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Continental Heat Treating
Los Angeles County, California
Site Inspection
Draft Sampling and Analysis Plan

USACE Contract Number: DACA45.98.D0004, Task Order 25
Document Control Number: 20074.025.066

November 2002

Prepared for:
U.S. Environmental Protection Agency
Region IX

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Weston Solutions, Inc.

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EPA ID: CAD095631719

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List of Acronyms

AOC	Analyte of Concern
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CHT	Continental Heat Treating
CLP	Contract Laboratory Program
CLPAS	Contract Laboratory Program Analytical Services
CUPA	Certified Unified Program Agency
DCE	Dichloroethene
DQO	Data Quality Objective
DQI	Data Quality Indicator
DTSC	Department of Toxic Substances Control
EST	Environmental Support Technologies
HRS	Hazard Ranking System
IDW	Investigation-Derived Wastes
LACFD	Los Angeles County Fire Department
MCL	Maximum Contaminant Levels
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NPL	National Priorities List
PCE	Tetrachloroethene
PM	Project Manager
PPE	Personal Protective Equipment
PRG	Preliminary Remediation Goal
QA	Quality Assurance
QAO	Quality Assurance Office
QC	Quality Control
RPD	Relative Percent Difference
RWQCB	Regional Water Quality Control Board
SAM	Site Assessment Manager
SAP	Sampling and Analysis Plan
SFSFD	Santa Fe Springs Fire Department
SI	Site Inspection
SOP	Standard Operating Procedure
TCA	Trichloroethane
TCE	Trichloroethene
TIC	Tentatively Identified Compound
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

1.0 INTRODUCTION

Under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA), Weston Solutions, Inc. (WESTON®) has been tasked to conduct a Hazard Ranking System (HRS) Site Inspection (SI) of the Continental Heat Treating (CHT) site, located at 10643 Norwalk Boulevard, Santa Fe Springs, California. The HRS assesses the relative threat associated with actual or potential releases of hazardous substances to the environment, and has been adopted by the U.S. Environmental Protection Agency (USEPA) to assist in setting priorities for further site evaluation and eventual remedial action. The HRS is the primary method for determining a site's eligibility for placement on the National Priorities List (NPL). The NPL identifies sites where the USEPA may conduct remedial actions.

This Sampling and Analysis Plan (SAP) describes the project and data use objectives, data collection rationale, quality assurance goals, and requirements for sampling and analysis activities. The SAP also defines the sampling and data collection methods that will be used for this project. The SAP is intended to accurately reflect the planned data-gathering activities for this site investigation; however, site conditions and additional USEPA direction may warrant modifications. All significant changes will be documented in the final report.

WESTON has been tasked to gather and review existing available information regarding site conditions, identify and fill data gaps, and prepare HRS scoresheets and rationale for the site.

The specific field sampling and chemical analysis information pertaining to the site is addressed in this SAP, in accordance with the USEPA documents *EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations* (QA/R-5), October 1997, Guidance for the Data Quality Objectives Process (QA/G-4), September 1994 and *Data Quality Objective Process for Superfund* (EPA 540/G-93/71), August 1993.

1.1 Project Organization

Project organization is conducted in accordance with the Coordination Sheet included as Appendix A. The following is a list of project personnel and their responsibilities:

USEPA Site Assessment Manager (SAM) - The USEPA SAM is Matt Mitguard. Mr. Mitguard is the primary decision maker for this investigation and is the primary contact for the WESTON Project Manager.

WESTON Project Manager (PM) and Field Sampling Quality Control (QC) Coordinator - The WESTON PM and Field Sampling QC Coordinator is Christina Castellana. Ms. Castellana is responsible for the overall performance of all tasks assigned to WESTON by the USEPA and working with the USEPA Quality Assurance Office (QAO) to ensure project quality assurance goals are met.

Analytical Laboratory - The USEPA QAO will arrange for laboratory services.

Table 1.1: Organizational Chart

Title/Responsibility	Name	Phone Number
USEPA Site Assessment Manager	Matt Mitguard	(415) 972-3096
USACE QA Officer	John Esparza	(916) 557-7451
WESTON Project Manager and Quality Assurance Coordinator	Christina Castellana	(818) 382-1811
USEPA Region IX Sample Control Coordinator	Carl Brickner	(415) 972-3814

1.2 Distribution List

Copies of the final SAP will be distributed to the following persons and organizations:

- Matt Mitguard, USEPA Region 9
- John Esparza, U. S. Army Corps of Engineers (USACE) Quality Assurance Office
- Dan McMindes, USACE Project Manager
- Weston Solutions, Inc. files

1.3 Statement of the Specific Problem

The CHT site, located at 10643 Norwalk Boulevard, occupies approximately 1.5 acres in an industrial area. CHT is bordered to the north by the Jalk Fee property, formerly used for oil production. CHT began operations as a heat treating facility in the late 1960s. In 1968, the heat-treating process consisted of immersion of steel parts in a molten cyanide salt bath followed by brine quenching and cleaning. Wastewater from the disposal of spent brine quench tank and alkaline cleaning tank solutions originally drained to city sewers. After the presence of 938 ppm cyanide was detected in wastewater during a city inspection, the city of Santa Fe Springs required CHT to pretreat the brine quench tank solution before disposal. Numerous violations were issued to CHT for failure to maintain the wastewater treatment system. Cyanide is no longer used on site, though there is evidence for its use at least through 1984. Soils and groundwater in the site vicinity have never been analyzed for the presence of cyanide.

CHT used solvents such as trichloroethene (TCE) and tetrachloroethene (PCE) in the degreasing process from at least 1984 through approximately 1995. The solvents were used in a degreasing unit located near the northern boundary of the site. Soil and soil gas sampling results in the vicinity of the degreaser showed the presence of TCE and PCE from the surface to 60 feet below ground surface (bgs), where groundwater is located. TCE and PCE have also been detected in soils and groundwater beneath a portion of the Jalk Fee site immediately adjacent to the CHT site boundary. CHT and Jalk

Fee site owners are both continuing to argue that the other site is responsible for soil and groundwater contamination.

2.0 BACKGROUND

2.1 Location and Description

The Continental Heat Treating site is located at 10643 South Norwalk Boulevard, Santa Fe Springs, California. The geographic coordinates for the site are 33° 56' 18" North, 118° 4' 22" West. The location of the site is shown in Figure 2-1.

CHT occupies approximately 1.5 acres in an industrial area. It is located in the southwest portion of the active Santa Fe Springs oil field. CHT is bordered in the north by Mobil/Jalk Fee, on the west and south by the Hathaway Properties, and on the east by Norwalk Boulevard (DTSC, 2001).

CHT currently consists of a single 20,000-square-foot building on the eastern portion of the property that houses the heat treating operations, plating line, and office. The remaining portion of the site is paved with asphalt. A hazardous materials storage area lies in the southwest corner of the property. A vapor degreaser was located in the north-central portion of the building until approximately 1995 (CHT, 1999; DTSC, 2001). The layout for this site is shown in Figures 2-2 and 2-3.

2.2 Operational History

Prior to 1968, site owners/operations are unknown. In 1968, Mr. Stall Sr. and Tower Industries began operating at the CHT site as a heat treating facility. In 1986, Mr. Stall Jr. bought the business, changed the name and ownership, but maintained operations as a heat treating facility. CHT currently leases the property from the Northern Trust Bank and Mr. Benjamin Hathaway. The current landowner is Ana A. Hathaway Revocable Trust (DTSC, 2001).

In 1968, the heat-treating process consisted of immersion of steel parts in a molten cyanide salt bath followed by brine quenching and cleaning. Wastewater from the disposal of spent brine quench tank and alkaline cleaning tank solutions originally drained to city sewers. After the presence of 938 ppm cyanide was detected in wastewater during a city inspection, the city of Santa Fe Springs required CHT to pretreat the brine quench tank solution for cyanide destruction by chlorine oxidation. In response, CHT installed a 1000-gallon Nottingham interceptor outside the east end of the building for pretreatment of wastewater (SFS, 1968; LACE, 1978).

During a 1984 inspection, the use and disposal of 4 gallons per month of 1-1-1-trichloroethane (1,1,1-TCA) and acetone, 150 gallons per month of PCE, and 4 gallons per month of cyanide wastes was documented. The 1,1,1-TCA, acetone, PCE, and cyanide wastes were periodically removed from the site by waste-haulers (LADHS, 1984). During a 1989 inspection, the use of 2,200 gallons per year of Acto-Kleen, a degreasing solution containing PCE, was noted. The Acto-Kleen was stored in 55-gallon drums and was periodically removed from the site by a waste-hauler for disposal (LADHS, 1989).

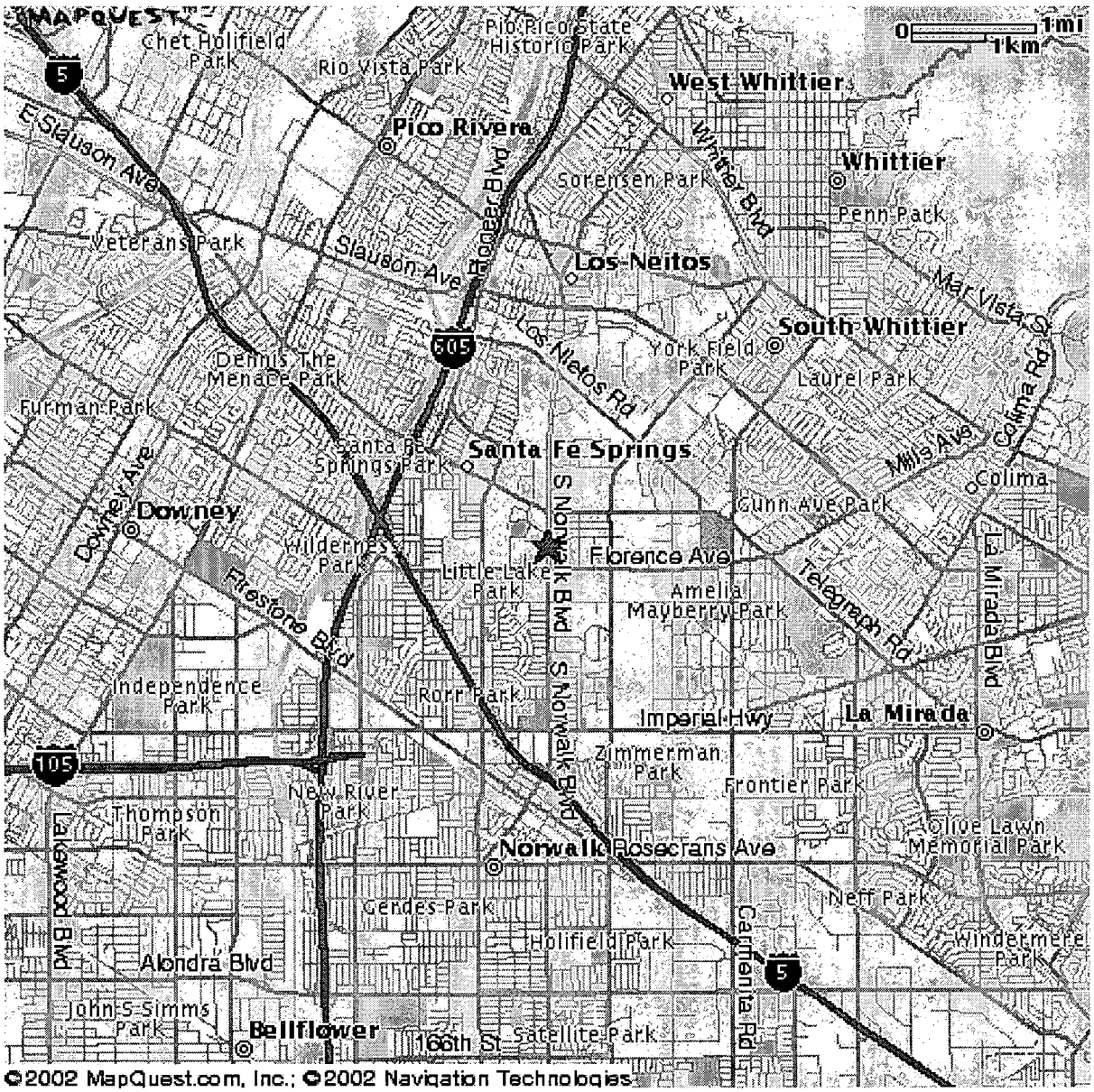

Figure 2-1: Site Location Map
Continental Heat Treating Site
Santa Fe Springs, California

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CHT currently provides heat treating services for manufacturers of aerospace, defense, nuclear, commerical and industrial products. The metal treating processes require cooling of the heat treated parts by oil quenching or by cooling with nitrogen to sub zero temperatures. All heat treating processes are conducted inside the building. In 1999, a copper plating line consisting of cleaning, plating, stripping, and rinse tanks was added to the facility (CHT, 1999).

Above-ground tanks are used to hold argon, hydrogen, nitrogen, and anhydrous ammonia gases used in the heat treat processes. The plating line uses acids and alkaline solutions for cleaning and stripping of metal parts, in addition to a copper plating tank. All chemicals used to make up these solutions are stored outside the building (CHT, 1999). Current hazardous wastes generated at the facility include waste quench oil, oil contaminated waste, sludge containing copper, and spent alkaline cleaning solution (SFSCUPA, 2000). PCE, TCE, and cyanide are no longer used on site (DTSC, 2001).

2.3 Previous Investigations and Regulatory Involvement

In 1970, Permit No. 4365 was issued to CHT by the Los Angeles County Project Planning and Pollution Control Division for disposal of approximately 110 gallons of wastewater per day to the street, after pretreatment in the Nottingham interceptor (LACE, 1969; SFS, 1970). From 1971 until 1975, samples were collected from the wastewater system by the Los Angeles County Industrial Waste Division. Samples collected over this time period indicated a maximum concentration of 904 ppm cyanide and a pH of 10.6 in the quencher tank, and a maximum concentration of 64 ppm cyanide and a pH of 9.0 in the outlet compartment of the interceptor. Samples collected in 1975 indicated a concentration of 2.9 ppm hexavalent chromium and 389,220 ppm oil and grease. Analytical methods were not described (LACE, 1971; 1972; 1975).

In 1976, Los Angeles County issued Permit for Industrial Wastewater Discharge No. 4827 to CHT (LACE, 1976). In 1978, a Notice of Violation was issued by the Los Angeles County Project Planning and Pollution Control Division, ordering CHT to clean and properly maintain the interceptor (LACE, 1978). In 1984, a Notice of Violation was issued by the Los Angeles County Department of Health Services for oil on the ground (LADHS, 1984).

The Santa Fe Springs Fire Department (SFSFD) issued a Notice of Violation in 1987 for blue-green water flowing at several gallons per hour onto Norwalk Boulevard from the CHT cooling tower. Mr. Ray Cross of CHT stated that the cooling tower pump had broken, and that the blue-green color was from a non-hazardous water treatment that did not contain chromium (SFSFD, 1987a). A similar discharge to the street was observed later that year, following the October 4, 1987 earthquake (SFSFD, 1987b). The SFSFD issued a Notice of Violation in 1988 for discharge of industrial wastewater to the street. The wastewater, which had a pH of 9 and contained a low concentration of an algicide, was discharged to the street when the blowdown water circulation pump malfunctioned (SFSFD, 1988).

In 1993, Mobil Oil Corporation (Mobil) conducted an environmental investigation at the adjacent Jalk Fee property located at 10607 Norwalk Boulevard. During this investigation, PCE, TCE, and 1,2-dichloroethene (1,2-DCE) were detected in site soils along the property line, and in groundwater from

a monitoring well installed in this area. Mobil concluded that this contamination originated from CHT and notified the SFSFD, the California Regional Water Quality Control Board (RWQCB), Department of Toxic Substances Control (DTSC), and the USEPA (Mobil, 1993). In 1994, CHT was issued a Notice of Violation by the Los Angeles County Fire Department (LACFD), ordering CHT to evaluate the soil contamination identified by Mobil (LACFD, 1994).

During subsequent investigations at the Jalk Fee site, PCE has been detected in soils at concentrations as high as 55,000 mg/kg. PCE and TCE have been detected in groundwater at maximum concentrations of 2,200 ug/L and 180 ug/L, respectively. In 1998, approximately 2,600 tons of PCE and TCE contaminated soil was removed from the site (DTSC, 2001).

In response to the 1994 order from the LACFD, Green Environmental, Inc., conducted a subsurface soil investigation for CHT in 1995. The investigation consisted of one hand-auger soil boring to a depth of 10 feet bgs immediately adjacent to the concrete sump of the former location of the industrial vapor degreaser. Soil samples were collected at the surface, 5 feet bgs, and 10 feet bgs, and were submitted for analysis of volatile organic compounds (VOCs) via EPA method 8240 (Green, 1995, LACFD, 1995). Results of this investigation are presented in Table 2-1.

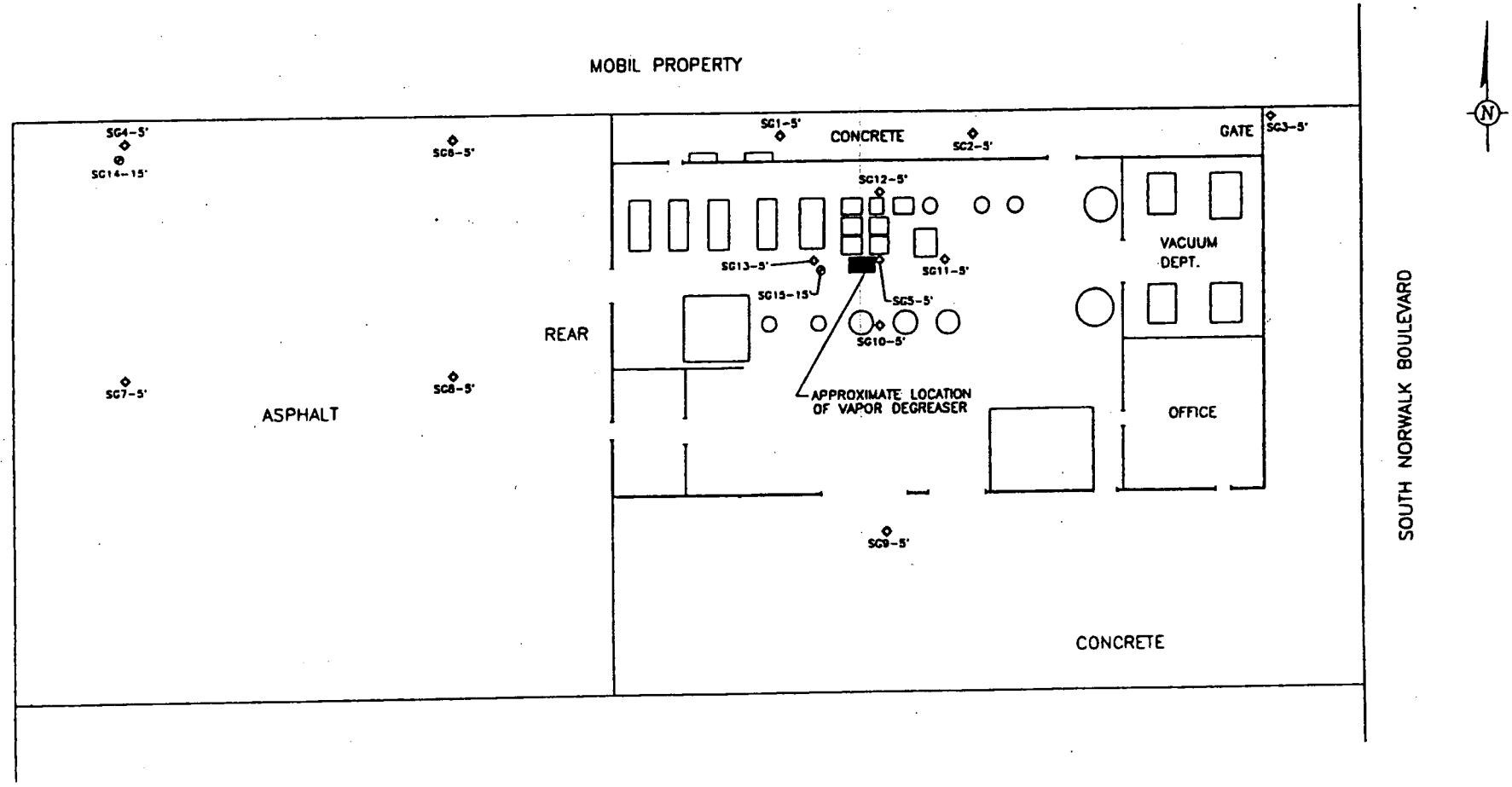
Table 2-1: Summary of Analytical Results for Soil, 1995 CHT Sampling Event (ug/kg)

Sample Depth	PCE	TCE
Surface	7,514	4,759
5 feet bgs	290	21
10 feet bgs	66	1,855

ug/kg: micrograms analyte per kilogram soil
PCE: tetrachloroethene
TCE: trichloroethene
bgs: below ground surface

In 1996, Environmental Support Technologies (EST) conducted a soil gas survey for CHT. The survey included the installation of 15 soil gas sampling probes, including 13 5-foot probes and two 15-foot probes. Soil gas samples were collected and analyzed on-site for VOCs in accordance with *Los Angeles Regional Water Quality Control Board's Requirements for Active Soil Gas Investigation*, March 1994 (EST, 1996). Sampling locations are shown in Figure 2-2 and sampling results are presented in Table 2-2.

In March 1997, EST performed an additional subsurface investigation at the CHT facility. A total of two 12-foot bgs, four 15-foot bgs four 25-foot bgs, and two 35-foot bgs soil gas proves were installed in the general vicinity of the former vapor degreaser. Soil gas samples were collected and analyzed on-site for VOCs in accordance with *Los Angeles Regional Water Quality Control Board's*



EXPLANATION

SG1-5' APPROXIMATE LOCATION OF A 5-FOOT SOIL GAS SAMPLING PROBE WITH ASSOCIATED PROBE NUMBER AND PROBE DEPTH

SG15-15' APPROXIMATE LOCATION OF A 15-FOOT SOIL GAS SAMPLING PROBE WITH ASSOCIATED PROBE NUMBER AND PROBE DEPTH

FURNACES

FURNACES

0 25 50

APPROXIMATE SCALE IN FEET

Figure 2-2 – Sampling Locations for 1996 EST Sampling Event Continental Heat Treating Santa Fe Springs, CA

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Table 2-2: Summary of Analytical Results for Soil Gas, 1996 CHT Sampling Event (ug/L)

Location	Depth (feet bgs)	Vinyl Chloride	1,1-DCE	trans-1,2-DCE	cis-1,2-DCE	TCE	PCE	Ethylbenzene	Total Xylenes
SG1-5	5	<1	<1	<1	<1	<1	5	<1	<1
SG2-5	5	<1	<1	<1	<1	<1	<1	<1	<1
SG3-5	5	<1	<1	<1	6	5	3	<1	<1
SG4-5	5	<1	<1	<1	<1	<1	198	<1	<1
SG5-5	5	<1	<1	<1	<1	<1	<1	<1	<1
SG6-5	5	<1	<1	<1	<1	<1	2	<1	<1
SG7-5	5	<1	<1	<1	<1	<1	58	<1	<1
SG8-5	5	<1	<1	<1	<1	<1	4	<1	<1
SG9-5	5	<1	<1	9	35	14	12	<1	<1
SG10-5	5	<1	<1	<1	<1	<1	<1	<1	<1
SG11-5	5	4	<1	<1	71	88	240	3	6
SG12-5	5	<1	<1	<1	3	3	6	<1	<1
SG13-5	5	74	7	174	756	246	144	5	11
SG14-15	15	<1	<1	<1	6	30	41,300	<1	<1
SG15-15	15	211	17	114	269	225	3,040	36	45

ug/L: micrograms analyte per liter soil gas
DCE: dichloroethene
PCE: tetrachloroethene
bgs: below ground surface
TCE: trichloroethene
Sample locations are shown in Figure 2-3.

Table 2-3: Summary of Analytical Results for Soil Gas, 1997 CHT Sampling Event (ug/L)

Sample Name	Depth (feet bgs)	Vinyl Chloride	trans-1,2-DCE	cis-1,2-DCE	TCE	PCE	Benzene	Toluene	Ethyl benzene	Total Xylenes
SG1-12	12	15	3	23	7	21	<1	<1	<1	<1
SG5-15	15	50	27	124	105	1,151	<5	148	<5	6
SG5-25	25	<50	<50	<50	<50	597	<50	<50	<50	<50
SG5-35	35	<25	<25	45	156	1,948	91	101	<25	<25
SG9-15	15	45	10	10	28	503	<1	214	4	18
SG9-25	25	<20	<20	<20	<20	213	<20	123	<20	<20
SG10-15	25	25	<10	24	33	118	<10	<10	<10	<10
SG10-25	25	29	24	82	116	533	<5	87	<5	<5
SG10-35	35	<10	<10	26	103	1,172	188	144	<10	<10
SG11-15	15	55	<20	48	92	445	<20	208	<20	<20
SG11-25	25	<20	<20	26	44	368	<20	257	<20	<20
SG12-12	12	<10	<10	31	23	284	<10	57	<10	<10

ug/L: micrograms analyte per liter soil gas
DCE: dichloroethene
PCE: tetrachloroethene
bgs: below ground surface
TCE: trichloroethene
Sample locations are shown in Figure 2-4.

Requirements for Active Soil Gas Investigation, March 1994. Soil gas results are presented in Table 2-3. Based on the soil gas analytical results, a single soil boring was advanced to groundwater inside the facility. Soil samples were collected at approximate five-foot intervals and submitted for analysis by a fixed laboratory. Groundwater was encountered at approximately 68 feet bgs, but was not sampled. Before backfilling, nested soil gas sampling proves were installed at approximately 50 and 60 feet bgs in the borehole; a vapor extraction well was installed to approximately 45 feet bgs (EST, 1997). Soil sampling results are presented in Table 2-4. Sampling locations are shown in Figure 2-3.

In June 1997, the LACFD referred the CHT site to the Los Angeles RWQCB, based on a perceived present or likely imminent groundwater impact. The LACFD also notified the RWQCB that the files for the site would be transferred to the SFSFD Certified Unified Program Agency (CUPA) effective July 1, 1997 (LACFD, 1997).

Based on the results of the 1996 and 1997 site assessments performed by EST, CHT requested clean closure from the SFSFD. Based on levels of PCE in soil gas found at sampling location SG14, the SFSFD was not able to issue closure. The SFSFD requested that a soil boring be advanced to groundwater at this location, with soil samples collected every 5 feet, and collection of a groundwater sample. Additionally, conversion of the boring into a monitoring well was requested (SFSFD, 1997).

On February 11, 1999, CHT was issued a Notice of Violation by the SFSFD. Violations included oil in the clarifier, improperly labeled waste containers, incomplete Spill Prevention Control and Countermeasures plan, and failure to determine whether grit blast must be included as a hazardous waste (SFSFD, 1999).

In 2001, Fero Engineering submitted an Unsaturated Soil Remediation System Installation Workplan to the RWQCB on behalf of CHT. Fero proposed to conduct remediation at the site using a vapor extraction system with a single deep extraction well screened from 10 to 65 feet bgs. In addition, four monitoring probes installed at nested depths of 5, 15, 30, 45, and 60 feet bgs were proposed (Fero, 2001). The RWQCB approved the plan, with a number of conditions, including the request that three groundwater monitoring wells be installed, and that quarterly monitoring be conducted (RWQCB, 2002). Subsequently, EST submitted a workplan for the groundwater monitoring well installation and monitoring (EST, 2002). To date, none of this work has begun.

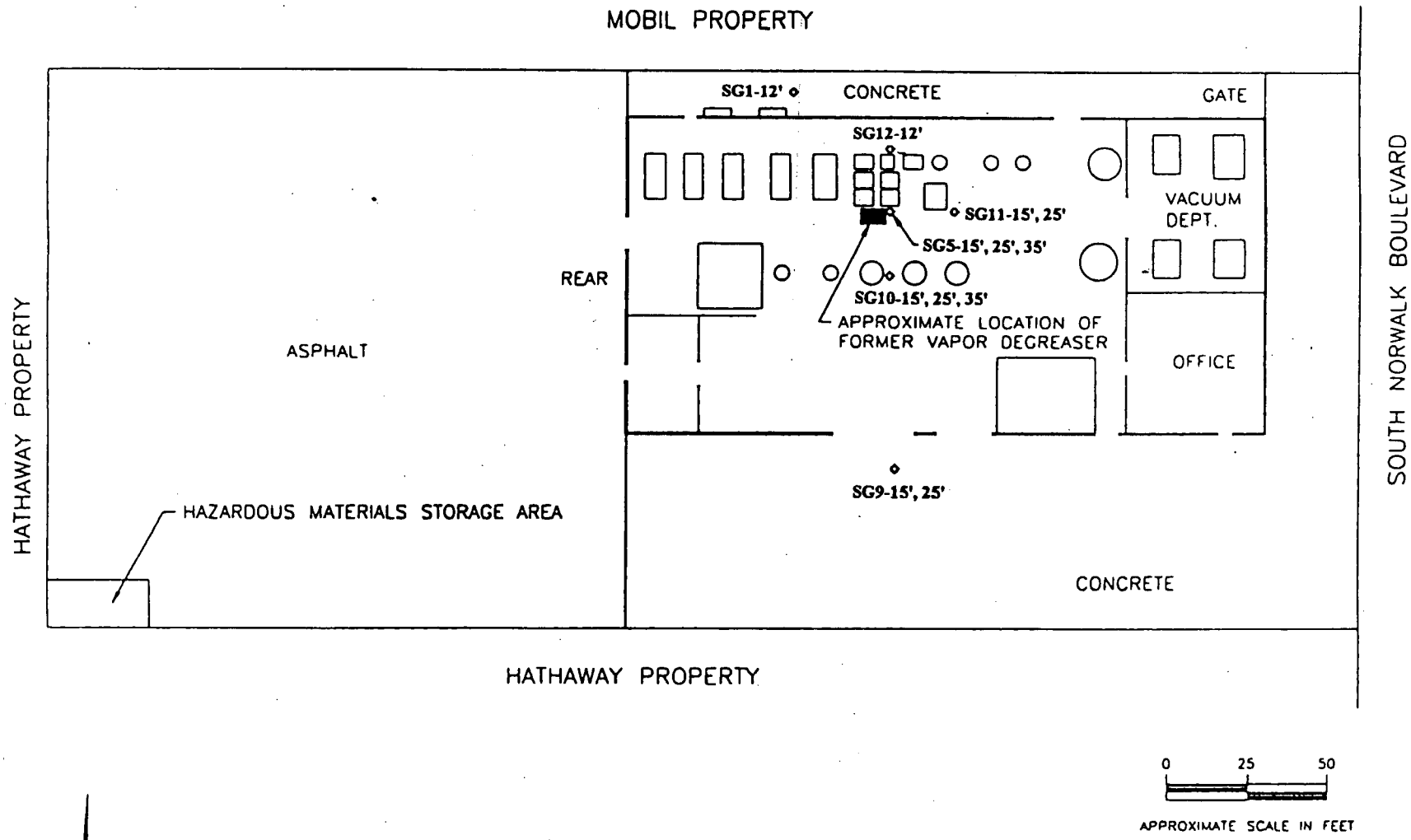

Figure 2-3 – Sampling Locations for 1997 EST Sampling Event Continental Heat Treating Santa Fe Springs, CA

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Table 2-4: Summary of Analytical Results for Soil, 1997 CHT Sampling Event (ug/kg)

Sample Name	Depth (feet bgs)	cis-1,2-DCE	TCE	PCE	Toluene
CHT-B1-5	5	<3	20	40	<3
CHT-B1-10	10	<3	9.6	31	<3
CHT-B1-15	15	<3	17	110	<3
CHT-B1-20	20	<3	14	42	<3
CHT-B1-25	25	<3	7	29	<3
CHT-B1-30	30	17	9.4	50	<3
CHT-B1-35	35	<3	<3	8.4	<3
CHT-B1-40	40	<3	3	16	<3
CHT-B1-45	45	<3	4	27	<3
CHT-B1-50	50	17	<3	4.8	<3
CHT-B1-55	55	<3	<3	5.2	<3
CHT-B1-60	60	<3	7.7	130	6.5
CHT-B1-65	65	<3	<3	<3	<3

ug/kg: micrograms analyte per kilogram soil
DCE: dichloroethene
PCE: tetrachloroethene
bgs: below ground surface
TCE: trichloroethene
Sampling locations are shown in Figure 2-4.

2.4 Geology/Hydrogeology

The Santa Fe Springs Oil Field is located on the Santa Fe Springs plain, which is part of the Montebello Forebay non-pressure area of the Central Basin. Groundwater is found throughout the region under unconfined conditions in the Recent Alluvium and in the underlying Exposition Aquifer. The first regional groundwater-bearing zone is the Exposition Aquifer, which is first encountered at approximately 60 feet bgs. The second regional aquifer is the Gage Aquifer, first encountered at approximately 110 feet bgs. The upper 100 feet of sediments consist predominantly of permeable sands, although the upper 15 feet of sediments have a higher silt and clay content and lower permeability (DTSC, 2001).

Depth to groundwater beneath the site is approximately 62 to 67 feet bgs, with a groundwater flow direction to the southwest (ATC, 2000). Soils beneath the site consist of silty sand from the surface to approximately 12 feet bgs, sandy silt and silt from approximately 12 to 23 feet bgs, a continuous clay interval from approximately 23 to 27 feet bgs, sandy silt and silt from approximately 27 to 40 feet bgs, and a sand interval from approximately 40 to 65 feet bgs (McLaren Hart 1997).

2.5 Waste Characteristics

Since the late 1960s, various hazardous substances such as cyanide and chlorinated solvents have been used during heat-treating operations at CHT. During the time period that cyanide was in use, up to 938 ppm cyanide was detected in wastewater from the site. CHT received several subsequent Notices of Violation for failure to maintain the wastewater treatment system. Though cyanide is no longer used at the site, site soils may have been impacted by previous wastewater spills. Therefore, site soils may be providing a source of cyanide to groundwater.

Though chlorinated solvents such as PCE and TCE are no longer used at the site, these hazardous substances have been detected in soil gas across the site. Chlorinated solvents have been detected in site soils beneath the former vapor degreaser throughout the vadose zone, to groundwater at approximately 68 feet bgs. In addition, chlorinated solvents that may have originated at the CHT site have been detected in soils and groundwater on an adjacent portion of the Jalk Fee site. Therefore, site soils may be providing a source of chlorinated solvents to groundwater.

2.6 HRS Pathways

Results from previous investigations at the adjacent Jalk Fee site suggest that groundwater beneath the site has been impacted by chlorinated solvents. Monitoring wells beneath the Jalk Fee site are screened in the shallow Exposition Aquifer. Many drinking water wells within the target distance limit from the site are screened in the Gage-Gardena aquifer, which is interconnected with the Exposition Aquifer within 2 miles of the site. All of the water-bearing units are designated as aquifers by the RWQCB.

3.0 PROJECT OBJECTIVES

3.1 Project Task and Problem Definition

WESTON has been tasked to conduct sampling of soil and groundwater beneath the CHT site to further the HRS process. To demonstrate the presence of hazardous substances in the source to groundwater, samples will be collected from soils in the vicinity of the former vapor degreaser. To establish a release to the groundwater pathway, groundwater samples will be collected upgradient, beneath the former vapor degreaser, and downgradient of the CHT facility. All samples will be submitted for laboratory analysis of cyanide and VOCs. Sampling at the CHT site will occur simultaneously with sampling at the Jalk Fee site.

3.2 Data Use Objectives

Data collected during this site investigation will be used to:

- Determine the concentrations of cyanide and VOCs in site soils to document the presence of hazardous substances in the source.

- Document the concentrations of cyanide and VOCs in groundwater to evaluate whether a release to groundwater has occurred and can be attributed to the site.
- Evaluate whether further characterization of the site is necessary. If additional characterization of the site is indicated, an addendum will be made to this SAP that documents these findings and provides a design and procedures for additional site characterization.

3.3 Action Levels

The action levels for groundwater dictated by the HRS for this investigation are three times the background concentrations of cyanide and individual VOCs found in groundwater samples collected downgradient of the site. If the background concentration is below detection, then the action level is the sample quantitation limit. Groundwater samples will be collected upgradient of the site to determine these background levels. If any analytical result for groundwater exceeds the action levels described above, then that result will be compared with secondary action levels. Secondary action levels for groundwater will be USEPA Maximum Contaminant Levels (MCLs).

Action levels for soils will be USEPA Region IX residential and industrial Preliminary Remediation Goals (PRGs). In addition, background soil samples will be collected for comparison purposes.

Based on previous investigations discussed in Section 2.3, the constituents deemed most likely to be elevated above background levels are cyanide and chlorinated solvents such as PCE, TCE, and DCE. Therefore, cyanide and these specific VOCs are the main analytes of concern (AOCs) for this investigation. However, if any other VOCs are detected during analysis, they will be evaluated as potential AOCs by comparison with their action levels as described above.

3.4 Decision Rules

If groundwater samples are found to be contaminated with any chlorinated solvents or cyanide above the corresponding action levels, an observed release will be documented and integrated into the site's HRS score. If site soils are found to be contaminated by chlorinated solvents or cyanide, then the presence of hazardous substances in the source will be documented.

3.5 Data Quality Objectives

3.5.1 Data Quality Objective (DQO) Process

The DQO process, as set forth in the USEPA document, *Guidance for the Data Quality Objectives Process,* EPA QA/G-4, was followed to establish the data quality objectives for this project. An outline of the process and the outputs for this project are included in Appendix B.

3.5.2 DQO Data Categories

This investigation will involve the generation of definitive data for soil and groundwater. The specific requirements for this data category are detailed in Section 9. The data generated under this project will comply with the requirements for that data category as defined in *Data Quality Objective Process for Superfund*, EPA 540/G-93/71, September 1993. All definitive analytical methods employed for this project will be methods approved by the USEPA.

3.5.3 Data Quality Indicators

Data quality indicator goals (DQIs) for this project were developed following guidelines in *EPA Guidance for Quality Assurance Project Plans,* EPA QA/G-5 Final. All sampling will be guided by procedures detailed in Section 6.2 and standard operating procedures (SOPs) to ensure representativeness of sample results. Tables 3-1 and 3-2 document the DQIs for this project.

USEPA Contract Laboratory Program (CLP) Contract Required Detection Limits (CRDLs) for cyanide and VOCs were determined to be appropriate for this project.

3.6 Data Management

Samples will be collected and logged on a chain-of-custody form as discussed in Section 8.4. Samples will be kept secure in the custody of the sampler at all times, who will assure that all preservation parameters are being followed. Samples will be transferred to the laboratory via a certified carrier in a properly custody-sealed container with chain-of-custody documentation. The laboratory should note any evidence of tampering upon receipt.

The completed laboratory data report will be submitted to the USACE QAO. Data validation will be conducted by the USACE QAO, who will provide the data validation reports to the USEPA TM. The USEPA TM will then provide the data reports to the WESTON PM. The data validation reports and laboratory data summary sheets will be included in the final report to be submitted to the USEPA TM. Before submittal, the final report will undergo a technical review to ensure that all data have been reported and discussed correctly.

3.7 Schedule of Sampling Activities

It is anticipated that field activities will begin the week of January 13, 2003. Field activities are expected to last three days. Subsequently, samples will be analyzed, data evaluated and validated, and a final report prepared. The target date for completion of the final report is February 28, 2003.

3.8 Special Training Requirements/Certifications

There are no special training or certification requirements specific to this project. Training requirements relevant to WESTON's health and safety program comply with 29 CFR 1910.120. The Site-Specific Health and Safety Plan is presented in Appendix C.

Table 3-1: Data Quality Indicator Goals - Soils, mg/kg

Method Analytes	PRG residential	PRG industrial	CRDL	Accuracy (% Recovery for MS/MSD)	Precision (RPD for MS/MSD and duplicates)	Percent Complete
CLPAS OLM04.2 Volatiles, low soil						
Vinyl chloride	0.079	0.75	0.01	75-125	≤35	≥90
1,1-Dichloroethene	120	410	0.01	75-125	≤35	≥90
trans-1,2-Dichloroethene	69	230	0.01	75-125	≤35	≥90
cis-1,2-Dichloroethene	43	150	0.01	75-125	≤35	≥90
Trichloroethene	0.053	0.11	0.01	75-125	≤35	≥90
Tetrachloroethene	1.5	3.4	0.01	75-125	≤35	≥90
CLPAS ILM05.2 ICP-AES						
Cyanide	1,200	12,000	1.0	75-125	≤35	≥90

mg/kg milligrams analyte per kilogram soil
PRG: USEPA Region 9 Preliminary Remediation Goals for soil
CRDL CLP Contract Required Detection Limits
MS/MSD Matrix Spike/Matrix Spike Duplicate
RPD Relative Percent Difference
CLPAS: EPA Contract Laboratory Program Analytical Services

Table 3-2: Data Quality Indicator Goals - Groundwater, ug/L

Method Analyte	Action Level (mg/L)	MCL	CRDL	Accuracy (% Recovery for MS/MSD)	Precision (RPD for MS/MSD and duplicates)	Percent Complete
CLPAS OLC03.2, Volatiles						
Vinyl chloride	3 x	2	0.5	75-125	≤35	≥90
1,1-Dichloroethene	3 x	7	0.5	75-125	≤35	≥90
trans-1,2-Dichloroethene	3 x	100	0.5	75-125	≤35	≥90
cis-1,2-Dichloroethene	3 x	70	0.5	75-125	≤35	≥90
Trichloroethene	3 x	5	0.5	75-125	≤35	≥90
Tetrachloroethene	3 x	5	0.5	75-125	≤35	≥90
CLPAS ILM05.2 ICP-AES						
Cyanide	3 x	200	10	75-125	≤35	≥90

ug/L micrograms analyte per liter water
MCL: USEPA Maximum Contaminant Levels for drinking water.
CRDL CLP Contract Required Detection Limits
MS/MSD Matrix Spike/Matrix Spike Duplicate
RPD Relative Percent Difference
CLPAS: EPA Contract Laboratory Program Analytical Services

4.0 SAMPLING RATIONALE

4.1 Sampling Locations and Rationale

Sampling of the CHT site will occur simultaneously with sampling at the adjacent upgradient Jalk Fee site; therefore background samples for CHT soil and groundwater will be collected on the Jalk Fee site. A combined total of five borings will be drilled at both sites for the purposes of collecting soil and groundwater samples using a cone-penetrometer testing (CPT) rig equipped for direct-push sampling. This method will minimize the generation of soil cuttings to eliminate additional costs for disposal.

Three of the boring locations will be located on Jalk Fee property, and two will be located on CHT property. Though all sampling locations will be discussed here, only the two CHT sampling locations will be included in the Request for Analysis tables in Section 5. Request for Analysis tables for samples collected on the Jalk Fee property will be included in the Jalk Fee SAP. Sampling locations are shown on Figure 4-1 and specific sampling locations are described below.

4.1.1 Groundwater Sampling

To establish whether a release to groundwater has occurred, groundwater samples will be collected in both background and downgradient locations relative to the site. The sampling locations have been selected to investigate the area of soil and groundwater contamination in the southeast portion of the Jalk Fee site, as well as the area of soil and soil gas contamination beneath the former degreaser on the CHT site. Groundwater will be collected from each boring at the top of the shallow water table, estimated to be approximately 65 feet bgs.

Groundwater sample JF-1-GW will be located hydraulically upgradient of both the Jalk Fee and CHT sites. This location will establish background levels of the AOCs for the area of contamination on the southeast portion of the Jalk Fee site. Groundwater sample JF-2-GW will be located on the Jalk Fee property immediately upgradient of the location of the former CHT degreaser, to establish background levels of AOCs for that area. Groundwater sample JF-3-GW will be located within the area of VOC contamination on the Jalk Fee property, adjacent to monitoring well MMW-5 (well MMW-5 is not accessible for sampling). Groundwater sample CHT-1-GW will be located beneath the location of the former vapor degreaser to provide a biased location where the highest concentrations of AOCs in groundwater are expected to be found on the CHT property. Groundwater sample CHT-2-GW will be collected downgradient of both the former degreaser and the area of contamination on the Jalk Fee property.

4.1.2 Soil Sampling

To determine background concentrations of the AOCs, soil samples JF-1-5 and JF-1-15 will be collected at 5 and 15 feet bgs, respectively. According to site historical information, chlorinated solvents were not used in this area, and were not detected in soils during previous sampling events. To establish a hazardous substance source at the Jalk Fee site, soil samples JF-3-20 and JF-3-25 will be collected at 20 and 25 feet bgs, respectively. Soils in this area were removed to a maximum depth of

15 feet bgs and replaced with clean fill. Therefore, samples will be collected at 20 and 25 feet to ensure sampling of undisturbed soils. To establish a hazardous substance source at the CHT site, soil samples will be collected at 5 and 15 feet bgs beneath the former vapor degreaser. These depths correspond with the highest concentrations of TCE and PCE found during previous investigations.

4.2 Analytes of Concern

Based on previous sampling events described in Section 2.3, specific AOCs at the site are cyanide and chlorinated solvents such as PCE, TCE, and DCE. Soil samples will be analyzed for VOCs via USEPA CLP Analytical Services (CLPAS) OLM04.2 or equivalent. Groundwater samples will be analyzed for VOCs via CLPAS OLC03.2 or equivalent. Soil and groundwater samples will be analyzed for cyanide via CLPAS ILM05.2 ICP-AES method or equivalent.

