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Sampling and Analysis Plan
Soil and Groundwater Sampling
Building 44 Site Investigation
U.S. Coast Guard Integrated Support Command
Alameda, California

December 2007

Project No. 27-167

Prepared for:

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Submitted by:
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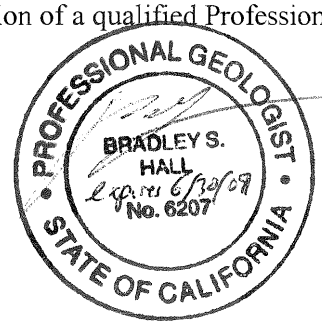
CERTIFICATION

This document was prepared under the direction and
supervision of a qualified Professional Engineer



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Acronyms and Abbreviations

ºC	degrees Celsius
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
ACEHS	Alameda County Environmental Health Services
ACWD	Alameda County Water District
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylene
CFR	Code of Federal Regulations
COC	chain of custody
COPC	chemical of potential concern
DQO	data quality objective
DPT	direct push technology
EPA	(U.S.) Environmental Protection Agency
ERRG	Engineering/Remediation Resources Group, Inc.
ESL	environmental screening level
Estuary	Oakland Estuary
FOSS	Foss Environmental Services
IDW	Investigation Derived Waste
ISC	Integrated Support Command
LCS	laboratory control spike
LCSD	laboratory control spike duplicate
MS	matrix spike
MSD	matrix spike duplicate
mg/kg	milligrams per kilogram

Acronyms and Abbreviations *(continued)*

mg/L	milligrams per liter
PCB	poly chlorinated biphenyl
P.G.	Professional Geologist
PID	photo-ionization detector
PVC	poly-vinyl chloride
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
RPD	relative percent difference
RWQCB	Regional Water Quality Control Board
SAP	Sampling Analysis Plan
SI	Site Investigation
SVOC	semi-volatile organic compound
SWRCB	State Water Resources Control Board
TCA	trichloroethane
Tetra Tech	Tetra Tech Inc.
TPH-d	total petroleum hydrocarbons in the diesel range
TPH-g	total petroleum hydrocarbons in the gasoline range
TPH-O&G	total petroleum hydrocarbons in the oil and grease range
TSCA	Toxic Substances Control Act
USA	Underground Service Alert
USCG	United States Coast Guard
USCS	Unified Soil Classification System
UST	underground storage tank
VOC	volatile organic compound

Section 1. Introduction

The objective of the Site Investigation (SI) is to delineate the vertical and horizontal extent of soil and groundwater contamination, adjacent to Building 44 at U.S. Coast Guard (USCG) Integrated Support Command (ISC) Alameda (Site). The purpose of this Sampling and Analysis Plan (SAP) is to describe the methods and procedures to be used to conduct the SI. This SAP has been prepared in accordance with guidelines developed by the U.S. Environmental Protection Agency (EPA) *Sampling and Analysis Plan (SAP) Guidance and Template*, R9QA/002.1 (EPA, 2000) The SI will determine lateral and vertical extent of contaminants of potential concern (COPC) in the vicinity of a former underground storage tank (UST) that was removed in November 2001. The work is being conducted by Engineering/Remediation Resources Group, Inc. (ERRG) on behalf of the property owner, the USCG. The lead regulatory agency overseeing the project is the Alameda County Environmental Health Services (ACEHS).

1.1. SITE DESCRIPTION

1.1.1. Site Location

The Site is located within ISC, on the southwest side of Coast Guard Island, southeast of the intersection at McCullough Drive and Spencer Road (Figure 1). The Site is bound by a parking lot located to the southeast, the Oakland Estuary (Estuary) and a USCG wharf to the southwest, Building 44 to the northwest, and Spencer Road to the northeast.

1.1.2. Site Background

In 1985, a 10,000-gallon double-walled fiberglass UST was installed on the east side of Building 44. According to the Final UST Closure Report, prepared by Tetra Tech Inc. (Tetra Tech) (Tetra Tech, 2002), the UST was removed by FOSS Environmental Services (FOSS) in November 2001. The 10,000-gallon UST was approximately 8 feet in diameter and 30 feet long. The ground above the former UST is currently paved and used as a parking lot. The harbor lies approximately 70 feet to the southwest of the Site, with riprap sloping from the pavement, approximately 50 feet southwest of the Site, to the harbor.

Historically, the UST received bilge water and oily water from USCG ships through underground pipelines that ran to the piers. Oily water and waste oil were periodically pumped out of the tank and disposed of off-site (Tetra Tech, 2002). An oil/water separator was later installed, which decanted most

of the water for disposal to the sanitary sewer system before the waste oil was disposed. Later still, the pipelines to the docks were taken out of service, and oily wastewater and waste oil was transported to the UST by tanker trucks. The separation process and off-site disposal procedures remained the same for the tanker truck disposal (Tetra Tech, 2002). At an unknown time, a monitoring system that detected potential tank leaks failed. The UST was taken out of service in November 2001 because of the monitoring system's failure (Tetra Tech, 2002).

1.2. PREVIOUS INVESTIGATIONS

The UST removal was conducted in November 2001 by FOSS, who was subcontracted by Tetra Tech. The following information was provided in the Final UST Closure Report (Tetra Tech, 2002).

Two liquid sensors, one for the secondary containment and one for the liquid level in the tank, were removed and at least three pipes associated with the UST were either removed or sealed prior to tank removal. One pipe formerly used to drain oily water from the oily waste line to the tank was cut, triple rinsed, and sealed with epoxy. Two vent pipes that led to the northeastern corner of Building 44 were removed and disposed. The concrete above the UST was removed and disposed. An pea gravel filled area approximately 7.5 feet deep, 16 feet wide, and 40 feet long was excavated and stockpiled northeast of the excavation as shown on Figure 2. The tank was cleaned, and approximately 700 gallons of oily water, 200 to 300 gallons of sandy sludge, and 500 gallons of wastewater were removed from the tank and disposed of to an unknown facility. Straps that had been used to hold the UST down to an underlying concrete slab, were severed during removal activities, which caused the UST to rise, floating on groundwater that had entered the excavation. The tank was removed and inspected. No holes were observed, but a black oily sheen was observed on the groundwater in the excavation. Staining was observed near the manhole of the UST, but not near the associated pipes. The tank was cut in to segments and a total of 40 cubic yards was disposed properly as non-hazardous waste (Tetra Tech, 2002).

Following tank removal, groundwater was encountered in the excavation at approximately 7.5 feet below ground surface (bgs). The excavation remained open for two days following the tank removal.

Four soil samples were taken from the bottom of the excavation pit and four soil samples were collected from the excavated gravel stockpile. One water sample was also collected from the excavation. Soil and groundwater samples were analyzed for:

- Total petroleum hydrocarbons-gasoline (TPH-g)
- TPH-diesel (TPH-d)
- TPH-oil and grease (TPH-O&G)
- Benzene toluene ethylbenzene and xylenes (BTEX)
- Fuel Oxygenates

- Volatile organic compounds (VOCs)
- Semi-volatile organic compounds (SVOCs)
- Metals (cadmium, chromium, lead, zinc, and nickel)

One soil sample, (sample location 1 on Figure 2), collected 8 feet bgs from soil staining near the location of the manhole, showed the highest concentrations of TPH-O&G (1,800 milligrams per kilogram [mg/kg]), 1,1,2-Trichloroethane (6,000 micrograms per kilogram [µg/kg]), and Naphthalene (3,000 µg/kg). The groundwater sample that was collected from the water in the bottom of the excavation had concentrations of TPH-d at 100,000 micrograms per liter (µg/L), TPH-g at 190 (µg/L), and TPH-O&G at 41 mg/L. In a December 18, 2006 letter, the ACEHS refused site closure due to the high concentrations of TPH-d in groundwater samples and 1,1,2-trichloroethane (TCA) and Naphthalene in soil samples reported in the Tetra Tech 2002 report (ACEHS, 2006). ACEHS requested that the USCG prepare a workplan to address the following comments:

- Characterize the lateral and vertical extent of contamination at the Site
- Conduct soil and grab groundwater sampling, including photo-ionization detector readings (PID)
- Prepare geologic cross sections
- Submit all analytical data to the State Water Resources Control Board (SWRCB) Geotracker website

The excavation was backfilled two days after the UST removal with a mixture of new, clean pea gravel, and previously excavated pea gravel. The Site was then restored to its former condition as a parking lot.

ERRG has prepared this SAP on behalf of the USCG in response to the ACEHS requests.

1.3. GEOLOGY AND HYDROGEOLOGY

The Site is situated within a parking lot at an elevation of approximately 11 feet above mean sea level (Tetra Tech, 2002).The topography is generally flat and the shallow geology in the vicinity of the site is reported to consist of sandy clay with silt (fill), underlain by a silty clay (Bay Mud). During the 2001 UST removal, groundwater purportedly was encountered at 7.5 feet bgs, although other documentation within the same report identified groundwater at 9 feet bgs, Exact groundwater elevation at the Site is unknown (Tetra Tech 2002).

Section 2. Proposed Scope of Work

The proposed scope of services will be performed in support of the SI, to delineate the vertical and horizontal extent of soil and groundwater contamination as directed by the ACEHS in their letter dated December 18, 2006 (ACEHS, 2006). ERRG will advance up to 11 soil borings to characterize the geology, hydrology and distribution of COPCs in soil and groundwater at the Site. Upon completion of the proposed scope of services, ERRG will review the soil and groundwater data (if groundwater is encountered) and prepare a Site Investigation Report (SI Report) to recommend further investigative or remedial actions necessary to achieve Site closure. The scope of work proposed for this SI includes the following:

- Prepare this SAP
- Prepare a Site-specific Health and Safety Plan
- Obtain drilling permits from Alameda County Water District (ACWD)
- Obtain utility clearance through Underground Service Alert (USA) and a private contractor
- Drill up to eleven soil borings to a maximum of 15 feet bgs
- Collect approximately two soil samples from each boring
- Collect one groundwater sample from each boring
- Analyze soil and groundwater samples for COPCs (TPH-d, TPH-g, VOCs, SVOCs, metals, polychlorinated biphenyls [PCBs])
- Prepare Draft and Final SI Reports with conclusions and recommendations for additional work or Site closure

Section 3. Data Quality Objectives and Sampling Rationale

In an effort to fully investigate the presence and concentrations of the COPC at the Site, the following data quality objectives (DQOs) and sampling rationale have been developed.

3.1. DATA QUALITY OBJECTIVES

The DQOs for this SI include collecting adequate data to delineate the vertical and lateral extent of COPC (TPH-d, TPH-g, TPH-O&G, VOCs, SVOCs, Metals, and PCBs) that are present in the soil and groundwater at the Site. The seven-step DQO process developed by EPA has been used to develop the sampling design for this investigation (EPA, 2000). The seven-step process and applicable DQOs are presented in Table 1.

Table 1. Seven Step DQO Process

Step 1	Problem Statement	Historically, COPCs were stored in the former UST and accidentally released to the surrounding soil and groundwater. The current concentration and lateral and vertical extent of COPCs in soil and groundwater is not delineated for the Site.
Step 2	Identification of Decisions	Are COPCs present in the soil and groundwater in the vicinity of the former UST at concentrations requiring further remedial action?
Step 3	Identify Inputs to Decisions	Concentrations of COPCs in soil and groundwater upgradient, downgradient, and crossgradient of the former UST.
Step 4	Definition of Study Boundaries	Groundwater samples will be collected from the water table, if groundwater is encountered, in the upgradient, downgradient and crossgradient locations relative to the former UST. Groundwater flow direction is unknown but predicted to be to the southwest toward the Estuary. Soil sampling will be conducted at the bottom of the former UST (approximately 8 bgs) and at the first encounter of groundwater or approximately 15 feet bgs, whichever occurs first in the upgradient, downgradient and crossgradient locations relative to the former UST to identify whether COPCs exist in soil and if so, whether they migrated to groundwater.
Step 5	Decision Rules	If laboratory results detect COPCs in groundwater, then COPCs are present. If COPCs are present, concentrations will be compared to environmental screening levels (ESLs) for the Site and remedial alternatives will be evaluated (Regional Water Quality Control Board [RWQCB], 2005). The ESLs for the COPCs identified at the Site are presented in Appendices A and B.
Step 6	Limits to Decision Errors	Samples will be sent to the laboratory for analysis. Duplicate quality control samples will be collected for 10 percent of groundwater and soil samples collected.
Step 7	Sampling Design	One groundwater sample will be collected from each boring advanced at the Site. Soil sampling will be conducted at approximately the tank bottom (8 feet bgs) and first encounter to groundwater or 15 feet bgs whichever occurs first from each well boring location, relative to the former UST. Step-out borings will be conducted when readings from a PID meter detect concentrations of VOCs. Step-out borings will be conducted 20 feet away from the boring where PID readings were observed as well as directionally away from the former UST.

Notes:

COPC = chemical of potential concern PID = photoionization detector ESL = environmental screening level

UST = underground storage tank VOC = volatile organic compounds

3.2. SAMPLING LOCATION AND RATIONALE

Seven soil borings and up to four optional step-out borings will be advanced to 15 feet bgs in an arrangement designed to delineate the contamination associated with the former UST and identify whether contamination may have migrated to groundwater as well as to the Estuary (Figure 2). Two subsurface soil samples and one groundwater sample will be collected from each boring at approximately 8 feet and 15 feet bgs or first groundwater, whichever occurs first at each boring. These locations were chosen based on the bottom depth of the former UST (8 feet bgs) and the first encountered groundwater. Both groundwater and soil samples will be analyzed for:

- TPH-g, TPH-d. TPH-O&G (by EPA Method 8015M),
- VOCs, (by EPA Method 8260B)
- SVOCs (by EPA Method 8270),
- Metals (by EPA Method 6010), and
- PCBs (by EPA Method 8082)

The sampling tasks and methods are detailed further in the Field Procedures, presented in Section 5.

The boring locations have been determined based on the location of the former UST, associated excavation and concentrations of contaminants reported from the previous sampling locations (Tetra Tech, 2002). Figure 2 presents the proposed locations of the seven initial soil borings. Rationale for the boring locations is provided below:

- Two borings are proposed on the northeast, and southwest sides of the former excavation, approximately three feet from the edge of the former UST. These borings will be located within the native soil. The purpose of these borings is to determine whether COPCs are present beyond the northeast (upgradient) and southwest (downgradient) boundaries of the former excavation.
- One boring is proposed five feet northwest of the northwest wall of the former UST and within an area of native soil just outside the former excavation area to determine whether COPCs exist northwest of the former UST.
- One boring location is positioned at the same location as the former sample #1 collected by Tetra Tech during the 2001 UST removal activities. The purpose of this location is to attempt to identify whether COPCs remains at this former hotspot.

Additionally, temporary monitoring wells will be installed in each of the four borings to document any changes in the groundwater potentiometric surface (water table) as a result of the tidal fluctuations in the Estuary. A more detailed explanation for the water table monitoring is discussed in Section 5.2.

- One boring will be advanced approximately 20 feet to the southeast of the former UST's southeastern wall to identify whether COPCs migrated to the southeast.

- Two borings will be located approximately 20 feet to the south and the southwest of the Site as close to the Estuary as possible[1] to determine whether contaminants may have migrated toward the direction of the Estuary.

Twenty-foot step-out borings will be conducted moving away from the former UST footprint at as many as four locations, if logistically possible. A step out boring will be advanced if contamination is detected through an elevated PID observation in conjunction with visual and olfactory observations during the advancement of a boring. In this situation, a boring will be conducted approximately 20 feet away from the boring that resulted in the observed contamination. No boring will be conducted if a physical barrier, such as a building, exists within the path of the step out location. If necessary, modifications to the proposed 20-foot step out distance will be made due to logistical restraints.

3.3. SCREENING LEVELS

This section discusses ESLs for the COPCs at the Site. As stated previously, the COPCs for the Site are TPH-g, TPH-d, TPH-O&G, VOCs, SVOCs, metals and PCBs.

The San Francisco Bay Regional Water Quality Control Board (RWQCB) has developed ESLs for groundwater and soil contamination at sites located in the San Francisco Bay area. Based on conversations with the ACEHS project manager, the concentrations of COPCs in soil samples will be compared to the ESLs for shallow soils where groundwater is a current or potential source of drinking water (RWQCB, 2005). These ESLs are provided in Appendix A. Similarly, groundwater sample concentrations will be compared to ESLs for Estuarine Surface Water Bodies based on the close proximity (60 feet) of the Site to the Estuary. (RWQCB, 2005) ESLs for Estuarine surface water are provided in Appendix B.

[1] Riprap is situated between the location of the former UST and the Estuary. This rip-rap logistically prohibits sample collection within 20 feet of the Estuary.

Section 4. Preparatory Procedures

4.1. SITE SPECIFIC HEALTH AND SAFETY PLAN

ERRG will prepare a Site-specific Health and Safety Plan in accordance with 29 Code of Federal Regulations (CFR) 1910.120 (29 CFR 1910.120). All personnel entering the work area will be required to read and understand the plan. At a minimum, the plan will specify the nature of the physical and chemical hazards associated with the Site and equipment used during the investigation, routes of exposure, first aid procedures associated with the expected hazards, and contact information for, and a map to, the nearest emergency medical facility.

4.2. PERMITS

Drilling and well permits will be obtained prior to the completion of the soil borings. The ACEHS will be given at least 48 hours notice prior to the completion of borings and installation of monitoring wells.

4.3. UTILITY CLEARANCE

ERRG will mark the proposed boring locations in white paint and notify USA a minimum of two working days in advance of the drilling. USA will notify public and private utility companies to mark the location of underground utilities owned and maintained by each company. ERRG will also contract with a private utility locator and review USCG-provided utility plot plans to locate utilities at the Site.

Section 5. Field Procedures

5.1. BORING ADVANCEMENT

Seven soil borings will be advanced into the subsurface for this SI using Direct Push Technology (DPT) equipment at locations identified on Figure 2. The soil borings will be 15 feet deep, and soil samples will be collected for laboratory analyses at soil depths of approximately 8 and 15 feet (or first groundwater).

5.1.1. Soil Logging

The borings will be continuously cored for the purpose of lithologic description, field screening, and sample collection. Soil will be field screened for the visual presence of contamination (staining or odors) and screened for VOCs using a PID (subsection 5.1.2).

Soil will be logged in the field using the Unified Soil Classification System (USCS) under the direct supervision of a California Professional Geologist (P.G.). The geologist will observe significant changes in subsurface material, changes in drilling conditions, lithologic changes, and water-producing zones and record them on a field boring log. The field boring log will be used later to prepare graphical boring logs and cross sections for the Site. Lithologic descriptions will include soil/rock type, color, grain size, texture, presence of hydrocarbons (including PID readings), and other pertinent information.

5.1.2. PID Measurement Collection

A PID will be used to screen for the presence of volatile contaminants in the soil core samples to access the need to drill additional step-out borings. A portion of the soil core will be placed in a re-sealable plastic bag, allowing volatile petroleum hydrocarbons to volatilize in the bag for at least 2 minutes. A headspace measurement for total volatile organic compounds will be taken from the sample by inserting the probe of the PID into the plastic bag. PID measurements will be recorded on the boring logs. PID measurements will be used to verify location of sample collection as well as determine where step-out borings should be conducted.

5.1.3. Soil Sample Collection

Subsurface soil will be collected using DPT sampling equipment. DPT sampling equipment will allow the borings to be continuously cored for the purpose of lithologic description and samples to be collected

at discrete intervals. The DPT sampling equipment consists of a 3-foot-long 2-inch drive casing with an inner sample barrel that has an inner sample sleeve (acetate liner). These components are simultaneously hammered into the subsurface at 3-foot intervals. After advancing three feet, the sample barrel and acetate liner are retrieved while the drive casing remains in the ground. The sample barrel with a new acetate sleeve is then placed back into the drive casing and driven 3 additional feet. The soil lithology is logged and a sample is collected at the appropriate intervals from the core contained in the acetate sleeve. This procedure will be followed in each boring to a depth of 15 feet bgs. Soil samples will be collected for analysis based on visual staining in conjunction with PID readings and sampling depth criteria (i.e. at approximately 8.0 feet bgs and 15 feet bgs) and/or at the ground water table. All soils will be visually inspected for the presence of free phase petroleum product.

At the specified depth, a soil sample will be collected by cutting a six-inch section of the acetate sleeve and capping the ends with Teflon squares and plastic end caps. Each soil sample will be labeled for identification including the boring designation, time of sampling and depth of sample, entered onto the sample register, and stored at a temperature of 4 degrees Celsius (ºC) for transport to analytical laboratory. Immediately after sampling, chain of custody (COC) forms will be completed and will accompany the sample coolers to the laboratory. Soil samples will be analyzed for the following;

- TPH-g, TPH-d. TPH-O&G (by EPA Method 8015M),
- VOCs, (by EPA Method 8260B)
- SVOCs (by EPA Method 8270),
- Metals (by EPA Method 6010), and
- PCBs (by EPA Method 8082)

5.1.4. Grab Groundwater Sample Collection

Grab groundwater samples will be collected from all borings advanced at the Site (Figure 2). Four groundwater grab samples will be collected from the monitoring well casings and screens temporarily installed in four of the borings and grab groundwater samples will be collected from the remaining three open borings.

