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WORK PLAN AND SITE HEALTH AND SAFETY PLAN LUST INVESTIGATION TO
CORRECTIVE ACTION PLAN BUILDING 1600 A OLD PWC GAS STATION NS GREAT
LAKES IL
6/1/1999
TOLTEST, INC

**WORK PLAN AND
SITE HEALTH AND SAFETY PLAN**

**LUST INVESTIGATION TO
CORRECTIVE ACTION PLAN**

AT

**BUILDING 1600A (OLD PWC GAS STATION)
GREAT LAKES, ILLINOIS**

ENVIRONMENTAL JOB ORDER CONTRACT (EJOC)

CONTRACT NO. N68950-96-D-0052

DELIVERY ORDER NO. 0054



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SITE HEALTH AND SAFETY PLAN**

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CONTRACT NO. N68950-96-D-0052
DELIVERY ORDER NO. 0054
TOLTEST PROJECT NO. 37755.01**

Submitted to:

**Department of the Navy
Naval Training Center (NTC) – Environmental Department
Building 1-A, 201 Decatur Avenue
Great Lakes, Illinois 60088-5600**

Submitted by:

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TABLE OF CONTENTS

	<u>Page No.</u>
Executive Summary	i
PART I – WORK PLAN	1
1.0 Introduction	1
1.1 Site Description	2
1.2 Environmental Setting	2
2.0 Construction Equipment, Tools, and Personnel	4
3.0 Construction Sequence and Operational Approach.....	5
3.1 Permitting and Notification	5
3.2 Mobilization and Site Set-up	5
3.3 Drilling Activities	6
3.4 Free-Product Recovery	9
3.5 Elevation Survey & Groundwater Gauging	9
3.6 In Situ Hydraulic Conductivity Tests.....	9
3.7 Well Purging/Sampling	10
3.8 Specific Sampling and Laboratory Analysis	10
3.8.1 Field Screening Methodology	10
3.9 Corrective Action Plan Preparation	11
4.0 Chemical Data Acquisition	13
5.0 Environmental Protection.....	19
6.0 Project Quality Control	21
7.0 Reporting Requirements.....	23
8.0 Schedule.....	24

TABLE OF CONTENTS (Continued)

	<u>Page No.</u>
PART II – SITE HEALTH AND SAFETY PLAN	1
1.0 Introduction	1
2.0 Applicability	2
3.0 Site Safety and Health	3
3.1 Key Personnel	3
3.2 Personal Protective Equipment	3
3.3 Site Control Measures	5
3.4 Site Standard Operating Safety Procedures	5
3.5 Site-Specific Respiratory Protection	6
3.6 Material Safety Data Sheets (MSDS)	7
4.0 Accident Prevention	8
4.1 Daily Safety Inspections	8
4.2 Accident Reporting	8
4.3 Drilling Safety	8
4.3.1 Site Preparation and Layout	9
4.3.2 Soil Borings/Monitoring Wells	10
5.0 Emergency Response	12
5.1 Work Zones and Evacuation Procedures	12
5.2 Decontamination	12
5.3 Emergency Medical Treatment and First Aid	13
5.3.1 Cold Stress	13
5.3.2 Heat Stress	15
5.4 Emergency Alerting and Response Procedures	17
5.5 Spill and Discharge Control	18

LUST Investigation to Corrective Action Plan
Building 1600A, GLNTC, EJOC DO #0054

Work/Health & Safety Plan
October 1999 (revised)

TABLE OF CONTENTS (Continued)

- APPENDIX A - Site Map
- APPENDIX B - Temporary Permit
- APPENDIX C - Disposal Facility Certifications
- APPENDIX D - Tier I Industrial/Commercial Remediation Objective Tables
- APPENDIX E - Time Line
- APPENDIX F - Material Safety Data Sheets
- APPENDIX G - Incident Forms
- APPENDIX H - Activity Hazard Analysis
- APPENDIX I - Hospital Location Directions
- APPENDIX J - Photoionization Detector Field Screening

LIST OF TABLES (PART I)

- Table 1 - Equipment, TolTest Personnel, Subcontractors
- Table 2 - Sampling & Analysis
- Table 3a - Tier 1 Soil Remediation Objectives for Residential Properties
- Table 3b - Tier 1 Soil Remediation Objectives for Industrial/Commercial Properties
- Table 3c - Tier 1 Groundwater Remediation Objectives
- Table 4 - Sample Holding Times, Container Types, Preservation

LIST OF TABLES (PART II)

- Table 1 - Chemical Hazards of Concern
-

LUST Investigation to Corrective Action Plan
Building 1600A, GLNTC, EJOC DO #0054

Work/Health & Safety Plan
October 1999 (revised)

LIST OF ACRONYMS

AHA	Activity Hazard Analysis
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CAP	Corrective Action Plan
CFR	Code of Federal Regulations
COCs	Chemicals of Concern
COR	Contracting Officers Representative
COTR	Contracting Officer's Technical Representative
DO	Delivery Order
DOT	Department of Transportation
EJ&E	Elgin, Joliet, and Eastern Railway
EPA	Environmental Protection Agency
FAR	Federal Acquisition Regulation
GC	Gas Chromatograph
HASP	Health and Safety Plan
HES	Heritage Environmental Services
IAC	Illinois Administrative Code
ID	Inside Diameter
IDW	Investigative Derived Waste
IEPA	Illinois Environmental Protection Agency
JULIE	Joint Utility Locating Information for Excavators
LUST	Leaking Underground Storage Tank
MSDS	Material Safety Data Sheets
MTBE	Methyl Tertiary Butyl Ether
NTC	Naval Training Center
OSFM	Office of the State Fire Marshal
OSHA	Occupational Safety and Health Administration
PCBs	Polychlorinated Biphenyls
PID	Photoionization Detector
PNAs	Polynuclear Aromatics
PPE	Personal Protective Equipment
PWC	Public Works Center
QA/QC	Quality Assurance/Quality Control

**LUST Investigation to Corrective Action Plan
Building 1600A, GLNTC, EJOC DO #0054**

**Work/Health & Safety Plan
October 1999 (revised)**

LIST OF ACRONYMS, continued

QCR	Quality Control Representative
RCRA	Resource Conservation and Recovery Act
SSHO	Site Safety and Health Officer
SVOCs	Semi-Volatile Organic Compound
TACO	Tiered Approach to Corrective Action Objectives
TCLP	Toxicity Characteristic Leaching Procedure
USDOT	United States Department of Transportation
USGS	United States Geologic Survey
UST	Underground Storage Tank
USEPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds

LUST Investigation to Corrective Action Plan
Building 1600A, GLNTC, EJOC DO #0054

Work/Health & Safety Plan
October 1999 (revised)

Executive Summary

TolTest, Inc. has been retained by the Department of the Navy, Naval Facilities Engineering Command under Contract No. N68950-96-D-0952, Delivery Order (DO) No. 0054 to conduct an additional leaking underground storage tank (LUST) investigation at Building 1600A, Naval Training Center (NTC), Great Lakes, Illinois. Heritage Environmental Services, Inc. (HES) submitted a LUST 45-Day/Site Classification Completion Report and LUST Investigation/Remediation Report in May 1998. This plan is divided into two parts, Part I - Work Plan, and Part II - Site Health and Safety Plan.

Included in this work plan are soil borings/well installations for groundwater monitoring and free product recovery (if needed), sampling procedures, and disposal facility permit/insurance. The installation of a recovery well and free product recovery will only be performed should confirmatory drilling indicate the presence of enough product to recover by passive measures.

Contaminants of concern include benzene, toluene, ethylbenzene, and xylenes (BTEX), methyl tertiary butyl ether (MTBE), polynuclear aromatics (PNAs), total lead and synthetic precipitate leaching procedure (SPLP) lead. MTBE recently became a concern with the IEPA regarding groundwater contamination and will soon be added to the list of LUST regulations.

The objective of this Work Plan is to ensure that the investigative data are sufficient in quality and quantity to adequately describe the nature and extent of subsurface soils and groundwater conditions. The results and data from all site investigations will be organized and presented accordingly as per IEPA requirements. A Corrective Action Plan (CAP) will be compiled and presented to the Navy following completion of all site investigation activities and laboratory testing. The CAP will address the methods and procedures used during the investigation

This Work Plan will be reviewed and approved by the Contracting Officers Technical Representative (COTR) prior to the start of any work.

PART I – WORK PLAN

1.0 Introduction

This Work Plan outlines the procedures that will be utilized for 1) the installation of five groundwater monitoring wells, 2) hydrogeological characterization, 3) the installation of a free-product recovery well (if needed), 4) groundwater monitoring, 5) passive free-product recovery, if needed, and 6) recommendations for corrective actions of the site. The site is the former PWC gasoline station located at Building 1600A between Iowa and Ray Streets, NTC, Great Lakes, Illinois. Exact location of the site can be found on the site map located in Appendix A.

The purpose of this LUST Investigation to Corrective Action Work Plan is to obtain additional hydrogeologic information and current laboratory analyses. Heritage Environmental Services, Inc. (HES) submitted a LUST 45-Day/Site Classification Completion Report and LUST Investigation/Remediation Report in May 1998. The HES report detailed UST closure activities, piping removal, impacted soils removal, and soil boring activities.

The LUST Investigation to Corrective Action Work Plan will be conducted in accordance with Illinois Environmental Protection Agency (IEPA) and Office of the State Fire Marshal (OSFM) regulations including 35 IAC parts 732, and 742 and United States Environmental Protection Agency (USEPA) Underground Storage Tank Regulations 40 CFR 280.71. This could include, but is not limited to, the following tasks:

1. Install ground-water monitoring wells;
2. Install free-product recovery well (if needed);
3. Evaluate and characterize soil and ground water according to Federal and State regulations;
4. Restore the site area;
5. Remove and dispose of contaminated auger cuttings;
6. Remove and dispose of contaminated development/purge water;
7. Transport, and recycle, treat or dispose of other wastes generated during project;
8. Environmental documentation and reporting to the IEPA and the OSFM;
9. Environmental documentation and reporting to the Navy Point of Contact.

**LUST Investigation to Corrective Action Plan
Building 1600A, GLNTC, EJOC DO #0054**

**Work/Health & Safety Plan
October 1999 (revised)**

1.1 Site Description

Building 1600A is located at the Great Lakes NTC, Lake County, Illinois. The site is located in the SE quarter of the NW quarter of the SE quarter of Section 5, Township 44 North, Range 12 East. The facility was utilized as a fueling station for Navy vehicles until 1972 when it was used by PWC motor pool until 1997. The building was constructed in the 1950's along with two 10,000-gallon steel USTs and steel distribution piping. In 1974, the steel USTs were replaced with two 10,000-gallon fiberglass gasoline tanks and one 6,500-gallon fiberglass diesel tank. These USTs and distribution piping were removed in 1997. A north-south railroad right-of-way transects the detected subsurface hydrocarbon plume to the east of the former UST location.

1.2 Environmental Setting

The HES report identified the surface geology at the site as part of the Lake Border Moraines of the Wadsworth Till Member of the Wedron Formation. The Wedron Formation generally consists of silty and clayey diamictons and is predominately till with interbedded deposits of waterlaid gravel, sand and silt.

The contaminants of concern are BTEX, MTBE, PNAs, total lead and SPLP lead as per 35 IAC Section 732.310 (b) and (c) since historically, the USTs contained leaded gasoline and diesel fuel. Benzene was detected in soil borings from within the Elgin Joliet and Eastern (EJ&E) Railway right-of-way and adjacent to the Navy-owned Iowa Street. MTBE recently became a concern with the IEPA regarding groundwater contamination and will soon be added to the list of LUST regulations.

With the exception of benzene, the soil sample laboratory results indicate the petroleum constituents were generally below the IEPA Tier 1 Site Remediation Objectives for the ingestion, inhalation and migration to groundwater routes of exposure for Industrial-Commercial Property uses. Initial evaluation of data from this investigation will be compared to Tier I, Class I Groundwater Residential standards and then to the most viable alternative if the initial approach is not acceptable.

The setting is commercial/ industrial judging by the manufacturing businesses in close proximity to the site. The EJ&E apparently dissects part of the soil and groundwater plume as previously characterized by HES in 1997. Clearly this site is not residential,

**LUST Investigation to Corrective Action Plan
Building 1600A, GLNTC, EJOC DO #0054**

**Work/Health & Safety Plan
October 1999 (revised)**

however the laboratory results will be evaluated in the context most conducive to closure and in keeping with the Navy's objectives and planned future use for the site.

Previous field gas chromatograph (GC) analysis conducted in 1997 indicates soil concentrations in excess of Tier 1 levels for ingestion/migration to Class I or Class II groundwater in soil at IPS 7 (for toluene, ethylbenzene & xylene), IPS 8 (toluene) IPS 14 (ethylbenzene) and nine other locations (for benzene only). The IPS locations are presumed to correlate to the boring locations indicated as shown on Figure 3 of the previously prepared HES report.

Inhalation standard are less stringent than the leaching/groundwater migration standard, therefore, the leaching/groundwater migration standard will drive the clean up.

LUST Investigation to Corrective Action Plan
 Building 1600A, GLNTC, EJOC DO #0054

Work/Health & Safety Plan
 October 1999 (revised)

2.0 Construction Equipment, Tools, and Personnel

This section details the equipment and personnel to be utilized during this project. ToITest personnel will be utilized for the additional LUST investigation as well as sampling and field screening of soil.

Personnel assigned to this project may change if needed to efficiently complete all tasks defined in this work plan. Any personnel changes will be with comparable ToITest personnel. ToITest personnel will coordinate the use of sub-contractors. Table 1 depicts the equipment, ToITest personnel, and subcontractors, which will be utilized to complete this project.

TABLE 1		
Equipment	ToITest Personnel	Subcontractors
Truck PID/FID detector Drill rig Support truck Assorted hand tools Generator Data logger and pressure transducer Water level indicator Geoprobe rig	Robert R. Beckwith, PG Principal Hydrogeologist/Project Manager Jeffrey M. Tinney Health & Safety Officer Timothy A. Boos Geologist, QA/QC Officer Neil Wiktor Driller Jay Leonard Driller	American Waste Processing Terra Probe

3.0 Construction Sequence and Operational Approach

The construction sequence and operational approach are defined in the following sections.

3.1 Permitting and Notification

Notification will be made to the facility caretaker and Joint Utility Locating Information for Excavators (JULIE) service 72 hours prior to drilling activities. Utility maps of the area surrounding the site will be examined. Caution will be used during soil boring activities, as exact placements of buried services may not be known. Should undocumented utilities be encountered, the Contracting Officer's Representative (COR) will be contacted immediately to facilitate relocations or possible interruptions. Interruptions of utility services will be kept to a minimum and will be at such times and duration as approved. No interruptions will occur, unless scheduled with the COR and approved in advance as to the time and duration of such interruptions:

ToITest obtained a "Temporary Permit to Enter Upon Property" from EJ&E. The permit is to gain access to the railway's right-of-way to conduct this soils and groundwater investigation. The EJ&E Chief Engineer, Dennis Ojard, PE, will be notified in writing at least 14 days in advance before entering upon or starting any work upon Railroad property.

A copy of the Temporary Permit is attached in Appendix B. Prior to mobilization, the scheduling of a EJ&E flagman will be discussed with Rick Weber, EJ&E, at (815) 740-6594. After a flagman is dispatched to the site, a final decision will be made if he is needed for the duration of the drilling activities.

A Pre-Construction meeting will be conducted on the site between the Government and ToITest along with any subcontractors prior to the start of any work. Details of the sequencing of work and site health and safety procedures will be reviewed.

3.2 Mobilization and Site Set-up

Upon mobilization of the crew and equipment, daily safety meetings will identify the work zones for drilling activities. The three general work zones, which will be established at the site, are the exclusion zone, contamination reduction zone, and support zone. The exclusion zone is defined as the area where contamination is either known or likely to be present, or because of activity, will provide a potential to cause harm to personnel. Entry into the

exclusion zone requires the use of personnel protective equipment. The exclusion zone will be situated around the drill rig and extend to at least 50 feet in diameter from the rear of the drill rig. The drill rig will be kept more than 15 feet from the rail of the nearest tracks.

The contamination reduction zone is the area where personnel conduct personal and equipment decontamination. It is essentially a buffer zone between contaminated areas and clean areas. The support zone is situated in clean areas where the chance to encounter hazardous materials or conditions is minimal. Personal protective equipment is therefore not required. Safe distances outside the exclusion zone and places of refuge are also outside the contamination reduction zone. During working and non-working periods, caution tape and traffic cones will be placed around the work area.

The Site Geologist will conduct air monitoring of each work area. Air monitoring measurements will be documented.

All investigative derived wastes (IDW) will be collected into USDOT-approved drums for disposal. Once the analytical results are received from the laboratory, TolTest will review and coordinate the proper disposal method with the Environmental Department Operations Manager, Mr. Devereaux. Mr. Devereaux will be notified two days prior to removing the waste from the site.

The American Waste Processing disposal facility uses its own internal chemical laboratory (as per their USEPA Permit to Operate under RCRA statutes) to analyze wastes before its acceptance for processing. Certifications for the disposal facilities can be found in Appendix C. Mr. Devereaux will be coordinated with for the review and signature of manifests. Parameters required by American Waste are listed in Table 2.

3.3 Drilling Activities

Drilling activities consists of installing nine soil borings and five monitoring wells at locations around the perimeter and within the identified subsurface plume. These monitoring wells will be used to assess groundwater quality within and around the plume; assess groundwater flow direction(s); and assess the hydraulic conductivity of the water-bearing zone. TolTest will be performing drilling activities with a geoprobe rig and drill rig under the direct supervision of a TolTest geologist.

LUST Investigation to Corrective Action Plan
Building 1600A, GLNTC, EJOC DO #0054

Work/Health & Safety Plan
October 1999 (revised)

The geoprobe rig will be used to install four small-diameter soil borings (one-inch diameter) approximately 15 to 20 feet west of the railroad tracks in the vicinity of HES soil boring B17. Direct push samplers with sample liners will be used to collect samples for visual inspections and soil classification, with attention to the possible occurrence of free product. Total depth of the geoprobe soil borings is estimated to be approximately 12 to 15 feet. A temporary one-inch diameter PVC screen will be placed in the geoprobe borings and visually inspected for any accumulation of free product with a small diameter teflon bailer. Upon completion of sampling and inspections, the small diameter soil borings will be backfilled with bentonite.

One free-product recovery well may be installed in the vicinity of HES soil boring location B17 if any of the four geoprobe soil borings near that location indicate the presence of free product as described in the HES report. Since no other location indicated the presence of free product, the B17 location is the most plausible location for a recovery well.

A truck-mounted drill rig will be utilized to advance the five large diameter soil borings. Figure 1 (Appendix A) depicts the locations of the soil borings/monitoring wells and recovery well. The borings will be advanced at least five feet into the apparent water table. Total depth is estimated to be approximately 12 to 15 feet. Contaminant transport mechanisms (groundwater movement) and pathways (zones of higher hydraulic conductivity) will be assessed to predict potential plume migration.

The soil boring for the recovery well will be installed last as to limit the possibility of cross-contamination of the drilling tools. This well will be advanced at least seven feet into the water table to accommodate a possible skimming system for free-product recovery.

Soil samples will be obtained continuously in soil borings utilizing 4¼" inside diameter (ID) hollow-stem auger methods. Standard penetration tests (ASTM D1586) will be performed utilizing 2" outside diameter split spoon sampler driven by a 140-pound drop hammer. The soil will be classified on boring logs indicating lithologic descriptions and Unified Soil Classified System descriptions, degree of sorting, sedimentary contacts, PID readings, etc. All soil cuttings will be placed in 55-gallon drums for disposal.

**LUST Investigation to Corrective Action Plan
Building 1600A, GLNTC, EJOC DO #0054**

**Work/Health & Safety Plan
October 1999 (revised)**

Monitoring wells will be constructed of 2-inch ID, schedule 40 flush joint PVC risers and screens. The recovery well will be constructed of 4-inch ID, schedule 40 flush joint PVC riser and screen. Ten feet of 0.010 slot screen and a sufficient length of riser will be placed in each boring. The screened interval will be installed as to intersect the apparent water table and to allow for potential seasonal fluctuations. Each well screen will be surrounded by a quartz sand filter pack with a bentonite seal, the remainder of the annulus will be back-filled with a cement/bentonite slurry. Well covers will be flush-mounted and will be concreted in place over the well casing.

Upon completion, the wells will be developed utilizing a teflon or PVC bailer to remove fines. Development and purge water will be containerized in USDOT-approved 55-gallon drums for disposal.

Drilling tools and augers will be decontaminated between borings with a pressurized steam cleaner. A temporary decon station, constructed of plastic sheeting bermed with lumber, will be established in the parking area adjacent to Building 1712 for soil borings west of the railroad tracks and in the lot area east of Iowa Street for soil borings east of the railroad tracks. Decon water will be pumped into USDOT-approved 55-gallon drums for disposal. The split spoon samplers will be cleaned by the following procedures;

- Washing with a non-phosphate detergent and potable water
- Rinsed with potable water
- Rinse with deionized/distilled water
- Air dry

Investigative derived wastes (IDW), including soil cuttings, and well development and purge water will be staged adjacent to Building 1600A until waste approvals are obtained from American Waste Processing Disposal Facility, Chicago, Illinois. All IDW drums will be properly labeled, manifested and transported to American Waste Processing. The American Waste Processing disposal facility uses its own internal chemical laboratory (as per their USEPA Permit to Operate under RCRA statutes) to analyze fluids before its acceptance for processing. Certifications for the disposal facilities can be found in Appendix B. Mr. Kelly Devereaux, Environmental Operations Manager, will be coordinated with for the review and signature of manifests.

LUST Investigation to Corrective Action Plan
Building 1600A, GLNTC, EJOC DO #0054

Work/Health & Safety Plan
October 1999 (revised)

3.4 Free-Product Recovery

If recoverable free product is found in the recovery well, a passive system will be installed in the well. A PetroTrap[™] skimmer will be deployed for the recovery. The system uses a floating collection canister without the need for electricity or air lines to the well. The skimmer will be checked daily and emptied, if needed, for one week. Data will be logged as to the amount of free product recovered. Subsequent visits to check the skimmer will be conducted weekly for one month. At that time, TolTest will confer with the Navy for the need to either continue or discontinue product recovery.

3.5 Elevation Survey & Groundwater Gauging

To help assess the apparent groundwater gradient, exact water level measurements will be made. Each monitoring well will be surveyed by a registered land surveyor to a United States Geological Survey (USGS) common site datum to a reference mark on the top of casing to the nearest 0.01 foot to determine relative elevations of the groundwater.

After the wells are developed and allowed to reach static equilibrium, water levels will then be taken with an electric water level indicator to an accuracy of 0.01 feet. From these measurements, groundwater contour maps will be constructed and the groundwater gradient and flow direction(s) can be assessed. Initial water level measurements will be recorded at least 48 hours after the monitoring wells are installed.

3.6 In Situ Hydraulic Conductivity Tests

Slug tests will be conducted on the five monitoring wells to calculate the hydraulic conductivity of the uppermost water-bearing zone. This test entails rapidly displacing a volume of water with a PVC bailer and measuring the rate of recharge towards static levels. Changes in water levels will be measured by a pressure transducer and recorded by a programmable hydraulic monitor.

The method developed by Bouwer and Rice (1976) will be used for calculating the hydraulic conductivity. This data will aid in assessing the transmissivity, rate of groundwater movement, and in assessing possible remedial actions. The pressure transducer and PVC bailer will be decontaminated following procedures previously outlined.

LUST Investigation to Corrective Action Plan
Building 1600A, GLNTC, EJOC DO #0054

Work/Health & Safety Plan
October 1999 (revised)

3.7 Well Purging/Sampling

Prior to collecting groundwater samples for analysis, each monitoring well will be purged of stagnant well casing water by bailing with a disposable bailer. Approximately three to five well volumes will be removed prior to sampling. The samples will be placed in EPA Level I approved glassware, labeled and placed in a cooler.

3.8 Specific Sampling and Laboratory Analysis

Site specific sampling procedures, sample preparation and handling, laboratory analysis, chain of custody procedures, and decontamination procedures will be performed in accordance with standard practices. Chemical analysis will be performed on selected soil samples (highest PID reading from each soil boring) and on water samples retrieved from each monitoring well. Soil and water samples will be analyzed for the parameters indicated on Table 2. Contaminants of concern include benzene, toluene, ethylbenzene, and xylenes (BTEX), methyl tertiary butyl ether (MTBE), polynuclear aromatics (PNAs), total lead and synthetic precipitate leaching procedure (SPLP) lead. MTBE recently became a concern with the IEPA regarding groundwater contamination.

Three soil and three groundwater sample will be analyzed for total lead and SPLP lead. The samples will be collected from the three proposed soil borings/monitoring wells near the fence line between the former UST excavation and the EJ&E railroad tracks.

Table 4 indicates the sample container, volume, preservation and holding times required by each analytical method. The samples will be analyzed in the laboratory on a maximum 48-hour turnaround basis.

Respirometer tests will be conducted on soil and groundwater samples to determine the activity of indigenous microorganisms, the approximate time for biodegradation, and the optimum combination of nutrients for possible corrective actions. Total organic carbon (TOC) analysis will be conducted on soil samples as part of the biodegradation study.

3.8.1 Field Screening Methodology Since SW846 Method 5035 is being used for volatile analyses, as soon as the split spoon sampler is opened, a disposable syringe will be used to collect the soil sample. The syringe will be inserted into the soil for a representative sample. Once the syringe is full, the sample will be inserted into a 40-ml

LUST Investigation to Corrective Action Plan
Building 1600A, GLNTC, EJOC DO #0054

Work/Health & Safety Plan
October 1999 (revised)

VOA vial, labeled and placed into a cooler for storage at 4 degrees C.

A photoionization detector (PID) headspace analysis will be performed for each soil sample collected. Soil from each sampling location/depth will be placed into two 16-ounce "Mason" jar for headspace screening. Appendix J contains the Field Operating Procedure to be followed for this procedure. The instrument's calibration log, located in the PID case, will be filled out for each calibration occurrence.