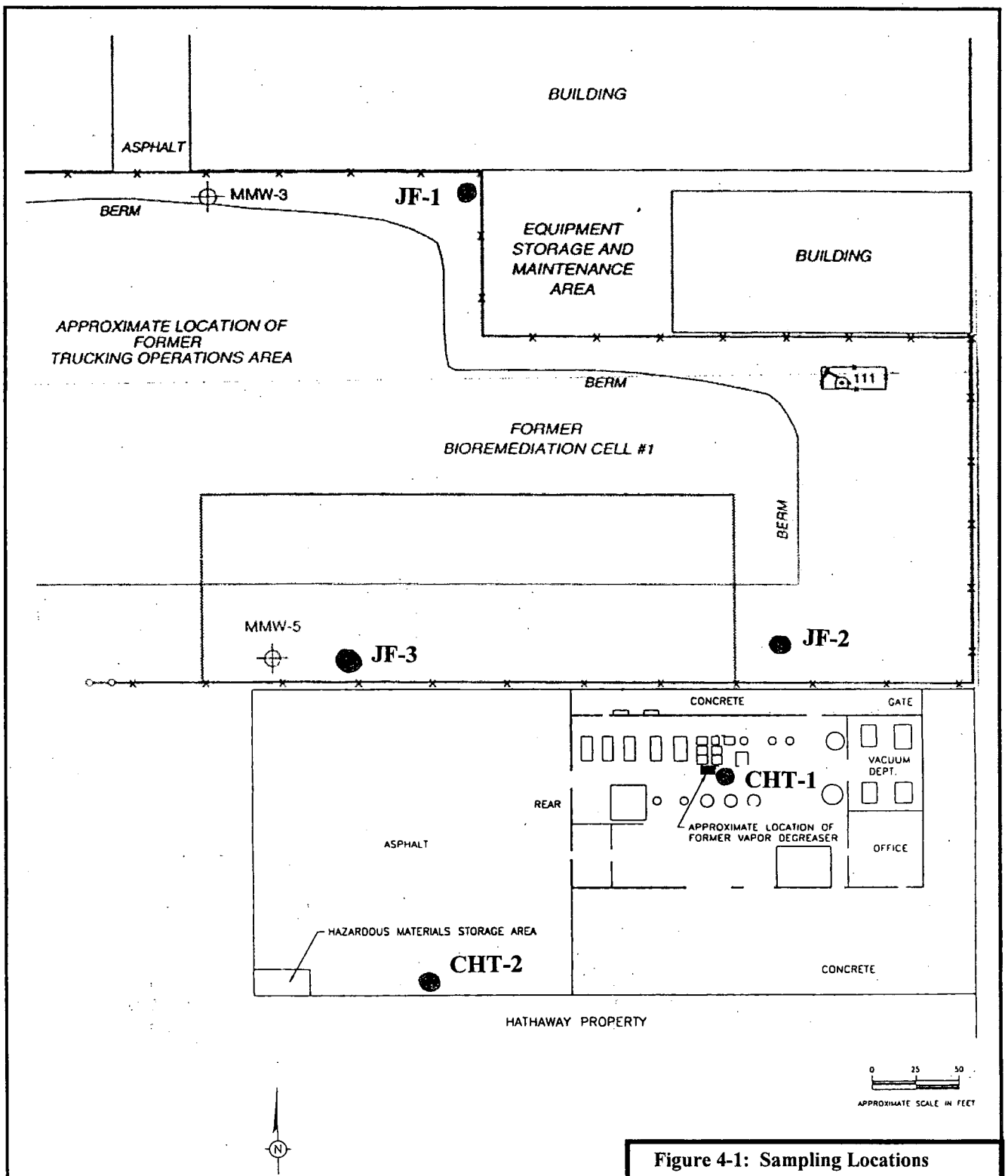

Figure 4-1: Sampling Locations
Jalk Fee/CHT Sites
Santa Fe Springs, California

WESTON
MANAGERS DESIGNERS/CONSULTANTS

5.0 REQUEST FOR ANALYSES

All laboratory services will be scheduled and arranged for by USEPA Region IX QAO. Samples will be analyzed through USEPA's Region IX laboratory or CLP. Sample containers, preservatives, holding times, and estimated number of field and QC samples are summarized in Tables 5-1 and 5-2.

As enumerated in Table 5-1, groundwater samples will be collected at two locations. One duplicate groundwater sample will be collected for a total of three groundwater samples. A double volume sample will be collected at one location for use as a laboratory QC sample. Each groundwater sample will be analyzed for cyanide via CLPAS Method ILM05.2 or equivalent, and for VOCs via CLPAS Method OLC03.2 or equivalent.

As enumerated in Table 5-2, soil samples will be taken at two locations. Additional sample collected at one sample location will be identified for use as a laboratory QC sample. One duplicate sample will be collected for a total of three samples. Each soil sample will be analyzed for cyanide via CLPAS Method ILM5.2 or equivalent, and for VOCs via CLPAS Method OLM04.2 or equivalent.

One equipment blank will be collected for each piece of sampling equipment requiring decontamination, each each day that samples are collected. A total of one equipment blank is expected. Equipment blanks will be analyzed for cyanide and VOCs in the same manner as the groundwater samples (see Table 5-1).

To provide analytical quality control for the analytical program, the following measures will be utilized:

- All sample analysis will be conducted by a laboratory selected by USEPA QAO.
- Additional volume of sample will be collected for at least one sample per media per each analytical method, to be utilized for matrix spike/matrix spike duplicate analysis.
- A CLP-type data package will be required from the laboratory for all resultant data.

Table 5-1: Request for Analytical Services, Matrix - Groundwater

ANALYSES REQUESTED							CONTRACT LABORATORY PROGRAM ANALYTICAL SERVICES (CLPAS)	
CHEMISTRY TYPE							INORGANICS	ORGANICS
SPECIFIC ANALYSES REQUESTED							CLPAS ILM05.2	CLPAS OLC03.2
PRESERVATIVES							Add NaOH to pH>13 Chill to 4°C	Add HCl to pH <2 Chill to 4°C
ANALYTICAL HOLDING TIME(S)							Hold < 6 months	Hold <7 days
CONTRACT HOLDING TIMES(S)							Hold <35 days	Hold <5 days
NUMBER OF SAMPLES x NUMBER OF SAMPLE CONTAINERS							No. of Containers per Analysis	No. of Containers per Analysis
Sample Number	**Sample Location**	**Sample Depth (feet)**	**Sampling Date**	**Special Designation**	**Conc. LOW**	**Conc. MED**	**1 liter polyethylene bottle**	**40 mL glass vials**
CHT-GW-1	CHT-1	65	1/16/03	lab QC		x	2	6
CHT-GW-2	CHT-2	65	1/16/03			x	1	3
CHT-GW-3	CHT-1	65	1/16/03	duplicate		x	1	3
CHT-GW-4	n/a	n/a	1/16/02	equipment blank	x		1	3
Total Number of Groundwater Samples							**4**	**4**
Total Number of Sample Containers							**5**	**15**

Table 5-2: Request for Analytical Services, Matrix - Soil

ANALYSES REQUESTED	CONTRACT LABORATORY PROGRAM ANALYTICAL SERVICES (CLPAS)	
CHEMISTRY TYPE	INORGANICS	ORGANICS
SPECIFIC ANALYSES REQUESTED	CLPAS ILM05.2	CLPAS OLM03.2
PRESERVATIVES	Chill to 4°C	Chill to 4°C
ANALYTICAL HOLDING TIME(S)	Hold < 6 months	Hold <7 days
CONTRACT HOLDING TIMES(S)	Hold <35 days	Hold <5 days
NUMBER OF SAMPLES x NUMBER OF SAMPLE CONTAINERS	No. of Containers per Analysis	No. of Containers per Analysis

Sample Number	Sample Location	Sample Depth (feet)	Sampling Date	Special Designation	Conc. LOW	Conc. MED	4 oz glass jar	5g EnCore sampler/ 4 oz glass jar
CHT-1-S5	CHT-1	5	1/16/02	lab QC		x	1	5/1
CHT-1-S15	CHT-1	15	1/16/02			x	1	3/1
CHT-2-S15	CHT-1	15	1/16/02	duplicate		x	1	3/1
						Total Number of Soil Samples	**3**	**3**
						Total Number of Sample Containers	**3**	**9/3**

6.0 METHODS AND PROCEDURES

6.1 Field Equipment

6.1.1 Sampling Equipment

The following equipment will be used to obtain environmental samples:

Equipment	Fabrication	Dedicated
Sampler Sleeves	Brass	Yes (new)
Trowels	Plastic	Yes
Temporary well screen	PVC	Yes
Minibailer	Stainless Steel	No

The CPT/direct push equipment and sampling devices will be operated by a subcontractor using standard industry practices. Equipment maintenance will be the responsibility of the subcontracted drilling company.

6.1.2 Inspection/Acceptance Requirements for Supplies and Consumables

There are no project-specific inspection/acceptance criteria for supplies and consumables. It is standard operating procedure that: personnel will not use broken or defective materials; items will not be used past their expiration date; supplies and consumables will be checked against order and packing slips to verify the correct items were received; and the supplier will be notified of any missing or damaged items.

6.2 Sampling Procedures

6.2.1 Underground Utilities Clearance

All underground utilities will be located and identified by a geophysical survey team. If any subsurface utilities are suspected beneath proposed borings, the borings will be relocated in order to avoid the utilities. Underground Services Alert will be notified at least 72 hours before drilling commences. In addition, the drilling subcontractor will be required to hand-auger the first five feet of each borehole.

6.2.2 Subsurface Soil Sampling

Subsurface soil samples will be collected using a CPT/direct push drill rig. The direct push is the preferred method of collecting samples because no soil cuttings will be produced.

Samples to be analyzed for volatile organic compounds will be collected first. Subsurface samples will be collected by boring to the desired sample depth using the CPT/direct push method. Samples will be collected in a split-spoon soil sampler lined with dedicated brass sleeves. Soil samples for VOC analyses will be collected from the brass sleeves as independent, discrete samples, using three 5 gram EnCore sampling devices for each location. Samples will be sealed using the EnCore sampler and a zip lock bag. Soils remaining in the brass sleeve will be distributed between two 4 oz. glass jars for moisture and cyanide analyses. Sample containers will be closed as soon as they are filled, chilled immediately to 4°C, and processed for shipment to the laboratory.

6.2.3 Groundwater Sampling

When groundwater is encountered in the borehole, an in-situ groundwater sample will be collected using a Hydropunch™ water sampling device, or equivalent. The Hydropunch™ is inserted into undisturbed soils at the base of the borehole. The outer portion of the Hydropunch™ is then retracted to expose a PVC screen in the water-bearing zone. A stainless steel mini-bailer is lowered into the screen for collection of an in-situ groundwater sample. Because groundwater samples collected with a Hydropunch™ are representative of in-situ groundwater conditions, samples may be collected immediately without purging or measurement of water quality parameters.

At each sampling location, all bottles designated for VOC analysis will be filled sequentially before bottles designated for cyanide analysis are filled. If a duplicate sample is to be collected at this location, all bottles for VOC analysis for both sample designations will be filled sequentially before bottles for another analysis are filled. In the filling sequence for duplicate samples, bottles with the two different sample designations will alternate. Groundwater samples will be transferred directly from the bailer directly into the appropriate sample containers with preservative, chilled, and processed for shipment to the laboratory. When transferring samples, care will be taken not to touch the bailer to the sample container.

Vials for volatile organic compound analysis will be filled first to minimize the effect of aeration on the water sample. The vials will be inverted and checked for air bubbles to ensure zero headspace. If a bubble appears, the vial will be discarded and a new sample will be collected.

6.3 Decontamination Procedures

With the exception of the stainless steel minibailer, all equipment that will come into contact with samples will be dedicated. The minibailer will be decontaminated by the drilling subcontractor by scrubbing with a non-phosphate detergent in hot water, rinsing twice in hot tap water, and rinsing with distilled water. The clean minibailer will be hung on a rack to dry.

7.0 DISPOSAL OF INVESTIGATION -DERIVED WASTE

In the process of collecting environmental samples at this site, several different types of potentially contaminated investigation-derived wastes (IDW) will be generated, including the following:

- Used personal protective equipment (PPE); and
- Disposable sampling equipment.

The USEPA's National Contingency Plan requires that management of IDW generated during site investigations comply with all relevant or appropriate requirements to the extent practicable. This sampling plan will follow the *Office of Emergency and Remedial Response (OERR) Directive* 9345.3-02 (May 1991) which provides the guidance for management of IDW during site investigations. Listed below are the procedures that will be followed for handling IDW. The procedures are flexible enough to allow the site investigation team to use its professional judgement on the proper method for the disposal of each type of IDW generated at each sampling location.

- Used PPE and disposable sampling equipment will be double bagged in plastic trash bags and disposed of in a municipal refuse dumpster. These wastes are not considered hazardous and can be sent to a municipal landfill. Any PPE or dedicated equipment that is to be disposed of that can still be reused will be rendered inoperable before disposal.

8.0 SAMPLE IDENTIFICATION, DOCUMENTATION AND SHIPMENT

8.1 Field Notes

8.1.1 Field Logbooks

Field logbooks will document where, when, how, and from whom any vital project information was obtained. Logbook entries will be complete and accurate enough to permit reconstruction of field activities. A separate logbook will be maintained for each project. Logbooks are bound with consecutively numbered pages. Each page will be dated and the time of entry noted in military time. All entries will be legible, written in ink, and signed by the individual making the entries. Language will be factual, objective, and free of personal opinions. At a minimum, the following information will be recorded, if applicable, during the collection of each sample;

- Sample ID number
- Sample location and description
- Sampler's name(s)
- Date and time of sample collection
- Type of sample (e.g., sediment)
- Field instrument readings and calibration
- Field observations and details related to analysis or integrity of samples (e.g., weather conditions, noticeable odors, colors, etc.)

- Preliminary sample descriptions
- Sample preservation

In addition to sampling information, the following specific information may also be recorded in the field logbook for each day of sampling:

- Team members and their responsibilities
- Time of arrival on site and time of departure
- Other personnel on site
- A summary of any meetings or discussions with any potentially responsible parties, or representatives of any federal, state, or other regulatory agency
- Deviations from sampling plans, site safety plans, and SAP procedures
- Changes in personnel and responsibilities as well as reasons for the change
- Levels of safety protection
- Calibration information for equipment used on site
- Record of photographs

8.1.2 Photographs

Photographs will be taken at the sampling locations and at other areas of interest on site. They will serve to verify information entered in the field logbook. When a photograph is taken, the following information will be written in the logbook or will be recorded in a separate field photography log:

- Time, date and location
- Description of the subject photographed
- Name of person taking the photograph

8.2 Sample Nomenclature

A unique, identifiable name will be assigned to each sample. The prefix "JF" will be used to identify the Jalk Fee site. The prefix "CHT" will be used to identify the CHT site. The next number will identify the sampling location (see Figure 4-1). The abbreviations S and GW will be used to identify soil and groundwater samples, respectively. For soil samples, a numbered suffix will be added to identify the sample depth. Thus, "JF-1-S5" will refer to the 5-foot bgs soil sample collected from location one on the Jalk Fee site. Duplicate and blank samples will be assigned fictitious names. The USEPA Regional Sample Control Coordinator may assign additional sample numbers.

8.3 Container, Preservation, and Holding Time Requirements

All sample containers used will have been delivered to WESTON in a pre-cleaned condition. Container, preservation, and holding time requirements are summarized in Tables 5-1 through 5-5.

8.4 Sample Labeling, Packaging and Shipping

All samples collected will be labeled in a clear and precise way for proper identification in the field and for tracking in the laboratory. Sample labels will be affixed to the sample containers and secured with clear tape. Samples will have preassigned, identifiable and unique numbers in accordance with Section 8.1. The sample labels will contain the following information where appropriate:

- Sample number
- Sample location
- Date and time of collection
- Site name
- Analytical parameter and method of preservation
- CLP Case Number (if applicable)

Sample coolers will be retained in the custody of site personnel at all times or secured so as to deny access to anyone else. The procedures for shipping samples are as follows:

- The bottom of the cooler will be lined with bubble wrap to prevent breakage during shipment.
- Screw caps will be checked for tightness.
- Containers will have custody seals affixed so as to prevent opening of the container without breaking the seal.
- All glass sample containers will be wrapped in bubble wrap.
- All containers will be sealed in zip-lock plastic bags.

All samples will be placed in coolers with the appropriate chain-of-custody forms. All forms will be enclosed in plastic bags and affixed to the underside of the cooler lid. Empty space in the cooler will be filled with bubble wrap or styrofoam peanuts to prevent movement and breakage during shipment. Each ice chest will be securely taped shut with strapping tape, and custody seals will be affixed to the front, right, and back of each cooler.

Samples will be shipped for immediate delivery to the contracted laboratory. The USEPA QAO's Region IX Regional Sample Control Coordinator (Carl Brickner (415) 972-3814) will be notified daily of the sample shipment schedule and will be provided with the following information:

- Sampling contractor's name
- The name of the site
- Case number
- Shipment date and expected delivery date
- Total number of samples by matrix, and relative level of contamination (i.e., low, medium, or high)
- Carrier, air bill number(s), and method of shipment (e.g., priority)
- Irregularities or anticipated problems associated with the samples
- Whether additional samples will be sent, if this is the last shipment

8.5 Chain of Custody Forms and QA/QC Summary Forms

A chain of custody form will be maintained for all samples to be submitted for analysis, from the time the sample is collected until its final deposition. Every transfer of custody must be noted and signed for; a copy of this record is kept by each individual who has signed. Corrections on sample paperwork will be made by drawing a single line through the mistake and initialing and dating the change. The correct information will be entered above, below, or after the mistake. When samples are not under the direct control of the individual responsible for them, they must be stored in a locked container sealed with a custody seal. The chain of custody must include the following:

- Sample identification numbers
- Site name
- Sample date
- Number and volume of sample containers
- Required analyses
- Signature and name of samplers
- Signature(s) of any individual(s) with control over samples
- Airbill number
- Note(s) indicating special holding times and/or detection limits

For samples that will be sent through the CLP Analytical Services Program, inorganic traffic reports will be used to document sample collection and shipment to a laboratory for analysis. One form will be completed and sent with the samples for each laboratory and each shipment. If all sample information cannot be entered in one form, then multiple forms will be used. The top copy of the form will be sent to the EPA QAO, the second copy will be sent to Contract Laboratory Analytical Services Support, and the remaining copies will accompany the samples to the laboratory. Upon completion of sampling, a photocopy of the traffic reports will be sent to USACE. A photocopy of the original will also be made for WESTON's master file.

A QA/QC summary form will be completed for each laboratory and each matrix of the sampling event. The sample number for all blanks, reference samples, laboratory QC samples (MS/MSDs) and duplicates will be documented on this form. This form is not sent to the laboratory. The original form will be sent to the EPA QAO; a photocopy of the original will be made for WESTON's master file.

The document titled "*Instructions for Sample Shipping and Documentation*," Quality Assurance Management Section, USEPA Region IX, November 1997, will be taken to the field as a reference. This document is included in Appendix D.

9.0 QUALITY ASSURANCE AND CONTROL (QA/QC)

9.1 Field Quality Control Samples

The QA/QC samples described in the following subsections, which are also listed in Tables 5-1 through 5-5, will be collected during this investigation.

9.1.1 Assessment of Field Contamination (Blanks)

9.1.1.1 Equipment Blanks

Equipment rinsate blanks will be collected to evaluate field sampling and decontamination procedures by pouring organic-free High Performance Liquid Chromatography (HPLC) over the decontaminated sampling equipment. One equipment rinsate blank will be collected per day for each piece of sampling equipment that is decontaminated in the field. Equipment rinsate blanks will be obtained by passing water through or over the decontaminated sampling devices used that day. The rinsate blanks that are collected will be analyzed for cyanide via CLPAS ILM05.2 and for VOCs via CLPAS OLC03.2, as indicated in Table 5-1.

The equipment blanks will be preserved, packaged, and sealed in the manner described for the groundwater samples in Section 6.2. A separate sample number will be assigned to each sample, and it will be submitted blind to the laboratory.

9.1.1.2 Temperature Blanks

For each cooler that is shipped or transported to an analytical laboratory, a 40-mL vial of deionized water will be included that is marked "temperature blank." This blank will be used by the sample custodian to check the temperature of samples upon receipt.

9.1.2 Assessment of Sample Variability (Field Duplicate or Co-located Samples)

Duplicate soil and groundwater samples will be collected at the sample locations indicated in Tables 5-1 and 5-2, and in Figure 4-1. Theses locations have been selected because they are beneath the former vapor degreaser and may have detectable concentrations of AOCs.

When collecting duplicate water samples, bottles with the two different sample identification numbers will be alternated in the filling sequence. Soil samples to be analyzed for cyanide will be homogenized in a sample-dedicated zip-lock bag. Homogenized material will then be transferred to 4 oz. glass jars . Duplicate soil samples for VOC analysis will not be homogenized. Equivalent EnCore samples will be collected from the sample sleeve immediately after the collection of the original samples.

Duplicate samples will be preserved, packaged, and sealed in the same manner described for the groundwater samples in Section 6.2. A separate sample number will be assigned to each duplicate, and it will be submitted blind to the laboratory.

9.2 Background Samples

Background soil and groundwater samples will be collected upgradient of the site to differentiate between on-site and off-site contributions to contamination. Background samples indicated in Tables 5-1 and 5-2 will be collected from the locations shown in Figure 4-1. Background samples will be analyzed by the methods indicated in Tables 5-1 and 5-2.

To determine background concentrations of the AOCs in soil, samples JF-1-5 and JF-1-15 will be collected at 5 and 15 feet bgs, respectively. According to site historical information, chlorinated solvents were not used in this area, and were not detected in soils during previous sampling events. Groundwater sample JF-1-GW will be collected hydraulically upgradient of both the Jalk Fee and CHT sites. This location will establish background levels of the AOCs for the area of contamination on the southeast portion of the Jalk Fee site. Groundwater sample JF-2-GW will be located on the Jalk Fee property immediately upgradient of the location of the former CHT degreaser, to establish background levels of AOCs for that area.

9.3 Laboratory Quality Control Samples

A laboratory QC sample is not an extra sample; rather, it is a sample that requires additional QC analyses.

A double volume groundwater sample will be collected at one assigned location to ensure that sufficient volume is collected for both routine sample analysis and additional laboratory QC analysis. Two sets of water sample containers will be filled and all containers labeled with a single sample number.

Soil samples for laboratory QC purposes will be obtained by collecting two additional EnCore samples from a co-located location in the same way as the original samples. The additional EnCore samples will be assigned the same sample number as the original sample. The 4 oz. soil sample for cyanide analysis contains sufficient volume for both routine sample analysis and additional laboratory QC analyses. Therefore, a separate soil sample for laboratory QC purposes for the cyanide analyses will not be collected.

For this sampling event, the samples collected at the locations indicated in Tables 5-1 and 5-2 will be the designated laboratory QC samples. These locations were chosen because they are beneath the former vapor degreaser and are suspected to contain detectable levels of AOCs. The sample labels and chain-of-custody records for these samples will identify them as a laboratory QC samples. At a minimum, one sample per 20 samples, per matrix, will be designated as a laboratory QC sample.

9.4 Analytical and Data Package Requirements

It is required that all samples be analyzed in accordance with the methods listed in Tables 5-1 and 5-2. The laboratory is required to supply documentation to demonstrate that their data meet the requirements specified in the method.

The data validation package shall include all original documentation generated in support of this project. In addition, the laboratory will provide original documentation to support that all requirements of the methods have been met. This includes, but is not limited to, sample tags, custody records, shipping information, sample preparation/extraction records, and instrument printouts such as mass spectra. Copies of information and documentation required in this document are acceptable. The following deliverables are required. Note that the following data requirements are included to specify and

emphasize general documentation requirements and are not intended to supersede or change requirements of each method.

- Title and signature page certifying the laboratory report.
- Table of contents for ease of locating sections.
- Copy of the chain of custody, sample log-in records, and a Case Narrative describing the analyses and methods used and discussing the presence or any interferences, the criteria used to identify tentatively identified compounds (TICs), and the failure of the lab to meet any of the requirements or re-analyses.
- Analytical data (results) up to 3 significant figures for all samples, method blanks, MS/MSD, Laboratory Control Samples (LCS), duplicates, and field QC samples.
- QC summary sheets: USEPA CLP forms that summarize the following
  1. MS/MSD/LCS recovery summary
  2. Method/preparation blank summary
  3. Initial and continuing calibration summary (including retention time windows)
  4. Sample holding time and analytical sequence (i.e., extraction and analysis)
  5. Calibration curves and correlation coefficients
  6. Duplicate summary
  7. Detection limit information
- Analyst bench records describing dilution, weighing of samples, percent moisture (solids), sample size, sample extraction and cleanup, final extract volumes and amount injected.
- Detailed explanation of the quantitation and identification procedure used for specific analyses, giving examples of calculations from the raw data.
- The final deliverable report will consist of sequentially numbered pages.
- Internal/surrogate recoveries
- Gas Chromatograph/Mass Spectrometer (GC/MS) tuning conditions.
- Reconstructed ion current chromatogram and quantitation reports for all sample standards, blanks, MS/MSD, and PE samples.
- For every compound identified and each field sample, provide raw versus enhanced spectra and enhanced versus reference spectra.
- For target analytes, the reference spectrum shall be the check standard for that sample. For TICs, the reference mass spectrum shall be the best fit spectrum from a search of the spectral library.
- Confirmation analysis data - second column confirmation required for all TICs. Provide all associated raw data and summary sheets for the confirmation analyses.

9.5 Data Validation

Data validation of analytical data generated by the CLP will be performed by the USACE QAO in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*. Tier 3 traditional full validation for all data will be required.

To meet requirements for categorization as definitive data, the following criteria will be evaluated:

- Holding times
- Sampling design approach
- Blank contamination
- Initial and continuing calibration
- Detection limits
- Analyte identification and quantitation
- Matrix spike recoveries
- Performance evaluation samples when specified
- Analytical and total error determination
- Laboratory Control Samples.

Upon completion of validation, data will be classified as one of the following: acceptable for use without qualifications, acceptable for use with qualifications, or unacceptable for use.

9.6 Field Variances

As conditions in the field may vary, it may become necessary to implement minor modifications to this plan. When appropriate, the USEPA QAO and USACE QAO will be notified of the modifications and a verbal approval obtained before implementing the modifications. Modifications to the original plan will be documented in the final report.

9.7 Assessment of Project Activities

9.7.1 WESTON Assessment Activities

The following assessment activities will be performed by WESTON:

- All project deliverables (SAP, Data Summaries, Data Validation Reports, Investigation Report) will be peer-reviewed prior to release to the USEPA and USACE. In time-critical situations, the peer review may be concurrent with the release of a draft document. Errors discovered in the peer review process will be reported by the reviewer to the originator of the document, who will be responsible for corrective action.
- The WESTON QA Officer will review project documentation (logbooks, chain of custody forms, etc.) to ensure the SAP was followed and that sampling activities were adequately documented. The QA Officer will document deficiencies and the PM will be responsible for corrective actions.

9.7.2 USEPA Assessment Activities

USEPA assessment activities, which can include surveillance, management system reviews, readiness reviews, technical system audits, performance evaluation, and audits and assessments of data quality, have not been formally identified to WESTON by the USEPA at the time of completion of the SAP.

9.7.3 Project Status Reports to Management

It is standard procedure for the WESTON PM to report to the USEPA SAM any issues, as they occur, that arise during the course of the project that could affect data quality, data use objectives, the project objectives, or project schedules.

9.7.4 Reconciliation of Data with DQOs

Assessment of data quality is an ongoing activity throughout all phases of a project. The following outlines the methods to be used by WESTON for evaluating the results obtained from the project.

- Review of the DQO outputs and the sampling design will be conducted by the WESTON QA Officer, the USEPA QAO, and the USACE QAO prior to sampling activities. The reviewer will submit comments to the WESTON PM for action, comment, or clarification. This process will be iterative.
- A preliminary data review will be conducted by WESTON. The purpose of this review is to look for problems or anomalies in the implementation of the sample collection and analysis procedures and to examine QC data for information to verify assumptions underlying the DQOs and the SAP. When appropriate to sample design, basic statistical quantities will be calculated and the data will be graphically represented.
- When appropriate to the sample design and if specifically tasked to do so by the USEPA SAM, WESTON will select a statistical hypothesis test and identify assumptions underlying the test.
- When appropriate to the sample design and if specifically tasked to do so by the USEPA SAM, WESTON will examine the underlying assumptions of the statistical hypothesis test in light of the environmental data. This will be accomplished by determining the approach for verifying assumptions, performing tests for assumptions, and determining corrective actions.

10.0 REFERENCES

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Continental Heat Treating (CHT), Consolidated Contingency Plan, Revised June 9, 1999.

Department of Toxic Substances Control (DTSC), Preliminary Assessment, Continental Heat Treating, June 27, 2001.

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LACFD, letter to J. E. Ross, Los Angeles Regional Water Quality Control Board re: Continental Heat Treating, June 3, 1997.

LADHS, Notice of Violation, March 16, 1984.

LADHS, Inspection Worksheet, 1989.

McLaren/Hart Environmental Engineering Corporation, Site Assessment Report and Remedial Action Plan, October 10, 1997.

Mobil Exploration & Producing U.S. Inc., Letter to Santa Fe Springs Fire Department Environmental Protection Division, September 30, 1993.

California Regional Water Quality Control Board, Los Angeles Region (RWQCB), Review of Unsaturated Soil Remediation System Installation Workplan - Continental Heat Treating, January 24, 2002.

City of Santa Fe Springs (SFS), Memorandum from Dave Edmondson about Continental Heat Treating Corporation, December 5, 1968.

SFS, Industrial Waste Disposal Permit No. 4365, January 20, 1970.

City of Santa Fe Springs Certified Unified Program Agency (SFSCUPA), Hazardous Waste Generator, Continental Heat Treating, Inc., September 1, 2000.

Santa Fe Springs Fire Department (SFSFD), Environmental Protection Division, Investigation Worksheet and Notice of Violation, August 18, 1987.

SFSFD, Environmental Protection Division, Investigation Worksheet, October 5, 1987.

SFSFD, Environmental Protection Division, Investigation Worksheet and Notice of Violation, February 23, 1988.

SFSFD, letter to James E. Stull, President, Continental Heat Treating, Subject: Request for Clean Closure Letter, September 12, 1997.

SFSFD, Notice of Violation and Order to Comply, issued to Continental Heat Treating, February 11, 1999.

APPENDIX A

COORDINATION SHEET

COORDINATION SHEET FOR: Continental Heat Treating

	EPA	USACE	Contractor
Who will write SAP/SAP Addendum?			X
Which agency will be reviewing the SAP/SAP Addendum?		X	
Which agency will coordinate and resolve SAP/SAP Addendum?		X	
Which agency will perform the lab audits?		X	
Which agency will perform the field audits? (In conjunction with the SAM)		X	
Which agency will coordinate primary analysis? (See RSCC Form)	X		
Will USACE perform QA analysis? (circle one) yes / (no)	-----	----------	----------
Which agency will perform the primary data review and validation?		X	
Which agency will perform corrective actions? (if necessary)		X	

Approved by: _____ EPA SAM Date: 10/2/02
Mr. M. Mitguard

Approved by: _____ USACE PM Date: 7 OCT 02
Mr. D. McMindes

Approved by: _____ USACE QA Officer Date: 10/8/02
Mr. J. Esparza

Approved by: _____ EPA QA Manager Date: 9-10-02
Mr. V. Fong

APPENDIX B

DATA QUALITY OBJECTIVE WORKSHEET

Data Quality Objective Process Worksheet

1. **State the Problem** - Summarize the contamination problem that will require new environmental data, and identify the resources available to resolve the problem.

Planning Team:
Matt Mitguard, USEPA
Dan McMindes, USACE
Tom Kellogg, USACE
Christina Castellana, Weston Solutions, Inc.

Matt Mitguard of the USEPA is the primary decision maker of the scoping team.

Problem: The Continental Heat Treating (CHT) site, located at 10643 Norwalk Boulevard, occupies approximately 1.5 acres in an industrial area. CHT is bordered to the north by the Jalk Fee property. CHT began operations as a heat treating facility in approximately 1969. In 1968, the heat-treating process consisted of immersion of steel parts in a molten cyanide salt bath followed by brine quenching and cleaning. Wastewater from the disposal of spent brine quench tank and alkaline cleaning tank solutions originally drained to city sewers. After the presence of 938 ppm cyanide was detected in wastewater during a city inspection, the city of Santa Fe Springs required CHT to pretreat the brine quench tank solution before disposal. Numerous violations were issued to CHT for failure to maintain the wastewater treatment system. Cyanide is no longer used on site, though there is evidence for its use at least through 1984. Soils and groundwater in the site vicinity have not been analyzed for the presence of cyanide.

CHT used solvents such as trichloroethene (TCE) and tetrachloroethene (PCE) in the degreasing process from at least 1984 through approximately 1995. The solvents were used in a degreasing unit located near the northern boundary of the site. The degreasing unit has since been moved. Soil and soil gas sampling results in the vicinity of the degreaser showed the presence of TCE and PCE from the surface to 60 feet below ground surface (bgs), where groundwater is located. TCE and PCE have also been detected on the Jalk Fee site, in soils and groundwater immediately adjacent to the CHT site boundary. CHT and Jalk Fee site owners are both arguing that the other site is responsible for soil and groundwater contamination.

Available Resources:
Use of USEPA CLP or Region ix laboratories. All work and reporting should be completed by February 28, 2003. Work for this site will be performed simultaneously with work for the adjacent Jalk Fee site.

2. **Identify the Decision** - Identify the decision that requires new environmental data to address the contamination problem.

Principal Study Questions:
Can an observed release of chlorinated solvents or cyanide from the site to groundwater be established? Can the presence of hazardous substances in the source be documented?

Define the alternative actions that could result from the resolution of the principal study question:

a) The site could be added to the National Priorities List through the HRS process;
b) No further action could occur at the site.

Decision Statement: If groundwater samples are found to be contaminated with any chlorinated solvents or cyanide above the corresponding action levels, an observed release will be documented and integrated into the site's HRS score. If source materials or site soils are found to be contaminated by chlorinated solvents or cyanide, then the presence of hazardous substances in the source will be documented.

3. **Identify Inputs to the Decision** - Identify the information needed to support the decision, and specify which inputs require new environmental data.

Information required to resolve the decision statement: Definitive laboratory analysis of volatile organic compounds (VOCs) and cyanide in background and downgradient groundwater. Definitive laboratory analysis of VOCs and cyanide in source materials (site soils).

Source(s) for information: Data sources will be limited to this sampling event. Existing data produced by others do not meet HRS quality assurance/quality control requirements.

Information needed to establish action levels: The action levels for groundwater dictated by the HRS for this investigation are three times the background concentrations of individual VOCs and cyanide found in groundwater beneath and downgradient from the site. Action levels for soils will be residential and industrial PRGs. In addition, soils will be compared with background concentrations since the site is in an industrial area where solvents have been used extensively over the years.

Confirm that measurement methods exist to provide data:
CLPAS method OLC03.2 for low-concentration organics. CLPAS ILM04.1 for cyanide.

4. **Define the Study Boundaries** - Specify the spatial and temporal aspects of the environmental media that the data must represent to support the decision.

Specific characteristics that define population being studied: Concentrations of VOCs and cyanide in site groundwater and soils.

Spatial boundary of decision statement: Groundwater immediately upgradient and downgradient of the site, as well as site soils.

Temporal boundary of decision statement: The data will represent the conditions of contaminant leaching into groundwater in the forseeable future.

When to collect samples: No practical constraints.

Practical constraints on data collection: No practical constraints.

5. **Develop a Decision Rule** - Develop logical "if...then" statements that define the conditions that would cause the decision maker to choose among alternative actions.

Statistical parameter that characterizes a population: Each analytical result, not statistical parameter, will be evaluated against the action levels.

Specify the action level(s) for the study: The action levels dictated by the HRS for this investigation are three times the background concentrations of individual VOCs and cyanide found in groundwater samples collected downgradient of the site.

Decision Rules:

a) If groundwater samples are found to contain concentrations of individual VOCs or cyanide of at least three times the background concentration, then an observed release will be documented and integrated into the Site's HRS score.

b) If source materials (site soils) are found to be contaminated by VOCs or cyanide, then the presence of hazardous substances in the source will be documented and integrated into the Site's HRS score.

6. **Specify the Limits on Decision Errors** - Specify the decision makers acceptable limits on decision errors, which are used to establish performance goals for limiting uncertainty in the data.

Use of biased sampling points precludes statistical determination of limits on decision errors. Measurement error, rather than sampling error, is deemed to be the primary factor affecting any decision error. Validated, definitive data will be required to limit measurement error. Sampling error will be limited to the extent practicable by following approved USEPA methods and applicable SOPs. Sampling error and tolerable limits cannot be quantified.

7. **Optimize the Design for Obtaining Data** - Identify the most resource-effective sampling and analysis design for generating data that are expected to satisfy the DQOs.

One goal of the sampling event is to establish whether an observed release to the drinking water aquifer has occurred. Groundwater samples will be collected upgradient and downgradient of the site to fulfill this goal.

The second goal of this sampling event is to document the presence of hazardous substances in the source. Site soils will be sampled to satisfy this goal.

APPENDIX C

SITE SPECIFIC HEALTH & SAFETY PLAN

SITE HEALTH AND SAFETY PLAN (HASP)-FORM 1

Prepared by: Christina Castellana	**W.O. Number:** 20074.025.066 20074.025.069 **Date:** November 18, 2002
Project Identification Office: Sherman Oaks, CA Site Name: Continental Heat Treating/ Jalk Fee Client: USACE/USEPA Work Location Address: 10607 & 10643 South Norwalk Blvd., Santa Fe Springs, CA	**Site History:** Since the late 1960s, the Continental Heat Treating site has been used for heat treating metal surfaces. Cyanide and chlorinated solvents were used during operations. Soils and groundwater beneath the Continental Heat Treating and Jalk Fee sites have been shown to contain chlorinated solvents such as PCE and TCE.

Scope of Work:
The Scope of Work to be completed at this site may include, but is not limited to, an on-site and off-site reconnaissance, and on-site soil and groundwater sampling.

☐ Site visit only; site HASP not necessary. List personnel here and sign off below:

Regulatory Status:

Site regulatory status:

CERCLA/SARA	RCRA	Other Federal Agency
☒ U.S. EPA	☐ U.S. EPA	☐ DOE
☐ State	☐ State	☒ USACE
☐ NPL Site	NRC	☐ Air Force
☐ OSHA	☐ 10 CFR 20	☐ _____

Hazard Communication (Req'd See Attachment D)
☒ 1910 ☒ 1926 ☐ State

X Safety Officer Manual (Required to be On-Site)
Based on the Hazard Assessment and Regulatory Status, determine the Standard HASP(s) applicable to this project. Indicate below which Standard HASP will be used and append the appropriate pages of this form along with the Standard Plan.

☐ Stack Test	☐ _____
☐ Air Emissions	☐ _____
☐ Asbestos	☐ _____
☐ Industrial Hygiene	☐ _____
☐ _____	☐ _____

Review and Approval Documentation:

Reviewed by:
SO/DSM/CHS _____ Date: _____
Name (Print) Signature

Approved by:
Project Manager Christina Castellana Date: _____
Name (Print) Signature

Hazard Assessment and Equipment Selection:

In accordance with WESTON's Personal Protective Equipment Program and 29 CFR 1910.132, at the site prior to personnel beginning work, the SHSC and/or the Site Manager have evaluated conditions and verified that the personal protective equipment selection outlined within this HASP is appropriate for the hazards known or expected to exist. (Refer to Safety Officer Manual Section 2, Personal Protection Program, for guidance.)

☐ SHSC ☒ Site Manager Christina Castellana Date: _____
Name (Print) Signature

Project start date: 1/13/03 End date: 01/31/03	This site HASP **must** be **reissued/reapproved** for any activities conducted after: Date: 01/31/03	Amendment date(s) By: 1. 2.

WESTON REPRESENTATIVES-FORM 2

Organization/Branch	Name/Title	Address	Telephone
WESTON/Seattle	Frank Monahan Program Manager	190 Queen Anne Ave, North Suite 200 Seattle, WA 98109-4927	(206) 521-7600
WESTON/Sherman Oaks	Christina Castellana Project Manager/ Field Sampling QC Coordinator	14724 Ventura Blvd. Suite 1000 Sherman Oaks, CA 91403	(818) 382-1811
WESTON/Sherman Oaks	Amanda K. Cohan Field Assistant	14724 Ventura Blvd. Suite 1000 Sherman Oaks, CA 91403	(818) 382-1818
WESTON/Sherman Oaks	Anitra Blanco Field Assistant	14727 Ventura Blvd. Suite 1000 Sherman Oaks, CA 91403	(818) 382-1815

Roles and Responsibilities: The Project Manager is responsible for project management of the PA/SI work assignment. The Field Sampling QC Coordinator is responsible for making sure that field QC requirements are met during the sampling event. The Field Manager is responsible for completion of the technical and field activities associated with the Seam Master Industries site.

WESTON SUBCONTRACTORS

Organization/Branch	Name/Title	Address	Telephone
To be determined.			

Roles and Responsibilities: Operate the CPT rig for soil and groundwater sampling, under WESTON direction.

SITE-SPECIFIC HEALTH AND SAFETY PERSONNEL

The Site Health and Safety Coordinator (SHSC) for activities to be conducted at this site is: Bill Clarke

The SHSC has total responsibility for ensuring that the provisions of this Site HASP are adequate and implemented in the field.

Changing field conditions may require decisions to be made concerning adequate protection programs. Therefore, the personnel assigned as SHSCs are experienced and meet the additional training requirements specified by OSHA in 29 CFR 1910.120.

Qualifications: 40-Hour HAZWOPER, current 8-Hour HAZWOPER Refresher, First Aid, CPR, BBP

Designated alternates include: Mark Dominick

The Dangerous Goods Shipper for activities to be conducted at this site is: _____

☒ Dangerous Goods Shipping not required for this site because only environmental samples will be shipped.

Qualifications: 40-Hour HAZWOPER, current 8-Hour HAZWOPER Refresher, Dangerous Goods Shipping

Designated alternates include:

The Environmental Compliance Officer (ECO) for activities to be conducted at this site is: __

The ECO has total responsibility for ensuring that the provisions of the Site EC Plan are adequate and implemented in the field.

Qualifications: Hazardous Waste Management & Shipping for Environmental Professionals

Designated alternates include:

HEALTH AND SAFETY EVALUATION-FORM 3

Hazard Assessment

Background Review: ☐ Complete ☒ Partial

If partial why? The contaminant source areas on-site and the contaminant migration have not been fully characterized. The HASP will be amended to include hazards noted during the site reconnaissance, if necessary.

Activities Covered Under This Plan:

No.	Task/Subtask	Description	Schedule
1	Borings will be drilled for soil and groundwater sampling. Sampling material in sump.	3 borings will be approximately 6 feet bgs each, and 6 boring will be approximately 65 feet deep. Depending on the boring location, groundwater and/or soil samples will be collected. If residue is present in the sump, then sample will be collected for analysis.	Tentatively beginning the week of Sept. 9, 2002

Types of Hazards:

1 Number refers to one of the following hazard evaluation forms. Complete hazard evaluation forms for each appropriate hazard class.

Physiochemical 1

- ☐ Flammable
- ☐ Explosive
- ☐ Corrosive
- ☐ Reactive
- ☐ O_2 Rich
- ☐ O_2 Deficient

Chemically Toxic 1

- ☒ Inhalation
- ☒ Ingestion
- ☒ Contact
- ☒ Absorption
- ☐ Carcinogen
- ☐ Mutagen
- ☐ Teratogen
- ☐ OSHA 1910.1000 Substance (Air Contaminants)
- ☒ OSHA Specific Hazard Substance Standard (Refer to following page for listing)

Radiation 3

Ionizing:

- ☐ Internal exposure
- ☐ External exposure

Non-ionizing:

- ☐ UV
- ☐ IR
- ☐ RF
- ☐ MicroW
- ☐ Laser

Biological 2

- ☐ Etiological Agent
- ☒ Other (plant, insect, animal)

☒ **Physical Hazards 4**

- ☒ Construction Activities

Source/Location of Contaminants and Hazardous Substances:

Directly Related to Tasks

- ☒ Air
- ☐ Other Surface
- ☒ Groundwater
- ☒ Soil
- ☐ Surface Water
- ☐ Sanitary Wastewater
- ☒ Process Wastewater
- ☐ Other Sediment

Indirectly Related to Tasks — Nearby Process(es) That Could Affect Team Members:

- ☐ Client Facility/WESTON Work Location
- ☐ Nearby Non-Client Facility

Describe:

- ☐ Have activities (task[s]) been coordinated with facility?

HEALTH AND SAFETY EVALUATION—CHEMICAL HAZARDS OF CONCERN-FORM 4 (REVISED 02/1998)

☐ N/A

Chemical Contaminants of Concern

Provide the data requested for chemical contaminants on HASP Form 25 or attach data sheets from an acceptable source such as NIOSH pocket guide, condensed chemical dictionary, ACGIH TLV booklet, etc. List chemicals and concentrations below and locate data sheets in Attachment B of this HASP.

Chemical Name	Concentration (if known)
Benzene	Unknown
1,1-dichloroethane	Unknown
1,1-dichloroethylene	Unknown
1,2-dichloroethane	Unknown
1,2-dichloropropane	Unknown
cis-1,2-dichloroethylene	Unknown
Tetrachloroethylene	Unknown
trans-1,2-dichloroethylene	Unknown
Trichloroethylene	Unknown
Vinyl Chloride	Unknown

☐ N/A

Identify hazardous materials used or on-site and attach Material Safety Data Sheets (MSDSs) for all reagent type chemicals, solutions, or other identified materials that in normal use in performing tasks related to this project could produce hazardous substances. Ensure that all subcontractors and other parties working nearby are informed of the presence of these chemicals and the location of the MSDSs. Obtain from subcontractors and other parties, lists of the hazardous materials they use or have on-site and identify location of the MSDSs here. List chemicals and quantities below and locate MSDSs in Attachment B of this HASP.

Chemical Name	Quantity
Isobutylene in air (compressed)	100 ppm x 0.5 kg
Hydrochloric Acid (preservative)	Approximately 51 preserved vials

OSHA-SPECIFIC HAZARDOUS SUBSTANCES

The following substances may require specific medical, training, or monitoring based on concentration or evaluation of risk. See the appropriate citation listed under 29 CFR 1910 or 1926 for additional information.

