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File: Oakland, Ca.
Environmental

July 10, 1992

Ms. Susan Hugo
Hazardous Materials Specialist
Department of Environmental Health
Hazardous Materials Division
80 Swan Way, Rm. 200
Oakland, Ca. 94621

Dear Ms. Hugo

Reference Mr. Paul Smith's letter of April 29, 1992, and my letter of June 10 concerning Union Pacific Railroad's underground tank removals at [redacted]

Attached for your review is a Preliminary Site Assessment work plan for this site. Also attached is analytical data on the oil in the December 1987 excavation and from the 1990 tank removal.

Our Consultant USPCI, should be able to begin this work within 45 days of your approval.

Should you have any questions, Please call me at (402) 271-4078.

Yours truly

Harry P. Patterson P.E.
Manager Environmental Site Remediation

CC: John Seagle - Oakland
Nancy Roberts - Rm. 830
Steve Barkley - Supt. Stockton
Dennis Duffy - Rm. 1200
Avery Grimes - Rm 930
Mike Chapman - UPMF
Eric Taylor - USPCI

no site map w/proposed SBs + MWs! + frmr tank locations

PRELIMINARY SITE ASSESSMENT work plan

UNION PACIFIC RAILROAD FACILITY
1750 Ferro Street
OAKLAND, CA

prepared for

UNION PACIFIC RAILROAD
1416 DODGE STREET, ROOM 930
OMAHA, NEBRASKA 68179

prepared for

Department of Environmental Health
Hazardous Materials Division
80 Swan Way, Rm. 200
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prepared by:

USPCI - Remedial Services
Boulder, Colorado

F. Erickson Taylor for

Curtis G. Hull
Program Manager, Environmental Assessments

F. Erickson Taylor

F. Erickson Taylor
CA Registered Geologist No. 4710

REGISTERED GEOLOGIST
F. ERICKSON TAYLOR
No. 4710
EXP. 6-92
STATE OF CALIFORNIA

date is expired

18 June 1992

1.0 INTRODUCTION

1.1 Scope of Work/Site Location/Background/Site History

This Preliminary Site Assessment (PSA) has been prepared for Union Pacific Railroad (UPRR) by USPCI in response to a 29 April 1992, Alameda County Department of Environmental Health, Hazardous Materials Division (ACDEH) request for site characterization at the UPRR Ferro Street facility in Oakland, CA. The facility was the site of an unauthorized release of petroleum hydrocarbons from underground storage tanks.

The UPRR facility is located at 1750 Ferro Street, Oakland, CA.

1.2 Tank Removal

One (1) underground storage tank (UST) was removed from the site in December 1987. Two (2) USTs were removed in May 1988 and two (2) USTs were removed in February 1990.

High concentrations of petroleum hydrocarbons were detected in the tank excavations during the December 1987 and May 1988 removals. Detectable concentrations of petroleum hydrocarbons were recorded from soil samples collected during the 1990 tank removals.

1.6 Regulatory Response

Subsequent to review of the existing technical information regarding the tank removals at the project site, the ACDEH, in a letter dated 29 April 1992, requested a workplan for a Preliminary Site Assessment of the Ferro Street facility.

2.0 BACKGROUND TECHNICAL DATA

2.1 Name and Address of Contact Person

Contact Person: Mr. Harry Patterson
Union Pacific Railroad
1416 Dodge Street, Room 930
Omaha, Nebraska 68179
(402) 271-4078

2.2 Geology

The site is located along the eastern margin of San Francisco Bay with in the East Bay Plain (Hickenbottom and Muir, 1988). The East Bay Plain lies within the Coast Range Geomorphic province and is characterized by broad alluvial fan margins sloping westward into San Francisco Bay. The eastern side of the plain in the Oakland area is marked by the active Hayward Fault, along the base of the Diablo Range escarpment (Heard, 1978). Branches of the Hayward Fault, typical of the right-later strike-slip faults found in the

Bay Area, are present within 5 miles of the site (Radbruch, 1969, California Division of Mines and Geology, 1982).

Helley, et.al. (1979) mapped the sediments underlying the site area as Holocene to late Pleistocene age alluvial deposits composed of unconsolidated to weakly consolidated, moderately to poorly sorted, irregularly interbedded to well-bedded sand, silt, clay, and minor gravel. Radbruch (1969) and Lawson (1914) mapped the sediments underlying the site area as late Pleistocene-age alluvial deposits derived from the Berkeley Hills to the east, and known locally as the Temescal Formation.

2.3 Hydrology

Alameda County uses ground water as part of its domestic water supply. The remainder of the water supply is derived from surface reservoirs and from imported water that is transported in from the Mokelumne Aqueduct, the State Water Project, and the Hetch Hetchy Aqueduct (Hickenbottom and Muir, 1988).

The site area is located within the Oakland Upland and Alluvial Plain, a groundwater subarea of the East Bay Plain. Groundwater quality in the water-bearing units of the Oakland Upland and Alluvial Plain is generally good (meets recommended primary and secondary standards for drinking water). The most productive water wells in the Oakland Upland and Alluvial Plain are those completed with in the older alluvium units. Smaller amounts of groundwater occur in the younger alluvium, fluvial deposits, interfluvial basin deposits, and Bay Mud estaurine deposits. These deposits generally are relatively thin (less than 120 feet thick), and generally yield only small amounts of groundwater to wells.

The site ins mapped by Hickenbottom and Muir (1988) as being immediately underlain by shallow fluvial deposits characterized by unconsolidated, moderately sorted fine sand and silt. These deposits are permeable, and generally yield only small amounts of groundwater to wells. Well log data in the area from the CAPWA indicate that the maximum thickness of the fluvial deposits is approximately 15 feet. Beneath the surficial fluvial deposits in the site area, the older alluvium units are encountered. These units contain appreciable quantities of groundwater and are therefore considered to be the principal groundwater reservoir in the East Bay Plain area. Data from the CAPWA well logs indicate that the thickness of the older alluvium deposits is approximately 500 to 600 feet thick in the site area.

2.4 Proximity of Private, Municipal, and Irrigation Wells

A survey of water wells located within a one-half mile radius of the project site will be completed based on information obtained from the California Department of Water Resources (DWR) and the County of Alameda Public Works Agency (CAPWA). Well locations, types, and status (i.e., active, inactive, destroyed) will be included in the survey.

3.0 PRELIMINARY SITE ASSESSMENT WORKPLAN

3.1 Workscope

In order to characterize soil and groundwater conditions at the Ferro Street facility, USPCI proposes to drill and sample soil borings and install groundwater monitoring wells near the former tank pit. A minimum of three groundwater monitoring wells will be installed near the former tank pit. One well will be installed up-gradient of each tank pit and two wells will be installed down-gradient of each tank pit. Analytical results obtained from the soil samples will be utilized to define the lateral and vertical extent of petroleum hydrocarbon impacted soils at the project site. Laboratory results for the groundwater samples will be used to evaluate the lateral extent of petroleum hydrocarbon impacted groundwater beneath the site.

3.2 Methodology

The USPCI workscope will be completed using the following methodology:

Drilling will be conducted by a CA State Licensed C57 contractor utilizing a hollow stem auger drill rig. All USPCI field activities, including data recording procedures, decontamination methods, soil classification, sample collection, boring abandonment, well construction, and drill cuttings and purge water disposal, will be conducted in accordance with USPCI's Quality Assurance/Quality Control (QA/QC) Plan (Appendix I, Sections 2.0, 3.0 & 5.0).

Soil samples collected from the intervals of interest will be analyzed by a California State Certified laboratory for benzene, toluene, ethylbenzene, xylenes (BTEX) and total petroleum hydrocarbons as gasoline and diesel (TPH/G&D) in accordance with USPCI's QA/QC Plan (Appendix I, Section 6.0).

All site activities involving potential contact with hazardous materials (i.e. gasoline impacted soils) will be conducted in accordance with USPCI's Health and Safety Plan (Appendix II).

A Preliminary Assessment Report will be prepared according to Regional Board guidelines summarizing the findings of the investigation and presenting options for site remediation. Copies of this report will be submitted to the ACDEH and the Regional Water Quality Control Board, Oakland, CA.

The field investigation ~~and~~ will be conducted under the direct supervision of F. Erickson Taylor, California Registered Geologist #4710. Mr. Taylor has 6 years of experience in CA LUST site characterization work.

6.0 REFERENCES CITED

California Division of Mines and Geology. January 1982. Maps of Special Studies Zones for Oakland East and San Leandro Quadrangles, California.

Helley, E. S., K.R. Lajoie, W. E. Spangle, and M. L. Blair. 1979. Flatland Deposits of the San Francisco Bay Region, California. U.S. Geological Survey Professional Paper No. 943.

Herd, D. G. 1978. Map of Quaternary faulting along the northern Hayward Fault Zone. Mare Island, Richmond, Briones Valley, Oakland West, Oakland East, San Leandro, Hayward, and Newark quadrangles, California. U.S. Geological Survey Open File Report 78-308.

Hickenbottom, Kelvin, and Kenneth Muir. June 1988. Geohydrology and Groundwater-Quality Overview of the East Plain Area, Alameda County, California. Alameda County Flood Control and Water Conservation District Report No. 205(J).

Lawson, A. C. 1914. Geologic Description of the San Francisco district; San Francisco, Concord, San Mateo, and Hayward quadrangles. U. S. Geological Survey Geologic Atlas, No. 193, San Francisco folio.

Radbruch, Dorothy H. 1969. Areal and Engineering Geology of the Oakland East Quadrangle, California. U.S. Geological Survey Geologic Quadrangle Map GQ-769.

USPCI

QUALITY ASSURANCE / QUALITY CONTROL PLAN

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USPCI
Quality Assurance /Quality Control Plan

INTRODUCTION

The USPCI quality assurance/quality control program (QA/QC) is intended to facilitate the acquisition of accurate and reliable data for environmental assessments.