3.9 Corrective Action Plan Preparation

A Corrective Action Plan (CAP) will be compiled and presented to the Navy following completion of all site investigation activities and laboratory testing. The CAP will summarize the methods and procedures used during the HES and TolTest investigations, including the quality and quantity of data and the character of the contaminant plume. The objective of the CAP will be to describe the proposed methods of remediation with support criteria and an estimation of the costs to implement and close the site through corrective action. The CAP will be provided in a format consistent with IEPA guidance and regulations.

Class I groundwater standards will be used for corrective actions. The results of this LUST investigation will determine if Class II standards can be used. The Tier 1 Remediation Objectives for Residential uses will be used to compare the soil and groundwater samples from the soil borings and monitoring wells and aid in determining the status of the site. Residential objectives will be used at the perimeter of the railroad property, and Industrial-Commercial objectives will be used on the Navy property if Residential standards are not met. The Tier 1 Tables can be found in Appendix D.

Residential standards will be pursued in the corrective action implementation. The objective is to not have land control and usage restrictions imposed on the site and/or the EJ&E property.

LUST Investigation to Corrective Action Plan
Building 1600A, GLNTC, EJOC DO #0054

Work/Health & Safety Plan
October 1999 (revised)

TABLE 2
SAMPLING & ANALYSIS

Location	Number of Samples Collected	Number of Samples for Analysis	Parameters/ EPA Method SW 846
Soil Borings	3 from near source area	3	SPLP Lead 1312/7421 Total Lead 7421
	1 from each boring with highest PID reading or at the water table if PID=0.0 ppm	6	BTEX/MTBE 5035 PNAs 8100 TOC 9060 Respirometer
Monitoring Wells	3 from near source area	3	SPLP Lead 1312/7421 Total Lead 7421
	1 from each well	5	BTEX/MTBE 5035 PNAs 8100 Respirometer
Auger Cuttings	1 composite from drums of soil	1	TCLP Lead 1311/6010A Flash Point 1010 Paint Filter
Development/ Purge Water	1 composite from drums of water	1	

SPLP = Synthetic precipitate leaching procedure
PNA = Polynuclear aromatic hydrocarbons
MTBE = Methyl tertiary butyl ether
BTEX = Benzene, toluene, ethylbenzene, xylenes
TOC = Total organ carbon
TCLP = Total characteristic leachate procedure

4.0 Chemical Data Acquisition

This section identifies the locations and types of chemical data needed, the protocol to be employed to acquire and transport samples to the laboratory, and the quality assurance/quality control (QA/QC) methods to be employed to ensure accurate, precise, representative, and legally defensible data. ToITest will be responsible for properly sampling and transporting samples to the analytical laboratory, as well as the quality of all data produced.

ToITest's analytical laboratory is located at 1810 North 12th Street, Toledo, Ohio. ToITest is an USACE-certified laboratory for chemical analysis in support of the USACE Hazardous and Toxic Waste Program. All sampling activities will be performed according to protocols, specific to each parameter of interest, as promulgated by the USEPA. The Site Geologist will collect the samples for field screening and laboratory analysis.

The investigation will include the complete suite of analysis necessary for gasoline and diesel fuel tanks. The method detection limits for analysis will be lower than the Tiered Approach to Corrective Action Objectives (TACO) standards for Tier 1 Residential and for Industrial-Commercial Cleanup Standards and migration to groundwater standards [Section 742: Appendix B: Tables A,B&E]. Where possible, laboratory detection limits that meet Class I groundwater and Tier I Residential standards will be used. Tables 3a, 3b, and 3c depicts the detection limits and Tier 1 clean up objectives.

TABLE 3a
Tier 1 Soil Remediation Objectives for Residential Properties
Building 1600A, NTC, Great Lakes, Illinois

Target Analyte	Method Detection Limit mg/kg	Soil Contamination of the Groundwater Ingestion Exposure Rate value		Exposure Route Specific values for Soil	
		Class I mg/kg	Class II mg/kg	Ingestion mg/kg	Inhalation mg/kg
Benzene	0.010	0.03	0.17	22	0.8
Ethylbenzene	0.010	13	19	7,800	400
Toluene	0.010	12	29	16,000	650
Xylenes	0.010	150	150	160,000	410
MTBE	0.010	*	*	*	*
Acenaphthene	0.030	570	2,900	4,700	*
Anthracene	0.030	12,000	59,000	23,000	*
Benzo(a)anthracene	0.030	2	8	0.9	*
Benzo(b)fluoranthene	0.030	5	25	0.9	*
Benzo(k)fluoranthene	0.030	49	250	9	*
Benzo(a)pyrene	0.030	8	82	0.09	*
Chrysene	0.030	160	800	88	*
Dibenzo(a,h)anthracene	0.030	2	7.6	0.09	*
Fluoranthene	0.030	4,300	21,000	3,100	*
Fluorene	0.030	560	2,800	3,100	*
Indeno(1,2,3-c-d)pyrene	0.030	14	69	0.9	*
Naphthalene	0.030	84	420	3,100	*
Pyrene	0.030	4,200	21,000	2,300	*
Lead (soil in mg/kg)	0.600			400	*
Lead (SPLP in mg/l)	0.002	0.0075	0.10		

* Indicates no toxicity criteria available on Tier 1 Table

TABLE 3b
Tier 1 Soil Remediation Objectives for Industrial/Commercial Properties
Building 1600A, NTC, Great Lakes, Illinois

Contaminant	Method Detection Limit mg/kg	Soil Component of the Groundwater Ingestion Exposure Route Values		Exposure Route Specific Values for Soil			
		Class II		Industrial/Commercial		Construction Worker	
		Class I mg/kg	Class II mg/kg	Ingestion mg/kg	Inhalation mg/kg	Ingestion mg/kg	Inhalation mg/kg
Benzene	0.010	0.03	0.17	200	1.5	4,300	2.1
Ethylbenzene	0.010	13	19	200,000	400	20,000	58
Toluene	0.010	12	29	410,000	650	410,000	42
Xylenes	0.010	150	150	1,000,000	410	410,000	410
MTBE	0.010	*	*	*	*	*	*
Acenaphthene	0.030	570	2,900	120,000	*	120,000	*
Anthracene	0.030	12,000	59,000	610,000	*	610,000	*
Benzo(a)anthracene	0.030	2	8	8	*	170	*
Benzo(b)fluoranthene	0.030	5	25	8	*	170	*
Benzo(k)fluoranthene	0.030	49	250	78	*	1,700	*
Benzo(a)pyrene	0.030	8	82	0.8	*	17	*
Chrysene	0.030	160	800	780	*	17,000	*
Dibenzo(a,h)anthracene	0.030	2	7.6	0.8	*	17	*
Fluoranthene	0.030	4,300	21,000	82,000	*	82,000	*
Fluorene	0.030	560	2,800	82,000	*	82,000	*
Indeno(1,2,3-c-d)pyrene	0.030	14	69	8	*	170	*
Naphthalene	0.030	84	420	82,000	*	8,200	*
Pyrene	0.030	4,200	21,000	61,000	*	61,000	*
Lead (soil in mg/kg)	0.600			400	*	400	*
Lead (SPLP in mg/l)	0.002	0.0075	0.1				

* Indicates no toxicity criteria available on Tier 1 Table

TABLE 3c
Tier 1 Groundwater Remediation Objectives for the Groundwater
Component of the Groundwater Injection Route
Building 1600A, NTC, Great Lakes, Illinois

Target Analyte	Maximum Detection Limit mg/l	Groundwater Remediation Objective	
		Class I mg/l	Class II mg/L
Benzene	0.001	0.005	0.025
Ethylbenzene	0.001	0.7	1.0
Toluene	0.001	1.0	2.5
Xylenes	0.001	10.0	10.0
MTBE	0.001	*	*
Acenaphthene	0.01	0.42	2.1
Anthracene	0.01	2.1	10.5
Benzo(a)anthracene	0.01	0.00013	0.00065
Benzo(b)fluoranthene	0.01	0.00018	0.0009
Benzo(k)fluoranthene	0.01	0.00017	0.00085
Benzo(a)pyrene	0.01	0.0002	0.002
Chrysene	0.01	0.0015	0.0075
Dibenzo(a,h)anthracene	0.01	0.0003	0.0015
Fluoranthene	0.01	0.28	1.4
Fluorene	0.01	0.28	1.4
Indeno(1,2,3-c-d)pyrene	0.01	0.00043	0.00215
Naphthalene	0.01	0.025	0.039
Pyrene	0.01	0.21	1.05
Lead (SPLP in mg/l)	0.002	0.0075	0.10

* Indicates no toxicity criteria available on Tier 1 Table

During sampling activities, appropriate decontamination measures will be taken to minimize sample contamination from external sources such as sampling equipment or sample containers. These procedures will be consistent with those outlined in "Test Methods for Evaluating Solid Waste-Physical/Chemical Methods" (USEPA SW-846, 3rd. ed.). The sampling program established for this project includes provisions for generating the appropriate field QC samples to assure the effectiveness of the specific procedures employed in controlling external contamination.

All samples collected will be preserved according to USEPA protocols established for the parameters of interest. Appropriate measures will be taken to ensure that storage requirements with respect to temperature are maintained during transport to the laboratory and prior to log-in and storage at the laboratory. Table 4 summarizes sample preservation.

LUST Investigation to Corrective Action Plan
Building 1600A, GLNTC, EJOC DO #0054

Work/Health & Safety Plan
October 1999 (revised)

TABLE 4
SAMPLE PRESERVATION

PARAMETER	CONTAINER	VOLUME	PRESERVATION	HOLDING TIME
PNAs	Glass, Teflon lined lid	8 oz. Soil 40 ml. Liquid	Soil-cool to 4° C Water-HCl added to reduce pH below 2.0, cool to 4° C	14 days
BTEX/MTBE	Glass, Teflon lined lid	4 oz. Soil 40 ml. Liquid	Soil-cool to 4° C Water-as above, Cool to 4° C	14 days
TOC	Glass, Teflon lined lid	4 oz. Soil	Soil-cool to 4° C	28 days
Lead	Glass, Teflon lined lid	16 oz. Soil 400 ml. Liquid	Soil-cool to 4° C Water-HNO ₃ added to reduce pH below 2.0, cool to 4° C	6 months

Environmental samples will be transported to TolTest's laboratory via a next day carrier. Samples will be packaged and transported according to USEPA, Contracting Officer and USDOT regulations.

Samples will be collected, transported and received under strict chain-of-custody protocols consistent with procedures established by the USEPA for litigation-related materials. Upon receipt at the laboratory, the laboratory will provide a specific mechanism through which the deposition and custody of the samples are accurately documented during each phase of the analytical process.

All information pertinent to the environmental samples, including specific field collection data and laboratory observations will be recorded in permanently bound notebooks. The laboratory employs a specific information management system to assist in tracking the progress of each sample through the analytical process.

5.0 Environmental Protection

TolTest will provide and maintain environmental protection through the completion of this project. A pre-construction meeting will be held prior to the commencement of drilling activities to discuss the proposed environmental protection. The meeting will develop a mutual understanding relative to required reports and measures to be taken should there be a failure to provide adequate protection in an adequate and timely manner. Environmental protection will be provided to correct conditions that develop during drilling activities. TolTest's operations will comply with all Federal, State and local regulations pertaining to water, air, solid waste, hazardous waste and substances, oily substances and noise pollution.

TolTest will at all times be aware of and adhere to all Environmental Protection Policies in force at the Naval Training Center, Great Lakes, Illinois. Information will be obtained by referencing OPNAVINST 5090.1B and the NTC Hazardous Waste Management Plan. TolTest will maintain compliance at all times with 40 CFR 263, 264, and 265 as well as IL Title 35, Subtitle G, Sections 700-871.

Any hazardous waste created, used, or brought on Government property by TolTest will be TolTest's responsibility. Hazardous waste will be stored and transported in approved containers in accordance with 49 CFR 178. Wastes will be properly labeled with the proper shipping description, accumulation start date and generator information. Containers will be removed from the project site and stored and treated/disposed of in accordance with 40 CFR 263, 264, and 265 and IL Title 35 Sections 700 through 750.

Special measures will be taken to prevent oily or other hazardous substances from entering the ground, drainage areas, or local bodies of water. Environmental requirements for the prevention of any spills is contained in EPA Regulations on Oil Pollution Prevention, Title 40 CFR 112. For oil and hazardous substance spills that may be large enough to violate Federal, State, or local regulations, the Environmental Operations Manager will be notified immediately.

TolTest will preserve the integrity of the natural resources of the project area. This includes returning the site to its pre-construction conditions, insuring that the surrounding

area is not environmentally damaged in any way, and preventing the release of any hazardous substances into the surrounding air, land or water. Absorbent pads will be available at all times to clean and wipe up any small spills.

6.0 Project Quality Control

The overall management of the project including quality and production is the responsibility of the Project Manager, Mr. Robert Beckwith, PG. He has authority for signing changes, negotiating proposals, and signing pay requests. The Administration Manager, Mr. Ernest Enrique, P.E. has the same authority.

Project management techniques will be implemented to manage resources, control quality, and ensure safe and efficient execution of the project. The Project Manager is supported by the Site Geologist and technical staff, which provide guidance and technical advice before and during the execution of this DO. Members of the technical staff are called upon on an as-needed basis to assist with the project. The Health and Safety Officer and QC Officer are utilized to ensure the project is completed in a quality manner and safely executed in compliance with applicable laws, regulations, and policies.

The following section details the personnel to be utilized during this project and their respective responsibilities. The following key positions will be utilized:

Project Manager - The Project Manager, Mr. Beckwith, is the key operational manager of project activities and is responsible for; maintaining clear up-to-date communications with the Navy Point of Contact, coordinating all resources required to complete the project, ensuring subcontractor compliance with regulations, procedures and contractual requirements, controlling the project schedule and cost.

Health and Safety Officer - The Health and Safety Officer, Mr. Jeffry Tinney is responsible for site activities, site safety oversight, and project performance. Mr. Tinney reports directly to the Project Manager.

Site Geologist/Quality Control Officer - The Site Geologist/Quality Control Officer, Mr. Timothy Boos, is responsible for all QC activities related to this project including site activities, decontamination procedures, data validation, and report preparation. He is responsible for site activities and day-to-day management of the project, oversees the administrative and support functions of the project and maintains files for task execution. Mr. Boos reports to the Project Manager.

Technical Support Team - Technical support may be given to project personnel on an as needed basis. This team provides review and support for the reporting and regulatory requirements for contamination investigation and remediation alternatives. This team may include geologists, hydrogeologists, chemists, engineers, and transportation and disposal specialists.

7.0 Reporting Requirements

ToITest will have all field paperwork signed by a representative of each service location as proof of services upon completion of services for the day. ToITest will report to the Environmental Office for review and signature of field paperwork, signature of manifest and to deliver all Government copies of the paperwork to the Great Lakes Environmental Office, Building 1A, Naval Training Center, Great lakes IL. Failure to perform this function will invalidate services performed since proof of services cannot be verified.

ToITest will provide the COTR a report detailing all work performed, soil assessment, analytical results, site and vicinity maps, photographic documentation, copies of waste manifest, chain-of-custody, and recommendations for corrective actions.

8.0 Schedule

The work schedule will be ten-hour days, four days per week. The construction sequence will begin once approvals and all necessary permits and notifications have been received. Drilling activities, hydrogeological testing, and sampling will be completed within 30 days of work plan approvals.

The work will be conducted in such a manner as to cause the least interference with the normal functions of the site and surrounding area. Portions of the site will be vacated for periods of time as necessary for ToITest to perform certain work and stage equipment and materials. Prior to beginning any work ToITest will meet with the Commanding Officer to approve the site requirements, schedule, and sequence of work. A copy of the Time Line can be found in Appendix E.

PART II – SITE HEALTH AND SAFETY PLAN

1.0 Introduction

ToITest is responsible for the safety, health and emergency response provisions for each DO for this contract. These provisions are provided through the development and implementation of ToITest's Corporate Health and Safety Plan and this Site Health and Safety Plan (HASP). All personnel on site, contractors and subcontractors included, will be informed of this plan and any potential health and safety hazards of the operation.

2.0 Applicability

This plan will be followed during all site activities starting with site mobilization through and including site demobilization. This plan incorporates the requirements of the following regulations and/or appropriate guidance:

- Federal Acquisition Regulation (FAR) clause 52.236-13, Accident Prevention,
- OSHA Construction Industry Standards, 29 CFR 1926,
- OSHA General Industry Standards, 29 CFR 1910 (including but not limited to 29 CFR 1910.120, Hazardous Waste Site Activities),
- NIOSH/OSHA/USCG/EPA, Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities,
- 40 CFR Parts 280, 281, 263-265, and IL Title 35 Section 700 through 750
- 49 CFR Part 178
- OPNAVINST 5090.1B and the base Hazardous Waste Management Plan
- American Petroleum Institute Recommended Practice, API 1604, API Publication 2015,
- Other applicable Federal, State, and local safety and health requirements.

3.0 Site Safety and Health

This section addresses the responsibilities for safety and health oversight, personnel protective equipment, site specific control measures and operating procedures.

3.1 Key Personnel

The Site Safety and Health Officer (SSHO), for this DO, has the overall responsibility for ensuring that the provisions of this HASP are implemented in the field. The SSHO will be present during the period that heavy equipment is operating and will observe and record the activities. The SSHO is responsible for conducting daily tailgate safety meetings and site inspections to ensure the effectiveness of this plan. As field conditions change, decisions will be made regarding additional protective measures. Personnel assigned to this project are experienced and meet the supervisory training requirements specified by OSHA in 29 CFR 1910.120 as well as first aid and CPR training. The SSHO is also trained in accordance with the bloodborne pathogen regulation 29 CFR 1910.130. In the event the SSHO becomes injured or impaired ToITest field personnel can render first aid and CPR.

3.2 Personal Protective Equipment

Personal protective equipment (PPE) is to be used by employees for each of the site tasks and operations being performed. The type of PPE will depend upon the level of potential exposure to hazards. Table 1 lists potential chemical hazards of concern. EPA Level D PPE is anticipated to be used for this project. Table 1 includes chemical hazards that may be found in gasoline and diesel fuel. ToITest personnel will be equipped at a minimum with the below mentioned PPE. If unexpected conditions arise and it is determined that respiratory protection is needed, Level D will be upgraded to EPA Level C. Level D may include:

- Working Uniform
- Tyvek suit (may be used pending site conditions)
- Boots/shoe, steel toe
- Hard hat
- Safety Glasses
- Hearing protection if noise level exceeds 85 dB
- Latex Gloves

TABLE 1
CHEMICAL HAZARDS OF CONCERN

Drilling/Soil Sampling

CONTAMINANT	TWA/IDLH	SOURCE/ CONCENTRATION	ROUTES OF EXPOSURE	MONITORING METHOD
BENZENE	TWA: 1.0 ppm IDLH: 500 ppm Ceiling Conc: 25.0 ppm	Surface soil, 0 to 5 ppm Liquids/sludge, 0 to 5 ppm	Inhalation Ingestion Contact Absorption	NIOSH: 1501 IP: 9.245 eV FLP: 12 F
TOLUENE	TWA: 200 ppm IDLH: 500 ppm Ceiling Conc: N/A	Surface soil, 0 to 5 ppm Liquids/sludge, 0 to 5 ppm	Inhalation Ingestion Contact Absorption	NIOSH: 1501 IP: 8.82 eV FLP: 40 F
ETHYL BENZENE	TWA: 100 ppm IDLH: 800 ppm Ceiling Conc: N/A	Surface soil, 0 to 5 ppm Liquids/sludge, 0 to 5 ppm	Inhalation Ingestion Contact Absorption	NIOSH: 1501 IP: 8.76 eV FLP: 55 F
XYLENE	TWA: 100 ppm IDLH: 900 ppm Ceiling Conc: N/A	Surface soil, 0 to 5 ppm Liquids/sludge, 0 to 5 ppm	Inhalation Ingestion Contact Absorption	NIOSH: 1501 IP: 8.56 eV FLP: 63 F
NAPHTHALENE	TWA: 10 ppm IDLH: 250ppm Ceiling Conc: N/A	Surface soil, 0 to 5 ppm Liquids/sludge, 0 to 5 ppm	Inhalation Ingestion Contact Absorption	NIOSH: 1501 IP: 8.12 eV FLP: 174 F
LEAD	TWA: 0.005 mg/m ³ IDLH: 100 mg/m ³ Ceiling Conc: N/A	Surface soil, 0 to 5 ppm Liquids/sludge, 0 to 5 ppm	Inhalation Ingestion Contact Absorption	

NOTE: Other PNA compounds not listed in OSHA or NIOSH concentration limits

3.3 Site Control Measures

Control procedures will be implemented to prevent unauthorized access to the work area. Safety cones and caution tape will be utilized around the work area. The SSHO will ensure that all personnel entering the site have the necessary training and medical approval documentation. Personnel entering the site will be given a thorough briefing on the site hazards and safe work procedures prior to proceeding. This safety meeting will be conducted on a daily basis and be documented. The topics of discussion will include potential physical and chemical hazards involved in tank removal work activities. The corporate Health & Safety Manual will be used as a reference to discuss in detail the pertinent topics that are applicable for each days work activities.

All visitors will be expected to comply with applicable regulatory OSHA requirements as well as the requirements of this HASP. Visitors will also be expected to provide their own protective equipment. In the event that a visitor does not adhere to the provisions of the HASP, they will be requested to leave the work area. All non-conformance incidents will be recorded in the site log. The SSHO will document a written record of all personnel entering and exiting the site.

3.4 Site Standard Operating Safety Procedures

The following safety rules will be adhered to during all site activities:

- At least one copy of this plan will be available at the project site, in a location readily available to all personnel, including visitors.
- Personnel should practice contamination avoidance. All liquid, sludge, and soil samples will be collected in such a manner to minimize contact or exposure to the materials being sampled.
- No food or beverages shall be present or consumed in the work area.
- No tobacco products shall be used on the project site.
- No alcohol or drugs shall be present or consumed on site, or in any company vehicle. No personnel will be permitted to work while under the influence of alcohol or drugs

while on site or operating a company vehicle.

- Emergency equipment will be located in the company vehicle in a readily accessible location. Emergency equipment will consist of fire extinguishers, first aid kit, and mobile telephone.

- Visual contact shall be maintained between crew members at all times, and crew members must observe each other for signs of exposure to chemical, biological, or physical agents. Indications of adverse effects include, but are not limited to:
 - Changes in complexion and skin coloration;
 - Changes in coordination;
 - Changes in demeanor;
 - Excessive salivation and pupillary response; and
 - Changes in speech pattern.

- All personnel shall inform their partners or team members of non-visible effects of overexposure to chemical, biological, or physical agents. Symptoms of overexposure may include:
 - Headaches;
 - Dizziness;
 - Nausea;
 - Blurred vision;
 - Cramps; and
 - Irritation of the eyes, skin, or respiratory tract.

3.5 Site-Specific Respiratory Protection

During this project petroleum containing liquids/sludges are being removed and petroleum impacted soil may be excavated. This may pose an inhalation hazards at the site. It is anticipated that respiratory protection will not be needed. If respiratory protection is deemed necessary, work will stop until the situation is assessed. The selection of respirators as well as any decisions regarding upgrading or downgrading of respiratory protection will be made by the SSHO.

3.6 Material Safety Data Sheets (MSDS)

The only known hazardous materials anticipated on site include unleaded gasoline, diesel fuel, various oils and lubricants, and liquids/soils contaminated by these petroleum products. MSDS' are included in Appendix F.

4.0 Accident Prevention

This section includes a description of the work activity, probable hazards related to the work, and proactive precautionary measures that will be taken for safeguarding against and minimizing or eliminating each particular hazard. In addition, daily safety inspections, accident reporting, and liquid/soil handling safety are discussed in the following paragraphs.

4.1 Daily Safety Inspections

All machinery and equipment will be inspected daily by the Site Supervisor/ SSHO to ensure a safe operating condition. Inspections will be in accordance with the manufacturer's recommendations and will be documented. Records of inspections will be maintained at the site, will be made available upon request, and will become part of the project file.

In addition to daily inspections, the Health & Safety Officer will conduct a daily safety meeting. The Health & Safety Officer will discuss safety topics relevant to the hazards involved in that day's work. All employees and visitors will sign and sign the safety-log which documents the topics of discussion. The safety-log will be submitted to the COTR with the Contractor Quality Control Reports on a weekly basis.

4.2 Accident Reporting

All reporting and record keeping requirements will be adhered to. ToITest's forms will be completed for all incidents including personal injury reports, safety incident reports, equipment damage reports, and vehicle accident reports. All reports will be submitted to the Navy representative within 24 hours of any accident. Copies of these forms are included in Appendix G.

4.3 Drilling Safety

Drilling work will not commence until ToITest has contacted the EJ&E, utility companies (gas, electric, telephone, and pipeline) and determined locations of any underground or overhead utilities. Clearances to adjacent overhead transmission and distribution electrical lines will be sufficient for the movement of vehicles and operation of construction equipment. The requirements stated in OSHA 29 CFR 1926 General Construction Industry Standard and the National Electric Safety Code will be followed by ToITest.

All drilling activities, hydrogeological studies, and sampling activities will be carried on in such a manner so as not to interfere with EJ&E property and operations. A flagman will be used, if conditions warrant at any time, for worker's protection during the implementation of this LUST investigation. If equipment or material is to be transported across the tracks, the flagman will provide the necessary safety and protection.

During periods when the work site is unoccupied (i.e., overnight, weekends and other similar off periods) barricades will be placed around the excavation site in such a manner to alert personnel to the danger and prevent them from entering the work area.

Listed below is a description of each task/operation in terms of the definable features associated with the major phase of work. The protective measures to be implemented during completion of those operations are identified in the activity hazard located in Appendix H. Activity Hazard Analyses (AHA) have been developed for:

- Site Preparation and Layout.
- Soil Borings/Monitoring Wells
- Soil Sampling
- Equipment Decontamination

The anticipated hazards are identified for each task, followed by hazard prevention measures.