☐ 1910.1001 Asbestos	☐ 1910.1002 Coal tar pitch volatiles	☐ 1910.1003 4-Nitrobiphenyl, etc.	☐ 1910.1004 alpha-Naphthylamine
☐ 1910.1005 [Reserved]	☐ 1910.1006 Methyl chloromethyl ether	☐ 1910.1007 3,3'-Dichlorobenzidine (and its salts)	☐ 1910.1008 bis-Chloromethyl ether
☐ 1910.1009 beta-Naphthylamine	☐ 1910.1010 Benzidine	☐ 1910.1011 4-Aminodiphenyl	☐ 1910.1012 Ethyleneimine
☐ 1910.1013 beta-Propiolactone	☐ 1910.1014 2-Acetylaminofluorene	☐ 1910.1015 4-Dimethylaminoazobenzene	☐ 1910.1016 N-Nitrosodimethylamine
☒ 1910.1017 Vinyl chloride	☐ 1910.1018 Inorganic arsenic	☐ 1910.1025 Lead (Att. FLD# 46)	☐ 1910.1027 Cadmium
☒ 1910.1028 Benzene	☐ 1910.1029 Coke oven emissions	☐ 1910.1043 Cotton dust	☐ 1910.1044 1,2-Dibromo-3-chloropropane
☐ 1910.1045 Acrylonitrile	☐ 1910.1047 Ethylene oxide	☐ 1910.1048 Formaldehyde	☐ 1910.1050 Methylenedianiline
☐ 1910.1051 1,3 Butadiene	☐ 1910.1052 Methylene chloride		

HEALTH AND SAFETY EVALUATION — 2 BIOLOGICAL HAZARDS OF CONCERN-FORM 5

☐ **Poisonous Plants** (FLD 43)

Location/Task No(s).:
Source: ☐ Known ☐ Suspect
Route of Exposure: ☐ Inhalation ☐ Ingestion ☐ Contact ☐ Direct Penetration

Team Member(s) Allergic: ☐ Yes ☐ No
Immunization required: ☐ Yes ☐ No

☒ **Insects** (FLD 43)

Location/Task No(s).:
Source: ☐ Known ☒ Suspect
Route of Exposure: ☐ Inhalation ☐ Ingestion ☒ Contact ☒ Direct Penetration

Team Member(s) Allergic: ☐ Yes ☒ No
Immunization required: ☐ Yes ☒ No

☐ **Snakes, Reptiles** (FLD 43)

Location/Task No(s).:
Source: ☐ Known ☐ Suspect
Route of Exposure: ☐ Inhalation ☐ Ingestion ☐ Contact ☐ Direct Penetration

Team Member(s) Allergic: ☐ Yes ☐ No
Immunization required: ☐ Yes ☐ No

☐ **Animals** (FLD 43)

Location/Task No(s).:
Source: ☐ Known ☐ Suspect
Route of Exposure: ☐ Inhalation ☐ Ingestion ☐ Contact ☐ Direct Penetration

Team Member(s) Allergic: ☐ Yes ☐ No
Immunization required: ☐ Yes ☐ No

FLD 43 — WESTON Biohazard Field Operating Procedures: Att. OP ☐

☐ **Sewage**

Location/Task No(s).:
Source: ☐ Known ☐ Suspect
Route of Exposure: ☐ Inhalation ☐ Ingestion ☐ Contact ☐ Direct Penetration

Team Member(s) Allergic: ☐ Yes ☐ No
Immunization required: ☐ Yes ☐ No

Tetanus Vaccination within Past 10 yrs: ☐ Yes ☐ No

☐ **Etiologic Agents (List)**

Location/Task No(s).:
Source: ☐ Known ☐ Suspect
Route of Exposure: ☐ Inhalation ☐ Ingestion ☐ Contact ☐ Direct Penetration

Team Member(s) Allergic: ☐ Yes ☐ No
Immunization required: ☐ Yes ☐ No

FLD 44 — WESTON Bloodborne Pathogens Exposure Control Plan – First Aid Procedures: Att. OP ☒

FLD 45 — WESTON Bloodborne Pathogens Exposure Control Plan – Working with Infectious Waste: Att. OP ☐

HEALTH AND SAFETY EVALUATION — 3 RADIATION HAZARDS OF CONCERN-FORM 6 (REVISED 02/1998)

NONIONIZING RADIATION

Task No.	Type of Nonionizing Radiation	Source On-Site	TLV/PEL	Wavelength Range	Control Measures	Monitoring Instrument
1	Ultraviolet	Sun			Sunscreen, stay hydrated	
N/A	Infrared					
N/A	Radio Frequency					
N/A	Microwave					
N/A	Laser					

IONIZING RADIATION

Task No.	Radionuclide	Major Radiations	Radioactive Half-Life (Years)	DAC (µCii/mL)			Surface Contamination Limit	Monitoring Instrument
				D	W	Y		

HEALTH AND SAFETY EVALUATION — 4 PHYSICAL HAZARDS OF CONCERN-FORM 7

Phy. Haz. Cond.	Physical Hazard	Attach OP	WESTON OP Titles
Loud noise	Hearing loss/disruption of communication	☒	FLD01 - Noise Protection
Inclement weather	Rain/humidity/cold/ice/snow/lightning	☐	FLD02 - Inclement Weather
Steam heat stress	Burns/displaced oxygen/wet working surfaces	☐	FLD03 - Hot Process - Steam
Heat stress	Burns/hot surfaces/low pressure steam	☐	FLD04 - Hot Process - LT3
Ambient heat stress	Heat rash/cramps/exhaustion/heat stroke	☒	FLD05 - Heat Stress Prevention/Monitoring
Cold stress	Hypothermia/frostbite	☐	FLD06 - Cold Stress
Cold/wet	Trench/paddy/immersion foot/edema	☐	FLD07 - Wet Feet
Confined spaces	Falls/burns/drowning/engulfment/electrocution	☐	FLD08 - Confined Space Entry
Explosive vapors	Thermal burns/impaction/dismemberment	☐	FLD09 - Hot Work
Improper lifting	Back strain/abdomen/arm/leg muscle/joint injury	☒	FLD10 - Manual Lifting/Handling Heavy Objects
Uneven surfaces	Vehicle accidents/slips/trips/falls	☒	FLD11 - Rough Terrain
Poor housekeeping	Slips/trips/falls/punctures/cuts/fires	☒	FLD12 - Housekeeping
Structural integrity	Crushing/overhead hazards/compromised floors	☐	FLD13 - Structural Integrity
Hostile persons	Bodily injury	☐	FLD14 - Site Security
Remote area	Slips/trips/falls/back strain/communication	☐	FLD15 - Remote Area
Improper cyl. handling	Mechanical injury/fire/explosion/suffocation	☐	FLD16 - Pressure Systems - Compressed Gases
Water hazards	Poor visibility/entanglement/drowning/cold stress	☐	FLD17 - Diving
Water hazards	Drowning/heat/cold stress/hypothermia/falls	☐	FLD18 - Operation and Use of Boats
Water hazards	Drowning/frostbite/hypothermia/falls/electrocution	☐	FLD19 - Working Over Water
Vehicle hazards	Struck by vehicle/collision	☐	FLD20 - Traffic
Explosions	Explosion/fire/thermal burns	☐	FLD21 - Explosives
Moving mechanical parts	Crushing/pinch points/overhead hazards/electrocution	☒	FLD22 - Heavy Equipment Operation
Moving mech. parts	Overhead hazards/electrocution	☐	FLD23 - Cranes/Lifting Equipment Operation
Working at elevation	Overhead hazards/falls/electrocution	☐	FLD24 - Aerial Lifts/Manlifts
Working at elevation	Overhead hazards/falls/electrocution	☐	FLD25 - Working at Elevation
Working at elevation	Overhead hazards/falls/electrocution/slips	☐	FLD26 - Ladders
Working at elevation	Slips/trips/falls/overhead hazards	☐	FLD27 - Scaffolding
Trench cave-in	Crushing/falling/overhead hazards/suffocation	☐	FLD28 - Excavating/Trenching
Improper material handling	Back injury/crushing from load shifts	☐	FLD29 - Materials Handling
Physiochemical	Explosions/fires from oxidizing, flam./corr. material	☐	FLD30 - Hazardous Materials Use/Storage
Physiochemical	Fire and explosion	☐	FLD31 - Fire Prevention/Response Plan Required
Physiochemical	Fire	☐	FLD32 - Fire Extinguishers Required
Structural integrity	Overhead/electrocution/slips/trips/falls/fire	☐	FLD33 - Demolition
Electrical	Electrocution/shock/thermal burns	☒	FLD34 - Utilities
Electrical	Electrocution/shock/thermal burns	☐	FLD35 - Electrical Safety
Burns/fires	Heat stress/fires/burns	☐	FLD36 - Welding/Cutting/Burning
Impact/thermal	Thermal burns/high pressure impaction/heat stress	☐	FLD37 - High Pressure Washers
Impaction/electrical	Smashing body parts/pinching/cuts/electrocution	☒	FLD38 - Hand and Power Tools
Poor visibility	Slips/trips/falls	☐	FLD39 - Illumination
Fire/explosion	Burns/impaction	☐	FLD40 - Storage Tank Removal/Decommissioning
Communications	Disruption of communications	☐	FLD41 - Std. Hand/Emergency Signals
Energy/release	Unexpected release of energy	☐	FLD42 - Lockout/Tagout
General field work	Insects, plants, animals, snakes, reptiles (Haz. Eval. Form 2)	☒	FLD43 - Biological Hazards
Providing first aid	HBV, HIV (Haz. Eval. Form 2)	☐	FLD44 - BBP for First Aid Providers
Handling infectious waste	HBV, HIV (Haz. Eval. Form 2)	☐	FLD45 - BBP for Infectious Waste
Lead contaminated sites	Lead poisoning	☐	FLD46 - Control of Exposure to Lead
Puncture/cuts	Cuts/dismemberment/gouges	☐	FLD47 – Clearing, Grubbing and Logging Operations
Not applicable	Not applicable	☒	FLD48 – OSHA Inspections
Drilling hazards	Electrocution/overhead hazards/pinch points	☒	1.6 - Drilling Safety Guide

TASK-BY-TASK RISK ASSESSMENT-FORM 8
(COMPLETE ONE SHEET FOR EACH TASK)

TASK DESCRIPTION

TASK 1 –Advance approximately 9 borings via CPT rig to conduct groundwater and soil sampling. Sampling material in sump bottom, if possible.

EQUIPMENT REQUIRED/USED
(Be specific, e.g., hand tools, heavy equipment, instruments, PPE)

Hard hat	First Aid Kit	Sample coolers
Safety Boots	PID	Sample Containers
Hearing Protection	Logbook	Zip-Lock Bags
Protective Glasses	Direct Push Probe/	Trash Bags
Nitrile Surgical Gloves	Hollow Stem Auger	Paper Towels

POTENTIAL HAZARDS/RISKS

Chemical

☒ Hazard Present Risk Level: ☐ H ☐ M ☒ L

What justifies risk level? Potential risk to exposure to chlorinated solvents in groundwater and soils. Contaminant concentrations expected to be low in groundwater and soil. No respiratory hazard anticipated. Hazard from contact or absorption will be mitigated by using gloves and implementation of good housekeeping to minimize contact with soil and groundwater.

Physical

☒ Hazard Present Risk Level: ☐ H ☒ M ☐ L

What justifies risk level? Potential hazards include being struck by heavy equipment, and pinching/crushing, tripping/falling. Will observe and avoid heavy equipment and maintain eye contact with operator.

Biological

☒ Hazard Present Risk Level: ☐ H ☐ M ☒ L

What justifies risk level? The risk level is expected to be low as insects, such as spiders, may be present at sampling locations.

RADIOLOGICAL

☒ Hazard Present Risk Level: ☐ H ☐ M ☒ L

What justifies risk level? This risk is expected to be low as sun exposure is always an element in the field. Sunscreen will be used, as well as continuing to stay hydrated.

LEVELS OF PROTECTION/JUSTIFICATION

Level D, since no air pathway hazards are known or suspected in the breathing zone. If elevated monitoring instrument readings are observed, the team will withdraw immediately and reassess the situation.

SAFETY PROCEDURES REQUIRED AND/OR FIELD OPS UTILIZED

FLD01, FLD05, FLD10, FLD11, FLD12, FLD22, FLD34, FLD38, FLD43, FLD48, 1.6-Drilling Safety Guide. All field activities will be performed in accordance with the HASP and WESTON's standard operating procedures outlined in WESTON's Safety Officer Field Manual.

PERSONNEL PROTECTION PLAN-FORM 9 (REVISED 02/1998)

Engineering Controls

Describe Engineering Controls used as part of Personnel Protection Plan:

Task(s)

1 Air monitoring will be performed at each sampling location. Situate workers on upwind side of boring wherever possible.

Administrative Controls

Describe Administrative Controls used as part of Personnel Protection Plan:

Task(s)

1 An initial safety meeting will be held at the site before work starts. Work will be completed in accordance with this HASP under the supervision/guidance of the SHSC.

Personal Protective Equipment

Action Levels for Changing Levels of Protection. Refer to HASP Form 13, Site Air Monitoring Program—Action Levels. Define Action Levels for up or down grade for each task:

Task(s)

1 Level D. PID in breathing zone (BZ) 25 ppm or less above background—continue work in Level D. Consistent PID readings in BZ greater than 25 ppm above background that do not dissipate—stop work. Requires Level B, personal protection.

DESCRIPTION OF LEVELS OF PROTECTION

Level D		Level D Modified
Task(s): All		**Task(s): All**
☒ Head	Hard Hat	☐ Head
☒ Eye and Face	Safety glasses	☐ Eye and Face
☒ Hearing	Earplugs as necessary	☐ Hearing
☐ Arms and Legs Only		☐ Arms and Legs Only
☐ Appropriate Work Uniform	Coveralls, or appropriate clothing	☐ Whole Body
☒ Hand - Gloves	Nitrile	☐ Apron
☒ Foot - Safety Boots	Steel Toe	☐ Hand - Gloves
☐ Fall Protection		☐ Gloves
☐ Flotation		☐ Foot - Safety Boots
☐ Other		☐ Over Boots

DESCRIPTION OF LEVELS OF PROTECTION-FORM 10

Level C	Level B
Task(s): All	**Task(s):**
☐ Head	☐ Head
☐ Eye and Face	☐ Eye and Face
☐ Hearing	☐ Hearing
☐ Arms and Legs Only	☐ Arms and Legs Only
☐ Whole Body	☐ Whole Body
☐ Apron	☐ Apron
☐ Hand - Gloves	☐ Hand - Gloves
☐ Gloves	☐ Gloves
☐ Gloves	☐ Gloves
☐ Foot - Safety Boots	☐ Foot - Safety Boots
☐ Outer Boots	☐ Outer Boots
☐ Boots (Other) _____	☐ Boots (Other) _____
☐ Half Face	☐ SAR - Airline
☐ Cart./Canister	☐ SCBA
☐ Full Face	☐ Comb. Airline/SCBA
☐ Cart./Canister	☐ Cascade System
☐ PAPR	☐ Compressor
☐ Cart./Canister	☐ Fall Protection
☐ Type C	☐ Flotation
☐ Fall Protection	☐ Other
☐ Flotation	
☐ Other	

SITE OR PROJECT HAZARD MONITORING PROGRAM-FORM 11

Air Monitoring Instruments

Instrument Selection and Initial Check Record

Reporting Format: ☒ Field Notebook ☐ Field Data Sheets* ☐ Air Monitoring Log ☐ Trip Report ☐ Other

Instrument	Task No.(s)	Number Required	Number Received	Checked Upon Receipt	Comment	Initials
☐ CGI				☐		
☐ O_2				☐		
☐ CGI/O_2				☐		
☐ CGI/O_2/tox-PPM, H_2S,H_2S/CO				☐		
☐ RAD				☐		
☐ GM (Pancake)				☐		
☐ NaI (Micro R)				☐		
☐ ZnS (Alpha Scintillator)				☐		
☐ Other _____				☐		
☒ PID	1			☐		
☐ HNu 10.2				☐		
☐ HNu 11.7				☐		
☐ Photovac, TMA				☐		
☐ OVM				☐		
☐ Other _____				☐		
☐ FID				☐		
☐ Fox 128				☐		
☐ Heath, AID, Other				☐		
☐ RAM, Mini-RAM, Other _____				☐		
☐ Monitox				☐		
Specify: _____				☐		
☐ Personal Sampling				☐		
Specify: _____				☐		
☐ Bio-Aerosol Monitor				☐		
☐ Pump - MSA, Dräeger, Sensidyne				☐		
☐ Tubes/type: _____				☐		
☐ Tubes/type: _____				☐		
☐ Other _____				☐		

*Refer to Attachment E.

SITE OR PROJECT HAZARD MONITORING PROGRAM-FORM 12

Air Monitoring Instruments Calibration Record

Instrument, Mfg., Model, Equip. ID No.	Date	Time	Calib. Material	Calib. Method Mfg.'s	Other	Initial Setting and Reading	Final Setting and Reading	Calibrator's Initials

SITE AIR MONITORING PROGRAM-FORM 13

Action Levels

These Action Levels, if not defined by regulation, are some percent (usually 50%) of the applicable PEL/TLV/REL. That number must also be adjusted to account for instrument response factors.

	Tasks	Action Level		Action
☐ **Explosive atmosphere**		Ambient Air Concentration	Confined Space Concentration	
		<10% LEL	0 to 1% LEL	Work may continue. Consider toxicity potential.
		10 to 25% LEL	1 to 10% LEL	Work may continue. Increase monitoring frequency.
		>25% LEL	>10% LEL	Work must stop. Ventilate area before returning.
☐ **Oxygen**		Ambient Air Concentration	Confined Space Concentration	
		<19.5% O_2	<19.5% O_2	Leave area. Re-enter only with self-contained breathing apparatus.
		19.5% to 25% O_2	19.5% to 23.5% O_2	Work may continue. Investigate changes from 21%.
		>25% O_2	>23.5% O_2	Work must stop. Ventilate area before returning.
☐ **Radiation**		< 3 times background		Continue work.
		3 times background to < 1 mR/hour		Radiation above background levels (normally 0.01-0.02 mR/hr) signifies possible radiation source(s) present. Continue investigation with caution. Perform thorough monitoring. Consult with a Health Physicist.
		> 1 mrem/hour		Potential radiation hazard. Evacuate site. Continue investigation only upon the advice of Health Physicist.
☒ **Organic gases and vapors**	1	PID readings in breathing zone (BZ) <= 1 ppm unit above background.		Continue working in Level D.
		PID readings in BZ consistently > 1 ppm unit above background that do not dissipate.		Cease work.
☒ **Inorganic gases, vapors, and particulates**	1	Negligible visible dust.		Continue working in Level D.
		Visible dust that does not dissipate.		Cease work.

CONTINGENCIES-FORM 14

Emergency Contacts and Phone Numbers

Agency	Contact	Phone Number
Local Medical Emergency Facility (LMF)	St. Francis Medical Center	(310) 603-6000
WESTON Medical Emergency Contact	Dr. Elyane Theriault	1-800-229-3674
WESTON Health and Safety	Corporate Health and Safety	(610) 701-3000
Fire Department	911	911
Police Department	911	911
On-Site Coordinator- SHSC	Amanda K. Cohan	(818) 382-1818 (office)
Client Site Contact		
Site Telephone or Nearest Telephone	Amanda K. Cohan	(818) 268-2342

Local Medical Emergency Facility(s)

Name of Hospital: St. Francis Medical Center

Address: 3630 E. Imperial Hwy., Lynwood, CA 90262 — **Phone No.:** (310) 900-8900

Name of Contact: Emergency Room — **Phone No.:**

Type of Service:

- ☐ Physical trauma only
- ☐ Chemical exposure only
- ☒ Physical trauma and chemical exposure
- ☒ Available 24 hours

Route to Hospital (written detail):

Head west on Southern Ave for 0.2 miles. Turn left onto Atlantic and head south for 1.1 miles. Turn right onto E. Imperial Hwy and head west for 1.1 miles. The hospital is located at 3630 E. Imperial Hwy on the south side.

Travel time from site: 5 minutes

Distance to hospital: 2.4 miles

Name/no. of 24-hr ambulance service: 911

Secondary or Specialty Service Provider

Name of Hospital:

Address: — **Phone No.:**

Name of Contact: — **Phone No.:**

Type of Service:

- ☐ Physical trauma only
- ☐ Chemical exposure only
- ☐ Physical trauma and chemical exposure
- ☐ Available 24 hours

Route to Hospital (written detail):

Travel time from site: _____

Distance to hospital: _____

Name/no. of 24-hr ambulance service: /

Figure 1. Route to Hospital

Refer to the map provided on the following page.

Figure 1—Route to Hospital (Map)-Form 15

CONTINGENCIES-FORM 16

Response Plans

Medical - General	First Aid Kit:	Type	Location	Special First-Aid Procedures:
Provide first aid, if trained; assess and determine need for further medical assistance. Transport, or arrange for transport, after appropriate decontamination.	(1) 5 man	General field first aid kit	WESTON field vehicle	Cyanides on-site ☐ Yes ☒ No If yes, contact LMF. Do they have antidote kit? ☐ Yes ☐ No
	Eyewash required ☐ Yes ☒ No	Type	Location	**HF** on-site ☐ Yes ☐ No If yes, need neutralizing ointment for first-aid kit. Contact LMF.
	Shower required ☐ Yes ☒ No	Type	Location	

Plan for Response to Spill/Release		**Plan for Response to Fire/Explosion**		**Fire Extinguishers ABC**
In the event of a spill or release, ensure safety, assess situation, and perform containment and control measures, as appropriate.	a. Cleanup per MSDSs if small; or sound alarm, call for assistance, notify Emergency Coordinator b. Evacuate to pre-determined safe place c. Account for personnel d. Determine if team can respond safely e. Mobilize per Site Spill Response Plan	In the event of a fire or explosion, ensure personal safety, assess situation, and perform containment and control measures, as appropriate:	a. Sound alarm and call for assistance, notify Emergency Coordinator b. Evacuate to predetermined safe place c. Account for personnel d. Use fire extinguisher only if safe and trained in its use e. Stand by to inform emergency responders of materials and conditions	Type/Location ABC/WESTON field vehicle ___/___ ___/___ ___/___ ___/___ ___/___
Description of Spill Response Gear	Location	Description (Other Fire Response Equipment)		Location
_____	_____	_____		_____
_____	_____	_____		_____
_____	_____	_____		_____
_____	_____	_____		_____

Plan to Respond to Security Problems

Local police shall be contacted in the event of a security problem – Dial 911.

DECONTAMINATION PLAN-FORM 17

Personnel Decontamination

Consistent with the levels of protection required, step-by-step procedures for personnel decontamination for each level of protection are attached.

Levels of Protection Required for Decontamination Personnel

The levels of protection required for personnel assisting with decontamination will be:

☐ Level B ☐ Level C ☒ Level D

Modifications include:

Disposition of Decontamination Wastes

Provide a description of waste disposition, including identification of storage area, hauler, and final disposal site, if applicable:

Dispose of personal protective equipment in sanitary trash.

Permission will be requested by the site representative to dispose of the decontamination fluids in a known or suspected source area at the site. If permission is granted, the fluids will be disposed of on-site. If the site representative will not grant permission, the fluids will be stored in 5-gallon plastic buckets with lids or a small drum. The decontamination fluids will be sampled using protocol similar to that used for surface water sampling. The bucket or drum will be sealed with USEPA custody seals, labeled, and staged in an area of the site designated by the site representative. Coordination of removal and disposal of the fluids will be arranged by WESTON pending the results of the laboratory analysis.

Equipment Decontamination

A procedure for decontamination steps required for non-sampling equipment and heavy machinery follows:

Non-sampling equipment will not be directly exposed to sources of contamination. They will be cleaned with a damp towel.

Sampling Equipment Decontamination

Sampling equipment will be decontaminated in accordance with the following procedure:

If non-disposable sampling equipment is used, it will be washed in a tub with a mixture of potable water and non-phosphate detergent and scrubbed with brushes; rinsed three times with deionized water, and allowed to air dry between sample locations.

LEVEL D/MODIFIED LEVEL D DECONTAMINATION PLAN-FORM 18

Check indicated functions or add steps, as necessary:

Function	Description of Process, Solution, and Container
☒ Segregated equipment drop	Plastic sheeting and/or clean with a damp towel.
☐ Boot cover and glove wash	
☐ Boot cover and glove rinse	
☐ Tape removal - outer glove and boot	
☐ Boot cover removal	
☒ Outer glove removal	Remove inside-out. Double-bag for disposal.
HOTLINE	
☐ Suit/safety boot wash	
☐ Suit/boot/glove rinse	
☐ Safety boot removal	
☐ Suit removal	
☐ Inner glove wash	
☐ Inner glove rinse	
☐ Inner glove removal	
☐ Inner clothing removal	
CONTAMINATION REDUCTION ZONE (CRZ)/SAFE ZONE BOUNDARY	
☐ Field wash	
☐ Redress	

Disposal Plan, End of Day:

All waste will be double-bagged in plastic trash bags. Waste may be stored in a bucket or drum on-site on a daily basis.

Disposal Plan, End of Week:

All waste will be double-bagged in plastic trash bags.

Disposal Plan, End of Project:

Double-bagged waste will be disposed of in an appropriate trash dumpster. Alternatively, it will remain onsite in a 5-gallon bucket or small drum for subsequent disposal by WESTON.

LEVEL C DECONTAMINATION PLAN-FORM 19

Check indicated functions or add steps, as necessary:

Function	Description of Process, Solution, and Container
☒Segregated equipment drop	Plastic sheeting and/or clean with a damp towel.
☒Boot cover and glove wash	Non-phosphate detergent in a tub.
☒Boot cover and glove rinse	Potable water in a tub.
☒Tape removal - outer glove and boot	Double-bag for disposal.
☒Boot cover removal	Double-bag for disposal.
☒Outer glove removal	Double-bag for disposal.
HOTLINE	
☒Suit/safety boot wash	Non-phosphate detergent in a tub, if necessary.
☒Suit/boot/glove rinse	Potable water in a tub, if necessary.
☒Safety boot removal	Bag for cleaning, if necessary.
☒Suit removal	Double-bag for disposal.
☒Inner glove wash	Non-phosphate detergent in a tub, if necessary.
☒Inner glove rinse	Potable water in a tub, if necessary.
☒Facepiece removal	Designated area on a plastic sheet.
☒Inner glove removal	Double-bag for disposal.
☐Inner clothing removal	
CONTAMINATION REDUCTION ZONE (CRZ)/SAFE ZONE BOUNDARY	
☒Field wash	Wash hands and face thoroughly.
☒Redress	Replace suit, if necessary.

Disposal Plan, End of Day:

See Plan for Level D.

Disposal Plan, End of Week:

See Plan for Level D.

Disposal Plan, End of Project:

See Plan for Level D.

SITE PERSONNEL AND CERTIFICATION STATUS-FORM 21

WESTON

Name: Christina Castellana **Title: Project Manager/Field Sampling QC Coordinator** **Task(s): 1** **Certification Level or Description:** ☒ Medical Current ☒ Training Current ☒ Fit Test Current (Qual.) ☐ Fit Test Current (Quant.)	**Name: Amanda K. Cohan** **Title: Field Manager** **Task(s): 1** **Certification Level or Description:** ☒ Medical Current ☒ Training Current ☒ Fit Test Current (Qual.) ☐ Fit Test Current (Quant.)
Name: Anitra Blanco **Title: Field Assistant** **Task(s): All** **Certification Level or Description:** ☒ Medical Current ☒ Training Current ☐ Fit Test Current (Qual.) ☐ Fit Test Current (Quant.)	**Name:** **Title:** **Task(s):** **Certification Level or Description:** ☐ Medical Current ☐ Training Current ☐ Fit Test Current (Qual.) ☐ Fit Test Current (Quant.)
Name: **Title:** **Task(s):** **Certification Level or Description:** ☐ Medical Current ☐ Training Current ☐ Fit Test Current (Qual.) ☐ Fit Test Current (Quant.)	**Name:** **Title:** **Task(s):** **Certification Level or Description:** ☐ Medical Current ☐ Training Current ☐ Fit Test Current (Qual.) ☐ Fit Test Current (Quant.)
Name: **Title:** **Task(s):** **Certification Level or Description:** ☐ Medical Current ☐ Training Current ☐ Fit Test Current (Qual.) ☐ Fit Test Current (Quant.)	**Name:** **Title:** **Task(s):** **Certification Level or Description:** ☐ Medical Current ☐ Training Current ☐ Fit Test Current (Qual.) ☐ Fit Test Current (Quant.)
Name: **Title:** **Task(s):** **Certification Level or Description:** ☐ Medical Current ☐ Training Current ☐ Fit Test Current (Qual.) ☐ Fit Test Current (Quant.)	**Name:** **Title:** **Task(s):** **Certification Level or Description:** ☐ Medical Current ☐ Training Current ☐ Fit Test Current (Qual.) ☐ Fit Test Current (Quant.)
Name: **Title:** **Task(s):** **Certification Level or Description:** ☐ Medical Current ☐ Training Current ☐ Fit Test Current (Qual.) ☐ Fit Test Current (Quant.)	**Name:** **Title:** **Task(s):** **Certification Level or Description:** ☐ Medical Current ☐ Training Current ☐ Fit Test Current (Qual.) ☐ Fit Test Current (Quant.)

TRAINING CURRENT - Training: All personnel, including visitors, entering the exclusion or contamination reduction zones must have certifications of completion of training in accordance with OSHA 29 CFR 1910, 29 CFR 1926, or 29 CFR 1910.120.

FIT TEST CURRENT - Respirator Fit Testing: All persons, including visitors, entering any area requiring the use or potential use of any negative pressure respirator must have had, as a minimum, a qualitative fit test, administered in accordance with OSHA 29 CFR 1910.134 or ANSI, within the last 12 months. If site conditions require the use of a full-face, negative-pressure, air-purifying respirator for protection from asbestos or lead, employees must have had a qualitative fit test, administered according to OSHA 29 CFR 1910.1001 or 1025/1926, within the last 6 months.

MEDICAL CURRENT - Medical Monitoring Requirements: All personnel, including visitors, entering the exclusion or contamination reduction zones must be certified as medically fit to work and to wear a respirator, if appropriate, in accordance with 29 CFR 1910, 29 CFR 1926/1910, or 29 CFR 1910.120.

The Site Health and Safety Coordinator is responsible for verifying all certifications and fit tests.

HEALTH AND SAFETY PLAN APPROVAL/SIGNOFF FORM-FORM 23

Site Name: Seam Master Industries	**WO#:** 20074.025.047
5211 Southern Ave., South Gate CA	
I understand, agree to, and will conform with the information set forth in this Health and Safety Plan (and attachments) and discussed in the personnel health and safety briefing(s).	

Name	Signature	Date

TRAINING AND BRIEFING TOPICS-FORM 24

The following items will be covered at the site-specific training meeting, daily or periodically.

☒ Site characterization and analysis, Sec. 3.0, 29 CFR 1910.120 I	☐ Level A
☒ Physical hazards, HASP Form 07	☐ Level B
☒ Chemical hazards, HASP Form 04	☐ Level C
☒ Animal bites, stings, and poisonous plants	☒ Level D
☐ Etiologic (infectious) agents	☒ Monitoring, 29 CFR 1910.120 (h)
☐ Site control, 29 CFR 1910.120 d	☒ Decontamination, 29 CFR 1910.120 (k)
☒ Engineering controls and work practices, 29 CFR 1910.120 (g)	☐ Emergency response, 29 CFR 1910.120 (l)
☒ Heavy machinery	☐ Elements of an emergency response, 29 CFR 1910.120 (l)
☐ Forklift	☒ Procedures for handling site emergency incidents, 29 CFR 1910.120 (l)
☐ Backhoe	☐ Off-site emergency response, 29 CFR 1910.120 (l)
☐ Equipment	☐ Handling drums and containers, 29 CFR 1910.120 (j)
☐ Tools	☐ Opening drums and containers
☐ Ladder, 29 CFR 1910.27 (d)/29 CFR 1926	☐ Electrical material handling equipment
☒ Overhead and underground utilities	☐ Radioactive waste
☐ Scaffolds	☐ Shock-sensitive waste
☐ Structural integrity	☐ Laboratory waste packs
☐ Unguarded openings - wall, floor, ceilings	☐ Sampling drums and containers
☐ Pressurized air cylinders	☐ Shipping and transport, 49 CFR 172.101, IATA
☒ Personal protective equipment, 29 CFR 1910.120 (g); 29 CFR 1910.134	☐ Tank and vault procedures
☐ Respiratory protection, 29 CFR 1910.120 (g); ANSI Z88.2	☐ Illumination, 29 CFR 1910.120 (m)
☒ Drilling Safety	☐ Sanitation, 29 CFR 1910.120 (n)
☐	☐
☐	☐
☐	☐

ATTACHMENT A

CHEMICAL CONTAMINANTS DATA SHEETS

FORM 25

HEALTH AND SAFETY EVALUATION — 1 CHEMICAL HAZARDS-FORM 25

Hazardous Substance/Tasks	Physical Properties	Normal Physical State	State At Site/Proj. Temp.	Characteristics	Exposure Limits	Route(s) of Exposure/ Symptoms	Monitoring Instruments/ Ionization Potential + % Response
Trichloroethylene	☐ Explosive ☐ Flammable ☐ Corrosive ☐ Reactive ☐ Water Reactive ☐ Oxidizer	☒ Solid ☐ Liquid ☐ Gas	☒ Solid ☒ Liquid ☐ Gas	pH: FP:N/A LEL: 8% UEL: 10.5% Auto. Ig.: N/A BP: 189°F	☐ CA ☒ PEL 100 ppm ☐ TLV ☒ IDLH 1000 ppm ☐ Only toxicological data available ☒ Other: NIOSH REL 2 ppm (as a 60-minute ceiling)	☒ Inhalation ☒ Ingestion ☒ Skin Absorption ☒ Contact ☐ Direct Penetration ☐ Other: _____	☐ HNu ☐ 11.7 eV ☐ 10.2 eV ☐ OVM ☐ 10.0/10.6 eV ☐ 11.8 eV
CAS No: 79-01-6	☐ Radioactive ☒ Other	Incompatible With: Strong caustics and alkalis; chemically active metals (such as barium, lithium, sodium, magnesium, titanium, and beryllium)		MP: N/A Sp. Gr.: 5.73			☐ CGI ☐ OVA
Synonyms: Ethylene trichloride, TCE, Trichloroethene, Trilene	Combustible Liquid, but burns without difficulty.			Vap. D.: Vap. P.:58 mm H_2O Sol.:0.0001% Other:MW: 131.4		Symptoms:	☐ IP: 9.45 eV % Response:

ATTACHMENT A

CHEMICAL CONTAMINANTS DATA SHEETS

FORM 25

International Chemical Safety Cards

TRICHLOROETHYLENE

ICSC: 0081

TRICHLOROETHYLENE
1,1,2-Trichloroethylene
Trichloroethene
Ethylene trichloride
$C_2HCl_3/ClCH{=}CCl_2$
Molecular mass: 131.4

CAS # 79-01-6
RTECS # KX4550000
ICSC # 0081
UN # 1710
EC # 602-027-00-9

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible under specific conditions. See Notes.		In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION	Risk of fire and explosion (see Chemical Dangers).		In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE			
• **INHALATION**	Dizziness. Drowsiness. Headache. Weakness. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration if indicated. Refer for medical attention.
• **SKIN**	Dry skin. Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• **EYES**	Redness. Pain.	Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• **INGESTION**	Abdominal pain (further see Inhalation).	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Do NOT induce vomiting. Give plenty of water to drink. Rest.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Ventilation. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place (extra personal protection: self-contained breathing apparatus).	Separated from metals (see Chemical Dangers), strong bases, food and feedstuffs. Dry. Keep in the dark. Ventilation along the floor.	Do not transport with food and feedstuffs. IMO: Marine Pollutant Xn symbol R: 40 S: 23-36/37 UN Hazard Class: 6.1 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0081 Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities © IPCS CEC 1993

International Chemical Safety Cards

TRICHLOROETHYLENE

ICSC: 0081

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
The vapour is heavier than air. As a result of flow, agitation, etc., electrostatic charges can be generated.

CHEMICAL DANGERS:
On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive fumes (phosgene, hydrogen chloride, chlorine). The substance decomposes on contact with strong alkali producing dichloroacetylene , which increases fire hazard. Reacts violently with metals such as lithium, magnesium aluminium, titanium, barium and sodium. Slowly decomposed by light in presence of moisture, with formulation of corrosive hydrochloric acid.

OCCUPATIONAL EXPOSURE LIMITS (OELs):
TLV: 50 ppm; 269 mg/m^3 (STEL): 200 ppm; 1070 mg/m^3 (ACGIH 1992-1993).

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

INHALATION RISK:
A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance irritates the eyes and the skin. Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. The substance may cause effects on the central nervous system. Exposure could cause lowering of consciousness.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the liver and kidney (see notes).

PHYSICAL PROPERTIES

Boiling point: 87°C
Melting point: -73°C
Relative density (water = 1): 1.5
Solubility in water, g/100 ml at 20°C: 0.1
Vapour pressure, kPa at 20°C: 7.8

Relative vapour density (air = 1): 4.5
Relative density of the vapour/air-mixture at 20°C (air = 1): 1.3
Auto-ignition temperature: 410°C
Explosive limits, vol% in air: 8-10.5
Octanol/water partition coefficient as log Pow: 2.42

ENVIRONMENTAL DATA

This substance may be hazardous to the environment; special attention should be given to water organisms.

NOTES

Combustible vapour/air mixtures difficult to ignite, may be developed under certain conditions. Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is indicated. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding. Technical grades may contain small amounts of carcinogenic stabilizers.

Transport Emergency Card: TEC (R)-723
NFPA Code: H2; F1; R0;

ADDITIONAL INFORMATION	
ICSC: 0081	**TRICHLOROETHYLENE**

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International Chemical Safety Cards

VINYLIDENE CHLORIDE

ICSC: 0083

VINYLIDENE CHLORIDE
1,1-Dichloroethene
1,1-Dichloroethylene
VDC
$C_2H_2Cl_2/H_2C{=}CCl_2$
Molecular mass: 97

CAS # 75-35-4
RTECS # KV9275000
ICSC # 0083
UN # 1303 (inhibited)
EC # 602-025-00-8

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Extremely flammable. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking.	Powder, water spray, foam, carbon dioxide.
EXPLOSION	Vapour/air mixtures are explosive. Vinyl chloride monomer vapours are uninhibited and may form polymers in vents or flame arresters of storage tanks, resulting in blockage of vents.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Use non-sparking handtools.	In case of fire: keep drums, etc., cool by spraying with water. Combat fire from a sheltered position.
EXPOSURE		STRICT HYGIENE!	
• **INHALATION**	Dizziness. Drowsiness. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration if indicated. Refer for medical attention.
• **SKIN**	Redness. Skin burns.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• **EYES**	Redness. Pain.	Safety goggles, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• **INGESTION**	Abdominal pain. Sore throat (further see Inhalation).	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Do NOT induce vomiting. Give plenty of water to drink. Rest.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Consult an expert! Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place (extra personal protection: complete protective clothing including self-contained breathing apparatus).	Fireproof. Separated from incompatible materials (see Chemical Dangers). Cool. Keep in the dark. Store only if stabilized.	Airtight. Unbreakable packaging; put breakable packaging into closed unbreakable container. IMO: Marine Pollutant F+ symbol Xn symbol R: 12-20-40 S: 7-16-29 Note: D UN Hazard Class: 3 UN Packing Group: I

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0083

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International Chemical Safety Cards

VINYLIDENE CHLORIDE

ICSC: 0083

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
VOLATILE COLOURLESS LIQUID, WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
The vapour is heavier than air and may travel along the ground; distant ignition possible.

CHEMICAL DANGERS:
The substance can readily form explosive peroxides. The substance will polymerize readily due to heating or under the influence of oxygen, sunlight, copper or aluminium, with fire or explosion hazard. May explode on heating or on contact with flames. The substance decomposes on burning producing toxic and corrosive fumes (hydrogen chloride, phosgene and chlorine). Reacts violently with oxidants.

OCCUPATIONAL EXPOSURE LIMITS (OELs):
TLV: 5 ppm; 20 mg/m^3 (STEL): 20 ppm; 79 mg/m^3 (ACGIH 1992-1993).

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

INHALATION RISK:
A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance irritates the eyes, the skin and the respiratory tract. Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. The substance may cause effects on the central nervous system.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the liver and kidneys.

PHYSICAL PROPERTIES

Boiling point: 32°C
Melting point: -122°C
Relative density (water = 1): 1.2
Solubility in water, g/100 ml at 25°C: 0.25
Vapour pressure, kPa at 20°C: 66.5
Relative vapour density (air = 1): 3.3
Relative density of the vapour/air-mixture at 20°C (air = 1): 2.5
Flash point: 5.6°C
Auto-ignition temperature: 570°C
Explosive limits, vol% in air: 5.6-16
Octanol/water partition coefficient as log Pow: 1.32

ENVIRONMENTAL DATA	This substance may be hazardous to the environment; special attention should be given to water organisms. In the food chain important to humans, bioaccumulation takes place, specifically in plants.

NOTES

Contains inhibitors (e.g. methoxyphenol). Depending on the degree of exposure, periodic medical examination is indicated. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding.

Transport Emergency Card: TEC (R)-641
NFPA Code: H2; F4; R2;

ADDITIONAL INFORMATION

ICSC: 0083 **VINYLIDENE CHLORIDE**

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International Chemical Safety Cards

TETRACHLOROETHYLENE

ICSC: 0076

TETRACHLOROETHYLENE
1,1,2,2-Tetrachloroethylene
Perchloroethylene
Tetrachloroethene
$C_2Cl_4/Cl_2C{=}CCl_2$
Molecular mass: 165.8

CAS # 127-18-4
RTECS # KX3850000
ICSC # 0076
UN # 1897
EC # 602-028-00-4

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION			
EXPOSURE		STRICT HYGIENE!	
• **INHALATION**	Incoordination. Exhilaration. Dizziness. Drowsiness. Headache. Nausea. Weakness. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration if indicated. Refer for medical attention.
• **SKIN**	Dry skin. Redness. Skin burns. Blisters.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• **EYES**	Redness. Pain.	Safety goggles, face shield.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• **INGESTION**	Abdominal pain (further see Inhalation).	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Do NOT induce vomiting. Give plenty of water to drink. Rest.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Ventilation. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place.	Separated from metals (see Chemical Dangers), food and feedstuffs. Keep in the dark. Ventilation along the floor.	Do not transport with food and feedstuffs. IMO: Marine Pollutant Xn symbol R: 40 S: 23-36/37 UN Hazard Class: 6.1 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0076

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International Chemical Safety Cards

TETRACHLOROETHYLENE

ICSC: 0076

IMPORTANT DATA	**PHYSICAL STATE; APPEARANCE:** COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR. **PHYSICAL DANGERS:** The vapour is heavier than air. **CHEMICAL DANGERS:** On contact with hot surfaces or flames this substance decomposes forming toxic and corrosive fumes (hydrogen chloride, phosgene, chlorine). The substance decomposes slowly on contact with moisture producing trichloroacetic acid and hydrochloric acid. Reacts with metals such as aluminium, lithium, barium, berrylium. **OCCUPATIONAL EXPOSURE LIMITS (OELs):** TLV: 50 ppm; 339 mg/m^3 (STEL): 200 ppm; 1357 mg/m^3 (ACGIH 1992-1993).	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation, through the skin and by ingestion. **INHALATION RISK:** A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C. **EFFECTS OF SHORT-TERM EXPOSURE:** The substance irritates the eyes, the skin and the respiratory tract. Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. The substance may cause effects on the central nervous system. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the liver and kidney. Tumours have been detected in experimental animals but may not be relevant to humans (see Notes).
PHYSICAL PROPERTIES	Boiling point: 121°C Melting point: -22°C Relative density (water = 1): 1.6 Solubility in water, g/100 ml at 20°C: 0.015	Vapour pressure, kPa at 20°C: 1.9 Relative vapour density (air = 1): 5.8 Relative density of the vapour/air-mixture at 20°C (air = 1): 1.09 Octanol/water partition coefficient as log Pow: 2.6
ENVIRONMENTAL DATA	This substance may be hazardous to the environment; special attention should be given to indoor air and water.	

NOTES

Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is indicated. The odour warning when the exposure limit value is exceeded is insufficient.Do NOT use in the vicinity of a fire or a hot surface, or during welding. Technical grades may contain small amounts of carcinogenic stabilizers.

Transport Emergency Card: TEC (R)-722
NFPA Code: H2; F0; R0;

ADDITIONAL INFORMATION

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International Chemical Safety Cards

1,2-DICHLOROETHANE

ICSC: 0250

1,2-DICHLOROETHANE
Ethylene dichloride
1,2-Ethylene dichloride
Ethane dichloride
$ClCH_2CH_2Cl$ / $C_2H_4Cl_2$
Molecular mass: 98.96

CAS # 107-06-2
RTECS # KI0525000
ICSC # 0250
UN # 1184
EC # 602-012-00-7

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Highly flammable. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking.	Powder, water spray, foam, carbon dioxide.
EXPLOSION	Vapour/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Prevent build-up of electrostatic charges (e.g., by grounding). Do NOT use compressed air for filling, discharging, or handling.	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		AVOID ALL CONTACT!	IN ALL CASES CONSULT A DOCTOR!
• INHALATION	Abdominal pain. Cough. Dizziness. Drowsiness. Headache. Nausea. Sore throat. Unconsciousness. Vomiting. Symptoms may be delayed (see Notes).	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Half-upright position. Artificial respiration if indicated. Refer for medical attention.
• SKIN	Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
• EYES	Redness. Pain. Blurred vision.	Safety goggles, face shield, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• INGESTION	Abdominal cramps. Diarrhoea (further see Inhalation).	Do not eat, drink, or smoke during work. Wash hands before eating.	Give nothing to drink. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer (extra personal protection: self-contained breathing apparatus).	Fireproof. Separated from strong oxidants, food and feedstuffs and other incompatible substances (see Chemical Dangers). Cool. Dry.	Unbreakable packaging; put breakable packaging into closed unbreakable container. Do not transport with food and feedstuffs. F symbol T symbol R: 45-11-22-36/37/38 S: 53-45 Note: E UN Hazard Class: 3 UN Subsidiary Risks: 6.1 UN Packing Group: II Marine pollutant.

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0250

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International Chemical Safety Cards

1,2-DICHLOROETHANE

ICSC: 0250

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
COLOURLESS, VISCOUS LIQUID , WITH CHARACTERISTIC ODOUR. TURNS DARK ON EXPOSURE TO AIR, MOISTURE AND LIGHT.

PHYSICAL DANGERS:
The vapour is heavier than air and may travel along the ground; distant ignition possible. As a result of flow, agitation, etc., electrostatic charges can be generated.

CHEMICAL DANGERS:
The substance decomposes on heating and on burning producing toxic and corrosive fumes including hydrogen chloride (ICSC # 0163) and phosgene (ICSC # 0007). Reacts violently with aluminium, alkali metals, alkali amides, ammonia, bases, strong oxidants. Attacks many metals in presence of water. Attacks plastic.

OCCUPATIONAL EXPOSURE LIMITS (OELs):
TLV: 10 ppm; 40 mg/m^3 (as TWA) (ACGIH 1994-1995).

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of its vapour, through the skin and by ingestion.

INHALATION RISK:
A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C.

EFFECTS OF SHORT-TERM EXPOSURE:
The vapour irritates the eyes, the skin and the respiratory tract. Inhalation of the vapour may cause lung oedema (see Notes). The substance may cause effects on the central nervous system, kidneys, liver , resulting in impaired functions.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Repeated or prolonged contact with skin may cause dermatitis. This substance is probably carcinogenic to humans.