The Quality Assurance Program is a totally integrated program for assuring the reliability of laboratory data, including quality planning, quality assessment and quality improvement efforts to meet project requirements at an economical level. Quality Assurance incorporates procedures for field sampling, sample handling and storage, analytical quality control and document preparation and review.

The Quality Control Program is a routine application of procedures such as blanks, spikes and spike duplicates for obtaining prescribed standards of performance in the measuring process. Quality Control is an audit of the overall Quality Assurance Program. Both programs are necessary to provide accurate data and documentation for investigations and laboratory analyses. The following personnel requirements and field and laboratory procedures will be implemented to ensure that QA/QC objectives are met on all USPCI projects.

1.0 FIELD PERSONNEL

All USPCI professional staff hold bachelor's degrees in their fields, and many also have advanced degrees in their technical disciplines. Where applicable, USPCI professionals are State Registered or Certified in their fields of expertise.

Due to the importance of protecting the health of USPCI employees, subcontractor personnel and others, all on-site workers involved in USPCI projects must have Occupational Safety and Health Administration (OSHA) 40-hour Health and Safety Training Certification. Additionally, USPCI personnel receive periodic training in the use of special equipment for air monitoring and contaminant detection, excavation and shoring, and computerized project management systems.

2.0 FIELD TECHNIQUES

2.1 Recording of Field Data

All information pertinent to the field investigation will be documented on field forms. Information to be documented includes at least the following:

- Sample numbers
- Locations of sample collection
- Soil boring or well numbers, as applicable
- Depths at which samples were obtained
- Names of sample collectors
- Dates and times of collection
- Purpose of sample
- Sample distribution (e.g., laboratory, archive, etc.)
- Field observations
- Field measurements (e.g., PID readings, Ph, conductivity, water levels).
- Other data records (e.g., development log, soil sampling report, well log, etc.)

2.2 Field Equipment Calibration and Maintenance

The following measuring equipment may be used during environmental assessments to ensure site safety. Monitoring equipment is grouped by field activity. Calibration procedures and frequency are listed for each piece.

<u>Soil Borings and Well dimensions</u>- Steel and coated cloth tape. Calibration: none.

Water Level Measurements in Wells- Steel surveyors tape. Calibration: manufacturer supplied temperature correction will be applied as applicable for field conditions. Electrical well sounders. Calibration: check against steel surveyor's tape.

Organic Vapors- Photoionization detector. Calibration: daily field calibration using an isobutylene standard as per manufacturers instructions.

Groundwater pH Measurement- Digital pH meter. Calibration: standard pH solutions of 4, 7, and 10 will be utilized for daily field calibration according to manufacturers instructions.

Electrical Conductivity- Electrical conductivity meter. Calibration: factory-calibrated annually and periodically calibrated against laboratory prepared standard calibration solution.

Water Temperature- Mercury or digital thermometers. Calibration: factory-calibrated once.

Combustible Gas/Oxygen- Combustible gas/oxygen meter calibration: Factory calibrated, field calibrated monthly, zeroed daily according to manufacturers instructions.

Miscellaneous Measuring Devices- Calibration procedures for any other measuring device used will be documented at the request of the regulatory authority.

All equipment will be checked daily and replaced as necessary. Instrument manuals and an instrument log book will accompany all equipment into the field. Any calibration, repairs or related information will be recorded in the log book.

3.0 SAMPLING METHODOLOGY

3.1 Sampling and Drilling Equipment Decontamination

All equipment used for drilling and sampling during USPCI environmental assessments will be decontaminated using a steam cleaner prior to use. In addition, the equipment will be decontaminated prior to commencing drilling at each subsequent drilling location. All equipment used for collection of more than one sample, such as water sampling bailers and split-spoon soil samplers, will be decontaminated between each use to prevent cross contamination between samples. The sampling equipment decontamination procedure for pesticides and organic analysis will consist of a low phosphate detergent (Alconox or equivalent) bath followed by tap water, and deionized water rinses. If the equipment is used to sample for metals, the initial rinse will be conducted with 0.1 N nitric acid followed by tap water and deionized water. Clean equipment will be placed on a rack and allowed to air dry. The water used in the decontamination procedure will be stored in containers certified for hazardous materials storage by U.S. Department of Transportation (DOT). The drums will be secured on-site.

3.2 Soil Sample Collection During Drilling Activities

A proposal will be submitted to the lead Regulatory Authority with proposed boring/sampling locations. The exact location and number of borings at each site will be determined in the field by the Project Geologist/Engineer.

Soil samples will be obtained using a California modified split-spoon sampler. The sampler consists of a thin-walled steel cylinder, held together on each end by threaded steel end pieces, which separates longitudinally into two halves allowing the removal of brass or stainless steel liners which are used to contain the sampled soil interval. The sampler is 18 to 24 inches long and typically contains 3 to 4, six inch long, 2 to 2.5 inch diameter liners. The sampler will be driven ahead of the hollow stem auger by a 140 pound hammer with a 30 inch drop in accordance with the American Society for Testing and Materials (ASTM) Methods D 1586-84 for split barrel sampling of soil and D 1587-83 for thin-walled tube sampling of soils. The blows required to drive the sampler each six inch interval will be recorded on the boring log. The sampler will be removed from the boring and opened to reveal the liners. Latex gloves will be worn to prevent cross-contamination with other samples. The disposable gloves will be discarded after collection of samples from each sample drive.

Whenever possible, the bottom liner is selected for laboratory analysis. The liner will be sealed on each end with aluminum foil, plastic end caps and duct tape. Samples selected for laboratory analysis will be preserved, stored and transported in accordance with USPCI sample processing protocol (see Section 6).

Soil in the other liners and sampler shoe will be described according to ASTM Standard Practice for Description and Identification of Soils, Visual-Manual Procedure (ASTM D-2488-90). Stratigraphic, genetic and other data/interpretations will also be recorded. Alternatively, one of the other sample liners may be used for the preparation of a duplicate sample. Field observations and selected sample intervals for laboratory analysis will be noted on the log prepared for each soil boring/ monitoring well. An explanation of the ASTM soil classification system will be included with the soil boring/well logs in an appendix of the assessment report.

Soil samples will be collected at five foot intervals, at significant changes in lithology and intervals of obvious contamination in order to develop a complete profile of soil contamination.

3.3 Soil Sampling with a Hand Auger and Hand Held Coring Hammer

Hand tools will be utilized to collect soil samples from areas which are inaccessible to drilling rigs or do not require one. A hand auger will be used to advance the soil boring to the interval of interest. A hand held sliding hammer soil coring device will be utilized to drive a steel liner to obtain a undisturbed sample. Latex gloves will be worn to prevent cross-contamination with other samples. The disposable gloves will be discarded after sample collection from each interval. The steel liner containing the collected sample will be sealed on each end with aluminum foil, plastic end caps and duct tape. Samples selected for laboratory analysis will be preserved, stored and transported in accordance with USPCI sample processing protocol (See Section 6).

Soil description and sample collection intervals will follow methods discussed in Section 3.2.

3.4 Soil Boring Abandonment

Upon completion of sampling activities, all USPCI soil borings will be abandoned with neat cement in order to prevent development of any preferential pathways from the surface to subsurface. The neat cement shall be composed of one sack of Portland cement (94 pounds or 43 kilograms) to 4.5 to 6.5 (depending on cement type and additives used) gallons (17 to 25 liters) of clean water. The borings will be backfilled in one continuous operation from the bottom up either through the drilling augers or via tremie pipe.

3.5 Disposal of Drill Cuttings

All soil cuttings generated during drilling activities will be contained in DOT approved, labeled steel drums certified for the storage of hazardous materials. The drums will be secured on-site.

4.0 OTHER SOIL SAMPLE COLLECTION METHODS

4.1 Sample Collection During Tank Removal

Soil samples will be collected as soon as possible after removal of the tank. Where feasible, all preparations for soil sampling will be made prior to tank removal. Soil samples collected from a backhoe bucket or directly from the excavation floor will be collected in thin-walled stainless steel or brass liners at least three inches long by one inch in diameter. From 3 to 24 inches of soil will be removed from the immediate surface area where the sample is to be taken and the cylinder then pounded into the soil with a wooden mallet, bulk density driver, or other decontaminated driving device. No head space will be present in the cylinder once the sample is collected. Care will be taken to avoid contamination of both the inside and outside of the cylinder as well as well as its contents. During sampling, latex gloves will be worn to prevent cross contamination with other samples.

Once the sample is collected, the liner will be sealed on each end with aluminum foil or teflon tape, polyethylene lids, and duct tape. The sample will stored and transported to the laboratory in accordance with USPCI Sample Processing Protocol (Section 6).

4.2 Sampling from Soil Piles or Shallow Soil Pits

Soil samples will be collected and transported from excavated material or shallow pits in the manner described in the previous section except that a backhoe will not be utilized. If composite samples are collected, four metal liners (brass or stainless steel) will be filled for every 50 cubic yards of material to be sampled unless otherwise specified by the regulatory agency. The samples will be composited in a State Certified laboratory prior to analysis.

5.0 GROUNDWATER MONITORING WELLS/ INSTALLATION, SURVEY, MONITORING, DEVELOPMENT AND SAMPLING

5.1 Monitoring Well Installation

If a soil boring is converted to a groundwater monitoring well, all well construction materials will be steam cleaned, as necessary, prior to installation. Well construction material decontamination will be conducted on impermeable surfaces and all decontamination effluent will be contained and transferred to DOT approved plastic or steel drums. The drums will be secured on-site.

Well casing will be selected based on the chemical compounds targeted for laboratory analysis, anticipated lifetime of the monitoring program, well depth and geochemistry. In most cases, polyvinyl chloride (PVC) well casing and screen will be utilized. Site specific conditions may, in some cases, require the use of other well construction materials. The casing/screen will be flush threaded. Unless site-specific conditions warrant otherwise, 0.020 inch slotted screen will be installed. The screened interval will extend up to 15 feet below the water table. Five feet of screen will extend above the saturated zone in order to allow for monitoring of free product under conditions of a rising water table. In order to prevent potential dilution of target chemical compounds in water samples, no more than 20 feet of screen will be installed in any monitoring well.

