TANK PROTECT ENGINEERING
Of Northern California, Inc

TANK PROTECT ENGINEERING
2821 Whipple Road
Union City, CA 94587-1233
(510) 429-8088 • (800) 523-8088
FAX (510) 429-8089

September 10, 1993

Mrs. Mary Petsas
16035 E. 14th Street
San Leandro, CA 94578

Re: Report of Gradient Determination and Groundwater Sampling for Third Quarter Report, 1993, Mrs. Mary Petsas, 16035 E. 14th Street, San Leandro, CA 94578

Dear Mrs. Petsas:

Tank Protect Engineering of Northern California, Inc. (TPE) is pleased to submit this quarterly letter report of environmental services conducted at the subject site. Previous work conducted at the site is summarized and work conducted during the subject quarter is presented in detail.

BACKGROUND

Work conducted by TPE during first quarter, 1992:

- February 4, 1992 - Removed two 1,000-gallon and one 750-gallon steel, single-walled, underground, unleaded gasoline storage tanks and waste oil tank, respectively, from the subject site.

- February 5, 1992 - Collected 5 soil samples from the tank excavations. One soil sample was also collected from native soil beneath the piping and 1 composite soil sample consisting of 4 discrete soil samples was collected from the stockpile. All samples were submitted for chemical analysis for total petroleum hydrocarbons as gasoline (TPHG) and for benzene, toluene, ethylbenzene, and xylenes (BTEX). One soil sample

was additionally analyzed for total petroleum hydrocarbons as diesel (TPHD), oil and grease (O&G), volatile organics, and selected metals.

- March 2 and 3, 1992 - Conducted horizontal and vertical excavation of contaminated soil from the waste oil and gasoline tank excavations. Approximately 40 cubic yards (cyds) of gasoline-contaminated soil and 50 cyds of waste oil-contaminated soil were excavated and stockpiled separately on site. Seven verification soil samples were collected to document cleanup of the excavation sidewalls and 2 composite soil samples consisting of 4 discrete samples each, were collected to document excavation of contaminated soil. All soil samples were analyzed for TPHG and BTEX with 3 soil samples being additionally analyzed for TPHD, O&G, and selected metals. One verification soil sample was also analyzed for semi-volatile organics and 1 stockpile composite sample was also analyzed for organic lead.

- March 3 and 4, 1992 - Alviso Independent Oil, Inc. (Alviso) removed about 420 gallons of drummed water and about 1,000 gallons of groundwater from the excavation.

- March 6, 1992 - Submitted to the client a Tank Closure Report and Workplan for Overexcavation of Contaminated Soil and Installation of Groundwater Monitoring Wells (TCR/WP) that documented tank closure activities and proposed a workplan to: (1) investigate the horizontal and vertical extent of contaminated vadose zone soil, (2) overexcavate and remediate contaminated vadose zone soil for on site reuse or disposal to an appropriate landfill, and (3) install up to 3 groundwater monitoring wells as an initial investigation of groundwater contamination.

- March 18, 1992 - Backfilled the excavation with imported pea gravel and aggregate base material.

- March 24 and 26, 1992 - Sealed the former excavation with a 3 to 5-inch layer of asphalt and applied an asphalt sealer to the surface.

- March 25 and 26, 1992 - Disposed of the gasoline-contaminated stockpiled soil at Redwood Landfill, Inc. located in Novato, California.

- March 31, 1992 - Conducted a file review at the California Regional Water Quality Control Board (CRWQCB)-San Francisco Bay Region's office to determine if any documented, off-site contamination may be impacting the subject site and to investigate vicinity and site groundwater flow direction.

Work conducted by TPE during second quarter, 1992:

- April 9, 1992 - Attended a meeting with Mr. Scott O. Seery of the Alameda County Health Care Services Agency (ACHCSA) to modify and addend the March 6, 1992 TCR/WP.