Because two-inch diameter poly-vinyl chloride (PVC) well casings and screens will be temporarily installed in four of the soil borings to collect water level information, grab groundwater samples will be collected from the monitoring wells instead of from the open borehole for these locations. The PVC casing will consist of 10 feet of solid PVC riser from the ground surface to 10 feet bgs and 5 feet of 0.010-inch slotted PVC screen from approximately 10 to 15 feet bgs. Grab groundwater samples will be collected using disposable bailers as soon as the temporary well has been installed.

Grab groundwater samples will be collected from the remaining three borings during the advancement of the boring. In this situation, a bailer will be inserted through the center of the DPT tools to collect the groundwater sample.

Groundwater samples will be placed in the appropriate sample container, labeled for identification including boring designation and time of sampling, logged onto the COC form, and stored at a temperature of 4 ºC for transport to the analytical laboratory. As stated previously, groundwater samples will be analyzed for;

- TPH-g, TPH-d. TPH-O&G (by EPA Method 8015M)
- VOCs, (by EPA Method 8260B)
- SVOCs (by EPA Method 8270)
- Metals (by EPA Method 6010)
- PCBs (by EPA Method 8082)

5.1.5. Soil Boring Abandonment

After completion and sampling of the soil borings all locations will be abandoned in accordance with ACWD abandonment requirements (ACWD, 2007). Each borehole will be inspected immediately prior to abandonment, and any obstructions will be removed. Each borehole will be filled with cement-bentonite grout, proceeding upward from the bottom of the boring. The grout will be placed by methods that prevent freefall, bridging, and dilution of sealing materials. The grout will be placed in one continuous operation (or pour), unless field conditions dictate that operations be conducted in a staged manner. A California P.G. will verify that the volume of grout placed during borehole abandonment equals or exceeds the required volume. No drill cuttings will be used to backfill the boreholes. Water used to prepare grout mixtures will be from a clean, uncontaminated water source.

5.2. TEMPORARY MONITORING WELL DATA COLLECTION

As stated previously, four monitoring well casings and screens will be temporarily installed in boreholes to monitor any potential effects on the water table as a result of tidal fluctuations from the nearby Estuary and to determine the groundwater gradient at the Site. The locations of the temporary monitoring wells are shown on Figure 2. Four locations, one near each wall of the former UST; three within the native soil and one within the footprint of the former excavation, will be monitored to obtain adequate groundwater level data to evaluate water level change and gradient within the vicinity of the former UST.

Four well casings and screens will be installed and sampled as described in subsection 5.1.4 (Figure 2). Following sample collection, a Solinist Levelogger® model 3001 will be installed in each of the four well screens to monitor water table fluctuations. A Barologger® barometric meter will also be installed in one

well screen in addition to a Solinist Levelogger® to monitor fluctuations in barometric pressure that would affect the water level readings. All monitoring equipment will be properly calibrated to assure accuracy of data collection. The Solinist Levelogger® monitoring equipment contains an internal memory and will record water level fluctuations over a designated time frame. The Barologger® also contains a memory that records the changes in barometric pressure over a designated time period. All monitoring equipment will be installed in to the temporary wells for a total of 24 hours. Following the 24-hour time period, water level data from the monitoring equipment memory will be downloaded to a personal computer. Once the data is collected, the temporary monitoring wells will be destroyed by removing the PVC casing from the ground and then abandoned as described in subsection 5.1.6. The data will be used to evaluate groundwater gradient and the effect, if any, of the Estuary's tidal fluctuations on the water table at the Site.

Section 6. Quality Control and Documentation

6.1. FIELD QA/QC SAMPLES

Field duplicates will be collected at the same time sequentially as the related sample and are intended to be identical to the original sample. As required by EPA definitive quality assurance (QA)/ quality control (QC) specifications, field duplicates will be collected at a rate of 10 percent of the total samples (EPA, 1998b). Field duplicates will be collected for soil samples (for TPH, VOCs, SVOCs, metals, and PCBs analysis) and groundwater samples (for TPH, VOCs, SVOCs, metals, and PCBs analysis).

6.2. CHAIN-OF-CUSTODY AND FIELD DOCUMENTATION

Immediately after samples are collected, they will be placed and stored in a cooler with bagged ice to maintain temperature at approximately 4^{o}C prior to sample delivery to a California certified laboratory, following the COC procedures.

COC documentation will be completed by the field staff immediately following sample collection. The COC documentation is required and necessary to physically track sample possession from the time of collection to its disposal after the analysis is completed. The COC documentation shall be signed as relinquished or received each time the sample changes possession. The COC documentation, at a minimum, shall contain the following elements:

- Project name and number
- Project contact name and phone number
- Name or names of field samplers
- Sample identification number for each sample
- Sample date and time of collection for each sample
- Sample matrix information for each sample (e.g., soil)
- Number of containers submitted for each sample
- Sample container type used to contain each sample
- Analysis requested for each sample
- Turnaround time requested for analyses

- Preservation method used for each sample (if applicable)
- Name and address of analytical laboratory performing the requested analyses
- Comments or special instruction for the analytical laboratory (if applicable)

In addition, a field sampling log will be prepared that provides the following minimum information:

- Figure showing approximate sample locations, an approximate scale, and a north-pointing arrow
- Types of equipment used to collect each sample
- Number of sample containers for each sample
- Description of the sample appearance
- Sample identification for each sample collected
- Date and time of collection for each sample
- Name or names of the field-worker who collected each sample

Copies of the field forms used to document the details of the sample collection are included in Appendix C.

6.3. SAMPLING SHIPMENT

The samples will be transported to a California certified laboratory for analytical testing. Whether the samples are shipped via Federal Express or sent by courier to the laboratory, the COC documentation will accompany the samples to the laboratory. Prior to shipment or delivery, a copy of the COC documentation will be made and maintained with the project file.

6.4. MANAGEMENT OF INVESTIGATION-DERIVED WASTE

Small quantities of investigation derived waste (IDW) are expected to be generated during the SI that will require appropriate on-Site and off-Site management. These materials and wastes will be generated during drilling and during the execution of associated support operations (i.e., equipment decontamination, sampling, etc.). One composite soil sample of each type of waste (groundwater and soil) will be collected for profiling and characterization and analyzed for TPH, PCBs, VOCs, SVOCs, and metals. The anticipated IDW to be generated during this project includes:

Source	Potential Materials and Wastes
Boring and Drilling Operations	Drill cuttings potentially contaminated with TPH, VOCs, SVOCs, metals and PCB's; PPE, debris, and disposable equipment.
Decontamination Activities	Water potentially contaminated with TPH, VOCs, SVOCs, metals and PCB's; PPE, debris, and disposable equipment.

The wastes from the activities listed above will be segregated into the following categories:

- Soil (drill cuttings) potentially contaminated with TPH, VOCs, SVOCs, metals and PCB's
- Water potentially contaminated with TPH, VOCs, SVOCs, metals and PCB's
- PPE, debris, and disposable equipment

These wastes will be segregated and stored as described in subsection 6.4.1, and characterized, handled, and disposed according to the procedures presented in subsection 6.4.2.

6.4.1. Waste Segregation and Storage

Soil cuttings from drilling operations and washwater will be immediately placed in Department of Transportation approved 55-gallon drums. The drums will be kept shut when they are not being filled, and they will be secured at the end of each workday. Once the drums are filled, or the drilling at that Site is completed, they will be labeled according to the waste characterization described in the following section.

PPE, debris, and disposable equipment will be disposed of in trash bags and into appropriate bins or dumpsters designed for municipal solid waste if not contaminated. Contaminated PPE or equipment will be placed in drums, secured and labeled as appropriate.

6.4.2. Waste Characterization

Implementation of the Site activities may involve handling waste materials that are subject to waste regulations under the Resource Conservation and Recovery Act (RCRA) and/or the Toxic Substances Control Act (TSCA).

A solid waste may be a RCRA or State of California hazardous waste if it is specifically listed as a hazardous waste in the regulations, or if it exhibits any of the following characteristics of hazardous waste: ignitability, corrosively, reactivity, and/or toxicity. The regulatory definitions for each of these characteristics are contained in 40 CFR Part 261.21 through 261.24, and California Code of Regulations 66261.20 to 66261.24. Any wastes identified as being either a listed or characteristic hazardous waste

must be managed in accordance with all applicable state and federal hazardous waste management regulations.

It is not anticipated that any listed wastes will be generated during the project; therefore, for the purposes of this plan, discussion will be limited to hazardous wastes that exhibit one or more of the toxicity characteristics. These hazardous waste characteristics are identified through laboratory analysis of waste materials and based on the waste generator's knowledge of the process generating the waste.

Any soil or ground water waste generated during this project will be a TSCA waste if it contains detectable concentrations of PCBs. As a TSCA waste, the material will be managed in accordance with TSCA regulations as well as other applicable state and federal hazardous waste management regulations.

The following sections discuss IDW sampling in order to characterize and classify the soil cuttings and wastewater generated during the project.

6.4.2.1. Soil Cuttings

One composite soil sample will be collected and analyzed to determine concentrations of COPCs in the soil cuttings. Samples will be analyzed for TPH, PCBs, VOCs, SVOCs, and metals. A waste disposal profile will be created from the composite sample results as well as the sampling activities at the Site and the soil cuttings will be disposed to an appropriate off-site facility.

6.4.2.2. Wastewater

Decontamination wastewater will be generated during this investigation, and will be characterized as stated above, with a composite sample analyzed for the following COPCs; TPH, PCBs, VOCs, SVOCs, and metals. A waste disposal profile will be created based on the analytical results from this sample and the wastewater will be disposed to an appropriate off-site facility.

6.4.2.3. Miscellaneous Wastes

A variety of non-hazardous waste materials will likely be generated during remedial action activities that will also require proper management. PPE and trash generated during Site activities are not expected to be contaminated to the extent that would classify them as a regulated or hazardous waste. These wastes will be disposed of in appropriate waste containers at the Site for offsite disposal as municipal solid waste.

Section 7. Laboratory Analyses Protocols

7.1. ANALYTICAL REQUIREMENTS

A California certified laboratory will be used to conduct the analyses for TPH, VOCs, SVOCs, metals, and PCBs, and will be identified prior to mobilization for the field activities. The laboratory will be certified by the State of California and/or relevant regulatory agencies for the requested analyses. Standard turnaround time for laboratory analysis (10 workdays) is specified for this project for analytical testing.

7.2. LABORATORY QA/QC PROCEDURES

The following Level II laboratory QA/QC elements will be performed by the contract laboratory for the analyses prescribed by this project:

- Method blank
- Laboratory control spike (LCS)
- Laboratory control spike duplicate (LCSD)
- Matrix spike (MS)
- Matrix spike duplicate (MSD)

In addition, all laboratory analytical equipment will be calibrated in accordance with the applicable EPA method. Laboratory QA/QC data will be validated in accordance with the data validation protocol described in Section 7.3 of this SAP.

7.3. DATA VALIDATION

Data validation is the systematic process for reviewing a set of data against pre-established criteria to determine the quality of the data. The laboratory will review their data for nonconformance and consistency. Upon receipt of the analytical data package from the laboratory, ERRG project personnel will ensure that the following have been implemented:

- The data package includes all requested deliverables.

- Samples were analyzed as requested.
- Sample holding times were met.
- QC sample results were within established control limits.
- Appropriate detection limits were obtained.
- Preservation was maintained.
- The COC was completed.
- Sample integrity was maintained.
- Calibration criteria were met.
- Blank sample results were below the detection limit.

A systematic effort will be made to identify any outliers (i.e., data values that are significantly different from the population) and/or errors prior to the reporting of the data to the USCG. Outliers can result from improper sampling or analytical methodology, matrix interference, errors in data transcription, and real but extreme changes in analytical parameters. Outliers that result from errors found during data validation will be identified. Outliers that cannot be attributed to analytical, calculation, or transcription errors will be retained in the database for further evaluation. Final data will be reviewed in accordance with the project-specific criteria specified in this SAP and the method-specific criteria stated in the analytical method. Results from the data review will be included in the SI Report and submitted to the USCG.

7.4. DATA REPORTING

Once analytical data have been reviewed by the laboratory, the following information will be provided in each data package and issued to the ERRG Project Manager in a paginated report for each sample delivery group:

- The laboratory shall report all analytes as a detected concentration or as less than the reporting limits. All samples with out-of-control spike recoveries attributed to matrix interference will be designated as such. All solid samples will be reported on a dry weight basis with the percent moisture reported for each sample. Dilution factors, date of extraction, date of analysis, and practical quantitation limits shall be reported for all analytes and method.
- Reports of method blanks shall include all analytes for each analytical method. Analytical results for each sample should be clearly associated with a particular method blank. Any detected concentration found in method blanks shall be reported. Reports of concentrations below the practical quantitation limits are necessary to evaluate low-levels of target compounds in samples.
- Surrogate spike recoveries shall be reported for all applicable methods. The report shall also specify the control limits for surrogate recoveries; any out-of-control recoveries shall result in the

sample being rerun once. If subsequent analyses result in out-of-control recoveries, both results shall be reported and the data flagged.

- MS/MSD recoveries shall be reported for all analyses. MS/MSD recoveries not meeting QC criteria specified in this SAP shall be rerun once. If subsequent analyses result in out-of-control recoveries, both results shall be reported and the data flagged. The laboratory shall not use samples from other projects for MS/MSD analyses. The report shall also specify control limits for spike recoveries and the relative percent difference (RPD) for each spiked analyte.
- Results for laboratory duplicates shall be reported with RPD limits for duplicate analyses.
- LCS/LCSD results shall be reported with control limits for LCS/LCSD analyses. Analytical results for each sample should be clearly associated with a particular LCS/LCSD.
- Results of initial and continuing calibration for all analyses shall be included in the data package. Continuing calibration results shall be organized such that sample results shall be clearly correlated with the calibration check samples that bracket the sample results. Inclusion of an injection record with the data package will facilitate compliance with this requirement.

The laboratory shall prepare a summary of all samples with detected concentrations of target compounds, indexed by method and by sample identification.

7.4.1. Initial Calibration

The concentrations of the standards used for analysis and the date and time of analysis shall be included in the report. The response factor, percent relative standard deviation, and retention time for each analyte shall be included in initial calibration summaries. A statement should also be made regarding the samples or dates for which a single initial calibration applies.

7.4.2. Daily Calibration and Mid-Level Standard

The concentration of the calibration standard used for daily calibration and/or the mid-level calibration check shall be reported. The response factor, percent difference, and retention time for each analyte shall be reported. Daily calibration information shall be linked to sample analyses by summary or by daily injection or analysis logs.

The comprehensive certificate of analysis shall contain a narrative section identifying samples not meeting QC criteria and any other out-of-control condition. The narrative shall describe the corrective action taken. If "matrix effects" are invoked as a cause for out-of-control recoveries, a subsection of the narrative shall present a detailed justification for this assertion to include a summary of all relevant QC data.

The data package shall be prepared at the conclusion of the sampling and analytical work. If requested, draft analytical results and preliminary QC data only shall be submitted to ERRG as soon as they are

available. Draft analyses results do not have to satisfy all of the requirements of this section, but should contain basic QC information such as MS/MSD analyses and method blank results.

The QC information provided will be used by ERRG project staff to evaluate the quality of the data. The results of this evaluation will be summarized and included in the SI report.

Section 8. Reporting

A Draft SI Report will be prepared and submitted to the USCG and ACEHS. The report will include a description of the methods used to advance the borings and sample collection methods, a figure indicating boring and sample locations and Site features, a tabulation of analytical results, laboratory analytical reports, soil boring logs, conclusions, and recommendations for additional investigation, remediation, or site closure, as appropriate. ERRG will prepare a Final SI Report within 45 days from the date of receipt of USCG comments for the Draft SI Report.

Section 9. Schedule

ERRG or its subcontractors will obtain well permits and schedule subcontractor services upon approval of this work plan by the ACEHS. The results of soil and groundwater sample analyses will be obtained within 10 days of sample collection. The draft SI Report will be submitted to the USCG and ACEHS within 45 days after receiving the analytical results. Following the draft SI Report, a Final SI Report will be prepared within 45 days of receipt of comments from USCG.

Section 10. References

Alameda County Environmental Health Services (ACEHS), 2006. Fuel Leak Case No. RO0002443, Coast Guard Island, Building 44, Alameda CA. December 18.

Alameda County Water District (ACWD) 2007. *Application for Drilling Permit Instructions* http://www.acwd.org/engineering/drilling_permit.php5#cat2

ASTM, 1999. Standard Guide for Sample Chain-of-Custody Procedures D 4840-99.

Code of Federal Regulations (CFR). Title 29, Chapter 17, Part 1910 – Occupational Health and Safety Standards, 1910 Subpart A, Section 120 – Hazardous Waste Operations and Emergency Response (29 CFR 1910.120).

San Francisco Bay Area Regional Water Quality Control Board, (RWQCB) 2005 *Screening for Environmental Concerns At Sites With Contaminated Soil and Groundwater, Volume 1:Summary Tier 1 Lookup Tables*, February

U. S. Environmental Protection Agency (EPA), 2000. Region IX, *Sampling and Analysis Plan (SAP) Guidance and Template*, R9QA/002.1. April.

Tetra Tech Inc. (Tetra Tech), 2002. Final Closure Report UST Removal at Building 44-ISC Alameda, California. January.

Figures

VICINITY MAP
NOT TO SCALE

0 500

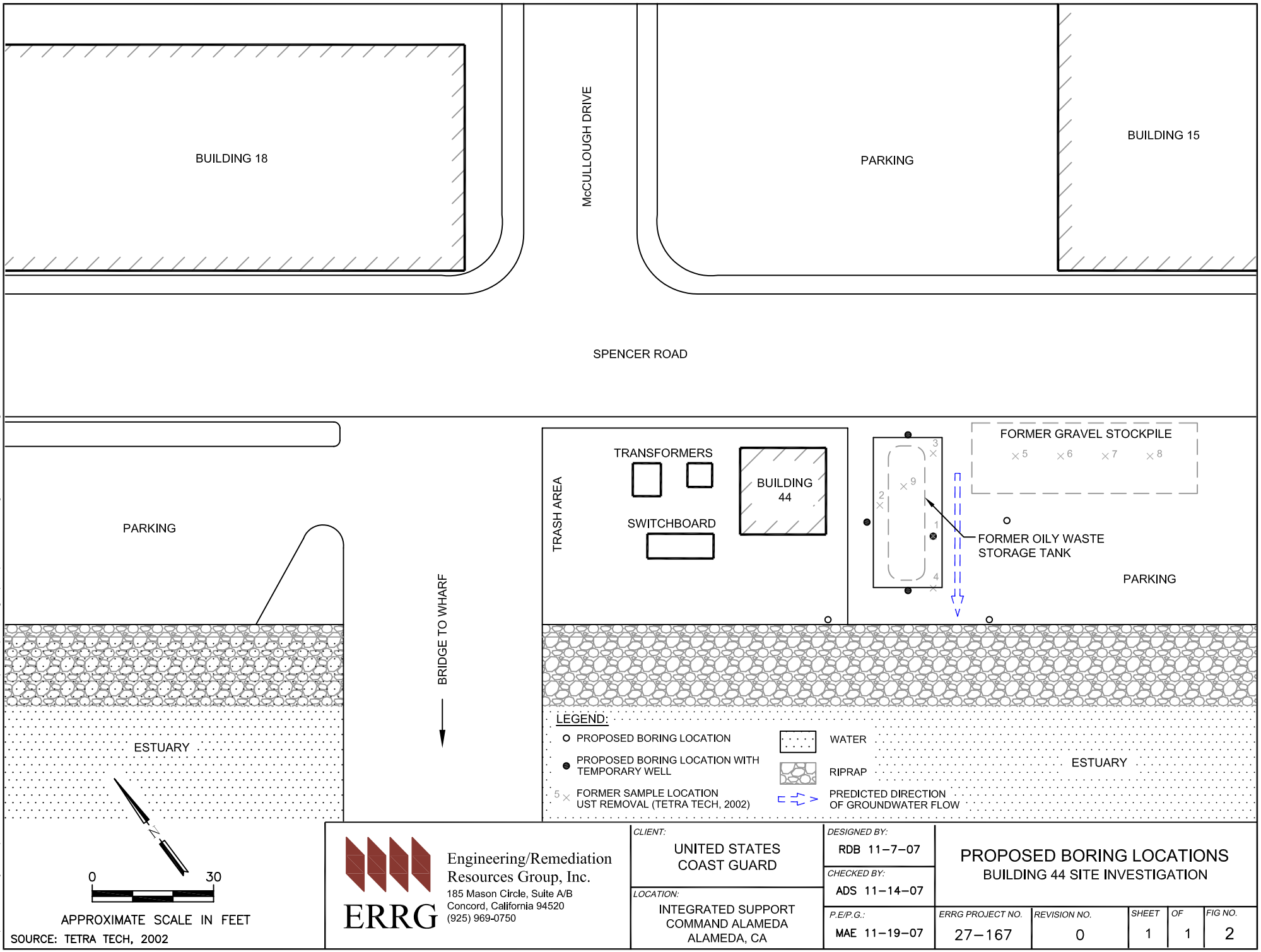
APPROXIMATE SCALE IN FEET

SOURCE: GOOGLE EARTH

P:\2007 Projects\27-167 USCG Alameda UST\N_Maps_Dwg \Site Location Map.dwg

ERRG
Engineering/Remediation Resources Group, Inc.
115 Sansome St., Suite 200
San Francisco, California 94104
(415) 395-9974

