AEGIS ENVIRONMENTAL, INC.

1050 Melody Lane, Suite 160, Roseville, CA 95678 ✦ 916 • 782-2110 / 916 • 969-2110 / FAX 916 • 786-7830

October 2, 1992

Mr. Robert Weston
Alameda County Environmental
Health Department
Division of Hazardous Material
80 Swan Way, Suite 210
Oakland, California 94621

Subject: **Previous Workplans/Final Reports**
Haber Oil
1401 Grand Avenue, San Leandro, California

Dear Mr. Weston:

Aegis Environmental, Inc. (Aegis), is pleased to provide the Alameda County Environmental Health Department with copies of final reports documenting work conducted at the subject site. The enclosed copies are: "Soil Boring Results Report," dated June 10, 1991; "Workplan For Limited Site Investigation," dated April 8, 1992; "Initial Subsurface Investigation Results Report," dated June 23, 1992; and "Workplan For Hydrogeologic Assessment," dated August 24, 1992.

On September 15, 1992, five groundwater monitoring wells, MW-1 through MW-5, were drilled, logged and sampled, and completed with 4-inch-diameter casing. Wells MW-1 and MW-2 were installed for the additional use as vapor extraction wells. A problem assessment report is being prepared documenting the work conducted at the site during September 1992, and will be sent to you as soon as the report is completed.

91-001M.LTR

If you have any questions regarding the enclosed information or the conditions of the site, please call at (916) 782-2110. Thank you.

Sincerely,

AEGIS ENVIRONMENTAL, INC.

Michael Kitko
Staff Geologist

Brian Garber
Project Manager

MK/BG/law

Enclosures

AEGIS ENVIRONMENTAL, INC.

WORKPLAN FOR HYDROGEOLOGIC ASSESSMENT

ARCO Service Station
1401 Grand Avenue
San Leandro, California

Aegis Project No. 91-001

August 24, 1992

Prepared By:
AEGIS ENVIRONMENTAL, INC.
1050 Melody Lane, Suite 160
Roseville, California 95678
(916) 782-2110

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1.0 INTRODUCTION

This workplan outlines the proposed hydrogeologic assessment to be conducted by Aegis Environmental, Inc. (Aegis), at the ARCO service station located at 1401 Grand Avenue in San Leandro, California (Figure 1). This workplan is based, in part, on information provided to Aegis by Haber Oil Products, Inc. (Haber Oil), and is subject to modification as newly acquired information may warrant.

1.1 Purpose

The purpose of the investigation is to further:

- characterize the site's shallow subsurface, including soil and hydrogeologic conditions; and,
- assess the presence of petroleum hydrocarbons, if any, in the soil and groundwater beneath the site.

1.2 Scope

The proposed scope of work will be performed according to the Aegis standard operating procedures included in Appendix A, and includes the following:

- Drill, log, and sample five soil borings to approximately 60 feet below surface, at the proposed locations shown on Figure 2.
- Based on the results of field observations and/or measurements, submit selected soil samples to a state-certified laboratory for analysis.
- Complete the borings as 4-inch diameter groundwater monitoring wells, MW-1 through MW-5.
- Measure stabilized water levels in each well. Develop, purge, and collect water samples from each well for submittal to a state-certified laboratory for analysis.

- Arrange for the survey of the top-of-casing elevation of each well by a licensed surveyor.
- Based on the water levels and survey data, determine the direction and gradient of groundwater flow beneath the site.
- Review the data and prepare a factual report of the investigation.

2.0 BACKGROUND

2.1 Site Description

The site is located on the east side of Grand Avenue and west of Highway 580 in San Leandro, California (Figure 2). The site is located within a commercial/residential area and is an active service station/convenience store that retails unleaded gasolines. Four UST exist at the site: a 7,500-gallon tank that previously contained regular-leaded gasoline and now contains regular-unleaded gasoline; a 7,500-gallon tank containing regular-unleaded gasoline; a 6,000-gallon tank containing super-unleaded gasoline, and a 550-gallon tank containing waste oil. A single pump island and canopy are located near the center of the property, along Grand Avenue. A storage building with an attached restroom borders the south property boundary.

2.2 Previous Investigations

On April 24, 1991, a limited subsurface soil assessment was performed by Aegis ("Soil Boring Results Report," dated June 10, 1991). The investigation included drilling four soil borings to approximately 40 feet below surface. Selected soil samples were submitted to a state-certified analytical laboratory for analysis of total petroleum hydrocarbons (TPH), as gasoline, benzene, toluene, ethylbenzene, and total xylenes (BTEX), total lead, ethylene dibromide (EDB), and 1,2-dichloroethane (EDC). The maximum concentrations of petroleum hydrocarbon constituents reported were in a soil sample (B-2) collected at 26.0 feet below surface. The analyses indicated TPH, as gasoline, at 66 parts-per-million (ppm), benzene at 0.94 ppm, toluene at 3.8 ppm, ethylbenzene at 1.3 ppm, total xylenes at 8.7 ppm, total lead at 3 ppm, and EDB and EDC below the method detection limits. A composite soil sample (SS-1A, SS-1B, SS-1C, and SS-1D) was collected from the drill cuttings and analyzed in accordance with landfill requirements. The composite sample contained 0.7 ppm TPH, as gasoline, 0.002 ppm benzene, 0.005 ppm total xylenes, and 0.06 ppm soluble lead. Soil boring locations are indicated on Figure 2.

On April 23, 1992, a limited subsurface assessment was performed by Aegis ("Initial Subsurface Investigation Results Report"). The investigation included drilling three angled soil borings beneath the UST to approximately 50 vertical feet below surface (Figure 2). Selected soil samples were submitted to a state-certified analytical laboratory for analysis of total petroleum hydrocarbons (TPH), as gasoline, benzene, toluene, ethylbenzene, and total xylenes (BTEX). Analytical results indicated concentrations of TPH as gasoline exceeding 500 ppm in four samples collected from soil borings B-5, B-6, and B-7. The highest reported concentration of TPH, as gasoline (4000 ppm) was found in a soil sample from soil boring B-7 collected at 40 feet below surface. Groundwater was encountered in the soil borings at a depth of approximately 42 feet below surface.

2.3 Unauthorized Release

The site owner indicated an unauthorized release occurred during various refillings of the gasoline UST. The amount of the unauthorized release is unknown.

2.4 Adjacent Land Uses

Properties surrounding the site are commercial and residential, with U.S. Interstate Highway 580 parallel to the east side of the site.

2.5 Utility Locations

A ground penetrating radar (GPR) survey was performed on April 4, 1992, by NORCAL Geophysical Consultants, Inc., of Petaluma, California. The survey was performed in the area of the existing UST basin to locate underground facilities, including fuel-related facilities, sewer, electrical, cable TV, compressed air, natural gas, water, and telephone lines for avoidance during drilling. The location of the underground utilities are shown on Figure 2.

2.6 Generalized Geology and Hydrogeology

The bedrock beneath the surface alluvium is indicated on the "Geologic Map" published by the California Division of Mines and Geology (1977) as sandstone, shale, limestone, chert, and conglomerates associated with the Jurassic age Franciscan Formation. The soils and alluvial materials underlying the site include: a) moderately stiff, moist clays to approximately 12.0 feet below grade; and b) medium dense, damp to moist, silts and sandy silts to approximately 41.0 feet below grade.