- April 13, 1992 - Submitted to ACHCSA a letter titled April 9, 1992 Meeting Regarding Addenda to March 6, 1992 Workplan for Mrs. Mary Petsas, 16035 East 14th Street, San Leandro, CA 94578.

- April 14, 1992 - Aerated about 65 cyds of waste oil-contaminated soil stockpile. Collected 4 discrete samples for laboratory compositing and analyses according to landfill requirements for total petroleum hydrocarbons as motor oil (TPHMO), waste extraction test (WET) for California 17 metals, and Toxicity Characteristic Leaching Procedure (TCLP) for TPHG and BTEX.

- May 20, 1992 - Disposed of the waste oil-contaminated stockpiled soil at Vasco Road Sanitary Landfill located in Livermore, California.

Work conducted by TPE during the second quarter, 1993:

- April 8 and 13, 1993 - Filed well installation permits with the Alameda County Flood Control and Water Conservation District, Water Resources

Management Zone 7 and filed notices of intent with the California Department of Water Resources.

- April 16, 1993 - Drilled 3 soil borings for the construction of groundwater monitoring wells MW-1 through MW-3; collected soil samples at approximately 5-foot depth intervals, or less, in the vadose zone; sampled continuously through the saturated zone to profile the aquifer; converted the above soil borings into groundwater monitoring wells; and analyzed 1 vadose zone soil sample from each of the borings for wells MW-1 and MW-3 for TPHD, TPHG, BTEX and O&G; and for well MW-2 for TPHG and BTEX.

- April 21 and 22, 1993 - Surveyed top-of-casings (TOCs) to the nearest .01 foot above mean sea level (MSL) and developed each monitoring well.

- May 5, 1993 - Measured depth to stabilized groundwater in each well; calculated direction and gradient of groundwater flow; sampled each well; and analyzed groundwater samples from wells MW-1 and MW-3 for TPHD, TPHG, and BTEX; analyzed the groundwater sample from MW-2 and 1 trip blank sample for TPHG and BTEX.

- May 7, 1993 - Sampled wells MW-1 and MW-3 for analysis for O&G.

WORK CONDUCTED BY TPE DURING THE THIRD QUARTER, 1993:

- August 10, 1993 - Measured depth to stabilized groundwater in each well; calculated direction and gradient of groundwater flow; sampled each well; and analyzed groundwater samples from wells MW-1 and MW-3 for TPHD, TPHG, BTEX and O&G; analyzed the groundwater sample from MW-2 and 1 trip blank sample for TPHG and BTEX.

- August 13, 1993 - Submitted to the client a Preliminary Site Assessment Report that reviewed site history and documented overexcavation of contaminated soil, verification soil sampling, installation of 3 groundwater

monitoring wells, soil and groundwater sampling, results of chemical analyses, disposal of contaminated soil, groundwater gradient determination, excavation closure, and TPE's conclusions and recommendations.

Details of the work performed during the subject quarter are presented below.

Groundwater Gradient

On August 10, 1993, depth-to-groundwater was measured from TOC in wells MW-1, MW-2, and MW-3 to the nearest 0.01 foot using an electronic Solinst water level meter. A minimum of 3 repetitive measurements were made for each level determination to ensure accuracy. Depth-to-groundwater was subtracted from the TOC elevation, measured relative to MSL, to calculate the elevation of the stabilized water level for each well (see attached Table 1).

Attached Figure 1 is a groundwater gradient map constructed from the data collected on August 10, 1993. Groundwater flow direction on August 10, 1993 was to the northwest with a gradient of .0018 feet per foot. Attached Table 2 presents cumulative information for average groundwater elevations, changes in average groundwater elevations, groundwater flow directions, and groundwater gradients for the site.

Based on the above groundwater flow direction, wells MW-1 and MW-3 are downgradient and crossgradient of the former tank complex and well MW-2 is upgradient.