CLIENT:	DESIGNED BY:	SITE LOCATION MAP				
UNITED STATES COAST GUARD	RDB 11/26/07					
	CHECKED BY: MAE 11/27/07					
LOCATION: INTEGRATED SUPPORT COMMAND ALAMEDA ALAMEDA, CALIFORNIA	P.E/P.G.: MAE 11/27/07	ERRG PROJECT NO. 27-167	REV. NO. 0	SHEET 1	OF 1	FIG NO. 1



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ERRG

Engineering/Remediation Resources Group, Inc.
185 Mason Circle, Suite A/B
Concord, California 94520
(925) 969-0750

CLIENT: UNITED STATES COAST GUARD

LOCATION: INTEGRATED SUPPORT COMMAND ALAMEDA ALAMEDA, CA

DESIGNED BY: RDB 11-7-07

CHECKED BY: ADS 11-14-07

P.E/P.G.: MAE 11-19-07

PROPOSED BORING LOCATIONS
BUILDING 44 SITE INVESTIGATION

ERRG PROJECT NO.	REVISION NO.	SHEET	OF	FIG NO.
27-167	0	1	1	2

Appendix A. Table A. ESLs Shallow Soils Where Groundwater is Current or Potential Source of Drinking Water (RWQCB, 2005)

TABLE A. ENVIRONMENTAL SCREENING LEVELS (ESLs)
Shallow Soils (≤3m bgs)
Groundwater IS Current or Potential Source of Drinking Water

	[1]Shallow Soil		
CHEMICAL PARAMETER	[2]Residential Land Use (mg/kg)	Commercial/ Industrial Land Use Only (mg/kg)	[3]Groundwater (ug/L)
ACENAPHTHENE	1.6E+01	1.6E+01	2.0E+01
ACENAPHTHYLENE	1.3E+01	1.3E+01	3.0E+01
ACETONE	5.0E-01	5.0E-01	1.5E+03
ALDRIN	3.2E-02	1.3E-01	2.0E-03
ANTHRACENE	2.8E+00	2.8E+00	7.3E-01
ANTIMONY	6.1E+00	4.0E+01	6.0E+00
ARSENIC	5.5E+00	5.5E+00	3.6E+01
BARIUM	7.5E+02	1.5E+03	1.0E+03
BENZENE	4.4E-02	4.4E-02	1.0E+00
BENZO(a)ANTHRACENE	3.8E-01	1.3E+00	2.7E-02
BENZO(b)FLUORANTHENE	3.8E-01	1.3E+00	2.9E-02
BENZO(k)FLUORANTHENE	3.8E-01	1.3E+00	2.9E-02
BENZO(g,h,i)PERYLENE	2.7E+01	2.7E+01	1.0E-01
BENZO(a)PYRENE	3.8E-02	1.3E-01	1.4E-02
BERYLLIUM	4.0E+00	8.0E+00	2.7E+00
BIPHENYL, 1,1-	6.5E-01	6.5E-01	5.0E-01
BIS(2-CHLOROETHYL)ETHER	1.8E-04	1.8E-04	1.4E-02
BIS(2-CHLOROISOPROPYL)ETHER	5.4E-03	5.4E-03	5.0E-01
BIS(2-ETHYLHEXYL)PHTHALATE	6.6E+01	6.6E+01	4.0E+00
BORON	1.6E+00	2.0E+00	1.6E+00
BROMODICHLOROMETHANE	1.4E-02	3.9E-02	1.0E+02
BROMOFORM	2.2E+00	2.2E+00	1.0E+02
BROMOMETHANE	2.2E-01	3.9E-01	9.8E+00
CADMIUM	1.7E+00	7.4E+00	1.1E+00
CARBON TETRACHLORIDE	1.2E-02	3.4E-02	5.0E-01
CHLORDANE	4.4E-01	1.7E+00	4.0E-03
CHLOROANILINE, p-	5.3E-02	5.3E-02	5.0E+00
CHLOROBENZENE	1.5E+00	1.5E+00	2.5E+01
CHLOROETHANE	6.3E-01	8.5E-01	1.2E+01
CHLOROFORM	8.8E-01	1.9E+00	7.0E+01
CHLOROMETHANE	7.0E-02	2.0E-01	1.3E+00
CHLOROPHENOL, 2-	1.2E-02	1.2E-02	1.8E-01
CHROMIUM (Total)	5.8E+01	5.8E+01	5.0E+01
CHROMIUM III	7.5E+02	7.5E+02	1.8E+02
CHROMIUM VI	1.8E+00	1.8E+00	1.1E+01
CHRYSENE	3.8E+00	1.3E+01	2.9E-01
COBALT	1.0E+01	1.0E+01	3.0E+00
COPPER	2.3E+02	2.3E+02	3.1E+00
CYANIDE (Free)	3.6E-03	3.6E-03	1.0E+00
DIBENZO(a,h)ANTHTRACENE	1.1E-01	3.8E-01	8.5E-03
DIBROMOCHLOROMETHANE	1.9E-02	5.4E-02	1.0E+02
1,2-DIBROMO-3-CHLOROPROPANE	4.5E-03	4.5E-03	2.0E-01
DIBROMOETHANE, 1,2-	3.3E-04	3.3E-04	5.0E-02
DICHLOROBENZENE, 1,2-	1.1E+00	1.1E+00	1.0E+01

TABLE A. ENVIRONMENTAL SCREENING LEVELS (ESLs)
Shallow Soils (≤3m bgs)
Groundwater IS Current or Potential Source of Drinking Water

CHEMICAL PARAMETER	[1]Shallow Soil		[3]Groundwater (ug/L)
	[2]Residential Land Use (mg/kg)	Commercial/ Industrial Land Use Only (mg/kg)	
DICHLOROBENZENE, 1,3-	7.4E+00	7.4E+00	6.5E+01
DICHLOROBENZENE, 1,4-	4.6E-02	1.3E-01	5.0E+00
DICHLOROBENZIDINE, 3,3-	7.7E-03	7.7E-03	2.9E-02
DICHLORODIPHENYLDICHLOROETHANE (DDD)	2.3E+00	9.0E+00	1.0E-03
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	1.6E+00	4.0E+00	1.0E-03
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	1.6E+00	4.0E+00	1.0E-03
DICHLOROETHANE, 1,1-	2.0E-01	2.0E-01	5.0E+00
DICHLOROETHANE, 1,2-	4.5E-03	4.5E-03	5.0E-01
DICHLOROETHYLENE, 1,1-	1.0E+00	1.0E+00	6.0E+00
DICHLOROETHYLENE, Cis 1,2-	1.9E-01	1.9E-01	6.0E+00
DICHLOROETHYLENE, Trans 1,2-	6.7E-01	6.7E-01	1.0E+01
DICHLOROPHENOL, 2,4-	3.0E-01	3.0E-01	3.0E-01
DICHLOROPROPANE, 1,2-	5.1E-02	1.2E-01	5.0E+00
DICHLOROPROPENE, 1,3-	3.3E-02	5.9E-02	5.0E-01
DIELDRIN	2.3E-03	2.3E-03	1.9E-03
DIETHYLPHTHALATE	3.5E-02	3.5E-02	1.5E+00
DIMETHYLPHTHALATE	3.5E-02	3.5E-02	1.5E+00
DIMETHYLPHENOL, 2,4-	6.7E-01	6.7E-01	1.0E+02
DINITROPHENOL, 2,4-	4.0E-02	4.0E-02	1.4E+01
DINITROTOLUENE, 2,4-	8.5E-04	8.5E-04	1.1E-01
1,4 DIOXANE	1.8E-03	1.8E-03	3.0E+00
DIOXIN (2,3,7,8-TCDD)	4.6E-06	1.9E-05	5.0E-06
ENDOSULFAN	4.6E-03	4.6E-03	8.7E-03
ENDRIN	6.5E-04	6.5E-04	2.3E-03
ETHANOL	4.5E+01	4.5E+01	5.0E+04
ETHYLBENZENE	3.3E+00	3.3E+00	3.0E+01
FLUORANTHENE	4.0E+01	4.0E+01	8.0E+00
FLUORENE	8.9E+00	8.9E+00	3.9E+00
HEPTACHLOR	1.4E-02	1.4E-02	3.8E-03
HEPTACHLOR EPOXIDE	1.5E-02	1.5E-02	3.8E-03
HEXACHLOROBENZENE	2.7E-01	9.6E-01	1.0E+00
HEXACHLOROBUTADIENE	1.0E+00	1.0E+00	2.1E-01
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	4.9E-02	4.9E-02	8.0E-02
HEXACHLOROETHANE	2.4E+00	2.4E+00	7.0E-01
INDENO(1,2,3-cd)PYRENE	3.8E-01	1.3E+00	2.9E-02
LEAD	1.5E+02	7.5E+02	2.5E+00
MERCURY	3.7E+00	1.0E+01	1.2E-02
METHOXYCHLOR	1.9E+01	1.9E+01	1.9E-02
METHYLENE CHLORIDE	7.7E-02	7.7E-02	5.0E+00
METHYL ETHYL KETONE	3.9E+00	3.9E+00	4.2E+03
METHYL ISOBUTYL KETONE	2.8E+00	2.8E+00	1.2E+02
METHYL MERCURY	1.2E+00	1.0E+01	3.0E-03
METHYLNAPHTHALENE (total 1- & 2-)	2.5E-01	2.5E-01	2.1E+00
METHYL TERT BUTYL ETHER	2.3E-02	2.3E-02	5.0E+00

TABLE A. ENVIRONMENTAL SCREENING LEVELS (ESLs)
Shallow Soils (≤3m bgs)
Groundwater IS Current or Potential Source of Drinking Water

	[1]Shallow Soil		
CHEMICAL PARAMETER	[2]Residential Land Use (mg/kg)	Commercial/ Industrial Land Use Only (mg/kg)	[3]Groundwater (ug/L)
MOLYBDENUM	4.0E+01	4.0E+01	3.5E+01
NAPHTHALENE	4.6E-01	1.5E+00	1.7E+01
NICKEL	1.5E+02	1.5E+02	8.2E+00
PENTACHLOROPHENOL	4.4E+00	5.0E+00	1.0E+00
PERCHLORATE	1.0E-02	1.0E-02	6.0E+00
PHENANTHRENE	1.1E+01	1.1E+01	4.6E+00
PHENOL	7.6E-02	7.6E-02	5.0E+00
POLYCHLORINATED BIPHENYLS (PCBs)	2.2E-01	7.4E-01	1.4E-02
PYRENE	8.5E+01	8.5E+01	2.0E+00
SELENIUM	1.0E+01	1.0E+01	5.0E+00
SILVER	2.0E+01	4.0E+01	1.9E-01
STYRENE	1.5E+00	1.5E+00	1.0E+01
tert-BUTYL ALCOHOL	7.3E-02	7.3E-02	1.2E+01
TETRACHLOROETHANE, 1,1,1,2-	2.4E-02	2.4E-02	1.3E+00
TETRACHLOROETHANE, 1,1,2,2-	9.1E-03	1.8E-02	1.0E+00
TETRACHLOROETHYLENE	8.7E-02	2.4E-01	5.0E+00
THALLIUM	1.0E+00	1.3E+01	2.0E+00
TOLUENE	2.9E+00	2.9E+00	4.0E+01
TOXAPHENE	4.2E-04	4.2E-04	2.0E-04
TPH (gasolines)	1.0E+02	1.0E+02	1.0E+02
TPH (middle distillates)	1.0E+02	1.0E+02	1.0E+02
TPH (residual fuels)	5.0E+02	1.0E+03	1.0E+02
TRICHLOROBENZENE, 1,2,4-	3.8E-01	1.0E+00	2.5E+01
TRICHLOROETHANE, 1,1,1-	7.8E+00	7.8E+00	6.2E+01
TRICHLOROETHANE, 1,1,2-	3.2E-02	7.0E-02	5.0E+00
TRICHLOROETHYLENE	2.6E-01	4.6E-01	5.0E+00
TRICHLOROPHENOL, 2,4,5-	1.8E-01	1.8E-01	1.1E+01
TRICHLOROPHENOL, 2,4,6-	1.7E-01	1.7E-01	5.0E-01
VANADIUM	1.1E+02	2.0E+02	1.5E+01
VINYL CHLORIDE	6.7E-03	1.9E-02	5.0E-01
XYLENES	2.3E+00	2.3E+00	2.0E+01
ZINC	6.0E+02	6.0E+02	8.1E+01

TABLE A. ENVIRONMENTAL SCREENING LEVELS (ESLs)
Shallow Soils (≤3m bgs)
Groundwater IS Current or Potential Source of Drinking Water

	[1]Shallow Soil		
CHEMICAL PARAMETER	**[2]Residential Land Use (mg/kg)**	**Commercial/ Industrial Land Use Only (mg/kg)**	**[3]Groundwater (ug/L)**
Electrical Conductivity (mS/cm, USEPA Method 120.1 MOD)	2.0	4.0	not applicable
Sodium Adsorption Ratio	5.0	12	not applicable

Red: Updated with respect to ESLs presented in July 2003 document.

Notes:

1. Shallow soils defined as soils less than or equal to 3 meters (approximately 10 feet) below ground surface.
2. Category "Residential Land Use" generally considered adequate for other sensitive uses (e.g., day-care centers, hospitals, etc.)
3. Assumes potential discharge of groundwater into a freshwater, marine or estuary surface water system.

Source of soil ESLs: Refer to Appendix 1, Tables A-1 and A-2.

Source of groundwater ESLs: Refer to Appendix 1, Table F-1a.

Soil data should be reported on dry-weight basis (see Appendix 1, Section 6.2).

Soil ESLs intended to address direct-exposure, groundwater protection, ecologic (urban areas) and nuisance concerns under noted land-use scenarios. **Soil gas data should be collected for additional evaluation of potential indoor-air impacts at sites with significant areas of VOC-impacted soil. See Section 2.6 and Table E.**

Groundwater ESLs intended to be address drinking water, surface water, indoor-air and nuisance concerns. **Use in conjunction with soil gas screening levels to more closely evaluate potential impacts to indoor-air if groundwater screening levels for this concern approached or exceeded (refer to Section 2.6 and Appendix 1, Table F-1a).**

Aquatic habitat goals for bioaccumulation concerns not considered in selection of groundwater goals (refer to Section 2.7).

Refer to appendices for summary of ESL components.

Soil and water ESLs for ethanol based on gross contamination concerns (see Appendix 1, Chapter 5 and related tables).

TPH -Total Petroleum Hydrocarbons. TPH ESLs must be used in conjunction with ESLs for related chemicals (e.g., BTEX, PAHs, oxidizers, etc.). See Volume 1, Section 2.2 and Appendix 1, Chapter 5.

Appendix B. Table F. ESLs Shallow Soils Surface Water Bodies (RWQCB, 2005)

TABLE F. ENVIRONMENTAL SCREENING LEVELS (ESLs)
Surface Water Bodies

	SURFACE WATER SCREENING LEVELS		
CHEMICAL PARAMETER	[1]Freshwater (ug/L)	[2]Marine (ug/L)	[3]Estuarine (ug/L)
ACENAPHTHENE	2.0E+01	2.0E+01	2.0E+01
ACENAPHTHYLENE	3.0E+01	3.0E+01	3.0E+01
ACETONE	1.5E+03	1.5E+03	1.5E+03
ALDRIN	1.4E-04	1.4E-04	1.4E-04
ANTHRACENE	7.3E-01	7.3E-01	7.3E-01
ANTIMONY	6.0E+00	5.0E+02	3.0E+01
ARSENIC	1.4E-01	1.4E-01	1.4E-01
BARIUM	1.0E+03	1.0E+03	1.0E+03
BENZENE	1.0E+00	7.1E+01	4.6E+01
BENZO(a)ANTHRACENE	2.7E-02	2.7E-02	2.7E-02
BENZO(b)FLUORANTHENE	2.9E-02	2.9E-02	2.9E-02
BENZO(k)FLUORANTHENE	2.9E-02	4.9E-02	4.9E-02
BENZO(g,h,i)PERYLENE	1.0E-01	1.0E-01	1.0E-01
BENZO(a)PYRENE	1.4E-02	1.4E-02	1.4E-02
BERYLLIUM	2.7E+00	2.7E+00	2.7E+00
BIPHENYL, 1,1-	5.0E-01	5.0E-01	5.0E-01
BIS(2-CHLOROETHYL)ETHER	1.4E-02	1.4E+00	1.4E+00
BIS(2-CHLOROISOPROPYL)ETHER	5.0E-01	6.1E+01	6.1E+01
BIS(2-ETHYLHEXYL)PHTHALATE	4.0E+00	5.9E+00	5.9E+00
BORON	1.6E+00	1.6E+00	1.6E+00
BROMODICHLOROMETHANE	1.0E+02	3.2E+03	3.2E+03
BROMOFORM	1.0E+02	3.6E+02	3.6E+02
BROMOMETHANE	9.8E+00	3.2E+03	1.6E+02
CADMIUM	1.1E+00	9.3E+00	1.1E+00
CARBON TETRACHLORIDE	5.0E-01	4.4E+00	4.4E+00
CHLORDANE	5.9E-04	5.9E-04	5.9E-04
CHLOROANILINE, p-	5.0E+00	5.0E+00	5.0E+00
CHLOROBENZENE	2.5E+01	5.0E+01	2.5E+01
CHLOROETHANE	1.2E+01	1.2E+01	1.2E+01
CHLOROFORM	7.0E+01	4.7E+02	4.7E+02
CHLOROMETHANE	1.3E+00	3.2E+03	3.2E+03
CHLOROPHENOL, 2-	1.8E-01	1.8E-01	1.8E-01
CHROMIUM (Total)	5.0E+01	1.8E+02	1.8E+02
CHROMIUM III	1.8E+02	1.8E+02	1.8E+02
CHROMIUM VI	1.1E+01	5.0E+01	1.1E+01
CHRYSENE	4.9E-02	4.9E-02	4.9E-02
COBALT	3.0E+00	3.0E+00	3.0E+00
COPPER	9.0E+00	3.1E+00	3.1E+00
CYANIDE (Free)	5.2E+00	1.0E+00	1.0E+00
DIBENZO(a,h)ANTHTRACENE	8.5E-03	4.9E-02	4.9E-02
DIBROMOCHLOROMETHANE	4.6E+01	4.6E+01	4.6E+01
1,2-DIBROMO-3-CHLOROPROPANE	2.0E-01	2.0E-01	2.0E-01
DIBROMOETHANE, 1,2-	5.0E-02	1.4E+03	1.4E+03
DICHLOROBENZENE, 1,2-	1.0E+01	1.0E+01	1.0E+01
DICHLOROBENZENE, 1,3-	7.1E+01	6.5E+01	6.5E+01
DICHLOROBENZENE, 1,4-	5.0E+00	1.1E+01	1.1E+01
DICHLOROBENZIDINE, 3,3-	2.9E-02	7.7E-02	7.7E-02