A coarse-grained sand filter pack (e.g. #2/12 Lonestar, #3 Monterey) will be utilized to mitigate siltation of the well by fine-grained sediments in the surrounding aquifer. The sand will be introduced through the drilling augers in order to ensure the integrity of the filter pack. A minimum 3 inch differential between the outer diameter of the well screen and the inner diameter of the augers will be maintained in order to ensure effective placement of filter pack. In some instances, saturated fine-grained sand (flowing sand) may enter the drill string during well completion. Although every effort will be made to prevent entry of native materials into the drill string during well completion (e.g. loading the augers with water), it may sometimes be necessary to utilize native material for filter pack. Information regarding filter pack condition will be included on the well log. The filter pack will extend to at least one foot but no more than two feet above the top of the screened interval to allow for filter pack settling during well development.

Subsequent to introduction of the filter pack, the surface sanitary seal will be completed. At least a two foot thick interval of sodium bentonite pellets will be deposited directly above the filter pack. The pellets will then be hydrated with clean water. A neat cement grout seal will be placed via tremie pipe from the bentonite pellet seal to just below the frost line. The neat cement grout seal will be composed of one sack of Portland cement (94 pounds or 43 kilograms) to 4.5 to 6.5 (depending on cement type and additives used) gallons (17 to 25 liters) of clean water.

Soundings will be made by the during all stages of well construction to ensure proper placement of filter pack and sealant materials. Moreover, the volume of filter pack and sealant required will be calculated to establish the correct subsurface distribution of the materials. The actual volume of materials used will be recorded during well construction. Discrepancies between calculated volumes and actual volumes will be noted and explained.

A subgrade traffic-rated well box, or aboveground steel casing imbedded in concrete will be installed to protect the wellhead. The concrete cap will extend from the frost line to the surface and blend into a four-inch thick apron at least two feet in diameter. Locating the interface between the concrete cap and the neat cement surface seal below the frost line serves to protect the well from damage due to frost heaving. The wellhead will be locked to provide monitoring well security.

A typical monitoring well completion is diagramed in Figure A. All well completion information will be included in the well log.

5.2 Elevation Survey of Monitoring Wells

All monitoring wells at USPCI project sites will be surveyed to a common datum by a qualified surveyor. Where required by regulatory agencies, the wells will be surveyed to mean sea level datum (MSLD) by a Registered land surveyor to an accuracy of 0.01 foot. The surveyor's report will be included as an appendix to the report. For consistency, the wells will be surveyed from the north side of the top of the monitoring well casing.

5.3 Well Development Protocol

Groundwater monitoring wells will be surged and developed subsequent to well completion. Flow reversals or surges will be created by using surge blocks, bailers or pumps. Formation water will be used to surge the well. In low yielding water bearing formations, an outside source of water may be introduced into the well to facilitate development. In such cases this water will be chemically analyzed beforehand to evaluate its potential impact on in-situ water quality. At no time will air be used to develop a well. Approximately 4 to 10 times the volume of water in the casing and pores of the filter pack will be withdrawn, if possible. Development volumes will be calculated in the following manner:

Volume of Schedule 40 PVC Pipe

Diameter (inches)	I.D. (inches)	Volume Gal/linear ft.
2	2.067	0.17
4	4.026	0.66

Volume of Open Borehole and Annular Space Between Casing and Hole

Hole Diameter (inches)	Volume/linear ft. of hole		Normal Casing Diameter (inches)	Volume/ linear ft. of* Annular Space	
	Gal.	Cu. Ft.		Gal.	Cu. ft.
7.25	2.14	0.29	2	1.91	0.26
8.25	2.78	0.37	2	2.55	0.34
10.25	4.29	0.57	2	4.06	0.54
10.25	4.29	0.57	4	3.46	0.46
12.25	6.13	0.82	4	5.30	0.71

*Note: Annular volumes will be multiplied by 30% to account for porosity of filter pack.

If the aquifer is slow to recharge, development will continue until recharge is too slow to practically continue. The volume of water produced versus time will be recorded on the well log.

All withdrawn groundwater will be stored on-site in DOT approved containers for hazardous material storage unless prior permission is granted by the appropriate regulatory agency to discharge the water to the ground surface or sanitary sewer. Contained water will be labeled with the source of the water to help ensure appropriate disposal based on contamination levels.

5.4 Documentation of Well Design, Construction and Development

The following well design and construction details for each monitoring well will be included on the boring log, purge log, or surveyor' report:

1) Date/time of construction
2) Drilling method and drilling fluid used
3) Well location (within 0.5 ft.)
4) Bore hole diameter and well casing diameter
5) Well depth (within 0.1 ft.)
6) Drilling and lithologic logs
7) Casing materials
8) Screen materials and design
9) Casing and screen joint type
10) Screen slot size /length
11) Filter pack material/size
12) Filter pack volume calculations
13) Filter pack placement method
14) Sealant materials (percent bentonite)
15) Sealant volume (lbs/gallon of cement)
16) Sealant placement method
17) Surface seal design/construction
18) Well development procedure
19) Type of protective well cap
20) Ground surface elevation (within 0.01 ft.)
21) Top of monitoring well casing elevation (within 0.01 ft.)
22) Detailed drawing of well (including dimensions)

5.5 Groundwater Monitoring Protocol

During a sampling event the depth to standing water and total depth of the well (bottom of screened interval) well be measured to an accuracy of 0.01 foot. For consistency, all measurements will be taken from the north side of the wellhead at the survey mark. These measurements are required to calculate the volume of stagnant water in the well and provide a check of the integrity of the well (e.g., identify siltation problems). The devices used to detect the water level surface and calibration methods have been discussed previously (Section 2.2).

5.5.1 Detection of Immiscible Layers

The thickness of immiscible layers (i.e., "floaters" and/or "sinkers") within a monitoring well, if present, will be determined during each sampling event. "Floaters" are those relatively insoluble organic liquids that are less dense than water and which spread across the potentiometric surface. "Sinkers" are those relatively insoluble organic liquids that are more dense water and tend to migrate vertically through the sand and gravel aquifers to the underlying confining layer.

The following procedures will be utilized for detecting the presence of light and/or dense phase immiscible organic layers. These procedures will be conducted prior to well evacuation for conventional sampling:

1) Remove the locking and protective caps.

2) Sample the air in the wellhead for organic vapors using either a photoionization analyzer or an organic vapor analyzer, and record measurements. The air above the wellhead will be monitored in order to determine the potential for fire, explosion, and/or toxic effects on workers.

3) Determine, using an interface probe, the static liquid level and thickness, if present, of any floating immiscible organic layers.

4) Determine the presence of dense phase immiscible layers by lowering an interface probe to the bottom of the well.

5.4.2 Collection of immiscible solutions

The approach to collecting light phase immiscibles is dependent upon the depth to the surface of the floating layer and the thickness of that layer. If the thickness of the phase is 2 feet or greater, a bottom valve bailer will be used. The bailer will be lowered slowly until contact is made with the surface of the immiscible phase, then lowered to a depth less than that of the immiscible/water interface depth as determined by preliminary measure with the interface probe.

When the thickness of the floating layer is less than 2 feet, a bailer will be modified to allow filling only from the top. The bailer will be lowered carefully, measuring the depth to the surface of the floating layer, until the top of the bailer is level with the top of the floating layer. The bailer will be lowered an additional one-half thickness of the floating layer and the sample collected.

A double check valve bailer will be used to collect dense phase immiscibles. The bailer will be slowly lowered and raised for sample collection.

Floating product thickness is calculated by subtracting the depth to product from the depth to water. In addition, water elevations are adjusted for the presence of fuel with the following calculation:

$$\text{(Product Thickness)}\ (.8) + \text{(Water Elevation)} = \text{Corrected Water Elevation}$$

Note: The factor of 0.8 accounts for the density difference between water and petroleum hydrocarbons.

Newly installed wells will be allowed to stabilize for 24 hours after development prior to free product inspection.

An acrylic surface sampler will be used for visual inspection of the groundwater in order to note sheens (difficult to detect with an Interface Probe), odors, microbial action and sediments. The sampler is calibrated in inches and centimeters for visual inspection of product thickness.

To reduce the potential for cross contamination between wells, well monitorings will proceed in order from the least to most contaminated wells, if known. Wells containing free product will be monitored last. Between each well monitoring the equipment will be decontaminated following the procedure detailed in Section 3.1.

Water level data collected from the wells will be used in combination with the survey data to develop a groundwater contour map for the project site. Groundwater flow will be estimated to be perpendicular to equipotential lines generated on the map.

5.6 Groundwater Sampling Protocol

Prior to arriving at the sampling site, all groundwater sampling equipment except pre-cleaned disposable materials will be washed with a low phosphate detergent (Alconox or equivalent), rinsed twice with tap water, and once with deionized water. If more than one monitoring well is on-site, this procedure will be carried out prior to sampling of each of the other monitoring wells.

Immediately prior to sampling, the depth to water (DTW) in the well will be recorded. The thickness of any floating or dense immiscible layers, if present, will be measured using an interface probe. The monitoring procedure is presented in Section 5.2 (Groundwater Monitoring Protocol).

Water elevations will be collected during each subsequent sampling event in order to determine if horizontal and vertical flow gradients have changed since initial site characterization. A change in hydrologic conditions may necessitate modification to the design of the site groundwater monitoring system.

If free product is detected, laboratory analysis of groundwater at the interface for dissolved product will not be conducted. A product sample will be collected for source identification.