4.3.1 Site Preparation and Layout

Hazards:

- Exposure to biological hazards and wildlife such as snakes, other animals, insects, poisonous plants and buried sharp objects.
- Slips, trips and falls.
- Back strain due to carrying equipment.
- Driving vehicles on uneven or unsafe surfaces can result in accidents due to overturned vehicles.

- Thermal stress.

Hazard Prevention Measures

- Wear long sleeved clothing and slacks to minimize contact with irritant and toxic plants and to protect against insect bites. Appropriate first aid for an individuals' known allergic reactions.
- Avoid wildlife when possible. In case of an animal bite, perform first aid and obtain medical treatment if necessary. Perform a tick check after leaving a wooded or vegetated area.
- Be alert and observe terrain while walking to minimize slips and falls. Steel-toed boots provide additional support and stability.
- Use proper lifting techniques to prevent strains.
- Ensure all maintenance is performed on vehicles before going to the field. A site surveillance on foot might be required to choose clear driving paths.
- Implement thermal stress management techniques identified in Section 3.

4.3.2 Soil Borings/Monitoring Wells

Hazards:

- Noise levels exceeding the OSHA PEL of 90 decibels (dB) are both a hazard and a hinderance to communication. Exposure above the PEL may result during operation of the drill rig.
- Struck by flying particles or contact with moving parts of equipment; e.g., auger, belts, gears may cause injury.

Moving the drill rig over uneven terrain may cause the vehicle to roll over or get stuck. Be aware of hazards associated with moving heavy machinery and other associated injury.

High pressure hydraulic lines and air lines used on drill rigs are hazardous when they are in need of repair or incorrectly assembled. These present "struck by" type of hazards.

Contact with underground/overhead utility lines. These present electrocution type of hazards

Hazard Prevention Measures

Wear proper PPE as specified. Hard hats, safety glasses and safety shoes must be worn at all times when working around a drill rig. Secure loose clothing. Wear hearing protection when operating the drill rig.

Keep a safe distance from the augers keeping all guards in place.

Block all wheels; level the rig; make sure outriggers are extended prior to drilling.

All chains, high pressure lines, and cables should be inspected prior to drilling and daily for weak spots, frays, etc.

Locate and mark all utility lines before drilling.

Maintain minimum 20 feet from overhead utility lines during the drilling operation.

To avoid possible contact with overhead utility lines, the drill rig boom must be lowered prior to moving the rig. Overhead utilities should be considered "live" until determined otherwise.

No drilling will occur during impending electrical storms, tornadoes, or when rain, ice, or snow creates a work hazard.

5.0 Emergency Response

ToTest will implement an emergency response and contingency procedures, in accordance with OSHA standards 29 CFR 1910.120(L). This section addresses work zones and drilling procedures, decontamination, emergency medical treatment, emergency response procedures, spill and discharge control.

5.1 Work Zones and Evacuation Procedures

Daily safety meetings will identify the work zones for construction activities. The three general work zones established at the site are the exclusion zone, contamination reduction zone, and support zone. The Exclusion Zone is defined as the area where contamination is either known or likely to be present, or because of activity, will provide a potential to cause harm to personnel. Entry into the exclusion zone requires the use of personnel protective equipment. Barricades will surround this zone.

The contamination reduction zone is the area where personnel conduct personal and equipment decontamination. It is essentially a buffer zone between contaminated areas and clean areas. The support zone is situated in clean areas where the chance to encounter hazardous materials or conditions is minimal. Personal protective equipment is therefore not required. Safe distances are outside the exclusion zone and places of refuge are outside the contamination reduction zone.

In the event of an emergency, which necessitates evacuation of the site, all personnel will be expected to leave the work zone, and mobilize at a safe distance, in an area using the designated evacuation routes. Personnel will remain at that area until the SSHO provides further instructions.

5.2 Decontamination

All site personnel should minimize contact with contaminants to minimize the need for extensive decontamination. The SSHO is responsible for monitoring decontamination procedures and determining their effectiveness. Sampling equipment will be decontaminated by first washing withalconox and water (or equivalent laboratory grade soap) triple rinsing with water and then allowed to air dry. Heavy equipment will be cleaned with a pressurized steam cleaner and detergent upon completion of work activities.

5.3 Emergency Medical Treatment and First Aid

There are no anticipated hazards expected on site, which require specific medical attention or protocols. All TolTest employees participate in TolTest's medical screening and surveillance programs. If an injury/illness or exposure occurs, employees must seek medical attention immediately. All TolTest field personnel are trained in first aid and CPR and can administer immediate assistance.

5.3.1 Cold Stress - Cold and/or wet environmental conditions can place workers at risk of cold-related illness. Hypothermia can occur whenever temperatures are below 45°F. The principal cause of hypothermia in these conditions usually involves the loss of insulating properties of clothing due to moisture; heat loss due to increased air movement, and evaporation of moisture on the skin.

Frostbite, the other illness associated with cold exposure, is the freezing of body tissue which ranges from superficial freezing of surface skin layers to deep freezing of underlying tissue. Frostbite will only occur when the ambient temperatures are below 32°F. The risk of frostbite increases as the temperature drops and the wind speed increases.

Most cold-related worker fatalities have resulted from failure to escape low environmental air temperatures, or from immersion in low temperature water. The single most important aspect of life-threatening hypothermia is a drop in the deep core body temperature.

Site workers should be protected from exposure to cold so that the core body temperature does not fall below 98.6°F. Lower body temperatures will very likely result in reduced mental alertness, reduction in rational decision making, or loss of consciousness with the threat of fatal consequences. To prevent such occurrence, the following measures will be implemented:

- Site workers should wear warm clothing, such as gloves, heavy socks, etc., when the air temperature is below 45°F. Protective clothing, such as Tyvek or other disposable overall, may be used to shield employees from the wind.
- When the air temperature is below 32°F, clothing for warmth should include:

- Insulated suits, such as whole body thermal underwear
 - Wool socks or polypropylene socks to keep moisture off the feet
 - Insulated gloves
 - Insulated boots
 - Insulated head cover such as hard hat, winter liner, or knit cap
 - Insulated jacket, with wind and water resistant outer layer
- At air temperatures below 32°F, the following work practices must be implemented:
 - If a site worker's underclothing becomes wet, the worker must change into dry clothing immediately. If the clothing becomes wet from sweating (and the employee is uncomfortable), the employee may finish the task at hand prior to changing into dry clothing.
 - Site workers will be provided with a warm (65°F or above) break area.
 - The intake of caffeinated beverages should be limited, due to their circulatory and diuretic effects.
 - The buddy system shall be practiced at all times on site. Any site worker observed with severe shivering shall go to the heated break area.
 - Site workers should dress in layers, with thinner lighter clothing worn next to the body.

Frostbite. To administer first aid for frostbite, take the exposed employee indoors and rewarm the areas quickly in warm water that is between 102° and 105°F, for about 20 minutes or until the frozen tissue regains the original color. Provide warm drinks, but no coffee, tea, or alcohol. Keep the affected (frozen) tissue in warm water or covered with warm clothing for 30 minutes, even though the tissue may be very painful as it thaws. If present, do not allow blisters to be broken. Use sterile, soft dry material to cover the injured area, keep the patient warm and get medical attention.

- Do not rub the frostbitten part, additional damage may be done.
- Do not use heat lamps or hot water bottles to warm the frostbitten areas.
- Do not place the exposed part near a hot stove.

Hypothermia. Hypothermia is defined as a lowering of the core body temperature. General hypothermia, the more life-threatening cold injury, affects the entire body system. Once the body temperature is lowered to 95°F, thermal control is lost, and the body is no longer in thermal balance. A coma may occur when the core temperature reaches to below 95°F. Death can occur within two hours of the first signs and symptoms. The general symptoms of the hypothermia are usually exhibited in five stages:

- Shivering;
- Apathy, listlessness, sleepiness, and (sometimes) rapid cooling of the body;
- Unconsciousness, glassy stare, slow pulse, and respiratory rate;
- Freezing of the extremities; and
- Death.

Extremely low temperatures are not necessary to induce hypothermia—it can occur in temperatures as high as 65°F, depending on the wind chill factor. Wind increases the body's heat loss by dispersing layers of warm air trapped between layers of clothing and skin. This heat loss increases as the wind speed increases.

5.3.2 Heat Stress - Physical hazards may involve heat-related symptoms such as heat stress, heat cramps, heat exhaustion, or heat stroke. Heat stress is the aggregate of environmental and physical work factors that make up the total heat load imposed on the body. The environmental factors of heat stress include air temperature, humidity, radiant heat exchange, and wind/water vapor pressure (related to humidity). Physical work contributes to the total heat stress by producing metabolic heat in the body, proportional to the intensity of the work. Heavy physical labor can greatly increase the likelihood of heat fatigue, heat exhaustion, and heat stroke, the latter being a life threatening condition. Heat stress monitoring and observation of personnel may commence when the ambient temperature is 80 degrees F or above (65 degrees F, if chemical protective clothing is worn).

All employees will be informed of the possibility and symptoms of heat stress. If an employee experiences extreme fatigue, cramps, dizziness, headache, nausea, profuse sweating, or pale, clammy skin, the employee and the SSHO will take control measures. If the symptoms

do not subside after a reasonable rest period, the SSHO shall seek medical assistance.

To prevent heat stress, the following control measures will be implemented.

- Site workers will be encouraged to drink plenty of water throughout the day.
- On-site drinking water will be kept cool to encourage personnel to drink frequently.
- A work regimen that will provide adequate rest periods for cooling down will be established, as required.
- All personnel will be advised of the dangers and symptoms of heat stroke, heat exhaustion, and heat cramps.
- Employees should be instructed to observe and monitor themselves and coworkers for signs of heat stress and to take additional breaks as necessary.
- All breaks should take place in cool, well ventilated, and shaded rest areas.

Heat Cramps

Heat cramps are caused by heavy sweating and inadequate electrolyte replacement.

Symptoms include muscle spasms.

Heat Exhaustion

Heat exhaustion occurs from increased stress on various body organs. Signs and symptoms include:

- Pale, cool, moist skin
- Heavy sweating
- Dizziness, nausea
- Fainting

Heat Stroke

Heat stroke is the most serious form of heat stress and should always be treated as a medical emergency. The body's temperature regulation system fails and the body temperature rapidly rises to critical levels. Immediate action must be taken to cool the body before serious injury or death occurs. Signs and symptoms of heat stroke include:

- Red, hot, usually dry skin

- Lack of or reduced respiration
- Nausea
- Dizziness and confusion
- Strong, rapid pulse and confusion
- Coma
- Death

The differential diagnosis for heat stroke is the lack of sweating as the body's defense mechanisms for shedding excess heat fail.

5.4 Emergency Alerting and Response Procedures

All hazardous substance releases or spills involving Government waste or Government property, other than the original release, will be immediately reported to the Department of the Navy. Spill cleanup and remediation and damage to the environment resulting from TolTest actions will be the responsibility of TolTest.

Below are a list of emergency numbers, emergency service organizations and directions to the nearest hospital. A telephone is located inside the TolTest support truck.

Emergency Telephone Numbers

Naval Training Center Environmental Office	847-688-5999
Navy Hazardous Substance Response Team	847-688-3333
Great Lakes Fire Department, Emergency	847-688-3333
Great Lakes Police Department, Emergency	847-688-3333
Naval Hospital Ambulance Service	847-688-3333
Naval Hospital	847-688-4560
Secondary Fire Department, North Chicago	847-689-3121
Secondary Hospital, US Veterans Medical Center	847-688-1900
National Response Center, Coast Guard	800-424-8802
CHEMTREC Emergency Response	800-424-9300
Environmental Hotline	847-688-4197

A primary and secondary route to the hospital can be found in Appendix I.

5.5 Spill and Discharge Control

This section provides contingency measures for potential spills and discharges from the handling and transportation of any contaminated soil, contamination fluids, and/or oil/fuel. If a spill or discharge occurs, the following actions, at a minimum, will be taken:

1. Notify the Department of the Navy representative immediately.
2. Take immediate measures to control and contain the spill within the site boundaries. This will include, at a minimum, the following actions:
 - Keep unnecessary people away, isolate hazardous areas, and deny entry.
 - Do not allow anyone to touch spilled material.
 - Stay upwind; keep out of low areas where fluids and/or vapors may accumulate.
 - Keep combustibles away from the spilled material.
 - Use water spray or foam to reduce vapor or dust generation, as needed.
 - Take samples for analysis to determine that clean up is adequate.
 - Take other corrective measures, as needed.

A written report will be submitted to the Navy within seven days of a verbal report. The SSHO will conduct spill prevention briefings daily during safety meetings for all personnel who are involved with handling, receipt, storage, and/or cleanup of oil/fuel.

Storage - All tanks, containers, and pumping equipment used for the storage or handling of flammable and combustible liquids will be labeled or placarded in accordance with the US DOT. Oils or fuels temporarily stored will be kept in tightly sealed containers, with the exception of proper venting, in fire-resistant areas and at safe distances from ignition sources. All transfer vessels will be emptied at the end of the workday.

Pumping Flammable and Combustible Liquids - Flammable liquid pumping systems will be electrically bonded and grounded, and will be drawn from, or transferred into vessels, containers, or tanks through a closed piping system, from safety cans, by means of a device drawing through the top, or from a container, or portable tanks, by gravity or pump, through an approved self closing valve. Transferring by means of air pressure on the container or

portable tank is prohibited.

Equipment Inspection - Equipment inspection is part of the daily routine during field activities. The Site Supervisor is to ensure that no oil/fuel spill has accumulated in any area by conducting daily visual inspection of the equipment. Equipment and safety issues will be documented in the daily report.

APPENDIX A

Site Map

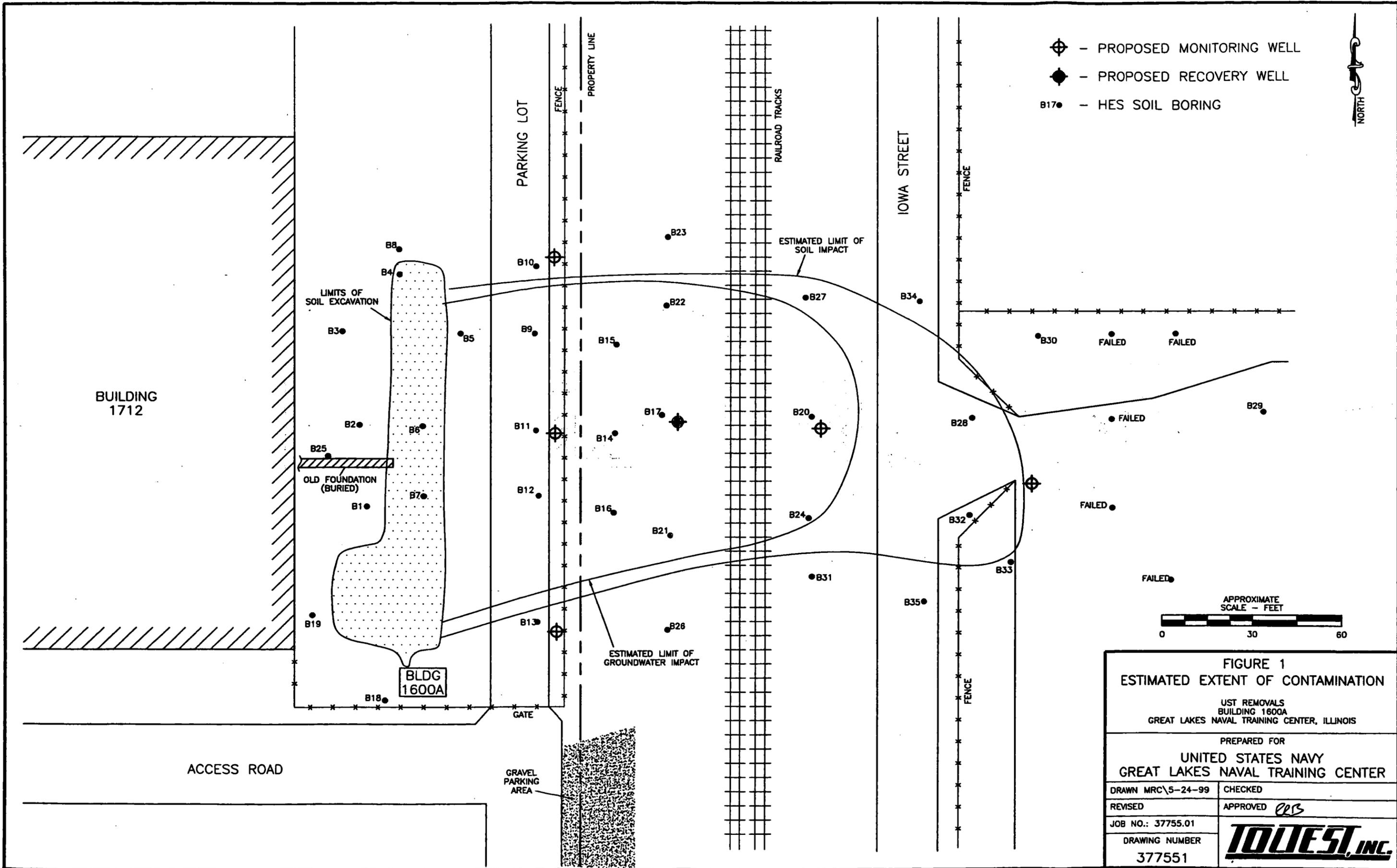


FIGURE 1 ESTIMATED EXTENT OF CONTAMINATION UST REMOVALS BUILDING 1600A GREAT LAKES NAVAL TRAINING CENTER, ILLINOIS	
PREPARED FOR UNITED STATES NAVY GREAT LAKES NAVAL TRAINING CENTER	
DRAWN MRC\5-24-99	CHECKED
REVISED	APPROVED <i>CRS</i>
JOB NO.: 37755.01	
DRAWING NUMBER 377551	

APPENDIX B

Temporary Permit

**EJ&E RAILWAY COMPANY
TEMPORARY PERMIT TO ENTER UPON PROPERTY**

PERMISSION is hereby granted this 19th day of OCTOBER, 1999 to TOLTEST, INC. hereinafter called "Permittee" to enter property of the EJ&E Railway, hereinafter called "Railroad", for the purpose of CONDUCTING SOIL BORINGS AND INSTALLING GROUNDWATER MONITORING WELLS in the County of _____ City of NORTH CHICAGO in the State ILLINOIS under the following terms and conditions:

1. **LOCATION AND ACCESS:** 100 FEET RAILROAD EAST OF THE SWITCH TO THE NORTH CHICAGO INDUSTRIAL AREA - NEAR RAY AND IOWA STREETS AT THE GREAT LAKES NAVAL TRAINING CENTER
2. **LIABILITY:** Permittee shall release, indemnify, defend, and save harmless the Railroad and any of its parent, subsidiary and affiliated companies, its or their directors, officers, employees, agents, contractors, subcontractors and suppliers (except Permittee and any of its agents, contractors, subcontractors and suppliers), from and against any and all detriment, damages, losses, claims, liabilities, demands, suits, costs or expenses, including counsel fees, which the Railroad may suffer, and become obligated to pay or sustain, or be subject to, directly or indirectly, for personal injury, death or property damage suffered by anyone whosoever (including Railroad and Permittee and their employees) and arising out of or caused either wholly or in part by reason of work performed on the Railroad's property by Permittee and/or his contractor, agents, employees, subcontractors and suppliers, regardless of the Railroad's fault or negligence. Permittee agrees that his use of the property and right of way of the Railroad will be in compliance and conformity with all applicable laws, ordinances, rules, regulations and requirements of all public authorities.
3. **CONSIDERATION:** Permittee will pay to the Railroad the sum of TWO HUNDRED AND FIFTY dollars (\$250) in partial consideration for the preparation of this permit.
4. **STARTING OF USE OF PROPERTY:** Permittee or his contractor shall notify in writing the Chief Engineer, or his designee, at least fourteen (14) days in advance before entering upon or starting any work upon Railroad property. No entry or use of Railroad property will be permitted until this permit is signed, charges thereunder paid, and written permission received from the Chief Engineer, D. R. Ojard. When requested, plans and/or a written description of the proposed work methods will be required. The permittee shall provide the following information for all contractors and subcontractors:

Name of Firm TolTest, Inc
 Home Office Address 1915 N 12th Street Toledo OH 43603
 Project Supervisor with Phone Number Robert Beckwith (419) 241-7175
 On-Site Contact Person with Phone Number Gary Koselsohn (847) 689-0697
 Subcontractor name _____
5. **SAFETY EQUIPMENT:** Each contractor employee, as a minimum, must wear a hard hat, steel toed safety boots with a minimum 8" height, safety glasses and other protective equipment as required for the task, e.g. gloves or respirator.
6. **RAILROAD OPERATIONS:** All operations shall be carried on in such a manner so as not to interfere with Railroad property and operations or the use of any Railroad facilities. If, in the opinion of the said Chief Engineer of the Railroad, or his designee, conditions warrant at any time, the Railroad will provide flag service and protection and/or engineering inspection at the expense of the Permittee, and Permittee agrees to pay to the Railroad the full cost and expense therefor.
7. **CROSSING TRACK:** In no event shall equipment or material be transported across a track or tracks without special written permission and with at least written notice of forty-eight (48) hours in advance, so that the Railroad may arrange for the necessary flag protection at the expense of the Contractor and Contractor agrees to pay to the Railroad the full cost and expense therefor. Such written permission shall be obtained from the said Chief Engineer of the Railroad or his designee.

-2-

8. **CLEARANCES:** All equipment working on or material in use upon the property of the Railroad shall be kept at all times not less than fifteen (15) feet from the nearest rail of any track, or as subsequently modified in writing by the said Chief Engineer or his designee. The Permittee and/or his contractor shall conduct his operations so that no part of his equipment shall foul an operated track, transmission, signal or communication lines, or any other structure of the Railroad.
9. **RESTORATION OF PREMISES:** Upon completion of the work, the Railroad's property shall be left in a condition satisfactory to the Railroad. This includes, without limitation, the restoration immediately of any fences removed.
10. **TERM OF PERMIT:** Unless subsequently modified or terminated, this permit shall extend until NOVEMBER 18, 1999 at which time it shall expire automatically. The Permittee agrees to notify, in writing, the Railroad when use of the property or work is completed. Under no circumstances shall this temporary permit be construed as granting the Permittee any; right, title or interest of any kind or character in, or about the land or premises of the Railroad.
11. **INSURANCE:** Permittee and his contractor shall furnish the Chief Engineer of the Railroad, or his designee, written evidence of his insurance coverage which must be in full force throughout this agreement. Said insurance shall be at the expense of permittee or contractor and shall be in compliance with the conditions described on exhibit attached.
12. **MODIFICATIONS IN WRITING ONLY:** Any modification, addition or deletion to this Agreement shall be in writing and signed by the parties thereto.
13. **ASSIGNABILITY:** Permittee shall not assign its rights and liabilities under this Agreement to another party without Railroad's written consent.
14. **SURVIVAL CLAUSE:** Termination of this Agreement, for whatever reason, shall not diminish or affect in any way any rights or obligations which accrued under this Agreement prior to such termination.
15. **SEVERABILITY:** Any terms within this Agreement which are adjudged or construed to be illegal, invalid or unconstitutional shall be stricken from the Agreement. The unaffected terms of this Agreement shall remain in effect as though the illegal, invalid or unconstitutional terms never were a part of this Agreement.
16. **ENTIRE AGREEMENT:** This written document represents the enter agreement and understanding of the parties. No prior terms, provisions, understandings, negotiations or promises are a part of this Agreement unless embodied herein.

To confirm your acceptance of the above conditions, please return both signed copies of permit to this office at One North Buchanan Street, Gary, Indiana 46402.

AGREED TO AND ACCEPTED:
TOLTEST, INC.

BY: Robert Barkhill

TITLE: Project Manager

DATE: 6/9/99

EJ&E RAILWAY COMPANY

BY: DR O'Neil

TITLE: Chief Engineer

DATE: 10/18/99

APPENDIX C

Disposal Facility Certifications

ACORD CERTIFICATE OF LIABILITY INSURANCE

CSR DW AMERWA1 DATE 03

PRODUCER

SCHIRER'S INCORPORATED
1023 West 55th Street
Countrydale IL 60525

James Scheer

Phone No. 708-352-6282 Fax No. 708-352-1201

INSURED American Waste Industries, Inc
American Waste Haulers, Inc.
American Waste Processing, Ltd
American Resource Recovery Inc
American Equipment Rental, Inc
P. O. Box 306
Maywood IL 60153

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.

COMPANIES AFFORDING COVERAGE

COMPANY A **Reliance National Indemnity**
COMPANY B
COMPANY C
COMPANY D

COVERAGES

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED, NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN. THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

CO LTR	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	LIMITS
	GENERAL LIABILITY <input type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS MADE <input type="checkbox"/> OCCUR <input type="checkbox"/> OWNER'S & CONTRACTOR'S PROT				GENERAL AGGREGATE PRODUCTS - COMP/OP AGG PERSONAL & ADV INJURY EACH OCCURRENCE FIRE DAMAGE (Any one fire) MED EXP (Any one person)
	AUTOMOBILE LIABILITY <input type="checkbox"/> ANY AUTO <input type="checkbox"/> ALL OWNED AUTOS <input type="checkbox"/> SCHEDULED AUTOS <input type="checkbox"/> HIRED AUTOS <input type="checkbox"/> NON OWNED AUTOS				COMBINED SINGLE LIMIT BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE
	GARAGE LIABILITY <input type="checkbox"/> ANY AUTO				AUTO ONLY - EA ACCIDENT OTHER THAN AUTO ONLY: EACH ACCIDENT AGGREGATE
	EXCESS LIABILITY <input type="checkbox"/> UMBRELLA FORM <input type="checkbox"/> OTHER THAN UMBRELLA FORM				EACH OCCURRENCE AGGREGATE
A	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY THE PROPRIETOR/ PARTNERS/EXECUTIVE OFFICERS ARE: <input type="checkbox"/> INCL <input type="checkbox"/> EXCL	NXC0135961-00	02/01/98	02/01/99	WC STATE INJURY LIMITS PER EMP EL EACH ACCIDENT \$ 1,000 EL DISEASE - POLICY LIMIT \$ 1,000 EL DISEASE - EA EMPLOYEE \$ 1,000
	OTHER				

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/SPECIAL ITEMS

CERTIFICATE HOLDER

SAM1001

SAMPLE CERTIFICATE

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING COMPANY WILL ENDEAVOR TO MAIL 30 DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE BUT FAILURE TO MAIL SUCH NOTICE SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE COMPANY, ITS AGENTS OR REPRESENTATIVES.