TABLE F. ENVIRONMENTAL SCREENING LEVELS (ESLs)
Surface Water Bodies

CHEMICAL PARAMETER	SURFACE WATER SCREENING LEVELS [1]Freshwater (ug/L)	[2]Marine (ug/L)	[3]Estuarine (ug/L)
DICHLORODIPHENYLDICHLOROETHANE (DDD)	8.4E-04	8.4E-04	8.4E-04
DICHLORODIPHENYLDICHLOROETHYLENE (DDE)	5.9E-04	5.9E-04	5.9E-04
DICHLORODIPHENYLTRICHLOROETHANE (DDT)	5.9E-04	5.9E-04	5.9E-04
DICHLOROETHANE, 1,1-	5.0E+00	4.7E+01	4.7E+01
DICHLOROETHANE, 1,2-	5.0E-01	9.9E+01	9.9E+01
DICHLOROETHYLENE, 1,1-	3.2E+00	3.2E+00	3.2E+00
DICHLOROETHYLENE, Cis 1,2-	6.0E+00	5.9E+02	5.9E+02
DICHLOROETHYLENE, Trans 1,2-	1.0E+01	2.6E+02	2.6E+02
DICHLOROPHENOL, 2,4-	3.0E-01	3.0E-01	3.0E-01
DICHLOROPROPANE, 1,2-	5.0E+00	1.0E+01	1.0E+01
DICHLOROPROPENE, 1,3-	5.0E-01	1.2E+02	1.2E+02
DIELDRIN	2.2E-03	1.9E-03	1.9E-03
DIETHYLPHTHALATE	1.5E+00	1.7E+00	1.5E+00
DIMETHYLPHTHALATE	1.5E+00	1.7E+00	1.5E+00
DIMETHYLPHENOL, 2,4-	1.0E+02	1.1E+02	1.1E+02
DINITROPHENOL, 2,4-	1.4E+01	7.5E+01	7.5E+01
DINITROTOLUENE, 2,4-	1.1E-01	9.1E+00	9.1E+00
1,4 DIOXANE	3.0E+00	5.0E+04	5.0E+04
DIOXIN (2,3,7,8-TCDD)	1.4E-08	1.4E-08	1.4E-08
ENDOSULFAN	5.6E-02	8.7E-03	8.7E-03
ENDRIN	3.6E-02	2.3E-03	2.3E-03
ETHANOL	5.0E+04	5.0E+04	5.0E+04
ETHYLBENZENE	3.0E+01	3.0E+01	3.0E+01
FLUORANTHENE	8.1E+00	8.0E+00	8.0E+00
FLUORENE	3.9E+00	3.9E+00	3.9E+00
HEPTACHLOR	2.1E-04	2.1E-04	2.1E-04
HEPTACHLOR EPOXIDE	1.1E-04	1.1E-04	1.1E-04
HEXACHLOROBENZENE	7.7E-04	7.7E-04	7.7E-04
HEXACHLOROBUTADIENE	2.1E-01	4.7E+00	4.7E+00
HEXACHLOROCYCLOHEXANE (gamma) LINDANE	6.3E-02	6.3E-02	6.3E-02
HEXACHLOROETHANE	7.0E-01	8.9E+00	8.9E+00
INDENO(1,2,3-cd)PYRENE	2.9E-02	2.9E-02	2.9E-02
LEAD	2.5E+00	8.1E+00	2.5E+00
MERCURY	1.2E-02	2.5E-02	1.2E-02
METHOXYCHLOR	1.9E-02	1.9E-02	1.9E-02
METHYLENE CHLORIDE	5.0E+00	1.6E+03	1.6E+03
METHYL ETHYL KETONE	4.2E+03	8.4E+03	8.4E+03
METHYL ISOBUTYL KETONE	1.2E+02	1.7E+02	1.7E+02
METHYL MERCURY	3.0E-03	3.0E-03	3.0E-03
METHYLNAPHTHALENE (total 1- & 2-)	2.1E+00	2.1E+00	2.1E+00
METHYL TERT BUTYL ETHER	5.0E+00	1.8E+02	1.8E+02
MOLYBDENUM	3.5E+01	2.4E+02	2.4E+02
NAPHTHALENE	1.7E+01	2.1E+01	2.1E+01
NICKEL	5.2E+01	8.2E+00	8.2E+00
PENTACHLOROPHENOL	1.0E+00	7.9E+00	7.9E+00
PERCHLORATE	6.0E+00	6.0E+02	6.0E+02
PHENANTHRENE	6.3E+00	4.6E+00	4.6E+00

TABLE F. ENVIRONMENTAL SCREENING LEVELS (ESLs)
Surface Water Bodies

CHEMICAL PARAMETER	SURFACE WATER SCREENING LEVELS [1]Freshwater (ug/L)	[2]Marine (ug/L)	[3]Estuarine (ug/L)
PHENOL	5.0E+00	1.3E+03	1.3E+03
POLYCHLORINATED BIPHENYLS (PCBs)	1.7E-04	1.7E-04	1.7E-04
PYRENE	2.0E+00	2.0E+00	2.0E+00
SELENIUM	5.0E+00	7.1E+01	5.0E+00
SILVER	3.4E-01	1.9E-01	1.9E-01
STYRENE	1.0E+01	1.1E+01	1.1E+01
tert-BUTYL ALCOHOL	1.2E+01	1.8E+04	1.8E+04
TETRACHLOROETHANE, 1,1,1,2-	1.3E+00	9.3E+02	9.3E+02
TETRACHLOROETHANE, 1,1,2,2-	1.0E+00	1.1E+01	1.1E+01
TETRACHLOROETHYLENE	5.0E+00	8.9E+00	8.9E+00
THALLIUM	2.0E+00	6.3E+00	6.3E+00
TOLUENE	4.0E+01	4.0E+01	4.0E+01
TOXAPHENE	2.0E-04	2.0E-04	2.0E-04
TPH (gasolines)	1.0E+02	3.7E+03	5.0E+02
TPH (middle distillates)	1.0E+02	6.4E+02	6.4E+02
TPH (residual fuels)	1.0E+02	6.4E+02	6.4E+02
TRICHLOROBENZENE, 1,2,4-	2.5E+01	6.5E+01	2.5E+01
TRICHLOROETHANE, 1,1,1-	6.2E+01	6.2E+01	6.2E+01
TRICHLOROETHANE, 1,1,2-	5.0E+00	4.2E+01	4.2E+01
TRICHLOROETHYLENE	5.0E+00	8.1E+01	8.1E+01
TRICHLOROPHENOL, 2,4,5-	6.3E+01	1.1E+01	1.1E+01
TRICHLOROPHENOL, 2,4,6-	5.0E-01	6.5E+00	6.5E+00
VANADIUM	1.5E+01	1.9E+01	1.9E+01
VINYL CHLORIDE	5.0E-01	5.3E+02	5.3E+02
XYLENES	2.0E+01	1.0E+02	1.0E+02
ZINC	1.2E+02	8.1E+01	8.1E+01
Electrical Conductivity (mS/cm, USEPA Method 120.1 MOD)	not applicable	not applicable	not applicable
Sodium Adsorption Ratio	not applicable	not applicable	not applicable

Red: Updated with respect to ESLs presented in July 2003 document.

Notes:

1. Source of Freshwater ESLs: Refer to Appendix 1, Table F-2a
2. Source of Marine ESLs: Refer to Appendix 1, Table F-2b.
3. Source of Estuarine ESLs: Refer to Appendix 1, Table F-2c.

Surface water screening levels lowest of drinking water goal (freshwater only), chronic aquatic habitat goal, goal to address bioaccumulation in aquatic organisms and subsequent consumption by humans, and general nuisance goal (odors, etc.). Refer to Section 2.7 of text for discussion.

Estuarine screening levels lowest of freshwater and marine screening levels.

Water ESLs for ethanol based on gross contamination concerns (see Appendix 1, Chapter 5 and related tables).

TPH -Total Petroleum Hydrocarbons. TPH ESLs must be used in conjunction with ESLs for related chemicals (e.g., BTEX, PAHs, oxidizers, etc.). See Section 2.2 and Appendix 1, Chapter 5.

Appendix C. Field Forms

ERRG

Boring #:
Sheet 1 of

Project Name and Location:					Job #:
Elevation:		Date and Time Started:			
Completion Depth	Number of Samples:	Drive:	1-liter	VOA:	Other:
Boring Diameter & Drilling Method:			Water Level:	First (date/time)	Second (date/time):
Sampler:	Hammer Wt:	Drop:	Boring Location:		
Drilling Co:	Driller:				

Depth (ft.)	Sample No	Sample Interval	Recovery	Blow Count	Description	Graphic Symbol	USCS Symbol	Estimated % of Gr	Sa	Si	Cl	P.I.D. Reading	Comments

ERRG

Boring #:
Sheet of

Project Name and Location: Job #:

Depth (ft.)	Sample No	Sample Interval	Recovery	Blow Count	Description	Graphic Symbol	USCS Symbol	Estimated % of				P.I.D. Reading	Comments
								Gr	Sa	Si	Cl		

ERRG
Engineering / Remediation Resources Group, Inc.
185 Mason Circle, Suite A
Concord, CA 94520
Phone: (925) 969-0750
Fax: (925) 969-0751

Lab No. _____ Page 1 of 1

Chain-of-Custody Record and Analysis Request

Project Contact (Hardcopy or PDF To):	**California EDF Report?** ☐ Yes ☐ No	
Laboratory / Address:	**Electronic Deliverables To (Email Address):**	
Phone No.: **Fax No.:**	**Sampler :**	
Project Number: **Phase # / Task #**		
Project Name:	**Project Address:**	

Project Manager:	**Sampling**		**Container**								**Matrix**			**Analysis Request**										**TAT** 12 hr/ 24 hr/ 48 hr/ 72 hr/STD (1 wk)	**Number of Containers**	**Comments**	**For Lab Use Only**
Sample Designation	**Date**	**Time**																							

Relinquished by:	**Date**	**Time**	**Received by:**	**Remarks:**
Relinquished by:	**Date**	**Time**	**Received by:**	
Relinquished by:	**Date**	**Time**	**Received by Laboratory:**	**Bill to:** Engineering / Remediation Resources Group, Inc. 185 Mason Circle, Suite A Concord, CA 94520

ERRG
185 Mason Circle, Suite A
Concord, CA 94520
Phone: (925) 969-0750

PROJECT NO: _____ WELL ID: _____
DATE: _____ SAMPLE ID: _____
CLIENT NAME _____ PURGED BY: _____
LOCATION: _____ SAMPLED BY: _____
ARRIVAL TIME: _____ DEPARTURE TIME: _____

Casing Diameter:	2"	3"	4"	5"	6"	8"	Other:
Casing Volume:	(0.17)	(0.38)	(0.66)	(1.02)	(1.05)	(2.60)	( )

Total Depth (feet) = _____ Depth to Water (feet): _____ Depth to Product (feet): _____

_____	-	_____	=	_____	x	_____	=	_____	x	_____	=	_____
TD		DTW				Casing volume				No. of casing volumes		Calculated Purge

Time Started: _____ Time ended: _____

Time (2400hr)	Volume (gal)	Temp. (°F)	Conductivity (µmhos/cm)	pH (units)	D.O. (mg/L)	Turbidity (NTU)	ORP (mV)	Odor (Y/N)	Pumped Dry (Y/N)

Actual gallons purged: _____ Sample Time: _____

PURGING EQUIPMENT

Active Extraction Well Pump ___ ___ Bailer (Teflon)
Portable Submersible Pump ___ ___ Bailer (PVC)
Other: ___ ___ Bailer (Stain. Steel)
Pump Depth: _____ ___ Dedicated

SAMPLING EQUIPMENT

Sampling Port ___ ___ Bailer (Teflon)
Portable Submersible Pump ___ ___ Bailer (PVC)
Peristaltic Pump ___ ___ Bailer (Stainless Steel)
___ Other: _____

Well Integrity: Good: ☐ Fair: ☐ Poor: ☐ Lock No. _____

Remarks: _____

Signature: _____ Reviewed by _____

Site-Specific Health and Safety Plan
Soil and Groundwater Sampling
Building 44 Site Investigation
U.S. Coast Guard Integrated Support Command
Alameda, California

December 2007

ERRG Project No. 27-167

Prepared for:

United States Coast Guard
Civil Engineering Unit Oakland
2000 Embarcadero, Suite 200
Oakland, California 94606

Prepared by:

Engineering/Remediation Resources Group, Inc.
115 Sansome St, Suite 200
San Francisco, California 94104
(415) 395-9974

Site-Specific Health and Safety Plan
Soil and Groundwater Sampling
Building 44 Site Investigation
U.S. Coast Guard Integrated Support Command
Alameda, California

Prepared by:

Engineering/Remediation Resources Group, Inc.

Melanie Enman	December 13, 2007
Signature	Date
Melanie Enman P.G.	Project Manager ERRG
Name	Title

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Acronyms and Abbreviations

ACGIH	American Conference of Governmental Industrial Hygienists
ANSI	American National Standards Institute
bgs	below ground surface
Cal/OSHA	California Occupational Safety and Health Administration
CCR	California Code of Regulation
CFR	Code of Federal Regulations
COPC	chemical of potential concern
CPR	cardio-pulmonary resuscitation
dB	decibel
EM	Engineers Manual
EPA	(U.S.) Environmental Protection Agency
ERRG	Engineering/Remediation Resources Group, Inc.
FAR	Federal Acquisition Regulation
GFCI	ground fault circuit interrupter
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
IARC	International Agency for Research on Cancer
IDLH	immediately dangerous to life and health
ISC	Integrated Support Command
kV	kilovolt
LEL	lower explosive limit
mg/m^3	milligrams per cubic meter
MSDS	material safety data sheet
MTBE	methyl tert-butyl ether

Acronyms and Abbreviations *(continued)*

NFPA	National Fire Protection Association
NIOSH	National Institute for Occupational Safety and Health
NRC	Nuclear Regulatory Commission
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyl
PID	photoionization detector
PPE	personal protection equipment
ppm	parts per million
QC	quality control
SPF	sun protection factor
SSHO	Site Safety and Health Officer
STEL	short-term exposure limit
SVOC	semi-volatile organic compound
Tetra Tech	Tetra Tech Inc.
TLV	threshold limit value
TPH	total petroleum hydrocarbons
TWA	time-weighted average
USA	Underground Service Alert
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USCS	Unified Soil Classification System
UST	underground storage tank
VOC	volatile organic compound

Section 1. Introduction

The purpose of this site-specific Health and Safety Plan (HASP) is to define the protocols necessary for protecting on-site personnel from hazards associated with the soil and groundwater sampling to be conducted at building 44 at the United States Coast Guard (USCG) Integrated Support Command (ISC) in Alameda, California (site). This HASP has been prepared by Engineering/Remediation Resources Group, Inc. (ERRG) for the work to be conducted at the site as requested by the USCG. This HASP provides essential information about the potential hazards associated with the project, and establishes site safety and health policies and procedures.

The provisions outlined in this HASP are mandatory for all project personnel, including subcontractors and authorized visitors (such as regulatory personnel). A copy of this document will be made available to personnel involved with site activities. Project personnel, including authorized visitors, will be required to sign the Safety Compliance Agreement Form (included as an attachment, along with other field forms) after reading the HASP and attending an on-site briefing.

This HASP is a "working document" for use by site personnel. The HASP may be modified at any time, with the approval of the Site Safety and Health Officer (SSHO), to address hazards and changing conditions encountered during the project. An up-to-date copy of this HASP will be maintained at the site during field operations, and will be made available to affected personnel. Questions regarding the HASP or health and safety issues should be directed to the SSHO.

A primary goal of this project is to conduct work in compliance with relevant sections of the following documents:

- Occupational Safety and Health Administration (OSHA) Standards 29 Code of Federal Regulations (CFR) 1910, Occupational Safety and Health Standards
- OSHA Standards 29 CFR 1926, Safety and Health Regulations for Construction
- OSHA 29 CFR 1926.65, Hazardous Waste Operations and Emergency Response (HAZWOPER)
- Federal Acquisition Regulation (FAR) Clause 52. 236. 13: Accident Prevention
- Nuclear Regulatory Commission (NRC) Standards, 10 CFR 19-171
- National Institute for Occupational Safety and Health (NIOSH)/OSHA/USCG/U.S. Environmental Project Agency (EPA), Occupational Safety and Health Guidance
- EPA, Standard Operating Safety Guides, July 1988
- American Conference of Governmental Industrial Hygienists (ACGIH), Threshold Limit Values and Biological Exposure Indices (latest edition)

- U.S. Army Corps of Engineers (USACE) Engineers Manual (EM) 385-1-1, November 2003
- National Fire Protection Association (NFPA), NFPA 326 Standard for the Safeguarding of Tanks and Containers for Entry, Cleaning, or Repair, 1999
- California Department of Industrial Relations, Division of Occupational Safety and Health (also known as California Occupational Safety and Health Administration) (Cal/OSHA), Title 8 California Code of Regulations (CCR), Chapter 4, Subchapter 7, General Safety Orders
- Cal/OSHA, 8 CCR Section 5192, Hazardous Waste Operations and Emergency Response
- Cal/OSHA, 8 CCR Chapter 4, Subchapter 4, Construction Safety Orders
- Cal/OSHA, 8 CCR Section 3203.1, Illness and Injury Prevention

Section 2. Project Location and Background

2.1. SITE LOCATION AND BACKGROUND

The site is located at the intersection of McCullough Drive and Spencer Road on the southwest side of Coast Guard Island (Figure 1). On the east side of Building 44 there was a 10,000-gallon double-walled fiberglass underground storage tank (UST) that was installed in 1985.

Initially, the UST received bilge water and oily water from the USCG ships through underground pipelines that ran to the piers. Oily water and waste oil were periodically pumped out of the tank and disposed of off-site. An oil/water separator was later installed, which decanted most of the water for disposal to the sanitary sewer system before the waste oil was disposed of. The pipelines to the docks were later taken out of service, and oily wastewater and waste oil was transported to the UST by tanker trucks. The separation process and off-site disposal procedure remained the same. The monitoring system that detected potential leaks in the tank failed and the UST was taken out of service because of this system's failure. Tetra Tech Inc. (Tetra Tech), on behalf of the USCG, removed the UST in November 2001 (Tetra Tech, 2002).

Section 3. Planned Site Activities

This HASP identifies potential hazards associated with removal sampling of soil and groundwater to be conducted at the site, as described below.

Seven soil borings will be advanced using a track-mounted drilling rig capable of using direct push technology. A California C-57 licensed well driller will install all of the proposed borings. The borings will be installed to approximately 15 feet below ground surface (bgs).

Borings will be continuously logged in the field using the Unified Soil Classification System (USCS). A photo-ionization detector (PID) will be used to screen for the presence of volatile chemicals in the soil cores. PID measurements will be recorded on the boring logs.

The first five feet of each bore hole will be advanced using a hand auger to ensure hole is clear of buried utilities. Soil samples will be collected from each soil boring at 5-foot intervals. Samples will be selected for chemical analysis based on visual observation, order and screening using a PID. Soil samples will be collected using a 4-foot long split tube sampler lined with an acrylic sampling tube. Immediately after removing the acrylic tube from the sampler, the tube will be cut to access the soil core. Part of the soil sample will be placed in a glass jar sealed with a Teflon-lined lid or a self-sealing plastic bag and allowed to volatilize. A headspace measurement will be taken from this sample for total organic compounds using the PID.

Soil cuttings generated during the investigation will be stored on-site in properly labeled, sealed 55-gallon Department of Transportation-approved, steel drums. Samples will be collected from the drums and composited for disposal purposes.

The project requires the following work elements:

1. Mobilization and Site Preparation
2. Utility Clearance
3. Concrete Coring
4. Drilling including Soil and Groundwater Sampling
5. Site Cleanup and Demobilization

Section 4. Activity Hazard Analysis

This section summarizes the potential hazards of the planned work activities and prevention strategies to protect workers from those hazards. Anticipated hazards, in part, are based on information contained in the project-specific contract requirements of the individual task order.

4.1. CHEMICAL HAZARDS

4.1.1. Site Distribution of Chemicals of Potential Concern

Chemicals of potential concern (COPCs) for this project have been identified as hydrocarbons associated with unleaded gasoline, diesel, and motor oil. Other COPCs for this project have been identified as volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), cadmium, chromium, lead, nickel, and zinc and potentially PCBs. Typical hydrocarbon constituents with their respective regulatory exposure levels, Proposition 65 status, and carcinogenicity status, are presented in Table 1. Table 2 summarizes health effects and physical properties of the COPCs. Table 3 presents the action levels and corresponding actions required.

4.1.2. Hazard Communication

ERRG's SSHO will keep copies of material safety data sheets (MSDSs) and NIOSH Data Sheets for all hazardous materials brought on site (see Attachment). In addition, as part of the project-specific training, staff will be briefed on the location of the reference information.

4.2. PHYSICAL HAZARDS

A number of physical hazards will exist at the site:

- Miscellaneous small equipment poses hazards such as friction burns, vibration, and physical trauma.
- Large equipment poses hazards from physical trauma, noise, and vibration.
- COPC exposure poses acute and chronic health hazards.

Other site-specific hazards include:

- Electrical hazards
- Hazards from improper grounding of tools
- Tripping hazards from extension cords
- Eye injuries from dust, projectiles, etc.