Site drainage is mainly toward the west onto Grand Avenue. The site's vicinity is part of the San Leandro Creek watershed, located approximately 1,000 feet to the north.

Groundwater was encountered during the April 14, 1992 investigation at a depth of approximately 42 feet below surface. Review of Alameda County, Zone 7 file information indicated the depth to groundwater at the site is 45 feet below surface. Regionally, groundwater is reported to flow toward the west to San Francisco Bay.

3.0 PROPOSED WORKPLAN

3.1 Site Safety Plan

A site safety plan (SSP) has been prepared and will be on site during all field activities. A copy of the SSP is included as Appendix B. All work on site described herein will be conducted according to the SSP. The SSP contains information on the properties of the hazardous materials determined to be on site by previous investigations. This information is equivalent to that contained within Material Safety Data Sheets.

3.2 Soil Boring and Soil Sampling

Prior to drilling, Underground Service Alert Network, or other such service, will be contacted for identification of buried utilities entering the site from the public right-of-way. As a further precaution to avoid drilling into or through potential buried obstructions, the first 5 feet of each boring will be augered by hand.

Five soil borings will be drilled to approximately 60 feet below surface at the locations shown on Figure 2. The borings are to be completed as 4-inch-diameter groundwater monitoring wells. The borings will be drilled using 10-inch-diameter hollow-stem augers to approximately 10 feet into the first water-bearing zone or until a maximum of 5 feet of low-estimated permeability confining material is encountered. Drilling into such a confining layer will be done so as to avoid its complete penetration, and maintain the layer's integrity. The total depth of each boring will be determined in the field. Aegis may elect to continuously core one or more of the borings to more completely evaluate the subsurface sedimentary and/or lithologic conditions.

During drilling, the subsurface soils and alluvial materials of the unsaturated zone will be sampled at 5-foot intervals and significant lithology changes. The sampling interval may be shortened where subsurface conditions warrant it. The deepest sample in each boring will be collected 10 feet below first water or within the low-estimated permeability confining layer. The soil samples will be screened for hydrocarbons in the field, using a portable photoionization detector (PID). Based on field observations, selected soil samples will be submitted for laboratory analysis.

Drilling and soil sampling equipment will be either steam cleaned or washed prior to first use, and between borings, to reduce the possibility of cross-contamination. Rinsewater will be stored temporarily on site in U.S. Department of Transportation (DOT)-approved 55-gallon drums, pending analytical results from the boring samples. Following receipt of the analytical results, the rinsewater will be transported from the subject site to an appropriate disposal facility.

The selected soil samples will be analyzed for concentrations of: a) total petroleum hydrocarbons (TPH), as gasoline, by GC\FID method 5030; and b) benzene, toluene, ethylbenzene and total xylenes (BTEX), by EPA Method 8020. In addition, the soil sample from each boring with the highest TPH concentration will be analyzed for total priority pollutant metals cadmium, chromium, lead and zinc by EPA Methods 6010 and 7421 (lead). If TPH is not detected, the sample collected at or near the air-water interface will be analyzed for the total metals. In each boring, a minimum of two samples, one from above and one from below the air-water interface, will be collected for possible analysis of petrophysical properties, including air or water permeability, porosity and grain-size distribution.

All drill cuttings will be stored temporarily on site, on and under plastic sheeting, pending analytical results from either the boring samples or additional samples collected from the stockpile that may be required in order to determine proper disposal. Following receipt of the analytical results, the drill cuttings will be transported, by a licensed hauler, from the site to an appropriate disposal facility.

3.3 Groundwater Monitoring Well Installation, Sampling and Surveying

A 4-inch-diameter groundwater monitoring well will be installed in each of the locations indicated on Figure 2. A diagram of typical groundwater monitoring well construction details is included as Figure 3. At a minimum, each of the wells will be constructed according to the standards found in California Code of Regulations, Title 23, Section 2647 and 2648, and the California Department of Water Resources Bulletin 74-81.

Water sampling equipment will be either steam-cleaned or washed prior to first use. Separate sampling equipment will be dedicated to each well to reduce the possibility of cross-contamination. The wells will be completed as indicated on Figure 3, with perforated casing extending, where possible, from 5 feet above the highest anticipated level of groundwater to 10 feet into the zone of first water. The screened interval of at least two of the wells will be extended to approximately 30 feet above the highest anticipated level of groundwater to facilitate the possible future use of the wells as vapor extraction wells. Each of the wells will be capped with a locking wellhead cap and secured by a water-tight, traffic-rated wellhead vault. The top-of-casing elevation above mean sea level of each well will be surveyed, using either an established or temporary bench mark, by a licensed surveyor. Depth-to-water measurements in each well will be adjusted to this new datum.

Well development water will be stored temporarily on site in DOT-approved 55-gallon drums, pending laboratory analysis of the groundwater samples. Following receipt of the laboratory results, the development water will be transported, by a licensed hauler, from the subject site to an appropriate disposal facility.

Groundwater samples will be analyzed for concentrations of: a) TPH, as gasoline, by GC\FID method 5030; and b) BTEX, by EPA Method 602.

3.5 Laboratory Analysis and Practical Quantitation Limits

The laboratory to be used for the analyses discussed above is tentatively identified as NET Pacific of Santa Rosa, California, a state-certified analytical laboratory.

In accordance with the Tri-Regional guidelines, dated August 10, 1990, the practical quantitation limits (PQL) for soil and water analyses are as follows:

Soil -

a) for TPH, as gasoline, the PQL is 1.0 parts-per-million (ppm); and,

b) for BTEX the PQL is 0.005 ppm.

Water -

a) for TPH, as gasoline, the PQL is 0.05 ppm; and,

b) for BTEX the PQL is 0.0005 ppm.

In addition, a spike peak, surrogate sample, and standards will be run to ensure quality assurance and quality control of the analyses.

3.4 Permitting and Project Contacts

Soil boring/monitoring well permits from Alameda County Flood Control and Water Conservation District, Zone 7, will be required for the work proposed herein. In addition, review of this workplan by the City of San Leandro staff is required prior to beginning the fieldwork.

Permitting Contact

Alameda County Flood Control and Water Conservation District, Zone 7

Wyman Hong
Alameda County Flood Control and Water Conservation District, Zone 7
5997 Parkside Drive
Pleasanton, California 94588

Project Contacts/Representatives

Haber Oil Products, Inc.

Manmohan Chopra
ARCO Service Station
1401 Grand Avenue
San Leandro, California
(510) 357-7330

San Leandro Fire Department

Mike Bakaldin
San Leandro Fire Department
835 East 14th Street
San Leandro, California
(510) 577-3331

Aegis Environmental, Inc.

Brian Garber
Aegis Environmental, Inc.
1050 Melody Lane, Suite 160
Roseville, California 95678
(916) 782-2110

4.0 SCHEDULE

Permits applications for the well installation will be submitted to Alameda County upon approval of Haber Oil, Co. and the property owner. Review of this workplan by Alameda County will take approximately 2 weeks. A non-date-specific timeline of the expected duration of the project is included as Figure 4.

5.0 REPORTING

The report of the proposed investigation will include, but not necessarily be limited to: a) discussion of the site background, investigative methods used, and local and regional hydrogeology; b) boring completion logs; c) distribution map(s) of hydrocarbons in soil; d) cross-section(s) of the project site's shallow subsurface depicting the relationship of soils and alluvial materials to laboratory analytical data; and e) laboratory reports and chain-of-custody forms.

