BP OIL

BP Oil Company
16400 Southcenter Parkway, Suite 301
Tukwila, Washington 98188
(206) 575-4077

STID 1771

February 4, 1993

Alameda County Health Agency
Ms. Susan Hugo
Division of Hazardous Materials
80 Swan Way, Room 350
Oakland, CA 94621

RE: BP OIL FACILITY #11270
3255 McCartney Road
Alameda, CA

Attached please find our **PRELIMINARY SITE ASSESSMENT REPORT AND UNDERGROUND STORAGE TANK UNAUTHORIZED RELEASE (LEAK) CONTAMINATION SITE REPORT** for the above referenced facility.

Please call me at (206) 394-5243 with questions regarding this submission.

Respectfully,

Pauline Reith
Environmental Professional

PR:jc ERM11270UST

cc: Mr. Markus Niebanck, 2363 Mariner Square Dr., Suite 243
Alameda, CA 194501

Site file

HYDRO
ENVIRONMENTAL
TECHNOLOGIES, INC.

PRELIMINARY SITE ASSESSMENT REPORT

BP Oil Company, U.S.A.
BP Oil Service Station No. 11270
3255 McCartney Road
Alameda, California

Prepared for:

BP OIL COMPANY
Northwest Division
Southcenter Place Building
16400 Southcenter Parkway - Suite 301
Tukwila, Washington 98188

Prepared by:

HYDRO-ENVIRONMENTAL TECHNOLOGIES, INC.
2363 Mariner Square Drive, Suite 243
Alameda, California 94501
HETI Job No. 9-042

January 7, 1993

HYDRO
ENVIRONMENTAL
TECHNOLOGIES, INC.

CERTIFICATION

This report was prepared under the supervision of a registered professional engineer. All statements, conclusions and recommendations are based solely upon field observations and analytical analyses performed by a state-certified laboratory related to work performed by Hydro-Environmental Technologies, Inc.

It is possible that variations in soil or ground water conditions exist beyond the points explored in this investigation. Also, site conditions are subject to change at some time in the future due variations in rainfall, temperature, regional water usage, or other factors.

The service performed by Hydro-Environmental Technologies, Inc. has been conducted in a manner consistent with the level of care and skill ordinarily exercised by members of our profession currently practicing under similar conditions in the area of the site. No other warranty, expressed or implied, is made.

Hydro-Environmental Technologies, Inc. includes in this report chemical analytical data from a state-certified laboratory. These analyses are performed according to procedures suggested by the U.S. EPA and the State of California. Hydro-Environmental Technologies, Inc. is not responsible for laboratory errors in procedure or result reporting.

Please note that contamination of soil and ground water contamination must be reported to the appropriate agencies in a timely manner.

HYDRO-ENVIRONMENTAL TECHNOLOGIES, INC.

Prepared by:

Henry A. Hurkmans
Staff Geologist

Reviewed by:

Markus B. Niebanck
Western Regional Manager

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1.0 INTRODUCTION

BP Oil Company retained Hydro-Environmental Technologies, Inc. (HETI) in August 1992 to conduct a preliminary environmental site assessment at BP Oil Service Station No. 11270, located at 3255 McCartney Road in Alameda, California. The site location map is presented as Figure 1.

1.1 Purpose and Scope

This preliminary site investigation work was performed to assess the nature and extent of petroleum hydrocarbons in the subsurface soil and/or ground water at the site, if any, and to determine the appropriate courses of action to comply with applicable laws and regulations.

The tasks performed under this preliminary assessment study included the following:

- Conduct a sensitive receptors survey including existing well search
- Survey monitoring wells and collect ground water samples for laboratory analysis of specified hydrocarbon constituents
- Analyze data/results and prepare a report presenting the findings of the preliminary assessment.

1.2 Site Location and Description

BP Oil Service Station No. 11270 is located on an out parcel of the Harbor Bay Landing shopping mall. The site is presently an operating service station with three underground gasoline storage tanks and one underground used oil tank. Figure 2 shows the layout of the site and the location of existing underground storage tanks and dispenser islands.

1.3 Sensitive Receptor Survey

A sensitive receptor survey and existing well search were performed to identify nearby environmental elements and land uses that may be affected by the existing BP Oil site or affect the subsurface conditions at the site. A copy of the completed sensitive receptor survey form and the results of the well survey are presented in Appendix A.

2.0 FIELD METHODS

The procedures and methods used during field activities are discussed below, and a description of the sampling procedures is presented in Appendix B.