Table 1. Exposure Levels of Chemicals of Potential Concern

COPC	Regulatory Exposure Levels	Proposition 65 Status	EPA Carcinogen Rating	IARC Carcinogen Rating
Benzene	1 ppm OSHA TWA; 5 ppm OSHA STEL; 500 ppm IDLH [note: 1 ppm = 3.19 mg/m^3]	cancer, developmental, male		A/1
Toluene	200 ppm OSHA TWA; 300 ppm Cal/OSHA TWA; 500 ppm IDLH [note: 1 ppm = 3.77 mg/m^3]	developmental		D/–
Ethylbenzene	100 ppm OSHA TWA; 125 ppm NIOSH STEL; 800 ppm IDLH [note: 1 ppm = 4.34 mg/m^3]	–		–/–
Xylene	100 ppm OSHA TWA; 150 ppm NIOSH STEL; 900 ppm IDLH [note: 1 ppm = 4.34 mg/m^3]	–		D/–
Methyl tert-butyl ether (MTBE)	None (OSHA/NIOSH); TLV = 50 ppm ACGIH TWA	–		–/–
TPH-gasoline	300 ppm Cal/OSHA TWA [note: 1 ppm = 3.00 mg/m^3]	–		–/2B
TPH_{diesel}	N/A	N/A	N/A	3
$TPH_{motor\ oil}$	100 mg/m^3 NIOSH REL TWA	cancer	N/A	N/A
PCB 1254	0.001 mg/m^3 NIOSH REL Ca TWA, 0.5 mg/m^3 OSHA PEL, 5 mg/m^3 IDLH Ca	cancer	B2	2A
Benzo(a)pyrene[1]	0.1 mg/m^3 NIOSH REL Ca TWA, 0.2 mg/m^3 OSHA PEL, 80 mg/m^3 IDLH Ca	cancer	B2	1
Dibenz(a,h)anthracene[1]	0.1 mg/m^3 NIOSH REL Ca TWA, 0.2 mg/m^3 OSHA PEL, 80 mg/m^3 IDLH Ca	cancer	B2	2A
Cadmium	0.005 mg/m^3 OSHA PEL, 9 mg/m^3 IDLH Ca	cancer, developmental male	B1	1
Chromium	0.5 mg/m^3 NIOSH REL TWA, 1 mg/m^3 OSHA PEL TWA, 250 mg/m^3 IDLH	cancer (VI)	D (III); A (VI)	3 (III); 1 (VI)
Lead	0.050 mg/m^3 NIOSH REL TWA, 0.050 mg/m^3 OSHA PEL, 100 mg/m^3 IDLH	cancer, developmental female/male	B2	2B, 2A, 3

Table 1. Exposure Levels of Chemicals of Potential Concern *(continued)*

COPC	Regulatory Exposure Levels	Proposition 65 Status	EPA Carcinogen Rating	IARC Carcinogen Rating
Nickel	0.015 mg/m^3 NIOSH REL Ca TWA, 1 mg/m^3 OSHA PEL, 10 mg/m^3 IDLH Ca	cancer	A,B2	1,2B
Zinc	5 mg/m^3 NIOSH REL TWA (Dust), 15 mg/m^3 OSHA PEL (total dust), 500 mg/m^3 IDLH	N/A	N/A	N/A

IARC = International Agency for Research on Cancer
STEL = short-term exposure limit
ppm = parts per million
MTBE = methyl tert-butyl ether
TLV = threshold limit value
TWA = time-weighted average (8-hour)
OSHA = Occupation Safety and Health Administration
IDLH = immediately dangerous to life and health
mg/m^3 = milligrams per cubic meter
NIOSH = National Institute for Occupational Safety and Health
ACGIH = American Conference of Governmental Industrial Hygienists
TPH = total petroleum hydrocarbons

EPA Classification:

A – Human carcinogen
B – Probable human carcinogen
C – Possible human carcinogen
D – Not classifiable as to human carcinogenicity
E – Evidence of no carcinogenicity for humans

IARC Classification:

1 – The agent is carcinogenic to humans
2A – The agent is probably carcinogenic to humans
2B – The agent is possibly carcinogenic to humans
3 – The agent is not classifiable as to its carcinogenicity to humans
4 – The agent is probably not carcinogenic to humans

Table 2. Health Effects and Physical Properties of Chemicals of Potential Concern

COPC	Physical Properties	Health Effects
Benzene	Colorless liquid with a characteristic odor.	Irritation of the eyes, skin, and respiratory tract. Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. May affect the central nervous system, resulting in lowered consciousness. Exposure far immediately above the occupational exposure limit value may result in unconsciousness and death.
Toluene	Colorless liquid with a sweet, pungent, benzene-like odor.	Irritation of the eyes and respiratory tract. Exposure could cause central nervous system depression. Exposure at high levels may result in cardiac dysrhythmia, unconsciousness, and death.
Ethylbenzene	Colorless liquid with an aromatic odor.	Irritation of the eyes, skin, and respiratory tract. Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. May affect the central nervous system. Exposure far above occupational exposure limit could cause lowering of consciousness. Repeated or prolonged contact with skin may cause dermatitis.
Xylene	Colorless liquid with an aromatic odor.	Irritation of the eyes and skin (including defatting of skin). May affect the central nervous system. If liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. May affect the central nervous system. May enhance hearing damage caused by exposure to noise. Animal tests show possible toxicity to human reproduction or development.
Methyl tert-butyl ether (MTBE)	Flammable liquid with distinctive, disagreeable odor	Breathing small amounts of MTBE for short periods may cause nose and throat irritation. Some people exposed to MTBE have reported headaches, nausea, dizziness, and mental confusion. There is no evidence that MTBE causes cancer in humans. One study with rats found that breathing high levels of MTBE for long periods may cause kidney cancer.
TPH-gasoline	Clear liquid with a characteristic odor.	Irritation of the eyes, skin, and mucous membrane; dermatitis; headache, lassitude (weakness, exhaustion), blurred vision, dizziness, slurred speech, confusion, convulsions; chemical pneumonitis (with aspiration of liquid); possible liver or kidney damage. Potential occupational carcinogen.
TPH-diesel	Clear liquid with a characteristic odor.	Irritation of the eyes, skin, and mucous membrane; dermatitis; headache, lassitude (weakness, exhaustion), blurred vision, dizziness, slurred speech, confusion, convulsions; chemical pneumonitis (with aspiration of liquid); possible liver or kidney damage. Potential occupational carcinogen.
TPH-motor oil	Dark liquid with a characteristic odor.	Irritation of the eyes, skin, and mucous membrane; dermatitis; headache, lassitude (weakness, exhaustion), blurred vision, dizziness, slurred speech, confusion, convulsions; chemical pneumonitis (with aspiration of liquid); possible liver or kidney damage. Potential occupational carcinogen.

Table 2. Health Effects and Physical Properties of Chemicals of Potential Concern *(continued)*

COPC	Physical Properties	Health Effects
PCB 1254	Thick, non-combustible colorless to light yellow liquid, with a hydrocarbon odor	Irritant, especially to eyes; dermatitis chloracne; possible liver damage; possible damage to human reproduction; headache; numbness; fever. Potential occupational carcinogen.
Benzo(a)pyrene[1]	Colorless liquid	Potential damage to human reproduction. Potential occupational carcinogen.
Dibenz(a,h)anthracene[1]	Colorless liquid	Potential occupational carcinogen.
Cadmium	Silver-white, blue-tinged lustrous, odorless solid	Extracted during the production of other metals like zinc, lead, and copper. Enters the air from industry and can travel long distances before falling into water or soil. It can bind strongly to soil particles and dissolves in water. Stays in the body a very long time and can build up from many years of exposure to low levels. Breathing high levels severely damages the lungs and can cause death. Ingestion severely irritates the stomach, leading to vomiting and diarrhea. Long-term effects are kidney disease, lung damage, and fragile bones. Animals given it in food or water had high blood pressure, iron-poor blood, liver disease, and nerve or brain damage. Skin contact not known to cause health effects in humans or animals.
Chromium	Blue-white to steel-gray, lustrous, brittle, hard, odorless solid	A metal found in natural deposits as ores containing other elements. Its greatest use is in metal alloys such as stainless steel; protective coatings on metal; magnetic tapes; and pigments for paints, cement, paper, rubber, composition floor covering, and other materials. Its soluble forms are used in wood preservatives. EPA has found short-term exposure symptoms to be skin irritation or ulceration. Long-term exposure may cause damage to the liver, kidney, circulatory and nerve tissues. May also cause skin irritation on contact.
Lead	A heavy, ductile, soft, gray solid	Used in manufacturing metal products. Can be released to the air and may travel long distances before settling to the ground. Usually sticks to soil particles and depending on the lead compound and soil characteristics, it will move to soil and ground. It can affect almost every organ and system in your body. The most sensitive is the central nervous system. Also damages kidneys and the reproductive system.

Table 2. Health Effects and Physical Properties of Chemicals of Potential Concern *(continued)*

COPC	Physical Properties	Health Effects
Nickel	Lustrous, silvery, odorless solid	Abundant metal used to make stainless steel and other metal alloys. Skin effects are the most common effects in people who are sensitive to nickel. Workers who breathed very large amounts of its compounds have developed lung and nasal sinus cancer. Much of nickel in the environment is found with soil and sediments because nickel attaches to particles that contain iron or manganese, which are often present in soil and sediments. Exposure comes from breathing air containing nickel, eating foods containing nickel, which is the major source of exposure for most people, drinking water, and handling metals. The most common health effect is skin rash at the site of contact. Less frequently some people who are sensitive to it have asthma attacks following exposure. Lung effects, including chronic bronchitis and reduced lung function, have been observed in workers who breathed large amounts of it. Animal studies show that breathing high levels of its compounds may result in inflammation of the respiratory tract. Eating or drinking large amounts has been reported to cause lung disease in dogs and rats and to affect the kidneys, stomach, blood, liver, immune system, and reproduction and development in rats and mice.
Zinc	White, odorless solid	Commonly used with other elements to form zinc compounds that are used in industry. It attaches to soil, sediments, and dust particles in the air and can move in to the groundwater. Most of the zinc in soil stays bound to soil particles. Harmful effects of high levels of ingested zinc include anemia and pancreas damage. Breathing large amounts as dust can cause specific short-term disease called metal fume fever.

Notes:

EPA = Environmental Protection Agency

MTBE = methyl tertiary-butyl ether

TPH = total petroleum hydrocarbons

Table 3. Action Levels

Reading	Action Level	Required Action
Organic vapors by PID	> 5 ppm above background in breathing zone	Increase ventilation to reduce vapor concentrations to background levels.
	> 10 ppm above background	Stop work.

Notes:
PID = photoionization detector
ppm = parts per million

All equipment, such as hand tools and machines, will be operated in accordance with the manufacturer's recommended safe practices.

4.2.1. Excavation and Trenching

There is no excavation or trenching activities planned for this project; however, the standard operating procedure for excavation and trenching is described in ERRG's Corporate Safety and Health Program, dated June 2000. The Corporate Safety and Health Program is located at all ERRG offices, and will be made available upon request.

4.2.2. Tools, Machinery, and Equipment

The following general safety guidelines will be followed when working with or around tools, machinery, and equipment:

- Inspect tools and equipment frequently for defects. Do not use defective tools or equipment; report them to your supervisor or the person in charge of the equipment.
- Use tools appropriately; do not use a wrench for a hammer, a screwdriver for a chisel, pliers for a wrench, etc.
- Do not lift or lower portable electric tools by means of a power cord; use a handline. Likewise, do not throw tools, equipment, or material up or down from one working level to another.
- Keep cords of electrical equipment coiled when not in use. When in use, ensure that cords are positioned or protected such that they cannot be run over by vehicles or equipment.
- When using any AC electrical-powered equipment, ensure that it is grounded by using three-wire receptacles and extension cords connected to a grounded source. Ground fault interrupters should be used on power circuits serving outlets in damp, wet, or outdoor locations or other areas where personnel may become well grounded. Install ground fault circuit interrupters (GFCIs) at the primary source of power.
- Shut down machinery before cleaning, oiling, or adjusting.
- Do not leave nails or spikes protruding from planks, boards, or other timbers. Pull them out or clinch them (bend them over) into the wood.
- Employees should not attempt to operate machinery or equipment without proper training and authorization.

- Loose or frayed clothing, dangling ties, finger rings, etc., should not be worn around moving machinery or other mechanical sources of entanglement. Jewelry should not be worn when working with chemicals or electricity.
- Machinery should not be repaired or adjusted while in operation, nor should oiling of moving parts be attempted, except on equipment that is designed or fitted with safeguards to protect the person performing the work.
- Do not operate equipment unless guards and safety devices are in place and operational.
- Do not use portable electrical tools or equipment that are not grounded (3-pronged plug) or double insulated.

4.2.3. Mobile Equipment and Vehicles

The following general safety guidelines should be followed when working with or around mobile equipment and vehicles:

- Document inspection of each piece of equipment prior to use on a daily basis in accordance with ERRG policy.
- Define equipment routes, traffic patterns, and site-specific safety measures.
- Ensure that operators are properly trained and equipment has been properly inspected and maintained. Verify back-up alarms are functioning properly.
- Ensure that the ground spotters are assigned and informed of proper hand signals and communication protocols. Stop heavy equipment work if spotter cannot be seen.
- Ensure that field personnel do not work in close proximity to operating equipment.
- Ensure that lifting capacities, load limits, etc., are not exceeded.
- Do not move drill rigs, winch trucks, etc., unless suspended loads are secured so they may not swing.
- No persons are allowed to ride on the ball or hook of any crane or derrick, on the bucket or cable of excavation equipment, or on loads being moved by heavy equipment.
- Cranes, backhoes, derricks, winch trucks, and drill rigs must be operated in accordance with the recognized clearance from electrical lines. Lines should be assumed to be energized unless they are visibly grounded at the work site. Lines that could accidentally come into contact with equipment must be de-energized or otherwise made safe before commencing work.
- Mark all overhead power lines at ground level for equipment movement prior to the start of work.
- Field personnel should keep out from under loads, and keep clear of moving loads.
- Mobile equipment or vehicles with an obstructed view to the rear must have back-up alarms, or be directed, when backing, by a spotter.
- The swing radius of trackhoes, etc. must be barricaded to keep personnel out of this area.
- All mobile equipment must be inspected to assure it is safe to operate prior to being used on site.

The following item should be kept in all ERRG field vehicles:

- Minimum 10 B:C fire extinguisher
- First-aid kit
- Disposable camera

The vehicle should be parked as near as possible to the work site, in a location between the work site and the nearest vehicle access road.

The following general safety guidelines should be followed when working with or around excavations and trenches:

- Prior to initiation of any ground disturbance, notification of Underground Services Alert's (USA) utility location service will be made, per Section 4.2.4 below.
- Excavations must be evaluated for potential flammable vapors to assure these do not exceed 10 percent lower explosive limit (LEL); any entry into an excavation requires evaluation to determine if it qualifies as a permit-required confined space.
- Ensure that excavations comply with, and personnel are informed of, the requirements of 29 CFR 1926 Subpart P.
- Ensure that any required sloping or benching is consistent with 29 CFR 1926 Subpart P, as well as USACE EM 385-1-1 (USACE, 2003), and will be reviewed and approved by a licensed Professional Engineer. However, excavation and trenching activities are not planned; therefore this guideline is not applicable.
- If sloughing is observed during the excavation activities, if unstable soils are identified in the field, or if free water is observed entering the excavation, the designated Competent Person, in consultation with a licensed Professional Engineer, will evaluate and determine the appropriate sloping requirements. If free water exists in the trench, no personnel entry is allowed.
- Identify special personal protective equipment (PPE) and monitoring needs if personnel are required to enter approved excavated areas or trenches.
- Maintain line of sight between equipment operators and personnel in excavations/trenches. Such personnel are prohibited from working in close proximity to operating machinery.
- Suspend or shut down operations at signs of cave in, excessive water, defective shoring, changing weather, or unacceptable monitoring results.
- Utilities requiring support will be held with braces or a suspension system.

4.2.4. Utility Lines and Buried Objects

Field vehicles and equipment will be maintained at a minimum distance of 20 feet, in vertical and horizontal directions from electrical power lines (energized lines) and/or electrical equipment with a voltage less than or equal to 50 kilovolts (kV). If the voltage exceeds 50 kV, the clearance will be increased by 4 inches for every 10 kV over that voltage. When excavation activities or trenching activities are planned, the location and marking of such lines and equipment will be coordinated with USA prior to the start of field activities. The following standard safety procedures should be employed and enforced:

- Underground electricity hazards can be more dangerous than those overhead. Be aware that underground utilities may be a considerable distance from signs or boundary lines.
- USA, and/or a local locating service, and a client representative will be notified prior to beginning work. No ground disturbance will be initiated until USA is notified and necessary precautions are implemented to avoid hitting on-site utilities. This may require air-knifing or other procedures to ascertain the exact location of utilities down to 5 feet.

As the activities at the site are not to extend below grade, utility locating will not be necessary.

4.2.5. Noise

Noise is a potential hazard in areas where noise-generating equipment (such as drill rigs, power tools, pumps, and generators) is operated. Equipment operation may produce noise levels that reach or exceed 85 decibels (dB), the action level established by OSHA. Exposure to elevated noise levels can lead to temporary or permanent hearing loss and can cause muscle tension and irritability. The SSHO will evaluate elevated noise levels when equipment is operated, and will ensure that hearing protection is utilized when noise levels are elevated. Hearing protection typically involves the use of disposable earplugs for the duration of the excessive noise level; such protection will be used during heavy equipment operations and other operations that present a noise hazard.

4.3. RADIOLOGICAL HAZARDS

No radiological hazards are anticipated at the sites included in the work covered by this HASP.

4.4. BIOLOGICAL HAZARDS

No biological hazards beyond flying insects, ticks, and spiders are identified.

- Biological hazards will be mitigated by personnel avoiding contact with insects and ticks, and carrying insect repellent, if necessary.
- Persons allergic to insect stings must have a sting kit, as prescribed by their physicians.

First-Aid: Workers bitten by insects or ticks will seek prompt first-aid attention on site, or if warranted at a nearby hospital. Incidents involving the hospital or incidents of concern to on-site workers will be reported to the SSHO, and records will be maintained in the Safety and Health files.

4.5. FIRE AND EXPLOSION SAFETY

Some of the COPCs are flammable or explosive. The following site-specific elements of fire and explosion prevention shall be adhered to:

- Vehicles and equipment will contain minimum 10B:C fire extinguishers as required by OSHA regulations. ERRG and subcontractors will locate additional 4A:80B:C fire extinguishers within the immediate work area, if required, so that the maximum travel distance does not exceed 75 feet.
- Trash and debris will be kept in appropriate containers, and emergency phone numbers will be posted at the work areas.

- Trenches and excavations will be evaluated to assure flammable vapors are < 10 percent LEL.

- Smoking will only be permitted in the designated areas.

4.6. HEAT AND COLD STRESS

The SSHO will routinely check with on-site staff to verify that they are not uncomfortably cold or hot. Simple preventive measures (such as rest breaks, availability of warm and cold clothing, hydration, etc.) are anticipated to be adequate. Should heat or cold stress cause employee discomfort and possible employee health hazards, the SSHO will amend this HASP (upon approval from ERRG's Corporate Health and Safety Manager) and will implement other procedures.

Heat stress and solar radiation exposures will be minimized by:

- Employees wearing long-sleeved shirts, hats, ultra-violet (UV)-rated sunglasses or safety glasses, and gloves
- Employees provided with high sun protection factor (SPF) (e.g., SPF 30) barrier cream for exposed skin areas
- Employees will be provided with an adequate supply of potable water (one quart per employee per hour)
- Employees will be provided access to an area with shade, and permitted to utilize that area whenever the individual believes a preventive recovery period is needed.

Persons experiencing heat stress symptoms such as headache, nausea, vomiting, or muscle cramps will immediately decontaminate, remove chemical-resistant clothing and respirators, and move to a shaded break area for further evaluation. Ill workers may also be placed in an air-conditioned vehicle or trailer to facilitate cooling.

Persons experiencing cold stress symptoms such as mild hypothermia should move to warm area and stay active. Remove wet clothes and replace with dry clothes or blankets, cover the head. To promote metabolism and assist in raising internal core temperature, drink a warm (not hot) sugary drink. Avoid drinks with caffeine. For more severe cases do all the above, plus contact emergency medical personnel (Call 911 for an ambulance), cover all extremities completely, place very warm objects, such as hot packs or water bottles on the victim's head, neck, chest and groin. Arms and legs should be warmed last. In cases of severe hypothermia treat the worker very gently and do not apply external heat to re-warm. Hospital treatment is required.

4.7. CONFINED SPACE

No confined space entry hazards are anticipated for this project; however any excavations would be evaluated to assure they are not permit-required confined spaces, due to egress limitations or other hazards.

4.8. GENERAL SAFETY HAZARDS

A number of general safety hazards exist at the site, including:

Fall Hazards: The site is relatively flat, without significant fall hazards. During site activities, exclusion zones will be flagged with caution tape and/or fall barriers as required for personnel safety.

Illumination: Adequate lighting is needed in work areas. If work illumination levels fall below a reasonable level (i.e., less than 10 foot-candles), supplemental lighting will be provided or work will be terminated.

Contaminant Ingestion/Smoking: Eating, drinking, chewing gum or tobacco, smoking, or other practices that involve hand-to-mouth contact increase the probability of contaminant ingestion and are prohibited in work areas where the possibility of contamination exists.

Sanitation: Drinking water will be obtained from off-site sources (e.g., bottled water). Adequate toilet facilities and hand washing facilities will be provided on site in accordance with 8 CCR Sections 1526 and 1527. Hands and faces must be thoroughly washed with soap and water upon leaving a contaminated or suspected contaminated work area before eating, drinking, or smoking.

Pathogen Exposures: PPE worn to protect against site hazards (i.e., coveralls and gloves) will also protect against common soil-borne pathogens. ERRG's "Bloodborne Pathogen Exposure Control Plan" defines bloodborne pathogen procedures, and will be used as applicable.

4.9. DECONTAMINATION

Protective equipment will be decontaminated as necessary and at the end of each field day using a solution of Alconox detergent and water. Detergent and water wash will be available for workers' hygiene in the support zone.

Small equipment, such as shovels, compaction tools, excavator buckets, etc., will be cleaned within the exclusion zone, before leaving the site. Potential contaminants will be removed by scraping and brushing the soil from the equipment while it is within the exclusion zone and adjacent to the excavation area. For heavy equipment decontamination, dry decontamination procedures similar to those used for small equipment will be used during site clean-up operations and prior to the equipment exiting the site. All decontamination procedures will comply with Spill Prevention and Control Measures included in subsection 4.12.