6.0 REMARKS/SIGNATURES

The information contained within this workplan reflects our professional opinions, and was developed in accordance with currently available information and accepted geologic, hydrogeologic, and engineering practices at this time and for this site. This workplan has been prepared solely for the use of Haber Oil Products, Inc. Any reliance on this workplan by parties other than Haber Oil shall be at such parties' sole risk.

The work proposed herein shall be conducted under the direct supervision of the professional geologist, registered with the State of California, whose signature appears below.

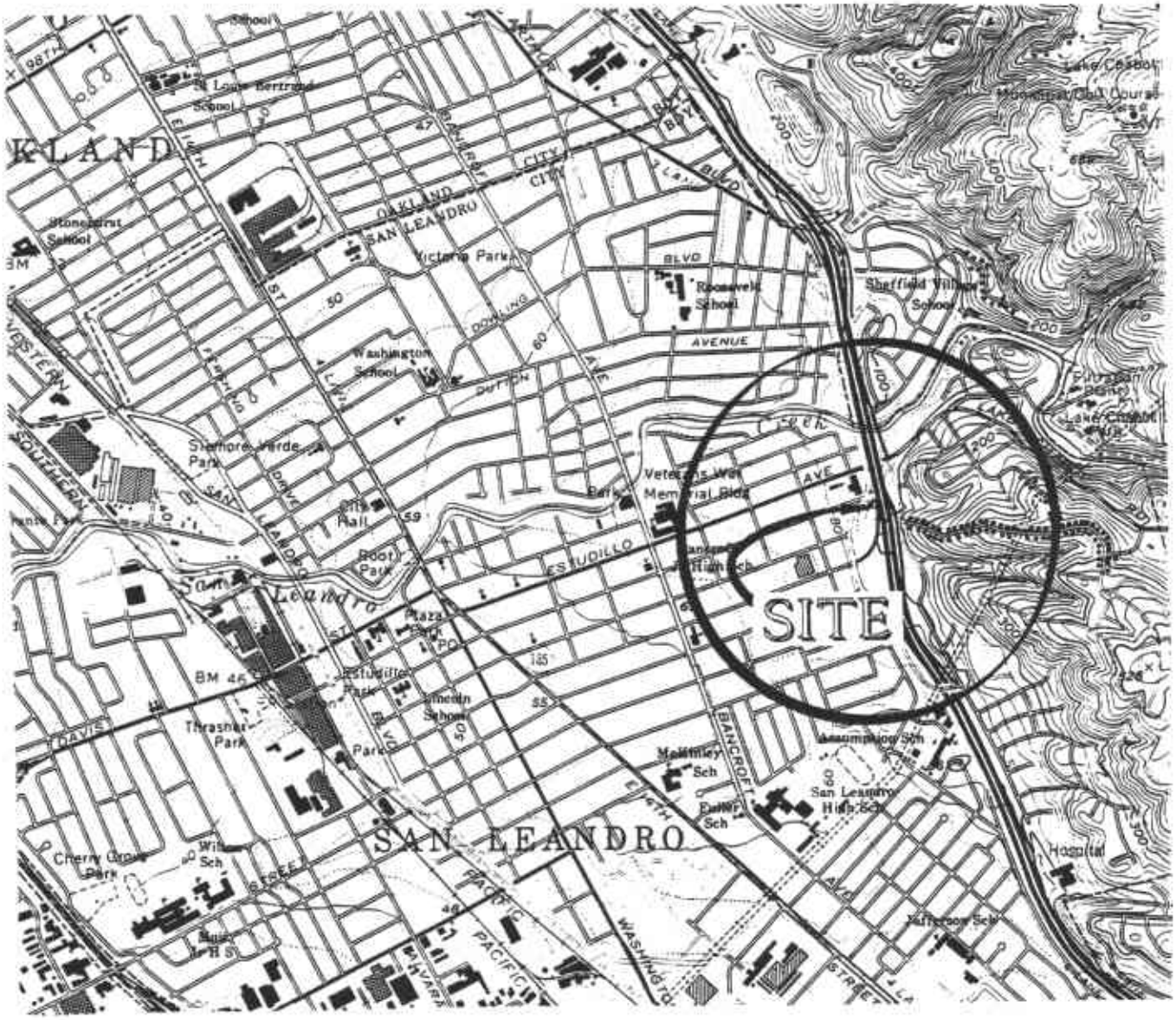
AEGIS ENVIRONMENTAL, INC.

Brian Garber
Senior Geologist

Pat Wright
Registered Geologist
CRG No. 529

8-24-92
Date

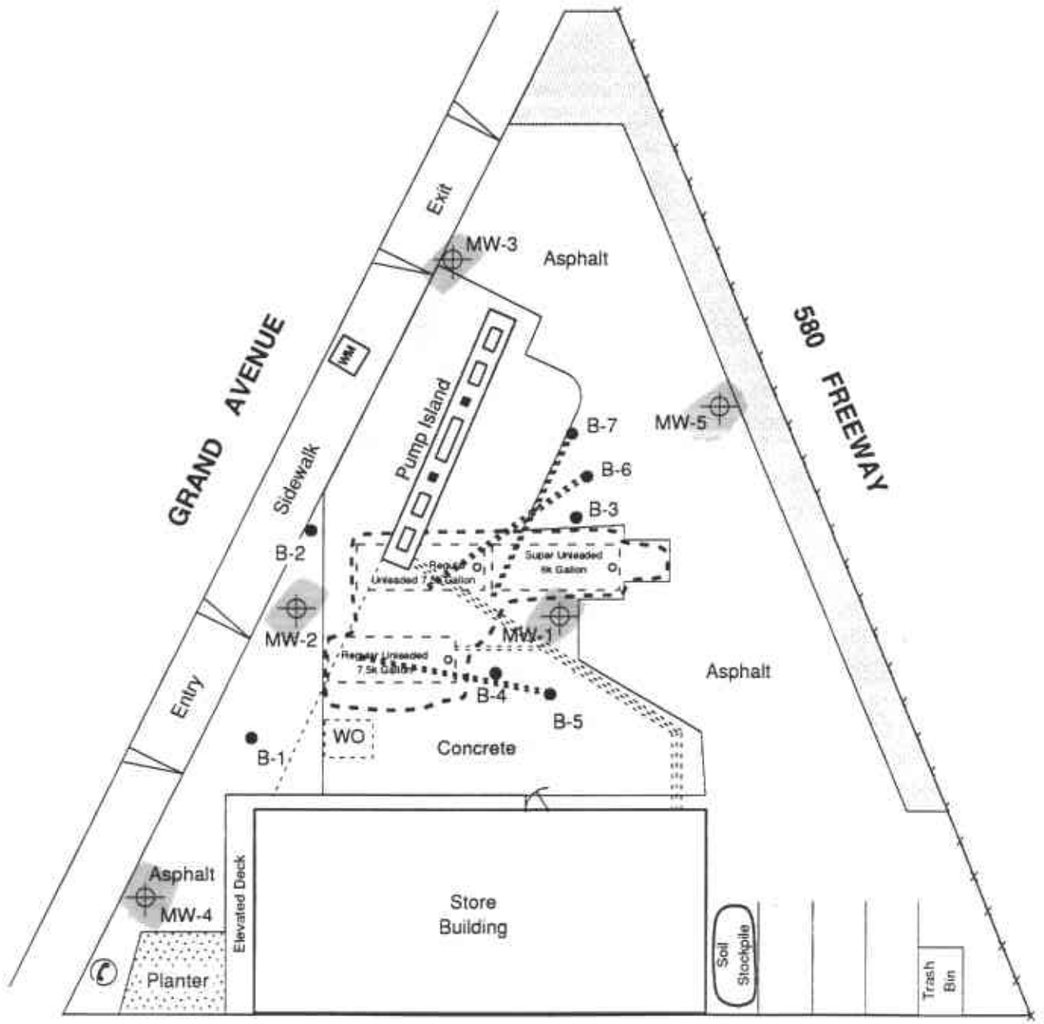
BG/PW/law/mjp



GENERAL NOTES:

BASE MAP FROM USGS
7.5 MINUTE TOPOGRAPHIC
SAN LEANDRO, CALIF.