The water standing in a well prior to sample collection may not be representative of in-situ ground-water quality. Prior to sample collection, the well will be purged with a bailer, WaTerra pump, or positive-gas-displacement pump until indicator parameters (temperature, conductivity and pH) stabilize. This generally requires the removal of at least three well casing volumes by bailing or pumping. The water will be drawn from the uppermost part of the water column in high-yield formations to ensure that fresh water from the formation will move upward in the screen. In low-yield formations, water will be purged so that it is removed from the bottom of the screened interval.

The criteria for determining well casing volumes and disposition of purged water is outlined in Section 5.3 (Well Development Protocol). The indicator parameter measurements will be taken both before and after purging of each well casing volume. Once indicator parameters have stabilized, a sample will be collected after the water level approaches 80 percent of its initial elevation. Where water level recovery is slow (exceeding 2 hours), the sample will be collected after stabilization is achieved and enough water is present to collect an adequate amount of sample for analysis. At no time will a well be pumped dry if the recharge rate causes the formation water to vigorously cascade down the sides of the screen and cause an accelerated loss of volatiles. All well development and purging information will be noted on purge logs and included as an appendix of the report.

Sampling will proceed from the least contaminated to the most contaminated well, if that information is available before sample collection, or if such information can be determined by field evidence. Where several types of analysis will be performed for a given well, individual samples will be collected in order of decreasing volatility as follows:

1. Volatile organics
2. Purgeable organic carbon
3. Purgeable organic halogens
4. Total organic carbon
5. Total organic halogens
6. Extractable organics
7. Total metals
8. Dissolved metals
9. Phenols
10. Cyanide
11. Sulfate and chloride
12. Turbidity
13. Nitrate and ammonia

The specific analytical methods to be utilized for the various analyses are shown on Table 2.

All sampling procedures will conform with the following:

1) Temperature, pH, and specific conductance measurements will be made in the field before and after sample collection as a check on the stability of the water sampled over time.

2) Water samples will be collected with a teflon bailer equipped with a bottom emptying device or a positive gas displacement bladder pump.

3) All sampling equipment introduced to the well will be constructed of inert materials (i.e. teflon or stainless steel).

4) Positive gas displacement bladder pumps will be operated in a continuous manner so that they do not produce pulsating samples that are aerated in the return tube or upon discharge.

5) Check valves will be designed and inspected to assure that fouling problems do not reduce delivery capabilities or result in aeration of the sample.

6) Sampling equipment (e.g., especially bailers) will never be dropped into the well, which causes degassing of the water upon impact.

7) Clean sampling equipment will not be placed directly on the ground or other contaminated surfaces prior to insertion into the well.

Duplicate samples will be transferred to vials or containers that meet Regulatory specifications (Table 1). When filling 40 ml vials, groundwater will be transferred from the sampling device to the sample container by allowing the fluid to flow slowly along the sides of the vessel. All containers will be filled above the top of the opening to form a positive meniscus. No head space should be present in the sample container once it is sealed. After the vial is capped, it will be inverted to check for air bubbles. If bubbles are present, the sample will be discarded and replaced. If it is not possible to collect a sample without head space, the problem will be noted on the field technician's sampling log. Immediately following sample collection, samples will be stored and transferred to the laboratory in accordance with USPCI sample processing protocol (Section 6).

If a positive gas displacement bladder pump is used for sample collection, pumping rates will not exceed 100 milliliters/minute. Higher rates can increase the loss of volatile constituents and can cause fluctuation in pH and pH-sensitive analytes. Once the portions of the sample reserved for the analysis of volatile components have been collected, higher pumping rates may be utilized for sample collection for other analyses. However, the sampling flow rate will not exceed the flow rate used while purging.

6.0 SAMPLE PROCESSING

6.1 Sample Containers

Soil and Groundwater samples will be placed in the proper containers for the desired analysis. Table 1 summarizes the required sample containers. All sample containers will be verified clean in the laboratory prior to shipment to a sampling site. Containers will be cleaned based on the analyte of interest. When samples are to be analyzed for metals, the sample containers as well as the laboratory glassware will be thoroughly washed with nonphosphate detergent and tap water, rinsed with (1:1) nitric acid, tap water, (1:1) hydrochloric acid, tap water, and finally Type II water, in that order. Containers used to store samples for organics analysis will be washed with a nonphosphate detergent in hot water, rinsed with tap water, distilled water, acetone, and finally with pesticide-quality hexane.

6.2 Sample Preservation

Samples will be preserved in order to : 1) retard biological activity, 2) retard hydrolysis, and 3) reduce sorption effects. Soil and groundwater samples will be preserved as indicated on Table 1 and placed in an ice chest immediately after collection. Chemical ice (blue ice), dry ice, or, where allowed, regular ice, sealed in plastic bags will be used to cool and maintain samples at a temperature of 4°C.

Samples requiring analysis for organics will not be filtered. Samples will not be transferred from one container to another, could cause losses of organic material onto the walls of the container or through aeration.

Metallic ions that migrate through the unsaturated (vadose) and saturated zones and arrive at a ground-water monitoring well may be present in the well. Particles (e.g., silt, clay), which may be present in the well even after well evacuation procedures, may absorb or adsorb various ionic species to effectively lower the dissolved metal content in the well water. Ground-water samples on which metals analysis will be conducted will be split into two portions. One portion will be filtered through a 0.45 micron membrane filter, transferred to a bottle, preserved with nitric acid to a pH less than 2 (Table 1), and analyzed for dissolved metals. The remaining portion will be transferred to a bottle, preserved with nitric acid, and analyzed for total metals. Any difference in concentration between the total and dissolved fractions may be attributed to the original metallic ion content of the particles and any sorption of ions to the particles.

6.3 Sample Labeling

Each sample container will be labeled to prevent misidentification. The label will contain at least the following information:

- Sample number which uniquely identifies the sample
- Project title or number
- Location of sample collection
- Soil boring or well number, as applicable
- Name of collector
- Date and time of collection
- Type of analysis requested.

Table 1
Sample Containers, Holding Times and Preservation

Parameter	Matrix	Container	Holding Time	Preservation
Total Petrol. Hydrocarbons	Soil	3" stainless steel or brass cylinder	14 days[1]/ 40 days[2]/	4°C
(Light Fractions)	Water	40 ml glass vial, teflon-faced silicon septum	14 days[1]/ 20 days[2]/	4°C HCl to pH * 2 (except $CaCO_3$ water)
(Heavy fractions)	Water	1 amber bottles, teflon seal/silicon septum	14 days[1]/ 40 days[2]/	4°C
Benzene Toluene Xylene Ethylbenzene	Soil	3" stainless steel or brass cylinder	14 days[1]/	4°C
	Water	40 ml glass vial, teflon seal/silicon septum	7 days[1]/ 14 days[3]/	4°C HCl to pH * 2 (except $CaCO_3$ water)
Purgeable Halocarbons	Soil	3" stainless steel or brass cylinder	14 days[1]/	4°C
	Water	500 ml glass vial, teflon seal/silicon septum	14 days[1]/	
Organic lead	Soil	3" stainless steel or brass cylinder	14 days[1]/	4°C
	Water	40 ml glass vial, teflon seal/silicon septum	14 days[1]/	4°C
Ethylene Dibromide	Soil	3" stainless steel or brass cylinder	14 days[2]/	4°C
	Water	40 ml glass vial, teflon faced silicon septum	14 days[1]/	4°C
Polynuclear Aromatic Hydrocarbons	Soil	8 oz. wide mouth glass with teflon seal	14 days[1]/ 40 days[2]/	4°C
	Water	1000 m. amber glass with teflon seal	7 days[1]/ 40 days[2]/	4°C

Table 1
Sample Containers, Holding Times and Preservation

Parameter	Matrix	Container	Holding Time	Preservation
Poly-Chlorinated Biphenyls	Soil	8 oz. wide mouth glass with teflon seal	7 days[1]/ 40 days[2]/	4°C
	Water	1000 ml amber glass with teflon seal	7 days[1]/ 40 days[2]/	4°C
Total Metals	Soil	3" stainless steel or brass cylinder	6 months	
	Water	1000 ml plastic	6 months	pH<2
Dissolved Metals	Water	1000 ml plastic	6 months	pH<2 0.45 micron filtration
Pesticides	Soil	3" stainless steel or brass cylinder	14 days[2]/	4°C
	Water	1000 ml glass	7 days[2]/	4°C

Note: [1]/ - Maximum holding time for sample (extract within this time or analyze if extraction is not required).

[2]/ - Maximum holding time for extract (analyze within this time).

[3]/ - Maximum holding time for sample when pH adjusted with HCl.

6.4 Chain-of-Custody Record and Sample Analysis Request Form

A chain-of-custody record for each container or sample will be used to track possession of the samples from collection in the field until arrival at the laboratory.

The chain-of-custody record will contain the following information:

1. Site name
2. Signature of collector
3. Date and time of collection
4. Sample identification number(s)
5. Number of containers in sample set
6. Description of sample and container(s)
7. Name and signature of persons, and the companies or agencies they represent, who are involved in the chain of possession
8. Inclusive dates and times of possession
9. Requested analysis for each sample

6.5 Delivery of Samples to Laboratory

Samples will be delivered to the laboratory within 48 hours when possible. Delivered samples will be accompanied by a chain-of-custody record. The laboratory shall note sample condition on the chain-of-custody (e.g. chilled, presence or absence of head space) upon arrival. Samples will be transported either by USPCI personnel or by private carrier. Analytical holding times will be considered in determining sampling and shipping schedules. Friday shipment/ Saturday laboratory receipt of samples will be coordinated in advance with the laboratory.

6.6 Quality Control Field Samples

A QC program independent from the laboratory's program will be instituted. The program entails "blind" submittals to the laboratory of blank and duplicate samples. No spiked samples will be supplied from the field for these investigations. All QC samples will be assigned independent sample numbers and made indistinguishable from non QC samples.

When submitting groundwater samples, travel blanks will be used to detect the introduction of contaminants during transportation from the field to the laboratory. The travel blanks will be provided by the analytical laboratory. Travel blanks will be taken to the field and accompany the collected groundwater samples to the laboratory for analysis. The blanks will consist of deionized water and analytically confirmed organic-free water. The blank will be numbered, packaged, and sealed in the same manner as the other samples.