4.10. ACTIVITY HAZARD ANALYSIS TABLES

The task-specific safety hazards identified for this project are summarized in Tables 4 through 8. The hazards analysis is based on the following primary site activities:

- Mobilization and Site Preparation
- Utility Clearance
- Concrete Coring
- Drilling including Soil and Groundwater Sampling
- Collection of Water Level Measurements
- Site Cleanup and Demobilization

Table 4. Activity Hazard Analysis – Mobilization and Site Preparation

Work Personnel	Principal Activities	Potential Hazards	Recommended Controls
▪ ERRG ▪ Vironex Drilling	▪ Delineate work zone ▪ Drum placement for soil cuttings ▪ Move heavy equipment and supplies onto site None of these activities is anticipated to create disturbances of contaminants in the subsurface soils due to concrete and asphalt paving.	▪ Physical hazards (slip, trip, and fall) ▪ Biological hazards ▪ Heat or cold stress ▪ Noise ▪ Injuries from equipment/tools ▪ Working around heavy equipment	▪ Use hearing protection and proper PPE ▪ Keep hydrated, use sunscreen, take rest breaks ▪ Employ good housekeeping techniques to keep the workplace free of slip, trip and fall hazards ▪ Be aware of surroundings- footing, equipment, personnel, tools, etc. ▪ Follow proper controls for work around heavy equipment ▪ Use proper lifting techniques (use a buddy if the object weighs more than 50 pounds, bend with the knees and not back, and do not twist side-to-side when lifting heavy objects).
Minimum PPE	**Safety Monitoring Equipment**	**Inspection Requirement**	**Training Requirements**
▪ Steel-toed boots (ANSI Z41.1) ▪ Hard hat (ANSI Z89.1) ▪ Safety glasses with side shields (ANSI Z87.1) ▪ Leather work gloves ▪ Safety vest	▪ Fire extinguisher ▪ First-aid kit ▪ Eye wash	▪ Current fire extinguisher certification ▪ Heavy equipment inspection checklist	▪ Complete 40-hour and 8-hour refresher HAZWOPER training. ▪ Read HASP and sign Safety Compliance Agreement Form. ▪ Attend on-site safety briefing and daily safety meetings. ▪ Training on equipment and tools being used by each person

ERRG = Engineering/Remediation Resources Group, Inc. PPE = personal protection equipment
ANSI = American National Standards Institute HASP = Health and Safety Plan

Table 5. Activity Hazard Analysis – Utility Clearance

Work Personnel	Principal Steps	Potential Hazards	Recommended Controls
▪ ERRG ▪ SLS	▪ Marking of sample locations ▪ Marking of utilities (private utility locator)	▪ Physical hazards (traffic) ▪ Heat stress ▪ Noise ▪ Biological hazards	▪ Follow proper work practices to minimize physical hazards. ▪ Keep hydrated, use sunscreen, take rest breaks ▪ Employ good housekeeping techniques to keep the workplace free of slip, trip and fall hazards ▪ Be aware of surroundings- footing, equipment, personnel, tools, etc.. ▪ Maintain line-of-site with on-site vehicles and equipment; utilize flagger(s) if necessary ▪ Level D PPE
Minimum PPE	**Safety Equipment**	**Inspection Requirement**	**Training Requirements**
▪ Steel-toed boots (ANSI Z41.1) ▪ Hard hat (ANSI Z89.1) ▪ Safety glasses with side shields (ANSI Z87.1) ▪ Hearing protection ▪ Leather work gloves ▪ Safety vest	▪ First-aid kit ▪ Eye wash	▪ None	▪ Complete 40-hour and 8-hour refresher HAZWOPER training. ▪ Read HASP and sign Safety Compliance Agreement Form. ▪ Attend on-site safety briefing and daily safety meetings.

ERRG = Engineering/Remediation Resources Group, Inc.
PPE = personal protection equipment
ANSI = American National Standards Institute
HAZWOPER = Hazardous Waste Operations and Emergency Response
HASP = Health and Safety Plan

Table 6. Activity Hazard Analysis – Concrete Coring

Work Personnel	Principal Steps	Potential Hazards	Recommended Controls
▪ Osborne Concrete	▪ Cutting 6 to 8-inch diameter cores from concrete	▪ Physical hazards (traffic) ▪ Heat stress ▪ Noise ▪ Biological hazards ▪ Work around coring equipment	▪ Keep hydrated, use sunscreen, take rest breaks ▪ Use hearing protection and proper PPE- leather work gloves and eye protection with side shields ▪ Maintain line-of-site with on-site vehicles and equipment; utilize flagger(s) if necessary ▪ Personnel not directly involved with concrete coring activities shall stay a minimum 20 feet from the coring equipment while it is being operated ▪
Minimum PPE	**Safety Equipment**	**Inspection Requirement**	**Training Requirements**
▪ Steel-toed boots (ANSI Z41.1) ▪ Hard hat (ANSI Z89.1) ▪ Safety glasses with side shields (ANSI Z87.1) ▪ Hearing protection ▪ Leather work gloves ▪ Safety vest	▪ First-aid kit ▪ Eye wash ▪ Fire extinguisher	▪ Current fire extinguisher certification	▪ Complete 40-hour and 8-hour refresher HAZWOPER training. ▪ Read HASP and sign Safety Compliance Agreement Form. ▪ Attend on-site safety briefing and daily safety meetings.

ERRG = Engineering/Remediation Resources Group, Inc.
PPE = personal protection equipment
ANSI = American National Standards Institute
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HASP = Health and Safety Plan

Table 7. Activity Hazard Analysis – Drilling including Soil and Groundwater Sampling

Work Personnel	Principal Steps	Potential Hazards	Recommended Controls
▪ ERRG ▪ Vironex Drilling	▪ Set up drilling rig on sample location ▪ Drill borings using direct-push drilling equipment ▪ Collect soil and groundwater samples for laboratory analysis ▪ Drumming of soil cuttings	▪ Physical hazards ▪ Heat stress ▪ Noise ▪ Biological hazards ▪ COPCs via ingestion, inhalation, or physical contact	▪ Follow proper controls for work around heavy equipment ▪ Ensure that equipment operators have line-of-sight with staff at all times ▪ Use hearing protection and proper PPE-leather work gloves and eye protection with side shields ▪ Follow proper work practices to minimize physical hazards. ▪ Keep hydrated, use sunscreen, take rest breaks ▪ Review emergency stop procedures on rig
Minimum PPE	**Safety Equipment**	**Inspection Requirement**	**Training Requirements**
▪ Steel-toed boots (ANSI Z41.1) ▪ Hard hat (ANSI Z89.1) ▪ Safety glasses with side shields (ANSI Z87.1) ▪ Hearing protection ▪ Leather work gloves ▪ Safety vest ▪ Full-face air purifying respiratior with organic vapor cartridges if necessary	▪ Fire extinguisher ▪ First-aid kit ▪ Eye wash ▪ Photoionization detector (PID)	▪ Heavy equipment inspection checklist ▪ PID calibration ▪ Current fire extinguisher certification ▪ Emergency shut-off testing	▪ Complete 40-hour HAZWOPER training. ▪ Read HASP and sign Safety Compliance Agreement Form. ▪ Drillers have C-57 drilling license ▪ Attend on-site safety briefing and daily safety meetings.

ERRG = Engineering/Remediation Resources Group, Inc.
PPE = personal protection equipment
PID = photoionization detector
ANSI = American National Standards Institute
HAZWOPER = Hazardous Waste Operations and Emergency Response
HASP = Health and Safety Plan

Table 8. Activity Hazard Analysis – Site Cleanup and Demobilization

Work Personnel	Principal Steps	Potential Hazards	Recommended Controls
▪ ERRG ▪ Waste transport subcontractor	▪ Close all soil cuttings drums ▪ Clean up materials and sweep area ▪ Pick up of drums after waste profiling	▪ Physical hazards ▪ Heat stress ▪ Noise ▪ Biological hazards	▪ Use hearing protection and proper PPE- leather work gloves and eye protection with side shields ▪ Follow proper work practices to minimize physical hazards. ▪ Keep hydrated, use sunscreen, take rest breaks ▪ Ensure that equipment operators have line-of-sight with staff at all times. ▪ Perform decontamination prior to leaving work zone.
Minimum PPE	**Safety Equipment**	**Inspection Requirement**	**Training Requirements**
▪ Steel-toed boots (ANSI Z41.1) ▪ Hard hat (ANSI Z89.1) ▪ Safety glasses with side shields (ANSI Z87.1) ▪ Leather work gloves ▪ Hearing protection ▪ Safety vest	▪ Fire extinguisher ▪ First-aid kit ▪ Eye wash	▪ Heavy equipment inspection checklist ▪ Current fire extinguisher certification	▪ Complete 40-hour and 8-hour refresher HAZWOPER training. ▪ Read HASP and sign Safety Compliance Agreement Form. ▪ Attend on-site safety briefing and daily safety meetings.

ERRG = Engineering/Remediation Resources Group, Inc.
PPE = personal protection equipment
ANSI = American National Standards Institute
HAZWOPER = Hazardous Waste Operations and Emergency Response
HASP = Health and Safety Plan

4.11. ACCIDENT PREVENTION

Daily safety and health inspections will be conducted by the SSHO to assess if site operations comply with the approved HASP, as well as OSHA and other regulatory requirements. Records of these inspections will be maintained on site and available for review by ERRG Health and Safety and regulatory personnel.

Daily safety briefings will reiterate means of avoiding physical accidents and exposure to the COPCs during work procedures. These briefings will typically be of a "tailgate" type, and will occur at the beginning of the workday. Records of these briefings will be maintained on site and available for review by ERRG Health and Safety and regulatory personnel.

4.12. SPILL PREVENTION AND CONTROL MEASURES

No discharge of groundwater to the storm drain or nearby surface water body is planned during field activities at the site. ERRG will make efforts to minimize accidental spills of fuel/oil during field activities. The field crew will be equipped with dry absorbent pads and brooms to clean up spills immediately. Chemical storage containers will be removed from near the work zones to reduce the potential impact of chemicals to spill. Based on the surface gradient at the site, sand bags may be placed downgradient from the work zones to divert spills from entering the storm drain or surface channels. Pipe fittings and pumps will be monitored periodically for leaks; leaks will be stopped and minor spills cleaned up immediately.

ERRG personnel are trained to contain and control minor spills. A hazardous materials spill kit will be kept readily available at the project site. Clean-up of minor spills will be initiated immediately after a spill event occurs. In the event of a spill, the ERRG Project Manager and SSHO will be notified immediately. An USCG representative and the local Fire Department will also be notified immediately after a spill occurs.

If a minor spill occurs, ERRG personnel will promptly contain and clean up the spill using the following procedures:

- If the spill occurs on paved or impermeable surfaces, it will be cleaned up using "dry" methods (i.e., absorbent pads or other material, and/or rags).
- If the spill occurs in a dirt area, it will be contained by constructing an earthen dike, digging up the impacted soil, and placing the soil in a stockpile for disposal.
- If the spill occurs while it is raining, the impacted area will be covered to minimize surface runoff from the area.

Examples of minor spills include: spilling of diesel fuel during fueling operations, piercing of a small container of liquid buried in the subsurface, and a vehicle accident in which the gas tank is ruptured.

If a major spill occurs at the work site, ERRG personnel will immediately notify an USCG representative, and will initiate emergency response notifications (subsection 8.4.2). An example of a major spill includes a breach of an unforeseen oil pipeline buried within the excavation areas.

4.13. WORK ZONES AND SUPPORT AREAS

Public safety will be addressed through the designation of work and support areas, and with the establishment of access controls.

Site control will be achieved by establishing work and support zones that confine and delineate specific areas of work. This will protect the surrounding environment from potential chemical and physical hazards, establish a safety monitoring perimeter of the work area, regulate entry into the work area, and facilitate communication and emergency response between work activities and management support.

The work zones are the locations where work is conducted and where the transport trucks and equipment are decontaminated. Entrance and egress to/from the work zone will be directed through one primary entry/exit point. Support supplies, including eyewash, first-aid supplies, and stress beverages, will be available on site on a daily basis.

The project support zone will be established in an adjacent area, and will have provisions to accommodate personnel and vehicles.

The entry point to the work zones will be monitored to prevent public access to the work area and to ensure that all equipment has been properly decontaminated prior to exiting the zones.

Section 5. Project Personnel and Safety Responsibilities

Table 9 lists key personnel for this project, and summarizes safety responsibilities for ERRG and subcontractors. The buddy system will be used during field activities. A minimum of two personnel (ERRG and/or other) will be on site for all field activities.

5.1. HAZARDOUS WASTE OPERATIONS TRAINING

ERRG employees and subcontractors working in areas in which exposure to potentially contaminated materials have received 40 hours of initial HAZWOPER training and 8 hours of annual update training as required by 29 CFR 1910.120 (California 8 CCR 5192). Proof of training will be provided by the individual to the SSHO, and will be maintained on site. Subcontractor personnel will be provided with site-specific training and orientation prior to conducting site work.

A minimum of two personnel assigned to this project (one or more of whom may be a subcontractor employee) will have successfully completed a basic first-aid/CPR (cardio-pulmonary resuscitation) course approved by the American Red Cross or other recognized approval agency. First-aid training and CPR training will be renewed periodically depending on the certificate issued.

Site-specific training will be conducted prior to the beginning of field activities to address unique and specific hazards at the site.

Table 9. Project Staff and Responsibilities

Organization	Staff	Responsibilities
ERRG	Project Manager Melanie Enman	▪ Coordinate resources for project ▪ Manage subcontractors ▪ Track project schedule, budget, and work scope as project progresses ▪ Resolve technical or contractual issues as they arise ▪ Plan and manage drilling staff resources for all operational work efforts ▪ Supervise the performance of drilling operations ▪ Coordinate logistics between operations ▪ Ensure adequacy of equipment, supplies, and personnel ▪ Direct supervision of field personnel, including subcontractors ▪ Responsible for subcontractor compliance with Work Plan and quality control (QC) protocols ▪ Resolve issues in the field and inform Project Manager of daily fieldwork status ▪ Take corrective action for any contractor personnel failing to comply with HASP ▪ Approve/disapprove all materials and labor costs for site operations
ERRG	Site Health and Safety Officer Melanie Enman	▪ Implement the HASP ▪ Provide guidance in determining excavation boundaries ▪ Enforce safe work and hygiene practices ▪ Establish and maintain restricted work areas ▪ Brief all field personnel regarding special hazards that may be associated with project operations ▪ Monitor the labeling, shipping, and control of hazardous or potentially hazardous samples ▪ Monitor field safety procedures ▪ Conduct daily safety meetings prior to the beginning of each work day ▪ Coordinate site health and safety requirements with field personnel ▪ Report all health and safety monitoring results to Project Manager ▪ Require proper use of PPE ▪ Ensure maintenance of all health and safety monitoring and personnel protective equipment ▪ Maintain a first-aid kit and provide first-aid ▪ Notify the proper response agency in the event of an emergency ▪ Complete the necessary record keeping ▪ Shut down field operations if a deviation from HASP is identified ▪ Recommend field modifications to improve worker health and safety

Section 6. Personnel Protective Equipment

6.1. REQUIRED LEVELS OF PROTECTION

Certain PPE (e.g., boots, hard hats, gloves, eye protection) are required and are detailed in Tables 4 through 8 (subsection 4.10). In general, PPE is not required to be worn during breaks, provided that no potential hazards exist in the break area.

6.2. PERSONAL PROTECTIVE EQUIPMENT DETAILS

The work proposed for this project will require the use of PPE as detailed in Tables 4 through 8 (Section 4.10).

6.3. RESPIRATORS

The work proposed for this project will not require use of respirators unless visual indicators are noted. In the event that respirators are required, the following general guidelines will apply:

- Facial hair or any other condition that interferes with a satisfactory fit of the mask-to-face seal will not be allowed.
- Cartridge change schedule (if needed) will be daily unless a different interval is determined under the manufacturers guidance, and will be specific to each type of cartridge. ERRG's corporate Health and Safety Manager will be contacted if respirators are required.

Individuals will be required to provide the SSHO with documentation of respirator use training, medical clearance, and fit testing (within the past 12 months) before being allowed to wear respiratory protection equipment on this project.

6.4. OTHER PERSONAL PROTECTIVE EQUIPMENT

Work will begin with workers in Level D gear. Workers will be ready to upgrade to Level C if needed, based on observations and photoionization detector readings.

A PID will be utilized to monitor work areas for organic vapors, or in the event that unknown vapors are encountered. The action level for benzene is 1.0 ppm; sustained exposure in the breathing zone at or above the action level for longer than 30 seconds, or more than 10 times during a one minute period, will require workers to upgrade to Level C (full-facepiece) with organic vapor cartridges. If necessary, continuous air monitoring for organic vapors will be conducted using a PID equipped with a 10.6-electron volt lamp. The PID will be calibrated with zero air and a span gas (isobutylene). Calibration will be performed on site prior to daily use.

No changes to the specified PPE will be made without the approval of the SSHO in concurrence with ERRG's corporate Health and Safety Manager. Specific tasks, relevant hazards, and required PPE for those tasks are described in Section 4.10.

Section 7. Medical Surveillance Program

Members of ERRG's hazardous substances remediation team undergo periodic medical screening by a licensed occupational physician to ensure that workers are in good health, with no medical conditions that might put them at an increased risk from hazardous site work. On-site staff members receive medical exams that comply with 29 CFR 1910.120(f)/8 CCR 5192(f)

Members of ERRG's hazardous substances remediation team who may wear respirators have received medical screening per the requirements of 8 CCR 5144.

The medical exam records and reports by the occupational physician are maintained by ERRG corporate staff.

Section 8. Emergency Procedures

Procedures included in this HASP address general emergency response requirements.

8.1. EMERGENCY CONDITIONS

During the site-specific daily safety meetings, site workers will be trained in, and reminded of, provisions of this emergency response plan, the communication systems, and evacuation routes. In addition, emergency response plan details will be discussed, as necessary, at the daily safety briefings. Emergencies that may occur at the site include accidental releases of gases, fires, explosions, and personal injuries.

The work site shall be equipped with a basic first-aid kit, in accordance with Title 8 CCR 1512 requirements. Each ERRG vehicle will contain a first-aid kit and a minimum 10B:C fire extinguisher. A mobile phone will be available for use at the job site. Refer to Figure 1 for the location of the nearest hospital and route from the site to the hospital.

8.2. SITE EMERGENCY WARNING SYSTEMS

Several warning systems may be utilized, depending on the work site conditions or emergency involved. These include:

- Verbal communications
- Vehicle horns
- Portable hand-held compressed gas horns
- Portable hand-held radios

One long blast is used to signify emergency evacuation of the immediate restricted work area to a predetermined location, upwind, where a head count will be taken, and further instructions given. The predetermined location will be addressed at daily safety briefings.

Repeated short blasts will be used to signify evacuation of all personnel from the site to a predetermined location, upwind, where further instructions will be given after a head count is taken.

8.3. EMERGENCY PROCEDURES

8.3.1. General

- The SSHO shall be notified immediately of emergencies.

- The SSHO has primary responsibility for responding to and correcting emergency situations. This may include taking appropriate measures to protect the safety of site personnel and the public. Possible actions may involve evacuation of personnel from the area to a previously determined location away from potential site hazards.
- The SSHO is additionally responsible for monitoring that appropriate persons are notified, corrective measures are being implemented, and follow-up reports completed.
- Upon hearing an alarm, non-emergency communications will cease. Crew members will proceed to give all pertinent information to the SSHO in a systematic and orderly manner.
- Power equipment will be shut down and operators will stand by for instruction.
- Individuals not assigned specific contingency response duties will precede immediately to the predetermined safe site.
- Upon arrival at the safe site, a complete head count will be conducted by the SSHO. Individuals will stay at the safe site until the contingency is secured or further instructions given.
- Vehicles and equipment will contain fire extinguishers as required by OSHA regulations. ERRG will locate additional 4A:80B:C fire extinguishers within the immediate work area, if required, so that the maximum travel distance does not exceed 75 feet. Heavy equipment shall be equipped with a minimum 10B:C type fire extinguisher as required by OSHA.

8.3.2. Accidental Release of a Gas

Underground utility lines may be present in the area. If these lines are punctured, the following actions shall be taken:

- Notify personnel within the immediate area of the release.
- Shut down equipment. Evacuate upwind of the area if release of the gas cannot be secured safely.
- SSHO shall notify the utility owner and others identified in Section 8.4.3.

8.3.3. Fires

If a fire breaks out in the area, the following actions shall be taken:

- Notify personnel within the immediate area of the fire.
- Evacuate the area if the fire cannot be extinguished safely, per the employees' training.
- Go directly to the nearest telephone and summon the Fire Department by dialing 911 or 510-747-7400.
- The SSHO shall notify Emergency Response personnel and others identified in Section 8.4.3.

8.3.4. Explosion

If an explosion occurs at or near the site, the following actions shall be taken:

- Report to the predetermined safe area for a head count, assisting others who may be mobility-impaired.
- Stand by for further assignment from the SSHO.
- SSHO will notify emergency response personnel and others identified in Section 8.4.3.