AEGIS ENVIRONMENTAL, INC.		SITE LOCATION MAP	FIGURE 1
DRAWN BY: Ed Bernard	DATE: June 10, 1992	Haber Oil 1401 Grand Avenue San Leandro, CA	
REVISED BY:	DATE:		PROJECT NUMBER: 10-91001
REVIEWED BY:	DATE:		



LEGEND

⊕	Proposed Monitoring Well
7.5k	7500 Gallon Underground Storage Tank
6k	6000 Gallon Underground Storage Tank
WM	Water Meter (East Bay Municipal Utilitiy District)
WO	Waste Oil Tank
✆	Telephone Booth
×—×—	Fence
·····●	Soil Boring Locations
·····	Subsurface Electric

NOTES

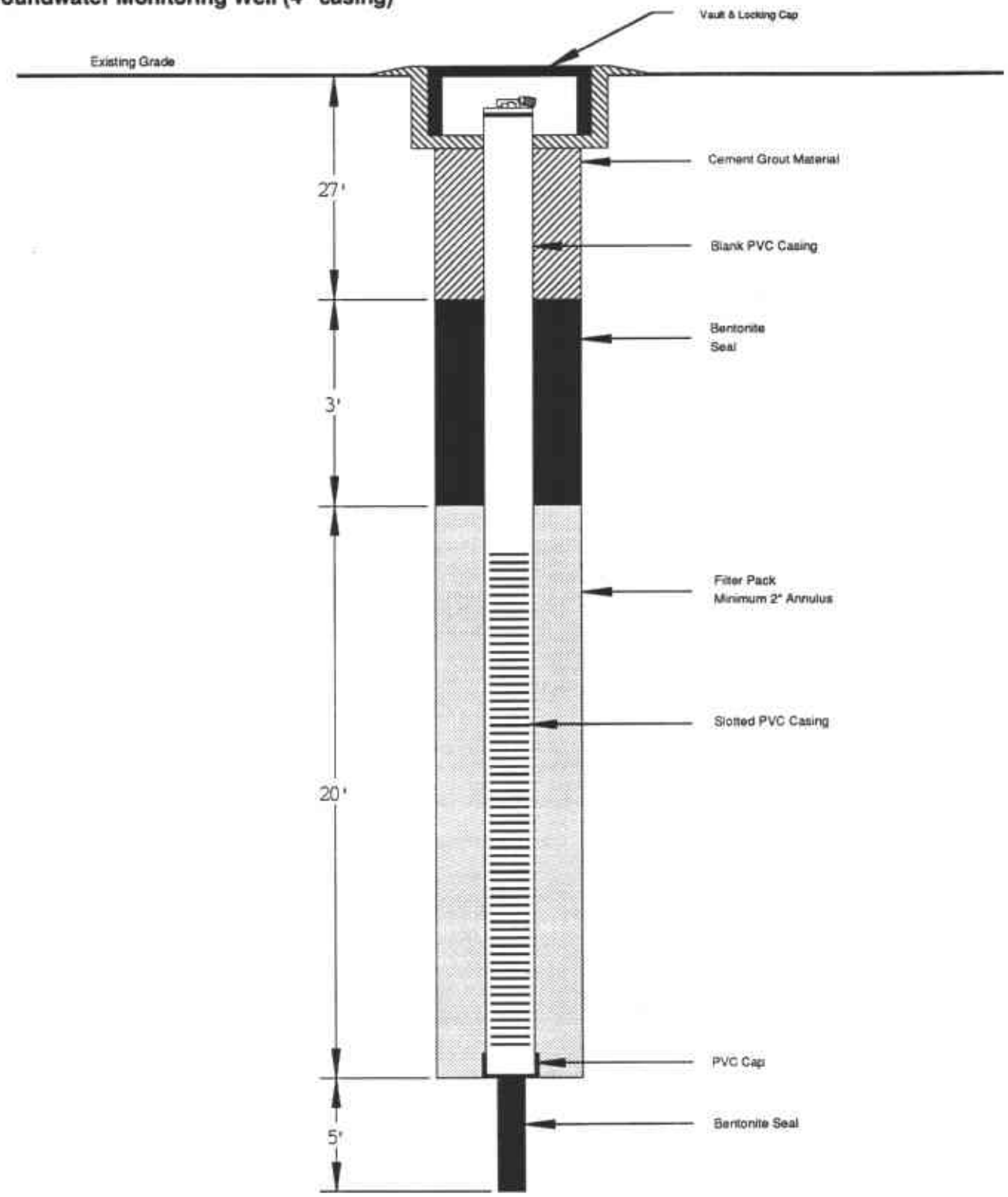
Site Sketch After GPR Location Map
By NORCAL Geophysical Consultants
(4/92)

All Locations Are Approximate

0 20 40
Approximate Scale
1" = 20'

AEGIS ENVIRONMENTAL, INC.		PROPOSED MONITORING WELL LOCATIONS	FIGURE 2
DRAWN BY: Ed Bernard	DATE: June 10, 1992	Haber Oil 1401 Grand Avenue San Leandro, CA	PROJECT NUMBER: 10-91001
REVISED BY: Ed Bernard	DATE: July 27, 1992		
REVIEWED BY:	DATE:		

Groundwater Monitoring Well (4" casing)



(NOT TO SCALE)

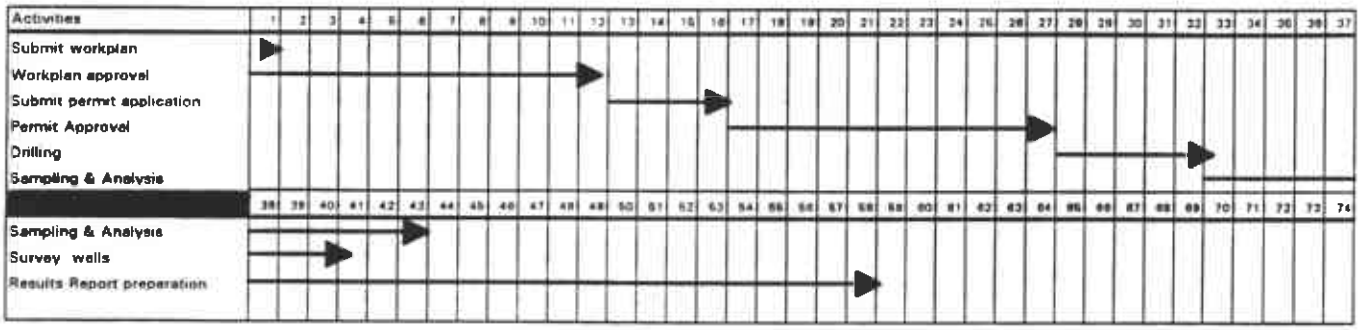
AEGIS ENVIRONMENTAL, INC.