AUTHORIZED REPRESENTATIVE

JAMES SCHEER

AERD. CERTIFICATE OF LIABILITY INSURANCE

DATE 03/12/98

Amerson Group, Ltd.
 (610) 850 7887
 917 N Elm Street #200
 Illinois IL 60521

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW COMPANIES AFFORDING COVERAGE

- COMPANY A CNA Insurance Company
- COMPANY B
- COMPANY C
- COMPANY D

American Resource Recovery of Texas, LTD.
 P.O. Box 308
 Maywood IL 60153

COVERAGES: THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE COVERAGE AFFORDED BY THE POLICIES LISTED TO HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES LIMITS SHOULD HAVE BEEN INDICATED BY EACH CLAIMS

POLICY	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/YY)	POLICY EXPIRATION DATE (MM/YY)	LIMITS
A	GENERAL LIABILITY <input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS MADE <input checked="" type="checkbox"/> OCCUR OWNERS & CONTRACTORS FORM	B162801761	10/14/97	10/14/98	GENERAL AGGREGATE \$ 2.0 PRODUCTS - COMPLETION \$ 2.0 PERSONAL & AUTO \$ 1.0 FALLING OBJECTS \$ 1.0 TORN (ANY) (Any one loss) \$ AUTO FOL (Any one person) \$ CYCLEDOWN \$ 1.00 OTHER \$ OTHER \$
A	AUTOMOBILE LIABILITY <input checked="" type="checkbox"/> ANY AUTO ALL OWNED AUTOS NON-OWNED AUTOS <input checked="" type="checkbox"/> HIREN AUTOS <input checked="" type="checkbox"/> IMR OWNED AUTOS	B162801775	10/14/97	10/14/98	CYCLEDOWN \$ 1.00 OTHER \$ OTHER \$ PROPERTY DAMAGE \$ AUTO FOL - EA ACCIDENT \$ OTHER \$
A	EXCESS LIABILITY <input checked="" type="checkbox"/> UMBRELLA FORM OTHER THAN UMBRELLA FORM	B162801792	10/14/97	10/14/98	FALLING OBJECTS \$ 1.00 AGGREGATE \$ 1.00 WC STATUTE LIMITS \$ EL EACH ACCIDENT \$ 500,000 EL DISEASE - POLICY LIMIT \$ 500,000 EL DISEASE - EA EMPLOYEE \$ 500,000
B	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY THE EMPLOYER'S POLICY SHOULD BE EXCL	WC1062801789	10/14/97	10/14/98	WC STATUTE LIMITS \$ EL EACH ACCIDENT \$ 500,000 EL DISEASE - POLICY LIMIT \$ 500,000 EL DISEASE - EA EMPLOYEE \$ 500,000

DESCRIPTION OF OPERATIONS/ACTIVITIES/SPECIAL ITEMS

CERTIFICATE HOLDER

CANCELLATION

SIGNED ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING COMPANY WILL FORWARD TO THE POLICY HOLDER WITHIN 10 DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE LEFT BUT FAILURE TO MAIL SUCH NOTICE SHALL IMPOSE NO OBLIGATION ON LIABILITY OF ANY KIND UPON THE COMPANY, ITS AGENTS OR REPRESENTATIVES AUTHORIZED REPRESENTATIVE

[Signature]
 AMERSON GROUP

ACORD CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD)

03/19/1

PRODUCER (847) 228-8400 FAX (847) 228-8505

Joseph M. Wiedemann & Sons, Inc.
 5 East Golf Road
 Ingleton Heights, IL 60005

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW

COMPANIES AFFORDING COVERAGE

COMPANY A	Reliance Insurance Company
COMPANY B	Reliance National Ins. Co.
COMPANY C	
COMPANY D	

AGENT: Michele Lemmens

Ext: 126

INSURED
 American Waste Haulers Inc.
 American Waste Processing
 American Resource & Recovery, Ltd
 P.O. Box 306
 Maywood, IL 60153

COVERAGES

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

CO LIR	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	LIMITS
	GENERAL LIABILITY COMMERCIAL GENERAL LIABILITY CLAIMS MADE OCCUR OWNERS & CONTRACTORS PROF				GENERAL AGGREGATE \$ PRODUCTS - COMP/OP AGG \$ PERSONAL & AUTO LIABILITY \$ EACH OCCURRENCE \$ FIRE DAMAGE (Any one fire) \$ MED EXP (Any one person) \$
	AUTOMOBILE LIABILITY ANY AUTO ALL OWNED AUTOS SCHEDULED AUTOS IMPROV AUTOS UNLICENSED AUTOS				COMBINED SINGLE LIMIT \$ BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE \$
	GARAGE LIABILITY ANY AUTO				AUTO ONLY - EA ACCIDENT \$ OTHER THAN AUTO ONLY \$ EACH ACCIDENT \$ AGGREGATE \$
	EXCESS LIABILITY UMBRELLA FORM OTHER THAN UMBRELLA FORM				EACH OCCURRENCE \$ AGGREGATE \$
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY THE PROPRIETOR PARTNERS, EXECUTIVE OFFICERS ARE OTHER				W/C STATU- TORY LIMITS \$ EL EACH ACCIDENT \$ EL DISEASE - POLICY LIMIT \$ EL DISEASE - FA EMPLOYE \$
A	Pollution legal Liability	HTA2512999	04/17/1996	04/17/1999	\$4,000,000 Each Loss \$8,000,000 Total Losses

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/SPECIAL ITEMS

Covered Locations: 2000-16 W. Madison, Maywood, Illinois and 11698 Farm Road, Maryneal, Texas

CERTIFICATE HOLDER'S RIGHTS AND OBLIGATIONS IN THE EVENT OF CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING COMPANY WILL ENDEAVOR TO MAIL 10 DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE POLICY BUT FAILURE TO MAIL SUCH NOTICE SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE COMPANY, ITS AGENTS OR REPRESENTATIVES AUTHORIZED REPRESENTATIVE

To Whom It May Concern

John Wiedemann/M.L.L

John Wiedemann

ACORD CERTIFICATE OF LIABILITY INSURANCE DATE (MM/YY) 03/18

FORM NO. 101

Anderson Group, Ltd.
 (630) 850-7887
 907 N. Elm Street #200
 Hinsdale IL 60521

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.

COMPANIES AFFORDING COVERAGE

COMPANY	A	Seligwick James of PA, Inc
COMPANY	B	
COMPANY	C	
COMPANY	D	

American Waste Processing of Maywood, Inc.
 P.O. Box 308
 Maywood IL 60153

COVERAGES: THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED, NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN. THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

CO. LTR.	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	LIMITS
A	GENERAL LIABILITY <input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS MADE <input checked="" type="checkbox"/> OCCUR OWNERS & CONTRACTORS FORM	GL02890914-00	02/14/98	02/14/99	GENERAL AGGREGATE \$ 1,000,000 PRODUCTS - COMPTOP AGG \$ 1,000,000 PERSONAL & ADV BLDG \$ 1,000,000 FAULT EXCLUSION \$ 1,000,000 TIME DAMAGE (Any one fire) \$ 1,000,000 MED EXP (Any one person) \$ 1,000,000
A	AUTOMOBILE LIABILITY <input type="checkbox"/> ANY AUTO <input type="checkbox"/> ALL OWNED AUTOS <input checked="" type="checkbox"/> SCHEDULED AUTOS <input type="checkbox"/> UNOWNED AUTOS <input type="checkbox"/> UNLICENSED AUTOS	HA02890915-00	02/14/98	02/14/99	COMBINED SINGLE LIMIT \$ 1,000,000 BODILY INJURY (Per person) \$ 1,000,000 BODILY INJURY (Per accident) \$ 1,000,000 PROPERTY DAMAGE \$ 1,000,000
	GARAGE LIABILITY <input type="checkbox"/> ANY AUTO				AUTO ONLY - EA ACCIDENT \$ 1,000,000 OTHER THAN AUTO ONLY \$ 1,000,000
	EXCESS LIABILITY <input type="checkbox"/> UMBRELLA FORM <input type="checkbox"/> OTHER THAN UMBRELLA FORM				EACH OCCURRENCE \$ 1,000,000 AGGREGATE \$ 1,000,000
	OWNERS COMPENSATION AND EMPLOYERS' LIABILITY <input type="checkbox"/> THE PROPRIETOR PARTNER/EXECUTIVE OFFICERS ARE COVERED				WC STATE TORY LIMITS \$ 1,000,000 EL EACH ACCIDENT \$ 1,000,000 EL DISEASE - POLICY LIMIT \$ 1,000,000 EL DISEASE - EA EMPLOYEE \$ 1,000,000

DESCRIPTION OF OPERATION/LOCATION/VEHICLES/SPECIAL ITEMS

CERTIFICATE HOLDER

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING COMPANY WILL Endeavor TO MAIL _____ DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE LEFT BUT FAILURE TO MAIL SUCH NOTICE SHALL NOT EXEMPT THE ISSUING COMPANY FROM LIABILITY OF ANY KIND FROM THE COMPANY, ITS AGENTS OR REPRESENTATIVES AUTHORIZED REPRESENTATIVE



State of Illinois
ENVIRONMENTAL PROTECTION AGENCY

Mary A. Gade, Director

2200 Churchill Road, Springfield, IL 62794-9

217/524-3300

December 3, 1987

Revised: December 2, 1994

American Waste Processing, Ltd.
Post Office Box 306
Maywood, Illinois 60153

Re: 0311830002 -- Cook County
American Waste Processing
ILD000716894
Supplemental Permit Number: 1987-216-SP
Log Number: 1994-485 (also includes 1993-540, 1993-378, 1993-377
1988-273, 1988-208, 1987-216 and 1986-152)
Expiration Date: December 31, 1999

Gentlemen:

Supplemental permit 1987-216-SP is hereby issued to the above referenced facility to accept the following nonhazardous wastes for storage in containers prior to offsite disposal, aerosol can processing (crushing), and shredding from any IEPA registered generator on a generic basis.

A. Non-hazardous off-specification, rejected, out-of-date, or surplus non-aerosol commercial chemical products for shredding and staging for further treatment or offsite disposal, which shall be limited to:

1. clothing;
2. tools;
3. plumbing hardware;
4. electrical hardware;
5. automotive hardware;
6. photographic supplies;
7. optical or audio supplies;
8. reproduction or recording supplies;
9. food products;
10. personal hygiene products;
11. over-the-counter pharmaceutical products;
12. household cleaning products;
13. person beauty care products;
14. automotive cleaning products.

These wastes may be accepted in containers under generic waste stream authorization number 000156.

- B. Non-hazardous used, rejected, discarded, or waste products for shredding and staging for further treatment or offsite disposal, which shall be limited to:
1. pallets;
 2. tires; and
 3. RCRA "empty" containers.

These waste may be accepted in containers under generic waste stream authorization number 000157:

- C. Nonhazardous waste product, product residues, and basic sediment and water (BS&W) generated from tanks used for the storage of petroleum motor fuels, kerosene, fuel oils, and diesel fuels. These wastes may be accepted in containers for storage under generic waste stream authorization number 000220.
- D. Non-hazardous waste sludges as identified in Log No. 1993-540 for storage in containers under generic waste stream authorization number 000383:
- E. Non-hazardous waste waters as identified in Log No. 1993-540 for storage in containers under generic waste stream authorization number 000384:

Final plans, specifications, application and supporting documents as submitted and approved shall constitute part of this permit and are identified on the records of the Illinois Environmental Protection Agency, Bureau of Land by the permit number and log number designated in the heading above.

This supplemental permit is subject to the standard conditions attached hereto and incorporated herein by reference and is further subject to the following special conditions:

1. The following shall not be accepted under any of these generic permits.
 - a. aerosol containers containing herbicides, pesticides or insecticides;
 - b. prescription pharmaceutical products;
 - c. lead acid batteries;
 - d. potentially infectious medical waste; and
 - e. hazardous wastes.
2. Oils contaminated with PCBs (greater than 50 ppm) or dioxins are not permitted under this generic permit.
3. A log of each shipment of aerosol cans that are received and processed through the can crusher shall be maintained on site as part of the facility's operating record and shall be available to the Agency upon written or verbal request.
4. The Permittee shall not store or treat containers holding a waste that is incompatible with any other stored waste or materials within the same secondary containment system.

5. An analysis of each waste stream accepted from each generator shall be performed in accordance with the facility's approved waste analysis plan and shall be maintained on site as part of the facility's operating record. This information shall be made available to the Agency upon verbal or written request.
6. Waste received at this site shall be transported to the facility via a licensed special waste hauler and accompanied by a properly completed IEPA manifest.
7. All generators which send waste to the facility must have an IEPA identification number.
8. To accept a waste, the facility must have a special waste stream permit or generic permit authorizing the receipt of the waste.
9. Special wastes generated at the facility for disposal, storage, incineration or further treatment elsewhere shall be transported to the receiving facility utilizing the Agency's Supplemental Waste Stream Permit and Manifest System.
10. The following information shall be documented in the facility's operating record for each load of special waste received:
 - a. Date the load was received.
 - b. Supplemental waste stream permit number (authorization number) and manifest number associated with the waste load.
 - c. Waste name and USEPA hazardous number (if applicable).
 - d. Volume of waste received.
 - e. Generator name, location and IEPA generator number.
 - f. Results of all analyses conducted on the load of waste.
 - g. Documentation as to whether the load of waste was received in drums, roll-off boxes or tote bags.
11. The following information shall be documented in the facility's operating record for all special waste treatment products shipped off-site for disposal or further treatment.
 - a. Date that each load is shipped.
 - b. Waste name and USEPA hazardous waste numbers (if applicable).
 - c. Name, location and IEPA identification number of the off-site receiving facility (if applicable).

- d. Supplemental waste stream permit number (authorization number) under which the waste is to be received at the off-site facility (if applicable).
 - e. Number of the manifest under which the waste is to be shipped.
 - f. Volume of each load waste shipped off-site.
 - g. Disposition of waste.
12. The information required to be traced in the facility's operating record by Conditions 11 and 12 above shall be made available to the Agency upon written or verbal request.
13. All loading and unloading of special wastes shall be accomplished over non-earthen spill containment structures or devices.
14. This permit is subject to review and modification by the Agency as deemed necessary to fulfill the intent and purpose of the Environmental Protection Act, and all applicable environmental rules and regulations.
15. Permittee shall notify the Agency of any changes from the information submitted to the Agency in its application for a developmental and operating permit for this site. Permittee shall notify the Agency of any changes in the names or addresses of both beneficial and legal titleholders to the herein-permitted site. Such notification shall be made in writing within fifteen (15) days of such change and shall include the name or names of any parties in interest and the address of their place of abode; or, if a corporation, the name and address of its registered agent.

Sincerely,



Harry A. Chappel, P.E.
Hazardous Waste Branch Manager
Permit Section, Bureau of Land

HAC:CLS/10/sp/740W,2-5

APPENDIX D

Tier I Industrial/Commercial Remediation Objective Tables

Section 742.APPENDIX B: Tier 1 Tables and Illustrations

Section 742.TABLE A: Tier 1 Soil Remediation Objectives^a for Residential Properties

CAS No.	Chemical Name	Exposure Route-Specific Values for Soils		Soil Component of the Groundwater Ingestion Exposure Route Values		
		Ingestion (mg/kg)	Inhalation (mg/kg)	Class I (mg/kg)	Class II (mg/kg)	ADL (mg/kg)
83-32-9	Acenaphthene	4,700 ^b	--- ^c	570 ^b	2,900	*
67-64-1	Acetone	7,800 ^b	100,000 ^d	16 ^b	16	*
15972-60-8	Alachlor ^o	8 ^e	--- ^c	0.04	0.2	NA
116-06-3	Aldicarb ^o	78 ^b	--- ^c	0.013	0.07	NA
309-00-2	Aldrin	0.04 ^e	3 ^e	0.5 ^e	2.5	*
120-12-7	Anthracene	23,000 ^b	--- ^c	12,000 ^b	59,000	*
1912-24-9	Atrazine ^o	2700 ^b	--- ^c	0.066	0.33	NA
71-43-2	Benzene	22 ^e	0.8 ^e	0.03	0.17	*
56-55-3	Benzo(a)anthracene	0.9 ^e	--- ^c	2	8	*
205-99-2	Benzo(b)fluoranthene	0.9 ^e	--- ^c	5	25	*

CAS No.	Chemical Name	Exposure Route-Specific Values for Soils		Soil Component of the Groundwater Ingestion Exposure Route Values		ADL (mg/kg)
		Ingestion (mg/kg)	Inhalation (mg/kg)	Class I (mg/kg)	Class II (mg/kg)	
207-08-9	Benzo(k)fluoranthene	9 ^e	--- ^c	49	250	*
50-32-8	Benzo(a)pyrene	0.09 ^{e,f}	--- ^c	8	82	*
111-44-4	Bis(2-chloroethyl)ether	0.6 ^e	0.2 ^{e,f}	0.0004 ^{e,f}	0.0004	0.66
117-81-7	Bis(2-ethylhexyl)phthalate	46 ^e	31,000 ^d	3,600	31,000 ^d	*
75-27-4	Bromodichloromethane (Dichlorobromomethane)	10 ^e	3,000 ^d	0.6	0.6	*
75-25-2	Bromoform	81 ^e	53 ^e	0.8	0.8	*
71-36-3	Butanol	7,800 ^b	10,000 ^d	17 ^b	17	NA
85-68-7	Butyl benzyl phthalate	16,000 ^b	930 ^d	930 ^d	930 ^d	*
86-74-8	Carbazole	32 ^e	--- ^c	0.6 ^e	2.8	NA
1563-66-2	Carbofuran ^o	390 ^b	--- ^c	0.22	1.1	NA
75-15-0	Carbon disulfide	7,800 ^b	720 ^d	32 ^b	160	*

CAS No.	Chemical Name	Exposure Route-Specific Values for Soils		Soil Component of the Groundwater Ingestion Exposure Route Values		
		Ingestion (mg/kg)	Inhalation (mg/kg)	Class I (mg/kg)	Class II (mg/kg)	ADL (mg/kg)
56-23-5	Carbon tetrachloride	5 ^e	0.3 ^e	0.07	0.33	*
57-74-9	Chlordane	0.5 ^e	20 ^e	10	48	*
106-47-8	4-Chloroaniline (<i>p</i> -Chloroaniline)	310 ^b	--- ^c	0.7 ^b	0.7	1.3
108-90-7	Chlorobenzene (Monochlorobenzene)	1,600 ^b	130 ^b	1	6.5	*
124-48-1	Chlorodibromomethane (Dibromochloromethane)	1,600 ^b	1,300 ^d	0.4	0.4	*
67-66-3	Chloroform	100 ^e	0.3 ^e	0.6	2.9	*
218-01-9	Chrysene	88 ^e	--- ^c	160	800	*
94-75-7	2,4-D	780 ^b	--- ^c	1.5	7.7	*
75-99-0	Dalapon	2,300 ^b	--- ^c	0.85	8.5	1.2
72-54-8	DDD	3 ^e	--- ^c	16 ^e	80	*
72-55-9	DDE	2 ^e	--- ^c	54 ^e	270	*

CAS No.	Chemical Name	Exposure Route-Specific Values for Soils		Soil Component of the Groundwater Ingestion Exposure Route Values		
		Ingestion (mg/kg)	Inhalation (mg/kg)	Class I (mg/kg)	Class II (mg/kg)	ADL (mg/kg)
50-29-3	DDT	2 ^e	---	32 ^e	160	*
53-70-3	Dibenzo(<i>a,h</i>)anthracene	0.09 ^{e,f}	---	2	7.6	*
96-12-8	1,2-Dibromo-3-chloropropane	0.46 ^e	11 ^b	0.002	0.002	*
106-93-4	1,2-Dibromoethane (Ethylene dibromide)	0.0075 ^e	0.17 ^e	0.0004	0.004	0.005
84-74-2	Di- <i>n</i> -butyl phthalate	7,800 ^b	2,300 ^d	2,300 ^d	2,300 ^d	*
95-50-1	1,2-Dichlorobenzene (<i>o</i> - Dichlorobenzene)	7,000 ^b	560 ^d	17	43	*
106-46-7	1,4-Dichlorobenzene (<i>p</i> - Dichlorobenzene)	---	---	2	11	*
91-94-1	3,3'-Dichlorobenzidine	1 ^e	---	0.007 ^{e,f}	0.033	1.3
75-34-3	1,1-Dichloroethane	7,800 ^b	1,300 ^b	23 ^b	110	*

CAS No.	Chemical Name	Exposure Route-Specific Values for Soils		Soil Component of the Groundwater Ingestion Exposure Route Values		
		Ingestion (mg/kg)	Inhalation (mg/kg)	Class I (mg/kg)	Class II (mg/kg)	ADL (mg/kg)
107-06-2	1,2-Dichloroethane (Ethylene dichloride)	7 ^c	0.4 ^c	0.02	0.1	*
75-35-4	1,1-Dichloroethylene	700 ^b	1,500 ^d	0.06	0.3	*
156-59-2	<i>cis</i> -1,2-Dichloroethylene	780 ^b	1,200 ^d	0.4	1.1	*
156-60-5	<i>trans</i> -1,2-Dichloroethylene	1,600 ^b	3,100 ^d	0.7	3.4	*
78-87-5	1,2-Dichloropropane	9 ^c	15 ^b	0.03	0.15	*
542-75-6	1,3-Dichloropropene (1,3-Dichloropropylene, <i>cis</i> + <i>trans</i>)	4 ^c	0.1 ^c	0.004 ^c	0.02	0.005
60-57-1	Dieldrin ^a	0.04 ^c	1 ^c	0.004 ^c	0.02	*
84-66-2	Diethyl phthalate	63,000 ^b	2,000 ^d	470 ^b	470	*
105-67-9	2,4-Dimethylphenol	1,600 ^b	--- ^c	9 ^b	9	*
121-14-2	2,4-Dinitrotoluene	0.9 ^c	--- ^c	0.0008 ^{e,f}	0.0008	0.013

CAS No.	Chemical Name	Exposure Route-Specific Values for Soils		Soil Component of the Groundwater Ingestion Exposure Route Values		
		Ingestion (mg/kg)	Inhalation (mg/kg)	Class I (mg/kg)	Class II (mg/kg)	ADL (mg/kg)
606-20-2	2,6-Dinitrotoluene	0.9 ^e	--- ^c	0.0007 ^{e,f}	0.0007	0.0067
117-84-0	Di- <i>n</i> -octyl phthalate	1,600 ^b	10,000 ^d	10,000 ^d	10,000 ^d	*
115-29-7	Endosulfan	470 ^b	--- ^c	18 ^b	90	*
145-73-3	Endothall ^o	1,600 ^b	--- ^c	0.4	0.4	NA
72-20-8	Endrin	23 ^b	--- ^c	1	5	*
100-41-4	Ethylbenzene	7,800 ^b	400 ^d	13	19	*
206-44-0	Fluoranthene	3,100 ^b	--- ^c	4,300 ^b	21,000	*
86-73-7	Fluorene	3,100 ^b	--- ^c	560 ^b	2,800	*
76-44-8	Heptachlor	0.1 ^e	0.1 ^e	23	110	*
1024-57-3	Heptachlor epoxide	0.07 ^e	5 ^e	0.7	3.3	*
118-74-1	Hexachlorobenzene	0.4 ^e	1 ^e	2	11	*
319-84-6	<i>alpha</i> -HCH (<i>alpha</i> -BHC)	0.1 ^e	0.8 ^e	0.0005 ^{e,f}	0.003	0.002

CAS No.	Chemical Name	Exposure Route-Specific Values for Soils		Soil Component of the Groundwater Ingestion Exposure Route Values		ADL (mg/kg)
		Ingestion (mg/kg)	Inhalation (mg/kg)	Class I (mg/kg)	Class II (mg/kg)	
58-89-9	<i>gamma</i> -HCH (Lindane) ^a	0.5 ^c	--- ^c	0.009	0.047	*
77-47-4	Hexachlorocyclopentadiene ^e	550 ^b	10 ^b	400	2,200 ^d	*
67-72-1	Hexachloroethane	78 ^b	--- ^c	0.5 ^b	2.6	*
193-39-5	Indeno(1,2,3- <i>c,d</i>)pyrene	0.9 ^c	--- ^c	14	69	*
78-59-1	Isophorone	15,600 ^b	4,600 ^d	8 ^b	8	*
72-43-5	Methoxychlor	390 ^b	--- ^c	160	780	*
74-83-9	Methyl bromide (Bromomethane)	110 ^b	10 ^b	0.2 ^b	1.2	*
75-09-2	Methylene chloride (Dichloromethane)	85 ^c	13 ^c	0.02 ^c	0.2	*
95-48-7	2-Methylphenol (<i>o</i> -Cresol)	3,900 ^b	--- ^c	15 ^b	15	*
91-20-3	Naphthalene	3,100 ^b	--- ^c	84 ^b	420	*
98-95-3	Nitrobenzene	39 ^b	92 ^b	0.1 ^{b,f}	0.1	0.26

CAS No.	Chemical Name	Exposure Route-Specific Values for Soils		Soil Component of the Groundwater Ingestion Exposure Route Values		ADL (mg/kg)
		Ingestion (mg/kg)	Inhalation (mg/kg)	Class I (mg/kg)	Class II (mg/kg)	
86-30-6	<i>N</i> -Nitrosodiphenylamine	130 ^e	--- ^c	1 ^e	5.6	*
621-64-7	<i>N</i> -Nitrosodi- <i>n</i> -propylamine	0.09 ^{e,f}	--- ^c	0.00005 ^{e,f}	0.00005	0.66
108-95-2	Phenol	47,000 ^b	--- ^c	100 ^b	100	*
1918-02-1	Picloram ^o	5,500 ^b	--- ^c	2	20	NA
1336-36-3	Polychlorinated biphenyls (PCBs) ⁿ	1; 10 ^h	--- ^{c,h}	--- ^h	--- ^h	*
129-00-0	Pyrene	2,300 ^b	--- ^c	4,200 ^b	21,000	*
122-34-9	Simazine ^o	390 ^b	--- ^c	0.04	0.37	NA
100-42-5	Styrene	16,000 ^b	1,500 ^d	4	18	*
127-18-4	Tetrachloroethylene (Perchloroethylene)	12 ^e	11 ^e	0.06	0.3	*
108-88-3	Toluene	16,000 ^b	650 ^d	12	29	*