Groundwater Sampling and Analytical Results

On August 10, 1993, one groundwater sample was collected from each of the 3 groundwater monitoring wells for chemical analysis. Before sampling, each well was checked for floating product using a dedicated, disposable polyethylene bailer. Gasoline odors were noted in wells MW-1 and MW-3; however, no floating product or sheen was observed. Each well was purged a minimum of 3 wetted well volumes

with a dedicated polyethylene bailer and until the temperature, conductivity, and pH of the water in the well had stabilized. Slightly turbid (NTU = <200) water was purged from each of the 3 wells. Water samples were collected in laboratory provided, sterilized, 40-milliliter glass vials and/or 1-liter bottles having Teflon-lined screw caps; measured for turbidity; and labeled with project name, date, time collected, sample number, and sampler. The samples were immediately stored in an iced cooler for transport to California State Department of Health Services (DHS) certified Trace Analysis Laboratory, Inc., located in Hayward, California accompanied by chain-of-custody documentation.

Groundwater samples from wells MW-1 and MW-3 were analyzed for TPHD and TPHG by the DHS Method and for BTEX and O&G by Modified United States Environmental Protection Agency (EPA) Method 8020 and EPA Standard Method 5520 F, respectively. The groundwater sample from well MW-2 and 1 trip blank (sample MW-4) were analyzed for TPHG and BTEX.

Purge water is stored on site in 55-gallon drums labeled to show material stored, known or suspected contaminant, date filled, expected removal date, company name, contact, and telephone number.

See attached protocols for TPE's sample handling, groundwater sampling, and quality assurance and quality control procedures.

TPHD, TPHG, and ethylbenzene were detected in wells MW-1 and MW-3 at concentrations of 640 parts per billion (ppb), 540 ppb, 79 ppb and 160 ppb, 53 ppb, and 0.73 ppb, respectively. Benzene and xylenes were also detected in well MW-1 at concentrations of 37 ppb and 8.9 ppb, respectively. TPHG and BTEX were not detected in well MW-2 and the trip blank (MW-4).

Analytical results are summarized in attached Table 3 and documented in an attached certified analytical report and a chain-of-custody.

DISCUSSION AND RECOMMENDATIONS

Results of groundwater analyses indicate the presence of a groundwater plume beneath the site. TPHD, TPHG, and ethylbenzene were detected in wells MW-1 and MW-3. Benzene and xylenes were also detected in well MW-1. TPHG and BTEX were not detected in well MW-2. Future groundwater sampling of this well will verify if possible off-site contaminants are moving onto the site from an upgradient source.

The groundwater gradient was to the northwest which is consistent with the previous sampling event on May 5, 1993.

TPE recommends quarterly groundwater sampling and quarterly gradient determinations of the 3 groundwater monitoring wells for a period of 1 year to establish a trend of groundwater quality and gradient beneath the site. TPE recommends that groundwater samples from wells MW-1 and MW-3 be analyzed for TPHD, TPHG, BTEX, and O&G and groundwater samples from well MW-2 be analyzed for TPHG and BTEX only. This sampling scheme conforms with the letter dated April 13, 1992 April 9, 1992 Meeting Regarding Addenda to March 6, 1992 Workplan for Mrs. Mary Petsas, 16035 East 14th Street, San Leandro, CA 94578.

An additional 2 copies of this report have been included for your delivery to:

Mr. Scott O. Seery
Alameda County Health Agency
Division of Hazardous Materials
Department of Environmental Health
80 Swan Way, Room 350
Oakland, California, 94621

California Regional Water Quality
Control Board - San Francisco Bay Region
Toxic Cleanup Division
2101 Webster Street, Suite 500
Oakland, CA 94612

TPE recommends that this quarterly report be submitted with a cover letter from Mrs. Mary Petsas.

If you have any questions, please call TPE at (510) 429-8088.