8.3.5. Personal Injuries

- Personal injuries must be reported to the individual's immediate supervisor.
- Supervisors must report worker personal injuries to the SSHO.
- First-aid trained personnel should administer first-aid to the injured party. Medical attention may be required beyond first-aid treatment. Refer to Figure 1 for the location of the nearby hospital. Refer to Section 8.4.3 for emergency phone numbers.
- If required, decontaminate injured personnel by removing disposable coveralls, gloves, boots, and respirator. Inform emergency personnel of contaminants present on site.
- Transport/move injured only if the injuries will permit.

8.3.6. Medical Emergency

At least one first-aid and CPR-trained persons will be on site during operations (one or more of whom may be a subcontractor employee). The designated first-aid providers must also have been trained on the requirements specified by the Bloodborne Pathogens Standard (29 CFR 1910.1030/8CCR 5193) as described in ERRG's Bloodborne Pathogen Exposure Control Plan.

The individual(s) identified with the appropriate first-aid and CPR training is (are) listed below.

Melanie Enman Project Manager/SSHO)
415-559-0718 (cell)

FIRST-AID KIT LOCATION: A first-aid kit will be located on site adjacent to the work area. The first-aid kit shall be adequate to support up to five persons and will be maintained by the SSHO. The first-aid kit will comply with Title 8, CCR Section 1512 requirements.

EYE WASH LOCATION: A 15-minute eye wash station will be located on site in an accessible location that requires no more than 10 seconds for the injured person to reach. Each worker will be informed of the eye wash location. Chemicals/particulates must be immediately flushed from the eyes using copious amounts of water. Particular attention should be given to flushing the chemical or particulate from under the top and bottom of the eyelids. If the eyewash is used, the SSHO should be notified immediately.

HOSPITAL NOTIFICATION: Prior to the beginning of field work, the SSHO will be responsible for contacting the nearest hospital (shown in Figure 1) and relaying the following information to the appropriate person or persons in charge of emergency room and emergency response services:

- Nature of the operation, including type of equipment used, number of workers, potential hazards, etc.
- Expected start date and duration of planned site activities
- The location of the site
- Name and phone number of the SSHO

8.3.7. Earthquakes (assumes personnel will be outdoors)

- Move to an area where there is the least chance of something falling from above.

- If it can be done without imminent hazard, evacuate to the designated safe area to be established during daily tailgate and await information from local emergency authorities.

8.4. EMERGENCY TELEPHONE LOCATION AND CALL PROTOCOL

Sections 8.4.2 and 8.4.3 will be reproduced and posted at the job site. The route map to the nearest hospital (Figure 1) and emergency telephone list (see Attachments) will also be photocopied and posted at the job site.

8.4.1. Telephone Location

The field crew will have access to cell phones. Site staff will be instructed to place emergency phone calls from these phones if needed.

8.4.2. Emergency Telephone Call Protocol

Site-specific contact information may be found in the front of this HASP and as an attachment to this report; contact information for major spills is listed below.

Table 10. Notification List for Major Spills

Organization	Phone Number
National Response Center	(800) 424-8802
California Office of Emergency Services	(800) 852-7550
U.S. Environmental Protection Agency-Region IX spill phone	(415) 947-4400
Alameda Police Department	911/510-337-8340
Alameda Fire Station 3	911/510-747-7400
Office of Emergency Services	510-286-0895

GIVE:

- Name
- Telephone Number
- Address
- Location, if different than address
- Brief, accurate description of emergency. Caller should be concise (e.g., vehicle fire, chemical fire, personal injury from vehicle accident, unconscious person, heat stress victim, etc.). State if there is chemical contamination on the victim.

DO NOT HANG UP UNTIL INFORMATION IS REPEATED BACK TO YOU AND IS ACCURATE. HANG UP ONLY WHEN ADVISED TO BY THE PERSON WHO RECEIVED YOUR CALL.

NOTIFY SITE CONTACT OF THE EXPECTED ARRIVAL OF THE RESPONDING EMERGENCY VEHICLE(S).

F or non-emergency situations, the following resources will be utilized:

1. Project Manager/SSHO – Melanie Enman
   415-559-7954 (cell)

8.4.3. Emergency Phone Numbers (To Be Posted On-Site At All Times)

EMERGENCY CARE (APPROX. 2.9 MILE)
Alameda Emergency Care Center
2070 Clinton Ave
Alameda, CA 94501
510-523-4357

Alameda Police Department
911/510-337-8340

Alameda Fire Station 3
911/510-747-7400

8.5. ACCIDENT REPORTING

"Near-misses" and incidents resulting in personal injury, exposure to toxic substances, illness, or property damage must be immediately reported by the involved individual(s) to the SSHO. The SSHO shall immediately report the incident to USCG and will complete a written injury report as soon as practicable, but no later than 24 hours after the injury or incident is reported. This report shall be submitted to the Project Manager. The Owner will be notified immediately and copied on all reports.

The SSHO will conduct a follow-up investigation and evaluate the corrective actions needed to prevent a recurrence of the accident. The results of this investigation will be reported within 4 working days to the individuals who received the original report. Based on the information provided, a more thorough investigation or additional corrective actions may be required by the ERRG Corporate Health and Safety Manager.

Records of site-specific injuries and incidents will be maintained by the SSHO and each subcontractor. These records will be made available upon request to the ERRG Project Manager.

Section 9. References

American Conference of Governmental Industrial Hygienists, Threshold Limit Values and Biological Exposure Indices (latest edition).

California Department of Industrial Relations, Division of Occupational Safety and Health (Cal/OSHA), Title 8 California Code of Regulations (CCR), Chapter 4, Subchapter 7, General Safety Orders.

California Department of Industrial Relations, Division of Occupational Safety and Health (Cal/OSHA), 8 CCR Chapter 4, Subchapter 4, Construction Safety Orders.

California Department of Industrial Relations, Division of Occupational Safety and Health (Cal/OSHA), 8 CCR Section 5192, Hazardous Waste Operations and Emergency Response.

California Department of Industrial Relations, Division of Occupational Safety and Health (Cal/OSHA), 8 CCR Section 3203.1, Illness and Injury Prevention.

California Department of Industrial Relations, Division of Occupational Safety and Health (Cal/OSHA), 8 CCR Section 5144, Respiratory Protection.

California Department of Industrial Relations, Division of Occupational Safety and Health (Cal/OSHA), 8 CCR Sections 1526 and 1527, Toilets/Sanitation.

Engineering/Remediation Resources Group, Inc. (ERRG), Corporate Health and Safety Program Manual, 2003.

Federal Acquisition Regulation Clause 52. 236. 13: Accident Prevention.

National Institute for Occupational Safety and Health (NIOSH)/Occupational Safety and Health Administration (OSHA)/U.S. Coast Guard/U.S. Environmental Project Agency (EPA), Occupational Safety and Health Guidance.

Occupational Safety and Health Administration (OSHA) Standards 29 Code of Federal Regulations (CFR) 1910, Occupational Safety and Health Standards.

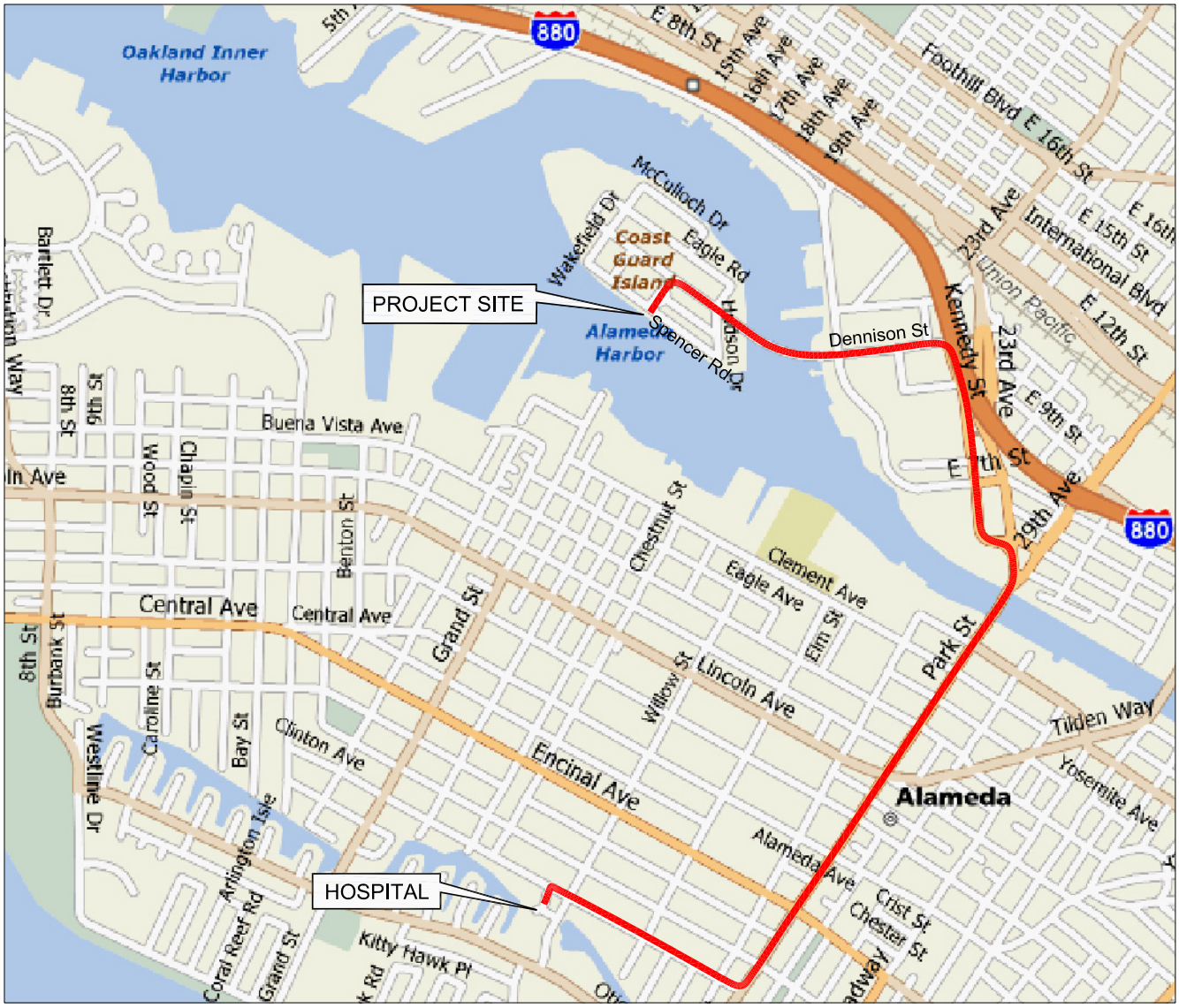
Occupational Safety and Health Administration (OSHA) 29 CFR 1926.65, Hazardous Waste Operations and Emergency Response (HAZWOPER).

Occupational Safety and Health Administration (OSHA) Standards 29 CFR 1926, Safety and Health Regulations for Construction.

U.S. Army Corps of Engineers (USACE), 2003. Engineers Manual 385-1-1, dated November.

U.S. Environmental Protection Agency (EPA), 1988. Standard Operating Safety Guides.

Figures



START:	BUILDING 44 AT McCULLOCH DR. AND SPENCER RD. ON COAST GUARD ISLAND	
	HEAD NORTHEAST ON McCULLOCH DR. TOWARD BEAR RD.	430 FT
	TURN RIGHT AT CAMPBELL BLVD.	0.1 MI
	CONTINUE ON COAST GUARD ISLAND BRIDGE	0.2 MI
	CONTINUE ON DENNISON ST.	0.3 MI
	DENNISON ST. TURNS RIGHT AND BECOMES KENNEDY ST.	0.5 MI
	SLIGHT RIGHT AT 23rd AVE.	374 FT
	SLIGHT RIGHT AT 29th AVE.	413 FT
	CONTINUE ON PARK ST.	0.9 MI
	TURN RIGHT AT CLINTON AVE.	0.5 MI
ARRIVE:	2070 CLINTON AVE., ALAMEDA, CA	2.7 MI (~10 MIN)

N

0 1500

APPOXIMATE SCALE IN FEET

ALAMEDA EMERGENCY CARE CENTER
2070 CLINTON AVE.
ALAMEDA, CA 94501
(510) 523-4357

SOURCE: MAPQUEST

ERRG
Engineering/Remediation Resources Group, Inc.
115 Sansome St., Suite 200
San Francisco, CA 94104
(415) 395-9974

CLIENT: UNITED STATES COAST GUARD

LOCATION: INTEGRATED SUPPORT COMMAND ALAMEDA ALAMEDA, CALIFORNIA

DESIGNED BY: RDB 12/14/07

CHECKED BY: ADS 12/14/07

P.E/P.G.: -

HOSPITAL ROUTE MAP

ERRG PROJECT NO.	REV. NO.	SHEET	OF	FIGURE
27-167	0	1	1	1

P:\2007_Projects\27-167_USCG Alameda USTN_Maps_Dwg \Hospital Route Map.dwg

Attachments

Emergency Contact List

Service/Organization	Division/Title	Contact	Phone Number
Ambulance	Lifeline Transport Inc		911/ 510-663-3333
Fire Department	Alameda Fire Station 3		911 / 510-747-7400
California Highway Patrol			911 / 925-646-4980
Police	Alameda Police Department		911 / 510-337-8340
Hospital	Alameda Emergency Care Center 2070 Clinton Ave Alameda, CA 94501		510-523-4357
Poison Control Center			1-800-222-1222
National Response Center (Toxic Chemical and Oil Spills)			1-800-424-8802
USEPA, Region 9	Spill Phone		415-744-2000
PG&E	Emergency Service		1-800-743-5000
County of Alameda-Department of Environmental Health			510-567-6700
ERRG	Project Manager/SSHO	Melanie Enman	415-559-9754
ERRG	Corporate Health & Safety Manager	Rowan Tucker	925-250-4043
USCG	Project Manager	Amanda Velasquez	510-535-7278

NIOSH and MSDS Chemical Hazards

NIOSH Publication No. 2005-151: September 2005

NIOSH Pocket Guide to Chemical Hazards

Chlorodiphenyl (54% chlorine)

CAS 11097-69-1

$C_6H_3Cl_2C_6H_2Cl_3$ (approx)

RTECS TQ1360000

Synonyms & Trade Names
Aroclor® 1254, PCB, Polychlorinated biphenyl

DOT ID & Guide
2315 171

Exposure Limits	NIOSH REL*: Ca TWA 0.001 mg/m^3 See Appendix A [*Note: The REL also applies to other PCBs.]
	OSHA PEL: TWA 0.5 mg/m^3 [skin]

IDLH Ca [5 mg/m^3] See: IDLH INDEX

Conversion

Physical Description
Colorless to pale-yellow, viscous liquid or solid (below 50°F) with a mild, hydrocarbon odor.

MW: 326 (approx)	BP: 689-734°F	FRZ: 50°F	Sol: Insoluble
VP: 0.00006 mmHg	IP: ?		Sp.Gr(77°F): 1.38
Fl.P: NA	UEL: NA	LEL: NA	

Nonflammable Liquid, but exposure in a fire results in the formation of a black soot containing PCBs, polychlorinated dibenzofurans, and chlorinated dibenzo-p-dioxins.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 5503; OSHA PV2088
See: NMAM or OSHA Methods

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

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

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter. Click here for information on selection of N, R, or P filters./Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

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

Symptoms Irritation eyes, chloracne; liver damage; reproductive effects; [potential occupational carcinogen]

Target Organs Skin, eyes, liver, reproductive system

Cancer Site [in animals: tumors of the pituitary gland & liver, leukemia]

See also: INTRODUCTION See ICSC CARD: 0939 See MEDICAL TESTS: 0176

NIOSH Publication No. 2005-149: **September 2005**

NIOSH Pocket Guide to Chemical Hazards

Coal tar pitch volatiles

CAS 65996-93-2

RTECS GF8655000

Synonyms & Trade Names
Synonyms vary depending upon the specific compound (e.g., pyrene, phenanthrene, acridine, chrysene, anthracene & benzo(a)pyrene). [Note: NIOSH considers coal tar, coal tar pitch, and creosote to be coal tar products.]

DOT ID & Guide
2713 153 (acridine)

Exposure Limits

NIOSH REL: Ca TWA 0.1 mg/m^3 (cyclohexane-extractable fraction) See Appendix A See Appendix C

OSHA PEL: TWA 0.2 mg/m^3 (benzene-soluble fraction) [1910.1002] See Appendix C

IDLH Ca [80 mg/m^3] See: 65996932

Conversion

Physical Description
Black or dark-brown amorphous residue.

Properties vary depending upon the specific compound.			

Combustible Solids

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
OSHA 58
See: NMAM or OSHA Methods

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

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

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter. Click here for information on selection of N, R, or P filters./Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes inhalation, skin and/or eye contact

Symptoms Dermatitis, bronchitis, [potential occupational carcinogen]

Target Organs respiratory system, skin, bladder, kidneys

Cancer Site [lung, kidney & skin cancer]

See also: INTRODUCTION See ICSC CARD: 1415 See MEDICAL TESTS: 0054

NIOSH Pocket Guide to Chemical Hazards

Benzene	**CAS** 71-43-2
C_6H_6	**RTECS** CY1400000
Synonyms & Trade Names Benzol, Phenyl hydride	**DOT ID & Guide** 1114 130

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

IDLH Ca [500 ppm] See: 71432	**Conversion** 1 ppm = 3.19 mg/m^3

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

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

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

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

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

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Important additional information about respirator selection
Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

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

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

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

Cancer Site [leukemia]

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

NIOSH Pocket Guide to Chemical Hazards

Ethyl benzene

CAS 100-41-4

$CH_3CH_2C_6H_5$

RTECS DA0700000

Synonyms & Trade Names
Ethylbenzol, Phenylethane

DOT ID & Guide
1175 129

Exposure Limits

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

OSHA PEL†: TWA 100 ppm (435 mg/m^3)

IDLH 800 ppm [10%LEL] See: 100414

Conversion 1 ppm = 4.34 mg/m^3

Physical Description
Colorless liquid with an aromatic odor.

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

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

Incompatibilities & Reactivities
Strong oxidizers

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

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

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

Important additional information about respirator selection
Respirator Recommendations NIOSH/OSHA
Up to 800 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

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

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

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

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

NIOSH Pocket Guide to Chemical Hazards

Toluene

CAS 108-88-3

$C_6H_5CH_3$

RTECS XS5250000

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

DOT ID & Guide
1294 130

Exposure Limits

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

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

IDLH 500 ppm See: 108883

Conversion 1 ppm = 3.77 mg/m^3

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

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

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

Incompatibilities & Reactivities
Strong oxidizers

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

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

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

Important additional information about respirator selection
Respirator Recommendations NIOSH
Up to 500 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

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

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

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

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

m-Xylene

CAS 108-38-3

$C_6H_4(CH_3)_2$

RTECS ZE2275000

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

DOT ID & Guide
1307 130

Exposure Limits

NIOSH REL: TWA 100 ppm (435 mg/m^3) ST 150 ppm (655 mg/m^3)

OSHA PEL†: TWA 100 ppm (435 mg/m^3)

IDLH 900 ppm See: 95476

Conversion 1 ppm = 4.34 mg/m^3

Physical Description
Colorless liquid with an aromatic odor.

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

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

Incompatibilities & Reactivities
Strong oxidizers, strong acids

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

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

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

Respirator Recommendations NIOSH/OSHA
Up to 900 ppm:
(APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*
(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*
(APF = 10) Any supplied-air respirator*
(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

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

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

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

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

o-Xylene

CAS 95-47-6

$C_6H_4(CH_3)_2$

RTECS ZE2450000

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

DOT ID & Guide
1307 130

Exposure Limits

NIOSH REL: TWA 100 ppm (435 mg/m^3) ST 150 ppm (655 mg/m^3)

OSHA PEL†: TWA 100 ppm (435 mg/m^3)

IDLH 900 ppm See: 95476

Conversion 1 ppm = 4.34 mg/m^3

Physical Description
Colorless liquid with an aromatic odor.

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

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

Incompatibilities & Reactivities
Strong oxidizers, strong acids

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

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

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

Respirator Recommendations NIOSH/OSHA
Up to 900 ppm:
(APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*
(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*
(APF = 10) Any supplied-air respirator*
(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

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

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

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

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

p-Xylene

CAS 106-42-3

$C_6H_4(CH_3)_2$

RTECS ZE2625000

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

DOT ID & Guide
1307 130

Exposure Limits

NIOSH REL: TWA 100 ppm (435 mg/m^3) ST 150 ppm (655 mg/m^3)

OSHA PEL†: TWA 100 ppm (435 mg/m^3)

IDLH 900 ppm See: 95476

Conversion 1 ppm = 4.41 mg/m^3

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

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

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

Incompatibilities & Reactivities
Strong oxidizers, strong acids

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

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

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

Respirator Recommendations NIOSH/OSHA
Up to 900 ppm:
(APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*
(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*
(APF = 10) Any supplied-air respirator*
(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

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

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

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

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

NIOSH Pocket Guide to Chemical Hazards

Gasoline

CAS 8006-61-9

RTECS LX3300000

Synonyms & Trade Names
Motor fuel, Motor spirits, Natural gasoline, Petrol [Note: A complex mixture of volatile hydrocarbons (paraffins, cycloparaffins & aromatics).]