		Exposure Route-Specific Values for Soils		Soil Component of the Groundwater Ingestion Exposure Route Values		
CAS No.	Chemical Name	Ingestion (mg/kg)	Inhalation (mg/kg)	Class I (mg/kg)	Class II (mg/kg)	ADL (mg/kg)
8001-35-2	Toxaphene ^a	0.6 ^c	89 ^e	31	150	*
120-82-1	1,2,4-Trichlorobenzene	780 ^b	3,200 ^b	5	53	*
71-55-6	1,1,1-Trichloroethane	--- ^c	1,200 ^d	2	9.6	*
79-00-5	1,1,2-Trichloroethane	310 ^b	1,800 ^d	0.02	0.3	*
79-01-6	Trichloroethylene	58 ^e	5 ^e	0.06	0.3	*
108-05-4	Vinyl acetate	78,000 ^b	1,000 ^b	170 ^b	170	*
75-01-4	Vinyl chloride	0.3 ^e	0.03 ^e	0.01 ^f	0.07	*
108-38-3	m-Xylene	160,000 ^b	420 ^d	210	210	*
95-47-6	o-Xylene	160,000 ^b	410 ^d	190	190	*
106-42-3	p-Xylene	160,000 ^b	460 ^d	200	200	*

		Exposure Route-Specific Values for Soils		Soil Component of the Groundwater Ingestion Exposure Route Values		
CAS No.	Chemical Name	Ingestion (mg/kg)	Inhalation (mg/kg)	Class I (mg/kg)	Class II (mg/kg)	ADL (mg/kg)
1330-20-7	Xylenes (total)	160,000 ^b	410 ^d	150	150	*
	Ionizable Organics					
65-85-0	Benzoic Acid	310,000 ^b	--- ^c	400 ^{b,i}	400 ⁱ	*
95-57-8	2-Chlorophenol	390 ^b	53,000 ^d	4 ^{b,i}	4 ⁱ	*
120-83-2	2,4-Dichlorophenol	230 ^b	--- ^c	1 ^{b,i}	1 ⁱ	*
51-28-5	2,4-Dinitrophenol	160 ^b	--- ^c	0.2 ^{b,f}	0.2	3.3
88-85-7	Dinoseb ^o	78 ^b	--- ^c	0.34 ^{b,i}	3.4 ⁱ	*
87-86-5	Pentachlorophenol	3 ^{e,j}	--- ^c	0.03 ^{f,i}	0.14 ⁱ	2.4
93-72-1	2,4,5-TP (Silvex)	630 ^b	--- ^c	11 ⁱ	55 ⁱ	*
95-95-4	2,4,5-Trichlorophenol	7,800 ^b	--- ^c	270 ^{b,i}	1,400 ⁱ	*
88-06-2	2,4,6 Trichlorophenol	58 ^e	200 ^e	0.2 ^{e,f,i}	0.77 ⁱ	0.43

CAS No.	Chemical Name	Exposure Route-specific Values for Soils		Soil Component of the Groundwater Ingestion Exposure Route Values		ADL (mg/kg)
		Ingestion (mg/kg)	Inhalation (mg/kg)	Class I (mg/L)	Class II (mg/L)	
	Inorganics					
7440-36-0	Antimony	31 ^b	--- ^c	0.006 ^m	0.024 ^m	*
7440-38-2	Arsenic ^{l,n}	0.4 ^{c,t}	750 ^e	0.05 ^m	0.2 ^m	*
7440-39-3	Barium	5,500 ^b	690,000 ^b	2.0 ^m	2.0 ^m	*
7440-41-7	Beryllium	0.1 ^{c,t}	1,300 ^e	0.004 ^m	0.5 ^m	*
7440-42-8	Boron	7,000 ^b	--- ^g	2.0 ^m	2.0 ^m	*
7440-43-9	Cadmium ^{l,n}	78 ^{b,r}	1,800 ^e	0.005 ^m	0.05 ^m	*
16887-00-6	Chloride	--- ^c	--- ^c	200 ^m	200 ^m	*
7440-47-3	Chromium, total	390 ^b	270 ^e	0.1 ^m	1.0 ^m	*
16065-83-1	Chromium, ion, trivalent	78,000 ^b	--- ^c	--- ^g	--- ^g	*
18540-29-9	Chromium, ion, hexavalent	390 ^b	270 ^e	---	---	*
7440-48-4	Cobalt	4,700 ^b	--- ^c	1.0 ^m	1.0 ^m	*

CAS No.	Chemical Name	Exposure Route-specific Values for Soils		Soil Component of the Groundwater Ingestion Exposure Route Values		ADL (mg/kg)
		Ingestion (mg/kg)	Inhalation (mg/kg)	Class I (mg/L)	Class II (mg/L)	
7440-50-8	Copper ⁿ	2,900 ^b	--- ^c	0.65 ^m	0.65 ^m	*
57-12-5	Cyanide (amenable)	1,600 ^b	--- ^c	0.2 ^q	0.6 ^q	*
7782-41-4	Fluoride	4,700 ^b	--- ^c	4.0 ^m	4.0 ^m	*
15438-31-0	Iron	--- ^c	--- ^c	5.0 ^m	5.0 ^m	*
7439-92-1	Lead	400 ^k	--- ^c	0.0075 ^m	0.1 ^m	*
7439-96-5	Manganese	3,700 ^b	69,000 ^b	0.15 ^m	10.0 ^m	*
7439-97-6	Mercury ^{l,n}	23 ^{b,s}	10 ^{b,i}	0.002 ^m	0.01 ^m	*
7440-02-0	Nickel ^l	1,600 ^b	13,000 ^c	0.1 ^m	2.0 ^m	*
14797-55-8	Nitrate as N ^p	130,000 ^b	--- ^c	10.0 ^q	100 ^q	*
7782-49-2	Selenium ^{l,n}	390 ^b	--- ^c	0.05 ^m	0.05 ^m	*

CAS No.	Chemical Name	Exposure Route-specific Values for Soils		Soil Component of the Groundwater Ingestion Exposure Route Values		ADL (mg/kg)
		Ingestion (mg/kg)	Inhalation (mg/kg)	Class I (mg/L)	Class II (mg/L)	
7440-22-4	Silver	390 ^b	--- ^c	0.05 ^m	---	*
14808-79-8	Sulfate	--- ^c	--- ^c	400 ^m	400 ^m	*
7440-28-0	Thallium	6.3 ^{b,u}	--- ^c	0.002 ^m	0.02 ^m	*
7440-62-2	Vanadium	550 ^b	--- ^c	0.049 ^m	---	*
7440-66-6	Zinc ¹	23,000 ^b	--- ^c	5.0 ^m	10 ^m	*

"*" indicates that the ADL is less than or equal to the specified remediation objective.
 NA means not available; no PQL or EQL available in USEPA analytical methods.

Chemical Name and Soil Remediation Objective Notations

- ^a Soil remediation objectives based on human health criteria only.
- ^b Calculated values correspond to a target hazard quotient of 1.
- ^c No toxicity criteria available for the route of exposure.
- ^d Soil saturation concentration ($C_{(sat)}$) = the concentration at which the absorptive limits of the soil particles, the solubility limits of the available soil moisture, and saturation of soil pore air have been reached. Above the soil saturation concentration, the assumptions regarding vapor transport to air and/or dissolved phase transport to groundwater (for chemicals which are liquid at ambient soil temperatures) have been violated, and alternative modeling approaches are required.
- ^e Calculated values correspond to a cancer risk level of 1 in 1,000,000.
- ^f Level is at or below Contract Laboratory Program required quantitation limit for Regular Analytical Services (RAS).
- ^g Chemical-specific properties are such that this route is not of concern at any soil contaminant concentration.
- ^h A preliminary goal of 1 ppm has been set for PCBs based on *Guidance on Remedial Actions for Superfund Sites with PCB Contamination*, EPA/540G-90/007, and on USEPA efforts to manage PCB contamination. See 40 CFR 761.120 - USEPA "PCB Spill Cleanup Policy." This regulation goes on to say that the remediation goal for an unrestricted area is 10 ppm and 25 ppm for a restricted area, provided both have at least 10 inches of clean cover.
- ⁱ Soil remediation objective for pH of 6.8. If soil pH is other than 6.8, refer to Appendix B, Tables C and D of this Part.
- ^j Ingestion soil remediation objective adjusted by a factor of 0.5 to account for dermal route.
- ^k A preliminary remediation goal of 400 mg/kg has been set for lead based on *Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities*, OSWER Directive #9355.4-12.
- ^l Potential for soil-plant-human exposure.
- ^m The person conducting the remediation has the option to use: 1) TCLP or SPLP test results to compare with the remediation objectives listed in this Table; or 2) the total amount of contaminant in the soil sample results to compare with pH specific remediation objectives listed in Appendix B, Table C or D of this Part. (See Section 742.510.) If the person conducting the remediation wishes to calculate soil remediation objectives based on background concentrations, this should be done in accordance with Subpart D of this Part.
- ⁿ The Agency reserves the right to evaluate the potential for remaining contaminant concentrations to pose significant threats to crops, livestock, or wildlife.
- ^o For agrichemical facilities, remediation objectives for surficial soils which are based on field application rates may be more appropriate for currently registered pesticides. Consult the Agency for further information.
- ^p For agrichemical facilities, soil remediation objectives based on site-specific background concentrations of Nitrate as N may be more appropriate. Such determinations shall be conducted in accordance with the procedures set forth in Subparts D and I of this Part.
- ^q The TCLP extraction must be done using water at a pH of 7.0.
- ^r Value based on dietary Reference Dose.
- ^s Value based on Reference Dose for Mercuric chloride (CAS No. 7487-94-7).
- ^t Note that Table value is likely to be less than background concentration for this chemical; screening or remediation concentrations using the procedures of Subpart D of this Part may be more appropriate.
- ^u Value based on Reference Dose for thallium sulfate (CAS No. 7446-18-6).

Section 742.APPENDIX B: Tier 1 Tables and Illustrations

Section 742.Table B: Tier 1 Soil Remediation Objectives^a for Industrial/Commercial Properties

CAS No.	Chemical Name	Exposure Route-Specific Values for Soils				Soil Component of the Groundwater Ingestion Exposure Route Values		ADL (mg/kg)
		Industrial-Commercial		Construction Worker		Class I (mg/kg)	ClassII (mg/kg)	
		Ingestion (mg/kg)	Inhalation (mg/kg)	Ingestion (mg/kg)	Inhalation (mg/kg)			
83-32-9	Acenaphthene	120,000 ^b	----- ^c	120,000 ^b	----- ^c	570 ^b	2,900	*
67-64-1	Acetone	200,000 ^b	100,000 ^d	200,000 ^b	100,000 ^d	16 ^b	16	*
15972-60-8	Alachlor ^o	72 ^e	----- ^c	1,600 ^e	----- ^c	0.04	0.2	NA
116-06-3	Aldicarb ^o	2,000 ^b	----- ^c	200 ^b	----- ^c	0.013	0.07	NA
309-00-2	Aldrin	0.3 ^e	6.6 ^e	6.1 ^b	9.3 ^e	0.5 ^e	2.5	*
120-12-7	Anthracene	610,000 ^b	----- ^c	610,000 ^b	----- ^c	12,000 ^b	59,000	*
1912-24-9	Atrazine ^o	72,000 ^b	----- ^c	7,100 ^b	----- ^c	0.066	0.33	NA
71-43-2	Benzene	200 ^e	1.5 ^e	4,300 ^e	2.1 ^e	0.03	0.17	*

		Exposure Route-Specific Values for Soils				Soil Component of the Groundwater Ingestion Exposure Route Values		
		Industrial-Commercial		Construction Worker				
CAS No.	Chemical Name	Ingestion (mg/kg)	Inhalation (mg/kg)	Ingestion (mg/kg)	Inhalation (mg/kg)	Class I (mg/kg)	Class II (mg/kg)	ADL (mg/kg)
56-55-3	Benzo(a)anthracene	8 ^e	----- ^e	170 ^e	----- ^e	2	8	*
205-99-2	Benzo(b)fluoranthene	8 ^e	----- ^e	170 ^e	----- ^e	5	25	*
207-08-9	Benzo(k)fluoroanthene	78 ^e	----- ^e	1,700 ^e	----- ^e	49	250	*
50-32-8	Benzo(a)pyrene	0.8 ^e	----- ^e	17 ^e	----- ^e	8	82	*
111-44-4	Bis(2-chloroethyl)ether	5 ^e	0.47 ^e	75 ^e	0.66 ^e	0.0004 ^{e,f}	0.0004	0.66
117-81-7	Bis(2-ethylhexyl)phthalate	410 ^e	31,000 ^d	4,100 ^b	31,000 ^d	3,600	31,000 ^d	*
75-27-4	Bromodichloromethane (Dichlorobromomethane)	92 ^e	3,000 ^d	2,000 ^e	3,000 ^d	0.6	0.6	*
75-25-2	Bromoform	720 ^e	100 ^e	16,000 ^e	140 ^e	0.8	0.8	*
71-36-3	Butanol	200,000 ^b	10,000 ^d	200,000 ^b	10,000 ^d	17 ^b	17	NA
85-68-7	Butyl benzyl phthalate	410,000 ^b	930 ^d	410,000 ^b	930 ^d	930 ^d	930 ^d	*
86-74-8	Carbazole	290 ^e	----- ^e	6,200 ^e	----- ^e	0.6 ^e	2.8	NA

		Exposure Route-Specific Values for Soils				Soil Component of the Groundwater Ingestion Exposure Route Values		
		Industrial-Commercial		Construction Worker				
CAS No.	Chemical Name	Ingestion (mg/kg)	Inhalation (mg/kg)	Ingestion (mg/kg)	Inhalation (mg/kg)	Class I (mg/kg)	Class II (mg/kg)	ADL (mg/kg)
1563-66-2	Carbofuran ^o	10,000 ^b	----- ^c	1,000 ^b	----- ^c	0.22	1.1	NA
75-15-0	Carbon disulfide	200,000 ^b	720 ^d	20,000 ^b	9.0 ^b	32 ^b	160	*
56-23-5	Carbon tetrachloride	44 ^e	0.64 ^e	410 ^b	0.90 ^e	0.07	0.33	*
57-74-9	Chlordane	4 ^e	38 ^e	12 ^b	53 ^e	10	48	*
106-47-8	4 - Chloroaniline (<i>p</i> -Chloroaniline)	8,200 ^b	----- ^c	820 ^b	----- ^c	0.7 ^b	0.7	1.3
108-90-7	Chlorobenzene (Monochlorobenzene)	41,000 ^b	210 ^b	4,100 ^b	1.3 ^b	1	6.5	*
124-48-1	Chlorodibromomethane (Dibromochloromethane)	41,000 ^b	1,300 ^d	41,000 ^b	1,300 ^d	0.4	0.4	*
67-66-3	Chloroform	940 ^e	0.54 ^e	2,000 ^b	0.76 ^e	0.6	2.9	*
218-01-9	Chrysene	780 ^e	----- ^c	17,000 ^e	----- ^c	160	800	*
94-75-7	2,4-D	20,000 ^b	----- ^c	2,000 ^b	----- ^c	1.5	7.7	*

		Exposure Route-Specific Values for Soils				Soil Component of the Groundwater Ingestion Exposure Route Values		
		Industrial-Commercial		Construction Worker				
CAS No.	Chemical Name	Ingestion (mg/kg)	Inhalation (mg/kg)	Ingestion (mg/kg)	Inhalation (mg/kg)	Class I (mg/kg)	Class II (mg/kg)	ADL (mg/kg)
75-99-0	Dalapon	61,000 ^b	----- ^c	6,100 ^b	----- ^c	0.85	8.5	1.2
72-54-8	DDD	24 ^e	----- ^c	520 ^e	----- ^c	16 ^e	80	*
72-55-9	DDE	17 ^e	----- ^c	370 ^e	----- ^c	54 ^e	270	*
50-29-3	DDT	17 ^e	1,500 ^e	100 ^b	2,100 ^e	32 ^e	160	*
53-70-3	Dibenzo(<i>a,h</i>)anthracene	0.8 ^e	----- ^c	17 ^e	----- ^c	2	7.6	*
96-12-8	1,2-Dibromo-3-chloropropane	4 ^e	17 ^b	89 ^e	0.11 ^b	0.002	0.002	*
106-93-4	1,2-Dibromoethane (Ethylene dibromide)	0.07 ^e	0.32 ^e	1.5 ^e	0.45 ^e	0.0004	0.004	0.005
84-74-2	Di- <i>n</i> -butyl phthalate	200,000 ^b	2,300 ^d	200,000 ^b	2,300 ^d	2,300 ^d	2,300 ^d	*
95-50-1	1,2-Dichlorobenzene (<i>o</i> -Dichlorobenzene)	180,000 ^b	560 ^d	18,000 ^b	310 ^b	17	43	*
106-46-7	1,4-Dichlorobenzene (<i>p</i> -Dichlorobenzene)	----- ^c	17,000 ^b	----- ^c	340 ^b	2	11	*

		Exposure Route-Specific Values for Soils				Soil Component of the Groundwater Ingestion Exposure Route Values		
		Industrial-Commercial		Construction Worker				
CAS No.	Chemical Name	Ingestion (mg/kg)	Inhalation (mg/kg)	Ingestion (mg/kg)	Inhalation (mg/kg)	Class I (mg/kg)	Class II (mg/kg)	ADL (mg/kg)
91-94-1	3,3'-Dichlorobenzidine	13 ^e	----- ^c	280 ^e	----- ^c	0.007 ^{e,f}	0.033	1.3
75-34-3	1,1-Dichloroethane	200,000 ^b	1,700 ^d	200,000 ^b	130 ^b	23 ^b	110	*
107-06-2	1,2-Dichloroethane (Ethylene dichloride)	63 ^e	0.70 ^e	1,400 ^e	0.99 ^e	0.02	0.1	*
75-35-4	1,1-Dichloroethylene	18,000 ^b	1,500 ^d	1,800 ^b	1,500 ^d	0.06	0.3	*
156-59-2	<i>cis</i> -1,2-Dichloroethylene	20,000 ^b	1,200 ^d	20,000 ^b	1,200 ^d	0.4	1.1	*
156-60-5	<i>trans</i> -1,2-Dichloroethylene	41,000 ^b	3,100 ^d	41,000 ^b	3,100 ^d	0.7	3.4	*
78-87-5	1,2-Dichloropropane	84 ^e	23 ^b	1,800 ^e	0.50 ^b	0.03	0.15	*
542-75-6	1,3-Dichloropropene (1,3-Dichloropropylene, <i>cis</i> + <i>trans</i>)	33 ^e	0.23 ^e	610 ^b	0.33 ^e	0.004 ^e	0.02	0.005
60-57-1	Dieldrin ^a	0.4 ^e	2.2 ^e	7.8 ^e	3.1 ^e	0.004 ^e	0.02	0.0013
84-66-2	Diethyl phthalate	1,000,000 ^b	2,000 ^d	1,000,000 ^b	2,000 ^d	470 ^b	470	*

		Exposure Route-Specific Values for Soils				Soil Component of the Groundwater Ingestion Exposure Route Values		
		Industrial-Commercial		Construction Worker				
CAS No.	Chemical Name	Ingestion (mg/kg)	Inhalation (mg/kg)	Ingestion (mg/kg)	Inhalation (mg/kg)	Class I (mg/kg)	Class II (mg/kg)	ADL (mg/kg)
105-67-9	2,4-Dimethylphenol	41,000 ^b	----- ^c	41,000 ^b	----- ^c	9 ^b	9	*
121-14-2	2,4-Dinitrotoluene	8.4 ^e	----- ^c	180 ^e	----- ^c	0.0008 ^{e,f}	0.0008	0.013
606-20-2	2,6-Dinitrotoluene	8.4 ^e	----- ^c	180 ^e	----- ^c	0.0007 ^{e,f}	0.0007	0.0067
117-84-0	Di- <i>n</i> -octyl phthalate	41,000 ^e	10,000 ^d	4,100 ^b	10,000 ^d	10,000 ^d	10,000 ^d	*
115-29-7	Endosulfan	12,000 ^b	----- ^c	1,200 ^b	----- ^c	18 ^b	90	*
145-73-3	Endothall ^o	41,000 ^e	----- ^c	4,100 ^b	----- ^c	0.4	0.4	NA
72-20-8	Endrin	610 ^b	----- ^c	61 ^b	----- ^c	1	5	*
100-41-4	Ethylbenzene	200,000 ^b	400 ^d	20,000 ^b	58 ^b	13	19	*
206-44-0	Fluoranthene	82,000 ^b	----- ^c	82,000 ^b	----- ^c	4,300 ^b	21,000	*
86-73-7	Fluorene	82,000 ^b	----- ^c	82,000 ^b	----- ^c	560 ^b	2,800	*
76-44-8	Heptachlor	1 ^e	11 ^e	28 ^e	16 ^e	23	110	*

CAS No.	Chemical Name	Exposure Route-Specific Values for Soils				Soil Component of the Groundwater Ingestion Exposure Route Values		
		Industrial-Commercial		Construction Worker		Class I (mg/kg)	Class II (mg/kg)	ADL (mg/kg)
		Ingestion (mg/kg)	Inhalation (mg/kg)	Ingestion (mg/kg)	Inhalation (mg/kg)			
1024-57-3	Heptachlor epoxide	0.6 ^e	9.2 ^e	2.7 ^b	13 ^e	0.7	3.3	*
118-74-1	Hexachlorobenzene	4 ^e	1.8 ^e	78 ^e	2.6 ^e	2	11	*
319-84-6	<i>alpha</i> -HCH (<i>alpha</i> -BHC)	0.9 ^e	1.5 ^e	20 ^e	2.1 ^e	0.0005 ^{e,f}	0.003	0.002
58-89-9	<i>gamma</i> -HCH (Lindane) ^a	4 ^e	----- ^c	96 ^e	----- ^c	0.009	0.047	*
77-47-4	Hexachlorocyclopentadiene	14,000 ^b	16 ^b	14,000 ^b	1.1 ^b	400	2,200 ^d	*
67-72-1	Hexachloroethane	2,000 ^b	----- ^c	2,000 ^b	----- ^c	0.5 ^b	2.6	*
193-39-5	Indeno(1,2,3- <i>c,d</i>)pyrene	8 ^e	----- ^c	170 ^e	----- ^c	14	69	*
78-59-1	Isophorone	410,000 ^b	4,600 ^d	410,000 ^b	4,600 ^d	8 ^b	8	*
72-43-5	Methoxychlor	10,000 ^b	----- ^c	1,000 ^b	----- ^c	160	780	*
74-83-9	Methyl bromide (Bromomethane)	2,900 ^b	15 ^b	1,000 ^b	3.9 ^b	0.2 ^b	1.2	*

		Exposure Route-Specific Values for Soils				Soil Component of the Groundwater Ingestion Exposure Route Values		
		Industrial-Commercial		Construction Worker				
CAS No.	Chemical Name	Ingestion (mg/kg)	Inhalation (mg/kg)	Ingestion (mg/kg)	Inhalation (mg/kg)	Class I (mg/kg)	Class II (mg/kg)	ADL (mg/kg)
75-09-2	Methylene chloride (Dichloromethane)	760 ^e	24 ^e	12,000 ^b	34 ^e	0.02 ^e	0.2	*
95-48-7	2-Methylphenol (o - Cresol)	100,000 ^b	----- ^c	100,000 ^b	----- ^c	15 ^b	15	*
86-30-6	N-Nitrosodiphenylamine	1,200 ^e	----- ^c	25,000 ^e	----- ^c	1 ^e	5.6	0.66
621-64-7	N-Nitrosodi-n-propylamine	0.8 ^e	----- ^c	18 ^e	----- ^c	0.00005 ^{e,f}	0.00005	0.66
91-20-3	Naphthalene	82,000 ^b	----- ^c	8,200 ^b	----- ^c	84 ^b	420	*
98-95-3	Nitrobenzene	1,000 ^b	140 ^b	1,000 ^b	9.4 ^b	0.1 ^{b,f}	0.1	0.26
108-95-2	Phenol	1,000,000 ^b	----- ^c	120,000 ^b	----- ^c	100 ^b	100	*
1918-02-1	Picloram ^g	140,000 ^b	----- ^c	14,000 ^b	----- ^c	2	20	NA
1336-36-3	Polychlorinated biphenyls (PCBs) ⁿ	1; 10; 25 ^h	----- ^{c,b}	1 ^b	----- ^{c,b}	----- ^b	----- ^b	*
129-00-0	Pyrene	61,000 ^b	----- ^c	61,000 ^b	----- ^c	4,200 ^b	21,000	*

		Exposure Route-Specific Values for Soils				Soil Component of the Groundwater Ingestion Exposure Route Values		
		Industrial-Commercial		Construction Worker				
CAS No.	Chemical Name	Ingestion (mg/kg)	Inhalation (mg/kg)	Ingestion (mg/kg)	Inhalation (mg/kg)	Class I (mg/kg)	Class II (mg/kg)	ADL (mg/kg)
122-34-9	Simazine ^o	10,000 ^b	----- ^c	1,000 ^b	----- ^c	0.04	0.37	NA
100-42-5	Styrene	410,000 ^b	1,500 ^d	41,000 ^b	430 ^b	4	18	*
127-18-4	Tetrachloroethylene (Perchloroethylene)	110 ^e	20 ^e	2,400 ^e	28 ^e	0.06	0.3	*
108-88-3	Toluene	410,000 ^b	650 ^d	410,000 ^b	42 ^b	12	29	*
8001-35-2	Toxaphene ^o	5.2 ^e	170 ^e	110 ^e	240 ^e	31	150	*
120-82-1	1,2,4-Trichlorobenzene	20,000 ^b	3,200 ^d	2,000 ^b	920 ^b	5	53	*
71-55-6	1,1,1-Trichloroethane	----- ^c	1,200 ^d	----- ^c	1,200 ^d	2	9.6	*
79-00-5	1,1,2-Trichloroethane	8,200 ^b	1,800 ^d	8,200 ^b	1,800 ^d	0.02	0.3	*
79-01-6	Trichloroethylene	520 ^e	8.9 ^e	1,200 ^b	12 ^e	0.06	0.3	*
108-05-4	Vinyl acetate	1,000,000 ^b	1,600 ^b	200,000 ^b	10 ^b	170 ^b	170	*