Sincerely,

John Mrakovich
Registered Geologist

Jeff Farhoomand
Civil Engineer

TABLE 1
GROUNDWATER ELEVATION

Well Name	Date	Elevation TOC[1] (feet MSL[2])	Depth-to-Water From TOC (feet)	Groundwater Elevation (feet MSL)
MW-1	04/19/93	32.72	6.82	25.90
	05/05/93		7.04	25.68
	08/10/93		7.40	25.32
MW-2	04/19/93	32.40	6.42	25.98
	05/05/93		6.62	25.78
	08/10/93		6.99	25.41
MW-3	04/19/93	32.56	6.58	25.98
	05/05/93		6.82	25.74
	08/10/93		7.23	25.33

[1] TOP OF CASING

[2] MEAN SEA LEVEL

TABLE 2
GROUNDWATER ELEVATION AND GRADIENT DATA

Date	Average Groundwater Elevation (feet MSL[1])	Change in Average Groundwater Elevation (feet)	Groundwater Gradient	Flow Direction
04/19/93	25.95		0.0031	N
05/05/93	25.73	-0.22	0.0025	NW
08/10/93	25.35	-0.38	0.0018	NW

[1] MEAN SEA LEVEL

TABLE 3
SUMMARY OF GROUNDWATER SAMPLE ANALYTICAL RESULTS
(ppb[1])

Sample ID Name	Date	TPHD	TPHG	Benzene	Toluene	Ethyl-Benzene	Xylenes	Oil & Grease
MW-1	05/05/93	460	720	54	<1.5	19	13	<1,000[2]
	08/10/93	640	540	37	<0.50	79	8.9	<1,000
MW-2	05/05/93	NA[3]	<50	47	<0.50	<0.87	<1.5	NA
	08/10/93	NA	<50	<0.50	<0.50	<0.50	<1.5	NA
MW-3	05/05/93	130	73	22	<0.50	<0.87	<1.5	<1,000[2]
	08/10/93	160	53	<0.50	<0.50	0.73	<1.5	<1,000
MW-4[4]	05/05/93	NA	<50	<0.50	<0.50	<0.50	<1.5	NA
	08/10/93	NA	<50	<0.50	<0.50	<0.50	<1.5	NA

[1] PARTS PER BILLION

[2] WELL SAMPLED ON 5/7/93

[3] NOT ANALYZED

[4] TRIP BLANK

Trace Analysis Laboratory, Inc.
3423 Investment Boulevard, #8 • Hayward, California 94545
Telephone (510) 783-6960
Facsimile (510) 783-1512

TAL

August 17, 1993

Mr. Marc Zomorodi
Tank Protect Engineering
2821 Whipple Road
Union City, CA 94587

Dear Mr. Zomorodi:

Trace Analysis Laboratory received four water samples on August 10, 1993 for your Project No. 218C081093, Petsas (our custody log number 3510).

These samples were analyzed for Total Petroleum Hydrocarbons as Diesel and Gasoline, Benzene, Toluene, Ethylbenzene and Xylenes and Oil and Grease. Our analytical report and the completed chain of custody form are enclosed for your review.

Trace Analysis Laboratory is certified under the California Environmental Laboratory Accreditation Program. Our certification number is 1199.

If you should have any questions or require additional information, please call me.

Sincerely yours,

Scott T. Ferriman

Scott T. Ferriman
Project Specialist

Enclosures

Trace Analysis Laboratory, Inc.
3423 Investment Boulevard, #8 • Hayward, California 94545
Telephone (510) 783-6960
Facsimile (510) 783-1512

TAL

LOG NUMBER: 3510
DATE SAMPLED: 08/10/93
DATE RECEIVED: 08/10/93
DATE ANALYZED: 08/11/93
DATE REPORTED: 08/17/93

CUSTOMER: Tank Protect Engineering

REQUESTER: Marc Zomorodi

PROJECT: No. 218C081093, Petsas, 16035 E. 14th Street

Sample Type: Water

Method and Constituent:	Units	MW-1 Concentration	MW-1 Reporting Limit	MW-2 Concentration	MW-2 Reporting Limit	MW-3 Concentration	MW-3 Reporting Limit
DHS Method:							
Total Petroleum Hydrocarbons as Gasoline	ug/l	540	50	ND	50	53	50
Modified EPA Method 8020 for:							
Benzene	ug/l	37	0.50	ND	0.50	ND	0.50
Toluene	ug/l	ND	0.50	ND	0.50	ND	0.50
Ethylbenzene	ug/l	79	0.50	ND	0.50	0.73	0.50
Xylenes	ug/l	8.9	1.5	ND	1.5	ND	1.5