Field blanks, sample containers filled with deionized water on-site under the same conditions as collected groundwater samples will be prepared in the field. These blanks will be numbered, packaged, and sealed in the same manner as the groundwater samples.

Ten percent of groundwater samples submitted to the laboratory for analysis will be duplicates. Water sample duplicates will be collected by filling two sample bottles from the one bailer volume. If more than one bailer volume is required, each bailer volume will be split between containers.

6.7 Laboratory QA/QC Plan

Soil and groundwater samples will be submitted to a State Certified Hazardous Waste Laboratory for chemical analysis of hazardous constituents. Established QA/QC procedures for analytical laboratory operations will include sample custody procedures, standards of analytical accuracy, analysis of matrix spikes and method blanks, data reduction, verification of raw analytical data, and maintenance of control charts to monitor analytical performance. These QA/QC procedures are outlined in the laboratory QA/QC Plan which is available upon request. Chemical analyses will be performed in accordance with standard procedures established by the United States Environmental Protection Agency (EPA) in "Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act" (40 CFR Part 136, October 1984). Analytical laboratories are periodically evaluated through external performance audits conducted by EPA and State agencies through government QC labs. The specific analytical methods to be utilized for purgeable and semivolatile hydrocarbons analyses are shown on Table 2.

Provided the data base is of sufficient size, statistical techniques may be employed for data validation.

Table 2
Laboratory Test Methodology
Underground Tank Sites

Hydrocarbon Leak	Soil Analysis		Water Analysis	
Unknown Fuel	TPH G	GCFID(5030)	TPH G	GCFID(5030)
	TPH D	GCFID(3550)	TPH D	GCFID(3510)
	BTX&E	8020 or 8240	BTX&E	602 or 624
Leaded Gas	TPH G	GCFID(5030)	TPH G	GCFID(5030)
	BTX&E	8020 or 8240	BTX&E	602 or 624
	---Optional---		TEL	DHS-LUFT
	TEL	DHS-LUFT	EDB	DHS-AB1803
	EDB	DHS-AB1803		
Unleaded Gas	TPH G	GCFID(5030)	TPH G	GCFID(5030)
	BTX&E	8020 or 8240	BTX&E	602 or 624
Diesel TPH D	GCFID(3550)		TPH D	GCFID(3510)
	BTX&E	8020 or 8240	BTX&E	602 or 624
Jet Fuel	TPH D	GCFID(3550)	TPH D	GCFID(3510)
	BTX&E	8020 or 8240	BTX&E	602 OR 624
Kerosene	TPH D	GCFID(3550)	TPH D	GCFID(3510)
	BTX&E	8020 or 8240	BTX&E	602 or 624
Fuel Oil	TPH D	GCFID(3550)	TPH D	GCFID(3510)
	BTX&E	8020 or 8240	BTX&E	602 or 624
Chlorinated Solvents	CL HC	8010 or 8240	CL HC	601 or 624
	BTX&E	8020 or 8240	BTX&E	602 or 624
Non Chlorinated Solvents	TPH D	GCFID(3550)	TPH D	GCFID(3510)
	BTX&E	8020 or 8240	BTX&E	602 or 624
Waste Oil or Unknown	TPH G	GCFID(5030)	TPH G	GCFID(5030)
	TPH D	GCFID(3550)	TPH D	GCFID(3510)
	O & G	503D&E	O & G	503A&E
	BTX&E	8020 or 8240	BTX&E	602 or 624
	CL HC	8010 or 8240	CL HC	601 or 624
	ICAP or AA to Detect Metals: Cd, Cr, Pb, Zn			
	Method 8270 for Soil or Water to Detect:			
	PCB*		PCB*	
	PCP*		PCP*	
	PNA		PNA	
	Creosote	Creosote		

* If found, analyze for dibenzofurans (PCBs) or dioxins (PCP)

U. S. POLLUTION CONTROL, INC.
REMEDIAL SERVICES GROUP

UNION PACIFIC RAILROAD
HEALTH AND SAFETY PLAN
FOR
SITE ASSESSMENT
AT
FERRO STREET YARD
1750 FERRO STREET, OAKLAND, CA

PROJECT NO. 96120-

1.0 INTRODUCTION

The personal health and safety of all individuals directly involved in the investigation of a possible leaking petroleum storage tank (LPST) in the Union Pacific Railroad (UPRR) in Oakland, CA, as well as the general public who may be in the vicinity of the site, is of particular concern to USPCI. Therefore, all prudent and reasonable measures will be taken to establish and maintain safe healthy working conditions.

This Health and Safety Plan identifies the potential hazards associated with the project and the actions which will be taken to minimize or eliminate those hazards; e.g. engineering controls, use of personal protective equipment, training, etc. Although every effort was made to develop a plan that is as comprehensive and detailed as possible, conditions may change which warrant modification of this plan once the project is initiated. Throughout each stage of the project, the plan will be reviewed and changed or modified as necessary.

Modification of the plan will be the responsibility of the USPCI Project Manager. Substantial changes will be reviewed and approved by a member of USPCI's Health and Safety staff. All on-site workers will be trained from this or any modified Health and Safety Plan.

Although it is hoped that the Ferro Street project will not require it, an Emergency Response Plan is provided in this document.

2.0 SCOPE OF WORK

Client's Business

Union Pacific Railroad (UPRR) in an active railroad company with approximately 23,000 route miles of track west of the Missouri River. The company's business is dedicated to the receiving, handling, shipping, and delivering of hugh quantities of freight of all types on its track system for a wide spectrum of customers. Support facilities for the business include operation and maintenance of rail and rail-related equipment, maintenance and operation of automotive equipment of many types, refueling facilities, etc.

History of Site

The Ferro Street yard in Oakland, CA is a equipment maintenance facility.

USPCI closed five underground storage tanks (UST's) in the yard by removal between December, 1987 and February, 1990 for UPRR.

Results from chemical analyses of soil samples collected at the time of closure indicated the presence of elevated hydrocarbon concentrations near the former tank pits.

Site Description

The former tank pit sites within the yard are very flat. Numerous shop buildings of various kinds are present as is abundant track. Most of the track in the area is still intact, however there is no active track in the immediate work areas.

Surrounding Area/Use

The area surrounding the Ferro Street yard is dedicated to light commerce, parks and residential areas.

Time Frame/Start Date

The Ferro Street yard project should take approximately 10 working days to complete. Anticipated startup date is August 15, 1992. All work will be conducted during daylight hours.

General Scope of Work

The general scope of work performed in connection with the site assessment will consist of the installation of a presently undetermined number of soil borings and monitoring wells to define the vertical and horizontal extent of petroleum hydrocarbon contamination in soil and groundwater at the site. Installation of borings and monitor wells will be performed by trained employees of a USPCI approved subcontractor.

USPCI personnel will be on-site to direct all phases of the operation. Specific activities performed by USPCI personnel, in addition to those of supervision and direction, will be the collection of soil samples from soil borings at on-site determined intervals as the borings progress. These soil samples will be scanned with photoionization detection (PID) equipment prior to preparation for shipment. The soil samples will be stored in chilled ice chests for shipment to a State Certified analytical laboratory.

Groundwater samples will be collected by USPCI personnel from monitoring wells after the wells have been properly developed. The groundwater samples will also be stored in chilled ice chests for shipment to the analytical laboratory.

Specific Tasks

1. Project supervision and management.

2. Operation of subcontractor equipment (auger drill, steam cleaning equipment, etc.).

3. Monitoring work environment and sample scanning with the PID.

4. Collecting soil samples from on-site determined intervals, placing samples in sample jars or containers, and storing containers in chilled ice chests for shipment.

5. Installation of monitoring wells by subcontractor employees using approved and properly cleaned or decontaminated well supplies (PVC casing, silica sand, hydrated bentonite, concrete, and well protectors).

6. Proper monitoring well development by either USPCI personnel or subcontractor employees depending on site specific conditions and equipment available (hand bailing, mechanical water pumping equipment, etc.).

7. Measuring static water level and/or free-phase product level in monitoring wells using oil/water interface probe.

8. Collection and proper storage of ground water samples from monitoring wells by USPCI personnel (appropriate sample containers, chilled ice chests, etc.).

9. Decontamination of subcontractor equipment using steam cleaners or pressure washing equipment by subcontractor employees.

10. Decontamination of USPCI sampling equipment and tools by USPCI personnel.

11. Implementation and monitoring of USPCI's site specific Health and Safety Plan by USPCI personnel.

12. Locating boring and monitor well site with respect to permanent objects (buildings, signal towers, power line or telephone poles, etc.) at the site to serve as basis for site map which will accompany final report for the assessment.

Personnel

One Project Manager/Supervisor, one geologist and sub-contractor employees will required for this project. Key personnel are:

Project Manager/Supervisor - Eric Taylor

Responsibilities include overall responsibility for all activities, personnel, health and safety.

Specific responsibilities include: client interface; acquisition, dispersal and maintenance of all supplies and equipment, maintenance of project records; compliance with all legal standards, policies and procedures; receipt and competed documentation for all contractors and subcontractors such training, insurance, supplies and other services; communicating the hazards of the site to all; maintaining communications with all parties involved with the site; observing all policies and procedures and complying with all applicable laws; receiving and acting on reports of injury and/or illness; observing a timely and safe progression of the project; recommending proper PPE and ensuring its use; using or managing the use of monitoring equipment; oversee maintenance of equipment; ensure adequate supplies, tool and equipment are available on site; ensure that the integrity of the various zones is observed and maintained; conduct daily health and safety meetings.

Geologist - Chris Byerman

Responsibilities include supervision of drilling and sample collection program, maintaining chain of custody (COC) documentation, equipment maintenance and calibration, activities of subordinate personnel, health and safety.