Typical Groundwater Monitoring Well
Construction Details (4" Casing)

Harber Oil Company
1401 Grand Avenue
San Leandro, CA

JOB NUMBER
10-91001

FIGURE
3



AEGIS ENVIRONMENTAL, INC.		PROJECT SCHEDULE TIMELINE (In Working Days)	FIGURE 4
DRAWN BY: Ed Bernard	DATE: July 27, 1992	Harber Oil Company 1401 Grand Avenue SAn Leandro	PROJECT NUMBER: 10-91001
REVISED BY:	DATE:		
REVIEWED BY:	DATE		

APPENDIX A

STANDARD OPERATING PROCEDURES

AEGIS ENVIRONMENTAL, INC.
STANDARD OPERATING PROCEDURES
RE: SOIL BORING SAMPLING
SOP-1

During drilling, soil samples for chemical analysis are collected in thin-walled brass tubes, of varying diameters and lengths (e.g., 4 or 6 inches long by 2 inches outside-diameter). Three or four of the selected tubes, plus a spacer tube, are set in an 18-inch long split-barrel sampler of the appropriate inside-diameter.

Where possible, the split-barrel sampler is driven its entire length either hydraulically or using a 140-pound drop hammer. The sampler is extracted from the borehole and the brass tubes, containing the soil samples, are removed. Upon removal from the sampler, the selected brass tubes are either immediately trimmed and capped with aluminum foil or Teflon sheets and plastic caps or the samples are extruded from the tubes and sealed within other appropriate cleaned sample containers (e.g., glass jar). The samples are then hermetically sealed, labeled, and refrigerated for delivery, under strict chain-of-custody, to the analytical laboratory. These procedures minimize the potential for cross-contamination and volatilization of volatile organic compounds (VOC) prior to chemical analysis.

One soil sample collected at each sampling interval is analyzed in the field using either a portable photoionization detector (PID), flame ionization detector, organic vapor analyzer, catalytic gas detector or an explosimeter. The purpose of this field analysis is to qualitatively determine the presence or absence of hydrocarbons, and the samples to be analyzed at the laboratory. The soil sample is sealed in either a brass tube, glass jar or plastic bag to allow for some volatilization of VOC. The PID is then used to measure the concentrations of hydrocarbons within the containers's headspace. The data is recorded on both field notes and the boring logs at the depth corresponding to the sampling point.

Other soil samples are collected to document the soil and/or stratigraphic profile beneath the project site, and estimate the relative permeability of the subsurface materials. All drilling and sampling equipment are either steam-cleaned or washed in solution and double-rinsed in deionized water prior to use at each site and between boreholes to minimize the potential for cross-contamination.

AEGIS ENVIRONMENTAL, INC.
STANDARD OPERATING PROCEDURES
RE: SOIL CLASSIFICATION
SOP-3

Soil samples are classified according to the Unified Soil Classification System. Representative portions of the samples may be shipped under strict chain-of-custody to an analytical laboratory for further examination and verification of the in-field classification, and analysis of soil mechanical and/or petrophysical properties. The soil types are indicated on logs of either excavations or borings together with depths corresponding to the sampling points, and other pertinent information.

AEGIS ENVIRONMENTAL, INC.
STANDARD OPERATING PROCEDURES
RE: SAMPLE IDENTIFICATION AND CHAIN-OF-CUSTODY PROCEDURES
SOP-4

Sample identification and chain-of-custody procedures ensure sample integrity, and document sample possession from the time of collection to its ultimate disposal. Each sample container submitted for analysis is labeled to identify the job number, date, time of sample collection, a sample number unique to the sample, any in-field measurements made, sampling methodology, name(s) of on site personnel and any other pertinent field observations also recorded on the field excavation or boring log.

Chain-of-custody forms are used to record possession of the sample from time of collection to its arrival at the laboratory. During shipment, the person with custody of the samples will relinquish them to the next person by signing the chain-of-custody form(s) and noting the date and time. The sample-control officer at the laboratory will verify sample integrity, correct preservation, confirm collection in the proper container(s) and ensure adequate volume for analysis.

If these conditions are met, the samples will be assigned unique laboratory log numbers for identification throughout analysis and reporting. The log numbers will be recorded on the chain-of-custody forms and in the legally-required log book maintained in the laboratory. The sample description, date received, client's name, and any other relevant information will also be recorded.

AEGIS ENVIRONMENTAL, INC.
STANDARD OPERATING PROCEDURES
RE: LABORATORY ANALYTICAL QUALITY ASSURANCE AND CONTROL
SOP-5

In addition to routine instrument calibration, replicates, spikes, blanks, spiked blanks, and certified reference materials are routinely analyzed at methods specific frequencies to monitor precision and bias. Additional components of the laboratory Quality Assurance/Quality Control program include:

1. Participation in state and federal laboratory accreditation/certification programs;

2. Participation in both U.S. EPA Performance Evaluation studies (WS and WP studies) and inter-laboratory performance evaluation programs;

3. Standard operating procedures describing routine and period instrument maintenance;

4. "Out-of-Control"/Corrective Action documentation procedures; and,

5. Multi-level review of raw data and client reports.

AEGIS ENVIRONMENTAL, INC.
STANDARD OPERATING PROCEDURE
RE: HOLLOW-STEM AUGER MONITORING WELL INSTALLATION AND DEVELOPMENT
SOP-6

Boreholes for monitoring wells are drilled using a truck-mounted, hollow-stem auger drill rig. The borehole diameter will be a minimum of 4 inches larger than the outside-diameter of the casing when installing well screen. The hollow-stem auger provides minimal interruption of drilling while permitting soil sampling at desired intervals. Soil samples are collected by either hammering or hydraulically pushing a conventional split-barrel sampler containing pre-cleaned 2-inch-diameter brass tubes. A geologist or engineer from Aegis Environmental, Inc., continuously logs each borehole during drilling and constantly checks drill cuttings for indications of both the first occurrence of groundwater and volatile hydrocarbons using either a portable photoionization detector, flame ionization detector, or an explosimeter. The sampler is rinsed between samples and either steam-cleaned or washed with all other drilling equipment between borings to minimize the potential for cross-contamination.

Monitoring wells are cased with threaded, factory-perforated and blank Schedule 40 PVC. The perforated interval consists of slotted casing, generally with 0.020 inch wide by 1.5-inch long slots, with 42 slots per foot. A PVC cap may be secured to the bottom of the casing with stainless steel screws; no solvents or cements are used. Centering devices may be fastened to the casing to assure even distribution of filter material and grout within the borehole annulus. The well casing is thoroughly washed and/or steam-cleaned, or may be purchased as pre-cleaned, prior to installation.