Method and Constituent:	Units	MW-4 Concentration	MW-4 Reporting Limit	Method Blank Concentration	Method Blank Reporting Limit
DHS Method:					
Total Petroleum Hydrocarbons as Gasoline	ug/l	ND	50	ND	50
Modified EPA Method 8020 for:					
Benzene	ug/l	ND	0.50	ND	0.50
Toluene	ug/l	ND	0.50	ND	0.50
Ethylbenzene	ug/l	ND	0.50	ND	0.50
Xylenes	ug/l	ND	1.5	ND	1.5

QC Summary:

% Recovery: 86
% RPD: 36

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 3510
DATE SAMPLED: 08/10/93
DATE RECEIVED: 08/10/93
DATE EXTRACTED: 08/11/93
DATE ANALYZED: 08/14/93
DATE REPORTED: 08/17/93
PAGE: Two

Sample Type: Water

Method and Constituent:	Units	MW-1 Concentration	MW-1 Reporting Limit	MW-3 Concentration	MW-3 Reporting Limit	Method Blank Concentration	Method Blank Reporting Limit
DHS Method:							
Total Petroleum Hydrocarbons as Diesel	ug/l	640	50	160	50	ND	50

QC Summary:

% Recovery: 104
% RPD: 12

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 3510
DATE SAMPLED: 08/10/93
DATE RECEIVED: 08/10/93
DATE EXTRACTED: 08/13/93
DATE ANALYZED: 08/16/93
DATE REPORTED: 08/17/93
PAGE: Three

Sample Type: Water

Method and Constituent:	Units	MW-1 Concentration	MW-1 Reporting Limit	MW-3 Concentration	MW-3 Reporting Limit	Method Blank Concentration	Method Blank Reporting Limit
Standard Method 5520 F Hydrocarbons:							
Oil and Grease	ug/l	ND	1,000	ND	1,000	ND	1,000

QC Summary:

% Recovery: 84
% RPD: 2.9

Concentrations reported as ND were not detected at or above the reporting limit.