2.1 Ground Water Level Monitoring and Well Surveying

Top of casing elevations of pre-existing former Mobil monitoring wells were surveyed relative to a temporary benchmark. An elevation of 15 feet above mean sea level was assumed for the temporary benchmark. Ground water gauging was conducted on October 29, 1992, using an interface probe. The depth, from the top of the well casing, to ground water in the wells was measured to the nearest 0.01 foot. A summary of ground water gauging information is presented in the Water Table Elevation Data sheet included in Appendix A. The graphical interpretation of the ground water gradient beneath the site is presented in Figure 3.

2.2 Monitoring Well Sampling

All monitoring wells were sampled on October 29, 1992. Prior to sampling, each well was first observed for the presence or absence of free floating product. The wells were purged of at least three well casing volumes or until dry, using a 2-inch PVC bailer.

During purging and prior to sample collection, pH, specific conductivity, and temperature were measured as indicators of the entrance of formation water into the well. Field observations during well sampling are presented in the purge/sample sheets included in Appendix C.

Ground water samples were collected in accordance with guidelines established by the lead regulatory agencies and consistent with HETI standard protocols (Appendix B). All samples were transported in a cooler to a State-certified laboratory following the proper chain-of -custody procedures.

3.0 ANALYTICAL METHODS

All laboratory analyses of ground water samples were performed by PACE Laboratory of Novato, California, a California-certified analytical laboratory, using standard test methods of the U.S. Environmental Protection Agency (EPA) and the California Department of Health Services (DHS).

All ground water samples were analyzed for the following constituents:

- Total petroleum hydrocarbons as gasoline (TPHg) using EPA Methods 8015
- Benzene, toluene, ethylbenzene, and total xylenes (BTEX) constituents using EPA Methods 8020

Ground water samples collected from MW-2, the closest samplable monitoring well to the used oil tank, were additionally analyzed for:

- Total petroleum hydrocarbons as diesel (TPHd) using EPA Methods 3550/8015.
- Total oil and grease (TOG) using Standard Method 5520.
- Halogenated volatile organic (HVO) compounds using EPA Method 8010.

Metals ?
8270 ?

The results of the laboratory analyses of ground water samples are summarized in Table 1, and illustrated on the TPHg, TPHd & BTEX Concentration Map. The official laboratory reports and chain of custody records are included in Appendix D.

4.0 DISCUSSION OF RESULTS

The results of the field activities and laboratory analyses of ground water samples collected during this preliminary investigation are discussed below.

- Four pre-existing former Mobil monitoring wells are present on-site.
- Three pre-existing recently installed (by Harbor Bay Landing) monitoring wells are present off-site. Because it was not in the scope of work, information about these off-site wells was not obtained.
- No new soil borings or monitoring well installations were attempted
- Ground water exist beneath the site approximately 7 feet below grade.

- Groundwater elevation data indicate a gradient of approximately 0.11 ft/ft in a general west direction across the site. However, this is considered anomalously steep considering the flatness of the local surface topography. Due to age and outdated construction of the wells, silting of MW-1 and MW-3 probably has decreased their hydraulic connection to the site ground water. Actual ground water levels at the site can still be measured accurately in MW-2 and MW-3, both had identical ground water elevations and exhibited good recharge during purging.

- A free product sheen was observed on the purge water from all the monitoring wells.

- Ground water samples were collected from monitoring wells MW-2 and MW-4. Insufficient recharge following purging of MW-1 and MW-3 precluded collection of representative ground water samples from these wells.

- Concentrations of TPHg in water samples collected from MW-2 and MW-4 were 2,500 and 2,600 parts per billion (ppb), respectively. Concentrations of benzene in water samples collected from MW-2 and MW-4 were 140 and 250 ppb, respectively (see Table 1 for complete analytical results).

- Water samples collected from MW-2 did not contain detectable concentrations of HVO. TPHd was detected in the water sample collected from MW-2 in a concentration of 3,900 ppb. TOG was detected in the water sample collected from MW-2, but TOG concentration quantification could not be made by the laboratory because of procedure difficulties.