PHYSICAL

Boiling point: 83.5°C
Melting point: -35.7°C
Relative density (water = 1): 1.235
Solubility in water, g/100 ml: 0.87

Relative density of the vapour/air-mixture at 20°C (air = 1): 1.2
Flash point: 13°C c.c.
Auto-ignition temperature: 413°C

PROPERTIES	Vapour pressure, kPa at 20°C: 8.7 Relative vapour density (air = 1): 3.42	Explosive limits, vol% in air: 6.2-16 Octanol/water partition coefficient as log Pow: 1.48
ENVIRONMENTAL DATA		

NOTES

Depending on the degree of exposure, periodic medical examination is indicated. The symptoms of lung oedema often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential. Immediate administration of an appropriate spray, by a doctor or a person authorized by him/her, should be considered.

Transport Emergency Card: TEC (R)-605
NFPA Code: H 2; F 3; R 0;

ADDITIONAL INFORMATION

ICSC: 0250 **1,2-DICHLOROETHANE**

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International Chemical Safety Cards

VINYL CHLORIDE

ICSC: 0082

VINYL CHLORIDE
Chloroethene
Chloroethylene
VCM
(cylinder)
$C_2H_3Cl/H_2C{=}CHCl$
Molecular mass: 62.5

CAS # 75-01-4
RTECS # KU9625000
ICSC # 0082
UN # 1086 (inhibited)
EC # 602-023-00-7

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Extremely flammable. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking.	Shut off supply; if not possible and no risk to surroundings, let the fire burn itself out; in other cases extinguish with powder, carbon dioxide.
EXPLOSION	Gas/air mixtures are explosive. Vinyl chloride monomer vapours are uninhibited and may form polymers in vents or flame arresters of storage tanks, resulting in blockage of vents.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Use non-sparking handtools.	In case of fire: keep cylinder cool by spraying with water. Combat fire from a sheltered position.
EXPOSURE		AVOID ALL CONTACT!	
• **INHALATION**	Dizziness. Drowsiness. Headache. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
• **SKIN**	ON CONTACT WITH LIQUID: FROSTBITE.	Protective gloves. Cold-insulating gloves. Protective clothing.	ON FROSTBITE: rinse with plenty of water, do NOT remove clothes.
• **EYES**	Redness. Pain.	Safety goggles, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• **INGESTION**		Do not eat, drink, or smoke during work. Wash hands before eating.	

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Consult an expert! Ventilation (extra personal protection: complete protective clothing including self-contained breathing apparatus).	Fireproof. Separated from incompatible materials (see Chemical Danger). Cool.	F symbol T symbol R: 45-13 S: 53-9-16-44 Note: D UN Hazard Class: 2.1

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0082

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International Chemical Safety Cards

VINYL CHLORIDE

ICSC: 0082

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
COLOURLESS COMPRESSED LIQUEFIED GAS , WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
The gas is heavier than air, and may travel along the ground; distant ignition possible.

CHEMICAL DANGERS:
The substance can under specific circumstances form peroxides, initiating explosive polymerization. The substance will polymerize readily due to heating and under the influence of air, light, and on contact with a catalyst, strong oxidizing agents and metals such as copper and aluminium, with fire or explosion hazard. The substance decomposes on burning producing toxic and corrosive fumes (hydrogen chloride and phosgene).

OCCUPATIONAL EXPOSURE LIMITS (OELs):
TLV: 5 ppm; 13 mg/m^3 (ACGIH 1993-1994).

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation.

INHALATION RISK:
A harmful concentration of this gas in the air will be reached very quickly on loss of containment.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance irritates the eyes. The liquid may cause frostbite. The substance may cause effects on the central nervous system. Exposure could cause lowering of consciousness. Medical observation is indicated.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The substance may have effects on the liver, blood vessels and connective tissue. This substance is carcinogenic to humans. May cause heritable genetic damage in humans.

PHYSICAL PROPERTIES

Boiling point: -13°C
Melting point: -154°C
Relative density (water = 1): 0.9
Solubility in water: none
Relative vapour density (air = 1): 2.2

Flash point: -78°C c.c.°C
Auto-ignition temperature: 472°C
Explosive limits, vol% in air: 3.6-33
Octanol/water partition coefficient as log Pow: 0.6

ENVIRONMENTAL DATA

NOTES

According to ACGIH this substance belongs to Group A1 indicating confirmed human carcinogen. Contains inhibitors

(e.g. phenol). Depending on the degree of exposure, periodic medical examination is indicated. The odour warning when the exposure limit value is exceeded is insufficient. Do NOT use in the vicinity of a fire or a hot surface, or during welding.

Transport Emergency Card: TEC (R)-150
NFPA Code: H 2; F 4; R 2;

ADDITIONAL INFORMATION

ICSC: 0082 **VINYL CHLORIDE**

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International Chemical Safety Cards

1,1-DICHLOROETHANE

ICSC: 0249

1,1-DICHLOROETHANE
Ethane, 1,1-dichloro-
Ethylidene chloride
CH_3CHCl_2
Molecular mass: 99.0

CAS # 75-34-3
RTECS # KI0175000
ICSC # 0249
UN # 2362
EC # 602-011-00-1

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Highly flammable. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking.	Powder, water spray, foam, carbon dioxide.
EXPLOSION	Vapour/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging, or handling.	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		PREVENT GENERATION OF MISTS!	
• INHALATION	Dizziness. Drowsiness. Dullness. Nausea. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
• SKIN	Dry skin. Roughness.	Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
• EYES	Redness. Pain.	Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• INGESTION	Burning sensation (further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Collect leaking liquid in sealable containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer (extra personal protection: self-contained breathing apparatus).	Fireproof. Separated from: see Chemical Dangers. Cool.	F symbol Xn symbol R: 11-22-36/37 S: 16-23 UN Hazard Class: 3 UN Packing Group: II Marine pollutant.

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0249

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities © IPCS CEC 1993

International Chemical Safety Cards

1,1-DICHLOROETHANE

ICSC: 0249

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
The vapour is heavier than air and may travel along the ground; distant ignition possible.

CHEMICAL DANGERS:
The substance decomposes on heating and on burning producing toxic and corrosive fumes including phosgene (see ICSC 0007) and hydrogen chloride (see ICSC 0162). Reacts violently with strong oxidants, alkali metals and earth-alkali metals, powdered metals, causing fire and explosion hazard. Attacks aluminium, iron and polyethylene. Contact with strong caustic will cause formation of flammable and toxic acetaldehyde gas.

OCCUPATIONAL EXPOSURE LIMITS (OELs):
TLV: 100 ppm; 405 mg/m^3 (ACGIH 1992-1993).

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation and by ingestion.

INHALATION RISK:
A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance may cause effects on the central nervous system. Exposure at high levels may result in unconsciousness.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The liquid defats the skin. The substance may have effects on the kidneys and liver.

PHYSICAL PROPERTIES

Boiling point: 57°C
Melting point: -98°C
Relative density (water = 1): 1.2
Solubility in water, g/100 ml at 20°C: 0.6
Vapour pressure, kPa at 20°C: 24
Relative vapour density (air = 1): 3.4
Flash point: -6°C c.c.
Auto-ignition temperature: 458°C
Explosive limits, vol% in air: 5.6-11.4
Octanol/water partition coefficient as log Pow: 1.8

ENVIRONMENTAL DATA

NOTES
Do NOT use in the vicinity of a fire or a hot surface, or during welding. Transport Emergency Card: TEC (R)-30G34 NFPA Code: H 2; F 3; R 0;

ADDITIONAL INFORMATION	

ICSC: 0249 **1,1-DICHLOROETHANE**

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Fisher Scientific
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**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

MSDS Name: 2,2-Dichloropropane, 98%
Catalog Numbers:
AC307040000, AC307040050
Synonyms:
Company Identification (Europe): Acros Organics BVBA
Janssen Pharmaceuticalaan 3a
2440 Geel, Belgium
Company Identification (USA): Acros Organics
One Reagent Lane
Fairlawn, NJ 07410
For information in North America, call: 800-ACROS-01
For information in Europe, call: 0032(0) 14575211
For emergencies in the US, call CHEMTREC: 800-424-9300
For emergencies in Europe, call: 0032(0) 14575299

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	EINECS#
594-20-7	2,2-Dichloropropane	98.0	209-832-0

Hazard Symbols: XN F
Risk Phrases: 11 20/22

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW

Appearance: Not available. Flash Point: -4 deg C.
Danger! Extremely flammable liquid. May cause eye and skin irritation. May cause respiratory and digestive tract irritation. May cause cardiac disturbances. May cause liver and kidney damage.
Target Organs: None known.

Potential Health Effects

Eye:
May cause eye irritation. Vapors may cause eye irritation.

Skin:
May cause skin irritation.

Ingestion:
May cause irritation of the digestive tract.

Inhalation:
May cause respiratory tract irritation. May cause liver and kidney damage. May cause cardiac abnormalities. Inhalation of high concentrations may result in bronchospasm.

Chronic:
No information found.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:
Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid

immediately.

Skin:
Get medical aid. Flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes.

Ingestion:
If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.

Inhalation:
Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

Notes to Physician:
Treat symptomatically and supportively.

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:
As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may form an explosive mixture with air. Vapors can travel to a source of ignition and flash back. Use water spray to keep fire-exposed containers cool. Extremely flammable liquid and vapor. Containers may explode in the heat of a fire. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas.

Extinguishing Media:
Use water spray to cool fire-exposed containers. Do NOT use straight streams of water. For large fires, use water spray, fog or regular foam. For small fires, use dry chemical, carbon dioxide, water spray or regular foam. Cool containers with flooding quantities of water until well after fire is out.

Autoignition Temperature: 480 deg C (896.00 deg F)
Flash Point: 70 deg F (21.11 deg C)
Explosion Limits, lower: Not available.
Explosion Limits, upper: Not available.
NFPA Rating: Not published.

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks:
Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Remove all sources of ignition. A vapor suppressing foam may be used to reduce vapors.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:
Wash thoroughly after handling. Use with adequate ventilation. Ground and bond containers when transferring material. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Avoid contact with heat, sparks and flame. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.

Storage:
Keep away from heat, sparks, and flame. Keep away from sources of ignition. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:
Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
2,2-Dichloropropane	none listed	none listed	none listed

OSHA Vacated PELs:
2,2-Dichloropropane:
No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes:
Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin:
Wear appropriate protective gloves to prevent skin exposure.

Clothing:
Wear appropriate protective clothing to prevent skin exposure.

Respirators:
Follow the OSHA respirator regulations found in 29CFR 1910.134 or European Standard EN 149. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State:	Liquid
Appearance:	Not available.
Odor:	Not available.
pH:	Not available.
Vapor Pressure:	Not available.
Vapor Density:	3.9
Evaporation Rate:	Not available.
Viscosity:	Not available.
Boiling Point:	70.5 deg C
Freezing/Melting Point:	-35 deg C
Decomposition Temperature:	
Solubility in water:	
Specific Gravity/Density:	1.0820g/cm3
Molecular Formula:	C3H6Cl2
Molecular Weight:	112.99

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:
Stability unknown.
Conditions to Avoid:
Incompatible materials, ignition sources.
Incompatibilities with Other Materials:
Strong oxidizing agents, dimethylzinc

Hazardous Decomposition Products:
Hydrogen chloride, carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:
CAS# 594-20-7: TX9662500
LD50/LC50:
Not available.
Carcinogenicity:
2,2-Dichloropropane -
Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
Epidemiology:
No data available.
Teratogenicity:
No data available.
Reproductive Effects:
No data available.
Neurotoxicity:
No data available.
Mutagenicity:
No data available.
Other Studies:
No data available.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste.
US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT
Shipping Name: FLAMMABLE LIQUID, N.O.S.*
Hazard Class: 3
UN Number: 1993
Packing Group: II
Canadian TDG
No information available.

**** SECTION 15 - REGULATORY INFORMATION ****

US FEDERAL
TSCA
CAS# 594-20-7 is listed on the TSCA inventory.
Health & Safety Reporting List
CAS# 594-20-7: Effective Date: March 7, 1986; Sunset Date: December 19, 1995
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b

None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA
Section 302 (RQ)
None of the chemicals in this material have an RQ.
Section 302 (TPQ)
None of the chemicals in this product have a TPQ.
Section 313
No chemicals are reportable under Section 313.
Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
2,2-Dichloropropane can be found on the following state right to know lists: Massachusetts.
California No Significant Risk Level:
None of the chemicals in this product are listed.
European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols: XN F
Risk Phrases:
R 11 Highly flammable.
R 20/22 Harmful by inhalation and if swallowed.
Safety Phrases:
S 16 Keep away from sources of ignition - No smoking.
S 24 Avoid contact with skin.
WGK (Water Danger/Protection)
CAS# 594-20-7: No information available.
United Kingdom Occupational Exposure Limits

Canada
CAS# 594-20-7 is listed on Canada's DSL List.
WHMIS: Not available.
CAS# 594-20-7 is not listed on Canada's Ingredient Disclosure List.
Exposure Limits

**** SECTION 16 - ADDITIONAL INFORMATION ****

MSDS Creation Date: 10/07/1997 Revision #1 Date: 8/02/2000

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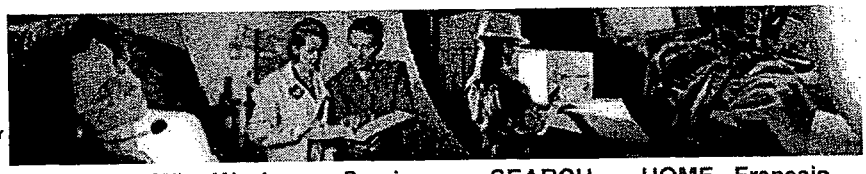

**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

MSDS Name: cis-1,2-Dichloroethylene, 97%
Catalog Numbers:
AC113380000, AC113380025, AC113380100
Synonyms:
Acetylene Dichloride
Company Identification (Europe): Acros Organics BVBA
Janssen Pharmaceuticalaan 3a
2440 Geel, Belgium
Company Identification (USA): Acros Organics
One Reagent Lane
Fairlawn, NJ 07410
For information in North America, call: 800-ACROS-01
For information in Europe, call: 0032(0) 14575211
For emergencies in the US, call CHEMTREC: 800-424-9300
For emergencies in Europe, call: 0032(0) 14575299

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	EINECS#
156-59-2	cis-1,2-Dichloroethylene	97%	205-859-7

Hazard Symbols: XN F
Risk Phrases: 11 20 52/53

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW

Appearance: colorless liquid. Flash Point: 6 deg C.
Warning! Flammable liquid and vapor. May cause central nervous system depression. May cause eye and skin irritation. May cause respiratory and digestive tract irritation. This substance may form hazardous decomposition products which may cause irritation and possible burns.
Target Organs: Central nervous system.

Potential Health Effects

Eye:
May cause eye irritation.

Skin:
May cause skin irritation. May cause dermatitis.

Ingestion:
May cause gastrointestinal irritation with nausea, vomiting and diarrhea.

Inhalation:
Inhalation of high concentrations may cause central nervous system effects characterized by nausea, headache, dizziness, unconsciousness and coma. May cause respiratory tract irritation. Inhalation of high concentrations may cause narcotic effects.

Chronic:
Not available.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:
Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

Skin:
Get medical aid. Flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes.

Ingestion:
If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid.

Inhalation:
Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

Notes to Physician:
Treat symptomatically and supportively.

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:
As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may form an explosive mixture with air. Vapors can travel to a source of ignition and flash back. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas.

Extinguishing Media:
Use water spray to cool fire-exposed containers. Use water spray, dry chemical, carbon dioxide, or appropriate foam.

Autoignition Temperature: 775 deg F (412.78 deg C)
Flash Point: 56 deg F (13.33 deg C)
Explosion Limits, lower: 9.7%
Explosion Limits, upper: 12.8%
NFPA Rating: Not published.

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks:
Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Remove all sources of ignition. Use a spark-proof tool.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:
Wash thoroughly after handling. Use only in a well-ventilated area. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Avoid contact with heat, sparks and flame. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.

Storage:
Keep away from heat, sparks, and flame. Keep away from sources of ignition. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:
Use adequate ventilation to keep airborne concentrations low.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
cis-1,2-Dichloroethylene	200 ppm	none listed	none listed

OSHA Vacated PELs:
cis-1,2-Dichloroethylene:
No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes:
Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin:
Wear appropriate protective gloves to prevent skin exposure.

Clothing:
Wear appropriate protective clothing to prevent skin exposure.

Respirators:
Follow the OSHA respirator regulations found in 29CFR 1910.134 or European Standard EN 149. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State:	Liquid
Appearance:	colorless liquid
Odor:	pleasant odor
pH:	Not available.
Vapor Pressure:	400 mm Hg @41.0 deg C
Vapor Density:	3.34
Evaporation Rate:	Not available.
Viscosity:	Not available.
Boiling Point:	60 deg C @ 760.00mm Hg
Freezing/Melting Point:	-80 deg C
Decomposition Temperature:	
Solubility in water:	
Specific Gravity/Density:	1.2840g/cm3
Molecular Formula:	C2H2Cl2
Molecular Weight:	96.94

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:
Stable under normal temperatures and pressures.

Conditions to Avoid:
Light, ignition sources, excess heat, exposure to flame.

Incompatibilities with Other Materials:
Potassium hydroxide, sodium, sodium hydroxide, strong oxidizing

agents, bases, Reaction with solid caustic alkalies or concentrated solution produces chloracetylene gas which ignites spontaneously in air..

Hazardous Decomposition Products:
Hydrogen chloride, phosgene, carbon monoxide, carbon dioxide.

Hazardous Polymerization: Will not occur.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:
CAS# 156-59-2: KV9420000

LD50/LC50:
CAS# 156-59-2: Inhalation, rat: LC50 = 13700 ppm.

Carcinogenicity:
cis-1,2-Dichloroethylene -
Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.

Epidemiology:
No data available.

Teratogenicity:
No data available.

Reproductive Effects:
No data available.

Neurotoxicity:
No data available.

Mutagenicity:
See actual entry in RTECS for complete information.

Other Studies:
No data available.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Ecotoxicity:
Dictionary of Substances and Their Effects 1992

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste.
US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT
Shipping Name: 1,2-DICHLOROETHYLENE
Hazard Class: 3
UN Number: 1150
Packing Group: II

Canadian TDG
No information available.

**** SECTION 15 - REGULATORY INFORMATION ****

US FEDERAL

TSCA
CAS# 156-59-2 is listed on the TSCA inventory.

Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.

SARA
Section 302 (RQ)
None of the chemicals in this material have an RQ.
Section 302 (TPQ)
None of the chemicals in this product have a TPQ.
Section 313
No chemicals are reportable under Section 313.

Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.

STATE
cis-1,2-Dichloroethylene can be found on the following state right to know lists: Florida, Pennsylvania, Massachusetts.
California No Significant Risk Level:
None of the chemicals in this product are listed.

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols: XN F
Risk Phrases:
R 11 Highly flammable.
R 20 Harmful by inhalation.
R 52/53 Harmful to aquatic organisms; may cause long-term adverse effects in the aquatic environment.
Safety Phrases:
S 7 Keep container tightly closed.
S 16 Keep away from sources of ignition - No smoking.
S 29 Do not empty into drains.
S 61 Avoid release to the environment. Refer to special instructions/Safety data sheets.

WGK (Water Danger/Protection)
CAS# 156-59-2: No information available.

United Kingdom Occupational Exposure Limits

Canada
CAS# 156-59-2 is listed on Canada's NDSL List.
WHMIS: Not available.
CAS# 156-59-2 is not listed on Canada's Ingredient Disclosure List.

Exposure Limits

**** SECTION 16 - ADDITIONAL INFORMATION ****

MSDS Creation Date: 2/09/1998 Revision #2 Date: 8/02/2000

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of

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**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

MSDS Name: trans-1,2-Dichloroethylene, 99.7% (GC), stabilized
Catalog Numbers:
AC406840000, AC406840250, AC406842500
Synonyms:
trans-Acetylene Dichloride
Company Identification (Europe): Acros Organics BVBA
Janssen Pharmaceuticalaan 3a
2440 Geel, Belgium
Company Identification (USA): Acros Organics
One Reagent Lane
Fairlawn, NJ 07410
For information in North America, call: 800-ACROS-01
For information in Europe, call: 0032(0) 14575211
For emergencies in the US, call CHEMTREC: 800-424-9300
For emergencies in Europe, call: 0032(0) 14575299

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	EINECS#
156-60-5	Trans-1,2-Dichloroethylene	99.7%	205-860-2

Hazard Symbols: XN F
Risk Phrases: 11 20 52/53

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW

Appearance: clear. Flash Point: 6 deg C.
Warning! Flammable liquid and vapor. Light sensitive. Air sensitive.
Moisture sensitive. May be harmful if swallowed.
Target Organs: Central nervous system, respiratory system, eyes.

Potential Health Effects

Eye:
Causes moderate eye irritation.

Skin:
Causes moderate skin irritation. May cause dermatitis.

Ingestion:
May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May be harmful if swallowed. May cause central nervous system depression.

Inhalation:
May cause respiratory tract irritation. May cause narcotic effects in high concentration. May cause nausea and possible vomiting.

Chronic:
Not available.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:
Flush eyes with plenty of water for at least 15 minutes,

occasionally lifting the upper and lower eyelids. Get medical aid.

Skin:
Get medical aid. Flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes.

Ingestion:
If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.

Inhalation:
Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

Notes to Physician:
Treat symptomatically and supportively.

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:
As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may form an explosive mixture with air. Vapors can travel to a source of ignition and flash back. Will burn if involved in a fire. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas.

Extinguishing Media:
Use water spray to cool fire-exposed containers. Use water fog, dry chemical, carbon dioxide, or regular foam.

Autoignition Temperature: Not available.
Flash Point: 6 deg C (42.80 deg F)
Explosion Limits, lower: 9.70 vol %
Explosion Limits, upper: 12.80 vol %
NFPA Rating: Not published.

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks:
Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Remove all sources of ignition. Use a spark-proof tool.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:
Wash thoroughly after handling. Use only in a well-ventilated area. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.

Storage:
Keep away from sources of ignition. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:
Use adequate ventilation to keep airborne concentrations low.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Trans-1,2-Dichloroethylene	200 ppm	none listed	none listed

OSHA Vacated PELs:
Trans-1,2-Dichloroethylene:
No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes:
Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin:
Wear appropriate protective gloves to prevent skin exposure.

Clothing:
Wear appropriate protective clothing to prevent skin exposure.

Respirators:
Follow the OSHA respirator regulations found in 29CFR 1910.134 or European Standard EN 149. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State:	Liquid
Appearance:	clear
Odor:	Pleasant odor
pH:	Not available.
Vapor Pressure:	710 hPa @ 38 deg C
Vapor Density:	3.3
Evaporation Rate:	Not available.
Viscosity:	Not available.
Boiling Point:	48 deg C @ 760.00mm Hg
Freezing/Melting Point:	-50 deg C
Decomposition Temperature:	
Solubility in water:	immiscible
Specific Gravity/Density:	1.2600g/cm3
Molecular Formula:	C2H2Cl2
Molecular Weight:	96.94

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:
Stable under normal temperatures and pressures.

Conditions to Avoid:
Light, ignition sources, exposure to air, exposure to moist air or water.

Incompatibilities with Other Materials:
Copper, copper alloys, oxidizing agents, alkalies, bases.

Hazardous Decomposition Products:
Hydrogen chloride, phosgene, carbon monoxide, carbon dioxide.

Hazardous Polymerization: Has not been reported

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:
CAS# 156-60-5: KV9400000
LD50/LC50:
CAS# 156-60-5: Draize test, rabbit, eye: 10 mg Moderate; Draize test, rabbit, skin: 500 mg/24H Moderate; Inhalation, rat: LC50 = 24100 ppm; Oral, mouse: LD50 = 2122 mg/kg; Oral, rat: LD50 = 1235 mg/kg; Skin, rabbit: LD50 = >5 gm/kg.
Carcinogenicity:
Trans-1,2-Dichloroethylene -
Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
Epidemiology:
No data available.
Teratogenicity:
No data available.
Reproductive Effects:
See actual entry in RTECS for complete information.
Neurotoxicity:
No data available.
Mutagenicity:
See actual entry in RTECS for complete information.
Other Studies:
No data available.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Ecotoxicity:
Invertebrate toxicity: LC50 (30 min) Photobacterium phosphoreum 1540 ppm Microtox test. (Dictionary of Substances and Their Effects 1992)

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste.
US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: CAS# 156-60-5: waste number U079.

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT
Shipping Name: 1,2-DICHLOROETHYLENE
Hazard Class: 3
UN Number: 1150
Packing Group: II
Canadian TDG
Shipping Name: DICHLOROETHYLENE
Hazard Class: 3
UN Number: UN1150

**** SECTION 15 - REGULATORY INFORMATION ****

US FEDERAL
TSCA
CAS# 156-60-5 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.

Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.

SARA
Section 302 (RQ)
CAS# 156-60-5: Final RQ = 1000 pounds (454 kg)
Section 302 (TPQ)
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 156-60-5: acute, chronic, flammable.
Section 313
No chemicals are reportable under Section 313.

Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
CAS# 156-60-5 is listed as a Priority Pollutant under the Clean Water Act.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.

STATE
Trans-1,2-Dichloroethylene can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Massachusetts.
California No Significant Risk Level:
None of the chemicals in this product are listed.

European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols: XN F
Risk Phrases:
R 11 Highly flammable.
R 20 Harmful by inhalation.
R 52/53 Harmful to aquatic organisms; may cause long-term adverse effects in the aquatic environment.
Safety Phrases:
S 7 Keep container tightly closed.
S 16 Keep away from sources of ignition - No smoking.
S 29 Do not empty into drains.
S 61 Avoid release to the environment. Refer to special instructions/Safety data sheets.

WGK (Water Danger/Protection)
CAS# 156-60-5: No information available.

United Kingdom Occupational Exposure Limits

Canada
CAS# 156-60-5 is listed on Canada's DSL List.
This product does not have a WHMIS classification.
CAS# 156-60-5 is not listed on Canada's Ingredient Disclosure List.

Exposure Limits
CAS# 156-60-5: Not available.

**** SECTION 16 - ADDITIONAL INFORMATION ****

MSDS Creation Date: 11/21/1997 Revision #2 Date: 8/02/2000

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if the company has been advised of the possibility of such damages.

FisherFast online

MATERIAL SAFETY DATA SHEET

BENZENE (AMOCO/TOTAL)

MSDS No. 11697000 ANSI/ENGLISH

1.0 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: BENZENE (AMOCO/TOTAL)

MANUFACTURER/SUPPLIER:

Amoco Oil Company
200 East Randolph Drive
Chicago, Illinois 60601 U.S.A.

EMERGENCY HEALTH INFORMATION:
1 (800) 447-8735

EMERGENCY SPILL INFORMATION:
1 (800) 424-9300 CHEMTREC (USA)

OTHER PRODUCT SAFETY INFORMATION:
(312) 856-3907

2.0 COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS#	Range % by Wt.
Benzene	71-43-2	99.80
Toluene	108-88-3	0.20

(See Section 8.0, "Exposure Controls/Personal Protection", for exposure guidelines)

3.0 HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: Danger! Extremely flammable. Causes eye and skin irritation. Inhalation causes headaches, dizziness, drowsiness, and nausea, and may lead to unconsciousness. Harmful or fatal if liquid is aspirated into lungs. Danger! Contains Benzene. Cancer hazard. Can cause blood disorders. Harmful when absorbed through the skin.

POTENTIAL HEALTH EFFECTS:

EYE CONTACT: Causes mild eye irritation.

SKIN CONTACT: Causes mild skin irritation. Causes skin irritation on prolonged or repeated contact. Harmful when absorbed through the skin.

INHALATION: Cancer hazard. Can cause blood disorders. Inhalation causes headaches, dizziness, drowsiness, and nausea, and may lead to unconsciousness. See "Toxicological Information" section (Section 11.0).

INGESTION: Harmful or fatal if liquid is aspirated into lungs. See "Toxicological Information" section (Section 11.0).

HMIS CODE: (Health:2) (Flammability:3) (Reactivity:0)

NFPA CODE: (Health:2) (Flammability:3) (Reactivity:0)

4.0 FIRST AID MEASURES

EYE: Flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation persists.

SKIN: Wash exposed skin with soap and water. Remove contaminated clothing, including shoes, and thoroughly clean and dry before reuse. Get medical attention if irritation develops.

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention.

INGESTION: If swallowed, drink plenty of water, do NOT induce vomiting. Get immediate medical attention.

5.0 FIRE FIGHTING MEASURES

FLASHPOINT: 12°F(-11°C)

UEL: 8.0%

LEL: 1.5%

AUTOIGNITION TEMPERATURE: 928°F (498°C)

FLAMMABILITY CLASSIFICATION: Extremely Flammable Liquid.

EXTINGUISHING MEDIA: Agents approved for Class B hazards (e.g., dry chemical, carbon dioxide, foam, steam) or water fog.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Extremely flammable liquid. Vapor may explode if ignited in enclosed area.

FIRE-FIGHTING EQUIPMENT: Firefighters should wear full bunker gear, including a positive pressure self-contained breathing apparatus.

PRECAUTIONS: Keep away from sources of ignition (e.g., heat and open flames). Keep container closed. Use with adequate ventilation.

HAZARDOUS COMBUSTION PRODUCTS: Incomplete burning can produce carbon monoxide and/or carbon dioxide and other harmful products.

6.0 ACCIDENTAL RELEASE MEASURES

Remove or shut off all sources of ignition. Remove mechanically or contain on an absorbent material such as dry sand or earth. Increase ventilation if possible. Wear respirator and spray with water to disperse vapors. Keep out of sewers and waterways.

7.0 HANDLING AND STORAGE

HANDLING: Use with adequate ventilation. Do not breathe vapors. Keep away from ignition sources (e.g., heat, sparks, or open flames). Ground and bond containers when transferring materials. Wash thoroughly after handling. After this container has been emptied, it may contain flammable vapors; observe all warnings and precautions listed for this product.

STORAGE: Store in flammable liquids storage area. Store away from heat, ignition sources, and open flame in accordance with applicable regulations. Keep container closed. Outside storage is recommended.

8.0 EXPOSURE CONTROLS / PERSONAL PROTECTION

EYE: Do not get in eyes. Wear eye protection.

SKIN: Do not get on skin or clothing. Wear protective clothing and gloves.

INHALATION: Do not breathe mist or vapor. If heated and ventilation is inadequate, use supplied-air respirator approved by NIOSH/MSHA.

ENGINEERING CONTROLS: Control airborne concentrations below the exposure guidelines.

EXPOSURE GUIDELINES:

Component	CAS#	Exposure Limits
Benzene	71-43-2	OSHA PEL: 1 ppm OSHA STEL: 5 ppm ACGIH TLV-TWA: 10 ppm
Toluene	108-88-3	OSHA PEL: 100 ppm (1989); 200 ppm (1971) OSHA STEL: 150 ppm (1989); Not established. (1971) OSHA Ceiling: 300 ppm (1971) ACGIH TLV-TWA: 50 ppm (skin)

9.0 CHEMICAL AND PHYSICAL PROPERTIES

APPEARANCE AND ODOR: Liquid. Colorless. Sweet odor.

pH: Not determined.

VAPOR PRESSURE: 74.6 mm Hg at 20 °C

VAPOR DENSITY: Not determined.

BOILING POINT: 176°F(80°C)

MELTING POINT: 42°F(6°C)

SOLUBILITY IN WATER: Slight, 0.1 to 1.0%.

SPECIFIC GRAVITY (WATER=1): 0.88

10.0 STABILITY AND REACTIVITY

STABILITY: Stable.

CONDITIONS TO AVOID: Keep away from ignition sources (e.g. heat, sparks, and open flames).

MATERIALS TO AVOID: Avoid chlorine, fluorine, and other strong oxidizers.

HAZARDOUS DECOMPOSITION: None identified.

HAZARDOUS POLYMERIZATION: Will not occur.

11.0 TOXICOLOGICAL INFORMATION

ACUTE TOXICITY DATA:

EYE IRRITATION: Testing not conducted. See Other Toxicity Data.

SKIN IRRITATION: Testing not conducted. See Other Toxicity Data.

DERMAL LD50: Testing not conducted. See Other Toxicity Data.

ORAL LD50: 3.8 g/kg (rat).

INHALATION LC50: 10000 ppm (rat)

OTHER TOXICITY DATA: Acute toxicity of benzene results primarily from depression of the central nervous system (CNS). Inhalation of concentrations over 50 ppm can produce headache, lassitude, weariness, dizziness, drowsiness, or excitation. Exposure to very high levels can result in unconsciousness and death.

Long-term overexposure to benzene has been associated with certain types of leukemia in humans. In addition, the International Agency for Research on Cancer (IARC) and OSHA consider benzene to be a human carcinogen. Chronic exposures to benzene at levels of 100 ppm and below have been reported to cause adverse blood effects including anemia. Benzene exposure can occur by inhalation and absorption through the skin.

Inhalation and forced feeding studies of benzene in laboratory animals have produced a carcinogenic response in a variety of organs, including possibly leukemia, other adverse effects on the blood, chromosomal changes and some effects on the immune system. Exposure to benzene at levels up to 300 ppm did not produce birth defects in animal studies; however, exposure to the higher dosage levels (greater than 100 ppm) resulted in a reduction of body weight of the rat pups (fetotoxicity). Changes in the testes have been observed in mice exposed to benzene at 300 ppm, but reproductive performance was not altered in rats exposed to benzene at the same level.

Aspiration of this product into the lungs can cause chemical pneumonia and can be fatal. Aspiration into the lungs can occur while vomiting after ingestion of this product. Do not siphon by mouth.

12.0 ECOLOGICAL INFORMATION

Ecological testing has not been conducted on this product.

13.0 DISPOSAL INFORMATION

Disposal must be in accordance with applicable federal, state, or local regulations. Enclosed-controlled incineration is recommended unless directed otherwise by applicable ordinances. Residues and spilled material are hazardous waste due to ignitability.

14.0 TRANSPORTATION INFORMATION

U.S. DEPT OF TRANSPORTATION

Shipping Name	Benzene
Hazard Class	3
Identification Number	UN1114
Packing Group	II
RQ	RQ

INTERNATIONAL INFORMATION:

Sea (IMO/IMDG)

Shipping Name Not determined.

Air (ICAO/IATA)

Shipping Name Not determined.

European Road/Rail (ADR/RID)

Shipping Name Not determined.

Canadian Transportation of Dangerous Goods

Shipping Name Not determined.

15.0 REGULATORY INFORMATION

CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR Part 302.4): This product is reportable under 40 CFR Part 302.4 because it contains the following substance(s):

Component/CAS Number	Weight %	Component Reportable Quantity (RQ)
Benzene 71-43-2	99.80	10 lbs.

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR Part 355): This product is not regulated under Section 302 of SARA and 40 CFR Part 355.

SARA TITLE III SECTIONS 311/312 HAZARDOUS CATEGORIZATION (40 CFR Part 370): This product is defined as hazardous by OSHA under 29 CFR Part 1910.1200(d).

SARA TITLE III SECTION 313 (40 CFR Part 372): This product contains the following substance(s), which is on the Toxic Chemicals List in 40 CFR Part 372:

Component/CAS Number	Weight Percent
Benzene 71-43-2	99.80

U.S. INVENTORY (TSCA): Listed on inventory.

OSHA HAZARD COMMUNICATION STANDARD: Flammable liquid. Carcinogen. Irritant. CNS Effects. Target organ effects.

EC INVENTORY (EINECS/ELINCS): In compliance.

JAPAN INVENTORY (MITI): Not determined.

AUSTRALIA INVENTORY (AICS): Not determined.

KOREA INVENTORY (ECL): Not determined.

CANADA INVENTORY (DSL): Not determined.

PHILIPPINE INVENTORY (PICCS): Not determined.

16.0 OTHER INFORMATION

Prepared by:

Environment, Health and Safety Department

Issued: November 14, 1995

This material Safety Data Sheet conforms to the requirements of ANSI Z400.1.

This material safety data sheet and the information it contains is offered to you in good faith as accurate. We have reviewed any information contained in this data sheet which we received from sources outside our company. We believe that information to be correct but cannot guarantee its accuracy or completeness. Health and safety precautions in this data sheet may not be adequate for all individuals and/or situations. It is the user's obligation to evaluate and use this product safely and to comply with all applicable laws and regulations. No statement made in this data sheet shall be construed as a permission or recommendation for the use of any product in a manner that might infringe existing patents. No warranty is made, either express or implied.

ATTACHMENT B

MATERIAL SAFETY DATA SHEETS

FORM 26

ATTACHMENT B

MATERIAL SAFETY DATA SHEETS

FORM 26

MATERIAL SAFETY DATA SHEET

EAGLE PICHER

HYDROCHLORIC ACID, SOLUTION
CAS#: 7647-01-0 (p 2)

EMERGENCY TELEPHONE: 800-535-5053 INFOTRAC *(24 hours)*

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE (TLV): ACGIH, OSHA Ceiling Limit: 5 ppm.
HEALTH HAZARDS: May be fatal by inhalation, ingestion or skin absorption. High concentrations may be destructive to tissue of mucous membranes, upper respiratory tract, eyes and skin. Inhalation may be fatal as a result of inflammation, spasm, and edema of larynx and bronchi, chemical pneumonitis and pulmonary edema.
EFFECTS OF OVEREXPOSURE: Burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting.

EMERGENCY FIRST AID PROCEDURES

INHALATION: Remove to fresh air. If breathing, giving oxygen. If not breathing, give artificial respiration. Call a physician.
EYE CONTACT: Immediately flush eyes with copious amounts of water for at least 15 minutes.
SKIN CONTACT: Immediately flush skin with copious amounts of water for at least 15 minutes while removing clothing.
INGESTION: Call physician immediately. If conscious, give water.

SECTION VI - REACTIVITY DATA

STABILITY: [X] STABLE [ ] UNSTABLE CONDITIONS TO AVOID: Heat, moisture.
INCOMPATIBILITY: Bases, amines, alkali metals, copper, copper alloys, aluminum.
HAZARDOUS DECOMPOSITION PRODUCTS: Hydrogen chloride gas.
HAZARDOUS POLYMERIZATION : [ ] MAY OCCUR [X] WILL NOT OCCUR

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Evacuate area. Wear self-contained breathing apparatus, rubber boots and heavy rubber gloves. Cover spill with dry lime, sand, or soda ash. Place in covered containers using non-sparking tools. Transport outdoors. Ventilate area and wash spill site after pick-up is complete.
WASTE DISPOSAL METHOD: For small quantities, cautiously add to a large quantity of stirred excess of water and adjust pH to 7 (neutral). Separate any insoluble solids and package for hazardous waste disposal. Flush aqueous solution down the drain with plenty of water. Hydrolysis may generate heat and fumes which can be controlled by rate of addition. Follow all Federal, State, and Local regulations.
PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Keep tightly closed, store in a cool, dry place. Wear chemical resistant gloves and avoid breathing vapor. Do not get on skin or in eyes.

SECTION VIII - SPECIAL PRECAUTIONS

RESPIRATORY PROTECTION: NIOSH/MSHA approved respirator.
PROTECTIVE GLOVES: Chemical resistant. EYE PROTECTION: Safety goggles/face shield.
OTHER PROTECTIVE EQUIPMENT: Lab coat or apron.
VENTILATION:
LOCAL EXHAUST: Acceptable MECHANICAL EXHAUST: Required SPECIAL: Chem. fume hood.

PRECAUTIONS: POISON! CORROSIVE! Avoid all contact. Avoid breathing vapor. Avoid prolonged or repeated exposure. Wash thoroughly after handling.

MATERIAL SAFETY DATA SHEET

EAGLE PICHER

HYDROCHLORIC ACID, SOLUTION
CAS#: 7647-01-0 (p.1)

EMERGENCY TELEPHONE: 800-535-5053 INFOTRAC (24 hours)

DATE PREPARED: August 25, 1992 DATE REVISED: September 15, 1

SECTION I

MANUFACTURER'S NAME	EAGLE-PICHER INDUSTRIES, INC. ENVIRONMENTAL SCIENCE AND TECHNOLOGY
ADDRESS	200 B. J. TUNNELL BLVD. MIAMI, OKLAHOMA 74354
EMERGENCY TELEPHONE NUMBER	(800) 535-5053 INFOTRAC (24 HOURS)
INFORMATION TELEPHONE NUMBER	(918) 540-1507
FAX NUMBER	(918) 542-3223
CHEMICAL NAME AND SYNONYMS	HYDROCHLORIC ACID, SOLUTION; MURIATIC ACID
TRADE NAME AND SYNONYMS	HYDROGEN CHLORIDE, CHLOROHYDRIC ACID
CAS#	7647-01-0
CHEMICAL FAMILY	CHLORIDE
FORMULA	HCL

SECTION II - HAZARDOUS INGREDIENTS/TOXICITY DATA

COMPONENTS	CAS #	ACGIH TLV	OSHA PEL	% (optional)
Hydrochloric acid	7647-01-0	5ppm CL	5ppm CL	

TOXICITY DATA: ihl-hmn LCLo: 1300ppm/30m, inl-hmn LCLo: 3000ppm/5m, ihl-rat LC50: 3124ppm/1h, orl-rat LD50: 900mg/kg.

SECTION III - PHYSICAL DATA

BOILING PT.	53°C (127°F)	SPECIFIC GRAVITY	1.18
MELTING PT	N/A	FORMULA WT	36.47
VAPOR PRESSURE (mmHg)	190 @ 25°C	%VOLATILE BY VOLUME	Unknown
VAPOR DENSITY (air=1)	@ 1.3	EVAPORATION RATE	Unknown

SOLUBILITY IN WATER: 100%, slight evolution of heat.

APPEARANCE AND ODOR: Colorless, fuming liquid.

SECTION IV - FIRE AND EXPLOSION DATA

FLASH POINT: N/A

FLAMMABLE LIMITS: N/A LEL: N/A UEL: N/A

EXTINGUISHING MEDIA: Non-combustible. Use extinguishing media appropriate to surrounding fire conditions.

SPECIAL FIRE FIGHTING PROCEDURES: Fire fighters should wear proper protective equipment and self-contained breathi apparatus with full face piece in positive pressure mode. DO NOT GET WATER INSIDE CONTAINERS!

UNUSUAL FIRE AND EXPLOSION HAZARDS: Will produce toxic fumes of hydrogen chloride gas in contact with water, ar hydrogen gas upon contact with metal.

MATERIAL SAFETY DATA SHEET

LIQUID CARBONIC
SPECIALTY GAS CORPORATION
135 SOUTH LA SALLE STREET • CHICAGO ILLINOIS 60603 4282
PHONE (312) 855-2500

Isobutylene

Revision Feb. 1987

24 Hour Emergency Phone Numbers: (504)673-8831; CHEMTREC (800)424-9300

SECTION I--PRODUCT IDENTIFICATION

CHEMICAL NAME: Isobutylene
COMMON NAME AND SYNONYMS: Isobutene, 2-Methylpropene
CHEMICAL FAMILY: Aliphatic Hydrocarbons FORMULA: $(CH_3)_2CH$

SECTION II--HAZARDOUS INGREDIENTS

MATERIAL	VOLUME %	CAS NO.	1985-6 ACGIH TLV UNITS	
Isobutylene	99.5	115-11-7	TWA	1,000 ppm
			STEL	1,250 ppm

for LPG (Liquified Petroleum Gas)

SECTION III--PHYSICAL DATA

BOILING POINT (°F.)	19.6	SPECIFIC GRAVITY (H_2O=1)	0.594 @ 20°C
VAPOR PRESSURE (mmHg.)	24.3 psig @ 70°F	% VOLATILE BY VOLUME	100
VAPOR DENSITY (AIR=1)	2.011	EVAPORATION RATE (BUTYL ACETATE=1)	Rapid
SOLUBILITY IN WATER	Insoluble		
APPEARANCE AND ODOR	A colorless flammable gas with an unpleasant odor similar to coal gas.		

SECTION IV--FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED) -105°F(C.C.) FLAMMABLE LIMITS LEL 1.8 UEL 8.8
EXTINGUISHING MEDIA: Carbon Dioxide, dry chemical, halon and water.
SPECIAL FIRE FIGHTING PROCEDURES: Stop flow of gas if possible. Use water spray to cool fire exposed containers. If feasible, allow fire to burn itself out to avoid accumulation of an unburned flammable mixture.
UNUSUAL FIRE AND EXPLOSION HAZARDS: Keep personnel away from fire scene since containers can rupture violently when exposed to fire. Fire fighters should use self-contained breathing apparatus and protective clothing. Unless gas supply is shut-off, it can reignite or explode. Vapor can flow to distant ignition source than flash back.

SECTION V--HEALTH HAZARD DATA

Route(s) of Entry: Inhalation? Yes Skin? Yes Ingestion? No
Carcinogenicity: NTP? No IARC Monographs? No OSHA? No
EFFECTS OF OVEREXPOSURE: Isobutylene is defined as a simple asphyxiant by displacing air. Can cause dizziness, drowsiness, and eventual unconsciousness. Liquid contact with eyes or skin may cause tissue freezing or frostbite.
EMERGENCY AND FIRST AID PROCEDURES: If inhaled: Remove to fresh air. Obtain prompt medical assistance. Unconscious persons should be given artificial resuscitation and supplemental oxygen. Keep warm and at rest.
Eye or skin contact: Promptly flush affected areas with copious quantities of tepid water (105-115°F). Remove contaminated clothing. A physician should see the patient promptly, if cryogenic burn has resulted in blistering of the dermal surface or deep tissue freezing.

SECTION VI--REACTIVITY DATA

STABILITY: UNSTABLE ( ) STABLE (X)

CONDITIONS TO AVOID: Heat, flame, direct sunlight and ignition sources.

INCOMPATABILITY (MATERIALS TO AVOID): Oxygen and strong oxidizing agents.

HAZARDOUS DECOMPOSITION PRODUCTS: CO_2 and water vapor. Can produce carbon monoxide when oxidized with deficiency of oxygen.
HAZARDOUS POLYMERIZATION: MAY OCCUR ( ) WON'T OCCUR (X)

CONDITIONS TO AVOID: N/A

SECTION VII--SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Evacuate all personnel from affected area. Stop leaks if possible. Emergency personnel should use self-contained breathing apparatus and should have protective clothing. Eliminate sources of ignition. Supply maximum ventilation with explosion-proof equipment.

WASTE DISPOSAL METHOD: Relocate leaking containers in a remote downwind area out doors, and allow to vent to atmosphere. Incinerate gas by controlled burning in flare if possible. Follow Federal, State and Local regulations.