		Exposure Route-Specific Values for Soils				Soil Component of the Groundwater Ingestion Exposure Route Values		
		Industrial-Commercial		Construction Worker				
CAS No.	Chemical Name	Ingestion (mg/kg)	Inhalation (mg/kg)	Ingestion (mg/kg)	Inhalation (mg/kg)	Class I (mg/kg)	Class II (mg/kg)	ADL (mg/kg)
75-01-4	Vinyl chloride	3 ^e	0.06 ^e	65 ^e	0.08 ^e	0.01 ^f	0.07	*
108-38-3	m-Xylene	1,000,000	420 ^d	410,000 ^b	420 ^d	210	210	*
95-47-6	o-Xylene	1,000,000	410 ^d	410,000 ^b	410 ^d	190	190	*
106-42-3	p-Xylene	1,000,000	460 ^d	410,000 ^b	460 ^d	200	200	*
1330-20-7	Xylenes (total)	1,000,000 ^h	410 ^d	410,000 ^b	410 ^d	150	150	*
	Ionizable Organics							
65-85-0	Benzoic Acid	1,000,000 ^b	----- ^c	820,000 ^b	----- ^c	400 ^{b,i}	400 ⁱ	*
95-57-8	2-Chlorophenol	10,000 ^b	53,000 ^d	10,000 ^b	53,000 ^d	4 ^{b,i}	20 ⁱ	*
120-83-2	2,4-Dichlorophenol	6,100 ^b	----- ^c	610 ^b	----- ^c	1 ^{b,i}	1 ⁱ	*
51-28-5	2,4-Dinitrophenol	4,100 ^b	----- ^c	410 ^b	----- ^c	0.2 ^{b,i}	0.2 ⁱ	3.3
88-85-7	Dinoseb ^o	2,000 ^b	----- ^c	200 ^b	----- ^c	0.34 ^{b,i}	3.4 ⁱ	*

		Exposure Route-Specific Values for Soils				Soil Component of the Groundwater Ingestion Exposure Route Values		
		Industrial-Commercial		Construction Worker				
CAS No.	Chemical Name	Ingestion (mg/kg)	Inhalation (mg/kg)	Ingestion (mg/kg)	Inhalation (mg/kg)	Class I (mg/kg)	Class II (mg/kg)	ADL (mg/kg)
87-86-5	Pentachlorophenol	24 ^{e,j}	----- ^c	520 ^{e,i}	----- ^c	0.03 ^{f,i}	0.14 ⁱ	2.4
93-72-1	2,4,5-TP (Silvex)	16,000 ^b	----- ^c	1,600 ^b	----- ^c	11 ⁱ	55 ⁱ	*
95-95-4	2,4,5-Trichlorophenol	200,000 ^b	----- ^c	200,000 ^b	----- ^c	270 ^{b,i}	1,400 ⁱ	*
88-06-2	2,4,6-Trichlorophenol	520 ^e	390 ^f	11,000 ^e	540 ^e	0.2 ^{e,f,i}	0.77 ⁱ	0.43

		Exposure Route-Specific Values for Soils				Soil Component of the Groundwater Ingestion Exposure Route Values		
		Industrial-Commercial		Construction Worker				
CAS No.	Chemical Name	Ingestion (mg/kg)	Inhalation (mg/kg)	Ingestion (mg/kg)	Inhalation (mg/kg)	Class I (mg/L)	Class II (mg/L)	
	Inorganics							
7440-36-0	Antimony	820 ^b	----- ^c	82 ^b	----- ^c	0.006 ^m	0.024 ^m	*
7440-38-2	Arsenic ^{1,n}	3 ^{e,i}	1,200 ^e	61 ^b	25,000 ^e	0.05 ^m	0.2 ^m	
7440-39-3	Barium	140,000 ^b	910,000 ^b	14,000 ^b	870,000 ^b	2.0 ^m	2.0 ^m	*
7440-41-7	Beryllium	1 ^{e,i}	2,100 ^e	29 ^e	44,000 ^e	0.004 ^m	0.5 ^m	*
7440-42-8	Boron	180,000 ^h	1,000,000	18,000 ^b	1,000,000	2.0 ^m	2.0 ^m	*
7440-43-9	Cadmium ^{1,n}	2,000 ^{b,r}	2,800 ^e	200 ^{b,r}	59,000 ^e	0.005 ^m	0.05 ^m	*
16887-00-6	Chloride	----- ^c	----- ^c	----- ^c	----- ^c	200 ^m	200 ^m	*
7440-47-3	Chromium, total	10,000 ^b	420 ^e	4,100 ^b	8,800 ^e	0.1 ^m	1.0 ^m	*
16065-83-1	Chromium, ion, trivalent	1,000,000 ^b	----- ^c	330,000 ^b	----- ^c	----- ^e	----- ^e	*
18540-29-9	Chromium, ion, hexavalent	10,000 ^b	420 ^e	4,100 ^b	8,800 ^e	-----	-----	*

		Exposure Route-Specific Values for Soils				Soil Component of the Groundwater Ingestion Exposure Route Values		
		Industrial-Commercial		Construction Worker				
CAS No.	Chemical Name	Ingestion (mg/kg)	Inhalation (mg/kg)	Ingestion (mg/kg)	Inhalation (mg/kg)	Class I (mg/L)	Class II (mg/L)	
7440-48-4	Cobalt	120,000 ^b	----- ^c	12,000 ^b	----- ^c	1.0 ^m	1.0 ^m	*
7440-50-8	Copper ⁿ	82,000 ^b	----- ^c	8,200 ^b	----- ^c	0.65 ^m	0.65 ^m	*
57-12-5	Cyanide (amenable)	41,000 ^b	----- ^c	4,100 ^b	----- ^c	0.2 ^q	0.6 ^q	*
7782-41-4	Fluoride	120,000 ^b	----- ^c	12,000 ^b	----- ^c	4.0 ^m	4.0 ^m	*
15438-31-0	Iron	----- ^c	----- ^c	----- ^c	----- ^c	5.0 ^m	5.0 ^m	*
7439-92-1	Lead	400 ^k	----- ^c	400 ^k	----- ^c	0.0075 ^m	0.1 ^m	*
7439-96-5	Manganese	96,000 ^b	91,000 ^b	9,600 ^b	8,700 ^b	0.15 ^m	10.0 ^m	*
7439-97-6	Mercury ^{l,a}	610 ^b	540,000 ^b	61 ^{b,s}	52,000 ^b	0.002 ^m	0.01 ^m	*
7440-02-0	Nickel ^l	41,000 ^b	21,000 ^c	4,100 ^b	440,000 ^c	0.1 ^m	2.0 ^m	*
14797-55-8	Nitrate as N ^p	1,000,000 ^b	----- ^c	330,000 ^b	----- ^c	10.0 ^q	100 ^q	*
7782-49-2	Selenium ^{l,n}	10,000 ^b	----- ^c	1,000 ^b	----- ^c	0.05 ^m	0.05 ^m	*

		Exposure Route-Specific Values for Soils				Soil Component of the Groundwater Ingestion Exposure Route Values		
		Industrial-Commercial		Construction Worker				
CAS No.	Chemical Name	Ingestion (mg/kg)	Inhalation (mg/kg)	Ingestion (mg/kg)	Inhalation (mg/kg)	Class I (mg/L)	Class II (mg/L)	
7440-22-4	Silver	10,000 ^b	----- ^c	1,000 ^b	----- ^c	0.05 ^m	-----	*
14808-79-8	Sulfate	----- ^c	----- ^c	----- ^c	----- ^c	400 ^m	400 ^m	*
7440-28-0	Thallium	160 ^{b,u}	----- ^c	160 ^{b,u}	----- ^c	0.002 ^m	0.02 ^m	*
7440-62-2	Vanadium	14,000 ^b	----- ^c	1,400 ^b	----- ^c	0.049 ^m	-----	*
7440-66-6	Zinc ^l	610,000 ^b	----- ^c	61,000 ^b	----- ^c	5.0 ^m	10 ^m	*

** indicates that the ADL is less than or equal to the specified remediation objective.

NA means Not Available; no PQL or EQL available in USEPA analytical methods.

Chemical Name and Soil Remediation Objective Notations (2nd, 5th thru 8th Columns)

- ^a Soil remediation objectives based on human health criteria only.
- ^b Calculated values correspond to a target hazard quotient of 1.
- ^c No toxicity criteria available for this route of exposure.
- ^d Soil saturation concentration ($C_{(sat)}$) = the concentration at which the absorptive limits of the soil particles, the solubility limits of the available soil moisture, and saturation of soil pore air have been reached. Above the soil saturation concentration, the assumptions regarding vapor transport to air and/or dissolved phase transport to groundwater (for chemicals which are liquid at ambient soil temperatures) have been violated, and alternative modeling approaches are required.
- ^e Calculated values correspond to a cancer risk level of 1 in 1,000,000.
- ^f Level is at or below Contract Laboratory Program required quantitation limit for Regular Analytical Services (RAS).
- ^g Chemical-specific properties are such that this route is not of concern at any soil contaminant concentration.
- ^h A preliminary goal of 1 ppm has been set for PCBs based on *Guidance on Remedial Actions for Superfund Sites with PCB Contamination*, EPA/540G-90/007, and on USEPA efforts to manage PCB contamination. See 40 CFR 761.120 for USEPA "PCB Spill Cleanup Policy." This regulation goes on to say that the remediation goal for an unrestricted area is 10 ppm and 25 ppm for a restricted area, provided both have at least 10 inches of clean cover.
- ⁱ Soil remediation objective for pH of 6.8. If soil pH is other than 6.8, refer to Appendix B, Tables C and D in this Part.
- ^j Ingestion soil remediation objective adjusted by a factor of 0.5 to account for dermal route.
- ^k A preliminary remediation goal of 400 mg/kg has been set for lead based on *Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities*, OSWER Directive #9355.4-12.
- ^l Potential for soil-plant-human exposure.
- ^m The person conducting the remediation has the option to use: (1) TCLP or SPLP test results to compare with the remediation objectives listed in this Table; or (2) the total amount of contaminant in the soil sample results to compare with pH specific remediation objectives listed in Appendix B, Table C or D of this Part. (See Section 742.510.) If the person conducting the remediation wishes to calculate soil remediation objectives based on background concentrations, this should be done in accordance with Subpart D of this Part.
- ⁿ The Agency reserves the right to evaluate the potential for remaining contaminant concentrations to pose significant threats to crops, livestock, or wildlife.
- ^o For agrichemical facilities, remediation objectives for surficial soils which are based on field application rates may be more appropriate for currently registered pesticides. Consult the Agency for further information.
- ^p For agrichemical facilities, soil remediation objectives based on site-specific background concentrations of Nitrate as N may be more appropriate. Such determinations shall be conducted in accordance with the located in Subparts D and I of this Part.
- ^q The TCLP extraction must be done using water at a pH of 7.0.
- ^r Value based on dietary Reference Dose.
- ^s Value based on Reference Dose for Mercuric chloride (CAS No. 7487-94-7).
- ^t Note that Table value is likely to be less than background concentration for this chemical; screening or remediation concentrations using the procedures of Subpart D of this Part.
- ^u Value based on Reference Dose for thallium sulfate (CAS No. 7446-18-6).

Section 742.APPENDIX B: Tier 1 Tables and Illustrations

Section 742.TABLE E: Tier 1 Groundwater Remediation Objectives for the Groundwater Component of the Groundwater Ingestion Route

CAS No.	Chemical Name	Groundwater Remediation Objective	
		Class I (mg/L)	Class II (mg/L)
83-32-9	Acenaphthene	0.42	2.1
67-64-1	Acetone	0.7	0.7
15972-60-8	Alachlor	0.002 ^c	0.01 ^c
116-06-3	Aldicarb	0.003 ^c	0.015 ^c
309-00-2	Aldrin	0.00004 ^a	0.0002
120-12-7	Anthracene	2.1	10.5
1912-24-9	Atrazine	0.003 ^c	0.015 ^c
71-43-2	Benzene	0.005 ^c	0.025 ^c
56-55-3	Benzo(a)anthracene	0.00013 ^a	0.00065
205-99-2	Benzo(b)fluoranthene	0.00018 ^a	0.0009
207-08-9	Benzo(k)fluroanthene	0.00017 ^a	0.00085
50-32-8	Benzo(a)pyrene	0.0002 ^{a,c}	0.002 ^c
111-44-4	Bis(2-chloroethyl)ether	0.01 ^a	0.01
117-81-7	Bis(2-ethylhexyl)phthalate	0.006 ^{a,c}	0.06 ^c
75-27-4	Bromodichloromethane (Dichlorobromomethane)	0.00002 ^a	0.00002
75-25-2	Bromoform	0.0002 ^a	0.0002
71-36-3	Butanol	0.7	0.7
85-68-7	Butyl benzyl phthalate	1.4	7.0
86-74-8	Carbazole	---	---
1563-66-2	Carbofuran	0.04 ^c	0.2 ^c
75-15-0	Carbon disulfide	0.7	3.5
56-23-5	Carbon tetrachloride	0.005 ^c	0.025 ^c
57-74-9	Chlordane	0.002 ^c	0.01 ^c

CAS No.	Chemical Name	Groundwater Remediation Objective	
		Class I (mg/L)	Class II (mg/L)
108-90-7	Chlorobenzene (Monochlorobenzene)	0.1 ^c	0.5 ^c
124-48-1	Chlorodibromomethane (Dibromochloromethane)	0.14	0.14
67-66-3	Chloroform	0.00002 ^a	0.0001
218-01-9	Chrysene	0.0015 ^a	0.0075
94-75-7	2,4-D	0.07 ^c	0.35 ^c
75-99-0	Dalapon	0.2 ^c	2.0 ^c
72-54-8	DDD	0.00011 ^a	0.00055
72-55-9	DDE	0.00004 ^a	0.0002
50-29-3	DDT	0.00012 ^a	0.0006
53-70-3	Dibenzo(<i>a,h</i>)anthracene	0.0003 ^a	0.0015
96-12-8	1,2-Dibromo-3-chloropropane	0.0002 ^c	0.0002 ^c
106-93-4	1,2-Dibromoethane (Ethylene dibromide)	0.00005 ^{a,c}	0.0005 ^c
84-74-2	Di- <i>n</i> -butyl phthalate	0.7	3.5
95-50-1	1,2-Dichlorobenzene (<i>o</i> -Dichlorobenzene)	0.6 ^c	1.5 ^c
106-46-7	1,4-Dichlorobenzene (<i>p</i> -Dichlorobenzene)	0.075 ^c	0.375 ^c
91-94-1	3,3'-Dichlorobenzidine	0.02 ^a	0.1
75-34-3	1,1-Dichloroethane	0.7	3.5
107-06-2	1,2-Dichloroethane (Ethylene dichloride)	0.005 ^c	0.025 ^c
75-35-4	1,1-Dichloroethylene ^b	0.007 ^c	0.035 ^c
156-59-2	<i>cis</i> -1,2-Dichloroethylene	0.07 ^c	0.2 ^c
156-60-5	<i>trans</i> -1,2-Dichloroethylene	0.1 ^c	0.5 ^c
78-87-5	1,2-Dichloropropane	0.005 ^c	0.025 ^c
542-75-6	1,3-Dichloropropene (1,3-Dichloropropylene, <i>cis</i> + <i>trans</i>)	0.001 ^a	0.005

CAS No.	Chemical Name	Groundwater Remediation Objective	
		Class I (mg/L)	Class II (mg/L)
60-57-1	Dieldrin	0.00002 ^a	0.0001
84-66-2	Diethyl phthalate	5.6	5.6
121-14-2	2,4-Dinitrotoluene ^a	0.00002	0.00002
606-20-2	2,6-Dinitrotoluene ^a	0.0001	0.0001
88-85-7	Dinoseb	0.007 ^c	0.07 ^c
117-84-0	Di- <i>n</i> -octyl phthalate	0.14	0.7
115-29-7	Endosulfan	0.042	0.21
145-73-3	Endothall	0.1 ^c	0.1 ^c
72-20-8	Endrin	0.002 ^c	0.01 ^c
100-41-4	Ethylbenzene	0.7 ^c	1.0 ^c
206-44-0	Fluoranthene	0.28	1.4
86-73-7	Fluorene	0.28	1.4
76-44-8	Heptachlor	0.0004 ^c	0.002 ^c
1024-57-3	Heptachlor epoxide	0.0002 ^c	0.001 ^c
118-74-1	Hexachlorobenzene	0.00006 ^a	0.0003
319-84-6	<i>alpha</i> -HCH (<i>alpha</i> -BHC)	0.00003 ^a	0.00015
58-89-9	<i>gamma</i> -HCH (Lindane)	0.0002 ^c	0.001 ^c
77-47-4	Hexachlorocyclopentadiene	0.05 ^c	0.5 ^c
67-72-1	Hexachloroethane	0.007	0.035
193-39-5	Indeno(1,2,3- <i>c,d</i>)pyrene	0.00043 ^a	0.00215
78-59-1	Isophorone	1.4	1.4
72-43-5	Methoxychlor	0.04 ^c	0.2 ^c
74-83-9	Methyl bromide (Bromomethane)	0.0098	0.049
75-09-2	Methylene chloride (Dichloromethane)	0.005 ^c	0.05 ^c
91-20-3	Naphthalene ²	0.025	0.039
98-95-3	Nitrobenzene ²	0.0035	0.0035

CAS No.	Chemical Name	Groundwater Remediation Objective	
		Class I (mg/L)	Class II (mg/L)
1918-02-1	Picloram	0.5 ^c	5.0 ^c
1336-36-3	Polychlorinated biphenyls (PCBs) ^a	0.0005 ^c	0.0025 ^c
129-00-0	Pyrene	0.21	1.05
122-34-9	Simazine	0.004 ^c	0.04 ^c
100-42-5	Styrene	0.1 ^c	0.5 ^c
93-72-1	2,4,5-TP (Silvex)	0.05 ^c	0.25 ^c
127-18-4	Tetrachloroethylene (Perchloroethylene)	0.005 ^c	0.025 ^c
108-88-3	Toluene	1.0 ^c	2.5 ^c
8001-35-2	Toxaphene	0.003 ^c	0.015 ^c
120-82-1	1,2,4-Trichlorobenzene	0.07 ^c	0.7 ^c
71-55-6	1,1,1-Trichloroethane ²	0.2 ^c	1.0 ^c
79-00-5	1,1,2-Trichloroethane	0.005 ^c	0.05 ^c
79-01-6	Trichloroethylene	0.005 ^c	0.025 ^c
108-05-4	Vinyl acetate	7.0	7.0
75-01-4	Vinyl chloride	0.002 ^c	0.01 ^c
1330-20-7	Xylenes (total)	10.0 ^c	10.0 ^c
	Ionizable Organics		
65-85-0	Benzoic Acid	28	28
106-47-8	4-Chloroaniline (<i>p</i> -Chloroaniline)	0.028	0.028
95-57-8	2-Chlorophenol	0.035	0.175
120-83-2	2,4-Dichlorophenol	0.021	0.021
105-67-9	2,4-Dimethylphenol	0.14	0.14
51-28-5	2,4-Dinitrophenol	0.014	0.014
95-48-7	2-Methylphenol (<i>o</i> -Cresol)	0.35	0.35
86-30-6	<i>N</i> -Nitrosodiphenylamine	0.01 ^a	0.05

CAS No.	Chemical Name	Groundwater Remediation Objective	
		Class I (mg/L)	Class II (mg/L)
621-64-7	<i>N</i> -Nitrosodi- <i>n</i> -propylamine	0.01 ^a	0.01
87-86-5	Pentachlorophenol	0.001 ^{a,c}	0.005 ^c
108-95-2	Phenol	0.1 ^c	0.1 ^c
95-95-4	2,4,5-Trichlorophenol	0.7	3.5
88-06-2	2,4,6 Trichlorophenol	0.0064 ^a	0.032
	Inorganics		
7440-36-0	Antimony	0.006 ^c	0.024 ^c
7440-38-2	Arsenic	0.05 ^c	0.2 ^c
7440-39-3	Barium	2.0 ^c	2.0 ^c
7440-41-7	Beryllium	0.004 ^c	0.5 ^c
7440-42-8	Boron	2.0 ^c	2.0 ^c
7440-43-9	Cadmium	0.005 ^c	0.05 ^c
16887-00-6	Chloride	200 ^c	200 ^c
7440-47-3	Chromium, total	0.1 ^c	1.0 ^c
18540-29-9	Chromium, ion, hexavalent	---	---
7440-48-4	Cobalt	1.0 ^c	1.0 ^c
7440-50-8	Copper	0.65 ^c	0.65 ^c
57-12-5	Cyanide	0.2 ^c	0.6 ^c
7782-41-4	Fluoride	4.0 ^c	4.0 ^c
15438-31-0	Iron	5.0 ^c	5.0 ^c
7439-92-1	Lead	0.0075 ^c	0.1 ^c
7439-96-5	Manganese	0.15 ^c	10.0 ^c
7439-97-6	Mercury	0.002 ^c	0.01 ^c
7440-02-0	Nickel	0.1 ^c	2.0 ^c
14797-55-8	Nitrate as N	10.0 ^c	100 ^c
7782-49-2	Selenium	0.05 ^c	0.05 ^c
7440-22-4	Silver	0.05 ^c	---
14808-79-8	Sulfate	400 ^c	400 ^c

CAS No.	Chemical Name	Groundwater Remediation Objective	
		Class I (mg/L)	Class II (mg/L)
7440-28-0	Thallium	0.002 ^c	0.02 ^c
7440-62-2	Vanadium ²	0.049	---
7440-66-6	Zinc	5.0 ^c	10 ^c

Chemical Name and Groundwater Remediation Objective Notations

- ^a The groundwater Health Advisory concentration is equal to ADL for carcinogens.
- ^b Oral Reference Dose and/or Reference Concentration under review by USEPA. Listed values subject to change.
- ^c Value listed is also the Groundwater Quality Standard for this chemical pursuant to 35 Ill. Adm. Code 620.410 for Class I Groundwater or 35 Ill. Adm. Code 620.420 for Class II Groundwater.