Louis W. DuPuis
Quality Assurance/Quality Control Manager

TANK PROTECT ENGINEERING
2021 WHIPPLE ROAD
UNION CITY, CA 94587
(415)429-8088
(800)523-8088
FAX(415)429-8089

3510

LAB: TAL

TURNAROUND: normal

P.O. #: 1072

PAGE 1 OF 1

CHAIN OF CUSTODY

PROJECT NO.: 218C081093

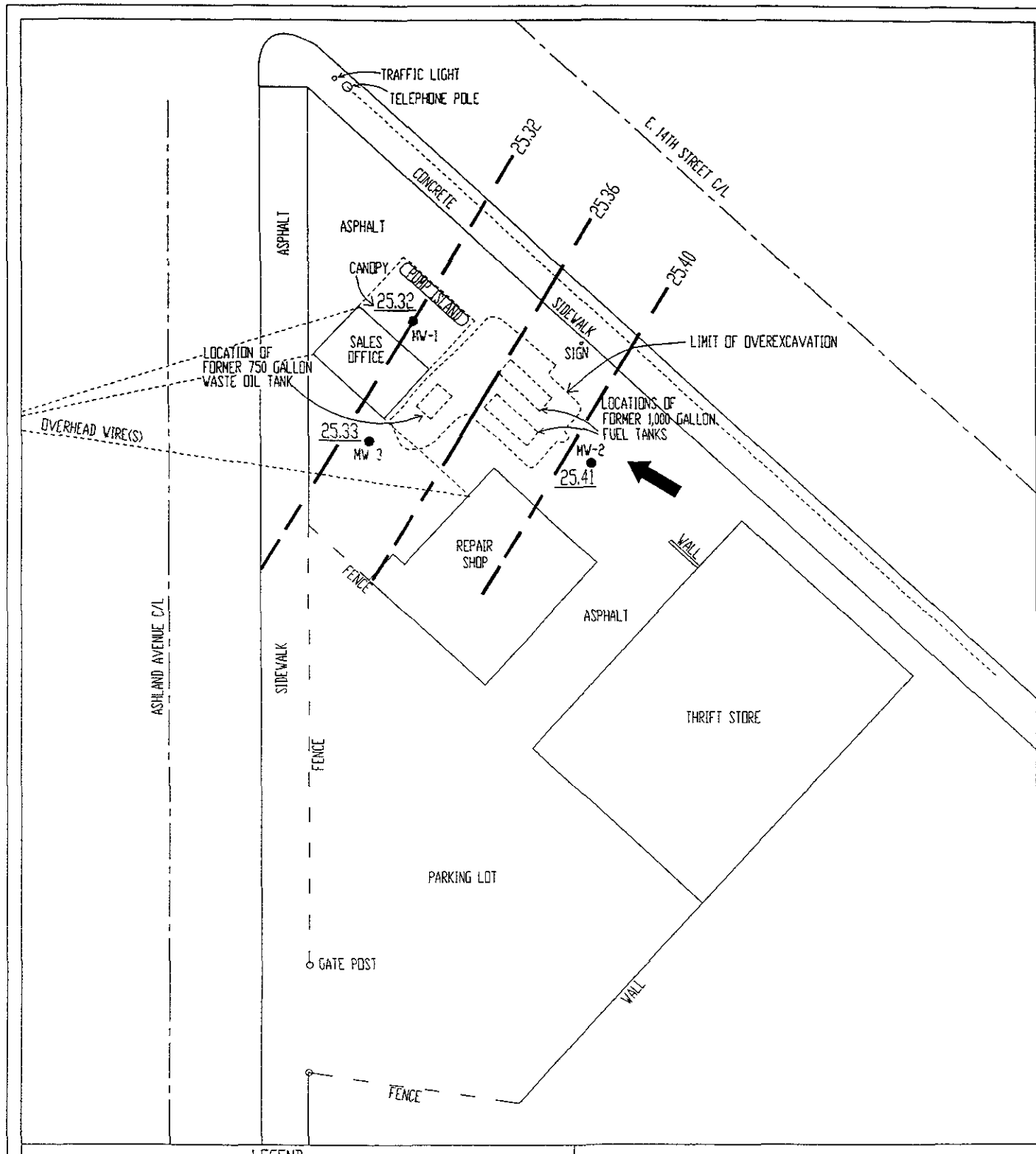
SITE NAME & ADDRESS: Petsas 16035 E 14th Street

SAMPLER NAME, ADDRESS AND TELEPHONE NUMBER: Lee Huckins, 2821 WHIPPLE ROAD, UNION CITY, CA 94587 (415) 429-8088

ID NO.	DATE	TIME	SOIL	WATER	SAMPLING LOCATION	(1) TYPE OF CONTAINER	TOTAL LIGHT HC	AROMATIC HC (BTX)	TOTAL HEAVY HC	OIL & GREASE	VOC SCAN (624's)	OTHER	REMARKS
MW-1	8/10	1220		X		2 Liters 40ml	X	X	X	X			O&G 5520-F
MW-2	8/10	1025		X		40ml vials	X	X					
MW-3	8/10	1125		X		2 Liters 40ml	X	X	X	X			O&G 5520-F
[redacted]													
MW-4	8/10	1225		X		40ml vials	X	X					