After setting the casing inside the hollow-stem auger, sand or gravel filter material is poured into the annular space to fill from boring bottom to generally 1 foot above the perforated interval. A 1 to 2-foot thick bentonite plug is set above this filter material to prevent grout from infiltrating into the filter pack. Either neat cement, containing about 5 percent bentonite, or sand-cement grout is then tremmied into the annular space from the top of the bentonite plug to near surface. A traffic-rated vault is installed around each wellhead for wells located in parking lots or driveways, while steel "stovepipes" are usually set over wellheads in landscaped areas.

After installation, the wells are thoroughly developed to remove residual drilling materials from the wellbore, and to improve well performance by removing fine material from the filter pack that may pass into the well. Well development techniques used may include pumping, surging, bailing, swabbing, jetting, flushing, and air-lifting. All development water is collected either in drums or tanks for temporary storage, and properly disposed of depending on laboratory analytical results. To minimize the potential for cross-contamination between wells, all development equipment are either steam-cleaned or properly washed prior to use.

AEGIS ENVIRONMENTAL, INC.
STANDARD OPERATING PROCEDURE
RE: GROUNDWATER PURGING AND SAMPLING
SOP-7

Prior to water sampling, each well is purged by evacuating a minimum of three well-bore volumes of groundwater. When required, purging will continue until either the discharge water temperature, conductivity or pH stabilize, a maximum of ten well-bore volumes of groundwater have been recovered or the well is bailed dry. When practical, the groundwater sample should be taken when the water level in the well recovers to at least 80 percent of its static level.

The sampling equipment consists of either a Teflon bailer, PVC bailer, or stainless steel bladder pump with a Teflon bladder. If the sampling system is dedicated to the well, then the bailer is usually Teflon, but the bladder pump is PVC with a polypropylene bladder. In general and depending on the intended laboratory analysis, 40-milliliter glass, volatile organic analyzer (VOA) vials, with Teflon septa, are used as sample containers.

The groundwater sample is decanted into each VOA vial in such a manner that there is no meniscus at the top of the vial. A cap is quickly secured to the top of the vial. The vial is then inverted and gently tapped to see if air bubbles are present. If none are present, the vial is labeled and refrigerated for delivery, under strict chain-of-custody, to the analytical laboratory. Label information should include a unique sample identification number, job identification number, date, time, type of analysis requested, and the sampler's name.

For quality control purposes, a duplicate water sample is collected from each well. This sample is put on hold at the laboratory. When required, a trip blank is prepared at the laboratory and placed in the transport cooler. It is labeled similar to the well samples, remains in the cooler during transport, and is analyzed by the laboratory along with the groundwater samples. In addition, a field blank may be prepared in the field when sampling equipment is not dedicated. The field blank is prepared after a pump or bailer has been either steam-cleaned or properly washed, prior to use in the next well, and is analyzed along with the other samples. The field blank analysis demonstrates the effectiveness of the in-field cleaning procedures to prevent cross-contamination.

To minimize the potential for cross-contamination between wells, all well development and water sampling equipment not dedicated to a well is either steam-cleaned or properly washed between use. As a second precautionary measure, wells are sampled in order of least to highest concentrations as established by available previous analyses.

APPENDIX B

SITE SAFETY PLAN

POST ON-SITE

FIELD INVESTIGATION TEAM
SITE HEALTH AND SAFETY PLAN

A. GENERAL INFORMATION

Client: Mr. Manmohan Chopra Aegis Project Number: 91-001

Site Name: ARCO Service Station Client Project Number:

Street Address: 1401 Grand Avenue
San Leandro, CA

Plan Prepared by: Mike Kitko Date: 2/7/92

Approved by: Brian Garber Date: 3/20/92

Revised by: Date:

Revision Approved by: Date:

Objectives:

Phase I - Conduct limited subsurface investigation

Phase II - To be announced

Proposed Date of Investigation: March 1992

Hazard Summary/Level of Protection

A:_____ B:_____ C:_____ D:___XX___(with modifications)

B. SITE/WASTE CHARACTERISTICS

Waste/Contaminant Type(s): XX Liquid XX Soil ____ Solid ____ Sludge
____ Gas

Characteristic(s): ____ Corrosive XX Ignitable ____ Radioactive
XX Volatile XX Toxic ____ Reactive
____ Unknown ____ Other (Name):

Contaminant Source: Self serve retail gasoline station with underground fuel storage tanks.

Surrounding Features: Commercial and residential area.

Status: Tanks, associated piping and pumps are active.

History: No history of injury or public complaint

C. HAZARD EVALUATION

Have all contaminants been identified that may be present on site?
Yes XX No_____ Unknown_____

List all chemicals below that have been identified or are suspected on site and their maximum concentrations in soil/water. Information on hazardous properties are listed in the appendix. For chemicals not shown in the SECTION G , enter the hazardous property information in the spaces provided.

Chemical Name	Maximum Concentration : In Soil
TPH gasoline	66.00 ppm
Benzene	0.94 ppm
Toluene	3.80 ppm
Ethylbenzene	1.30 ppm
Xylenes	8.70 ppm
Total Lead	3.00 ppm
EDB	0.00 ppm
EDC	0.00 ppm

TPH = Total Petroleum Hydrocarbons
(ppm) = parts per million
(ppb) = parts per billion
NA = Not Applicable
P = results pending
EDB = Ethylene Dibromide
EDC = 1,2 Dichloroethane

Free product present? _____ Yes _____ No XX Unknown

Type of product present: XX Leaded XX Unleaded _____ Diesel

D. SITE SAFETY WORKPLAN

PERSONNEL

Team Member	Title	Responsibility
Mike Kitko	Geologist	Site Geologist
Brian Garber	Senior Geologist	Project Manager
Brian Garber	Senior Geologist	Site Safety Officer

PERIMETER ESTABLISHED

Map/Sketch Attached?	Yes___	No XX
Site Secured?	Yes___	No XX
Perimeter Identified?	Yes XX	No___
Zero line defined?	Yes___	No XX

INVESTIGATION-DERIVED MATERIAL DISPOSAL:

Soil from investigative activities will be stockpiled and stored on site until analyses are available to describe the levels of petroleum hydrocarbon constituents contained in them. Soil stockpiled on site will be underlain by and covered with plastic sheeting or contained in drums if required by local regulatory agencies. Water from investigative activities will be stored in DOT-approved 55-gallon drums. Any material disposed off site will be disposed of in accordance with existing regulation and guidelines.

D1. PERSONAL SAFETY

SITE ENTRY PROCEDURES: Notify store manager

PERSONNEL PROTECTION:

Level of protection: A_____ B_____ C_____ D__XX__

Modifications:

1. All personnel must wear hard hat, safety shoes, safety glasses and/or face shield.
2. Neoprene gloves and tyvek/saranax suit should be worn if contact with contaminated water or soil is likely.
3. Hearing protection must be worn if noise levels prevent normal conversation at a distance of three feet. No smoking, eating, or drinking is allowed on site.
4. Respiratory protection is dependent on conditions listed in the next section.
5. No personnel are to enter or approach any excavation area where there is a danger of wall collapse or confined space entry.

Surveillance Equipment and Materials:

Instrumentation	Action Level	Action
photoionization	5 units or 5 times background (breathing zone)	use halfmask respirator with organic cartridges
oxygen meter	<19. 5% oxygen	do not enter area or confined space until levels are reduced.
explosimeter	>10% LEL	eliminate all ignition sources and
	>20% LEL	reduce levels immediately or leave site.

First Aid Equipment: Standard first aid kit, portable eye wash.