Health and Safety Designee - Eric Taylor

Responsibilities include: revising the Health and Safety Plan when there are changes in the scope, duration or activity of the job; identifying actual and potential risks to health and safety; communicating all risk assessment results to the Project Manager/Supervisor; maintaining supplies of PPE; providing "stand-by" status when an observer is needed; maintaining and managing the decontamination area; monitoring environmental; conditions that pose risks (temperature, airborne contaminants, etc.); acquiring and organizing health and safety information (MSDS's, analytical results, emergency information, etc.).

Instrument Qualified Person - Chris Byerman

Responsible for PID (OVM) and interface probe operation, maintenance, calibration results interpretation and documentation.

Subcontractor Employees (2 to 3 required)

Responsibilities include operation and maintenance of subcontractor equipment at direction of USPCI personnel, decontamination of contractor equipment, health and safety.

Tools and Equipment

Subcontractor Equipment

1. Hard hat, safety glasses with side-shields, nitrile gloves when contaminant is present (according to OVM, visual observations or smell), leather outer gloves, steel-toed safety boots, full-face respirator with organic vapor/acid/ gas/HEPA cartridge available in the immediate area.

2. CME-55 or CME-75 auger drill

3. Steam cleaner/pressure washer

4. Other subcontractor equipment (hand tools, shovels, trucks, trailers, water truck, etc.)

USPCI Equipment

1. Hard hat, safety glasses with side-shields, nitrile gloves when contaminant is present (according to OVM, visual observations or smell), leather outer gloves, steel-toed safety boots, full-face respirator with organic vapor/acid/ gas/HEPA cartridge available in the immediate area.

2. Photoionization detector (PID) - Model 580B OVM (organic vapor monitor)

3. Oil/water interface probe

4. Appropriate soil and ground water sample containers

5. Soil sample collection and storage equipment (stainless steel spatulas, protective wrappers for sample containers, water-proof labeling materials, sealing tape, ice chests, "blue ice" or ice, "zip-lock" bags, plastic trash bags, distilled water, Tri-sodium phosphate soap for decon of sample tools, spray bottle, measuring rule, etc.)

6. Ground water sampling equipment (disposable or PVC bailers, protective wrappers for sample containers, water-proof labeling materials, sealing tape, ice chests, "blue ice" or ice, distilled water, Tri-sodium phosphate soap, spray bottle, etc.)

7. Ph meter

8. Conductance meter

9. Measuring chain (for locating drill sites with reference to permanent objects)

3.0 HAZARDS

Every attempt has been made to produce a project design that provides for the maximum health and safety of site personnel, the community, and the environment. However, because of he nature of the work to be performed, potential chemical and physical hazards will be eliminated or reduced through the use of engineering controls and personnel protective equipment (PPE). The PPE required for this project is discussed in the PPE Section of this Health and Safety Plan.

The potential hazards associated with each task within the respective zone are presented in Table of Tasks, Potential Hazards and Controls which follows.

4.0 CONTROLS

Engineering controls or work practices that minimize or eliminate the potential hazards associated with a particular task are presented in Table of Tasks, Potential Hazards and Controls which follows.

5.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

The proper PPE for each respective task performed in the established zones is presented in the following table.

Zone	Task	PPE Required
EZ	soil borings/ monitor wells	Hard hat, safety glasses with side-shields, Nitrile gloves when contaminant is present (according to OVM, visual observations or smell), leather outer gloves, steel-toed safety boots, a fullface respirator with organic vapor/acid gas/HEPA cartridge available in the immediate area.
	monitor work env. w/ OVM	Hard hat, safety glasses with side-shields, Nitrile gloves when contaminant is present (according to OVM, visual observations or smell), leather outer gloves, steel-toed safety boots, a fullface respirator with organic vapor/acid gas/HEPA cartridge available in the immediate area.
	collect soil/ water samples	Hard hat, safety glasses with side-shields, Nitrile gloves when contaminant is present (according to OVM, visual observations or smell), leather outer gloves, steel-toed safety boots, a fullface respirator with organic vapor/acid gas/HEPA cartridge available in the immediate area.

EZ	measure water levels	Hard hat, safety glasses with side-shields, Nitrile gloves when contaminant is present (according to OVM, visual observations or smell), leather outer gloves, steel-toed safety boots, a fullface respirator with organic vapor/acid gas/HEPA cartridge available in the immediate area.
DZ	decon	Hard hat, safety glasses with side-shields, Nitrile gloves when contaminant is present (according to OVM, visual observations or smell), leather outer gloves, steel-toed safety boots, a fullface respirator with organic vapor/acid gas/HEPA cartridge available in the immediate area.
SZ	locate drill sites	Hard hat, safety glasses with side-shields, Nitrile gloves when contaminant is present (according to OVM, visual observations or smell), leather outer gloves, steel-toed safety boots, a fullface respirator with organic vapor/acid gas/HEPA cartridge available in the immediate area.
SZ	store drill supplies	Hard hat, safety glasses with side-shields, Nitrile gloves when contaminant is present (according to OVM, visual observations or smell), leather outer gloves, steel-toed safety boots, a fullface respirator with organic vapor/acid gas/HEPA cartridge available in the immediate area.

6.0 INSTRUMENT MONITORING

Instrument	Location of Sampling	Frequency	Action Level/Action
580B OVM	Mouth of boring/well, breathing zone (approx. 5' AGS)	Continuous while drill in operation	≥50 ppm for more than 15 minutes, suspend field operations until source identified and mitigated.

Calibration will be performed in accordance with the manufacturer's specifications, using the procedures detailed by the manufacturer.

Calibrations will be done only by those USPCI employees qualified by education and training. Calibration will be done in a clean environment which is similar to the actual work environment in terms of temperature, pressure, humidity, and "background noise". Prior to actual use each instrument will be allowed sufficient time to warm up and will be "zeroed" as applicable. Calibration and maintenance log book will be maintained on-site for each instrument.

All readings will be recorded in the project's general log book or the project's instrumentation log book. Results, sample locations, environmental conditions, dates, times nd the instrument operator's initials shall be logged.

Dust and excessive particulate matter in the air will not be a problem at the work site. No special monitoring for this problem is warranted.

7.0 SITE CONTROL MEASURES

The following zones will be established at the site:

1. Exclusion Zone (EZ) - a zone consisting of a 35-foot radius around each soil boring or monitoring well location at the site.

   No one may enter the EZ who is not properly protected, using the required PPE, and who has not: 1) completed the required training; 2) completed the field supervised training; and 3) been medically evaluated and found to be "medically fit" to work at a hazardous waste site.

   Smoking, drinking and eating are prohibited in the EZ.

2. Decontamination Zone (DZ) - an area, of sufficient size depending on site specific conditions, so designated at the site where decon of dirty and/or contaminated drilling equipment can be accomplished. Visqueen sheeting and diking will be used to contain decon refuse (drill cuttings, cleanup water, etc.). The decon refuse will be collected and stored at the site in DOT approved 55-gallon steel drums pending final disposal.

   Wastes generated by USPCI personnel in the course of sampling soils and ground water will also remain in the decon area pending final disposal.

3. Support Zone (SZ) - essentially the remainder of the site, as needed, for use storing drilling and well completion supplies (PVC casing, well protectors, cement, bentonite, guard posts, unused steel storage drums, etc.)

   This zone will not be restricted and will function as the area in which all non-hazardous activities can be located.

Site security will be the responsibility of the USPCI Project Manager/Supervisor and Geologist. Visitors and spectators not concerned with the project will not be permitted on site.

8.0 DECONTAMINATION PROCEDURES

Personnel decon will consist of washing with soap and rinsing with clean water available at the DZ. The Project Supervisor/geologist will have 5-gallon buckets of Alconox-soap solution and rinse water available at the drill site in case of a need for emergency or immediate cleanup. Distilled water in a spray bottle is also available at the geologist's work area. After removal, used PPE will be stored in 55-gallon steel drum pending final disposal. Respirators will be cleaned with sterilized wipes daily.

Decon water will be stored in a DOT approved 55-gallon steel drum at the site pending final disposal.

Equipment will consist of washing with a steam cleaner/pressure washer at the DZ. Refuse generated in the DZ will be stored in DOT-approved 55-gallon steel drums which will be stored at the site pending final disposal.

9.0 TRAINING

All USPCI personnel on site will have completed 40-hour OSHA training, 3-day supervised field training, 8-hour instrumentation training, be current with annual refresher training, and respirator-fit testing. Supervisory personnel will have completed 8 additional hours of supervisory training.

Employees of subcontractors on the approved USPCI subcontractor list will be permitted to perform activities at this site commensurate with their training as equipment operators. All subcontractors must provide the necessary documentation pertaining to employee training and medical monitoring prior to beginning operations at the site.

A pre-job conference and daily safety meetings will be held.

10.0 MEDICAL MONITORING

All USPCI employees involved on-site will have received a pre-employment and annual physical and are certified to be capable of working on a hazardous waste site, to wear respiratory protection and to operate equipment as applicable.

All subcontractor documentation supporting employee medical monitoring and training will be kept on file at the USPCI office in Boulder, Colorado.

This project does not warrant special monitoring of any kind.

11.0 EMERGENCY PLAN

In case of any emergency, the on-site supervisor is responsible for verbally alerting all personnel and providing instructions for response or evacuation.

Employees who become minimally contaminated will immediately flush the affected area with soap and water available at the Project Supervisor's work location. Gross decontamination will be performed with the water hose used for equipment decontamination. After decon, the Project Supervisor will determine in medical attention is needed.

A fire extinguisher, first aid kit and an eye wash will be available on site. The Project Supervisor will have an emergency site map and emergency telephone numbers on site at all times.

Should an injury occur, the immediate well-being of he injured part is the prime responsibility. In the event of an emergency, the expedient care of field personnel supersedes the above-referenced procedures. Emergency numbers and the route to the nearest emergency medical service will available on site. Unnecessary people must be kept away, the area isolated, and entry denied. If fumes or vapors are a potential hazard, workers must stay upwind and keep out of low area. After caring for the injured person, the most immediate supervisor available will be notified of the situation.