Relinquished by : (Signature)	Date / Time	Received by : (Signature)	Relinquished by : (Signature)	Date / Time	Received by : (Signature)
Lee Huckins	8/10/93 4:00	[signature]	[signature]	8/10/93 4:33	
		Received for Laboratory by: [Signature] TAL	Date / Time 8/10/93 4:33	Remarks: Pu water, 4 L, 2-HCl & VOAs HCl white, 5-Day .SF	

DATE: _____



TANK PROTECT ENGINEERING

SITE DETAIL
GROUNDWATER GRADIENT MAP (8/10/93)

16035 EAST 14TH STREET
SAN LEANDRO, CA 94578

DATE	8/10/93
FIGURE	1
FILE #	218-8
DRAWN BY	LNH
CHECKED BY	JVM

SAMPLE HANDLING PROCEDURES

Soil and groundwater samples will be packaged carefully to avoid breakage or contamination, and will be delivered to the laboratory in an iced-cooler. The following sample packaging requirements will be followed.

- Sample bottle/sleeve lids will not be mixed. All sample lids will stay with the original containers and have custody seals affixed to them.

- Samples will be secured in coolers to maintain custody, control temperature, and prevent breakage during transportation to the laboratory.

- A chain-of-custody form will be completed for all samples and accompany the sample cooler to the laboratory.

- Ice, blue ice, or dry ice (dry ice will be used for preserving soil samples collected for the Alameda County Water District) will be used to cool samples during transport to the laboratory.

- Each sample will be identified by affixing a pressure sensitive, gummed label, or standardized tag on the container(s). This label will contain the site identification, sample identification number, date and time of sample collection, and the collector's initials.

- Soil samples collected in brass tubes will be preserved by covering the ends with Teflon tape and capped with plastic end-caps. The tubes will be labeled, sealed in quart size bags, and placed in an iced-cooler for transport to the laboratory.

All groundwater sample containers will be precleaned and will be obtained from a State Department of Health Services certified analytical laboratory.

Sample Control/Chain-of-Custody: All field personnel will refer to this workplan to verify the methods to be employed during sample collection. All sample gathering activities will be recorded in the site file; all sample transfers will be documented in the chain-of-custody; samples are to be identified with labels and all sample bottles are to be custody-sealed. All information is to be recorded in waterproof ink. All TPE field personnel are personally responsible for sample collection and the care and custody of collected samples until the samples are transferred or properly dispatched.

The custody record will be completed by the field technician or professional who has been designated by the TPE project manager as being responsible for sample shipment to the appropriate laboratory. The custody record will include, among other things, the following information: site identification, name of person collecting the samples, date and time samples were collected, type of sampling conducted (composite/grab), location of sampling station, number and type of containers used, and signature of the TPE person relinquishing samples to a non-TPE person with the date and time of transfer noted. The relinquishing individual will also put all the specific shipping data on the custody record.

Records will be maintained by a designated TPE field employee for each sample, site identification, sampling locations, station numbers, dates, times, sampler's name, designation of the samples as a grab or composite, notation of the type of sample (e.g. groundwater, soil boring, etc.), preservatives used, on-site measurement data, and other observations or remarks.

GROUNDWATER MONITORING WELL SAMPLING PROCEDURES

Groundwater monitoring wells will not be sampled until at least 72 hours after well development. Groundwater samples will be obtained using either a bladder pump, clear Teflon bailer, or dedicated polyethylene bailer. Prior to collecting samples, the sampling equipment will be thoroughly decontaminated to prevent introduction of contaminants into the well and to avoid cross-contamination. Monitoring wells will be sampled after 3 to 10 wetted casing volumes of groundwater have been evacuated and pH, electrical conductivity, and temperature have stabilized as measured with a Hydac Digital Tester. If the well is emptied before 3 to 10 well volumes are removed, the sample will be taken when the water level in the well recovers to 80% of its initial water level or more.

When a water sample is collected, turbidity of the water will be measured and recorded with a digital turbidimeter. Degree of turbidity will be measured and recorded in nephelometric turbidity units (NTU).