First Aid Procedures:

Ingestion: DO NOT induce vomiting, summon medical help.

Inhalation: Move victim to fresh air, seek medical attention if needed.

Dermal Exposure: Remove contaminated clothing, flush with water.

DECONTAMINATION PROCEDURE:

Personnel: Flush exposed skin with soap and water.

WORK LIMITATIONS:(time of day, weather, heat/cold stress):

In high ambient temperatures, follow heat-stress precautions: Provide plenty of cool water and electrolytes (e.g., Gatorade), remove protective clothing during breaks: check resting pulse and increase number of breaks if pulse does not return to normal during work break.

In cold ambient temperatures (<35°F.), follow hypothermia precautions. Work may only progress during daylight hours or under conditions of adequate lighting.

ELECTRICAL HAZARDS:

Will be located by U.S.A. before drilling.

Maintain at least 10 feet clearance from overhead power lines. If unavoidably close to overhead or buried power lines, turn power off and lockout circuit breaker. Avoid standing in water when operating electrical equipment.

CONFINED SPACES:

Monitor organic vapors and oxygen before entering. If the following values are exceeded, do not enter.

1. Oxygen < 20.0%.

2. Total hydrocarbons > 5 ppm above background, if all air contaminants have not been identified.

3. Concentrations of specific air contaminants exceeding action levels in Section D, if all air contaminants have been identified.

If entering a confined space, monitor oxygen and organic vapors continuously.

AGENCIES CONTACTED IN UNDERGROUND UTILITY SEARCH:

E. EMERGENCY INFORMATION

LOCAL TELEPHONE NUMBERS (provide area codes):

Ambulance	911	
Hospital Emergency Room	(510) 357-8300	Physicians Community Memorial
Poison Control Center	911	
Fire Department	911	
Airport	(510) 293-8678	Hayward Airport
Explosives Unit	911	

SITE RESOURCES:

Water supply available on site:	Yes XX	No ____
Telephone available on site:	Yes XX	No ____
Bathrooms available on site:	Yes XX	No ____
Other resources available on site: :Electricity	Yes XX	No ____

EMERGENCY CONTACTS	PHONE NO.
1. Project Manager: Brian Garber	(916) 782-2110
2. Health and Safety Officer: Brian Garber	(916) 782-2110
4. Site Contact: Jay Anast	(510) 357-7330
5. Regulatory Contact: Larry Ceto Alameda County	(510) 271-4320

F. EMERGENCY ROUTES

HOSPITAL: Physicians Community Hospital
2800 Benedict Drive
San Leandro, California
(510) 357-8300
North on Grand Avenue - over freeway
Right on Benedict Drive
3 blocks through residential
Hospital easily spotted
Approximate travel time: 10 to 15 minutes

G. HAZARD EVALUATION

PARAMETER	TLV (ppm)	OT (ppm)	IDLH (ppm)	VOLA-TILITY	SKIN HAZARD	EXPLO-SIVITY
Benzene	0.1	4	2,000	H	L	H
Ethylbenzene	100	NS	2,000	M	L	H
Toluene	100	2	2,000	M	L	H
Xylene	100	<1	10,000	H	M	H
Gasoline	300	NS	NS	H	L	H

KEY: TLV = Threshold Limit Value (Worker - 8 Hours)
OT = Odor Threshold
DLH = Immediately Dangerous to Life and Health
NS = None Specified
NR = Not Reported
H = High
M = Medium
L = Low
U = Unknown

APPENDIX A: HAZARDOUS PROPERTY INFORMATION

Explanations and Footnotes

Water solubility is expressed in different terms in different references. Many references use the term "insoluble" for materials that will not readily mix with water, such as gasoline. However, most of these materials are water soluble at the part per millon or part per billion level. Gasoline for example, is insoluble in the gross sense, and will be found as a discreet layer on top of the ground water. But certain gasoline constituents, such as benzene, toluene, and xylene will also be found in solution in the ground water at the part per millon or part per billion level.

A. Water solubility expressed as 0.2g means 0.2 grams per 100 grams water at 20°C.

B. Solubility of metals depends on the compound in which they are present.

C. Several chlorinated hydrocarbons exhibit no flash point in conventional sense, but will burn in presence of high energy ignition source or will form explosive mixtures at temperatures above 200°F.

D. Practically non-flammable under standard conditions.

E. Expressed as mm Hg under standard conditions

F. Explosive concentrations of airborne dust can occur in confined areas.

G. Values for Threshold Limit Value - Time Weighted Average (TLV-TWA) are OSHA Permissible Exposure Limits (PEL) except where noted in H. and I.

H. TLV - TWA adopted by the American Conference of Government Industrial Hygienists (ACGIH) which is lower than the OSHA PEL.

I. TLV - TWA recommended by the National Institute for Occupational Safety and Health (NIOSH). A TLV or PEL has not been adopted by the ACGIH or OSHA.

J. A. - Corrosive
B. - Flammable
C. - Toxic
D. - Volatile
E. - Reactive
F. - Radioactive
G. - Carcinogen
H. - Infectious
K. - Dermal Toxicity data is summarized in the following three categories:

Skin penetration

A - negligible penetration (solid-polar)
B - slight penetration (solid-nonpolar)
C - moderate penetration(liquid-nonpolar)
D - high penetration (gas/liquid-nonpolar)

Systemic Potency

E - slight hazard - LD_{50} = 500-15,000 mg/kg
lethal dose for 70 kg man = 1 pint-1 quart
F - moderate hazard - LD_{50} = 50-500 mg/kg
lethal dose for 70 kg man = 1 ounce-1 pint
G - extreme hazard - LD_{50} = 10-50 mg/kg
lethal dose for 70 kg man = drops to 20 ml

Local Potency

H - slight - reddening of skin
I - moderate - irritation/inflammation of skin
J - extreme - tissue destruction/necrosis

1. Acute Exposure Symptoms

A - abdominal pain
B - central nervous system depression
C - comatose
D - convulsions
E - confusion
F - dizziness
G - diarrhea
H - drowsiness
I - eye irritation
J - fever
K - headache
L - nausea
M - respiratory system irritation
N - skin irritation
O - tremors
P - unconsciousness
Q - vomiting
R - weakness

HAZARDOUS PROPERTY INFORMATION - FUELS

Material	Water[A] Solubility	Specific Gravity	Vapor Density	Flash Point °F	Vapor[E] Pressure	LEL UEL	LD_{50} mg/kg	TLV-TWA[G]	IDLH Level	Odor Threshold or Warning Concentration	Hazard[J] Property	Dermal[K] Toxicity	Accute[L] Exposure Symptoms
Diesel Fuel	insoluble	0.81-0.90	---	130	---	0.6-1.3 6.0-7.5		none established	NE	0.008 ppm	BCD	CI	BCEFHIKL MNP
Gasoline	insoluble	0.72-0.76	3-4	-45	variable	1.4% 7.6%		300 ppm	NE	< 1 ppm	BCDG	CI	BCEFHIKL MNP
Kerosene	insoluble	0.83-1.0	---	100-165	5	0.7% 5.0%		none established	NE	0.008 ppm	BCD	CI	BCEFHIKL MNP