In case of small spills, soil berms and dirt will be used to contain and cleanup liquids. A broom and shovel will be used to cleanup spills of dry material.

Emergency telephone numbers are listed below. Direction to the nearest medical facility also follows. Reportable spills will be brought to the attention of the project supervisor.

Client Contact- Harry Patterson (UPRR) 402-271-4078
USPCI Proj. Mgr.-Eric Taylor 713-350-7266
USPCI Regional Mgr.-T. C. Hobbs 713-350-7244
USPCI Health and Safety-Mary A. Heaney 303-938-5512
Fire-911
Ambulance-911
National Spill Center (Spill Reporting) 1-800-424-8802

12.0 ACKNOWLEDGEMENT AND SIGN-OFF

All persons entering the work area, (USPCI employees, subcontractors, visitors, clients, regulatory agency personnel, etc.) must read the Health and Safety Plan and acknowledge by their signature that they have understood the plan and will abide by the requirements therein.

> "I acknowledge that I have read and understand the preceding Health and Safety Plan and will abide by the requirements specified in it."

Signature	Name	Date

NATIONAL ANALYTICAL LABORATORIES
A Division of
POLLUTION CONTROL, INC.

RECEIVED

rem of 10,000 gal D
6,000 gal G
tanks

JOE NICHOLSON
USPCI - REMEDIAL SERVICES
731-M NORTH MARKET

SACREMENTO CA 95834

EPORT NUMBER: 9293A05

PAGE 5

AMPLE IDENTIFICATION: 9293-05
USTOMER IDENTIFICATION: UP-OAK-002
ATE SAMPLED: 2/22/90
YPE OF MATERIAL: LIQUID - maybe water sample from under generator

DATE RECEIVED: 2/26/90
DATE COMPLETED: 2/27/90

ARAMETER	REF. METHOD	DET. LIMIT	RESULT
ENZENE	EPA 8020	0.002 MG/KG	0.053 MG/KG
THYLBENZENE	EPA 8020	0.002 MG/KG	BDL MG/KG
OLUENE	EPA 8020	0.002 MG/KG	0.023 MG/KG
YLENES	EPA 8020	0.002 MG/KG	0.026 MG/KG
OTAL PETROLEUM HYDROCARBONS	-	-	-
ASOLINE	MOD 8015	0.05 MG/KG	BDL MG/KG
IESEL	MOD 8015	0.05 MG/KG	BDL MG/KG

chain of custody? - attached to 3-3-90 letter
site map w/sample locations?

DL = BELOW DETECTION LIMIT

NATIONAL ANALYTICAL LABORATORIES
A Division of
U.S. POLLUTION CONTROL, INC.

received
3/2/90

JOE NICHOLSON
USPCI - REMEDIAL SERVICES
731-M NORTH MARKET

SACREMENTO CA 95834

EPORT NUMBER: 9293A02

AMPLE IDENTIFICATION: 9293-01
USTOMER IDENTIFICATION: UP-OAK-002
ATE SAMPLED: 2/22/90
YPE OF MATERIAL: SOIL

DATE RECEIVED: 2/26/90
DATE COMPLETED: 2/27/90

ARAMETER	REF. METHOD	DET. LIMIT	RESULT
ENZENE	EPA 8020	0.002 MG/KG	BDL MG/KG
THYLBENZENE	EPA 8020	0.002 MG/KG	BDL MG/KG
OLUENE	EPA 8020	0.002 MG/KG	BDL MG/KG
YLENES	EPA 8020	0.002 MG/KG	BDL MG/KG
OTAL PETROLEUM HYDROCARBONS	-	-	-
ASOLINE	MOD 8015	0.05 MG/KG	BDL MG/KG
IESEL	MOD 8015	0.05 MG/KG	BDL MG/KG

BDL = BELOW DETECTION LIMIT

NATIONAL ANALYTICAL LABORATORIES
A Division of
U.S. POLLUTION CONTROL, INC.

received 3/2/90

JOE NICHOLSON
USPCI - REMEDIAL SERVICES
731-M NORTH MARKET

SACREMENTO CA 95834

EPORT NUMBER: 6233A03

PAGE 2

AMPLE IDENTIFICATION: 6233-02
USTOMER IDENTIFICATION: UP-OAK-003
ATE SAMPLED: 2/22/90
YPE OF MATERIAL: SOIL

DATE RECEIVED: 2/26/90
DATE COMPLETED: 2/27/90

ARAMETER	REF. METHOD	DET. LIMIT	RESULT
ENZENE	EPA 8020	0.002 MG/KG	BDL MG/KG
THYLBENZENE	EPA 8020	0.002 MG/KG	BDL MG/KG
OLUENE	EPA 8020	0.002 MG/KG	BDL MG/KG
YLENES	EPA 8020	0.002 MG/KG	BDL MG/KG
OTAL PETROLEUM HYDROCARBONS	-	-	-
ASOLINE	MOD 8015	0.05 MG/KG	BDL MG/KG
IESEL	MOD 8015	0.05 MG/KG	BDL MG/KG

BDL = BELOW DETECTION LIMIT

NATIONAL ANALYTICAL LABORATORIES
A Division of
U.S. POLLUTION CONTROL, INC.

received
3/2/90

JOE NICHOLSON
USPCI - REMEDIAL SERVICES
731-M NORTH MARKET

SACREMENTO CA 95834

REPORT NUMBER: 5293AC5

PAGE 3

SAMPLE IDENTIFICATION: 5293-03
CUSTOMER IDENTIFICATION: UP-OAK-004
DATE SAMPLED: 2/22/90
TYPE OF MATERIAL: SOIL

DATE RECEIVED: 2/26/90
DATE COMPLETED: 2/27/90

PARAMETER	REF. METHOD	DET. LIMIT	RESULT
BENZENE	EPA 8020	0.002 MG/KG	BDL MG/KG
ETHYLBENZENE	EPA 8020	0.002 MG/KG	BDL MG/KG
TOLUENE	EPA 8020	0.002 MG/KG	0.008 MG/KG
XYLENES	EPA 8020	0.002 MG/KG	0.025 MG/KG
TOTAL PETROLEUM HYDROCARBONS			
GASOLINE	MOD 8015	0.05 MG/KG	2.32 MG/KG
DIESEL	MOD 8015	0.05 MG/KG	BDL MG/KG

BDL - BELOW DETECTION LIMIT

NATIONAL ANALYTICAL LABORATORIES
A Division of
ENVIRONMENTAL ANALYSIS, INC.

received
3/5/90

JOE NICHOLSON
USPCI - REMEDIAL SERVICES
731-M NORTH MARKET

SACREMENTO CA 95834

EPORT NUMBER: 6293A05

PAGE 4

AMPLE IDENTIFICATION: 6293-04
USTOMER IDENTIFICATION: UP-OAK-003
ATE SAMPLED: 2/22/90
YPE OF MATERIAL: SOIL

DATE RECEIVED: 2/25/90
DATE COMPLETED: 2/27/90

ARAMETER	REF. METHOD	DET. LIMIT	RESULT
ENZENE	EPA 8020	0.002 MG/KG	0.004 MG/KG
THYLBENZENE	EPA 8020	0.002 MG/KG	0.007 MG/KG
OLUENE	EPA 8020	0.002 MG/KG	0.003 MG/KG
YLENES	EPA 8020	0.002 MG/KG	0.012 MG/KG
OTAL PETROLEUM HYDROCARBONS	-	-	-
ASOLINE	MOD 8015	0.05 MG/KG	BDL MG/KG
IESEL	MOD 8015	0.05 MG/KG	BDL MG/KG
3-C20 HYDROCARBONS	MOD 8015	0.05 MG/KG	2.13 MG/KG

BDL = BELOW DETECTION LIMIT

4023 South 49th West Avenue • Tulsa, Oklahoma 74107 • (918) 446-1162

tank was excavated—removed 12-17-87!

SUPERIOR ANALYTICAL LABORATORY, INC.

[illegible]5 Fairfax St., Ste D • San Francisco, CA 94124 • Phone 415 [illegible]081

CERTIFICATE OF ANALYSIS

LABORATORY NO. 50125
CLIENT: Gregg & Associates
CLIENT ID: Union Pacific RW

DATE RECEIVED: 2/25/88
DATE REPORTED: 3/4/88
JOB NO. 01-184-006

ANALYSIS FOR TOTAL PETROLEUM HYDROCARBONS by Modified EPA SW-846 Method 8015

Sample Identification	Matrix	Concentration (ppM)
Sample #1 Union Pacific RW 25 Feb 88	Oil	Gasoline: ND <10 Kerosene: ND <10 Diesel: ND <10

I think this sample was taken 2-16-88 of oil seeping into the pit.

no results for TPH + BTEX, as per 4-26-88 report by Hunter.

Apparently, soil samples during tank rem. on 12-17-87 were not taken. Why?

chain of custody? in 6-88 UST Clos. Report — so is ClHCs

site map w/sample locations?

Richard K. [illegible]

[signature]

Laboratory Manager

SUPERIOR ANALYTICAL LABORATORY, INC.
1385 FAIRFAX ST., STE D • SAN FRANCISCO, CA 94124 • PHONE (415) 647-2081

C E R T I F I C A T E   O F   A N A L Y S I S

LABORATORY NO. 50125
CLIENT: Gregg & Associates
CLIENT ID: Union Pacific RW

DATE RECEIVED: 2/25/88
DATE REPORTED: 3/4/88
JOB NO. 01-184-006

ANALYSIS FOR PCB
by Modified EPA SW-846 Method 8080

Sample Identification	Matrix	Concentration (ppM)
Sample #1 Union Pacific RW 25 Feb 88	Oil	ND < 1

Richard F. Srna, Ph.D.