APPENDIX E

Time Line

TIME LINE
Additional LUST Investigation.
Building 1600A, GLNTC, Illinois

ID	Task Name	Duration	Start	Finish	October 1999				November 1999				December 1999							
					10/10	10/17	10/24	10/31	11/7	11/14	11/21	11/28	12/5	12/12	12/19	12/26				
1	Additional Investigation	49 days	10/18/99	12/23/99	[Summary bar]															
2	Site Work	7 days	10/18/99	10/26/99	[Task bar]															
3	Mobilization	1 day	10/18/99	10/18/99	[Task bar]															
4	Drilling activities	3 days	10/19/99	10/21/99	[Task bar]															
5	Soil sampling	3 days	10/19/99	10/21/99	[Task bar]															
6	Well development	1 day	10/22/99	10/22/99	[Task bar]															
7	Groundwater sampling	1 day	10/25/99	10/25/99	[Task bar]															
8	Slug tests	1 day	10/26/99	10/26/99	[Task bar]															
9	Demobilization	0 days	10/26/99	10/26/99	[Milestone diamond]															
10	Post Work Submittals	42 days	10/27/99	12/23/99	[Summary bar]															
11	Draft Completion Report	23 days	10/27/99	11/26/99	[Task bar]															
12	Navy review & comments	12 days	11/29/99	12/14/99	[Task bar]															
13	Final Completion Report	7 days	12/15/99	12/23/99	[Task bar]															
14	Navy approval	0 days	12/23/99	12/23/99	[Milestone diamond]															

APPENDIX F

Material Safety Data Sheets

BP OIL -- GASOLINE, BP REGULAR UNLEADED
MATERIAL SAFETY DATA SHEET
NSN: 913000N082378
Manufacturer's CAGE: 82250
Part No. Indicator: A
Part Number/Trade Name: GASOLINE, BP REGULAR UNLEADED

General Information

Company's Name: BP OIL CO
Company's Street: 200 PUBLIC SQUARE
Company's City: CLEVELAND
Company's State: OH
Company's Country: US
Company's Zip Code: 44114-2375
Company's Emerg Ph #: 800-424-9300 (CHEMTREC)
Company's Info Ph #: 800-321-8642; 216-586-8023
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 25APR95
Safety Data Review Date: 03FEB98
MSDS Serial Number: CGCVB

Ingredients/Identity Information

Proprietary: NO
Ingredient: GASOLINE (MAY CONTAIN INGREDIENTS 2-11) % WT: 99.99-100
Ingredient Sequence Number: 01
Percent: 80F, >27C
Melting Point: N/A
Vapor Pressure (MM Hg/70 F): 760 @ 100F
Vapor Density (Air=1): 1.2
Specific Gravity: 0.72-0.74
Evaporation Rate And Ref: >1 (H*20=1)
Solubility In Water: NEGLIGIBLE
Percent Volatiles By Volume: 100

Fire and Explosion Hazard Data

Flash Point: -35F, -37C
Flash Point Method: TCC
Lower Explosive Limit: 1.4%
Upper Explosive Limit: 7.6%
Extinguishing Media: USE DRY CHEMICAL, ALCOHOL FOAM, ALL PURPOSE AFFF OR CARBON DIOXIDE TO EXTINGUISH FIRE.
Special Fire Fighting Proc: USE NIOSH APPRVD SCBA & FULL PROT EQUIP (FP N). WATER MAY BE INEFTIVE BUT SHOULD BE USED TO COOL FIRE-EXPOS CNTNRS, STRUCTURES & TO PROTECT PERS. IF (SUPDAT)
Unusual Fire And Expl Hazrds: DANGEROUS WHEN EXPOS TO HEAT/FLAME. VAPS FORM FLAM/EXPLO MIXS W/AIR AT ROOM TEMP. VAP/GAS MAY SPREAD TO DISTANT IGNIT SOURCE & FLASH BACK. VAPS MAY CONC(SUPDAT)

Reactivity Data

Stability: YES
Cond To Avoid (Stability): STABLE UNDER CONDITIONS OF NORMAL USE.
Materials To Avoid: AVOID CONTACT WITH STRONG OXIDIZERS.
Hazardous Decomp Products: COMBUSTION MAY PRODUCE CARBON MONOXIDE, CARBON DIOXIDE AND REACTIVE HYDROCARBONS.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT

Health Hazard Data

LD50-LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.
Route Of Entry - Inhalation: YES

Route Of Entry - Skin: YES
 Route Of Entry - Ingestion: YES
 Health Haz Acute And Chronic: INGEST:ASPIR INTO LUNGS MAY CAUSE PNEUMIT.
 MAY CAUSE GI DISTURBS. SYMPS INCL IRRIT, NAUS, VOMIT & DIARR. MAY CAUSE
 HARMFUL CNS EFTS; MAY INCL EXCITATION, EUPHORIA, HDCH, DIZZ, DROW, BLURRED
 SLIGHT IRRIT. RPTD/PRLNGD CNTCT MAY CAUSE (EFTS OF OVEREXP)
 Carcinogenicity - NTP: YES
 Carcinogenicity - IARC: YES
 Carcinogenicity - OSHA: YES
 GROUP 2B. BENZENE: IARC MONO, VOL 7, PG 120, 1987:GROUP 1. NTP 7TH (ING 13)
 Signs/Symptoms Of Overexp: HLTH HAZ: DEFAT, REDNESS, ITCH, INFLAM,
 CRACKING & POSS BURNS & SECONDARY INFECTION. HIGH PRESS SKIN INJECTIONS ARE
 SERIOUS MED EMERS. INJURY MAY NOT APPEAR SERIOUS AT FIRST; W/IN FEW HRS,
 TISS BECOMES SWOLLEN, DISCOLORED & EXTREMELY PAINFUL. EYES:MAY CAUSE IRRIT,
 REDNESS, PAIN, BLURRED VISION, LACRIM & CONJ. (ING 14)
 Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
 Emergency/First Aid Proc: INGEST:DO NOT INDUCE VOMIT; ASPIR DANGER. GET
 REMOVE CONTAMD CLTHG IMMED. WASH AREA W/SOAP & WATER. GET MED ATTN IF IRRIT
 PERSISTS. HIGH PRESS SKIN INJECTIONS REQ IMMED MED CARE. EYES:FLUSH IMMED
 W/LG AMTS OF WATER FOR AT LST 15 MIN. HOLD LIDS AWAY FROM EYEBALL. GET MED
 ATTN IF IRRIT RSLTS. INHAL:REMOVE FROM EXPOS. IF (ING 19)

=====
 Precautions for Safe Handling and Use
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Steps If Matl Released/Spill: SHUT OFF IGNIT SOURCE. STOP LEAK IF W/OUT
 RISK. WATER SPRAY MAY REDUCE VAP BUT MAY NOT PVNT IGNIT IN CLSD SPACES. SM
 SPILL:TAKE UP W/NONCOMBUST ABSORB & PLACE INTO CNTNRS. LG SPILL:DIKE FAR
 AHEAD OF LIQ SPILL. CNTCT NEHC FOR MORE INFO (FP N).
 Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
 Waste Disposal Method: CHECK 40 CFR 261 TO DETERMINE WHETHER THIS
 SUBSTANCE IS HAZARDOUS WASTE. TRANSPORTATION, STORAGE, TREATMENT & DISPOSAL
 OF THIS WASTE MATERIAL MUST BE CONDUCTED IN COMPLIANCE W/ALL APPLIC
 FEDERAL, STATE & LOCAL REGS. FOR MORE INFO CNTCT NEHC (FP N).
 Precautions-Handling/Storing: STORE ONLY IN APPRVD, CLEARLY LABELED CNTNRS
 (NEVER IN GLASS/UNAPPRVD PLASTIC CNTNRS); TIGHTLY CLSD IN COOL, DRY,
 ISOLATED, WELL-VENTD AREA.
 Other Precautions: DO NOT SIPHON PROD BY MOUTH. USE ONLY AS MOTOR FUEL;
 NOT FOR CLEANING, PRESS APPLIANCE FUEL/ANY OTHER USE. KEEP OUT OF REACH OF
 CHILDREN. EMPTY CNTNRS MAY CNTN TOX, FLAM, COMBUST, EXPLO RESIDUE/VAPS.
 CONTACT NEHC FOR MORE INFO (FP N).

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 Control Measures
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Respiratory Protection: IF EXPOS LIMS ARE EXCEEDED OR IRRIT IS
 EXPERIENCED, NIOSH APPRVD RESP PROT SHOULD BE WORN. VENT & OTHER FORMS OF
 ENGINEERING CTS ARE OFTEN PREF MEANS FOR CONTROLLING CHEM EXPOS. RESP PROT
 MAY BE NEEDED FOR NON-ROUTINE OR EMER SITUATIONS.
 Ventilation: NONE SPECIFIED BY MANUFACTURER.
 Protective Gloves: IMPERVIOUS GLOVES.
 Eye Protection: ANSI APPRVD CHEM WORKERS GOGGLES (FP N).
 Other Protective Equipment: ANSI APPROVED EYE WASH & DELUGE SHOWER (FP N).
 AVOID SKIN CONTACT. WEAR PROT CLTHG. DO NOT WEAR CNTCT LENSES.
 Work Hygienic Practices: WASH HANDS IF IN CNTCT W/MATL. USE GOOD PERSONAL
 HYGIENE. WEAR REGULARLY CLEANED WORK CLTHG. SHOWER & CHANGE AFTER WORK.
 Suppl. Safety & Health Data: FIRE FIGHT PROC: LEAK/SPILL HAS NOT IGNITED,
 VENT AREA & USE WATER SPRAY TO DISPERSE GAS/VAP & PROTECT PERS. USE WATER
 TO DULUTE SPILLS & FLUSH THEM AWAY FROM IGNIT SOURCE. DO NOT FLUSH DOWN
 PUBLIC SEWERS/OTHER DRAIN SYS. EXPLO HAZ: IN CONFINED AREAS. RUNOFF TO
 SEWER MAY CAUSE FIRE/EXPLO HAZ. CNTNRS MAY (ING 12)

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 Transportation Data
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 Disposal Data
 =====

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 Label Data
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Label Required: YES
Technical Review Date: 03FEB98
Label Date: 29JAN98
Label Status: G
Common Name: GASOLINE, BP REGULAR UNLEADED
Chronic Hazard: YES
Signal Word: DANGER!
Acute Health Hazard-Moderate: X
Contact Hazard-Moderate: X
Fire Hazard-Severe: X
Reactivity Hazard-None: X
Special Hazard Precautions: FLAMMABLE. ACUTE: INGEST: ASPIRATION INTO LUNGS MAY CAUSE PNEUMIT. MAY CAUSE GI DISTURBS. SYMPTOMS INCL IRRIT, NAUSEA, VOMIT & DIARR. MAY CAUSE HARMFUL CNS EFTS; MAY INCL EXCITATION, EUPHORIA, HEADACHE, DIZZ, DROW, BLURRED VISION, FATIGUE, TREMORS, CONVLS, UNCON, COMA, RESP ARREST & DEATH. SKIN: SLIGHT IRRIT. EYES: SLIGHT IRRIT. MAY CAUSE REDNESS, PAIN, BLURRED VISION, LACRIMATION & CONJ. INHAL: MAY CANCER HAZARD. GASOLINE IS LISTED AS AN ANIMAL LUNG CARCINOGEN. CONTAINS BENZENE WHICH IS LISTED AS A HUMAN LUNG CARCINOGEN (FP N). MAY ADVERSELY EFFECT LIVER & KIDNEY.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: BP OIL CO
Label Street: 200 PUBLIC SQUARE
Label City: CLEVELAND
Label State: OH
Label Zip Code: 44114-2375
Label Country: US
Label Emergency Number: 800-424-9300 (CHEMTREC)

MOBIL OIL -- MOBIL DTE 15M - HYDRAULIC FLUID, PETROLEUM BASE
MATERIAL SAFETY DATA SHEET
NSN: 9150012209321
Manufacturer's CAGE: 77988
Part No. Indicator: B
Part Number/Trade Name: MOBIL DTE 15M

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General Information
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Item Name: HYDRAULIC FLUID, PETROLEUM BASE
Company's Name: MOBIL OIL CORP
Company's Street: 150 E 42ND ST
Company's City: NEW YORK
Company's State: NY
Company's Country: US
Company's Zip Code: 10017-5612
Company's Emerg Ph #: 212-883-4411
Company's Info Ph #: 703-849-3265 OR 800-662-4525
Distributor/Vendor # 1: MOBIL OIL CORP ENVIRONMENTAL AFFAIRS & T
Distributor/Vendor # 1 Cage: OAHKO
Distributor/Vendor # 2: MOBIL CHEMICAL CO DIV OF MOBIL OIL CORP
Distributor/Vendor # 2 Cage: 29430
Record No. For Safety Entry: 003
Tot Safety Entries This Stk#: 003
Status: SM
Date MSDS Prepared: 21SEP90
Safety Data Review Date: 11FEB94
Supply Item Manager: CX
MSDS Preparer's Name: ENVIRO HEAL & SAFE DEPT
Preparer's Company: MOBILE OIL CORPORATION
Preparer's City: PRINCETON
Preparer's State: NJ
MSDS Serial Number: BSRFC
Hazard Characteristic Code: N1
Unit Of Issue: CN
Unit Of Issue Container Qty: 5 GALLONS

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Ingredients/Identity Information
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Proprietary: NO
Ingredient: DISTILLATES, HYDROTREATED HEAVY PARAFFINIC
Ingredient Sequence Number: 01
Percent: UNKNOWN
NIOSH (RTECS) Number: PY8035500
CAS Number: 64742-54-7
OSHA PEL: 300 PPM
ACGIH TLV: 300 PPM
Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: MINERAL OIL, PETROLEUM DISTILLATES, SOLVENT-DEWAXED HEAVY PARAFFINIC
Ingredient Sequence Number: 02
Percent: UNKNOWN
NIOSH (RTECS) Number: PY8038500
CAS Number: 64742-65-0
OSHA PEL: 5 MG/M3 AS OIL MIST
ACGIH TLV: 5 MG/M3 AS OIL MIST
Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: MINERAL OIL, PETROLEUM DISTILLATES, HYDROTREATED LIGHT NAPHTHENIC
Ingredient Sequence Number: 03
Percent: UNKNOWN
NIOSH (RTECS) Number: PY8036000
CAS Number: 64742-53-6

OSHA PEL: 5 MG/M3 (OIL MIST)
 ACGIH TLV: 5 MG/M3 (OIL MIST)
 Other Recommended Limit: NONE RECOMMENDED

 Proprietary: NO
 Ingredient: 2-PROPENOIC ACID, 2-METHYL-DODECYL ESTER, POLYMER W/METHYL 2-METHYL-2-PROPENOATE & TETRADECYL 2-METHYL-2-PROPENOATE.
 Ingredient Sequence Number: 04
 Percent: 600F, >316C
 Melting Point: N/A
 Vapor Pressure (MM Hg/70 F): 330F, >166C
 Flash Point Method: COC
 Lower Explosive Limit: 0.6
 Upper Explosive Limit: 7.0
 Extinguishing Media: WATER/FOAM CAUSE FROTHING. USE WATER TO COOL CONTAINERS.
 Special Fire Fighting Proc: FIREFIGHTERS MUST USE SCBA FOR FIRES IN ENCLOSED AREAS.
 Unusual Fire And Expl Hazrds: NONE

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

Stability: YES
 Cond To Avoid (Stability): EXTREME HEAT.
 Materials To Avoid: STRONG OXIDIZERS.
 Hazardous Decomp Products: CARABON MONOXIDE.
 Hazardous Poly Occur: NO
 Conditions To Avoid (Poly): N/A

=====
 Health Hazard Data
 =====

LD50-LC50 Mixture: TLV=5.00MG/M3 FOR OIL MIST
 Route Of Entry - Inhalation: YES
 Route Of Entry - Skin: YES
 Route Of Entry - Ingestion: YES
 Health Haz Acute And Chronic: ACUTE:INGEST:ESTIMATED SLIGHTLY TOXIC
 INHAL:HARMFUL CONCEN OF MISTS &/OR VAPORS ARE UNLIKELY TO BE ENCOUNTERED THROUGH ANY CUSTOMARY OR REASONABLY FORESEEABLE HANDLING, USE, OR MISUSE OF PRODUCT. EYE:EXPECTED TO BE NONIRRITATING. SKIN:SLIGHT IRRITATION ON PROLONGED/REPEATED CONTACT. CHRONIC: SLIGHT SKIN IRRITATION.
 Carcinogenicity - NTP: NO
 Carcinogenicity - IARC: NO
 Carcinogenicity - OSHA: NO
 Signs/Symptoms Of Overexp: INGEST:ESTIMATED SLIGHTLY TOXIC. SKIN: REDNESS, ITCHING, DISCMFORT.
 Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
 Emergency/First Aid Proc: EYE:FLUSH W/WATER. SKIN:WASH AREA W/SOAP & WATER. HIGH PRESSURE ACCIDENTAL INJECTION THROUGH SKIN REQUIRES IMMED MEDICAL ATTENTION FOR POSSIBLE INCISION, IRRIGATION &/OR DEBRIDEMENT. INHAL:NOT EXPECTED TO BE A PROBLEM. INGEST:NOT EXPECTED TO BE A PROBLEM, HOWEVER, IF >1/2 LITER (PINT) INGESTED, IMMED GIVE 1-2 GLASSES OF WATER & SEE DOCTOR. DO NOT INDUCE VOMITING OR GIVE ANYTHING BY MOUTH TO UNCONSC

=====
 Precautions for Safe Handling and Use
 =====

Steps If Matl Released/Spill: ADSORB ON FIRE RETARDANT TREATED SAWDUST, DIATOMACEOUS EARTH, ETC. SHOVELUP & DISPOSE OF @ AN APPROPRIATE WASTE DISPOSAL FACILITY. REPORT TO US COASTGUARD 800-424-8802 SPILLS THAT COULD REACH ANY WATERWAY. FOR ACCIDENT/ROADSPILLS CALL CHEMTREC 800-424-9300
 Waste Disposal Method: DISPOSE OF IAW LOC/STA/FED REGUL & PRODUCT CHARACTERISTICS @ TIME OF DISPOSAL. PRODUCT SUITABLE FOR BURNING IN ENCLOSED CONTROLLED BURNER FOR FUEL VALUE/DISPOSAL BY SUPERVISED INCINERATION & APPROVED RECYCLING FACIL OR GOVT APPROVED WASTE DISP FACILIT
 Precautions-Handling/Storing: NONE SPECIFIED BY MANUFACTURER.
 Other Precautions: NONE SPECIFIED BY MANUFACTURER.

=====
 Control Measures
 =====

Respiratory Protection: NO SPECIAL REQUIREMENTS UNDER ORDINARY CONDITIONS OF USE AND WITH ADEQUATE VENTILATION.

Ventilation: NO SPECIAL REQUIREMENTS UNDER ORDINARY CONDITIONS OF USE AND WITH ADEQUATE VENTILATION.

Protective Gloves: NONE SPECIFIED BY MANUFACTURER.

Eye Protection: NONE SPECIFIED BY MANUFACTURER.

Other Protective Equipment: NONE SPECIFIED BY MANUFACTURER.

Work Hygienic Practices: WASH HANDS THOROUGHLY AFTER HANDLING AND BEFORE EATING/SMOKING/DRINKING.

Suppl. Safety & Health Data: PRODUCT CONTAINS TWO OR MORE OF INGREDIENTS 1,2,3 WHICH ARE BASE OILS (PETROLEUM DISTILLATES) MAKING UP >90.00%. PRODUCT MAY ALSO CONTAIN THE ZINC ADDITIVE.

=====
Transportation Data
=====

Trans Data Review Date: 94045

DOT PSN Code: ZZZ

DOT Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION

IMO PSN Code: ZZZ

IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION

IATA PSN Code: ZZZ

IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION

AFI PSN Code: ZZZ

AFI Prop. Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION

=====
Disposal Data
=====

=====
Label Data
=====

Label Required: YES

Technical Review Date: 14FEB94

Label Status: F

Common Name: MOBIL DTE 15M

Chronic Hazard: NO

Signal Word: CAUTION!

Acute Health Hazard-Slight: X

Contact Hazard-Slight: X

Fire Hazard-None: X

Reactivity Hazard-None: X

Special Hazard Precautions: INGEST:ESTIMATED SLIGHTLY TOXIC. INHAL:HARMFUL
CONCEN OF MISTS &/OR VAPORS ARE UNLIKELY TO BE ENCOUNTERED THROUGH ANY
EXPECTED TO BE NONIRRIT.SKIN:SLIGHT IRRIT ON PROLONG/REPEAT CONTACT.TARGET
ORGANS:RESP TRACT/SKIN.1ST AID:EYE:FLUSH W/WATER.SKIN:WASH W/SOAP & WATER.
HIGH PRESSURE ACCIDENTAL INJECTION THROUGH SKIN REQUIRES IMMEDIATE MED ATTN FOR
POSSIBLE INCISION, IRRIGATION &/OR DEBRIDEMENT. INHAL/INGEST:NOT EXPECTED TO
BE A PROBLEM, HOWEVER IF >1/2 LITER (PINT) INGESTED, IMMEDIATELY GIVE 1-2 GLASSES OF
WATER. SEE DOCTOR. DON'T INDUCE VOMIT OR GIVE ANYTHING BY MOUTH TO UNCONSC
PERSON.

Protect Eye: Y

Protect Skin: Y

Protect Respiratory: Y

Label Name: MOBIL OIL CORP

Label Street: 150 E 42ND ST

Label City: NEW YORK

Label State: NY

Label Zip Code: 10017-5612

Label Country: US

Label Emergency Number: 212-883-4411

Please reduce your browser font size for better viewing and printing.

MSDS**Material Safety Data Sheet**

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

MALLINCKRODT

24 Hour Emergency Telephone: 908-850-2151
CHEMTREC: 1-800-424-6300

National Response in Canada
CANUTEC: 613-690-6606

Outside U.S. and Canada
Chemtrec: 202-463-7616

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

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

METHYL TERT-BUTYL ETHER

MSDS Number: B7222 — Effective Date: 09/08/97

1. Product Identification

Synonyms: 2-Methoxy-2-methylpropane; tert-Butyl methyl ether; Methyl 1,1-dimethyl ethyl ether; MTBE

CAS No.: 1634-04-4

Molecular Weight: 88.15

Chemical Formula: C₅H₁₂O

Product Codes:

J.T. Baker: 9034, 9042, 9043

Mallinckrodt: 5398

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Methyl tert-butyl Ether	1634-04-4	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE. HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. MAY AFFECT CENTRAL NERVOUS SYSTEM, BLOOD, AND KIDNEYS. A CENTRAL NERVOUS SYSTEM DEPRESSANT. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

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

Health Rating: 3 - Severe (Poison)

Flammability Rating: 4 - Extreme (Flammable)
Reactivity Rating: 2 - Moderate
Contact Rating: 1 - Slight
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT
HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:

Inhalation of vapor can irritate respiratory tract. Causes central nervous system effects. Breathing high concentrations in air can cause lightheadedness, dizziness, weakness, nausea, headache.

Ingestion:

May cause nausea, vomiting. Other symptoms similar to inhalation may occur. Laryngeal, ocular, and respiratory muscles are affected in severe poisoning.

Skin Contact:

A mild skin irritant which causes loss of natural oils. May be a route of absorption into the body.

Eye Contact:

Vapors can irritate eyes; splashes may cause damage to eye tissue.

Chronic Exposure:

Symptoms noted above may be produced by cumulative exposure.

Aggravation of Pre-existing Conditions:

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

4. First Aid Measures

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Ingestion:

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

Skin Contact:

Remove any contaminated clothing. Wash skin with soap and water for at least 15 minutes. Get medical attention if irritation develops or persists.

Eye Contact:

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

5. Fire Fighting Measures

Fire:

Flash point: -27C (-17F)

Autoignition temperature: 435C (815F)

Flammable limits in air % by volume:

lcl: 1.6; ucl: 8.4

Extremely Flammable Liquid and Vapor! Vapor may cause flash fire.

Explosion:

METHYL TERT-BUTYL ETHER

Above the flash point, explosive vapor-air mixtures may be formed. Vapors can flow along surfaces to distant ignition source and flash back. Sealed containers may rupture when heated. Sensitive to static discharge.

Fire Extinguishing Media:

Water spray, dry chemical, alcohol foam, or carbon dioxide. Water spray may be used to keep fire exposed containers cool.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB(tm) solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

-ACGIH Threshold Limit Value (TLV): 40 ppm (TWA)

Ventilation System:

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

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded, a full facepiece respirator with dust/mist filter may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For

emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. **WARNING:** Air purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:

Wear protective gloves and clean body-covering clothing.

Eye Protection:

Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:

Clear, colorless liquid.

Odor:

Characteristic ethereal odor.

Solubility:

4.8 g/100g of water.

Specific Gravity:

0.74

pH:

No information found.

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

100

Boiling Point:

55C (131F)

Melting Point:

-110C (-166F)

Vapor Density (Air=1):

No information found.

Vapor Pressure (mm Hg):

245 @ 25C (77F)

Evaporation Rate (BuAc=1):

No information found.

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage. Unstable in acid solutions.

Hazardous Decomposition Products:

Carbon dioxide and carbon monoxide may form when heated to decomposition.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Oxidizers, acids.

Conditions to Avoid:

Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Oral rat LD50: 4 gm/kg; inhalation rat LC50: 23576 ppm/4H.

METHYL TERT-BUTYL ETHER

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

Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	
Methyl tert-butyl Ether (1634-04-4)	No	No	None

12. Ecological Information

Environmental Fate:

When released into the soil, this material is not expected to biodegrade. When released into the air, this material is expected to adversely affect the ozone layer. When released into the soil, this material is expected to quickly evaporate. When released to water, this material is expected to quickly evaporate. When released into the water, this material is expected to have a half-life between 1 and 10 days. This material has an estimated bioconcentration factor (BCF) of less than 100. This material is not expected to significantly bioaccumulate. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is not expected to be degraded by photolysis. When released into the air, this material is expected to have a half-life between 1 and 10 days.

Environmental Toxicity:

No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: METHYL TERT-BUTYL ETHER

Hazard Class: 3

UN/NA: UN2398

Packing Group: II

Information reported for product/size: 335LB

International (Water, I.M.O.)

Proper Shipping Name: METHYL TERT-BUTYL ETHER

Hazard Class: 3.1

UN/NA: UN2398

Packing Group: II

Information reported for product/size: 335LB

15. Regulatory Information

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

TSCA EC Japan Australia

METHYL TERT-BUTYL ETHER

 Methyl tert-butyl Ether (1634-04-4) Yes Yes Yes Yes

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

Ingredient Korea DSL NDSL Phil. --Canada--

Methyl tert-butyl Ether (1634-04-4) Yes Yes No Yes

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

Ingredient -SARA 302- -SARA 313-
 RQ TPQ List Chemical Catg.

Methyl tert-butyl Ether (1634-04-4) No No Yes No

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

Ingredient CERCLA -RCRA- -TSCA-
 261.33 8(d)

Methyl tert-butyl Ether (1634-04-4) 1000 No No

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

Australian Hazchem Code: 3[Y]E

Poison Schedule: No information found.

WHMIS:

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

16. Other Information

NFPA Ratings: Health: 2 Flammability: 4 Reactivity: 0

Label Hazard Warning:

WARNING! EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE. HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. MAY AFFECT CENTRAL NERVOUS SYSTEM, BLOOD, AND KIDNEYS. A CENTRAL NERVOUS SYSTEM DEPRESSANT. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

Label Precautions:

Keep away from heat, sparks and flame.
 Avoid contact with eyes, skin and clothing.
 Avoid breathing vapor.
 Keep container closed.
 Use only with adequate ventilation.
 Wash thoroughly after handling.

Label First Aid:

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

Product Use:

METHYL TERT-BUTYL ETHER

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 15.

Disclaimer:

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Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

APPENDIX G

Incident Forms

Accident & Incident Report

<input type="checkbox"/> Personal Injury/Illness	<input type="checkbox"/> Vehicle Incident; Vehicle #: _____
<input type="checkbox"/> First Aid	<input type="checkbox"/> Accident
<input type="checkbox"/> Other: _____	<input type="checkbox"/> Body Damage
	<input type="checkbox"/> Theft
<input type="checkbox"/> Safety/Non-Injury Incident	<input type="checkbox"/> Equipment Damage
<input type="checkbox"/> Near Miss	<input type="checkbox"/> Lost
<input type="checkbox"/> Vandalism / Property Damage	<input type="checkbox"/> Stolen
<input type="checkbox"/> Personal Property	
<input type="checkbox"/> Company Property	
<input type="checkbox"/> Other: _____	

Associates Name: _____ SS#: _____

Date Incident Occurred: _____ Time of Incident: _____ A.M. P.M.

Supervisor's Name: _____ Date and Time Reported: _____

Project Manager's Name: _____

Date of Hire: _____ Time in Present Occupation: _____ years _____ months

Names of Witnesses to the Incident: _____

In case of accident, were the police called: Yes No If yes, who responded: _____

Describe the Events leading to the Incident: _____

Task at which the associate was engaged (Describe any tools or equipment being used): _____

Description of the work area: _____

Description of the incident: _____

Did the incident take place on the premises: Yes No Location: _____

Tracking # _____

Did associate receive medical care? Yes No Number of days **NOT** worked? _____

If yes, where (Place, city, and phone #): _____

Name of the attending physician: _____

Type of injury: _____ Part of body injured: _____
(Sprain, Strain, Cut, Abrasion, Contusion, Break, etc.)