Table 1

GROUND WATER SAMPLES
SUMMARY OF ANALYTICAL RESULTS

BP Service Station No. 11270
3255 McCartney Road
Alameda, California

Well Number	TPHg (ppb)	TPHd (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	HVO (ppb)	TOG (ppb)
MW-1	NS	NS	NS	NS	NS	NS	NS	NS
MW-2	2,500	3,900	140	ND	65	22	ND	P
MW-3	NS	NS	NS	NS	NS	NS	NS	NS
MW-4	2,600	NT	250	2.5	74	6.6	NT	NT
MDL/MW-2	1,000	50	10	10	10	10	0.5-2.0	5,000
MDL/MW-4	100	NT	1.0	1.0	1.0	1.0	NT	NT

TPHg = Total petroleum hydrocarbons as gasoline by EPA Method 8015

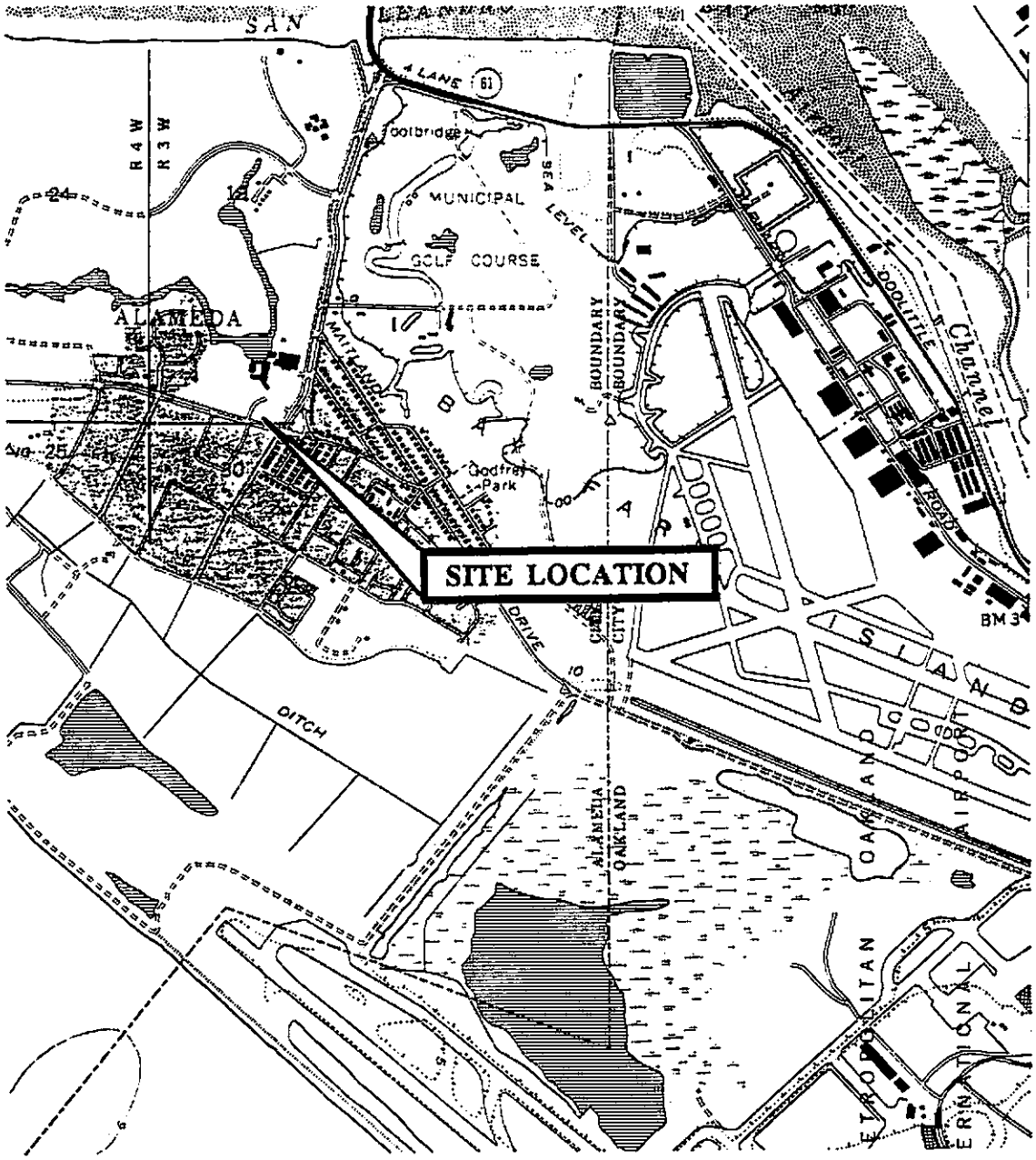
TPHd = Total petroleum hydrocarbons as diesel by EPA Method 8015

B = Benzene
T = Toluene
E = Ethylbenzene
X = Total Xylenes BTEX by EPA Method 8020

HVO = Halogenated volatile organics by EPA Method 8010
TOG = Total oil and grease by Standard Method 5520

NS = Not sampled because of inadequate well recharge
NT = Not tested
ND = Not detected in concentrations exceeding laboratory method detection limits
P = Positive result for analyte, but lab unable to quantitate (procedure difficulties)