Laboratory Manager

SUPERIOR ANALYTICAL LABORATORY, INC.
1385 FAIRFAX ST., STE D • SAN FRANCISCO, CA 94124 • PHONE (415) 647-2081

C E R T I F I C A T E   O F   A N A L Y S I S

LABORATORY NO. 50125
CLIENT: Gregg & Associates
CLIENT ID: Union Pacific RW

DATE RECEIVED: 2/25/88
DATE REPORTED: 3/4/88
JOB NO. 81-184-006

CAM-17 METALS
by SW 846 7000 SERIES

Compound	Results(ppM)
Antimony	ND <.5
Arsenic	ND <.5
Barium	1.6
Beryllium	ND <.01
Cadmium	ND <.5
Chromium (total)	ND <.5
Cobalt	ND <.5
Copper	2.1
Lead	18.
Mercury	ND <1
Molybdenum	ND <1
Nickel	9.1
Selenium	ND <1
Silver	ND <1
Thallium	ND <5
Vanadium	ND <.5
Zinc	140.

RECEIVED

Richard F. Srna, Ph.D.

RFS

Laboratory Manager

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C E R T I F I C A T E O F A N A L Y S I S

LABORATORY NO. 50181
CLIENT: Gregg & Associates
CLIENT ID: Union Pacific RR

DATE RECEIVED: 5/25/88
DATE REPORTED: 5/31/88
JOB NO.: N/A

ANALYSIS FOR TOTAL PETROLEUM HYDROCARBONS by Modified EPA SW-846 Method 8015

Sample Identification	Concentration (mg/kg)
1A Union Pacific Oakland	ND < 100
2A Union Pacific Oakland	ND < 100
2B Union Pacific Oakland	ND < 100
3A 1000gal Tank Union Pacific	ND < 100
3B Union Pacific Oakland	ND < 100

mg/kg = part per million (ppm)

Note: Detection limits lower than 100 mg/kg could not be achieved because of interference from the large oil content of the samples.

RECEIVED JUN 0 6 1988

Richard F. Srna, Ph.D.

Laboratory Manager

SUPERIOR ANALYTICAL LABORATORY, INC.
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CERTIFICATE OF ANALYSIS

LABORATORY NO. 50181
CLIENT: Gregg & Associates
CLIENT ID: Union Pacific RR

DATE RECEIVED: 5/25/88
DATE REPORTED: 5/31/88
JOB NO.: N/A

ANALYSIS FOR OIL & GREASE
by Standard Methods Method 503E

Sample Identification	Concentration (mg/kg)
1A Union Pacific Oakland	5910
2A Union Pacific Oakland	2285
2B Union Pacific Oakland	18050
3A 1000gal Tank Union Pacific	69
3B Union Pacific Oakland	8120

QA/QC Summary: Sample 2A Duplicate RPD = 0.5%

mg/kg = part per million (ppm)

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Richard F. Srna, Ph.D.

Laboratory Manager

SUPERIOR ANALYTICAL LABORATORY, INC.
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CERTIFICATE OF ANALYSIS

LABORATORY NO. 50181
CLIENT: Gregg & Associates
CLIENT ID: Union Pacific

DATE RECEIVED: 5/25/88
DATE REPORTED: 7/15/88
JOB NO. 01-184-006

EPA SW - 846 METHOD 8240 - VOLATILE ORGANICS by Gas Chromatography/ Mass Spectrometry

SAMPLE: 1A Union Pacific 1750 Ferro St. Oakland

Compound	(ppm)	Compound	(ppm)
Acetone	ND<1000	trans-1,2-Dichloroethene	ND<500
Acrolein	ND<500	1,2-Dichloropropane	ND<500
Acrylonitrile	ND<500	cis-1,3-Dichloropropene	ND<500
Benzene	ND<500	trans-1,3-Dichloropropene	ND<500
Bromodichloromethane	ND<500	Ethanol	ND<500
Bromoform	ND<500	Ethylbenzene	ND<500
Bromomethane	ND<500	Ethyl methacrylate	ND<500
2-butanone	ND<1000	2-Hexanone	ND<500
Carbon disulfide	ND<500	Iodomethane	ND<500
Carbon tetrachloride	ND<500	Methylene chloride	ND<1000
Chlorobenzene	ND<500	4-Methyl-2-pentanone	ND<500
Chlorodibromomethane	ND<500	Styrene	ND<500
Chloroethane	ND<500	1,1,2,2-tetrachloroethane	ND<500
Chloroform	ND<500	Tetrachloroethylene	ND<500
2-chloroethylvinylether	ND<1000	Toluene	ND<500
Chloromethane	ND<500	1,1,1-Trichloroethane	ND<500
Dibromomethane	ND<500	1,1,2-Trichloroethane	ND<500
1,4-Dichloro-2-butane	ND<500	Trichloroethene	ND<500
1,1-Dichloroethane	ND<500	Trichlorofluoromethane	ND<500
Dichlorodifluoromethane	ND<500	1,2,3-Trichloropropane	ND<500
1,2-Dichloroethane	ND<500	Vinyl acetate	ND<500
1,1-Dichloroethene	ND<500	Vinyl chloride	ND<500
		Xylene	ND<500

Sample Matrix: Soil

Richard F. Srna, Ph.D.

Michael N. Kirk for RFS
Laboratory Manager

SUPERIOR ANALYTICAL LABORATORY, INC.
1385 FAIRFAX ST., STE D • SAN FRANCISCO, CA 94124 • PHONE (415) 647-2081

CERTIFICATE OF ANALYSIS

LABORATORY NO. 50181
CLIENT: Gregg & Associates
CLIENT ID: Union Pacific

DATE RECEIVED: 5/25/88
DATE REPORTED: 7/15/88
JOB NO. 01-184-006

EPA SW - 846 METHOD 8240 - VOLATILE ORGANICS by Gas Chromatography/ Mass Spectrometry

SAMPLE: 3A Union Pacific 1750 Ferro St. Oakland

Compound	(ppm)	Compound	(ppm)
Acetone	ND<1000	trans-1,2-Dichloroethene	ND<500
Acrolein	ND<500	1,2-Dichloropropane	ND<500
Acrylonitrile	ND<500	cis-1,3-Dichloropropene	ND<500
Benzene	ND<500	trans-1,3-Dichloropropene	ND<500
Bromodichloromethane	ND<500	Ethanol	ND<500
Bromoform	ND<500	Ethylbenzene	ND<500
Bromomethane	ND<500	Ethyl methacrylate	ND<500
2-Butanone	ND<1000	2-Hexanone	ND<500
Carbon disulfide	ND<500	Iodomethane	ND<500
Carbon tetrachloride	ND<500	Methylene chloride	ND<1000
Chlorobenzene	ND<500	4-Methyl-2-pentanone	ND<500
Chlorodibromomethane	ND<500	Styrene	ND<500
Chloroethane	ND<500	1,1,2,2-tetrachloroethane	ND<500
Chloroform	ND<500	Tetrachloroethylene	ND<500
2-Chloroethylvinylether	ND<1000	Toluene	ND<500
Chloromethane	ND<500	1,1,1-Trichloroethane	ND<500
Dibromomethane	ND<500	1,1,2-Trichloroethane	ND<500
1,4-Dichloro-2-butane	ND<500	Trichloroethene	ND<500
1,1-Dichloroethane	ND<500	Trichlorofluoromethane	ND<500
Dichlorodifluoromethane	ND<500	1,2,3-Trichloropropane	ND<500
1,2-Dichloroethane	ND<500	Vinyl acetate	ND<500
1,1-Dichloroethene	ND<500	Vinyl chloride	ND<500
		Xylene	ND<500

Sample Matrix: Soil

Richard F. Srna, Ph.D.

Laboratory Manager

JUL 18 1988

SUPERIOR ANALYTICAL LABORATORY, INC.

1385 FAIRFAX ST., STE D • SAN FRANCISCO, CA 94124 • PHONE (415) 647-2081

CERTIFICATE OF ANALYSIS

LABORATORY NO. 50181
CLIENT: Gregg & Associates
CLIENT ID: Union Pacific

DATE RECEIVED: 5/25/88
DATE REPORTED: 3/15/88
JOB NO. 01-184-006

EPA SW - 846 METHOD 8240 - VOLATILE ORGANICS
by Gas Chromatography/ Mass Spectrometry

Compound	(ppm)	Compound	(ppm)
cetone	ND<1000	trans-1,2-Dichloroethene	ND<500
croleln	ND<500	1,2-Dichloropropane	ND<500
crylonitrile	ND<500	cis-1,3-Dichloropropene	ND<500
enzene	ND<500	trans-1,3-Dichloropropene	ND<500
[illegible]	ND<500	Ethyl methacrylate	ND<500
romomethane	ND<1000	2-Hexanone	ND<500
-butanone	ND<500	Iodomethane	ND<500
rbon disulfide	ND<500	Methylene chloride	ND<1000
rbon tetrachloride	ND<500	4-Methyl-2-pentanone	ND<500
hlorobenzene	ND<500	Styrene	ND<500
hlorodibromomethane	ND<500	[illegible]	ND<500
hloroethane	ND<500	Tetrachloroethylene	ND<500
hloroform	ND<1000	Toluene	1300
-chloroethylvinylether	ND<500	1,1,1-Trichloroethane	ND<500
hloromethane	ND<500	1,1,2-Trichloroethane	ND<500
Dibromomethane	ND<500	Trichloroethene	ND<500
1,4-Dichloro-2-butene	ND<500	Trichlorofluoromethane	ND<500
1,1-Dichloroethane	ND<500	1,2,3-Trichloropropane	ND<500
Dichlorodifluoromethane	ND<500	Vinyl acetate	ND<500
1,2-Dichloroethane	ND<500	Vinyl chloride	ND<500
1,1-Dichloroethene		Xylene	2360

Sample Matrix: Soil

Richard W. [illegible]
Laboratory [illegible]

OUTSTANDING QUALITY AND SERVICE

NOV 28 '88 18:09