SECTION VIII--SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION: Use self-contained breathing apparatus when necessary.

VENTILATION: LOCAL EXHAUST (X) Provide adequate ventilation in sumps,
MECHANICAL (GENERAL) (X) confined areas and to meet TWA standards.

PROTECTIVE GLOVES: Rubber or plastic EYE PROTECTION: Safety goggles, safety glasses or face shield.

OTHER PROTECTIVE EQUIPMENT: Safety shoes, eyewash, safety shower and protective clothing if liquid contact potential exists.

SECTION IX--SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Protect cylinders against physical damage. Store in cool, dry, well-ventilated area, away from sources of heat and ignition. Keep away from oxidizers such as oxygen, chlorine and fluorine. Electrical equipment should be explosion-proof. Piping connections and containers should be grounded. Use check valve or trap in discharge line to prevent hazardous back flow. Post "No Smoking" or "Open Flame" signs in storage and use areas. Cylinder temperature should be kept under 130°F.
OTHER PRECAUTIONS: Use only DOT or ASME coded containers. Electrically ground all lines and equipment. Cylinders must not be recharged except by or with consent of Liquid Carbonic. For more information, refer to CGA Bulletin SB-2 "Oxygen Deficient Atmospheres" and CGA Pamphlet P-1 "Safe Handling of Compressed Gases in containers.

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ATTACHMENT C

SAFETY PROCEDURES/FIELD OPERATING PROCEDURES

(FLD OPS)

FLD 01 OCCUPATIONAL NOISE AND HEARING CONSERVATION

(Final revision 11/8/1999)

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GENERAL

Noise is defined as unwanted sound. Noise can cause sudden traumatic temporary or permanent hearing loss, long term slowly occurring sensory-neural and irreversible hearing loss, disruption of communication, and masking of warning devices and alarms. Increased stress levels and effects on the cardiovascular and nervous systems have been documented as additional concerns.

The goal of this operating practice is to reduce and potentially eliminate hazardous levels of noise exposure.

REFERENCES

29 CFR 1910.95

RESPONSIBILITIES

Project Manager or Supervisor: The Project Manager or employee's supervisor shall ensure that WESTON and subcontract personnel under their control comply with the requirements of this procedure and have the necessary resources to assure compliance. The Project Manager or Supervisor will ensure that hazard assessment, monitoring and control procedures have been implemented.

Safety Officer: The safety officer (site, project or region) shall assist the Project Manager or Supervisor in understanding the technical requirements of this practice.

The Corporate Health and Safety (CHS) Director: The CHS Director or his designees (e.g., safety professionals, safety officers, division safety managers, or operations health and safety group) will provide assistance with interpretations of this practice. The CHS Director will ensure periodic evaluation of this operating practice through practice review and inspections.

Occupational Medical Provider (OMP): WESTON's OMP will assist in compliance with this practice through evaluation of clinics, verification of baseline exams and annual employee audiogram evaluation. The OMP will advise the Safety Officer and, if necessary, the CHS Director of any problems associated with medical compliance or occupationally related hearing loss in workers.

Employees: All affected employees are responsible for complying with the requirements of this practice. Any concerns or questions regarding compliance is to be brought the attention of the Safety Officer, the Project Manager, or the Supervisor.

Recognition and Risk Assessment

Employee noise exposure is expressed as an eight-hour time-weighted average (full shift exposure) in decibels (dB) on the "A-scale" (dBA). This number is to be compared to the Occupational Safety and Health Administration's Permissible Exposure Limit (PEL) which is an 8-hour time-weighted average (TWA) of 90 dBA, and the OSHA Action Level (AL) which is 85 dBA. Table G-16 in 29 CFR 1910.95 provides information regarding time-equivalent PELs.

The PEL is a limit which should not be exceeded, and the AL is a noise level threshold which when exceeded obligates the employer to establish a Hearing Conservation Program (HCP). The HCP includes baseline and annual hearing tests, and hearing conservation training. Whenever there is a reasonable possibility of employee noise exposure over 85 decibels, the affected employee is enrolled in the HCP.

The need for noise monitoring equipment, noise dosimeters or hearing protection devices must be addressed in the planning stages of a project. WESTON personnel and WESTON subcontractors are to wear hearing protection devices when required and where signs are posted requiring their use.

Some of the sources of noise at hazardous materials sites, demolition operations, construction and industrial sites which can cause hearing damage are: compressor motors, drill rig engines, hammer blows (such as from a split spoon), compressor motors, compressed air, and heavy equipment. Examples of approximate noise levels from various activities are as follows:

- Rock Drilling: up to 115 dBA
- Chain Saws: up to 125 dBA
- Abrasive Blasting: up to 110 dBA
- Heavy Equipment: 95 to 110 dBA
- Demolition: up to 117 dBA
- Needle Guns: up to 112 dBA
- Riveter/Chipper: up to 120 dBA
- Noisy Factory: up to 90 dBA
- Noisy Office: 70 to 80 dBA
- Conversational Speech: 60 dBA

Noise Evaluation and Surveillance Procedures

Noise exposure assessment is performed only by qualified personnel with properly calibrated and functional noise measuring equipment. If the HASP or the Safety Officer indicate that the site, or activity, requires an instrumentation survey then the area will be screened with an A-weighted sound level meter (Area Monitoring). If deemed necessary a more in depth evaluation utilizing a noise dosimeter may be performed (Personnel Monitoring). Both types of monitoring, if needed, will be accomplished in accordance with requirements established in 29 CFR 1910.95(d).

Long-term work efforts at fixed locations (e.g., water treatment plants, incinerators, etc.) will require an evaluation of noise levels utilizing instrumentation. Re-monitoring may be necessary when changes in equipment, processes or activities result in modification of the noise level.

If impact noise is present, the peak noise levels and the frequency of the impacts should be determined. Both OSHA and the American Conference of Governmental Industrial Hygienists (AGCIH) recommend certain limits to impact noise which depend on the noise intensity and frequency of the impacts. These resources and/or qualified personnel should be consulted if questions arise regarding impact or impulse noise.

Noise Control Methods

Engineering Controls

The primary means of reducing or eliminating personnel exposure to hazardous noise is through engineering controls. Engineering controls are defined as any modification or replacement of equipment, or related physical change at the noise source or along the sound transmission path that will reduce the noise level to the employees ear. Engineering controls include items such as; mufflers on heavy equipment or motors, sound baffles, and enclosures.

Administrative Controls

Administrative controls are defined as changes in the work schedule or operations which reduce noise exposure. These controls include increasing worker distance from the noise source and rotation of jobs so that time limits of exposure are reduced.

Administrative time control is not a preferable method for preventing noise exposure since extreme noise for a short duration can cause severe, permanent hearing loss. Administrative controls may be utilized in accordance with the TWA Tables (see 29 CFR 1910.95, Table G-16). Administrative controls may not be utilized for exposures greater than 115 dBA, regardless of the exposure time.

Hearing Protection

Hearing protection devices are utilized whenever engineering controls prove to be infeasible or cost prohibitive. Various types of ear muffs and ear plugs are available. Hearing protector attenuation is intended to reduce employee exposures below 85 dBA for employees with standard threshold shifts and below 90 dBA for all other employees.

Hearing protection devices are strongly recommended in any noisy environment, but are mandatory in the following situations:

- The eight hour average may equal or exceed 90 decibels.
- Any employee exposed to greater than or equal to 85 decibels and who have experienced a standard threshold shift (STS) in their hearing.
- Any noise equal to greater than 115 decibels impact, continuous or intermittent.
- Anywhere a "HEARING PROTECTION REQUIRED" sign is posted. These signs are to be posted in all mandatory situations listed above.

In the absence of sound level measuring instrumentation, any noise preventing normal vocal discussion between two individuals at arms length distance ("arms-length rule") will dictate the need for hearing protection. WESTON guidelines require the use of hearing protection on an immediate basis under the "arms-length rule". Exceptions may be granted based upon task and duration.

Not all hearing protection devices have the same noise reduction rating (NRR). Verification of all NNR values must be made by referring to the manufacturers' specifications.

The proper hearing protection is selected using results from a properly calibrated sound level meter in the following manner. The NRR of the device chosen is reduced by subtracting. Then this resulting number is subtracted from the noise level in dBA (for example: if the noise reading is 100 dBA, and the ear plugs selected have a NRR of 27. Subtracting 7 from 27 equals 20. Subtracting 20 from 100 equals 80. The attenuated sound level to the wearer is 80). Appendix B of 29 CFR 1910.95 provides information on attenuation adequacy using other monitoring devices or scales.

Hearing protection must attenuate employee exposure to an 8-hour TWA of 90 dBA or less. WESTON will strive to accomplish an attenuation of 85 dBA or less. For any employee diagnosed with a standard threshold shift, the attenuation must be 85 dBA or less.

Additional information regarding the selection, use, maintenance, and control of hearing protection devices is provided in the WESTON Personnel Protective Equipment Program.

Medical Surveillance

Compliance with the Hearing Conservation Program (HCP) component of 29 CFR 1910.95 is required whenever an employee's exposure to noise in excess of 85 dBA occurs. As such, field employees whose job descriptions require work with drill rigs, heavy construction equipment or noisy client operations would be candidates for the HCP and medical surveillance requirements thereof. Supervisors of any employees not meeting the categories above (e.g., treatment plant operations, print shop, maintenance personnel) are required to determine the need for those employees to participate in the HCP by performing noise surveys, and advise their safety officer who will in turn notify the Occupational Medical Provider.

WESTON's Occupational Medical Provider will make the final determination of employee involvement in the medical surveillance component of the HCP.

Audiometric testing is performed annually to evaluate the hearing of all individuals who are routinely exposed to 8 hour TWA exposures of 85 dBA or greater (including compliance with the "arms-length rule"). By evaluating the hearing of these individuals, the overall effectiveness of the Occupational Noise and Hearing Conservation Program can be systematically monitored. WESTON's Occupational Medical Provider is responsible for assuring local clinic compliance with the audiometric testing component of the standard.

Training

Initial and annual training shall be given to each employee included in the Hearing Conservation Program. Training will address the following:

The effects of noise on hearing.

- The purpose of hearing protection, advantages, disadvantages, attenuation of various types, and the selection, fitting, use, and care of protectors.
- The purpose of audiometric tests and explanation of test procedures.
- Recognition of hazardous noise.

WESTON's initial and refresher courses under 29 CFR 1910.120 (Hazwoper) are utilized to deliver these training obligations. Alternative training will be given to employees who are included in the HCP but who are not trained in accordance with Hazwoper requirements,.

Program Evaluation

Periodic program evaluations will be conducted to assess compliance with 29 CFR 1910.95 and this operating practice. The CHS Director (or his designee) is responsible for reviewing this practice on an annual basis. WESTON's Occupational Medical Provider is responsible for assisting in this evaluation by providing information relative to employee exposure and medical surveillance data.

Recordkeeping

Employee exposure measurements are retained for a minimum of two years and audiometric test records are retained for the duration of the employee's employment, plus thirty years.

FLD 05 HEAT STRESS PREVENTION AND MONITORING

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GENERAL

Heat stress may occur at any time work is performed at elevated temperatures. Wearing chemical protective clothing often decreases natural body heat loss and increases the risk of heat stress.

If the body's physiological processes fail to maintain a normal body temperature because of excessive heat, a number of physical reactions can occur, with symptoms ranging from mild (such as fatigue, irritability, anxiety, and decreased concentration or dexterity) to fatal. Because heat stress is one of the most common and potentially serious illnesses at hazardous waste sites, regular monitoring and other preventive measures are vital to ensure worker safety.

Employees who are taking prescription or over-the-counter medications should consult with their personal physician prior to working in high-temperature environments.

REFERENCES

OSHA 29 CFR 1910 and 1926

Related FLD OPS:

FLD02 – Inclement Weather
FLD03 – Hot Processes – Steam
FLD08 – Confined Space Entry
FLD36 – Welding, Cutting and Burning
FLD37 – Pressure Washing

APPENDICES

A Common Heat Stress Disorders and Their Prevention and Treatment

PROCEDURE

Recognition and Risk Assessment

In the planning stages of a project, the potential for heat stress disorders must be considered as a physical hazard in the site-specific Health and Safety Plan (HASP). Risk assessment can be accomplished in the development stages of a project by listing in the HASP the most likely heat stress disorders that may occur.

The SHSC must make decisions on the proper safety procedures and recommend them to the site manager. Each worker must evaluate the risk associated with his or her work and be actively alert to these hazards. Any site worker may stop work if safety procedures are not followed or the risk is too great. In addition, all site personnel must be aware of these symptoms in both themselves and their co-workers.

Four common heat stress disorders and their associated prevention and treatment methods are provided in Appendix A.

Prevention and Protection Programs

Heat stress is affected by several interacting factors including, but not limited to, age, obesity, physical condition, substance abuse, level of personal protective equipment worn, and environmental conditions (temperature, shade, and humidity). Site workers must learn to recognize and treat the various forms of heat stress. The best approach is preventive heat stress management such as the examples given below.

Have workers drink 16 ounces of water before beginning work, at established breaks, and in the morning or after lunch. The body's normal thirst mechanism is not sensitive enough to ensure body fluid replacement, therefore, pre- and post-work fluid intake is necessary. Under heavy work and heat conditions, the body may lose up to 2 gallons of fluids per day. In order to prevent heat stress symptoms, the individual must ensure replacement of this moisture.

Provide disposable cups that hold about 4 ounces, and water that is maintained at 50 to 60°F. Have workers drink 16 ounces of water before beginning work, and a cup or two at each break period. Provide a shaded area for rest breaks. Discourage the intake of caffeinated drinks during working hours. Monitor for signs of heat stress.

Encourage workers to maintain a good diet during these periods. In most cases, a balanced diet and lightly salted foods should help maintain the body's electrolyte balance. Bananas are especially good for maintaining the body's potassium level. The most important measure to prevent heat-related illness is adequate fluid intake. Workers should drink 1/2 to 1 quarts of liquids per hour in high heat conditions. Most of this liquid should be water.

If utilizing commercial electrolyte mixes, double the amount of water called for in the package directions. Indications are that "full-strength" preparations taken under high heat stress conditions may actually decrease the body's electrolytes.

Acclimate workers to site work conditions by slowly increasing workloads, i.e., do not begin work activities with extremely demanding tasks. Rotate shifts of workers who are required to wear impervious clothing in hot weather. In extremely hot weather, conduct field activities in the early morning and evening.

Provide cooling devices to aid natural body heat regulation. These devices, however, add weight and their use should be balanced against worker efficiency. An example of a cooling aid is long cotton underwear, which acts as a wick to absorb moisture and protect the skin from direct contact with heat-absorbing protective clothing.

Ensure that adequate shelter is available to protect personnel against heat and direct sunlight, which can decrease physical efficiency and increase the probability of heat stress. If possible, set up the command post in the shade.

Good hygienic standards must be maintained by frequent showering and changes of clothing. Clothing should be permitted to dry during rest periods. Persons who notice skin problems should immediately consult medical personnel.

Heat Stress Monitoring and Work Cycle Management

When strenuous field activities are part of on-going site work conducted in hot weather, the following guidelines should be used to monitor the body's physiological response to heat, and to manage the work cycle, even if workers are not wearing impervious clothing. These procedures should be instituted when the temperature exceeds 70°F and the tasks/risk analysis indicates an increased risk of heat stress problems. Consult the HASP and a safety professional (e.g., Division safety manager, safety officer) if questions arise as to the need for specific heat stress monitoring. In all cases, the site personnel must be aware of the signs and symptoms of heat stress and provide adequate rest breaks and proper aid as necessary.

Measure Heart Rate – Heart rate should be measured by the radial pulse for 30 seconds as early as possible in the rest period. The heart rate at the beginning of the rest period should not exceed 110 beats per minute. If the heart rate is higher, the next work period should be shortened by 33%, while the length of the rest period stays the same. If the pulse rate still exceeds 110 beats per minute at the beginning of the next rest period, the following work cycle should be further shortened by 33%. The procedure is continued until the rate is maintained below 110 beats per minute.

Measure Body Temperature – When ambient temperatures are over 90°F, body temperatures should be measured with a clinical thermometer as early as possible in the rest period. If the oral temperature exceeds 99.6°F (or 1 degree change from baseline) at the beginning of the rest period, the following work cycle should be shortened by 33%. The procedure is continued until the body temperature is maintained below 99.6°F (or 1 degree change from baseline). Under no circumstances should a worker be allowed to work if their oral temperature exceeds 100.6°F.

Measure Body Water Loss – Body water loss greater than 1.5% of total body weight is indicative of a heat stress condition. Body weight is measured before personal protective equipment (PPE) is donned and after the PPE is removed following a work cycle. Body water loss can be measured with an ordinary bathroom scale, however, the scale must be sensitive to one-half pounds increments. A worker is required to drink additional fluids and rest if their body water loss is greater than 1.5%.

Note: For purposes of this operating practice, a break is defined as a 15-minute period and/or until an individual's vital signs are within prescribed guidelines.

A physiological monitoring schedule is determined by following the steps below:

Measure the air temperature with a standard thermometer.

Estimate the fraction of sunshine by judging what percent the sun is out (refer to Table 1).

Calculate the adjusted temperature based on the following formula:

Adjusted Temperature = Actual Temperature + 13 X
(fraction of the percent sunshine factor)

Using Table 2, determine the physiological monitoring schedule for fit and acclimated workers.

The length of work period is governed by frequency of physiological monitoring (Table 2). The length of the rest period is governed by physiological parameters (heart rate and oral temperature). For example, site personnel anticipate wearing level C (impermeable clothing) during site activities.

The air temperature is 80°F and there are no clouds in the sky (100% sunshine). The adjusted temperature is calculated in the following manner:

Adjusted Temperature (Adj T °F) = Actual Temperature (Amb T °F) + (13 x fraction of the percent sunshine factor).
Adj T °F = 80°F + (13 x 1.0)
Adj T °F = 93°F

Using Table 2, the pulse rate, oral temperature and body water loss monitoring would be conducted after each 60 minutes of work. The adjusted temperature may need to be redetermined if the percent sunshine and ambient temperature changes drastically during site work.

If an individual's heart rate exceeds 110 beats per minute at the beginning of the rest period, that individual will continue to rest until his or her heart rate drops to baseline; the next work period is then decreased by 33%.

Revised 11/1999

TABLE 1

PERCENT SUNSHINE FACTORS
HEAT STRESS PREVENTION AND MONITORING

Percent Sunshine (%)	Cloud Cover	Sunshine fraction
100	No cloud cover	1.0
50	50% cloud cover	0.5
0	Full cloud cover	0.0

TABLE 2

PHYSIOLOGICAL MONITORING SCHEDULE
HEAT STRESS PREVENTION AND MONITORING

Adjusted Temperature	Level D (Permeable clothing)	Level C, B, or A (Nonpermeable clothing)
90°F (32.2^{o}C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5^{o}F (30.8^{o}-32.2^{o}C)	After each 60 minutes of work	After each 30 minutes of work
82.5^{o}-87.5^{o}F (28.1^{o}-32.2^{o}C)	After each 90 minutes of work	After each 60 minutes of work
77.5^{o}-82.5^{o}F (25.3^{o}-28.1^{o}C)	After each 120 minutes of work	After each 90 minutes of work
72.5^{o}-77.5^{o}F (22.5^{o}-25.3^{o}C)	After each 150 minutes of work	After each 120 minutes of work

Revised 11/1999

APPENDIX A

COMMON HEAT STRESS DISORDERS AND THEIR PREVENTION AND TREATMENT

Heat Rash

Heat rash is caused by continuous exposure to heat and humidity, and is aggravated by chafing clothes. The condition decreases an individual's ability to tolerate heat and can be extremely uncomfortable.

Symptoms – Mild red rash, especially in areas of the body that come into contact with protective gear.

Treatment – Decrease amount of time spent working in protective gear and provide body powder to help absorb moisture and decrease chafing.

Heat Cramps

Heat cramps are caused by inadequate electrolyte intake. The individual may be receiving adequate water, however, if not combined with an adequate supply of electrolytes, the blood can thin to the point where it seeps into the active muscle tissue, causing cramping.

Symptoms – Acute painful spasms of voluntary muscles, most notably the abdomen and extremities.

Treatment – Move the victim to a cool area and loosen clothing. Have the victim drink 1 to 2 cups of lightly salted water or diluted commercial electrolyte solution immediately, and then every 20 minutes thereafter until symptoms subside. Electrolyte supplements can enhance recovery (e.g., Gatorade, Quench) however, it is best to double the amount of water required by the dry mix package directions or add water to the liquid form.

Heat Exhaustion

Heat exhaustion is a state of very definite weakness or exhaustion caused by the loss of fluids from the body. The condition is much less dangerous than heat stroke, but it nonetheless must be treated.
Symptoms – Pale, clammy, and moist skin, profuse perspiration, and extreme weakness. Body temperature is normal, pulse is weak and rapid, and breathing is shallow. The person may have a headache, may vomit, and may feel dizzy.

Treatment – Move the victim to a cool, air-conditioned or temperature-controlled area, loosen clothing, place in a position with the head lower than the feet (shock prevention), and allow the victim to rest. Consult a physician, especially in severe cases. Have the victim drink 1 to 2 cups of water immediately, and every 20 minutes thereafter until symptoms subside.

Heat Stroke

Heat stroke is an acute and dangerous reaction to heat stress caused by a failure of the body's heat regulating mechanisms, i.e., the individual's temperature control system (sweating) stops working correctly. Body temperature rises so high that brain damage and death may result if the person is not cooled quickly.

Symptoms – Red, hot, dry skin (although the person may have been sweating earlier); nausea, dizziness, confusion, extremely high body temperature, rapid respiratory and pulse rate, unconsciousness or coma.

Treatment – Remove the victim from the source of heat and cool the victim quickly. If the body temperature is not brought down quickly, permanent brain damage or death may result. Soak the victim in cool (not cold) water, sponge the body with cool water, or pour water on the body to reduce the temperature to a safe level (less than 102°F). Monitor the victim's vital signs and obtain immediate medical help. Do not give the victim coffee, tea, or alcoholic beverages.

FLD 10 MANUAL LIFTING AND HANDLING OF HEAVY OBJECTS

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GENERAL

PROCEDURE

Improper lifting can result in cuts, pinches, crushing, and serious injury to back, abdomen, arm and leg muscles, and joints. Even relatively light objects, lifted improperly, can contribute to injury.

Cuts, Pinching, and Crushing

Splinters, slivers, and sharp edges on objects to be lifted can result in cuts. Heavy objects can pinch or crush fingers, toes, arms, and legs between the object and nearby objects (e.g., walls, tables, counters, or railings).

Muscle and Joint Injuries

Muscle and joint injuries occur when objects to be lifted are too heavy or awkward, are lifted improperly, or in areas where access is restricted.

Lifting tasks which are awkward and repetitive, even if involving only light objects, can lead to nerve and joint damage.

Recognition and Hazard Assessment

The need for manual lifting must be identified as a physical hazard when project tasks specifically require manual handling or use of heavy equipment, and the following safe lifting techniques must be instituted:

- Plan any lifting task, noting:
  - **Contact hazards**. Check each object before lifting for presence of splinters, slivers, sharp edges or parts, cracks and loose joints, signs of biological hazards, and chemical or radioactive material contamination.
  - **Weight of object**. Unless involved in weight training, recommended safe lifting weights for an average man or woman are 50 and 35 pounds, respectively.
  - **Size and shape of object**. Large and oddly shaped objects are more difficult to lift, even within safe weight limits, due to imbalanced center of gravity.
  - **Area in which lifting is to be done.** Check for pinch points such as other objects close by and ensure there is room for safe lifting.
  - **Conditions under which lifting is to be accomplished.** Check for wet or slippery surfaces. Also consider level of protection to be used. Level B or A protection may add up to 40 lbs. To be lifted, as well as restricting range of motion and adding to area restriction by increasing bulk.

- **Route to be traveled, if lifting includes carrying.** Check walking and working surfaces for slip and trip hazards, note ramps, changes in level of elevation, and ladders or stairways that need to be negotiated.

Prevention and Protection Programs

- Before lifting, identify the potential for contact hazards on objects to be lifted. Check each object before lifting, remove any noted hazards as feasible, and wear gloves (cotton, at a minimum, or leather, kevlar, or chemical resistant material, depending on the nature of the hazard).

- Avoid contact with, or cover cracks or loose joints to reduce hazards of pinching.

- Workers must know their lifting limitations, plan before lifting, keep themselves in good physical condition, and get help if uncertain that they can lift safely. Managers must plan and allow for safe lifting.

- When lifting an object from the floor:

  - Determine that the object is within the safe weight limit.

  - Check for contact hazards.

  - Walk the intended route of travel to identify and remove slip and fall hazards.

  - Identify changes in elevation, steps, ramps, stairs and ladders that must be negotiated.

- To lift square or rectangular objects:

  - Avoid reaching as you lift.

  - Set feet firmly, placing one foot alongside the load and the other slightly behind the load.

  - Keep objects close to the body.

  - Squat in front of the load.

  - Grasp one of the top corners away from the body and the opposite bottom corner closest to the body.

  - Tilt the object slightly away from the body, tilt forward at the hips, keep the back straight and tuck in the chin.

  - Straighten the legs, keeping the spine straight, pull the object into the body and stand up slowly and evenly without jerking or twisting.

  - If turning or change of direction is required, turn with feet without twisting the torso and step in the direction of travel

- To set an object down, reverse the sequence, being sure not to trap the bottom hand between the object and the surface on which the object is set.

Workers must be trained and have the opportunity to use the above steps with lighter objects before performing heavy lifting. **For odd-shaped objects, the only modification needed should be hand-hold position**. When two or more persons are lifting, have a plan and a set of signals so lifting occurs simultaneously.

Do not carry objects in a manner which obstructs vision in the line of travel.
Carry objects so one hand is free to hold the handrail on stairs and that there is an unobstructed view of footing. Carry objects in a manner to permit use of both hands while climbing a ladder.

Manual Handling of Heavy Objects

Hazard

Manual maneuvering or handling of heavy objects without actually lifting is often required for hazardous materials and on Resource Conservation and Recovery Act (RCRA) facilities and construction sites. Manual handling of heavy objects, even when not actually lifting, can pose the same hazards as lifting including cuts, pinches, bruises, crushing, muscle and joint strain, and contact with hazardous materials and biological hazards.

Recognition and Risk Assessment

The need for manual handling of heavy objects must be addressed in the planning stages of a project Health and Safety Plan (HASP). Drums and other containers which must be maneuvered for access to information or sampling locations, that are inaccessible to mechanical handling equipment, require manual handling and special precautions. When handling of heavy objects does not actually involve lifting, workers can handle heavier objects, even those weighing several hundred pounds, safely if proper techniques are used. In many instances, the procedures involve balancing and taking advantage of the shape of the object.

Prevention and Protection Programs

Prior to performing manual handling, it must be determined that it can be done safely and that mechanical assistance is infeasible.

Mechanical equipment or assistance such as dollies, carts, come-alongs or rollers are to be used whenever possible. Mechanical assistance must be of proper size, have wheels sized for the terrain, and be designed to prevent pinching or undue stress on wrists. Objects to be moved must be secured to prevent falling and properly balanced to prevent tipping.

The minimum protection for manual handling is heavy cotton or leather gloves, safety boots, and coveralls. Metatarsal guards, chemical protective clothing, and metal mesh or kevlar gloves must be used as risk increases of heavy items falling, hazardous materials contact and sharp edges, splinters or slivers.

Workers must be aware of and work within their weight-handling capabilities.

Objects to be manually handled must be checked for contact hazards prior to beginning movement, and to ensure handling will not trap hands, arms, legs, or feet between the object and other objects, walls, or railings.

Properly trained personnel may roll heavy objects with a round base such as 55 gallon drums or compressed gas cylinders, if rolling will not damage the structural integrity. Rolling must be controlled by chutes, tag-lines, or other means of limiting acceleration. Use of the legs for pushing and tag-line control of rolled objects must be stressed.

Only properly trained personnel may move cylindrical objects which must remain upright by hand. Cylindrical objects, such as drums that must remain upright, are handled manually by slightly tilting the object, using the legs for control, and balancing the object on the bottom edge. The handler then walks beside the object, with the object tilted toward the body, positioning the hands on the top edge away from the body and moving so they do not cross, thus maintaining balance and a steady controlled forward motion.

Prior to moving cylindrical objects in this way, the route of travel must be walked to identify any changes of elevation, pot holes, or other obstructions that could cause the object to snag, tip, or get out of control.

Flat, square, or rectangular objects are most easily handled using make-shift rollers or skids to break the friction with the resting surface and pushing, using the legs.

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FLD 11 ROUGH TERRAIN

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GENERAL

REFERENCES

Related FLD OPS:

FLD02 – Inclement Weather
FLD15 – Remote Areas

Hazard

Physical hazards associated with rough terrain include vehicle accidents, falling, slipping, and tripping. Driving vehicles on uneven surfaces creates a possibility of the vehicle rolling, getting stuck in mud or ditches, or of an accident due to flat tires or striking obstacles and other vehicles. Falling is a potential hazard when working near mountain cliffs or steep inclines. Steep surfaces covered with heavy vegetation and undergrowth create tripping hazards. Heavy or downed vegetation can hide holes or breaks in the terrain, which increase risk of falls or vehicle accidents.

Recognition and Risk Assessment

Rough terrain complicates work activities and adds or increases risk. In the planning stages of a project, rough terrain must be considered as a physical hazard. Risk assessment is usually accomplished from site history information (i.e., site topography) and onsite by the Site Health and Safety Coordinator (SHSC).

Hazard Prevention and Protection Programs

Hazard prevention can be achieved by ensuring regular maintenance is performed on vehicles. In order to minimize accidents, a site surveillance on foot may be required to ensure clear driving paths. The site crew should be alert and observe terrain while walking to minimize slips and falls. Boots that are ankle high or higher should be worn to provide additional support and stability. Vehicle drivers and passengers should wear seatbelts at all times. Fall protection is required when there is a potential for falls.

Personnel should maintain a high level of physical conditioning due to increased body stress and exertion. Personnel should be aware of potential hazards and ensure the availability of first aid supplies and knowledge of the location of the nearest medical assistance.

FLD 12 HOUSEKEEPING

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GENERAL

Hazards associated with poor housekeeping include slips, trips, falls, punctures, cuts, and fires.

REFERENCES

Related FLD OPS:

FLD29 – Material Handling
FLD33 – Demolition
FLD39 – Illumination

PROCEDURE

Recognition and Risk Assessment

Good housekeeping is an important element of accident prevention. Good housekeeping should be planned at the beginning of the job and carefully supervised and monitored through to the final clean-up.

Housekeeping requirements must be addressed in the planning stages of a project and safety plan. Risk assessment can be accomplished in the development stages of a project by listing in the site-specific Health and Safety Plan (HASP), good housekeeping requirements and the hazards associated with poor housekeeping (e.g., slips, trips and falls). The SHSC must make decisions on the proper safety procedures and recommend them to the site manager. Each worker must evaluate the risk associated with his or her work and be actively alert to these hazards. Any site worker may stop work if safety procedures are not followed or the risk is too great.

Prevention and Protection Programs

Poor housekeeping can be prevented by following the three steps described below:

1. Plan ahead. A materials storage area which has been planned is more orderly than one which has developed haphazardly.

2. Assign responsibilities. If the size of the job and work force merit, a person should be assigned specific responsibility for clean up. Ideally, each individual should pick up his or her work area and help keep the site neat.

3. Implement the program. Housekeeping must be part of the daily routine, with clean-up being a continuous procedure.

Accidents caused by poor housekeeping can be prevented by adherence to the following rules.

Lunch areas should be kept clear of empty bottles, containers, and papers. Trash disposal cans should be provided. An effective means of preventing litter is the provision of suitable receptacles for hazardous waste, as well as nonhazardous waste.

Revised 11/1999

Accumulation of flammable and combustible liquids on floors, walls, and other areas, is prohibited. All spills of flammable and combustible liquids must be cleaned up immediately. Combustible waste such as soiled rags and paper is to be stored in a safe place (such as a covered metal container) and disposed of regularly.

WESTON project managers and WESTON subcontractors should provide sufficient personnel and equipment to ensure compliance with all housekeeping requirements.

Work will not be allowed in areas that do not comply with the requirements of this section.

The SHSC and WESTON subcontractors will inspect the work area daily for adequate housekeeping and record unsatisfactory findings on the daily inspection report.

If applicable, the decontamination line must be keep neat and free of debris.

Adequate lighting should be provided in or around all work areas, passageways, stairs, ladders, and other areas used by personnel.

All stairways, passageways, gangways, and accessways shall be kept free of materials, supplies, and obstructions at all times.

Loose or light material should not be stored or left on roofs or floors that are not enclosed, unless it is safely secured.

Tools, materials, extension cords, hoses, or debris are to be used, disposed of, and stored so as not to cause a tripping or other hazard.

Tools, materials, and equipment subject to displacement or falling should be adequately secured.

Empty bags that contained lime, cement, and other dust-producing materials should be removed periodically, as specified by the designated authority.

Protruding nails in scrap boards, planks, and timbers should be removed, hammered in, or bent over flush with the wood, unless placed in containers or trucks for removal.

Walkways, runways, and sidewalks should be kept clear of excavated material or other obstructions and no sidewalls should be undermined unless shored to carry a minimum live load of 125 pounds per square foot.

Containers should be provided for storing or carrying rivets, bolts, and drift pins, and secured against accidental displacement when aloft.

When rivet heads are knocked off or backed out, they should be prevented from falling.

Form and scrap lumber and debris should be cleared from work areas, passageways, and stairs in and around building storage yards and other structures.

All storage and construction sites should be kept free of the accumulation of combustible materials.

All materials should be maintained in neat stockpiles for ease of access. Aisles and walkways should be kept clear of loose materials and tools.

Areas prone to weeds and grass should be kept mowed. A standard procedure should be established for cleanup of such areas, as specified by the SHSC.

Rubbish, brush, long grass, or other combustible material must be kept from areas where flammable and combustible liquids are stored, handled, or processed.

FLD 22 HEAVY EQUIPMENT OPERATION

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GENERAL

REFERENCES

Related FLD OPS:

FLD23 – Cranes/Lifting Equipment
FLD24 – Aerial Lifts/Manlifts
FLD34 – Utilities
FLD35 – Electrical Safety

PROCEDURE

Machinery and Mechanized Equipment Safety

Before any machinery or mechanized equipment is placed in use, it will be inspected and tested by a competent mechanic and certified to be in safe operating condition.

The employer will designate a competent person to be responsible for the inspection of all machinery and equipment daily and during use to make sure it is in safe operating condition. Tests will be made at the beginning of each shift during which the equipment is to be used to determine that the brakes and operating systems are in proper working condition.

Preventative maintenance procedures recommended by the manufacturer will be followed.

Any machinery or equipment found to be unsafe will be deadlined and its use prohibited until unsafe conditions have been corrected.

Inspections or determinations of road conditions and structures will be made in advance to ensure that clearances and load capacities are safe for the passing or placement of any machinery or equipment.

Machinery and mechanized equipment will be operated only by designated personnel. Equipment deficiencies observed at any time that affect safe operation will be corrected before continuing operation.

Seats or equal protection will be provided for each person required to ride on equipment.

Getting off or on any equipment while it is in motion is prohibited.

Machinery or equipment requiring an operator will not be permitted to run unattended.

Machinery or equipment will not be operated in a manner that will endanger persons or property, nor will the safe operating speeds or loads be exceeded.

All machinery or equipment will be shut down and positive means taken to prevent its operation while repairs or manual lubrications are being done. The only exemption is equipment designed to be serviced while running.

All repairs on machinery or equipment will be made at a location that will provide protection from traffic for repair persons.

Heavy machinery and equipment, or parts thereof, that are suspended or held apart by slings, hoists, or jacks also will be substantially blocked or cribbed before personnel are permitted to work underneath or between them.

Bulldozer and scraper blades, end-loader buckets, dump bodies, and similar equipment will be either fully lowered or blocked when being repaired or when not in use. All controls will be in a neutral position, with the engines stopped and brakes set, unless work being performed on the machine requires otherwise.

Stationary machinery and equipment will be placed on a firm foundation and secured before being operated.

All points requiring lubrication during operation will have fittings so located or guarded to be accessible without hazardous exposure.

When necessary, all mobile equipment and the operating area will be adequately illuminated while work is in progress.

Mechanized equipment will be shut down prior to and during fueling operations. Closed systems, with automatic shutoff that will prevent spillage if connections are broken, may be used to fuel diesel powered equipment left running.

All towing devices used on any combinations of equipment will be securely mounted and structurally adequate for the weight drawn.

Persons will not be permitted to get between a piece of towing equipment and the item being towed until the towing equipment has come to a complete stop.

All equipment with windshields will be equipped with powered wipers. Vehicles that operate under conditions that cause fogging or frosting of windshields will be equipped with operable defogging or defrosting devices.

All equipment left unattended at night, adjacent to a highway in normal use, or adjacent to construction areas where work is in progress, will have lights or reflectors, or barricades equipped with lights or reflectors, to identify the location of the equipment.

Whenever the equipment is parked, the parking brake will be set. Equipment parked on inclines will have the wheels chocked or track mechanism blocked and the parking brake set.

Equipment such as lift trucks and stackers will have the rated capacity posted on the vehicle so as to be clearly visible to the operator. When auxiliary removable counterweights are provided by the manufacturer, corresponding alternate rated capacities also will be clearly shown on the vehicle. The ratings will not be exceeded.

Steering or spinner knobs will not be attached to the steering wheel unless the steering mechanism prevents road reactions from causing the steering handwheel to spin. When permitted, the steering knob will be mounted within the periphery of the wheel.

All industrial trucks in use will meet the requirements of design, construction, stability, inspection, testing, maintenance, and operation, defined in American National Standards Institute (ANSI) B56.1, Safety Standards for Powered Industrial Trucks.

The installation of live booms on material and personnel hoists is prohibited.

The controls of loaders, excavators, or similar equipment with folding booms or lift arms will not be operated from a ground position unless so designed.

Personnel will not work or pass under the buckets or booms of loaders in operation.
Cranes and any other equipment used for lifting must be inspected as required and records of inspection must be maintained.

Drill Rigs

WESTON has adopted the Drilling Safety Guide prepared by the Diamond Core Drilling Manufacturers Association and the National Drilling Contractors Association, as published by the National Drilling Federation, as the basic safety programs for all activities involving drill rigs or similar apparatus for the purpose of well installation or soil borings.

FLD 34 UTILITIES

PURPOSE

This program provides requirements for identification, location, and avoidance of underground utilities, appurtenances, and structures during intrusive activities. The program also addresses actions to be taken in response to encountering or contacting underground utilities. These requirements are applicable to all Weston Solutions, Inc. (WESTON) operations. The procedures address the requirements and recommendations for identifying and locating, working around, and encountering or contacting underground utilities.

DEFINITIONS

Aggressive Methods

The use of mechanized equipment such as excavators, backhoes, drill rigs, directional drilling, road saws, etc. Non-Aggressive methods involve the use of manual methods such as hand digging with shovels and air/hydro/vacuum methods.

Buffer Zone

As defined in this procedure, the area around a utility where only non-aggressive excavation methods may be utilized, unless specific conditions are met.

The definition cited above, and the excavation requirements and restrictions associated with it, will vary depending on the particular state regulations. WESTON requires the imposition of a four-foot Buffer Zone on all sides of the utility as measured from the outside edges of the utility, both horizontally and vertically. Since most jurisdictions recognize Buffer Zones which vary somewhere in the range of 18 to 36 inches, this distance must be verified by consulting the applicable state regulations before excavating so that adjustments to surface markings can be made to achieve the WESTON-required four-foot buffer zone.

Referred to as the "Tolerance Zone", "Safety Zone", or "Approximate Location of Underground Utilities" in some jurisdictions.

Competent Person

A Competent Person has the ability to recognize hazards associated with underground utilities and the authority to stop or direct operations to ensure the safety of personnel and conformance with this procedure. The Competent Person has an understanding of this procedure, and the "One-Call" system requirements for the jurisdiction where excavation is occurring. The Competent Person must be capable of notifying One-Call agencies and maintaining and tracking One-Call Locate Numbers. Additionally, they must have knowledge of methods and work practices for utility identification, avoidance, and protection.

The designation of a Competent Person will be made by the Site or Project Manager with the concurrence of the Division EHS Manager.

De-Energize

As applicable to a utility, to physically eliminate and/or prevent the presence, transmission, flow, or release of energy or materials which may cause harm to personnel or property.

Excavation (Intrusive Activity)

An operation for the purpose of movement or removal of earth, rock, or the materials in the ground, including but not limited to; digging, blasting, augering, test boring, drilling, pile driving, directional drilling, grading, plowing-in, hammering, pulling-in, jacking-in, trenching, tunneling, structural demolition, milling, scraping, tree and root removal (grubbing), fence or sign post installation. WESTON requires that the designated One-Call Agency for the applicable jurisdiction be contacted any time an intrusive activity is planned.

Jurisdiction

The authority having legal jurisdiction relative to regulations and requirements for notification of excavation activities and associated identification and marking. In the United States, the states have jurisdiction, and most consider the regulations applicable when excavation is to be performed in any location, including any public or private way, any company right-of-way or easement, or any public or privately owned land or way. Note: One caveat to remember – Jurisdiction may flow to the "owner" on private or government-owned property because the State One-Call Agencies may not clear utilities on such facilities.

Locate

To indicate the existence of a utility by establishing a mark through the use of flags, pins, stakes, paint, or some other customary manner, that approximately determines the location of a line or facility.

Locate Request

A communication between an entity performing intrusive activities and a utility marking Agency (One-Call, etc).

Observer

The person assigned to visually monitor and, as needed, signal the operator during mechanized intrusive activity when the activity is occurring within four feet of the outside edge of the buffer zone. This person remains in close communication with the equipment operator(s) and will stop the activity if needed.

One-Call Agency

An entity that administers a system through which a person can notify owners/operators of underground lines or utilities of the intent to perform intrusive activities in proposed public areas.

Positive Response

Communication with the entity performing intrusive activities, prior to the activity, to ensure that all contacted (typically via the One-Call Agency) owner/operators have located and marked the underground utilities.

Potholing

The practice of exposing an underground facility by safe, non-aggressive excavation methods in order to ascertain the precise horizontal and vertical position and orientation of underground lines or utilities.

Underground Utility

An underground or submerged conductor, pipe, or structure used in providing electric or communications service (including but not limited to, traffic control loops and similar underground or submerged devices), or an underground or submerged pipe used in carrying, providing, or gathering gas, oil or oil product, sewage, storm drainage, water or other liquid service (including, but not limited to, irrigation systems), and appurtenances thereto. As used in this procedure, utility includes all underground appurtenances and structures.

The following are examples of the types of underground utilities that may be present in a given location:

- Natural gas pipelines
- High voltage electric cables
- Water pipelines
- Fiber optic telecommunications lines
- Telephone cable lines
- Steam pipelines
- Gasoline, oil, or other fuels
- Sewer pipelines
- Vents for sewer and gasoline/diesel fueling systems
- Underground Storage Tanks (USTs)
- Abandoned underground structures containing hazardous materials, hazardous wastes, and radioactive materials

Note: Electrical and pressurized mechanical underground utilities that are not energized shall be considered as applicable to the requirements of this procedure until they are disconnected, de-energized removed and/or protected by a lockout/tagout system approved by WESTON.

Underground Utility Owner

Any person, utility, municipality, authority, political subdivision or other person or entity who owns, operates, or controls the operation of an underground line/facility.

White Lining

The practice whereby the entity, which intends to perform intrusive activities, pre-marks the site with an outline of the area where intrusive activities will occur. This involves the use of white paint, flags, stakes, or a combination thereof to mark the extent of where work is to be performed. The marking may vary depending on what intrusive activities are to be conducted. For example, for general excavation, an areal outline of the excavation shall be marked, while for drilling, the individual boreholes shall be marked. Studies have shown that pre-marking is a practice that does prevent utility contact incidents. Check State or local regulatory requirements to ensure compliance.

RESPONSIBILITIES

Competent Person

The Competent Person shall be responsible for:

- Obtaining a copy of, and understanding the applicable regulations for the state of jurisdiction where the excavation activities are to be performed.
- Contacting the appropriate One-Call Agency or private locating service, as applicable.
- Recording One-Call locate numbers.
- If necessary, renewing One-Call locate numbers before expiration.
- Ensuring that white-lining of the area to be excavated is performed; if another equal or better protective measure is necessary because of the nature of the work, state/local regulation or client requirements, the Health and Safety Plan should be amended to reflect the change.
- Ensuring that a "positive response" has been received from every utility owner/operator identified by the One-Call Agency and that they have located their underground utilities and have appropriately marked any potential conflicts with the areas of planned intrusive activities prior to the start of intrusive work.
- Completion of the Underground Utilities Locating and Marking Checklist (Attachment A) and the Underground Utilities Management Checklist (Attachment B).
- Reviewing applicable Activity Hazard Analyses (AHAs) with all project members before work begins.
- Conducting training on communication protocols to be used by the excavation observer and equipment operator.
- Ensuring Implementation of appropriate work practices during intrusive activities (including maintaining the prescribed buffer zone for use of aggressive methods).
- Conducting daily or more frequent (due to changes in conditions) inspections of the excavation area to make sure that all markings are intact.

- Maintaining required records (see Attachments A & B).
- Providing the Site Health and Safety Coordinator (SHSC) with all required documentation on a daily basis.

Observer

Whenever intrusive operations with mechanized equipment are being conducted within four feet of the outside edge of the buffer zone, horizontally and vertically, an observer must be assigned to monitor the activities. The observer is responsible for:

- Maintaining a safe vantage point relative to digging machinery, excavation edge and proximity to the hazard posed by the utility.
- Observing the operation to ensure that the operator stops operations if utilities are observed.
- Reviewing hand signals and other forms of communication with the operator.
- Properly signaling the operator.
- Stopping the operation immediately if the observer's attention must be diverted even momentarily.
- Stopping the operation immediately if a hand signal or other directive is not followed. Operations will not resume until the observer and operator mutually agree that the reason(s) for not complying with the directive(s) are/is identified and fully corrected.
- Maintaining required records, such as logbook entries, or other, as requested by line management.

Line Management

The Project Manager (PM) or Site Manager (SM) {e.g., the on-site manager} shall be responsible for:

- Establishing the site culture with the assistance of the Site Health and Safety Coordinator that ensures compliance with this procedure.
- Providing the necessary resources for compliance with this procedure.
- Designating Competent Personnel in consultation with the Division EHS Manager prior to the start of work.