DOT ID & Guide
1203 128

Exposure Limits

NIOSH REL: Ca See Appendix A

OSHA PEL†: none

IDLH Ca [N.D.] See: IDLH INDEX

Conversion 1 ppm 2.95 mg/m^3 (approx)

Physical Description
Clear liquid with a characteristic odor.

MW: 72 (approx)	BP: 102°F	FRZ: ?	Sol: Insoluble
VP: 38-300 mmHg	IP: ?		Sp.Gr(60°F): 0.72-0.76
Fl.P: -45°F	UEL: 7.6%	LEL: 1.4%	

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

Incompatibilities & Reactivities
Strong oxidizers such as peroxides, nitric acid & perchlorates

Measurement Methods
OSHA PV2028
See: NMAM or OSHA Methods

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

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

Important additional information about respirator selection
Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

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

Symptoms Irritation eyes, skin, mucous membrane; dermatitis; headache, lassitude (weakness, exhaustion), blurred vision, dizziness, slurred speech, confusion, convulsions; chemical pneumonitis (aspiration liquid); possible liver, kidney damage; [potential occupational carcinogen]

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

Cancer Site [in animals: liver & kidney cancer]

See also: INTRODUCTION

MSDS
Definition of terms

Material Safety Data Sheet for #2 Diesel

1. Chemical Product

MSDS Number: U7770

MSDS Date: 01-31-99

Product Name: #2 Diesel Fuel

24 Hour Emergency Phone: (210) 979-8346
Transportation Emergencies: Call Chemtrec at 1-800-424-9300
MSDS Assistance: (210) 592-4593

Distributors Name and Address:

T.W. Brown Oil Co., Inc.
1857 Knoll Drive
Ventura, California 93003

Chemical Name:#2 Diesel Fuel **Cas Number:** 68476-34-6

Synonyms/Common Names: This Material Safety Data Sheet applies to the following product descriptions for Hazard Communication purposes only. Technical specifications vary greatly depending on the product, and are not reflected in this document. Consult specification sheets for technical information.

California Air Resources Board (Carb) Diesel Fuel- On-road, Off-Road, Tax Exempt blends
Premium Diesel Fuel- Low-Sulfur, High-sulfur, On-Road, Off-Road, Tax Exempt blends
#2 Distillate- Low-Sulfur, High-sulfur, On-Road, Off-Road, Tax Exempt blends
#2 Diesel Fuel- Low-Sulfur, High-sulfur, On-Road, Off-Road, Tax Exempt blends
#2 Fuel Oil- Low-Sulfur, High-sulfur, On-Road, Off-Road, Tax Exempt blends

2. Composition, Information On Ingredients

Product Use: This product is intended for use as a fuel in engines and heaters designed for diesel fuels, and for use in engineered processes. Use in other applicatiions may result in higher exposures and require additional controls, such as local exhaust ventilation and personal protective equipment.

Description: #2 Diesel is a complex mixture of hydrocarbons from a variety of chemical processes blended to meet standardized product specifications. Composition varies greatly and includes C9 to C20 hydrocarbons with a boiling range of about 325-675 degrees F. The following is a non-exhaustive list of common components, typical percentage ranges in product, and occupational exposure limits for each.

Component or Material Name	%	CAS Number	ACGIH Limits TLV -- STEL -- Units	OSHA Exposure Limits PEL -- STEL -- C/P -- Units
Cat cracked distillate, light	0-100	64741-59-9	100 -- NA -- mg/m3	N/A -- N/A -- N/A -- N/A

Hydrotreated distillate, middle	0-100	64742-46-7	100 -- NA -- mg/m3	N/A -- N/A -- N/A -- N/A
Hydrotreated distillate, light	0-100	64742-47-8	100 -- NA -- mg/m3	N/A -- N/A -- N/A -- N/A
Gas oil, light	0-100	64741-44-2	100 -- NA -- mg/m3	N/A -- N/A -- N/A -- N/A

3. Hazards Identification

Health Hazard Data:

1. The major effect of exposure to this product is giddiness, headache, central nervous system depression; possible irritation of eyes, nose, and lungs; and dermal irritation. Signs of kidney and liver damage may be delayed. Pulmonary irritation secondary to exhalation fo solvent.

2. NIOSH recommends that whole diesel engine exhaust be regarded as a potential occupational carcinogen. Follow OSHA and NSHA rules where diesel engine exhaust fumes may be generated.

3. A life time skin painting study by the American Petroleum Institute has shown that similar naphtha products with a boiling range of 350-700 degrees F usually produce skin tumors and/ or skin cancers in laboratory mice. Only a weak to moderate response occurred. The effect to humans has not been determined.

4. Positive results at 2.0 ml/kg and 6.0 ml/kg noted in mutagenesis studies via in-vivo bone marrow cytogenetics assay in rats.

5. Kerosene is classified as a severe skin irritant. Mutation data has been reported for kerosene products. Hydrotreated kerosene is listed as being probably carcinogenic to humans with limited evidence in humans and sufficient evidence in experimental animals.

Hazards of Combustion Products: Carbon monoxide and carbon dioxide can be found in the combustion products of this product and other forms of hydrocarbon combustion. Carbon monoxide in moderate concentrations can cause symptoms of headache, nausea, vomiting, increased cardiac output, and confusion. Exposure to higher concentrations of carbon monoxide can cause loss of consciousness, heart damage, brain damage, and/or death. Exposure to high concentrations of carbon dioxide can cause simple asphyxiation by displacing available oxygen. Combustion of this and other similar materials should only be carried out in well ventilated areas.

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⇦ to Automotive MSDS Listings product sheet for SAE 40 Motor Oil ⇨

Material Safety Data Sheet - SAE 40 Motor Oil

Product Identification

EDP Number: 182134

Product Name: SAE 40 Motor Oil

DOT Hazard: Not Hazardous, Flammable

DOT ShipName: Motor Oil and Lubricant

Physical Data

Boil Point	Freeze Point	Gravity	Vapor Pressure	Vapor Density	Evap Rate	% Volatile	Solubility
432 F	N/A	N/A	<0.01	N/A	N/A	N/A	Neg.

Odor and Appearance: Clear, Bright light brown liquid with petroleum odor

Ingedients

Material Name	Percentage	TLV	Hazard	CAS Number
Base Lubricants Oils Mixture	75-85	No Limit	Irritant, Flammable	
Detergent/Inhibitor System Mixture	5-15	No Limit	Irritant	
Viscosity Index Improver Mixture	5-15	No Limit	Irritant	
Pour Point Depressant Mixture	<1	No Limit	None	
Antifoam Additive Mixture	<1	No Limit	None	

Fire and Explosion Hazard Data

Flash Point	LEL	UEL
432 F	N/A	N/A

Extinguishing Media: Foam, Carbon Dioxide and Dry Chemicals.

Unusual Fire & Explosion Hazards: Water may be ineffective but can be used to cool containers exposed to heat or flame. Caution should be exercised when using water or foam as frothing may occur, especially if sprayed into containers of hot, burning liquid.

Health Hazard Data

Acute Effects: N/A

Swallowing: This product is relatively non-toxic by ingestion but may cause abdominal cramps and diarrhea.

Inhalation: Prolonged and repeated exposure to oil mist poses a risk of pulmonary disease such as chronic lung inflammation. This condition is usually asymptomatic as a result of repeated small aspirations. Shortness of breath and cough are the most common symptoms.

Skin Contact: Minimaly irritating upon contact. Prolonged exposure may result in contact dermatitis.

Eye Contact: Minimal irritation upon direct contact.

Chronic Effects: None Known.

Other Hazards: None.

Emergency First Aid Procedures

Swallowing: Do not induce vomiting. Seek medical attention immediately.

Inhalation: Remove to fresh air. If not breathing begin CPR. If symptoms persist, seek medical attention immediately.

SkinContact	Wash effected area immediately with soap and water. Remove contaminated clothing and wash before re-use. Seek medical attention immediately if skin disorder develops.
Eye Contact	Flush eye with large amounts of water for 15 minutes, lifting upper and lower lids periodically. Seek medical attention immediately if eye irritation develops and/or persists.
Primary	N/A
Note to Physician	This product contains Zinc at a wt. of 2.5%. This product is considered non hazardous in its blended form. All ingredients of this product are listed on the Toxic Control Act Inventory.

Reactivity Data

Stablility	Stable
Conditions to Avoid	Heat sources, open flames, sparks and strong oxidizing agents such as peroxides, chlorine and strong acids.
Materails to Avoid	Strong oxidizing agents such as peroxides, chlorine and strong acids.
Hazardous Decom Prod	Decomposition and combustion may cause dense smoke, carbon dioxide and carbon monoxide and other oxides.
Hazardous Polymerization	No
Additional Cond to Avoid	Sources of heat, open flames, sparks and strong oxidizing agents.

Spill or Leak Procedures

Steps if spilled	Ventilate the area. Remove any sources of ignition. Dyke to contain the spill. Absorb with inert material such as clay, sand or commercial absorbants. Keep out of sewers and natural waterways.
Waste Disposal Method	Dispose of in accordance with all local, state and federal regulations. Keep this product out of sewers and waterways.

Special Protection Information

Respiratory Protection	Not needed if used in consumer quantities. If bulk handling, use NIOSH approved respirator or mask to prevent over exposure. Use of self-contained breathing apparatus for entry to confined spaces, poorly ventilated areas and for large spill clean up sites.
Ventilation	Use with appropriate general ventilation.
Impervious Gloves	Neoprene Gloves.
Other PPE	None if used as a consumer. If bulk handling, use noeprene gloves and apron. If handling hot, use insulated protective clothing.

Special Precautions

Storage & Handling Precautions	Store in closed, properly marked containers away from heat source, open flames, sparks or strong oxidizing agents.
Other Precautions	Wearing contact lenses while bulk handling is not advisable. Keep away from children and animals.

HMIS Ratings

Health	1
Flammability	2
Reactivity	1
Personal Protective Equipment	D

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These numbers are available days, nights, weekends and holidays.

Last Updated 10/14/04

THE INFORMATION CONTAINED HEREIN IS BASED ON DATA CONSIDERED ACCURATE. HOWEVER, NO WARRANTY IS EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THIS DATA OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF. VENDOR ASSUMES NO RESPONSIBILITY FOR INJURY TO VENDEE OR THIRD PERSONS PROXIMATELY CAUSED BY THE MATERIALS IF REASONABLE SAFETY PROCEDURES ARE NOT ADHERED TO AS STIPULATED IN THE DATA SHEET. ADDITIONALLY, VENDOR ASSUMES NO RESPONSIBILITY FOR INJURY TO VENDEE OR THIRD PERSONS PROXIMATELY CAUSED BY ABNORMAL USE OF THE MATERIAL, EVEN IF REASONABLE SAFETY PROCEDURES ARE FOLLOWED. FURTHERMORE, VENDEE ASSUMES THE RISK IN HIS USE OF THE MATERIAL.

Cadmium dust (as Cd)

CAS 7440-43-9 (metal)

Cd (metal)

RTECS EU9800000 (metal)

Synonyms & Trade Names
Cadmium metal: Cadmium
Other synonyms vary depending upon the specific cadmium compound.

DOT ID & Guide
2570 154 (cadmium compound)

Exposure Limits

NIOSH REL*: Ca See Appendix A [*Note: The REL applies to all Cadmium compounds (as Cd).]

OSHA PEL*: [1910.1027] TWA 0.005 mg/m^3 [*Note: The PEL applies to all Cadmium compounds (as Cd).]

IDLH Ca [9 mg/m^3 (as Cd)] See: IDLH INDEX

Conversion

Physical Description
Metal: Silver-white, blue-tinged lustrous, odorless solid.

MW: 112.4	BP: 1409°F	MLT: 610°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 8.65 (metal)
Fl.P: NA	UEL: NA	LEL: NA	

Metal: Noncombustible Solid in bulk form, but will burn in powder form.

Incompatibilities & Reactivities
Strong oxidizers; elemental sulfur, selenium & tellurium

Measurement Methods
NIOSH 7048, 7300, 7301, 7303, 9102; OSHA ID121, ID125G, ID189, ID206
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: No recommendation
Eyes: No recommendation
Wash skin: Daily
Remove: No recommendation
Change: Daily

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

Respirator Recommendations (See Appendix E) NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on selection of N, R, or P filters./Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes inhalation, ingestion

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

Target Organs respiratory system, kidneys, prostate, blood

Cancer Site [prostatic & lung cancer]

See also: INTRODUCTION See ICSC CARD: 0020 See MEDICAL TESTS: 0035

Chromium metal

CAS 7440-47-3

Cr

RTECS GB4200000

Synonyms & Trade Names
Chrome, Chromium

DOT ID & Guide

Exposure Limits

NIOSH REL: TWA 0.5 mg/m^3 See Appendix C

OSHA PEL*: TWA 1 mg/m^3 See Appendix C [*Note: The PEL also applies to insoluble chromium salts.]

IDLH 250 mg/m^3 (as Cr) See: 7440473

Conversion

Physical Description
Blue-white to steel-gray, lustrous, brittle, hard, odorless solid.

MW: 52.0	BP: 4788°F	MLT: 3452°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 7.14
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid in bulk form, but finely divided dust burns rapidly if heated in a flame.

Incompatibilities & Reactivities
Strong oxidizers (such as hydrogen peroxide), alkalis

Measurement Methods
NIOSH 7024, 7300, 7301, 7303, 9102; OSHA ID121, ID125G
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: No recommendation
Eyes: No recommendation
Wash skin: No recommendation
Remove: No recommendation
Change: No recommendation

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

Respirator Recommendations NIOSH

Up to 2.5 mg/m^3:
(APF = 5) Any quarter-mask respirator. Click here for information on selection of N, R, or P filters.*

Up to 5 mg/m^3:
(APF = 10) Any particulate respirator equipped with an N95, R95, or P95 filter (including N95, R95, and P95 filtering facepieces) except quarter-mask respirators. The following filters may also be used: N99, R99, P99, N100, R100, P100. Click here for information on selection of N, R, or P filters.*
(APF = 10) Any supplied-air respirator*

Up to 12.5 mg/m^3:
(APF = 25) Any supplied-air respirator operated in a continuous-flow mode*
(APF = 25) Any powered air-purifying respirator with a high-efficiency particulate filter.*

Up to 25 mg/m^3:
(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on selection of N, R, or P filters.
(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter*
(APF = 50) Any self-contained breathing apparatus with a full facepiece
(APF = 50) Any supplied-air respirator with a full facepiece

Up to 250 mg/m^3:
(APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

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

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

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

Symptoms Irritation eyes, skin; lung fibrosis (histologic)

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0029 See MEDICAL TESTS: 0052

Lead

CAS 7439-92-1

Pb

RTECS OF7525000

Synonyms & Trade Names
Lead metal, Plumbum

DOT ID & Guide

Exposure Limits	NIOSH REL*: TWA 0.050 mg/m^3 See Appendix C [*Note: The REL also applies to other lead compounds (as Pb) -- see Appendix C.]
	OSHA PEL*: [1910.1025] TWA 0.050 mg/m^3 See Appendix C [*Note: The PEL also applies to other lead compounds (as Pb) -- see Appendix C.]

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

Conversion

Physical Description
A heavy, ductile, soft, gray solid.

MW: 207.2	BP: 3164°F	MLT: 621°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 11.34
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid in bulk form.

Incompatibilities & Reactivities
Strong oxidizers, hydrogen peroxide, acids

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

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

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

Respirator Recommendations (See Appendix E) NIOSH/OSHA

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

Up to 1.25 mg/m^3:
(APF = 25) Any supplied-air respirator operated in a continuous-flow mode
(APF = 25) Any powered, air-purifying respirator with a high-efficiency particulate filter

Up to 2.5 mg/m^3:
(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on selection of N, R, or P filters.
(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode
(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter
(APF = 50) Any self-contained breathing apparatus with a full facepiece
(APF = 50) Any supplied-air respirator with a full facepiece

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

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

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

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on selection of N, R, or P filters./Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

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

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

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

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

Nickel metal and other compounds (as Ni)

CAS 7440-02-0 (Metal)

Ni (Metal)

RTECS QR5950000 (Metal)

Synonyms & Trade Names
Nickel metal: Elemental nickel, Nickel catalyst
Synonyms of other nickel compounds vary depending upon the specific compound.

DOT ID & Guide

Exposure Limits

NIOSH REL*: Ca TWA 0.015 mg/m^3 See Appendix A [*Note: The REL does not apply to Nickel carbonyl.]

OSHA PEL*†: TWA 1 mg/m^3 [*Note: The PEL does not apply to Nickel carbonyl.]

IDLH Ca [10 mg/m^3 (as Ni)] See: 7440020

Conversion

Physical Description
Metal: Lustrous, silvery, odorless solid.

MW: 58.7	BP: 5139°F	MLT: 2831°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 8.90 (Metal)
Fl.P: NA	UEL: NA	LEL: NA	

Metal: Combustible Solid; nickel sponge catalyst may ignite SPONTANEOUSLY in air.

Incompatibilities & Reactivities
Strong acids, sulfur, selenium, wood & other combustibles, nickel nitrate

Measurement Methods
NIOSH 7300, 7301, 7303, 9102; OSHA ID121, ID125G
See: NMAM or OSHA Methods

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

First Aid (See procedures)

Skin: Water flush immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on selection of N, R, or P filters./Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

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

Symptoms Sensitization dermatitis, allergic asthma, pneumonitis; [potential occupational carcinogen]

Target Organs Nasal cavities, lungs, skin

Cancer Site [lung and nasal cancer]

See also: INTRODUCTION See ICSC CARD: 0062 See MEDICAL TESTS: 0156

Zinc oxide

CAS 1314-13-2

ZnO

RTECS ZH4810000

Synonyms & Trade Names
Zinc peroxide

DOT ID & Guide
1516 143

Exposure Limits

NIOSH REL: Dust: TWA 5 mg/m^3 C 15 mg/m^3
Fume: TWA 5 mg/m^3 ST 10 mg/m^3

OSHA PEL†: TWA 5 mg/m^3 (fume) TWA 15 mg/m^3 (total dust) TWA 5 mg/m^3 (resp dust)

IDLH 500 mg/m^3 See: 1314132

Conversion

Physical Description
White, odorless solid.

MW: 81.4	BP: ?	MLT: 3587°F	Sol(64°F): 0.0004%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 5.61
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Chlorinated rubber (at 419°F), water [Note: Slowly decomposed by water.]

Measurement Methods
NIOSH 7303, 7502; OSHA ID121, ID143
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: No recommendation
Eyes: No recommendation
Wash skin: No recommendation
Remove: No recommendation
Change: No recommendation

First Aid (See procedures)

Breathing: Respiratory support

Respirator Recommendations NIOSH/OSHA

Up to 50 mg/m^3:
(APF = 10) Any particulate respirator equipped with an N95, R95, or P95 filter (including N95, R95, and P95 filtering facepieces) except quarter-mask respirators. The following filters may also be used: N99, R99, P99, N100, R100, P100. Click here for information on selection of N, R, or P filters.
(APF = 10) Any supplied-air respirator

Up to 125 mg/m^3:
(APF = 25) Any supplied-air respirator operated in a continuous-flow mode
(APF = 25) Any powered air-purifying respirator with a high-efficiency particulate filter.

Up to 250 mg/m^3:
(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on selection of N, R, or P filters.
(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode
(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter
(APF = 50) Any self-contained breathing apparatus with a full facepiece
(APF = 50) Any supplied-air respirator with a full facepiece

Up to 500 mg/m^3:
(APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

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

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

Exposure Routes inhalation

Symptoms Metal fume fever: chills, muscle ache, nausea, fever, dry throat, cough; lassitude (weakness, exhaustion); metallic taste; headache; blurred vision; low back pain; vomiting; malaise (vague feeling of discomfort); chest tightness; dyspnea (breathing difficulty), rales, decreased pulmonary function

Target Organs respiratory system

See also: INTRODUCTION See ICSC CARD: 0208 See MEDICAL TESTS: 0246

Field Forms

SITE SAFETY AND HEALTH PLAN
SAFETY COMPLIANCE AGREEMENT FORM

Project:

Project No.:

Project Location:

Project Manager: Project Director:

The undersigned acknowledge that they have read and understood and agree to abide by the health and safety plan.

Name (Printed)	Name (Signature)	Date

TAILGATE SAFETY MEETING

SITE LOCATION: _____ **CONTRACT #** _____

DATE _____ **TIME** _____ **PROJECT NUMBER** _____

CLIENT _____

SPECIFIC LOCATION _____

TYPE OF WORK _____

_____

SAFETY TOPICS PRESENTED

SAFETY TOPICS _____

PROTECTIVE CLOTHING/EQUIPMENT _____

_____

_____

_____

CHEMICAL HAZARDS _____

PHYSICAL HAZARDS _____

_____

EMERGENCY PROCEDURES _____

HOSPITAL/CLINIC _____ **PHONE** _____ **PARAMEDIC PHONE** _____

HOSPITAL ADDRESS _____

SPECIAL EQUIPMENT _____

NOTE : _____

_____

ATTENDEES

NAME PRINTED	COMPANY	SIGNATURE

Health & Safety Officer _____ **SUPERINTENDENT** _____

SIGNATURE _____ **SIGNATURE** _____