First aid and/or medical treatment provided (be specific): _____

Have you ever injured this area before? Yes No If yes, when: _____

Safety Officer's Comments: _____

Corrective action (Preventative, Avoidance, Engineered changes): _____

Signature of Associate: _____ Date: _____

Signature of Departmental Safety Officer: _____ Date: _____

Signature of Corporate Safety Officer: _____ Date: _____

HUMAN RESOURCES DEPARTMENT

ABRA Case #: _____ Lost Time: Y N Restrictions: _____

Recordable: Y N # Days Away: _____ # Days Restricted: _____

Out of State: Y N Filed with BWC: Y N Date filed: _____

BWC Claim #: _____ Date Closed: _____

Original: Health and Safety File

CC: Associate Dept. Safety Rep. Worker's Comp File

APPENDIX H

Activity Hazard Analysis

ACTIVITY HAZARD ANALYSIS

ACTIVITY Site Preparation/Layout ANALYZED BY/DATE K. Helman 10/98 REVIEWED BY/DATE R. Schmitt 6/21/99

PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS
<p>Site walk through</p> <p>Identification of work zones for construction activities</p>	<ol style="list-style-type: none"> 1. Exposure to irritant and toxic plants such as poison ivy and sticker bushes may cause allergic reactions. 2. Surfaces covered with heavy vegetation and under growth create a tripping hazard. 3. Back strain due to carrying instruments. 4. Native wildlife such as rodents, ticks, and snakes present the possibility of insect bites and associated diseases such as Lyme disease. 5. Driving vehicles on uneven or unsafe surfaces can result in accidents such as overturned vehicles or flat tires. 6. Electrical hazard due to fallen lines. 7. Thermal stress due to hot/cold temperature extremes. 	<ol style="list-style-type: none"> 1. Wear long sleeved clothing and slacks to minimize contact with irritant and toxic plants and to protect against insect bites. Appropriate first aid for personnel's known allergic reactions. 2. Be alert and observe terrain while walking to minimize slips and falls. Steel-toed boots provide additional support and stability. 3. Use proper lifting techniques to prevent back strain. 4. Avoid wildlife when possible. In case of an animal bite, perform first aid and capture the animal, if possible, for rabies testing. Perform a tick check after leaving a wooded or vegetated area. 5. Ensure all maintenance is performed on vehicles before going to the field. Site surveillance on foot might be required to choose clear driving paths. 6. Ensure fallen power lines are not energized. 7. Implement thermal stress management techniques such as shifting work hours, fluid intake, and monitoring employees, especially high risk
EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
		<ol style="list-style-type: none"> 1. Review hazard analysis with personnel performing the site walk through prior to start

ACTIVITY HAZARD ANALYSIS

ACTIVITY Drilling ANALYZED BY/DATE K. Helman 10/98

REVIEWED BY/DATE R. Bechtel 6/21/99

PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS
Soil Borings/Well Installations	<ol style="list-style-type: none"> 1. Noise levels exceeding the OSHA action level of 85 dBA are both a hazard and a hinderance to communication. 2. Overhead utility wires, i.e., electrical and telephone, can be hazardous when the drill rig boom is in the upright position. 3. Underground pipelines and utility lines can be ruptured or damaged during active drilling operations. 4. Moving parts, i.e. augers, on the drill rig may catch clothing. Free or falling parts from the cat head may cause head injury. 5. Moving the drill rig over uneven terrain may cause the vehicle to roll over or get stuck in a rut or mud. Be aware of hazards associated with moving heavy machinery and other associated injury. 6. High pressure hydraulic lines and air lines used on drill rigs are hazardous when they are in ill repair or incorrectly assembled. 	<ol style="list-style-type: none"> 1. Wear hard hats at all times on-site 2. Review the contaminants suspected to be onsite and perform air monitoring as required. 3. All chains, lines, cables should be inspected daily for weak spots. 4. Ear muffs and ear plugs effectively reduce noise levels. 5. Secure loose clothing. 6. Check boom prior to approaching drill rig. 7. Barricades will be placed to create an exclusion zone around the heavy equipment. 8. To avoid contact with any overhead lines, the drill rig boom should be lowered prior to moving the rig. Overhead utilities should be considered "live" until determined otherwise. 9. The rig mast should not be erected within 10 feet of an overhead electrical line until the line is deenergized, grounded, or shielded and an electrician has certified that arcing cannot occur. 10. Adhere to the minimum working distances around "live" overhead power lines 11. A thorough underground utilities search should be conducted before the commencement of a drilling project. 12. All high pressure lines should be checked prior to and during use. Clips, retainers, or whip check devices should be used on all hose connections. Manufacturer pressure recommendations will not be exceeded.
EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
Drilling rig	Use general safety rules and procedures listed in HASP, review manufacturer's recommendation and guidance on inspection equipment. Complete on daily basis after use.	OSHA 1910.120 40-Hour Training, 3 day OJT, 8 hours Supervisory, 8 hour Refresher, HASP, OSHA Hazard Communication and Respirator training.

ACTIVITY HAZARD ANALYSIS

ACTIVITY Soil Sampling ANALYZED BY/DATE K. Helman 10/98 REVIEWED BY/DATE R. Bechtel 6/21/99

PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS
Subsurface Soil Sampling	<ol style="list-style-type: none"> 1. Dermal contact with or inhalation of contaminants, potentially in high concentrations in sampling media. 2. Back strain and muscle fatigue due to lifting, shoveling and auguring techniques. 3. Dermal contact with or inhalation of decontamination solutions. 	<ol style="list-style-type: none"> 1. To minimize exposure to chemical contaminants, a thorough review of suspected contaminants shall be completed and implementation of an adequate protection program. 2. PPE shall include level D consisting of work uniform, steel toe boots/shoes, hard hat, safety glasses, hearing protection (when levels exceed 85 dbs) and tyvek suit (may not be needed depending on site conditions). 3. Proper lifting (pre-lift weight assessment, use of legs, multiple personnel) techniques will prevent back strain. Use slow easy motions when shoveling, auguring, and digging to decrease muscle strain. 4. Material Safety Data Sheets for all decontamination solutions shall be included with the Site Health and Safety Plan. 5. First aid equipment shall be available based on MSDS requirements.
EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
Soil sampling tools		OSHA 1910.120 40-hr. training, 3 day OJT, 8 hr. Supervisory, 8 hr. refresher, OSHA Hazard Communication, and Respirator training. Knowledge and training on collection of environmental samples

ACTIVITY HAZARD ANALYSIS

ACTIVITY Equipment Decontamination ANALYZED BY/DATE K. Helman 10 /1998 REVIEWED BY/DATE R. Bachert 6/21/99

PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS
<p>Decontaminate Heavy Equipment Using High Pressure Wash or Hand Scrubbing</p> <p>Decontaminate Sampling Equipment by Hand Washing</p>	<p>1. Contact with contaminated material, inhalation of airborne aerosols, contact with high-pressure wash stream, unexpected movement of material to be decontaminated.</p>	<p>1. Decontamination area to provide isolation and controlled access.</p> <p>2. Level D PPE with face shield. Secure items to be decontaminated. Visual inspect integrity of containment liners and containers used for wastewater. CRZ provided for worker decontamination.</p> <p>3. MSDS' obtained and reviewed for all cleaning solutions chemicals if used.</p>
EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
<p>High pressure wash with soap solution, other decontamination solutions, scrub brushes.</p>	<p>Use general safety rules and procedures listed in HASP, review manufacturer's recommendation and guidance on inspection equipment. Complete on daily basis after use.</p>	<p>OSHA 1910.120 40-Hour Training, 3 day OJT, 8 hours Supervisory, 8 hour Refresher, HASP, OSHA Hazard Communication and Respirator training.</p>

APPENDIX I

Hospital Location Directions



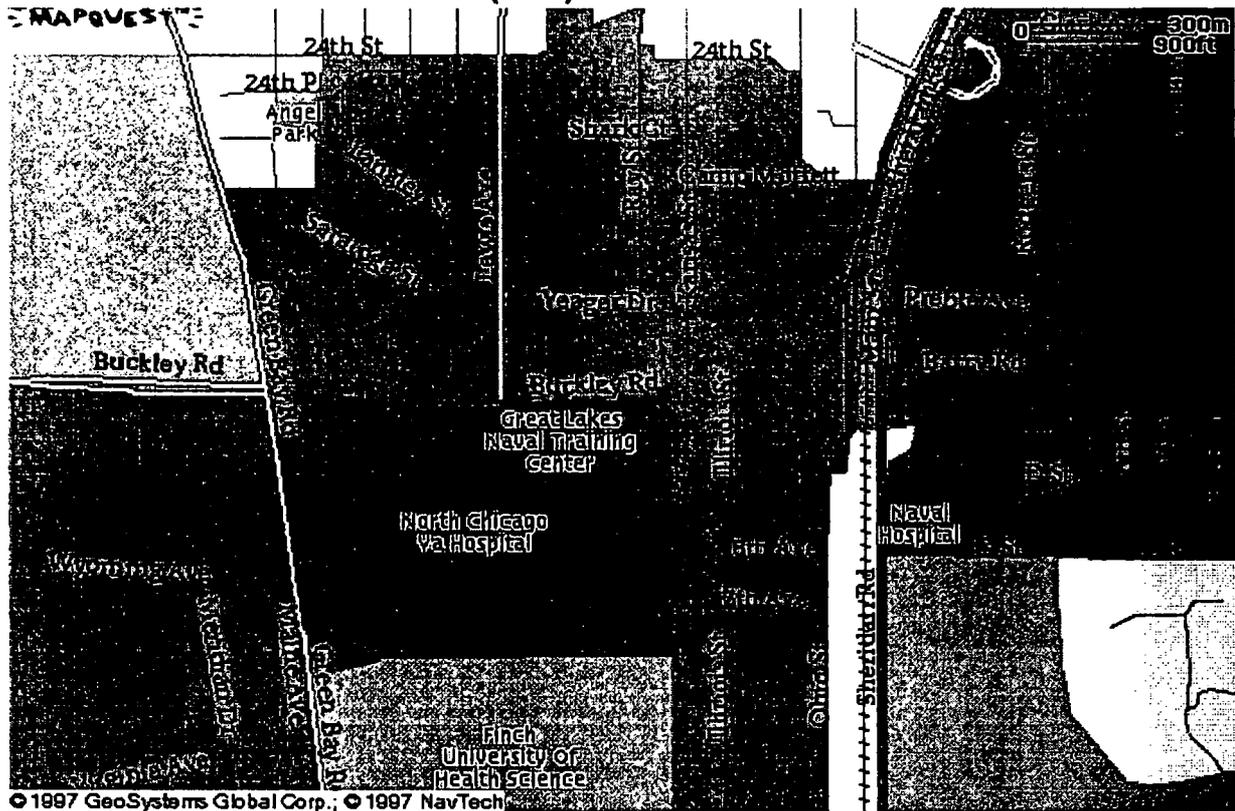
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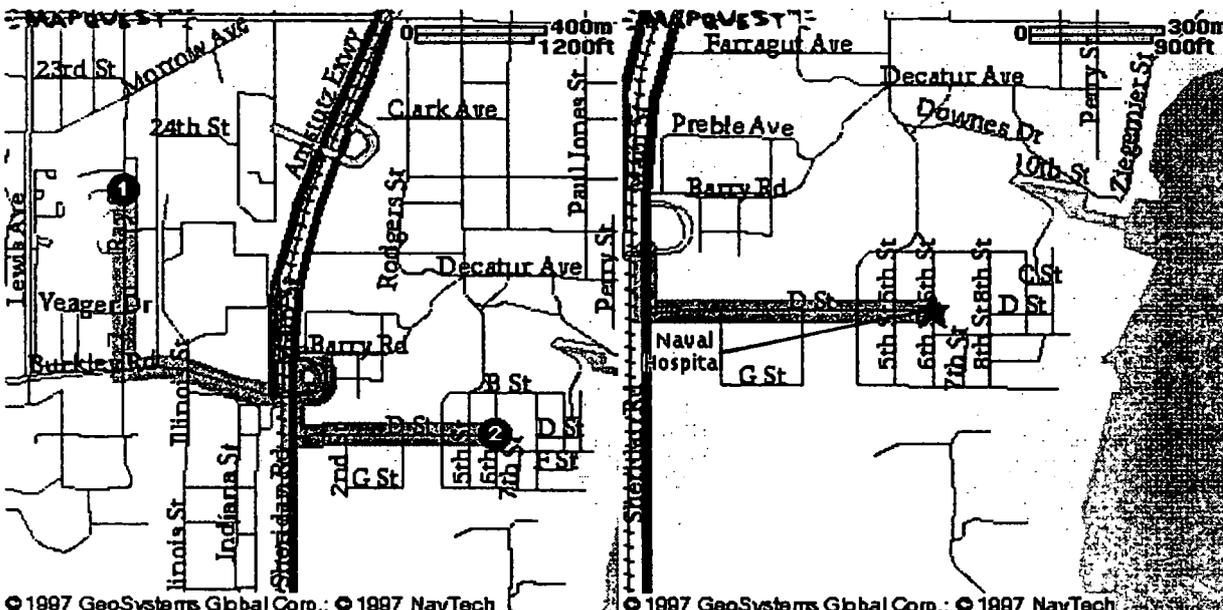
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[New Search](#)

The exact starting address was unavailable, but this is very nearby.
The exact destination address was unavailable, but this is very nearby.

Starting From: Ray St and Shark Ct
Arriving At: D St and 6th St
Distance: 1.4 miles
Approximate Travel Time: 7 mins
 Great Lakes, IL 60088 Great Lakes, IL 60088

	Directions	miles
1.	Start out going South on RAY ST towards SKATE CT.	0.4
2.	Turn LEFT onto BUCKLEY RD.	0.3
3.	Stay straight to go onto ramp.	0.2
4.	Turn LEFT onto SHERIDAN RD.	0.2
5.	Turn LEFT onto D ST.	0.4



1) Enter a starting address : 2) and a destination address:

Street Address, Intersection or Airport Code

City, State Zip or a ZIP

Street Address, Intersection or Airport Code

City, State Zip or a ZIP



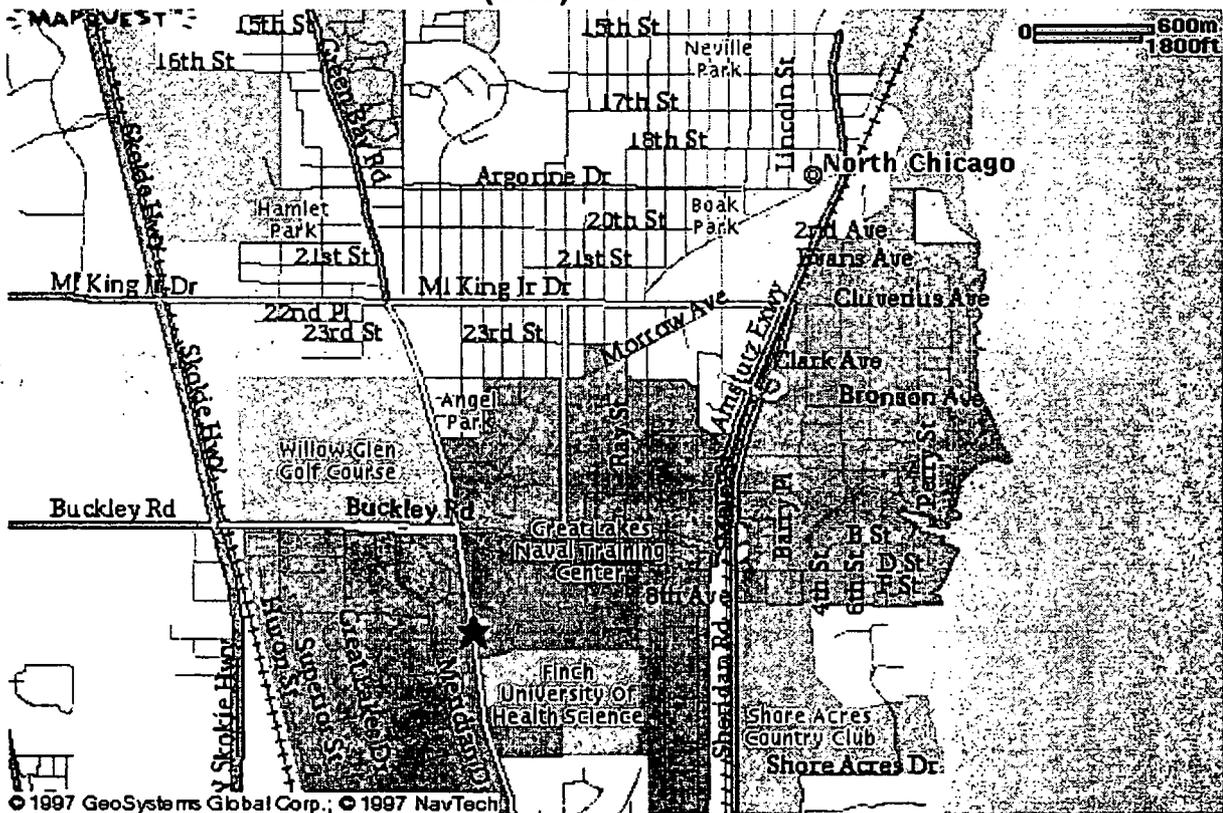
[Yahoo!](#) - [Yellow Pages](#) - [Maps](#) - [Address Book](#) - [Help](#)

Expect More

3001 Green Bay Rd, North Chicago, IL

[New Search](#)

**US Veterans Medical Ctr
3001 Green Bay Rd, North Chicago, IL 60064
(847) 688-1900**



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Find: Loans for Me Powered by GetSmart.com

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The exact starting address was unavailable, but this is very nearby.

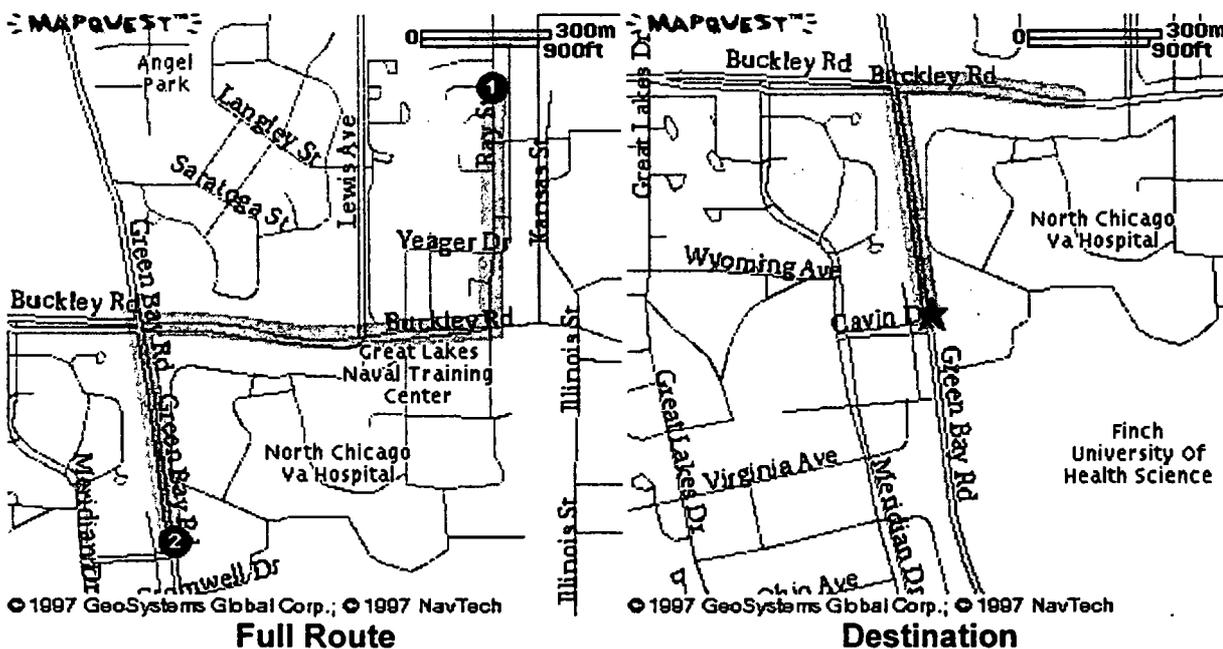
Starting From: Ray Street and Shark Ct 3001 Green Bay Rd
 Great Lakes, IL 60088

 Arriving At: North Chicago, IL 60064

 Distance: 1.2 miles

 Approximate Travel Time: 5 mins

- | | Directions | miles |
|----|---|-------|
| 1. | Start out going South on RAY ST towards SKATE CT. | 0.4 |
| 2. | Turn RIGHT onto BUCKLEY RD. | 0.5 |
| 3. | Turn LEFT onto GREEN BAY RD. | 0.4 |



1) Enter a starting address : 2) and a destination address:

Street Address, Intersection or Airport Code

City, State Zip or a ZIP

Street Address, Intersection or Airport Code

City, State Zip or a ZIP

(Like any driving directions/map, you should always do a reality check and make sure the road still exists, watch out for construction, and follow all traffic safety precautions. This is only to be used as an aid in planning.)

APPENDIX J

Photoionization Detector Field Screening

Subject: PHOTOIONIZATIONDETECTOR FIELD SCREENING	Procedure No:	Rev. No:	Page No:
	FOP 7-1	1	1 of 3
	Effective Date: August 1, 1995		
Revised: October 13, 1999			

1.0 Purpose

The purpose of this procedure is to outline the procedures for photoionization detector (PID) screening of soil samples during site investigations. Soil sampling for environmental projects is normally conducted to define the nature and extent of soil contamination. Soil samples are collected at individual sampling locations across the area of investigation as well as at various depths within each sample location to characterize subsurface contamination. The use of PID screening during these investigations provides a relative indication of the vertical and horizontal extent of contamination. The PID is also used in selecting samples for laboratory analysis.

2.0 Scope

This procedure applies to all sites that contain compounds, which are ionizable by a PID. The use of a field-screening device is necessary to facilitate the selection of samples for laboratory analysis. Attachment 7-1A provides the ionization potential of compounds that may be investigated.

All measurement data will include the following information:

- Site/borehole location
- Sample interval
- Date and time of soil collection
- Copy of calibration record
- Time and result of background measurements
- Duplicate sample results
- Disposition of headspace media

3.0 References

- HNU Systems, Inc., July 1984, *Instruction Manual, Trace Gas Analyzer*
- U.S. Environmental Protection Agency, 1984, Volume II, *Characterization of Hazardous Waste Sites -A Methods Manual*.
- U.S. Environmental Protection Agency, 1988. *Field Screening Methods Catalog*, USEPA/540/2-88/005, Office of Emergency and remedial Response, Washington, D.C.

PHOTOIONIZATION DETECTOR FIELD SCREENING	Procedure No: FOP 7-1	Rev. No: 1	Page No: 2 of 3
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4.0 Definitions

Head Space Gases - are the accumulated gaseous components found above solid or liquid layers in closed vessels.

Ionization Potential - Gases with ionization potentials near to or less than that of the lamp will be ionized. These gases will thus be detected and measured by the analyzer. The attached table provides the ionization potential for the compounds, which may be encountered at uncontrolled hazardous waste sites.

Photoionization Detector - A portable instrument used to detect and measure a variety of trace gases.

5.0 Responsibilities

The Project Manager is responsible for overall management of field activities and ensuring that appropriate field screening procedures are followed.

6.0 Equipment

The following pieces of equipment and supplies may be needed to field screen the soil samples:

- Organic Vapor Monitoring Device (PID or OVA)
- Appropriate Sampling Equipment
- Appropriate Sampling Containers
- 16-ounce "Mason" jars
- Field Logbook and Field Sampling Forms
- Aluminum Foil
- Rubber Bands

7.0 Procedure

The contaminant of interest must have an ionization potential equal to or lower than the PID probe used for the screening. The PID should not be used to screen samples with high moisture content. PID and OVA FID field instruments should be operated and calibrated to yield total organic vapors in parts per million (ppm) volume per unit volume as methane or isobutylene referenced as benzene. PIDs must be operated with the lamp source indicated in the project-specific planning documents. O&M, and calibration should be recorded in the instrument's logbook. For jar headspace screening, instrument calibration should be checked/adjusted no less than once every 10 analyses, or daily, whichever is more frequent. Attachment 7-1B contains the PID Field Screening Field Log

- Half fill two clean glass "Mason" jars with the sample to be analyzed. Quickly cover each open top with one or two sheets of clean aluminum foil and apply screw caps to tightly seal the jars.

PHOTOIONIZATION DETECTOR FIELD SCREENING	Procedure No: FOP 7-1	Rev. No: 1	Page No: 3 of 3
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Sixteen-ounce (approximately 500-ml) soil or "Mason" jars are preferred. If SW846 Method 5035 is to be used for analysis, first collect the sample into the appropriate syringe.

- Allow headspace development for at least 10 minutes. Vigorously shake both jars for 15 seconds, both at the beginning and end of the headspace development period. Where the ambient temperature is below 32 degrees F (0 degrees C), headspace development should be within a heated vehicle or building. During this period, the instrument may be calibrated, if not done previously.
- Subsequent to headspace development, remove the lid and quickly puncture the foil seal with the instrument probe to a point about one-half of the headspace depth. Avoid the uptake of water droplets or soil particles.
- Record the highest meter response as the sample concentration. Using the foil seal/probe insertion method, the maximum response should occur within two to five seconds. Erratic meter response may occur at high organic vapor concentrations or conditions of elevated headspace moisture; in these cases, headspace data should be discounted.
- The headspace screening data from both jar samples should be recorded and compared; generally replicate values should be consistent to $\pm 20\%$.

Jars may be re-used after thorough potable water rinse when measurements collected are below background measurements. Jars will be air dried or dried with paper towels before re-use.

8.0 Attachments

7-1A Ionization Potential of Selected Compounds.

7-1B PID Field Screening Field Log.