Environmental, Health and Safety Personnel

The Site Health and Safety Coordinator (SHSC) shall be responsible for:

- Providing oversight on the implementation of the requirements contained in this procedure.
- Consulting with the PM, SM and Competent Person on underground utility issues.

PROCEDURE

The following sections provide the requirements and recommendations of this procedure, which are intended to prevent injury to personnel, damage to infrastructure, and associated indirect effects associated with encountering or contacting underground utilities during the execution of intrusive work. Underground utilities present multiple potential hazards that must be recognized before and during work which occurs near them, therefore, this procedure is divided into sections addressing underground utility identification and location, working around or near underground utilities, and actions to be taken in the event that underground utilities are encountered or contacted. Hazards that may be presented by underground utilities include explosion and fire, electrocution, toxic exposures, pathogens, and drowning.

Identifying and Locating Underground Utilities

The possibility of the existence of underground utilities ***(note: also consider the impact of any subsurface mining activities)*** must be evaluated as early as possible in the planning phase for any project, which involves intrusive activities. The following sections describe various methods for identifying and locating utilities on a site. Plans should be verified during the readiness review. The *Underground Utilities Locating and Marking Checklist* (Attachment A) and the *Underground Utilities Management Checklist* (Attachment B) must be completed before any activities meeting the definition of excavation are conducted. Attachment A is intended to be used as a guide during the process of locating and marking utilities in the area to be excavated. Attachment B is intended to be used as a guide in the overall process of underground utilities management during the course of the project. **Note:** Attachments A and B or their equivalents must be used to document compliance with this operating procedure and will be subject to audit.

All underground utilities on a site involving excavation must be located and identified before intrusive activities commence, by at least two of the following:

- ***The Utility Owner***
- ***A Private or Public Utility Locating Service***
- ***Review of the most current utility drawing, maps or other available records by an approved WESTON Competent Person***
- ***Use of utility locating technology by a WESTON Competent Person or Subcontractor***

Pre-Planning and the Site HASP

The Site-Specific Health and Safety Plan (HASP) developed for the project must:

- Identify the location and types of underground utilities that are believed to be present on the site.
- Reference this procedure (FLD 34), and describe how it will be implemented on the project.
- Contain an Activity Hazard Analysis in which the hazards associated with underground utilities are identified, as well as the measures used to control them.
- Contain, as an appendix, a copy of the applicable regulations from the state of jurisdiction where excavation activities are to be performed. These can usually be obtained via the Internet.

- Contain clear and concise procedures to be followed in the event that contact with underground utilities occurs.
- Address underground utilities and potential associated scenarios in the emergency response section of the HASP.

"One-Call" Locating and Marking Services

Every state has utility marking service programs having various names such as "One-Call", "Dig-Safe", "Call-Before-You-Dig", "Dig-Safely", and many others. These services will identify the types and locations of any utility that may exist in an area to be excavated, as long as the property is in the public domain.

- The appropriate One-Call service for the jurisdiction where the project is located must be contacted prior to beginning excavation work. The One-Call Agency should be given as detailed a description of the property as possible; address, cross street, utility pole numbers, physical description, etc.
- Notification to the One-Call service shall allow sufficient lead-time for the Agency to mark the utilities before excavation begins. The lead times vary, but range from two to ten days, depending on the state of jurisdiction.
- A complete listing of One-Call agencies and telephone numbers for all states is available in the *"Call-Before-You-Dig Call Center Directory"*, which can be accessed on the Internet at the WebPage (http://underspace.com/index.htm) sponsored by *"Underground Focus"* magazine.
- Once notified, the One-Call Agency will provide the contractor with a unique "locate number" or "reference number". This reference number must be kept in the project files by the Competent Person or designee. Additionally, the reference numbers have expiration dates, which may vary depending on the particular One-Call Agency. The valid period of the locate number and required renew notification date shall be requested from the One-Call Agency.
- On a project with multiple contractors, each contractor must request a separate locate number. Under no circumstances will any other contractor or entity be allowed to "work under our locate number". Subcontractors to WESTON may excavate under the locate number secured by WESTON, provided that they are excavating within the area which was previously white-lined by WESTON and subsequently marked. **However, the One-Call Agency must be contacted and notified of this arrangement so that the subcontractor can be recorded as working under the existing locate number.** If a WESTON subcontractor will be excavating in an area not white-lined by WESTON, then the WESTON subcontractor must request a new locate. **Note: State and local requirements must be checked for local application of this procedure.**
- The area where work is to be performed shall be white-lined by WESTON personnel before the locating service goes to the site.
- It is good practice to arrange a pre-excavation meeting at the project site with the personnel performing the utility location and marking. This meeting will facilitate communications, coordinate the marking with actual excavation, and assure identification of high-priority utilities.

- The One-Call Agency should provide the identities of the utility owners that will be notified of the locate request. This information shall be recorded on the Underground Utility Locating and Marking Checklist (Appendix A) and maintained in the project files. The contact person and phone number for each utility owner shall also be recorded.

- The utility owners should provide a "positive response" relative to the locate request, which can consist of two types of action by the utility owner. The facility owner or operator is required to 1) mark it's underground utilities with stakes, paint, or flags, or 2) notify the excavator that the utility owner/operator has no underground utilities in the area of the excavation.

- The positive responses shall be recorded on the Underground Utility Locating and Marking Checklist (Appendix A) and crosschecked with the list of utility owners that the One-Call Agency stated that they would notify. If it is discovered that a utility owner has not provided a positive response, then the One-Call Agency must be notified.

- Excavation shall not be conducted until positive responses have been received from all utility owners identified by the One-Call Agency as having underground utilities on the property.

- Before beginning excavation, the excavator must verify that the location marked was correct, and the distinct, color-coded markings of all utility owners are present.

- Examine the site to check for any visible signs of underground utilities that have not been located and marked such as pedestals, risers, meters, warning signs, manholes, pull boxes, valve boxes, patched asphalt or concrete pavement, areas of subsidence, fresh sod or grass, lack of grass or vegetation, and new trench lines.

- The markings placed by the utility owners should be documented by WESTON using a still, digital, or video camera, whenever practical and reasonable.. The photo-documentation shall be maintained with the project files.

- The markings placed by the utility owners or marking services shall follow the American Public Works Association Uniform Color Code as described in ANSI Standard Z 535.1. This code follows:

American Public Works Association Uniform Color Code

Red		Electric Power Lines, Cables, Conduit
Orange		Communications, Telephone, Cable TV
Yellow		Gas, Oil, Steam, Petroleum or Gaseous Materials
Green		Sewers and Drains
Blue		Potable Water Systems
Purple		Reclaimed Water, Irrigation, Slurry Lines
Pink		Temporary Survey Markings
White		Proposed Excavation

Note: Unless otherwise specified in the utility clearance, such clearance will not be considered valid after 30 days from the date it was issued.

Private Utility Locating and Marking Services

- **One-Call agencies arrange for the identification and marking of underground utilities only on public property, up to the point of contact with private property.** In the event that activities are to be conducted on non-public properties, the presence, location, depth, and orientation of all underground utilities shall be ascertained through records review, including any site plot plans, utility layout plans, and as-built drawings available from the property owner, as well as through interviews with knowledgeable personnel associated with the property. Additionally, the information gathered from these sources shall be verified by physical detection methods (non-aggressive), performance of a geophysical survey, or by procuring the services of a private utility locating and marking service. If any detection methods are to be self-performed, the requirements within this FLD must be followed. **A list of vendors providing this service can be found in the *"Network of Underground Damage Prevention Professionals"* which can be accessed on the Internet at the *"Underspace"* WebPage (http://underspace.com/index.htm).**

Self-Performance of Utility Locating and Marking

The techniques and instruments used to locate and characterize underground utilities can be extremely complicated and difficult to use effectively. Additionally, interpretation of the data generated by this instrumentation can be difficult. The utility marking services, as previously described are staffed by well-trained, experienced professionals who perform locating activities on a regular basis. For these reasons, it is most desirable that these professional services are used for utility location and marking on projects.

- In some instances, such as long-term projects where excavation is a primary task, and the presence of underground utilities is extensive, it may be prudent to self-perform locating and marking activities.
- If locating and marking is to be self-performed, all personnel using instrumentation will be trained on the use of the equipment that will be used, and the interpretation of the data.
- There are variety of locating methods which may be utilized for self-performance of utility locating as categorized below:
  - Magnetic field-based locators or path tracers
  - Buried electronic marker systems (EMS)
  - Ground penetration radar-based buried –structure detectors
  - Acoustics-based plastic pipe locators
  - Active probes, beacons, or sondes for non-metallic pipes
  - Magnetic polyethylene pipe
- Before self-performing any underground utility locating on a project, approval must be obtained from the appropriate WESTON Division EHS Manager or the Director, Corporate EHS and QA.

Working Near or Around Underground Utilities

After the site has been properly evaluated for the presence of underground utilities, intrusive activities may begin. Since there is no perfect way of eliminating the hazards presented by underground utilities, an effort must be made to perform the tasks following the direction and guidance as described by the following best practices that should be implemented during the execution of the project.

Work Site Review

Before beginning intrusive activities, a meeting shall be held between all members of the project team. This shall consist of a review of the marked utility locations with the equipment operators, observers, laborers, etc.

Preservation of Marks

During excavation, efforts must be made to preserve the markings placed by the utility owners until they are no longer required. If any markings are obliterated, the One-Call Agency must be contacted for re-marking. No intrusive activities are to take place if markings are not visible.

Excavation Observer

Whenever intrusive operations are being conducted within four feet of the edge of the buffer zone, an observer must be assigned to monitor the activities. The observer will be designated each day, and a review of hand signals and other forms of communication between the observer and operator will be conducted. The directives of the observer will be followed precisely and immediately by those operating equipment.

Excavation Within The Buffer Zone

Performing intrusive activities within the buffer zone requires careful adherence to proper guidelines and procedures to minimize the risk of contact with underground utilities.

The purpose of the buffer zone is to designate and define an area where careful, prudent, and reasonable excavation practices are to be used to prevent contact with underground utilities. However, there may be occasions where it is necessary to perform aggressive excavation methods in this designated area.

The boundaries of the buffer zone will be observed at all times during intrusive activities. Aggressive excavation methods (excavators, backhoes, drill rigs) must be restricted to areas outside of the 4-foot buffer zone unless a special exemption to this requirement is obtained.

Consider whether the objective of the project can be completed without performing intrusive activities in the buffer zone at all. This will greatly reduce the risks presented by performing work in close proximity to underground utilities. If after consideration, the determination is made that intrusive activities in the buffer zone are necessary, then a formal exemption request shall be made to the Division EHS Manager according to the guidelines below.

A request to utilize aggressive excavation methods in the buffer zone may be made if:

- There is no other appropriate and reasonable alternative to using aggressive methods in the buffer zone; and
- The utility has been de-energized (and purged if necessary), verified as de-energized, and locked-out;

  Or

  The depth and orientation of the utility has been adequately and visually determined through the use of non-aggressive methods such as air/hydro/vacuum excavation, potholing, probing, hand-digging, or a combination thereof; and
- For utilities containing electrical energy, the depth of the existing water table is below the location of the utility; and
- Request for the exemption has been submitted to the appropriate Division EHS Manager and approved.

The following conditions will apply to this request:

- Aggressive methods may be used in the buffer zone only to the extent allowed by the applicable state or other jurisdictional regulations.
- Appropriate physical protection measures for exposed utilities shall be implemented to eliminate the potential for equipment contact with utilities.
- The extent of the project excavation area to be covered by the exemption request must be specified in the request for exemption.
- When evaluating the use of aggressive excavation methods in the buffer zone, the Division EHS Manager will consider the type of utility involved and the associated risk potential. Based on this evaluation, the Division EHS Manager may impose further conditions and requirements. Even if the above exemption conditions are met, the Division EHS Manager has authority to deny the request, the reasons for which will be provided at the time of denial.

Unless exempted according to the above provisions of this procedure, only non-aggressive methods may be used within the buffer zone. Non-aggressive, or non-mechanized equipment is used in order to prevent mechanical contact with underground utilities, which could result in damage to the utility and create the potential for personal injury and property damage. Following are examples of non-aggressive excavation methods:

- Hand-digging
  - Non-conductive hand tools must be used when digging within the buffer zone surrounding underground electrical utilities.
  - If conductive hand tools must be used near electrical lines, then the SHSC shall be consulted to determine additional requirements relative to safe electrical practices, procedures, and equipment.

- Hydro-excavation (water pressure).
- Air excavation (air pressure).
- Vacuum extraction (soil excavation/removal).
- Air excavation/vacuum extraction combination.
- Aggressive methods may be used for the removal of pavement over a utility, if allowed by the state regulations.

Protection of Underground Utilities

It is very important that consideration be given to the protection of underground utilities when performing adjacent intrusive activities. This is necessary not only to prevent physical damage and associated indirect effects, but also to prevent the potential for injury to employees and the public.

- When using aggressive excavation methods within the buffer zone around exposed underground utilities, physical protection must be used as required by OSHA in 29 CFR 1926.651. Basically, this involves creation of a physical barrier between the mechanized operation and the utility. The following are some possible types of physical protective measures:
    - Heavy timbers, similar to swamp mats.
    - Sheets of plywood.
    - Blasting mats.
- Once exposed, underground utilities no longer have the support provided by surrounding soil and may need to be physically supported to prevent shifting, bending, separation, or collapse, which could result in damage to the utility, and possibly personnel. Following are suggested support methods:
    - Timber shoring underneath the utility.
    - Timbers or girders over the top of the excavation fitted with hangers that support the utility.
    - Design by a PE for complicated or large applications.
- Utilities must also be protected from objects that may fall into the excavation such as rocks and equipment. This can be accomplished by following these guidelines:
    - Cast spoils as far away from the excavation as possible. Excavated and loose materials shall be kept two feet from the edge of excavations, as required by OSHA.
    - Relocate large rocks, cobbles, and boulders away from the excavation and sloped spoils piles.
    - When vehicles and machinery are operating adjacent to excavations, warning systems such as soil berms, stop logs or barricades shall be utilized to prevent vehicles from entering the excavation or trench.

- Scaling or barricades shall be used to prevent rock and soils from falling into the excavation.

- Barriers shall be provided to prevent personnel from inadvertently falling into an excavation.

De-Energizing Utilities

Utilities can carry many types of potential energy, including electricity, flowing liquids, liquids under pressure, gasses under pressure, etc. A release, such as may happen if a utility conveyance is compromised, could result in personal injury, property damage, and other indirect effects. If the white lines of the proposed excavation area overlaps or extends into the buffer zone of a known underground utility, then if at all possible, that utility shall be de-energized to physically prevent the transmission, flow, or release of energy. Conversely, if the buffer zone of the known utility lies outside of the white-lined, proposed excavation area, then de-energization is not required.

- The owner of the utility shall be contacted to determine the feasibility and methodology of de-energizing the utility. Plenty of lead-time should be provided for this since it may take utility companies weeks to de-energize some utilities.

- Depending on the utility and the material being conveyed, isolation points which may be suitable for de-energizing include but are not limited to the following:

  - Electrical circuit breakers
  - Slide gate
  - Disconnect switches
  - Piping flanges
  - Other similar devices

- When utilities are de-energized, it must be verified by demonstration. This can be accomplished by testing equipment, switching on a machine or lighting, opening a valve, etc. For any current-carrying electrical equipment, such as cables, electrical panels, etc., successful de-energization must be certified through the use of appropriate electrical testing equipment.

- Whenever a utility is de-energized, a means of ensuring that the energy isolation device and equipment cannot be operated until the device is removed must be provided. Typically, this is achieved by utilizing a lockout device, accompanied by a written tag, that physically controls the configuration of the energy isolation point. Lockout devices include but are not limited to the following:

  - Locks
  - Chains
  - Valve covers
  - Circuit breaker hasps
  - Blind flanges
  - Slip blinds, and
  - Multiple lock hasps

- When de-energizing and locking out of utilities is practiced, the provisions of FLD 42 Lockout/Tagout shall be followed, as applicable.

- In the event that a utility is de-energized, but there is no means of adequately providing a physical locking-out of the utility, then a spotter must be posted at the point of isolation to ensure that the utility is not re-energized. The spotter must be supplied with a communication device such as a site radio.

Damage Discovery

During excavation, utility damage may be discovered which is pre-existing or otherwise not related to a known contact. Disclosure to the utility owner is very important because the possibility of utility failure or endangerment of the surrounding population increases when damage has occurred. The utility may not immediately fail as a result of damage, but the utility owner or operator must be afforded the opportunity to inspect the utility and make a damage assessment and effect repairs if necessary. The following guidance applies:

- Observe and photograph the utility from a safe distance and determine if there is damage. Damage would be all breaks, leaks, nicks, dents, gouges, grooves, or other damages to utility lines, conduits, coatings, or cathodic protection systems.
- The One-Call Agency or private location service must be contacted immediately.
- A Notification of Incident (NOI) Report should be used to document such a discovery.

Encountering or Contacting Underground Utilities

In the event that encountering or contacting an underground utility occurs, it is imperative that the appropriate actions are taken to minimize damage to the utility, prevent personal injury, and minimize indirect effects.

Encountering Underground Utilities

It is possible that underground utilities will be encountered in locations that have previously been "cleared" of having underground utilities by the locating service, or are found outside of the area, which has been marked as having underground utilities. In either case, if this occurs, the following applies:

- Site personnel must be warned and moved to a safe location; equipment engines and ignition sources should be turned off, if possible, as the operator is exiting his/her equipment.
- Intrusive activities must be stopped
- The One-Call Agency or private location service must be contacted immediately
- The PM, SM and SHSC must be notified
- No further intrusive activities may be conducted until:
    - The One-Call Agency/private location service and/or the subject utility owner visit the site;
    - Identification of the utility owner and the type of material/energy being conveyed by the utility has been made; and

- The orientation and depth of the subject utility has been determined and suitably marked.

- A WESTON Notification of Incident (NOI) Report and Investigation form must be completed. The report should be accompanied by photographs clearly showing the marking(s), and the actual location, with a distance gauge to document how far off the mark the utility was encountered.

- Any exceptions to, or deviations from these requirements must be reviewed and approved by the appropriate Division EHS Manager (e.g., abandoned lines at certain Brownfield sites that may be encountered an confirmed as abandoned/not active).

Contacting Underground Utilities

If excavation or other equipment being used for intrusive activities makes contact with an underground utility, the following guidelines apply:

- Site personnel must be warned and moved to a safe location; equipment engines and ignition sources should be turned off, if possible, as the operator is exiting his/her equipment.

- Intrusive activities must be stopped immediately.

- Observe the utility from a safe distance and determine if there is damage. Damage would be all breaks, leaks, nicks, dents, gouges, grooves, scratched coatings, cathodic protection compromise, material leakage, obvious electrical energy.

- Move all personnel to the evacuation meeting point as described in the HASP.

  EXCEPTION: If an electrical line has been contacted and it is your belief that equipment (such as an excavator) is electrically energized, do not approach the equipment. Order the operator to remain in the equipment until emergency personnel can de-energize the source (unless the equipment is on fire, at which time the operator should jump off of the vehicle and shuffle along the ground to a safe area). Shuffling is required because current flows outward through the soil in a ripple pattern called a power gradient, creating a pattern of high and low potential, Shuffling decreases the chance that these gradients could be bridged, causing current to flow through the body, resulting in electrocution.

- Secure the area to prevent the public from entering.

- Contact emergency responders as specified in the HASP.

- The One-Call Agency or if known, the utility owner must be contacted immediately.

- The PM, SM and SHSC must be notified.

- No further intrusive activities may be conducted until:

  - The utility owner inspects the scene and after repairs, verifies that all danger has passed.

  - The orientation and depth of the subject utility has been determined and suitably marked.

- Permission from the emergency responders to resume work has been given.

- A WESTON Notification of Incident (NOI) Report and Investigation form must be completed. The report should be accompanied by photographs clearly showing the marking(s), and the actual location, with a distance gauge to document how far off the mark the utility was encountered.

- State and Local regulations must be reviewed to determine if reporting to any additional agencies is required.

Training

Competent Persons shall have adequate experience and/or training to carry out the requirements of this procedure.

SOURCES OF INFORMATION

Organizations

- Common Ground Alliance
  http://www.commongroundalliance.com/wc.dll?cga~toppage

- Center for Subsurface Strategic Action (CSSA)
  http://underspace.com/cs/index.htm

- DigSafely
  http://www.digsafely.com/digsafely/default.asp

- National Utility Contractors Association (NUCA)
  http://www.nuca.com/

- National Utility Locating Contractors Association (NULCA)
  http://underspace.com/nu/index.htm

- Underground Focus Magazine
  http://underspace.com/uf/index.htm

- NUCA State Listing of One-Call centers
  http://www.nuca.com/

- Utility Safety Magazine
  http://www.utilitysafety.com/

Vendors and Commercial Sites

- RadioDetection, Inc. (Detection Instruments)
  http://www.radiodee.com/

- Heath Consultants (Detection Instruments)
  http://www.heathus.com/

- Ben Meadows Company (Detection Instruments)
  http://www.benmeadows.com/cgi-bin/SoftCart.exe/index.html?E+scstore

- So-Deep, Inc. (Complete Utilities Services)
  http://www.sodeep.com/

- Concept Engineering Group, Inc. (Air Excavation Equipment)
  http://www.air-spade.com/index.html

- Rycom Instruments, Inc. (Detection Instruments)
  http://www.rycominstruments.com/

- Schonstedt Instrument Company (Detection Instruments)
  http://www.schonstedt.com/

- Forestry Suppliers, Inc. (Fiberglass Probe – "Fiberglass Tile Probe", Part #77543, Approx. $20.00, Telephone 800-647-5368)
  http://www.forestry-suppliers.com/

REFERENCES

- Common Ground Study of One-Call Systems and Damage Prevention Best Practices, August, 1999, Sponsored by US DOT.

ATTACHMENTS

Attachment A – Underground Utilities Locating and Marking Checklist
Attachment B – Underground Utilities Management Checklist

FLD 34 UTILITIES - ATTACHMENT A
UNDERGROUND UTILITY LOCATING AND MARKING CHECKLIST
Weston Solutions, Inc.
To be Completed by PM and/or "Competent Person"
Complete Form as Location/Marking Progresses and Maintain in Site Files

PROJECT INFORMATION:	Location:
Project Name:	Task/Activity:
Weston Competent Person:	Start Date of Work:
Weston Subcontractor: ☐ No ☐ Yes:	Private Locating Service Required: ☐ Yes ☐ No
Property Owner:	If Not, Explain:
NOTIFICATION:	
Locating Service Name:	Locating Service Tel. Number:
Date Locating Service Notified:	Locate Ticket Number:
Address of Property to be Marked:	Locate Ticket Expiration Date:
Nearest Intersecting Street:	
Are There Any Utilities on the Properties That the Locating Service Will Not Contact? ☐ Yes ☐ No	
Specify:	
Enter Utility Information in Table 1 Below. In Addition to Utility Locating Services, Consult Client, Utility Owners, Drawings, Facility Personnel, Maintenance Personnel, Municipalities, etc.	

TABLE 1
ON-SITE UTILITY INFORMATION

NAME OF UTILITY COMPANY	TYPE OF UTILITY	COLOR CODE	UTILITY PRESENT ON-SITE?	EMERGENCY PHONE NUMBER	DATE MARKS COMPLETED
	Electric	RED			
	Communications, Phone, CATV	ORANGE			
	Gas, Oil, Steam, Petroleum	YELLOW			
	Sewers, Drains	GREEN			
	Potable Water	BLUE			
	Reclaimed Water, Irrigation	PURPLE			
	Temporary Survey Markings	PINK			
To be performed by excavator prior to utility mark-out.	Proposed Excavation	WHITE			

White-Lining Completed? ☐ No Explain: _____ ☐ Yes: Date: _____ By Whom? _____

LOCATING AND MARKING:

Have All Utilities Identified in Table 1 Been Marked? ☐ Yes ☐ No (If Not, Contact Locating Service for Resolution)
Problem(s) With Markings?
☐ Yes ☐ No ☐ No Marks ☐ Incorrect Location ☐ Too Wide
☐ Other: _____ ☐ Not All Utilities Marked Per Table 1 (notify marking service)
Measurements Taken: ☐ Yes ☐ No
Documentation of Marks: ☐ Photos ☐ Video ☐ Other: _____

EXCAVATION:

Utilities Accurately Marked? ☐ Yes ☐ No
If no, describe: _____
Were Unmarked or Mis-Marked Utilities Encountered? ☐ Yes ☐ No
If Yes, Specify: _____
Locating Service Notified? ☐ Yes ☐ No
Will Excavation Continue Past Locate Number Expiration? ☐ Yes ☐ No
If Yes, Locate Number Renewed? ☐ Yes ☐ No New Expiration Date: _____
Any Other Problems/Concerns? Specify: _____

Form Completed By:	Signature:	Date:

FLD 34 UTILITIES - ATTACHMENT B
UNDERGROUND UTILITIES MANAGEMENT CHECKLIST
Weston Solutions, Inc.
To be Completed by PM and/or "Competent Person"
Complete Form as Project Progresses and Maintain in Site Files.

PHASE		TASK	YES	NO	NA	COMMENTS Required if Response is No or NA. (Reference Item Number)
Pre-Planning	1.	Excavation in Work Scope?				
	2.	Underground Utilities Identified?				
	3.	Competent Person Assigned?				
	4.	Has a Copy of the Applicable State Regulations Been Obtained, Read, Understood?				
	5.	EHS Plan Addresses Underground Utilities? (AHAs, Contingency Plan, State Regulations Appendix)				
Identifying, Locating and Marking	6.	Locating and Marking Checklist Initiated? (Attachment A)				
	7.	Identification and Address of Property Determined, Including Nearest Intersection?				
	8.	One-Call Agency Contacted?				
	9.	Additional Locating and Marking Required on Property? (One-Call agency marks to public property line only)				
	10.	Additional Marker/Locator Identified?				
	11.	Additional Marker/Locator Qualified?				
	12.	Weston Self-Performing Location and Marking?				
	13.	If Yes to 12 Above, Approval From Division EHS Manager?				
	14.	Area of Excavation "White-Lined" by WESTON?				
	15.	WESTON Present When Markings Completed?				
	16.	All Utilities Marked? (Refer to Attachment A, Table 1)				
	17.	All Markings Photo/Video Documented?				
	18.	Area Checked for Signs of Previous Excavation? (Subsidence, new grass, patching, etc)				
	19.	All Applicable Information Recorded on Attachment A?				
	20.	Multiple Contractors Excavating On-Site?				
	21.	Separate Locate Requests for All Contractors?				
	22.	WESTON Subcontractors Excavating in WESTON White-Lined Area(s)?				
	23.	If Yes to 22 Above, One-Call Agency Contacted to Determine if WESTON Subcontractor Can be Added to Existing Locate Ticket?				
Excavation Activities	24.	Meeting and Site Walkover Conducted with Project Personnel? (Managers, Equipment Operators, Laborers, Competent Person, Excavation Observer, etc)				
	25.	AHA and HASP Review Conducted With Personnel?				
	26.	Do Site Activities Have Potential to Obliterate Utility Markings?				
Excavation Activities – Cont'd	27.	If Yes to 26 Above, Have Provisions Been Made to Preserve Markings?				

PHASE		TASK	YES	NO	NA	COMMENTS Required if Response is No or NA. (Reference Item Number)
	28.	Has an Excavation Observer Been Designated to Monitor Excavation When Occurring within 4 Feet of the Buffer Zone?				
	29.	Have Operator and Observer Reviewed Commands and Signals?				
	30.	Has WESTON-Required 4-Foot Buffer Zone Been Marked on Either Side of Markings Placed by Locator?				
Excavation Within Buffer Zone	31.	Is Excavation Within The Buffer Zone Absolutely Necessary?				
	32.	If Yes to 31 Above, Can Non-Aggressive Methods Be Used For Excavation In The Buffer Zone? If Yes, Identify Appropriate Non-Aggressive Methods.				
	33.	If No to 32 Above, Has a Buffer Zone Exemption Request Been Approved? If No, then Aggressive Methods May Not Be Used in The Buffer Zone.				
	34.	If Yes to 33 Above, Has the Utility Been De-Energized, Purged, Verified/Tested, and Locked-Out? Or, Has The Depth and Orientation of the Utility Been Adequately and Visually Determined Through The Use of Non-Aggressive Methods?				
	35.	If Yes to 34 Above, Have All of The Following Conditions Been Met? For Utilities Containing Electrical Energy, Is The Depth of The Water Table Below The Depth of The Utility? Have Regulations Been Consulted to Determine Specific State Requirements Relative to Excavating in The Buffer Zone? Have Appropriate Physical Protection Measures Been Implemented to Prevent Equipment Contact With Utilities and to Prevent Damage to Utilities? If No to Any of The Above Conditions, Then Only Non-Aggressive Excavation Methods May Conducted in The Buffer Zone, Since The Conditions of The Exemption Have Not Been Satisfied.				
Working Around Exposed Utilities	36.	If Necessary, Have Provisions Been Made to Support the Utility During Work Activities?				
	37.	Have Spoils Been Placed as far Away From the Excavation as Feasible?				
	38.	Has the Utility Been De-Energized? (If Any Portion of the 4-Foot Buffer Zone around a Utility is Inside of the White-Lined Area)				
	39.	Has the Isolation Point for the De-Energized Utility Been Physically Locked-Out?				
Working Around Exposed Utilities – Cont'd	40.	If No to 39 Above, Has a Spotter Been Assigned to Monitor Isolation Point?				
	41.	If Yes to 40 Above, Does the Spotter Have Adequate Communications? (Radio, Telephone, etc)				
	42.	Has the Isolation Point Been Tagged?				
Damage Discovery	43.	Has Pre-Existing Damage to a Utility Been Discovered During Excavation?				

PHASE		TASK	YES	NO	NA	COMMENTS Required if Response is No or NA. (Reference Item Number)
	44.	If Yes to 43 Above, Has the One-Call Agency and/or Utility Owner Been Notified?				
	45.	If Yes to 43 Above, Have Photographs Been taken?				
Encountering or Contacting Underground Utilities	46.	Have Utilities Been Encountered in Locations That Have Not Been Marked?				
	47.	If Yes to 46 Above, Has the One-Call Agency or Other Locating Service Been Contacted?				
	48.	If Yes to 46 Above, Has the PM and PESM Been Notified?				
	49.	If Yes to 46 Above, Has a WESTON Notification of Incident (NOI) Report Been Completed? (Include Photographs)				
	50.	Have Excavation Equipment Come In Contact With Underground utilities?				
	51.	If Yes to 50 Above, Were Intrusive Activities Immediately Curtailed?				
	52.	If Yes to 50 Above, Has a Damage Determination Been Made From a Safe Distance?				
	53.	If Yes to 50 Above, Has the Area Been Secured?				
	54.	If Yes to 50 Above, Have Emergency Responders Been Notified?				
	55.	If Yes to 50 Above, Has the Locating Agency and/or Utility Owner Been Notified?				
	56.	If Yes to 50 Above, Have State and Local Reporting Requirements Been Met?				
	57.	If Yes to 50 Above, Were Intrusive Activities Curtailed Until; Inspection From Utility Owner, Orientation and Depth of Utility Was Determined and Marked, Permission From Emergency Responders Given?				
	58.	If Yes to 50 Above, Has a WESTON Notification of Incident (NOI) Report Been Completed? (Include Photographs)				

CHECKLIST COMPLETED BY:

NAME	SIGNATURE	DATE
NAME	SIGNATURE	DATE

FLD 38 HAND AND POWER HAND TOOLS

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GENERAL

REFERENCES

Related FLD OPS:

FLD01 – Noise Protection
FLD02 – Inclement Weather
FLD08 – Confined Spaces Entry
FLD09 – Hot Work
FLD10 – Manual Lifting and Handling of Heavy Objects
FLD12 – Housekeeping
FLD16 – Compressed Gases
FLD22 – Heavy Equipment Operation
FLD24 – Aerial Lifts/Manlifts
FLD29 – Materials Handling
FLD30 – Hazardous Materials Use and Storage
FLD31 – Fire Prevention/Protection/ Response Plans
FLD32 – Fire Extinguishers Required and Requirements
FLD34 – Utilities
FLD35 – Electrical Safety

PROCEDURE

Work with other than the simplest non-powered hand tools shall be performed only by those persons competent by reason of formal training or documented experience.

Unsafe hand tools shall not be issued or used. All hand tools will be kept in good repair and used only for the purposes for which they were designed. Wrenches with sprung jaws, where slippage could occur, impact tools with mushroomed heads, and wooden handled tools with cracks or splinters are examples of unsafe hand tools.

Tools having defects that will impair their strength or render them unsafe will be tagged or made inoperable and removed from service.

Guards must be in place during operation on all power tools designed to accommodate them. Guards and safety devices must remain in place on power tools unless removed according to manufacturer's instruction for maintenance by a competent person and must be replaced before use. Belts, gears, shafts, drums, flywheels, chains or other rotating, reciprocating, or moving parts exposed to employee contact, or representing other hazards, must be guarded.

Proper personal protective equipment (PPE) must be used when operating power tools or hand tools that may produce projectiles, cuts or abrasions, dusts, fume, mists, or light, or which pose a risk of harm to arms, legs, or feet if dropped.

Throwing tools or materials from one location to another, from one person to another, or dropping them to lower levels, is not permitted.

Only nonsparking tools will be used in locations where sources of ignition may cause a fire or explosion.

Power tools will be inspected, tested, and determined to be safe for operation prior to use. Continued periodic inspections will be made to ensure safe operating condition and proper maintenance.

Electric powered tools must be approved double-insulated or grounded in accordance with 1926.404.

Rotating or reciprocating portable power tools will have a constant pressure switch that will shut off the power when the tool is released by the operator. A portable power tool may have a lock-on control provided turn-off can be accomplished by a single motion of the same finger or fingers that turned it on.

Hydraulic fluid used in powered tools will retain its operating characteristics at the most extreme temperatures to which it will be exposed.

Manufacturer's safe operating pressures for hydraulic hoses, valves, pipes, filters, and other fittings will not be exceeded.

All hydraulic or pneumatic tools that are used on or around energized lines or equipment will have nonconducting hoses having adequate strength for the normal operating pressures.

Loose and frayed clothing, dangling jewelry, rings, chains, and wrist watches will not be worn while working with any power tool or machine. Long hair will be tied back or otherwise secured.

All woodworking tools and machinery will meet applicable requirements of American National Standards Institute (ANSI) 01.1, Safety Code for Woodworking Machinery.

Extension cords:

- Must meet Underwriter's Laboratory (UL) or other rating criteria according to Occupational Safety and Health Administration (OSHA).
- Use will be limited to essential tasks.
- Must be tested for continuity before each use and must be connected to grounded outlets, or ground fault current interrupters must be used.
- Must be inspected daily for loose insulation, broken or missing plugs, bared wires, or other hazards.
- Grounding of outlets used for portable tools must be confirmed before use.
- Must not be allowed to become tripping or slipping hazards.
- Must not be used for lifting or tying off, and shall be disconnected by pulling on the plug.

Any piece of equipment used for lifting materials or personnel shall be used and maintained in strict accordance with manufacturer's directions and applicable OSHA regulations.

Load limits will be visibly posted on all lifting devices.

Only operators with demonstrated competence shall be permitted to operate lifting devices.

Lifting machinery, and all elements of equipment involved in lifting or supporting loads, must be inspected prior to use and then monthly, at a minimum. Inspections must be performed by a competent person and must be documented.

Revised 11/1999

FLD 43 BIOLOGICAL HAZARDS

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GENERAL

Response personnel may encounter biological hazards that include endemic hazards as follows: animals, insects, molds and fungus, and plants. In addition, hazardous waste site personnel may be exposed to etiological agents (infectious diseases).

Endemic Biological Hazards

An important part of health and safety planning and protection includes identifying and understanding local flora and fauna. Animals, insects, molds and fungus, and poisonous plants vary from site to site, their likelihood of causing harm also varies. Risk assessment and protection protocol determinations include knowing the how, where and what of hazardous types of plants, animals, insects, or molds and fungus.

Animals

Animals represent hazards because of their poisons or venoms, size and aggressiveness, diseases transmitted, or the insects they may carry.

Poisonous snakes are common across the U.S. The major variables are the likelihood of encounter and the snake likely to be encountered. Encounters with snakes may be caused by moving containers, reaching into holes, or just walking through high grass, swampy area, or rocks.

Key factors to working safely include being alert, using care when reaching into or moving containers, and being familiar with the habits and habitats of snakes in the vicinity of an incident or site.

A snake bite warrants medical attention after administration of proper first aid procedures. Landfills and abandoned buildings often attract stray or abandoned dogs. These animals often become pack oriented, very aggressive, and represent serious risk of harm to unprotected workers.

Workers entering abandoned buildings should be alert for such animals and avoid approaching them since this may provoke aggressive behavior. Avoidance and protection protocols include watching for animal dens, using good housekeeping, and using repellents.

Animal borne diseases include rabies (generally found in dogs, skunks, raccoons, bats, and foxes). Rabies varies from area to area as do the animals most likely to be rabid.

Questions and Answers about Rabies

Q. *What is Rabies and how is it transmitted?*

A. Rabies is a viral infection most often transmitted by bites of animals infected with the virus.

Q. *What animals are most likely to be infected?*

A. Skunks, raccoons, foxes, and bats are wild animals most frequently found to be infected with rabies; however, any warm blooded animal can be infected. Squirrels, groundhogs, horses, cattle, and rabbits have been tested positive for rabies. Dogs and cats are frequently rabies-infected if not immunized.

Q. How can you tell if an animal is rabies-infected?

A. Rabies infection is not always apparent. Signs to look for in wild animals are over aggressiveness or passivity. Spotting animals which are normally nocturnal (active at night) during the day and being able to approach them would be an example of unusual behavior. Finding a bat alive and on the ground is abnormal. The best precaution, however, is to observe wild animals from a safe distance, even if they are injured. Avoid dogs and cats that you do not know.

Q. What should you do if bitten by an animal you suspect is infected with rabies?

A. As quickly as possible, wash the bite area with soap and water, then disinfect with 70% alcohol and seek medical attention for follow-up.

Try to capture the animal. Avoid being bitten again or contacting the mouth or any saliva of the animal. Keep the animal under surveillance and call the police for assistance to capture it.

Have the animal tested. A dead animal believed to be infected should be preserved and tested for rabies. Health departments are often sources where information can be found regarding testing.

Q. Is there a cure for rabies?

A. Rabies is preventable, even after being bitten, if treatment is begun soon enough. Getting prompt medical attention and confirming the rabies infection of an animal are very important.

Rabies is not curable once symptoms or signs of rabies appear.

There are vaccines available that should be considered if a work assignment involves trapping animals likely to carry rabies. Medical consultants must be involved in decisions to immunize workers against rabies.

Hantavirus

WESTON employees or contractors/subcontractors conducting field work in areas where there is evidence of a rodent population should be aware of an increased level of concern regarding the transmission of "Hantavirus"-associated diseases. Hantavirus is associated with rodents, especially the deer mouse (*Peromyscus maniculanis*) as a primary reservoir host. Hantavirus has resulted in approximately a dozen deaths in the southwestern U.S. in recent months. The Center for Disease Control and Prevention (CDC) was concerned that the virus may have been distributed over a larger geographic area than originally suspected.

The Hantavirus can be transmitted by infected rodents through their saliva, urine, and feces. Human infection may occur when infected wastes are inhaled as a result of aerosols produced directly from the animals. They also may come from dried materials introduced into broken skin or onto mucous membranes. Infections in humans occur most in adults and are associated with activities that provide contact with infected rodents in rural/semirural areas.

Hantavirus symptoms begin with one or more flu-like symptoms (i.e., fever, muscle aches, headache, and/or cough) and progresses rapidly to severe lung disease. Early diagnosis and treatment are vital. Personnel involved in work areas where rodents and the presence of the Hantavirus are known or suspected will need to take personal protective measures and to develop an expanded site safety plan. Field personnel involved in trapping or contacting rodents or their waste products will need to wear respirators with HEPA filters, eye protection, Tyvek coveralls, chemical resistant gloves, and disposable

boot covers. Strict decontamination requirements are needed. Double-bag, label, and require specific handling, packaging, shipping, storage, and analytical procedures to minimize the risks of exposure of collected mice. More detailed procedures can be obtained from Corporate Health and Safety.

For employees and facilities in rural/semirural areas: the following risk-reduction strategies are appropriate:

- Eliminate rodents and reduce availability of food sources and nesting sites used by rodents.
- Store trash/garbage in rodent-proof metal or thick plastic containers with tight lids.
- Cut all grass/underbrush in proximity to buildings.
- Prevent rodents from entering buildings (e.g., use steel wool, screen, etc., to eliminate openings).

Insects

Diseases that are spread by insects include the following: Rocky Mountain Spotted Fever or Lyme Disease (tick); Bubonic Plaque (fleas); Malaria, and Equine Encephalitis (mosquito).

Lyme Disease is the second most rapidly spreading disease in the U.S.

Lyme Disease

1. <u>Facts</u>

   - Definition:
     - Bacterial infection transmitted by the bite of a deer tick.
     - Prevalence (nationwide and other countries).
   - Three stages/sizes of deer ticks:
     - Larvae
     - Nymph
     - Adult
   - Tick season is May through October.
   - Not all ticks transmit Lyme Disease.
   - Ticks must be attached for several hours before Lyme Disease can be transmitted.
   - Being bitten by a tick does not mean you will get Lyme Disease.

2. <u>Prevention and Protection:</u>

   - Wear light-colored, tight-knit clothing.
   - Wear long pants and long-sleeved shirts.
   - Tuck pant legs into shoes or boots.
   - Wear a hat.
   - Use insect repellant containing DEET (follow manufacturer's instructions for use).

- Check yourself daily for ticks after being in grassy, wooded areas.
- Request information from the Health and Safety Medical Section regarding Lyme Disease.

3. <u>If Bitten:</u>

- Remove the tick immediately with fine-tipped tweezers. Grasp the tick as close to the skin as possible. Pull gently but firmly without twisting or crushing the tick.
- Wash your hands and dab the bite with an antiseptic.
- Save the tick in a jar in some alcohol. Label the jar with the date of the bite, the area where you picked up the tick, and the spot on your body where you were bitten.
- Monitor the bite for any signs of infection or rash.

4. <u>Symptoms:</u>

Early Signs (may vary from person to person)

- Expanding skin rash.
- Flu-like symptoms during summer or early fall that include the following:
  - Chills, fever, headache, swollen lymph nodes.
  - Stiff neck, aching joints, and muscles.
  - Fatigue.
- Later signs
  - Nervous system problems.
  - Heart problems.
  - Arthritis, especially in knees.

5. <u>Upon Onset of Symptoms:</u>

- Notify your Safety Officer (SO) <u>and</u> your supervisor.
- Submit incident report form.

A sensitivity reaction is one of the more dangerous and acute effects of insect bites or stings. It is the most common cause of fatalities from bites, particularly from bees, wasps, and spiders. Anaphylactic shock due to stings can lead to severe reactions in the circulatory, respiratory, and central nervous system. This can also result in death.

Site personnel must be questioned regarding their allergic reaction to insect bites. Anyone knowingly allergic should be required to carry and know how to use a response kit. First aid providers must be instructed on how to use the kit also. The kit must be inspected to ensure it is updated.

Administer first aid and observe persons reporting stings for signs of allergic reaction, such as unusual swelling, nausea, dizziness, and shock. At the first sign of these symptoms, take the individual to a medical facility for attention.

Fire ants are small red ants found primarily in southern and western states. There is some indication that if bitten a person may show allergic reaction in addition to severe pain.

It is important to note that animals may serve as hosts for insects which may spread diseases. Ticks carrying Lyme disease and Rocky Mountain spotted fever are found on grass, but may be carried on animals. Bubonic plague, which has emerged in parts of Colorado, New Mexico, and Arizona, is associated with fleas found on prairie dogs.

Other insect hazards include mosquitos and scorpions. There have been articles published recently indicating increases in encephalitis in Florida. Encephalitis is reportedly spread by mosquitos. The local health department should be contacted prior to working in areas where WESTON does not have good information about potential biological hazards.

Molds and Fungi

In addition to the previously discussed animal inhabitants of old buildings, which are often part of hazardous materials sites, birds often invade the buildings leaving behind debris and droppings which may contain molds and fungi in dry forms. Inhalation of this easily airborne dust can result in serious lung disease such as histoplasmosis.

There is a fungus that grows in soil indigenous to the San Joaquin Valley, parts of southern California, Arizona, and New Mexico. This organism can produce a disease called "Fever", "Valley Fever", or, technically, Coccidiomycosis when inhaled. Growing up in infected areas apparently provides a degree of resistance, which newcomers to the areas do not have.

Awareness of a hazard and the prudent use of respiratory protection are key factors to protection.

Plants

Toxic effects from plants are generally caused by ingestion of nuts, fruits, or leaves. Response personnel should also be concerned with plants like poison ivy, poison oak, and poison sumac, that produce adverse effects from direct contact. The usual effect is dermatitis or inflammation of the skin. The protective clothing and decontamination procedures used for chemicals also reduce the exposure risk from the plant toxins. Risk can be reduced by cleaning the skin thoroughly with soap and water after contact.

Biological Agents

Microbial hazards can occur when the materials handled by workers contain biological contamination. Biological contamination can be a problem if a chemical spill is mixed with sewage. Most bacteria that affects humans prefer a neutral environment (pH 7). Thus, an extremely acid or alkaline environment should destroy or inhibit bacterial growth. However, during neutralization, the environment could become more conducive to bacteria growth. In these situations, normal decontamination procedures will usually alleviate problems associated with worker contamination, although additional decontamination measures may be required for certain biological exposures.

Another source of infection for response workers is poor sanitation. Waterborne and foodborne diseases can be a problem if adequate precautions are not taken. Examples of waterborne diseases are cholera, typhoid fever, viral hepatitis, salmonellosis, bacillary dysentery, and amoebic dysentery. In an emergency response related to a disaster, water supplies may be affected. The source of water for a long-term remedial action is also important. In some locations, it may be necessary to transport water and food to the site. The food and water must be handled properly and come from an uncontaminated source.

The response team must also avoid creating any sanitation problems by making sure that properly designed lavatory facilities are available at the work site. Note that OSHA requires proper sanitation measures and potable water at temporary job sites.

Tetanus is another form of biological hazard encountered on hazardous materials sites. Workers must be careful to avoid puncture hazards, wear appropriate protective clothing, and have current tetanus inoculations.