TPE will also measure the thickness of any floating product in the monitoring wells using a probe, clear Teflon, or polyethylene bailer. The floating product will be measured after well development but prior to the collection of groundwater samples. If floating product is present in the well, TPE will recommend to the client that product removal be commenced immediately and reported to the appropriate regulatory agency.

Unless specifically waived or changed by the local, prevailing regulatory agency, water samples shall be handled and preserved according to the latest EPA methods as described in the Federal Register (Volume 44, No.233, Page 69544, Table ll) for the type of analysis to be performed.

Development and/or purge water will be stored on site in labeled containers. The disposal of the containers and development and/or purge water is the responsibility of the client.

MEASUREMENTS

Purged Water Parameter: During purging, discharged water will be measured for the following parameters.

Parameter	Units of Measurement
pH	None
Electrical Conductivity	Micromhos
Temperature	Degrees F or C
Depth to Water	Feet/Tenths
Volume of Water Discharged	Gallons
Turbidity	NTU

Documentation: All parameter measurements shall be documented in writing on TPE development logs.

QUALITY ASSURANCE AND QUALITY CONTROL PROCEDURES

The overall objectives of the field sampling program include generation of reliable data that will support development of a remedial action plan. Sample quality will be checked by the use of proper sampling, handling, and testing methods. Additional sample quality control methods may include the use of background samples, equipment rinsate samples, and trip and field blanks. Chain-of-custody forms, use of a qualified laboratory, acceptable detection limits, and proper sample preservation and holding times also provide assurance of accurate analytical data.

TPE will follow a QA/QC program in the field to ensure that all samples collected and field measurements taken are representative of actual field and environmental conditions and that data obtained are accurate and reproducible. These activities and laboratory QA/QC procedures are described below.

Field Samples: Additional samples may be taken in the field to evaluate both sampling and analytical methods. Three basic categories of QA/QC samples that may be collected are trip samples, field blanks, and duplicate samples.

Trip blanks are a check for cross-contamination during sample collection, shipment, and in the laboratory. Analytically confirmed organic-free water shall be used for organic parameters and deionized water for metal parameters. Blanks will be prepared by the laboratory supplying the sample containers. The blank shall be numbered, packaged, and sealed in the same manner as the other samples. One trip blank will be used for each sample set of less than 20 samples. At least 5% blanks will be used for sets greater than 20 samples. The trip blank is a water sample that remains with the collected samples during transportation and is analyzed along with the field samples to check for residual contamination. The trip blank is not to be opened by either the sample collectors or the handlers.

The field blank is a water sample that is taken into the field and is opened and exposed at the sampling point to detect contamination from air exposure. The water sample is poured into appropriate containers to simulate actual sampling conditions. Contamination for air exposure can vary considerably from site to site.

The laboratory will not be informed about the presence of field and trip blanks and a false identifying number will be put on the label. Full documentation of these collection and decoy procedure will be made in the site log book.

Duplicate samples are identical sample pairs (collected in the same place and at the same time), placed in identical containers. For soils, adjacent sample liners will be analyzed. For the purpose of data reporting, one is arbitrarily designated the sample, and the other is designated as a duplicate sample. Both sets of results are reported to give an indication of the precision of sampling and analytical methods.

The laboratory's precision will be assessed without the laboratory's knowledge by labeling one of the duplicates with false identifying information. Data quality will be evaluated on the basis of the duplicate results.

Laboratory QA/QC: Execution of a strict QA/QC program is an essential ingredient in high-quality analytical results. By using accredited laboratory techniques and analytical procedures, estimates of the experimental values can be very close to the actual value of the environmental sample. The experimental value is monitored for its precision and accuracy by performing QC test designed to measure the amount of random and systematic errors and to signal when correction of these errors is needed.

The QA/QC program describes methods for performing QC tests. These methods involve analyzing method blanks, calibration standards, check standards (both independent and EPA-certified standards), duplicates, replicates, and sample spikes. Internal QC also requires adherence to written methods, procedural documentation, and record keeping, and the observance of good laboratory practices.