HAZARDOUS PROPERTY INFORMATION - VOLATILE ORGANIC PRIORITY POLLUTANTS

Material	Water[A] Solubility	Specific Gravity	Vapor Density	Flash Point °F	Vapor[E] Pressure	LEL UEL	LD_{50} mg/kg	TLV-TWA[G]	IDLH Level	Odor Threshold or Warning Concentration	Hazard[J] Property	Dermal[K] Toxicity	Accute[L] Exposure Symptoms
Acrolein	22%	0.8410	1.9	-15	214 mm	2.8% 31.0%	46	0.1 ppm	5 ppm	0.1-16.6 (0.21-0.5)	BCED	BJ	ABDFGHIK LMNOPQR
Acrylonitrile	7.1%	0.8060	1.8	30	83 mm	3.0% 17.0%	82	2.0 ppm	4,000 ppm	19-100	BCEGD	DIG	FGIKLMNQ R
Benzene	820 ppm	0.8765	2.8	12	75 mm	0.339% 7.1%	3800	10.0 ppm	2,000 ppm	4.68	BCGD	CIG	BCDFHIKL MNOQR
Bromomethane	0.1 g	1.732	3.3	none	1.88 atm	13.5% 14.5%		5.0 ppm	2,000 ppm	no odor	CD		BCDEIJKL MNOQR
Bromodichloromethane	insoluble	1.980	--	none	n/a	non-flam.	916	none established	none specified		CGD		BIMN
Bromoform	0.01 g	2.887	--	none	5 mm	non-flam.	1147	0.5 ppm	n/a	530	CED		BCDKMN
Carbon Tetrachloride	0.08%	1.5967	5.3	none	91 mm	non-flam.	2800	5.0 ppm	300 ppm	21.4-200	CD	JGH	ABCFGHKN Q
Chlorobenzene	0.01 g	1.1058	3.9	84	8.8 mm	1.3% 9.6%	2910	75.0 ppm	2,400 ppm	0.21-60	BCD	CIF	BCFIKLMN OPQR
Chloroethane	0.6 g	0.8978	2.2	-58	1.36 atm	3.8% 15.4%		1000.0 ppm	20,000 ppm		BCD		BFHIKMNP
2-Chloroethylvinyl Ether	insoluble	1.0475	3.7	80	30 mm	--	250	none established	none specified		BCD		HIM
Chloroform	0.8 g	1.4832	4.12	none	160 mm	non-flam.	800	10.0 ppm	1,000 ppm	50-307 fatigue (>4096)	CD		BCEGIKLM N
Chloromethane	0.74%	0.9159	1.8	32	50 atm	7.6% 19.0%		50.0 ppm	10,000 ppm	10-100 no odor (500-1000)	BCD	DHF	ABCDEFGI JKLOQR
Dibromochloromethane	insoluble	2.451	--	--	--	--	848	none established	none specified		BCD		BFHIMNPQ

HAZARDOUS PROPERTY INFORMATION - VOLATILE ORGANIC PRIORITY POLLUTANTS (CONTINUED)

Material	Water[A] Solubility	Specific Gravity	Vapor Density	Flash Point °F	Vapor[E] Pressure	LEL UEL	LD_{50} mg/kg	TLV-TWA[G]	IDLH Level	Odor Threshold or Warning Concentration	Hazard[J] Property	Dermal[K] Toxicity	Accute[L] Exposure Symptoms
Trichloroethylene (TCE)	0.1%	1.4642	4.5	90	58 mm	12.5% 90.0%	4920	50.0 ppm[M]	1,000 ppm	21.4-400	BC		BFKLNOPQ
Trichlorofluoromethane	0.11 g	1.494	--	none	0.91 atm	non-flam.		1000.0 ppm	10,000 ppm	135-209	CD		BFHKLQ
Toluene	0.05 g	0.866	3.2	40	22 mm	1.3% 7.1%	5000	100.0 ppm	2,000 ppm	0.17-40 fatigue (300-400)	BC	BHE	BEFHIKLM NOPQ
Vinyl Chloride	negligible	0.9100	2.24	-108	3.31 atm	3.6% 33.0%	500	1.0 ppm	none specified	260	BCEG	DJG	ABFHIKLN R

HAZARDOUS PROPERTY INFORMATION - HEAVY METALS

Material	Water[A] Solubility	Specific Gravity	Vapor Density	Flash Point °F	Vapor[E] Pressure	LEL UEL	LD_{50} mg/kg	TLV-TWA[G]	IDLH Level	Odor Threshold or Warning Concentration	Hazard[J] Property	Dermal[K] Toxicity	Accute[L] Exposure Symptoms
Arsenic	B	5.727	n/a	none	n/a	F		10.0 ug/m^3	none specified		CEG	CJG	ACDGJLMO QR
Beryllium	B	1.85	n/a	none	n/a	F		2.0 ug/m^3	none specified		C		IJMNR
Cadmium	B	8.642	n/a	none	n/a	F	225	0.5 mg/m^3	40/mg^3		C		ABGIKLMN QR
Chromium	B	7.20	n/a	none	n/a	F F		0.5 mg/m^{3H}	500/mg^3				FMNQ
Copper	B	8.92	n/a	none	n/a	F		0.1 mg/m^3	none specified		C		FGIJLMOQ R
Lead	B	11.3437	n/a	none	n/a	F		50.0 ug/m^3	none specified		C		ACDFGOQR
Mercury	B	13.5939	7.0	none	0.0012 mm	F		50.0 ug/m^{3H}	28 mg/m^3		C		AGLMNQ
Nickel	B	8.9	n/a	none	n/a	F		1.0 mg/m^3	none specified		C		DGJLMNQ
Silver	B	10.5	n/a	none	n/a	F		0.01 mg/m^3	none specified		C		IN
Thallium	B	11.85	n/a	none	n/a	F		0.1 mg/m^3	20 mg/m^3		C	BG	ADGLNOQ
Zinc	B	7.14	n/a	none	n/a	F		none established	none specified		C		DF

HAZARDOUS PROPERTY INFORMATION - MISCELLANEOUS

Material	Water[A] Solubility	Specific Gravity	Vapor Density	Flash Point °F	Vapor[E] Pressure	LEL UEL	LD_{50} mg/kg	TLV-TWA[G]	IDLH Level	Odor Threshold or Warning Concentration	Hazard[J] Property	Dermal[K] Toxicity	Accute[L] Exposure Symptoms
Acetone	soluble	0.8	2.0	-4	400 mm	2.5% 12.8%	9750	750 ppm	10,000 ppm	100	BCD	DI	N
Asbestos	insoluble	2.5	n/a	none	n/a	non-flam.		0.2-2 fibers/cc	none specified		CG		MN
Chromic Acid	soluble	1.67-2.82	n/a	none	n/a	non-flam.		none established	none specified		ACEG		GIN
Cyanides	58-72%		n/a	none	n/a	non-flam.		5 mg/m^3	50 mg/m^3		CE		FKLNPQ
PCB (Generic)	slightly soluble	--	n/a	none	n/a	non-flam.		1.0 ug/m^3[I]	none specified		CG		CHLPQ
Phenol	8.4%	1.0576	3.2	175	0.36 mm	1.8% 8.6%	414	5 ppm	100 ppm	0.047-5 (48)	C		ABCDGIKM NOQ
Xylene	0.00003%	0.8642	3.7	84	9.0 mm	1.1% 7.0%	5000	100 ppm	10,000 ppm	0.5-200 (200)	BCD		ABFHIKLM NPQ