Medical wastes may be encountered on hazardous materials sites. Agents may be present in this waste that are still capable of causing infection. Generally, procedures for protection against chemical hazards are sufficient to protect workers. Full enclosure chemical protective clothing may be appropriate since these organisms may have the ability to penetrate the skin. One additional precaution is to use bleach or some other equivalent agent capable of destroying the biological organisms in the decontamination procedure.

Bloodborne Pathogens

In July of 1992, OSHA issued a final Standard for Protection of Workers Potentially Exposed to Bloodborne Pathogens (29 CFR 1910.1030). This standard primarily involves medical and research personnel and their exposure to blood or blood-containing fluids infected with Bloodborne Pathogens. Bloodborne pathogens are pathogenic microorganisms that may be present in human blood and may cause disease in humans. These pathogens include, but are not limited to, Hepatitis B Virus (HBV) and Human Immunodeficiency Virus (HIV).

These HIV and HBV organisms could potentially be present in viable states on hazardous waste sites, with Hepatitis Virus being the more likely to survive in temperatures outside the body temperature ranges.

The other potential for exposure would be to workers who could be infected. The OSHA Standard specifically includes first aid providers among workers covered by this standard.

The basic concept of this Standard is that medical care first aid workers must take the **"universal precaution"** of assuming that any blood-containing fluid, person bleeding, or equipment contaminated with blood are infected with both viruses.
Protection involves use of personal protection such as gloves, gowns, eye shields, surgical masks, one-way valve rescue breather devices. It also involves training, disinfectants, and decontamination.

Workers expected to administer first aid must have a basic understanding of Bloodborne Pathogens in order to protect themselves effectively from any hazards.

Completion of safety plans requires identification of and assessment of risk of exposure to biological hazards. This program deals primarily with two forms of infection (Hepatitis B Virus (HBV) and Human Immunodeficiency Virus (HIV)), which are of concern to workers who may come in contact with bodily fluids associated with blood.

At a minimum, WESTON's Bloodborne Pathogen Exposure Control Plan will be on site and implemented for each project for first aid providers. If medical waste is anticipated on a site, WESTON's Employee Exposure Control Plan for Hazardous Waste Workers will be implemented.

Hepatitis B Virus

Definition — The term "hepatitis" simply means an inflammation of the liver. This condition can be

caused by a wide variety of agents including medications, alcohol, toxic or poisonous substances, and infectious agents such a viruses. Hepatitis B, formerly known as "serum" hepatitis, is the only form of viral hepatitis that poses a significant occupational threat in the health care environment.

Symptoms — HBV is a disease that causes liver damage, the severity of which can range from mild or even inapparent to severe or fatal. Of the infected individuals, 6-10% will become HBV carriers. Carriers are at risk of developing chronic liver disease, including active hepatitis, cirrhosis and primary liver cancer. Carriers are also infectious to others (USHHS and NIOSH, 1989).

Sources of Infection — The Hepatitis B virus has been isolated from various body fluids including blood, semen, vaginal secretions, breast milk, saliva, and serous fluid. Within the health care setting, however, Hepatitis B is thought to be transmitted primarily by percutaneous or permucosal blood through needle sticks or the splashing of blood or blood-tinged body fluids into the eyes or mouth.

Risk — There is a direct relationship between the likelihood of occupational Hepatitis B infection and the frequency of blood contact. Health care professionals (surgeons, operating room-staff, pathologists, and emergency room personnel) exhibit a high incidence of exposure to Hepatitis B infection. The frequency of blood contact determines the level of risk.

Protective Measures

Protective measures against Hepatitis B infection include good hand washing practices, caution, and proper technique in the handling of the following potentially contaminated items: needles, sharps, supplies, and instruments. Excellent protective treatment for, or prevention of, this disease is afforded by both Hepatitis B immune globulin (HBIG) and by Hepatitis B vaccine. Either or both of these should be given as soon as possible after any documented exposure to blood (Johnson and Johnson, 1992).

Acquired Immunodeficiency Virus

Definition — Acquired Immunodeficiency Syndrome or AIDS is a severe viral disease recently introduced into the U.S. AIDS severely affects the immune system and is characterized by a multitude of opportunistic infections.

The AIDS virus is typical of most viruses. It cannot survive for any appreciable amount of time outside its human host. Its presence in the general environment is extremely unlikely and is limited to body secretions, primarily blood and semen. HIV is very susceptible to a large number of common household disinfectants since it is an unstable virus.

Symptoms — The outcome or manifestation of illness varies with individuals who are infected with the HIV virus.

Some infected persons have no disease symptoms and may not show outward signs of the disease for many years.

Some infected persons suffer less severe symptoms than do those with diagnosed cases of AIDS. These lesser symptoms may include loss of appetite, weight loss, fever, night sweats, skin rashes, diarrhea, tiredness, lack of resistance to infection, and swollen lymph nodes.

AIDS is the result of the progressive destruction of a persons immune system, which is the body's defense against disease. This destruction allows diseases to threaten the person's health and life that the body can normally fight. A particularly dangerous type of pneumonia and certain other infections often invade a

body weakened by HIV. HIV can also attack the nervous system and cause damage to the brain. This may take years to develop. The symptoms may include memory loss, indifference, loss of coordination, partial paralysis, or mental disorder (USHHS and NIOSH, 1989).

Sources of Infection — The various modes by which HIV can be transmitted are well defined. Male homosexual and bisexual practices along with intravenous (IV) drug abuse are two major means of transmission.

Although not as efficient a mode of infection, heterosexual transmission does occur, and is increasing in incidence in several countries around the world. Comparatively, fewer individuals have contracted AIDS as the result of receiving contaminated blood or blood products. In addition, the advent of laboratory tests to detect infection with HIV has almost eliminated any possibility of this mode of transmission.

AIDS is not hereditary, however, it can be congenital. In fact, vertical transmission, which involves passage of the virus from an infected woman to her unborn child, is the third major means of transmission and accounts for the majority of cases of pediatric AIDS.

Risk — There is a common misconception that health care workers are at high risk for acquiring HIV infection through occupational exposure. Studies confirm the fact that this supposed risk is less than one percent. Of the thousands of health care workers in the U.S. and other parts of the world who have been exposed to HIV through patient contact, very few have developed subsequent infection. AIDS is a concern of immense proportion to the health care community. However, from an occupational health point of view there is little reason for undue concern regarding this virus.

Protective Measures

Simple use of good personal hygiene, common sense, and the barrier techniques which are discussed in this operating practice will help to prevent health care workers from contracting HIV infection or any other serious illness in the workplace (Johnson and Johnson, 1992).

United States Postal Service -- Long Beach Facility 2002 Annual Air Emission

SUBCONTRACTORS

			TASK 0001	
			2002 AER	
Item	Service	Vendor (if known)	Cost	Effort
1	Sub #1	Environmental Safety Professionals	$ 4,000.00	$ 4,320.00
2	Sub #2		$ -	$ -
3	Sub #3		$ -	$ -
4	Sub #4		$ -	$ -
5	Sub #5		$ -	$ -
6	Sub #6		$ -	$ -
7	Sub #7		$ -	$ -
8	Sub #8		$ -	$ -
9	Sub #9		$ -	$ -
10	Sub #10		$ -	$ -
	TOTALS		$ 4,000.00	$ 4,320.00

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TRAVEL EXPENSE

	Category	Item Description	Unit	Total Qty	Unit Price	Extension	Handl. Chrg	Total Effort	TOTALS Quantity	TOTALS Extension	TASK 0001 2002 AER Quantity	TASK 0001 2002 AER Extension
1	Airfare	City A to City B, best avail	rndtrip	1	$ -	$ -	1.1022	$ -	1	$ -	1	$ -
2	Airfare	City C to City D, best avail	rndtrip	0	$ -	$ -	1.1022	$ -	0	$ -	0	$ -
3	Train	Airport to downtown	rndtrip	0	$ -	$ -	1.1022	$ -	0	$ -	0	$ -
4	Car Rental	from _____ Airport, per day	day	0	$ -	$ -	1.1022	$ -	0	$ -	0	$ -
5	Parking/Tolls/Taxi	Airport parking	day	0	$ -	$ -	1.1022	$ -	0	$ -	0	$ -
6	Parking/Tolls/Taxi	Taxi, hotel to job site	1-way	0	$ -	$ -	1.1022	$ -	0	$ -	0	$ -
7	Parking/Tolls/Taxi	Tolls	total	0	$ -	$ -	1.1022	$ -	0	$ -	0	$ -
8	POV Mileage	to/from airport, per roundtrip	miles	0	$ -	$ -	1.1022	$ -	0	$ -	0	$ -
9	POV Mileage	To/from site, field operations	miles	490	$ 0.37	$ 178.85	1.0000	$ 178.85	490	$ 178.85	490	$ 178.85
10	Per Diem	Lodging + M&IE, City/City Code	nights	0		$ -	1.0000	$ -	0	$ -	0	$ -
11	Per Diem	M&IE only, City/City Code	days	0	$ -	$ -	1.0000	$ -	0	$ -	0	$ -
12	Miscellaneous	Gasoline for rental vehicle	each	0	$ -	$ -	1.1022	$ -	0	$ -	0	$ -
13				0	$ -	$ -	1.1022	$ -	0	$ -	0	$ -
14				0	$ -	$ -	1.1022	$ -	0	$ -	0	$ -
15				0	$ -	$ -	1.1022	$ -	0	$ -	0	$ -
16				0	$ -	$ -	1.1022	$ -	0	$ -	0	$ -
17				0	$ -	$ -	1.1022	$ -	0	$ -	0	$ -
18				0	$ -	$ -	1.1022	$ -	0	$ -	0	$ -
19				0	$ -	$ -	1.1022	$ -	0	$ -	0	$ -
20				0	$ -	$ -	1.1022	$ -	0	$ -	0	$ -
	TOTALS					$ 178.85		$ 178.85				$ 178.85

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Purpose
Procedure
Inspection Follow-Up
Inspection Closure

Purpose:

To provide guidance on OSHA inspections conducted at WESTON project sites.
OSHA inspections occur from time to time. A typical sequence of events is as follows:

- The OSHA inspector arrives at the site and introduces himself to the manager in charge of the operation.
- The inspector conducts a pre-inspection conference with the manager and other individuals as determined by the manager. At that time the scope of the inspection should clearly be described by the inspector.
- The inspector will perform the inspection, which typically includes a walk-through inspection of the work-site. This inspection may be limited to specific areas of the site, especially if it was initiated in response to a worker's complaint. The inspector may make notes or take pictures to document site conditions.
- The site inspection typically ends with a close-out conference during which the inspector provides tentative findings. In some cases the inspector may forego the close-out conference and issue a written citation after leaving the site. On occasion, inspections may require more than one day.
- OSHA inspectors seldom issue citations during the inspection, however, if an inspector observes an imminent hazard he/she can order a work stoppage. A citation is not considered to have been issued until it is in writing and received by mail or by another appropriate method.

It is WESTON's practice to cooperate with investigations. Information that is requested should be provided.

Requests for copies of documents, safety plans, etc. should not be provided without first obtaining approval by WESTON's Law Department. Under no circumstances should any attempt be made to mislead the Inspector. If the inspection is on a client site, WESTON will refer to the client's written procedures for handling OSHA inspections.

If the client's procedures differ significantly from WESTON's procedures, the Site Manager in consultation and agreement with the Division Safety Manager (DSM) and Corporate Counsel will document site-specific procedures and ensure that site personnel and client contacts are aware of these modifications.

Procedure:

Coordination of the OSHA inspection is the responsibility of the Site Manager with assistance from the Site Health and Safety Coordinator (SHSC). The Site Manager, the SHSC, or both will accompany the Inspector during all stages of the inspection. The following guidelines will apply:

- Treat the Inspector as a professional and with courtesy.
- Ask for the Inspector's credentials to verify that he is representing OSHA. Personnel who cannot demonstrate their affiliation with OSHA should not be allowed access to the site.
- Ensure there is a pre-inspection conference that is attended by both the Site Manager and the SHSC, at a minimum. If not stated during the pre-inspection conference, ask the nature of the inspection.
- Contact the client and, in order of priority, one of the following: the Division Safety Manager (DSM) or Corporate Environmental Health and Safety (CEHS), prior to taking the Inspector on-site. The DSM, Safety Officer (SO), or CEHS will notify the appropriate WESTON personnel including the following:

  - General Counsel
  - Corporate Environmental Health and Safety Director
  - Vice President, Human Resources
  - Division Manager(s) and other DSMs responsible for the project
  - Project Manager and Client Services Manager responsible for the project
  - Chief Operating Officer (COO)

- If there are any questions during the conference, contact WESTON Corporate Environmental Health and Safety Department for guidance.
- Note where and what observations are made and write down any comments. If the Inspector makes photographs or videotapes, take photographs or video footage that will document the conditions being recorded. If cameras or video recorders are not available at the site, at least document what shots were taken and what conditions existed, such as weather, work activities, etc. Record the names of any individuals to whom the Inspector speaks.
- At the end of the inspection, assure that there is a closing conference. Take full notes of all proceedings. Contact and debrief the DSM immediately following the closeout.
- Remember that subcontractor's conformance with OSHA regulations is considered the general contractor's responsibility. Do not rely on indemnification to protect WESTON. Act at all times in conformance with OSHA.
- Upon receipt of final reports or Notices of Violation from the Inspector, contact and provide copies to the following WESTON personnel:

  - DSM
  - Corporate Environmental Health and Safety Director
  - Corporate Counsel.

- The Inspector will be required to follow the same health and safety procedures and OSHA regulations and requirements as any employee or other person (such as confined space, personal protective equipment, etc.).
- All employees are to be reminded that the law and WESTON policy prohibit any retaliation against any person reporting health and safety concerns.

Inspection Follow-Up:

- The project PM will be responsible for assembling an inspection review and response team consisting of the PM, the appropriate DSM's, SO's, the Corporate Environmental Health and Safety Director and Health and Safety resources as needed.
- A chronology of event report will be started and any corrective actions deemed appropriate by the team will be taken and documented.
- OSHA has up to 6 months to issue a written Notice of Violation. However, OSHA typically will be able to complete a written Notice of Violation within 90 days. The Notice of Violation is not official until it is received. At this point, WESTON has 15 working days to decide to contest any violations and request an informal conference. An abatement plan will be required by OSHA, the team will be responsible for preparing this plan along with any rebuttal of the citation.

Inspection Closure:

- The chronology report will conclude when the abatement plan has been accepted and OSHA indicates, preferably in writing, that the violations have either been vacated or abated.

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PURPOSE

To ensure that multi-media samples collected in the course of WESTON work assignments are not stored in a manner that creates undue hazard to WESTON employees or others.

PROCEDURE

Samples that are transported from a WESTON work location must be classified and packaged in compliance with US DOT requirements or alternatively in accordance with International Air Transport Association (IATA) regulations. WESTON's manual of Procedures for Shipping and Transporting Dangerous Goods must be consulted to determine if the samples will be classified as either "environmental" or "hazardous materials" samples.

Environmental Samples

Environmental samples are not subject to US DOT or IATA dangerous goods regulations and must be packaged to protect their integrity during transportation and temporary storage and should have appropriate chain-of-custody documentation. These samples may be brought to a WESTON office location or rented space to verify sample documentation and repackaging (e.g., with ice or cold packs). Minor spill clean-up capability would be required.
Once secured for shipment, these samples can be temporarily stored for the next day ground or air shipment pick-up. Under no circumstances are samples to be stored beyond the time necessary to arrange for transportation to a laboratory.

Hazardous Materials Samples

These samples are subject to US DOT and/or IATA dangerous goods regulations and must be packaged and labeled according to the appropriate regulations, including completed chain-of-custody documentation prior to being transported from the WESTON work site. WESTON drivers must have the documentation paperwork for the samples and a US DOT Emergency Response Guide (ERG) readily available in the vehicle.

Under normal circumstances these samples should be shipped from the field and never brought back to a WESTON office location or into a rented space. If it is not possible to ship the samples from the field during the same day they are collected, a properly packaged, labeled, and sealed sample shipping container may be brought back to a WESTON office location for shipment to a laboratory the next business day - providing the temporary storage location is secure from access from any personnel who are not trained in shipping hazardous materials. Under no circumstances are samples to be stored in rented space; if necessary, secure temporary storage in a locked vehicle may be authorized. Note that some offices leases do not permit the storage of hazardous materials and the lease will govern whether such materials can even be stored overnight.

INSPECTION FOLLOW-UP

Shipping procedures for samples should be included in the site-specific health and safety plan (HASP) and reviewed for compliance with these procedures prior to approval. EHS audits will include a review to sample shipping and storage procedures.

LINK TO THE ERG (Referenced Above)

The ERG can be found on-line at: http://hazmat.dot.gov/gydebook.htm and appropriate sections can be copied to accompany samples being transported by vehicles driven by WESTON employees.

Revised 4/2002

1.6 Benzene Guideline - FLD41

Health and Safety Plan Operating Procedures

Field Operating Procedures - FLD41 - Benzene Guideline

This Operating Practice must be implemented as a strategy for air monitoring and upgrading Level of Protection (LOP) during activities where Benzene may be listed as a constituent of the contamination suspected. Activities of concern include, but are not limited to, gasoline spill response, and excavation or drilling activities where gasoline or petroleum constituents are encountered. During these activities air monitoring of the breathing zone should be conducted in the following manner:

1. Monitor contaminant concentrations with Direct Reading Instruments sensitive to aromatic compounds as specified in the Health And Safety Plan (HASP).

2. Level D protection is considered acceptable if Instrument readings remain below 1 unit above background.

3. Level C protection is required if Instrument readings are between 1 to 5 units above background.

4. An Instrument reading of 5 units above background shall be further characterized by taking a breathing zone air sample using a colorimetric detector tube (e.g. Drager, MSA). The colorimetric detector tube must be sensitive to 0.5 ppm Benzene.

5. Level C protection is considered acceptable if the colorimetric detector tube indicates less than 1.0 ppm Benzene. Periodic measurements should be taken with the colorimetric detector tube.

6. A colorimetric detector tube indication of 1.0 ppm Benzene or greater will be verified by a second measurement, using a colorimetric tube, at the end of a ten (10) minute interval.

7. Level B protection is required if both colorimetric detector tube measurements taken ten (10) minutes apart indicate 1.0 ppm Benzene or greater.

8. Irrespective of colorimetric detector tube indications Level B protection will be initiated at Direct Reading Instrument readings of 500 units above background.

The steps outlined above are a strategy for air monitoring and upgrading the LOP, air monitoring for combustible gas/vapor levels is in conjunction with this strategy, is continuous, and is not limited to the breathing zone.

As mentioned above **THIS OPERATING PROCEDURE IS FOR BENZENE AS A CONSTITUENT OF THE SUSPECTED CONTAMINANT** in the situation where **BENZENE IS A KNOWN MAJOR CONTAMINANT** colorimetric detector tube measurements shall be initiated when Direct Reading Instruments read 1 unit above background, steps 5-8 are followed.

Other on-site contaminants listed in the HASP may require LOP upgrades at or below the levels indicated in this document, this document is STRICTLY for BENZENE. Please refer to the HASP for LOP selection requirements regarding other on-site contaminants.

2.5 DRILLING SAFETY GUIDE

2.5.1 An Introduction To Drilling Safety

The organization where you work is interested in your safety, not only when you are working on or around a drill rig, but also ,when you are traveling to and from a drilling site, moving the drill rig and tools from location to location on a site, or providing maintenance on a drill rig or drilling tools. This safety guide is for your benefit.

Every drill crew should have a designated safety supervisor. The safety supervisor should have the authority to enforce safety on the drilling site. A rig worker's first safety responsibility is to listen to the safety directions of the safety supervisor.

2.5.2 Governmental Regulations

All local, state, and federal regulations or restrictions, currently in effect or effected in the future, take precedence over the recommendations and suggestions that follow. Government regulations will vary from country to country and from state to state.

2.5.3 The Safety Supervisor

The safety supervisor for the drill crew, in most cases, will be the drill rig operator.

- The safety supervisor should consider the "responsibility" for safety and the "authority" to enforce safety to be a matter of first importance.
- The safety supervisor should be the leader in using proper personal safety gear and set an example in following the rules that are being enforced on others.
- The safety supervisor should enforce the use of proper personal protective safety equipment and take appropriate corrective action when proper personal protective safety equipment is not being used.
- The safety supervisor should understand that proper maintenance of tools and equipment and general "housekeeping" on the drill rig will provide the environment to promote and enforce safety.
- Before drilling is started with a particular drill, the safety supervisor must be ensured that the operator (who may be the safety supervisor) has had adequate training and is thoroughly familiar with the drill rig, its controls, and its capabilities.
- The safety supervisor should inspect the drill rig at least daily for structural damage, loose bolts and nuts, proper tension in chain drives, loose or missing guards or protective covers, fluid leaks, damaged hoses, and or damaged pressure gauges and pressure relief valves.

- The safety supervisor should check and test all safety devices, such as emergency shutdown switches, at least daily and preferable at the start of a drilling shift. Drilling should not be permitted until all emergency shutdown and warning systems are working correctly. Do not wire ground, bypass or remove an emergency device.
- The safety supervisor should check that all gauges, warning lights, and control levers are functioning properly and listen for unusual sounds on each starting of an engine.
- The safety supervisor should ensure that all new drill rig workers are informed of safe operating practices on and around the drill rig and should provide each new drill rig worker with a copy of the organization's drilling operations safety manual, and, when appropriate, the drill rig manufacturer's operations and maintenance manual. The safety supervisor should ensure that each new employee reads and understands the safety manual.
- The safety supervisor should carefully instruct a crew worker in drilling safety and observe the new worker's progress towards understanding safe operating practices.
- The safety supervisor should observe the mental, emotional, and physical capability of each worker to perform the assigned work in a proper and safe manner. The safety supervisor should dismiss any worker from the drill site whose mental and physical capabilities might cause injury to the worker or coworkers.
- The safety supervisor should ensure that there is a first-aid kit and a fire extinguisher on each drill rig and on each additional vehicle, and ensure that they are properly maintained.
- The safety supervisor (and as many crew members as possible) should be well trained and capable of using first-aid kits, fire extinguisher, and all other safety devices and equipment.
- The safety supervisor should maintain a list of addresses and telephone numbers of emergency assistance units (ambulance services, police, hospitals, etc.) and inform other members of the drill crew of the existence and location of the list.

2.5.4 Individual Protective Equipment

For most geotechnical, mineral, and/or groundwater drilling projects, individual protective equipment should include a safety hat, safety shoes, safety glasses and close fitting but comfortable, without loose ends, straps, draw strings or belts, or otherwise unfastened parts that might catch on some rotating or translating component of the drill rig. Rings and jewelry should not be worn during a work shift.

- Safety Head Gear. Safety hats (hard hats) should be worn by everyone working or visiting at or near a drilling site. All safety hats should meet the requirements of ANSI Z89.1. All safety hats should be kept clean and in good repair with the headband and crown straps properly adjusted for the individual drill rig worker or visitor.
- Safety Shoes or Boots. Safety shoes or boots should be worn by all drilling personnel and all visitors to the drill site observing drilling operations within close proximity of the drill rig. All safety shoes or boots should meet the requirements of ANSI Z41.1.
- Gloves. All drilling personnel should wear gloves for protection against cuts and abrasion, which could occur while handling wire rope or cable and from contact with sharp edge and burrs on drill rods and other drilling or sampling tools. All gloves should be close fitting and not have large cuffs or loose ties that can catch on rotating or translating components of the drill rig.
- Safety Glasses. All drilling personnel should wear safety glasses. All safety glasses should meet the requirements of ANSI Z87.1.
- Other Protective Equipment. For some drilling operations, the environment or regulations may dictate that other protective equipment be used. The requirement for such equipment must be determined jointly by the management of the drilling organization and the safety supervisor. Such equipment might include face or ear protection or reflective clothing. Each drill rig worker should wear noise reducing ear protectors when appropriate. When drilling is performed in chemically-or radiologically-contaminated ground, special protective equipment and clothing may and probably will be required. The design and composition of the protective equipment and clothing should be determined as a joint effort of management and the client who requests the drilling services.

2.5.5 Housekeeping On and Around the Drill Rig

The first requirement for safe field operations is that the safety supervisor understands and fulfills the responsibility for maintenance and "housekeeping" on and around the drill rig.

- Suitable storage locations should be provided for all tools, materials, and supplies so that tools, materials, and supplies can be conveniently and safely handled without hitting or falling on a member of the drill crew or a visitor.
- Avoid storing or transporting tools, materials, or supplies within or on the mast (derrick) of the drill rig.

- Pipe, drill rods, casing, augers, and similar drilling tools should be orderly stacked on racks or sills to prevent spreading, rolling, or sliding.
- Penetration or other driving hammers should be placed at a safe location on the ground or be secured to prevent movement when not in use.
- Work areas, platforms, walkways, scaffolding and other accessways should be kept free of materials, debris and obstructions, and substances such as ice, grease, or oil that could cause a surface to become slick or otherwise hazardous.
- Controls, control linkages, warning and operation lights, and lenses should be stored free of oil, grease, and/or ice.
- Gasoline should not be stored in any portable container other than a non-sparking, red container with flame arrester in the fill spout and having the word "gasoline" easily visible.

2.5.6 Maintenance Safety

Good maintenance will make drilling operations safer. Maintenance should be performed safely.

- Wear safety glasses when performing maintenance on a drill rig or on drilling tools.
- Shut down the drill rig engine to make repairs or adjustments to a drill rig or to lubricate fitting (except repairs or adjustments that can only be made with the engine running). Take precautions to prevent accidentally starting of an engine during maintenance by removing or tagging the ignition key.
- Always block the wheels or lower the leveling jacks or both, and set hand brakes before working under a drill rig.
- When possible and appropriate, release all pressure on the hydraulic systems, the drilling fluid system, and the air pressure systems of the drill rig prior to performing maintenance. Reduce the drill rig and operating systems to a "zero energy state" before performing maintenance. Use extreme caution when opening drain plugs, radiator caps, and other pressurized plugs and caps.
- Do not touch an engine or the exhaust system of an engine following its operation until the engine and exhaust system have had adequate time to cool.
- Never weld or cut on or near a fuel tank.
- Do not use gasoline or other volatile, flammable liquids as a cleaning agent on or around a drill rig.
- Follow the manufacturer's recommendations for applying the proper quantity and quality of lubricants, hydraulic oils, and/or coolants.

- Replace all caps, filler plugs, protective guards or panels, and high pressure hose clamps, chains or cables that have been removed for maintenance before returning the drill rig to service.

2.5.7 Safe Use Of Hand Tools

There are almost an infinite number of hand tools that can be used on or around a drill rig and in repair shops. "Use the tool for its intended purpose" is the most important rule of proper use. The following are a few specific and some general suggestions that apply to safe use of several hand tools often used on and around drill rigs:

- Wear safety glasses and require all others around you to wear safety glasses when using a hammer.
- Wear safety glasses and require all others around you to wear safety glasses when using a chisel.
- Keep all tools cleaned and orderly stored when not in use.
- Use wrenches on nuts - don't use pliers on nuts.
- Use screwdrivers with blades that fit the screw slot.
- When using a wrench on a tight nut - first use some penetrating oil, use the largest wrench available that fits the nut, when possible pull on the wrench handle rather than pushing, and when possible apply force to the wrench with both hands while both feet are firmly placed.
- Don't push or pull with one or both feet on the drill rig or the side of a mud pit or some other blocking-off device. Always assume that you may lose your footing - check the place where you may fall for sharp objects.
- Keep all pipe wrenches clean and in good repair. The jaws of pipe wrenches should be wire brushed frequently to prevent an accumulation of dirt and grease that would otherwise build up and cause wrenches to slip.
- Never use pipe wrenches in place of a rod holding device.
- Replace hook and heel jaws when they became visibly worn.
- Position your hands so that your fingers will not be smashed between the wrench handle and the ground or the platform when breaking tool joints on the ground or on the drilling platform; the wrench may slip or the joint may suddenly let go.

2.5.8 Clearing the Work Area

Prior to drilling, adequate site clearing and leveling should be performed to provide a safe working area for the drill rig and supplies. Drilling should not be commenced when tree limbs, unstable ground, or site obstructions cause unsafe tool handling conditions.

2.5.9 Start-up

- All drill rig personnel and visitors are instructed to "stand clear" of the drill rig immediately prior to and during starting of an engine.
- Make sure all gear boxes are in neutral, all hoist levers are disengaged, all hydraulic levers are in the correct nonactuating positions, and the cathead rope is not on the cathead before starting a drill rig engine.
- Start all engines according to the manufacturer's manual.

2.5.10 Safety During Drilling Operations

Safety requires the attention and cooperation of every worker and site visitor.

- Do not drive the drill rig from hole to hole with the mast (derrick), in the raised position.
- Before raising the mast (derrick), check for overhead obstructions. (Refer to Section 2.5.11 an Overhead and Buried Utilities.)
- Before raising the mast (derrick), ensure all drill rig personnel (with exception of the operator) and visitors are cleared from the areas immediately to the rear and the sides of the mast. All drill rig personnel and visitors should be informed that the mast is being raised prior to raising it.
- Before the mast (derrick) of a drill rig is raised and drilling is commenced, level, and stabilize the drill rig with leveling jacks and/or solid cribbing. The drill rig should be releveled if it settles after initial set-up. Lower the mast (derrick) only when the leveling jacks are down, and do not raise the leveling jack pods until the mast (derrick) is lowered completely.
- Before starting drilling operations, secure and/or lock the mast (derrick) if required according to the drill manufacturer's recommendations.
- The operator of a drill rig will only operate a drill rig from the controls. If the operator of the drill rig must leave the area of the controls, the operator should shift the transmission controlling the rotary drive into neutral and place the feed control lever in neutral. The operator should shut down the drill engine before leaving the vicinity of the drill.
- Throwing or dropping tools is not permitted. All tools should be carefully passed by hand between personnel or a hoist line should be used.
- Do not consume alcoholic beverages or other depressants or chemical stimulants prior to starting work on a drill rig or while on the job.

- If it is necessary to drill within an enclosed area, make certain that exhaust fumes are conducted out of the area. Exhaust fumes can be toxic, and some cannot be detected by smell.
- Clean mud and grease from your boots before mounting a drill platform, and use hand holds and railings. watch for slippery ground when dismounting from the platform.
- During freezing weather, do not touch any metal parts of the drill rig with exposed flesh. Freezing of moist skin to metal can occur almost instantaneously.
- Drain all air and water lines and pumps when not in use if freezing weather is expected.
- Cover all unattended boreholes or otherwise protect to prevent drill rig personnel, site visitors, or animals from stepping or falling into the hole. All open boreholes should be covered, protected, or backfilled adequately according to local or state regulations on completion of the drilling project.
- Do not "horse around" within the vicinity of the drill rig and tool and supply storage areas even when the drill rig is shut down.
- When using a ladder on a drill rig, face the ladder and grasp either the side rails or the rungs with both hands while ascending or descending. Do not attempt to use one or both hands to carry a tool while on a ladder. Use a hoist line and a tool "bucket" or a safety hook to raise or lower hand tools.

An elevated derrick platform should be used with the following precautions:

- When working on a derrick platform, use a safety belt and a lifeline. The safety belt should be at least 4 in. (100 mm) wide and should fit snugly but comfortably. The lifeline, when attached to the derrick, should be less than 6 ft (2 m) long. The safety belt and lifeline should be strong enough to withstand the dynamic force of a 250 lb (115 kg) weight (contained within the belt) falling 6 ft (2 m).
- When climbing to a derrick platform that is higher than 20 ft (6 m), use a safety climbing device.
- When a rig worker is on a derrick platform, fasten the lifeline to the derrick just above the derrick platform and to a structural member that is not attached to the platform or to other lines or cables supporting the platform.
- When a rig worker first arrives at a derrick platform, inspect the platform for broken members, loose connections and loose tools, or other loose materials.
- Securely attach tools to the platform with safety lines. Do not attach a tool to a line attached to your wrist or any other part of your body.

- When you are working on a derrick platform, do not guide drill rods or pipe into racks or other supports by taking hold of a moving hoist line or a traveling block.
- Do not leave loose tools and similar items on the derrick platform or on structural members of the derrick.
- Ensure that a derrick platform over 4 ft (1.2 m) above ground surface has toe boards and safety railings that are in good condition.
- When working on the ground or the drilling floor, avoid being under rig workers on elevated platforms, whenever possible.

Be careful when lifting heavy objects:

- Before lifting any object without using a hoist, make sure the load is within your personal lifting capacity. If it is too heavy, ask for assistance.
- Before lifting a relatively heavy object, approach the object by bending at the knees, keeping your back vertical and unarched while obtaining a firm footing. Grasp the object firmly with both hands and stand slowly and squarely while keeping your back vertical and unarched. In other words, perform the lifting with the muscles in your legs, not with the muscles in your lower back.
- If a heavy object must be moved some distance without the aid of machinery, keep your back straight and unarched. Change directions by moving your feet, not by twisting your body.
- Move heavy objects with the aid of hand carts whenever possible.

Drilling operations should be terminated during an electrical storm, and the complete crew should move away from the drill rig.

2.5.11 Overhead And Buried Utilities

The use of a drill rig on a site within the vicinity of electrical power lines and other utilities requires that special precautions be taken by both supervisors and members of the exploration crew. Electricity can shock, burn, and cause death.

- Locate, note, and emphasize all overhead and buried utilities on all boring location plans and boring assignment sheets.
- When overhead electrical power lines exist at or near a drilling site or project, consider all wires to be alive and dangerous.
- Watch for sagging power lines before entering a site. Do not lift power lines to gain entrance. Call the utility and ask them to lift or raise the lines or deenergize (turn off) the power.

- Before raising the drill rig mast (derrick) on a site in the vicinity of power lines, walk completely around the drill rig. Determine what the minimum distance from any point on the drill rig to the nearest power line will be when the mast is raised and/or being raised. Do not raise the mast or operate the drill rig if this distance is less than 20 ft (6 m), or if known, the minimum clearance stipulated by federal, state, and local regulations.
- Keep in mind that both hoist lines and overhead power lines can be moved toward each other by the wind.
- Move the drill rig with the mast (derrick) down to avoid contact with power lines.
- If there are any questions whatever concerning the safety of drilling on sites in the vicinity of overhead power lines, call the power company. The power company will provide expert advice at the drilling site as a public service and at no cost.

Underground electricity is as dangerous as overhead electricity. Be aware and always suspect the existence of underground utilities such as electrical power, gas, petroleum, telephone, sewer and water. Ask for assistance:

- If a sign warning of underground utilities is located on a site boundary, do not assume that underground utilities are located on or near the boundary or property line under the sign: call the utility and check it out. The underground utilities may be considerable distance away from the warning sign.
- Always contact the owners of utility lines or the nearest underground utility location service before drilling. Determine jointly with utility personnel the precise location of underground utility lines, mark and flag the locations, and determine jointly with utility personnel what specific precautions must be taken to ensure safety.

2.5.12 Safe Use of Electricity

Drilling projects sometimes require around-the-clock operations and, therefore, require temporary electrical lighting. In general, all wiring and fixtures used to provide electricity for drilling operations should be installed by qualified personnel in accordance with the National Electrical Code (NFP A70-1984) with consideration of the American Petroleum Institute's recommended practices for electrical installations for production facilities (API-RP-500B). Lights should be installed and positioned to ensure that the work area and operating positions are well lit without shadows or blind spots. The following specific recommendations emphasize the safe use of electricity during land-bored drilling operations:

- Before working on an electrical power or lighting system, lock out the main panel box with your own lock and keep the key on your person at all times.
- Install all wiring using high quality connections, fixtures and wire, insulated and protected with consideration of the drilling environment. Makeshift wiring and equipment should not be permitted.
- All lights positioned directly above working areas should be enclosed in cages or similar enclosures to prevent loose or detached lamps or vapor tight enclosures from failing on workers.
- Install all lights to produce the least possible glare or "blind spots" on tools, ladders, walkways, platforms, and the complete working area.
- Locate and guard all electrical cables to prevent damage by drill operations or by the movement of personnel, tools, or supplies.
- Ensure that all plug receptacles are the three-prong, U-blade, grounded type and have adequate current carrying capacity for the electrical tools that may be used.
- Ensure that all electric tools have three-prong, U-blade, ground wire plugs and cords.
- Do not use electrical tools with lock-on devices.
- Ensure that all electrical welders, generators, control panels, and similar devices are adequately grounded.
- Avoid attaching electrical lighting cables to the derrick or other components of the drill rig. If this must be done, use only approved fasteners. Do not "string" wire through the derrick.
- Do not use poles used to hold wiring and lights for any other purpose.
- Power should be turned off before changing fuses or light bulbs.
- When a drilling area is illuminated with electrical lighting, wear safety head gear that protects the worker's head, not only against falling or flying objects, but also against limited electrical shock and burn according to ANSI Z89.1 and Z89.2.
- Ensure that all electrical equipment is operated by trained, designated personnel.
- If you are not qualified to work on electrical devices or on electric lines, do not go near them.

2.5.13 React to Contact with Electricity

If a drill rig makes contact with electrical wires, it may or may not be insulated from the ground by the tires of the carrier. Under either circumstance, the human body, if it simultaneously comes in contact with the drill rig and the ground, will provide a conductor of the electricity to the ground. Death or serious injury can be the result. If a drill rig or a drill rig carrier makes contact with overhead or underground electrical lines:

- Under most circumstances, the operator and other personnel on the seat of the vehicle should remain seated and not leave the vehicle. Do not move or touch any part, particularly a metallic part, of the vehicle or the drill rig.
- If it is determined that the drill rig should be vacated, then all personnel should jump clear and as far as possible from the drill. Do not step off - jump off, and do not hang on to the vehicle or any part of the drill when jumping clear.
- If you are on the ground, you should stay away from the vehicle and the drill rig, do not let others get near the vehicle and the drill rig, and seek assistance from local emergency personnel such as the police or a fire department.
- When an individual is injured and in contact with the drill rig or with power lines, only rescue with extreme caution. If a rescue is attempted, use a long, dry, unpainted piece of wood or a long, dry, clean rope. Keep as far away from the victim as possible and do not touch the victim until the victim is completely clear of the drill rig or electrical lines.
- When the victim is completely clear of the electrical source and is unconscious and a heart beat (pulse) cannot be detected, cardiopulmonary resuscitation (CPR) should be begun immediately.

2.5.14 Safe Use of Wire Line Hoists, Wire Rope and Hoisting Hardware

The use of wire line hoists, wire rope, and hoisting hardware should be as stipulated by the American Iron and Steel Institute Wire Rope Users Manual.

- All wire ropes and fittings should be visually inspected during use and thoroughly inspected at least once a week for: abrasion, broken wires, wear, reduction in rope diameter, reduction in wire diameter, fatigue, corrosion, damage from heat, improper reeving, jamming, crushing, bird caging, kinking, core protrusion, and damage to lifting hardware. Wire ropes should be replaced when inspection indicates excessive damage according to the Wire Rope Users Manual. All wire ropes that have not been used for a period of a month or more should be thoroughly inspected before being returned to service.
- End fittings and connections consist of spliced eyes and various manufactured devices. All manufactured end fittings and connections should be installed according to the manufacturer's instructions and loaded according to the manufacturer's specifications.

- If a ball-bearing type hoisting swivel is used to hoist drill rods, swivel bearings should be inspected and lubricated daily to ensure that the swivel freely rotates under load.
- If a rod slipping device is used to hoist drill rods, do not drill through or rotate drill rods through the slipping device, do not hoist more than 1 ft (0.3 m) of the drill rod column above the top of the mast (derrick), do not hoist a rod column with loose tool joints, and do not make up, tighten, or loosen tool joints while the rod column is being supported by a rod slipping device. If drill rods should slip back into the borehole, do not attempt to brake the fall of the rods with your hands or by tensioning the slipping device.
- Most sheaves on exploration drill rigs are stationary with single part line. The number of parts of line should not ever be increased without first consulting with the manufacturer of the drill rig.
- Wire ropes must be properly matched with each sheave - if the rope is too large, the sheave will pinch the wire rope - if the rope is too small, it will groove the sheave. Once the sheave is grooved, it will severely pinch and damage larger sized wire rope.

The following procedures and precautions must be understood and implemented for safe use of wire ropes and rigging hardware:

- Use tool handling hoists only for vertical lifting of tools (except when angle hole drilling). Do not use tool handling hoists to pull on objects away from the drill rig; however, drills may be moved using the main hoist if the wire rope is spooled through proper sheaves according to the manufacturer's recommendations.
- When stuck tools or similar loads cannot be raised with a hoist, disconnect the hoist line and connect the stuck tools directly to the feed mechanism of the drill. Do not use hydraulic leveling jacks for added pull to the hoist line or the feed mechanism of the drill.
- When attempting to pull out a mired down vehicle or drill rig carrier, only use a winch on the front or rear of the vehicle and stay as far as possible away from the wire rope. Do not attempt to use tool hoists to pull out a mired down vehicle or drill rig carrier.
- Minimize shock loading of a wire rope apply loads smoothly and steadily.
- Avoid sudden loading in cold weather.
- Never use frozen ropes.
- Protect wire rope from sharp corners or edges.
- Replace faulty guides and rollers.
- Replace worn sheaves or worn sheave bearings.
- Know the safe working load of the equipment and tackle being used. Never exceed this limit.

- Periodically inspect and test clutches and brakes of hoists.
- Know and do not exceed the rated capacity of hooks, rings, links, swivels, shackles, and other lifting aids.
- Always wear gloves when handling wire ropes.
- Do not guide wire rope on hoist drums with your hands.
- Following the installation of a new wire rope, first lift a light load to allow the wire rope to adjust.
- Never carry out any hoisting operations when the weather conditions are such that hazards to personnel, the public, or property are created.
- Never leave a load suspended in the air when the hoist is unattended.
- Keep your hands away from hoists, wire rope, hoisting hooks, sheaves and pinch points as slack is being taken up, and when the load is being hoisted.
- Never hoist the load over the head, body, or feet of any personnel.
- Never use a hoist line to "ride" up the mast (derrick) of a drill rig.
- Replace wire ropes with ones that conform to the drill rig manufacturer's specifications.

2.5.15 Safe Use of Cathead and Rope Hoists

The following safety procedures should be employed when using a cathead hoist:

- Keep the cathead clean and free of rust and oil and/or grease. The cathead should be cleaned with a wire brush if it becomes rusty.
- Check the cathead periodically, when the engine is not running, or rope wear grooves. If a rope groove forms to a depth greater then 1/8 inch (3 mm), the cathead should be replaced.
- Always use a clean, dry, sound rope. A wet or oily rope may "grab" the cathead and cause drill tools or other items to be rapidly hoisted to the top of the mast.
- Should the rope "grab" the cathead or otherwise become tangled in the drum, release the rope and sound an appropriate alarm for all personnel to rapidly back away and stay clear. The operator should also back away and stay clear. If the rope "grabs" the cathead, and tools are hoisted to the sheaves at the top of the mast, the rope will often break, releasing the tools. If the rope does not break, stay clear of the drill rig until the operator cautiously returns to turn off the drill rig engine and appropriate action is taken to release the tools. The operator should keep careful watch on the suspended tools and should quickly back away after turning off the engine.

- Protect the rope from contact with all chemicals. Chemicals can cause deterioration of the rope that may not be visibly detectable.
- Never wrap the rope from the cathead (or any other rope, wire rope or cable on the drill rig) around a hand, wrist, arm, foot, ankle, leg, or any other part of your body.
- Always maintain a minimum of 18 inches of clearance between the operating hand and the cathead drum when driving samplers, casing or other tools with the cathead and rope method. Be aware that the rope advances toward the cathead with each hammer blow as the sampler or other drilling tool advances into the ground.
- Never operate a cathead (or perform any other task around a drill rig) with loose, unbuttoned, or otherwise unfastened clothing or when wearing gloves with large cuffs or loose straps or lacings.
- Do not use a rope that is any longer than necessary. A rope that is too long can form a ground loop or otherwise become entangled with the operator's legs.
- Do not use more rope wraps than are required to hoist a lead.
- Do not leave a cathead unattended with the rope wrapped on the drum.
- Position all other hoist lines to prevent contact with the operating cathead rope.
- When using the cathead and rope for driving or back-driving, make sure that all threaded connections are tight and stay as far away as possible from the hammer impact point.
- The cathead operator must operate the cathead standing on a level surface with good, firm footing conditions without distraction or disturbance.

2.5.16 Safe Use of Augers

The following general procedures should be used when starting a boring with continuous flight or hallow-stem augers:

- Prepare to start an auger boring with the drill rig level, the clutch or hydraulic rotation control disengaged, the transmission in low gear, and the engine running at low RPM.
- Apply an adequate amount of down pressure prior to rotation to seat the auger head below the ground surface.
- Look at the auger head while slowly engaging the clutch or rotation control and starting rotation. Stay clear of the auger.
- Slowly rotate the auger and auger head while continuing to apply down pressure. Keep one hand on the clutch or the rotation central at all times until the auger has penetrated about one foot or more below ground surface.

- Use the auger guide to facilitate the starting of a straight hole through hard ground or a pavement.

The operator and tool handler should establish a system of responsibility for the series of various activities required for auger drilling, such as connecting and - disconnecting auger sections, and inserting and removing the auger fork. The operator must ensure that the tool handler is well away from the auger column and that the auger fork is removed before starting rotation.

- Only use the manufacture's recommended method of securing the auger to the power coupling. Do not touch the coupling or the auger with your hands, a wrench, or any other tools during rotation.
- Whenever possible, use tool hoists to handle auger sections.
- Never place hands or fingers under the bottom of an auger section when hoisting the auger over the top of the auger section in the ground or other hard surfaces such as the drill rig platform.
- Never allow feet to get under the auger section that is being hoisted.
- When rotating augers, stay clear of the rotating auger and other rotating components of the drill rig. Never reach behind or around a rotating auger for any reason whatever.
- Use a long-handled shovel to move auger cuttings away from the auger. Never use your hands or feet to move cuttings away from the auger.
- Do not remove earth from rotating augers. Augers should be cleaned only when the drill rig is in neutral and the augers are stopped from rotating.

2.5.17 Safety During Rotary And Core Drilling

Rotary drilling tools should be safety checked periodically and replaced when necessary.

- Water swivels and hoisting plugs should be lubricated and checked for "frozen" bearings before use.
- Drill rod chuck jaws should be checked periodically and replaced when necessary.
- The capacities of hoists and sheaves should be checked against the anticipated weight to the drill rod string plus other expected hoisting loads.

Special precautions that should be taken for Safe rotary or core drilling involve chucking, joint break, hoisting, and lower of drill rods:

- Only the operator of the drill rig should brake or set a manual chuck so that rotation of the chuck will not occur prior to removing the wrench from the chuck.

- Drill rods should not be braked during lowering into the hole with drill rod chuck jaws.
- Drill rods should not be held or lowered into the hole with pipe wrenches.
- If a string of drill rods are accidentally or inadvertently released into the hole, an attempt should not be made to grab the falling rods with your hands or a wrench.
- In the event of a plugged bit or other circulation blockage, the high pressure in the piping and hose between the pump and the obstruction should be relieved or bled down before breaking the first tool joint.
- When drill rods are hoisted from the hole, they should be cleaned for safe handling with a rubber or other suitable rod wiper. Do not use your hands to clean drilling fluids from drill rods.
- If work must progress over a portable drilling fluid (mud) pit, no one should attempt to stand on narrow sides or cross members. The mud pit should be equipped with rough surfaced, fitted cover panels of adequate strength to hold drill rig personnel.
- Drill rods should not be lifted and leaned unsecured against the mast. Either provide some method of securing the upper ends of the drill rod sections for safe vertical storage or lay the rods down.

2.5.18 Safety During Travel

The individual who transports a drill rig on and off a drilling site should:

- Be properly licensed and should only operate the vehicle according to federal, state, and local regulations.
- Know the traveling height (overhead clearance), width, length, and weight of the drill rig with carrier and know highway and bridge load, width and overhead limits, making sure these limits are not exceeded with an adequate margin.
- Never move a drill rig unless the vehicle brakes are in sound working order.
- Allow for most overhang when cornering or approaching other vehicles or structures.
- Be aware that the canopies of service stations and motels are often too low for a drill rig mast to clear with the mast in the travel position.
- Watch for low hanging electrical lines, particularly at the entrances to drilling sites, restaurants, motels, or other commercial sites.
- Never travel on a street, road, or highway with the mast (derrick) of the drill rig in the raised or partially raised position.
- Remove all ignition keys when a drill rig is left unattended.

2.5.19 Loading and Unloading

When loading or unloading a drill rig on a trailer or a truck:

- Use ramps of adequate design that are solid and substantial enough to bear the weight of the drill rig with carrier - including tooling.
- Load and unload on level ground.
- Use the assistance of someone on the ground as a guide.
- Check the brakes on the drill rig carrier before approaching loading ramps.
- Distribute the weight of the drill rig, carrier, and tools on the trailer so that the center of weight is approximately on the centerline of the trailer and so that some of the trailer load is transferred to the hitch of the pulling vehicle. Refer to the trailer manufacturer's weight distribution recommendations.
- Secure drill rig and tools to the hauling vehicle with ties, chains, and/or load binders of adequate capacity.

2.5.20 Off-Road Movement

The following safety suggestions relate to off-road movement:

- Before moving a drill rig, first walk the route of travel, inspecting for depressions, stumps, gullies, ruts and similar obstacles.
- Always check the brakes of a drill rig carrier before traveling, particularly on rough, uneven, or hilly ground.
- Check the complete drive train of a carrier at least weekly for loose or damaged bolts, nuts, studs, shafts, and mountings.
- Discharge all passengers before moving a drill rig on rough or hilly terrain.
- Engage the front axle (for 4 x 4, 6 x 6, etc. vehicles or carriers) when traveling off highway on hilly terrain.
- Use caution when traveling side-hill. Conservatively evaluate side-hill capability of drill rigs, because the arbitrary addition of drilling tools may raise the center of mass. When possible, travel directly uphill or downhill. Increase tire pressures before traveling in hilly terrain (do not exceed rated tire pressure).
- Do not attempt to cross obstacles such as small logs and small erosion channels or ditches at an angle.
- Use the assistance of someone on the ground as a guide when lateral or overhead clearance is close.
- After the drill has been moved to a new drilling site, set all brakes and/or locks. When grades are steep, block the wheels.
- Never travel off-road with the mast (derrick) of the drill rig in the raised or partially raised position.

2.5.21 Tires, Batteries And Fuel

Tires on the drill rig must be checked daily for safety and during extended travel for loss of air, and they must be maintained and/or repaired in a safe manner. If tires are deflated to reduce ground pressure for movement on soft ground, the tires should be reinflated to normal pressures before movement on firm or hilly ground or on streets, roads, and highways. Under-inflated tires are not as stable on firm ground as properly-inflated tires. Air pressures should be maintained for travel on streets, roads, and highways according to the manufacturer's recommendations. During air pressure checks, inspect for:

- Missing or loose wheel lugs.
- Objects wedged between duals or embedded in the tire casing.
- Damage to or poorly fitting rims or rim flanges.
- Abnormal or uneven wear and cuts, breaks, or tears in the casing.

The repair of truck and off-highway tires should only be made with required special tools and following the recommendations of a tire manufacture's repair manual.

Batteries contain strong acid. Use extreme caution when servicing batteries.

- Service batteries in a ventilated area while wearing safety glasses.
- When a battery is removed from a vehicle or service unit, disconnect the battery ground clamp first.
- When installing a battery, connect the battery ground clamp last.
- When charging a battery with a battery charger, turn off the power source to the battery before either connecting or disconnecting charger loads to the battery posts. Cell caps should be loosened prior to charging to permit the escape of gas.
- Spilled battery acid can burn your skin and damage your eyes. Immediately flush spilled battery acid off of your skin with lots of water. Should battery acid get into someone's eyes, flush immediately with large amounts of water and see a medical physician at once.
- To avoid battery explosions, keep the cells filled with electrolyte, use a flashlight (not an open flame) to check electrolyte levels, and avoid creating sparks around the battery by shorting across a battery terminal. Keep lighted smoking materials and flames away from batteries.

Special precautions must be taken for handling fuel and refueling the drill rig or carrier.

- Only use the type and quality of fuel recommended by the engine manufacturer.
- Refuel in a well-ventilated area.
- Do not fill fuel tanks while the engine is running. Turn off all electrical switches.
- Do not spill fuel on hot surfaces. Clean any spillage before starting an engine.
- Wipe up spilled fuel with cotton rags or cloths - do not use wool or metallic cloth.
- Keep open lights, lighted smoking materials, and flames or sparking equipment well away from the fueling area.
- Turn off heaters in carrier cabs when refueling the carrier or the drill rig.
- Do not fill portable fuel containers completely full to allow expansion of the fuel during temperature changes.
- Keep the fuel nozzle in contact with the tank being filled to prevent static sparks from igniting the fuel.
- Do not transport portable fuel containers in the vehicle or carrier cab with personnel.
- Keep fuel containers and hoses in contact with a metal surface during travel to prevent the buildup of static charge.

2.5.22. First Aid

At least one member of the drill crew, preferably the drilling safety supervisor, should be trained to perform first aid. First aid is taught on a person-to-person basis, not by providing or reading a manual. Manuals should only provide continuing reminders and be used for reference. It is suggested that courses provided or sponsored by the American Red cross or a similar organization would best satisfy the requirements of first aid training for drill crews.

For drilling operations, it is particularly important that the individual responsible for first aid should be able to recognize the symptoms and be able to provide first aid for electrical shock, heart attack, stroke, broken bones, eye injury, snake bite, and cuts or abrasions to the skin. Again, first aid for these situations is best taught to drill crew members by instructors qualified by an agency such as the American Red Cross.

A first aid kit should be available and well maintained on each drill site.

2.5.23 Drill Rig Utilization

Do not attempt to exceed manufacturers' ratings of speed, force, torque, pressure, flow, etc. Only use the drill rig and tools for the purposes that they are intended and designed.

2.5.24 Drill Rig Alterations

Alterations to a drill rig or drilling tools should only be made by qualified personnel and only after consultation with the manufacturer.

DRILL RIG INSPECTION CHECKLIST

Answer Yes or No, and make any additional comments you feel are necessary. Potions of this checklist should be filled out during drilling operations.

A. GENERAL HEALTH AND SAFETY

1. Does the Health and Safety Plan (HASP) address drilling hazards? _____

   Comments: _____

2. Have the hazards of drilling been communicated to all field personnel? _____

   Comments: _____

3. Have the drillers been informed not to wear rings, loose fitting clothes, straps, draw strings, or other items which may catch in rotating or moving parts? _____

   Comments: _____

4. Do all field personnel know where the emergency shut off is for the rig? _____

   Comments: _____

5. Has the drill crew been informed that only qualified drillers may operate the rig? _____

   Comments: _____

6. Have all field personnel been informed of the location of posted information, i.e., hospitals, emergency phone numbers, evacuation routes? _____

   Comments: _____

7. Do all field personnel know the location of safety equipment, i.e., first aid kits, fire extinguishers? _____

   Comment: _____

8. Do drillers know the air monitoring scheme, i.e., when samples are to be taken? _____

Comments: _____

_____

9. Have the geologist and the drill crew established and/or been informed of the method for signaling an emergency? _____

Comment: _____

_____

B. PERSONAL PROTECTIVE EQUIPMENT

1. Do drillers have hard hats, safety glasses, and steel toed boots? _____

Comments: _____

_____

2. Does this equipment meet ANSI standards?
Hard hat (ANSI Z81.1) _____; safety glasses (ANSI Z87.1) _____; steel toed boots (ANSI Z41.1) _____

Comments: _____

_____

3. Do drillers have hearing protection available? _____

Comments: _____

_____

4. Do drillers have the personal protective equipment required in case of upgrade? _____

Comment: _____

_____

5. If respirators stored on the rig, are they clean and stored in plastic bags in a dry, safe place such that rubber components are not distorted? _____

Comments: _____

_____

6. Do drillers have gloves that are durable and will protect them from the chemical hazards? _____

Comments: _____

_____

7. Do the drillers have the correct respirator cartridge, as stated in the HASP? _____

Comments: _____

_____

8. Is this equipment used according to OSHA 29 CFR 1910.134? _____

Comments: _____

_____

C. HOUSEKEEPING

1. Is there adequate storage area for tools, augers, pipe, etc.? _____

Comments: _____

_____

2. Are pipes, augers and rods stacked in an area where they cannot roll or slide? _____

Comment: _____

_____

3. Are work areas and platforms free of tools, debris, and slick substances such as ice, mud, and grease? _____

Comments: _____

_____

4. Are controls free of slick substances such as mud, grease, and ice? _____

Comment: _____

_____

5. Is gasoline stored in OSHA approved containers? _____

Comments: _____

_____

D. MAINTENANCE

1. Do the drillers have a rig inspection program? _____

Comments: _____

_____

2. Are the inspections documented? _____

Comments: _____

_____

3. How often are the inspections performed? _____

Comments: _____

_____

4. Who performs the inspections? _____

Comments: _____

_____

5. Do the drillers perform daily checks on the equipment? _____

Comments: _____

_____

E. RIG EQUIPMENT

1. Are parking brakes available and in use when the equipment is not in use? _____

Comments: _____

_____

2. Are lights, mirrors, windshields and side windows in good condition and operational? _____

Comments: _____

_____

3. Are back-up alarms and warning signals operational? _____

Comments: _____

_____

4. Are mud flaps in place and in good condition? _____

Comments: _____

_____

5. Are the necessary protective guards maintained in place where injury may result? _____

Comments: _____

_____

6. Are cables in good condition and inspected often for, birdcaging, kinks, and flattened areas? _____

Comments: _____

_____

7. Are other signs of wear apparent, such as broken or cut wires on the cable? _____

Comments: _____

_____

8. Do pulleys operate freely and are cable guards maintained in place? _____

Comments: _____

_____

9. Are cable eyes formed and constructed properly? _____

Comments: _____

_____

10. Are at least three saddle clips installed and spaced properly, with the "U" section of the clip on the dead end of the rope? _____

Comments: _____

_____

11. Are pulleys the proper size for the cable diameter? _____

Comments: _____

_____

12. Is the rope to the slide hammer free of worn or burned spots? _____

Comments: _____

_____

13. Are hydraulic lines in good condition and fittings tight? _____

Comments: _____

_____

14. Are hydraulic slides and guides lubricated adequately and frequently? _____

Comments: _____

_____

15. Is the cat head lubricated frequently during use to avoid damaging the rope? _____

Comments: _____

_____

16. Is the emergency shut off system working properly? _____

Comments: _____

_____

17. Is there a first aid kit with a daily inspection log on the rig? _____

Comments: _____

_____

18. Is there a 20 B-C fire extinguisher with a current inspection tag available in the work area? _____

Comments: _____

_____

F. CUTTING TORCHES AND WELDING

1. Are drillers who are using cutting/welding equipment properly trained or experienced? _____

Comments: _____

_____

2. Are hoses in good shape, with no cuts or worn spots? _____

Comments: _____

_____

3. Are oxygen and acetylene tanks used, stored upright and secured from dropping or falling? _____

Comments: _____

_____

4. Are oxygen, acetylene and other fuel tanks stored at least 25' apart when not in use? _____

Comments: _____

_____

5. Are appropriate eye shades provided? _____

Comments: _____

_____

6. Is a wrench provided for operating the valves on the tank? _____

Comments: _____

_____

7. Are potentially toxic coatings removed from the materials prior to cutting/welding? _____

Comments: _____

_____

8. Is adequate ventilation provided when cutting/welding? _____

Comments: _____

_____

9. Are electric cables and connectors in good shape? _____

Comments: _____

_____

10. Is appropriate protective clothing worn when welding? _____

Comments: _____

_____

11. Are combustible materials kept away from the area while welding activities are in progress? _____

Comments: _____

_____

12. Is a Hot Work Permit program in effect when cutting/welding is performed? _____

Comments: _____

_____

G. <u>HAND TOOL SAFETY</u>

1. Are hand tools being used for their designed? _____

Comments: _____

_____

2. Are tools checked for signs of stress: cracked handles _____; loose handles _____; cracked or mushroomed metal _____; tips or points properly sharpened _____; wrenches _____; worn gripping surfaces _____.

Comments: _____

_____

3. Are safety glasses being worn when hand tools that may produce flying fragments are in use? _____

Comments: _____

_____

4. Are wrenches being used on nuts and bolts (pliers or pipe wrenches should not be used)? _____

Comments: _____

_____

5. Are pipe wrenches and other hand tools clean and in good condition? _____

Comments: _____

_____

H. ELECTRICITY AND POWER TOOLS

1. Is low voltage equipment used in tanks and wet area? _____

Comments: _____

_____

2. Are tools maintained, inspected and in good condition? _____

Comments: _____

_____

3. Are electrical tools and instruments approved for use in hazardous areas? _____ If yes, good for Class_____, Division _____, Groups _____

Comments: _____

_____

4. Is the insulation on cords in good condition, and plugs unbroken? _____

Comments: _____

_____

5. Are extension and power cords protected from vehicular traffic? _____

Comments: _____

_____

6. Has the grounding prong on any three prong plug been cut off? If not, is the extension cord made for a ground plug? _____

Comments: _____

_____

7. Are guards in place on portable electric tools?

Comments: _____

_____

I. SAFETY DURING SETUP AND DRILLING

1. Is bannerguard used to delineate the area around the rig (standard is one derrick length)? _____

Comments: _____

_____

2. Is the derrick lowered when the rig is moved from one place to another? _____

Comments: _____

_____

3. Have overhead and buried utilities been located and marked before drilling begins? _____

Comments: _____

_____

4. Are all personnel (except drillers) Cleared from the rear of and the sides of the rig when the derrick is being raised? _____

Comments: _____

_____

5. Are the jack pods lowered and leveled before the derrick is lowered? _____

Comments: _____

_____

6. Before drilling begins, is the derrick locked into place? _____

Comments: _____

_____

7. Does the driller shut down the operation of the rig when he is not at the controls? _____

Comments: _____

_____

8. Are open holes covered when left unattended? _____

Comments: _____

_____

9. Are drillers restricted from climbing the derrick? _____ If not do they use safety belts or harnesses? _____

Comments: _____

_____

10. Are all drilling operations shut down and workers required to be in safe locations during electrical storms? _____

Comments: _____

_____

11. Are drillers aware that the derrick must be a minimum of 20' from overhead power lines? _____

Comments: _____

_____

12. Have underground surveys been performed before drilling at each location? _____

Comments: _____

_____

13. If drilling is allowed after dusk, are 5 footcandles of light provided? _____

Comments: _____

_____

14. Is the entire drilling area illuminated so that personnel may see the hazards? _____

Comments: _____

_____

NOTE: Drilling after dusk is not recommended. CAR HEADLIGHTS ARE NOT AN ACCEPTABLE MEANS OF ILLUMINATION.

APPENDIX D

INSTRUCTIONS FOR SAMPLE SHIPPING AND DOCUMENTATION

INSTRUCTIONS FOR

SAMPLE SHIPPING

AND DOCUMENTATION

November 1997

Quality Assurance Management Section
U. S. EPA Region 9
San Francisco, CA

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1.0 GENERAL

1.1 When all paperwork has been completed by the sampler and samples are ready to be shipped, place the laboratories' copies in a plastic bag and tape it to the inside of the lid of the cooler(s). For CLP Analytical Services, Contract Laboratory Analytical Services Support's (CLASS) copies must be submitted within 5 days of sampling. The Region's copies may be submitted at that time or at the end of the sampling event. If the sampling event covers an extended length of time, the Region's copies must be submitted weekly. (Note: The RSCC coordinator will not forward CLASS's copies. They will be returned to the sampler.)

QAMS address:

U.S. EPA Region 9
Quality Assurance Program (PMD-3)
75 Hawthorne Street
San Francisco, CA 94105
Attn.: RSCC Coordinator

CLASS address:

Contract Laboratory Analytical Services Support
DynCorp
2000 Edmund Halley Dr.
Reston, VA 20191-3436
Attn.: Region 9 Coordinator

1.2 For analyses performed by the Regional Laboratory, DO NOT send any copies of the paperwork to the Contract Laboratory Analytical Services Support (CLASS).

1.3 DISTRIBUTION OF COPIES

1.3.1 CLP ANALYTICAL SERVICES

1.3.1.1 ORGANIC TRAFFIC REPORT/CHAIN-OF-CUSTODY FORM

a. Blue (original) copy to QAMS, Region 9
b. Pink (second) copy to CLASS
c. White (third) and Yellow (fourth) copies accompany samples to laboratory
d. Photocopy for sampler's files

1.3.1.2 INORGANIC TRAFFIC REPORT/CHAIN-OF-CUSTODY FORM

a. Green (original) copy to QAMS, Region 9
b. Pink (second) copy to CLASS
c. White (third) and Yellow (fourth) copies accompany samples to laboratory
d. Photocopy for sampler's files

1.3.2 REGIONAL ANALYTICAL PROGRAM (RAP):

1.3.2.1 RAP CHAIN-OF-CUSTODY FORM

a. White (original) copy to laboratory with samples
b. Pink copy to QAMS, Region 9
c. Photocopy for sampler's file

1.3.3 FIELD QA/QC SUMMARY FORM

a. Original to QAMS, Region 9
b. Photocopy for sampler's files

2.0 SAMPLE SHIPMENTS

2.1 Calling in shipments to the RSCC coordinator

2.1.1 Call the EPA Regional Sample Control Center (RSCC) coordinator on a daily basis, even if no shipments were made. The RSCC coordinator may be reached at (415) 744-1498.

2.1.2 Try to stick to the sampling schedule. If this is not possible, let the RSCC coordinator know immediately so other arrangements can be made.

2.1.3 Notify the RSCC coordinator within 12 hours of sample shipments. Calling in sample shipments to the RSCC coordinator is MANDATORY. Provide the following information to the RSCC coordinator:

1. Case number
2. Name of Laboratory
3. Date of shipment
4. Carrier and airbill number
5. Number of samples shipped by matrix and analysis type
6. Number of coolers shipped
7. Information on completions, changes, delays, etc.

2.2 Special shipments (i.e., Saturday delivery/pickup)

2.2.1 General - Friday shipments for Saturday delivery/pickup must be called in by noon (12:00 pm) Friday. This is to enable the RSCC coordinator to pass the information on to CLASS or to the laboratories. Samplers may not contact the laboratories directly. (Laboratories do not have to accept notification of delivery of samples from sources other than CLASS or RSCC.)

2.2.2 Regional Laboratory - The Regional Laboratory is located within a gated compound that is closed on weekends and holidays. Designated laboratory personnel will pickup the samples at the Federal Express office, take them to the laboratory and place them inside the refrigerators. If the following shipping instructions are not followed, an

unsuccessful delivery attempt will be made to the Regional Laboratory. In addition, the staff member on call will not be able to pickup the samples, since they will not be at the Federal Express office.

To ensure that samples are held at the Federal Express office, please be sure to complete the following items:

1. On the lower left side of the Federal Express airbill, "For HOLD at FedEx Location check here," mark the box for "Hold Saturday."

2. In Section 3 of the airbill, print the following Federal Express office address:

   1600 63rd Street
   Emeryville, CA 94608

Federal Express may affix stickers to the coolers. Be sure they read "SATURDAY FEDERAL EXPRESS CENTER HOLD" or something similar. Under no circumstances should a "SATURDAY DELIVERY" sticker be placed on the cooler.

If a carrier other than Federal Express is used, please call the RSCC coordinator (415-744-1498) to make special arrangements.

2.2.3 Most CLP laboratories and other commercial laboratories contracted by QAP are staffed on Saturdays. Therefore, coolers can be delivered directly to these laboratories. In this case, the "SATURDAY DELIVERY" sticker should be placed on the cooler.

2.2.4 Laboratories may request advance notification of the arrival of certain types of samples, such as samples with very short holding times (e.g., Cr +6) that will be hand delivered to the laboratory. Required deadlines for notification of sample shipments in these special cases will be determined on a case by case basis. The RSCC coordinator will inform the samplers as to when notification of sample delivery is required (e.g., by noon on the day samples will be delivered). This is to facilitate the laboratory(ies) having personnel available to analyze the samples as soon as they arrive.

2.3 Cooler Return

Samplers are responsible for providing laboratories with a means to return coolers to their place of origin. The easiest way is to enclose an airbill with return shipping instructions (i.e., the address filled in as to where the coolers are to be returned to) and an account number to charge shipping costs to.

Samplers using EMFAC coolers should refer to Section 7 of the

EMFAC Users Guide for cooler return instructions. EPA contractors should contact their EPA Project Officer for details on acceptable modes of cooler return and shipping cost reimbursement.

3.0 CLP ANALYTICAL SERVICES (CLPAS) TRAFFIC REPORT/CHAIN-OF-CUSTODY FORMS FOR ORGANIC AND INORGANIC ANALYSES

3.1 CASE DOCUMENTATION

Complete this form when collecting CLPAS samples. See Attachments 1 through 3 for examples.

Enter the CLPAS case number in the box(es) located in the upper right corner of the form. CLPAS case numbers have the format "xxxxx" (e.g., 18123).

3.2 HEADER INFORMATION

3.2.1 Box 1 - PROJECT CODE/SITE INFORMATION

Enter the Project Code (i.e., $F), Site Name, City, State, Site Spill ID. **(Note: the information entered here does not go through to the laboratory's copies.)**

If sampling is not under the Superfund program, enter the Account code (account to be billed), any Regional Information and the name of the program (e.g., RCRA) in the box titled "Non-Superfund program."

3.2.2 Box 2 - REGIONAL INFORMATION

Enter the Region number, the name of your sampling company, and your name and signature in the designated spaces.

3.2.3 Box 3 - TYPE OF ACTIVITY

Check the appropriate box(es) for the type of activity for this sampling event. See Appendix A for acronym definitions.

3.2.4 Box 4 - SHIPPING INFORMATION

Enter the date shipped, the carrier (e.g., Federal Express, Airbourne, etc.) and the air bill number in the appropriate spaces.

3.2.5 Box 5 - SHIP TO

Enter the laboratory name, full address and laboratory contact (e.g., Sample Custodian).

3.2.6 Box 6 - PRESERVATIVE

This box provides a list of commonly used preservatives. Enter the appropriate preservative in Column D. If you enter "5" on the Organic Traffic Report or "7" on the Inorganic Traffic Report indicating "Other", specify the preservative used at the bottom of the "Sample Documentation" area.

If you are using more than one type of preservative, you may either note the preservatives in the box specifically under the requested analyses (e.g., in the Cyanide box enter "2") or list them, separated by commas, in the same order as the checked sample analyses. (Alternatively, the analyses may be listed on separate lines.)

3.2.7 Box 7 - SAMPLE DESCRIPTION

This box provides a list of the description/matrices of the samples that are collected. Enter the appropriate description in Column A.

3.3 SAMPLE DOCUMENTATION

3.3.1 SAMPLE NUMBERS

Carefully transcribe the CLPAS sample numbers from the printed labels onto the Organic or Inorganic Traffic Report/Chain-of-Custody forms in the column labeled "CLP Sample Numbers".

CLPAS sample numbers have the following formats: YX123 for organic and MYX123 for inorganic samples. See Appendix B for examples.

3.3.2 Column A - SAMPLE DESCRIPTION

Enter the appropriate sample description code from Box 7.

Note: Item #6 "Oil" and Item #7 "Waste" are for RAP projects only. Do not ship oily samples or waste samples without making prior arrangements with the EPA.

3.3.3 Column B - CONCENTRATION

Enter "L" for low and "M" for medium concentration samples. (Prior arrangements must have been made with the ESAT RSCC coordinator, CLASS and the laboratories accepting the samples before shipping medium concentration samples. At this time, high concentration samples must be scheduled through the RAP system.)

NOTE: Medium concentration samples must be shipped in metal cans.

3.3.4 Column C - SAMPLE TYPE COMPOSITE/GRAB

Enter the type of sample you collected. A composite is a sample composed of more than one discrete sample. A grab is a discrete sample.

3.3.5 Column D - PRESERVATIVE USED

Enter the preservative used from Box 6.

3.3.6 Column E - CLPAS ANALYSIS

Check the analytical fractions requested for each sample, for example, VOAs, BNAs and Pesticides/PCBs are for low/medium concentration organics. Total metals and cyanide are for low/medium concentration inorganics.

NOTE: If dissolved metals are requested, a note must be added indicating that the samples have been field filtered and that digestion is required. See Attachment 2 for an example.

3.3.7 Column F - REGIONAL SPECIFIC TRACKING NUMBERS OR TAG NUMBERS

Region 9 does not issue tracking numbers or tag numbers. Samplers may use this column for sampler specific tracking numbers or for "Special Instructions". If you choose to use this as "Special Instructions", be sure to note, at the bottom of the "Sample Documentation" area, what the special handling is. The number and type of containers could be entered here. (e.g., 3-40 mL, 6-1L)

3.3.8 Column G - STATION LOCATION NUMBER

Enter the station location in the space provided.

3.3.9 Column H - MO/DAY/YEAR/TIME OF SAMPLE COLLECTION

Record the month, day, year and time (use military time, e.g., 1600 = 4:00 pm) of sample collection.

3.3.10 Column I - SAMPLER INITIALS

Enter your initials.

3.3.11 Column J - CORRESPONDING CLP ORGANIC/INORGANIC SAMPLE NUMBER

Enter the corresponding CLP sample number for organic or inorganic CLPAS analysis.

3.3.12 Column K - DESIGNATED FIELD QC

NOTE: This column is NOT to be used for the designated laboratory QC samples. Information entered here is not reproduced onto the laboratories' copies.

Enter the appropriate qualifier as listed below for "Blind" Field QC samples in this column. (NOTE: All samples must have a qualifier.)

Blind Field QC	Qualifier
Blind Blanks (field, etc.)	B
Blind Field Duplicates	D
Blind Field Spikes	S
Blind PE Samples	PE
All other field samples	--

"B" = These are blanks and include trip blanks (T), field blanks (F) and equipment blanks (E). Blanks may be further identified by the letter in parenthesis. For example, B(T) indicates that the sample is a trip blank.

"D" = These are field duplicates. Do not include samples designated as laboratory duplicates. The primary sample is identified with "--" and the duplicate is given "D" in column K. In addition, the station locations should also identify the primary and duplicate samples. For example, MW-1 is the primary sample and MW-1B is the duplicate sample.

"S" = These are spiked field samples and are generated by field personnel

"PE" = These are performance evaluation samples. They are spiked samples but are not field samples. They are usually prepared by other than field personnel.

"--" = All other samples not designated as blind field QC samples are given this qualifier.

3.4 "SHIPMENT FOR CASE COMPLETE (Y/N)"

This should reflect the status of the samples scheduled to be shipped to a laboratory for a specific case. Only when ALL samples scheduled for shipment to a laboratory for a specific case have been shipped is the case complete.

3.5 "PAGE 1 OF ____"

Enter the number of Traffic Report/Chain-of-Custody Record form(s) enclosed in each cooler. The form(s) accompanying each cooler must list only those samples contained in that cooler.

3.6 "SAMPLE USED FOR SPIKE AND/OR DUPLICATE"

Enter the sample number of the sample designated for laboratory spike and/or duplicate analysis. This is also known as the Laboratory QC sample. This sample should be included in the first shipment to the laboratory and in the first shipment for each subsequent sample delivery group (SDG).

DO NOT enter samples designated as blind field duplicates in this block.

3.7 "ADDITIONAL SAMPLER SIGNATURES"

Record additional sampler signatures that are different from that in Box 2.

3.8 "CHAIN OF CUSTODY SEAL NUMBER"

Enter the Chain of Custody Seal Number used to seal the cooler, if applicable.

3.9 Instructions summarizing CLP sample volumes, packaging and shipment reporting requirements are printed on the back of the Traffic Reports.

4.0 REGIONAL ANALYTICAL PROGRAM (RAP) CHAIN-OF-CUSTODY FORMS

4.1 CASE DOCUMENTATION

Complete this form when collecting RAP samples. See Attachment 4 for an example.

4.1.1 PROJECT NUMBER

Enter the RAP case number in this box.

4.1.2 PROJECT NAME

Leave this space blank.

4.1.3 SAMPLERS (Signature)

Record all sampler signatures in this box.

4.2 SAMPLE DOCUMENTATION

4.2.1 SAMPLE NUMBERS

No sample numbers are provided. Samplers should designate their own numbers and enter them in the space labeled STA.NO.

4.2.2 DATE

Enter the month, day and year the sample was collected in the "DATE" column.

4.2.3 TIME

Enter the time (using military time) in the "TIME" column.

4.2.4 COMP/GRAB

Check the kind of sample collected in the composite or grab column.

4.2.5 STATION LOCATION

Enter the sample site location in the space provided.

4.2.6 SAMPLE MATRIX

For each sample, enter the appropriate sample matrix description in the right third portion of the "STATION LOCATION" column.

4.2.7 NO. OF CONTAINERS

Enter the total number of sample containers collected for each matrix at each station location.

4.2.8 SAMPLE ANALYSES

There are six slanted columns to be used to specify the kind of analysis to be performed by the laboratory. Enter the appropriate analysis in each column. Mark the box of the appropriate analysis for each sample collected.

4.2.9 REMARKS

The items listed below are to be included in this area on the appropriate sample line.

4.2.9.1 CONCENTRATION

Enter "L" for low concentration, "M" for medium concentration and "H" for high concentration.

NOTE: Medium and high concentration samples must be shipped in metal cans.

4.2.9.2 PRESERVATIVE USED

Enter the preservative used.

If more than one type of preservative is used for a sample, separate the preservative references with commas. The sequence of the reference numbers must follow the sequence of the requested "RAP Analysis" parameters that are recorded in the analysis columns.

4.2.9.3 SAMPLE USED FOR SPIKE AND/OR DUPLICATE

Enter the sample number designated for spike and/or duplicate analysis. This is also known as the Laboratory QC sample. This sample should be included in the first shipment to the laboratory and in the first shipment for each subsequent sample delivery group (SDG).

4.3 AIRBILL NUMBER

The airbill number should be entered on the first signature line, in the box marked "Received by: (Signature)".

4.4 "REMARKS" BOX

Located in the lower right hand corner of the Chain of Custody is a box labeled "Remarks". The following items should be entered there.

4.4.1 CHAIN OF CUSTODY SEAL NUMBER

Enter the Chain of Custody Seal Number used to seal the coolers, if applicable, in the box labeled "Remarks", in the lower right-hand corner.

4.4.2 LABORATORY NAME

Enter the Laboratory name in the box labeled "Remarks", in the lower right-hand corner.

4.4.3 SHIPPING COMPLETE?

Enter "yes, shipping is complete" or "No, shipping is not complete" in the box labeled "Remarks", in the lower right-hand corner.

4.4.4 CARRIER

Enter the carrier (e.g., "Fed Ex") in the box labeled "Remarks", in the lower right-hand corner.

5.0 <u>SAMPLE BOTTLES</u>

5.1 Sample bottles be labeled with the following information:

a. Case number
b. Date/Time of collection
c. Matrix/Concentration
d. Station Location
e. Sample number (CLP or sampler designated)
f. Analysis
g. Preservative

5.2 Pre-printed, self-adhesive labels are provided for CLPAS Organic, CLPAS Inorganic and RAP samples.

5.2.1 Transcribe the appropriate sample number onto the corresponding bottle label and/or affix the sample number label onto the bottle.

5.2.2 Destroy all unused labels or return them to the ESAT RSCC coordinator. DO NOT use them for future samplings. New sample numbers will be assigned.

6.0 FIELD QA/QC SUMMARY FORM

6.1 Complete one form per laboratory per matrix for each sampling event. For long term projects, complete a form(s) after each week of sampling. Complete the header portion even if no QA/QC samples were provided.

6.2 Complete all applicable entries. Please use the appropriate sample numbers for each laboratory. (e.g., for the laboratory performing CLPAS organics, use the CLP organic sample numbers, YX123, etc. For the laboratory performing RAP analyses, use the RAP sample numbers, SY0123, etc.) Please do not use station locations. If a laboratory is performing more than one type of analysis, list all applicable sample numbers.

6.3 This form is very important for validation purposes. The validators will compare the results of duplicates and assess the quality of blanks, if they know which samples they are. Failure to provide this information will delay the completion of validation.

Appendix A

TYPE OF ACTIVITY

Check the box which describes the funding lead for this sampling event:

Funding Lead

SF = Superfund
PRP = Potentially Responsible Party
ST = State
FED = Federal

Check one or more boxes, as appropriate, which describe the task of this sampling event:

Pre-Remedial

PA = Preliminary Assessment
SSI = Screening Site Investigation
LSI = Listing Site Investigation

Remedial

RIFS = Remedial Investigation Feasibility Study
RD = Remedial Design
O&M = Operations and Maintenance
NPLD = National Priorities List

Removal

CLEM = Classic Emergency
REMA = Removal Assessment
REM = Removal
OIL = Oil Response
UST = Underground Storage Tank Response

CLP SAMPLE NUMBERS

Each sample is assigned a unique sample number. A "sample" is defined as follows:

- one matrix, e.g., water, soil/sediment, fish, etc.
- one station location
- one analytical program, e.g., CLPAS organics, CLPAS inorganics or a RAP analysis
- one laboratory

Sample numbers for CLPAS analyses:

- CLPAS Organic sample numbers consist of five alpha-numerics, always beginning with "Y" .

  Example - YJ386

- CLPAS Inorganic sample numbers consist of six alpha-numerics, always beginning with "MY"

  Example - MYG528

Examples for assigning sample numbers:

- CLPAS Volatiles & CLPAS Pesticides/PCBs receive the <u>SAME SAMPLE NUMBER</u>, if the samples are:

  - the same matrix
  - part of the same analytical program, e.g., CLPAS organics
  - from the same station location
  - going to the same laboratory

- CLPAS Volatiles & CLPAS Pesticides/PCBs receive <u>DIFFERENT SAMPLE NUMBERS</u>, if the samples are:

  - the same matrix
  - part of the same analytical program, e.g., CLPAS organics
  - from the same station location
  - going to different laboratories

- CLPAS Volatiles & CLPAS Metals receive <u>DIFFERENT SAMPLE NUMBERS</u>, if the samples are:

  - the same matrix
  - part of different analytical programs, e.g., CLPAS organics & CLPAS inorganics
  - from the same station location
  - going to the same laboratory

EPA

United States Environmental Protection Agency
Contract Laboratory Program Sample Management Office
PO Box 818 Alexandria, VA 22313
703-557-2490 FTS 557-2490

Organic Traffic Report & Chain of Custody Record

(For Organic CLP Analysis)

SAS No. (If applicable):

Case No.: 17235

1. Project Code: SF
Account Code:
2. Region No.: 9
Sampling Co.: Ace
4. Date Shipped: 1-7-94
Carrier: Fed. Express

Regional Information:
Sampler (Name): Gail Jones
Airbill Number: 0912345678

Non-Superfund Program:
Sampler Signature: Gail Jones
5. Ship To: Alpha Lab, 123 Pine Ave, NY, NY 10001
ATTN: John Doe

Site Name: Toxic Dump
City, State: Smallville CA
Site Spill ID: 99

3. Type of Activity:

	Lead	Pre-Remedial	Remedial	Removal
SF	X		RIFS X	CLEM
PRP		PA	RD	REMA
ST		SSI	RA	REM
FED		LSI	O&M	OIL
			NPLD	UST

6. Preservative (Enter in Column D)
1. HCl
2. HNO_3
3. $NaHSO_4$
4. H_2SO_4
5. Other (Specify)
6. Ice only
N. Not preserved

7. Sample Description (Enter in Column A)
1. Surface Water
2. Ground Water
3. Leachate
4. Rinsate
5. Soil/Sediment
6. Oil (High only)
7. Waste (High only)
8. Other (Specify)

CLP Sample Numbers (from labels)	A Enter # from Box 7	B Conc. Low Med High	C Sample Type: Comp./Grab	D Preservative from Box 6	E RAS Analysis: VOA	BNA	Pest/PCB	High only ARO/TOX	F Regional Specific Tracking Number or Tag Numbers	G Station Location Number	H Mo/Day/Year/Time Sample Collection	I Sampler Initials	J Corresp. CLP Inorg. Samp. No.	K Enter Appropriate Qualifier for Designated Field QC (B = Blank, S = Spike, D = Duplicate, PE = Perform. Eval., — = Not a QC Sample)
										MW-1	1-6-94 0900	gr	MYG001	—
YJ126	2	L	G			X				MW-2	1-6-94 1000	gr	MYG003	—
YJ127	2	L	G			X				MW-3	1-6-94 1100	gr	MYG005	—
YJ128	2	L	G			X								

Shipment for Case complete? (Y/N): Y
Page 1 of 1
Sample used for a spike and/or duplicate: YJ127
Additional Sampler Signatures:
Chain of Custody Seal Number:

CHAIN OF CUSTODY RECORD

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Gail Jones	1-7-94 1600	0912345678			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks: Is custody seal intact? Y/N/none	
			mpl	Ac	(Signature)

Declined

EPA Form 9110-2 (Rev. 5-91) Replaces EPA Form (2075-7), previous edition which may be used.

ATTACHMENT 1

EPA

United States Environmental Protection Agency
Contract Laboratory Program Sample Management Office
PO Box 818 Alexandria, VA 22313
703-557-2490 FTS 557-2490

Inorganic Traffic Report & Chain of Custody Record

(For Inorganic CLP Analysis)

SAS No. (if applicable):

Case No.: 17235

1. Project Code: $F
Account Code:
2. Region No.: 9
Sampling Co.: Ace
4. Date Shipped: 1-7-94
Carrier: Fed. Express
Regional Information:
Sampler (Name): Gail Jones
Airbill Number: 0912345699
Non-Superfund Program:
Sampler Signature: Gail Jones
5. Ship To: Beta Labs, Inc. 465 Maple Ave. Atlanta, GA 04507
ATTN: Mary Smith
Site Name: Toxic Dump
3. Type of Activity: SF [X] PRP [ ] ST [ ] FED [ ] Lead; Pre-Remedial: PA [ ] SSI [ ] LSI [ ]; Remedial: RIFS [X] RD [ ] RA [ ] O&M [ ] NPLD [ ]; Removal: CLEM [ ] REMA [ ] REM [ ] OIL [ ] UST [ ]
City, State: Smallville CA
Site Spill ID: 99

6. Preservative (Enter in Column D): 1. HCl 2. HNO3 3. NaOH 4. H_2SO_4 5. $K_2CR_2O_7$ 6. Ice only 7. Other (Specify) N. Not preserved

7. Sample Description (Enter in Column A): 1. Surface Water 2. Ground Water 3. Leachate 4. Rinsate 5. Soil/Sediment 6. Oil (High only) 7. Waste (High only) 8. Other (Specify)

CLP Sample Numbers (from labels)	A Enter # from Box 7	B Conc. Low Med High	C Sample Type: Comp./Grab	D Preservative from Box 6	E - RAS Analysis: Metals Total	Metals Dissolved	Cyanide	Low Conc. only: Nitrate/Nitrite	Fluoride	High only: pH	Conductivity	F Regional Specific Tracking Number or Tag Numbers	G Station Location Number	H Mo/Day/Year/Time Sample Collection	I Sampler Initials	J Corresp. CLP Org. Samp. No.	K Enter Appropriate Qualifier for Designated Field QC (B = Blank S = Spike D = Duplicate PE = Perform. Eval. — = Not a QC Sample)
MYG001	2	L	G	23	X		X						MW-1	1-6-94 0900	JB	YJ126	—
MYG002	2	L	G	2		X						A	MW-1	1-6-94 0915	JB	YJ126	—
MYG003	2	L	G	23	X		X						MW-2	1-6-94 1000	JB	YJ127	—
MYG004	2	L	G	2		X						A	MW-2	1-6-94 1015	JB	YJ127	—

A = Field Filtered, 0.45 micron
Digestion required for all dissolved samples

Shipment for Case complete? (Y/N): N
Page 1 of 1
Sample used for a spike and/or duplicate: MYG003 + MYG004
Additional Sampler Signatures: John Brown
Chain of Custody Seal Number:

CHAIN OF CUSTODY RECORD

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Gail Jones	1-7-94 1600	0912345699			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	Is custody seal intact? Y/N/none

Split Samples [ ] Accepted (Signature)

ATTACHMENT 2

NVIRONMENTA IOTECTION AGENCY
Office of Enforcement

REGION
75 Hawthorne Street
San Francisco, California 94105

CHAIN OF CUSTODY RECORD

PROJ. NO.: R94S12
PROJECT NAME:
SAMPLERS: (Signature) K. Pettit

TA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	MATRIX	NO. OF CONTAINERS	LOW LEVEL VOA	SULFIDE	NITRATE/NITRITE				REMARKS
D000	7/21/94	1000		✓	FRONT - MW	GW	4	X	X	X				VOA'S PRESERVED W/ HCL SULFIDE PRESERVED W/NaOH + Zn ACETATE
D001	7/21/94	1030		✓	BACK - MW	GW	4	X	X	X				
D002	7/21/94	1300		✓	EAST - MW	GW	4	X	X	X				LABQC
D003	7/21/94	1320	✓		EAST - S	SOIL	1			X				LABQC

ALL SOIL AND GW SAMPLES ARE LOW CONCENTRATION

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
K. Pettit	7/22/94 1600	1234567890			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks LAB: REGION 9 SHIPPING IS COMPLETE CARRIER: FED EX 7/22/94 CUSTODY SEAL #: 12345	

Distri Orl ccor Ship Cop ordi ield

ATTACHMENT 43

SAMPLE SHIPMENT INFORMATION

DATE: _____ # OF PAGES: _____

TO: GAIL JONES, RSCC COORDINATOR FROM: _____

CO.: EPA REGION 9 (P-3-2) CO.: _____

PHONE #: (415) 744-1498 PHONE #: _____

FAX #: (415) 744-1476 FAX #: _____

//

CASE #: _____ LAB NAME: _____

COOLERS: _____ SHIPPING DATE: _____

CARRIER: _____ AIRBILL #: _____

# SAMPLES	CONC/MATRIX	ANALYSES

Is this sampling event complete with this shipment? Y N

COMMENTS: _____

//

CASE #: _____ LAB NAME: _____

COOLERS: _____ SHIPPING DATE: _____

CARRIER: _____ AIRBILL #: _____

# SAMPLES	CONC/MATRIX	ANALYSES

Is this sampling event complete with this shipment? Y N

COMMENTS: _____

ATTACHMENT 4

FIELD QA/QC SUMMARY FORM

Instructions: Complete one form per laboratory and per matrix for each sampling e

Date: 1-10-94 Site: Toxic Dump

Sampler: Gail Jones Case/SAS #: 17235

Office: ACE Laboratory: Beta Labs, Inc

Phone: (415) 456-7890

Matrix: (check one)
X Groundwater ___ Surface Soil ___ Air
___ Surface Water ___ Subsurface Soil ___ Other ___

I. BLANKS

Sample #	Type (circle one)	Date Collected
MVG 021	Equip / Field / Travel	1-9-94
	Equip / Field / Travel	
	Equip / Field / Travel	
	Equip / Field / Travel	
	Equip / Field / Travel	
	Equip / Field / Travel	
	Equip / Field / Travel	
	Equip / Field / Travel	
	Equip / Field / Travel	
	Equip / Field / Travel	
	Equip / Field / Travel	
	Equip / Field / Travel	

II. BACKGROUND SAMPLES

Sample #	Date Colle

III. LAB QC SAMPLES

Sample #	Date Colle
MVG 003	1-6-9
MVG 004	1-6-9

IV. DUPLICATES

Sample #	Matches Sample #	Date Collected	Type (circle one)
MVG 015	MVG 016	1-9-94	a / (b) / c / d
			a / b / c / d
			a / b / c / d
			a / b / c / d
			a / b / c / d
			a / b / c / d

a= composite
b= consecutiv
c= colocated
d= consecutiv
soil sleev

V. Checklist of Field Problems Encountered

	Sample # / Date(s) of Occurrence / Comments
X None	
___ Pumping Equipment Problems	
___ Sample Filtering Problems	
___ Less Than Required Sample Volume	
___ Low Flow/Recharge Rates	
___ Preservation Problems	
___ Samples Not Shipped in 24 hrs.	
___ Federal Express Delay	
___ Other	

ATTACHMENT 5

SAMPLE SHIPMENT INFORMATION

DATE: _____

TO: GAIL JONES, RSCC COORDINATOR

CO.: EPA REGION 9 (P-3-2)

PHONE #: (415) 744-1498

FAX #: (415) 744-1476

OF PAGES: _____

FROM: _____

CO.: _____

PHONE #: _____

FAX #: _____

//

CASE #: _____

COOLERS: _____

CARRIER: _____

LAB NAME: _____

SHIPPING DATE: _____

AIRBILL #: _____

# SAMPLES	CONC/MATRIX	ANALYSES

Is this sampling event complete with this shipment? Y N

COMMENTS: _____

//

CASE #: _____

COOLERS: _____

CARRIER: _____

LAB NAME: _____

SHIPPING DATE: _____

AIRBILL #: _____

# SAMPLES	CONC/MATRIX	ANALYSES

Is this sampling event complete with this shipment? Y N

COMMENTS: _____