MDL/MW-2 = Method detection limits for MW-2 water sample analyses
MDL/MW-4 = Method detection limits for MW-4 water sample analyses

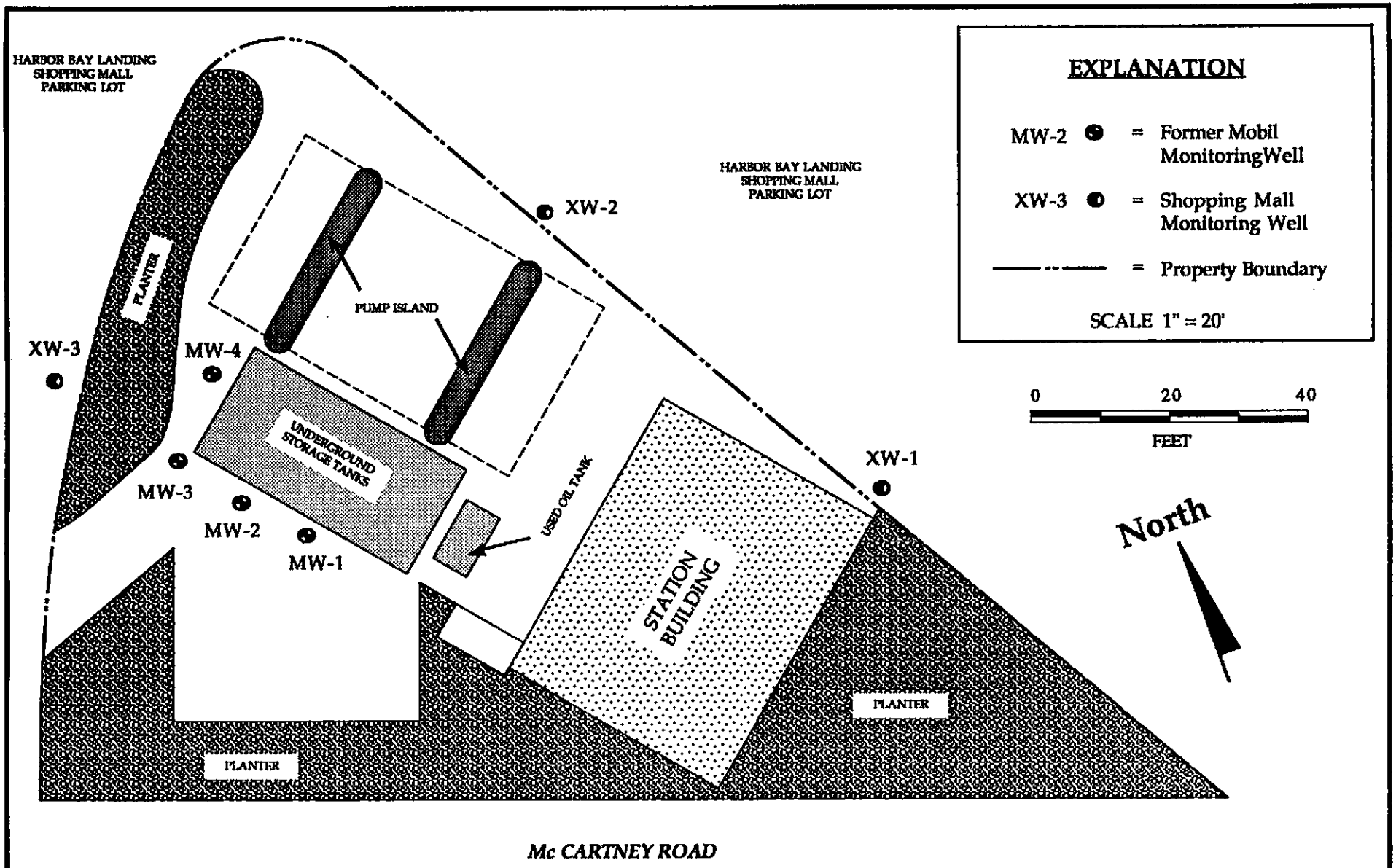


North

SOURCE:
USGS QUADRANGLE, 7.5 MINUTE SERIES
ENTITLED "SAN LEANDRO, CA"
SCALE 1: 24 000

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 5 0 1 KILOMETER

HYDRO ENVIRONMENTAL TECHNOLOGIES, INC.	**Site Location Map** BP Service Station No. 11270 3255 McCartney Road Alameda, California	Job No. 9-042 Figure 1

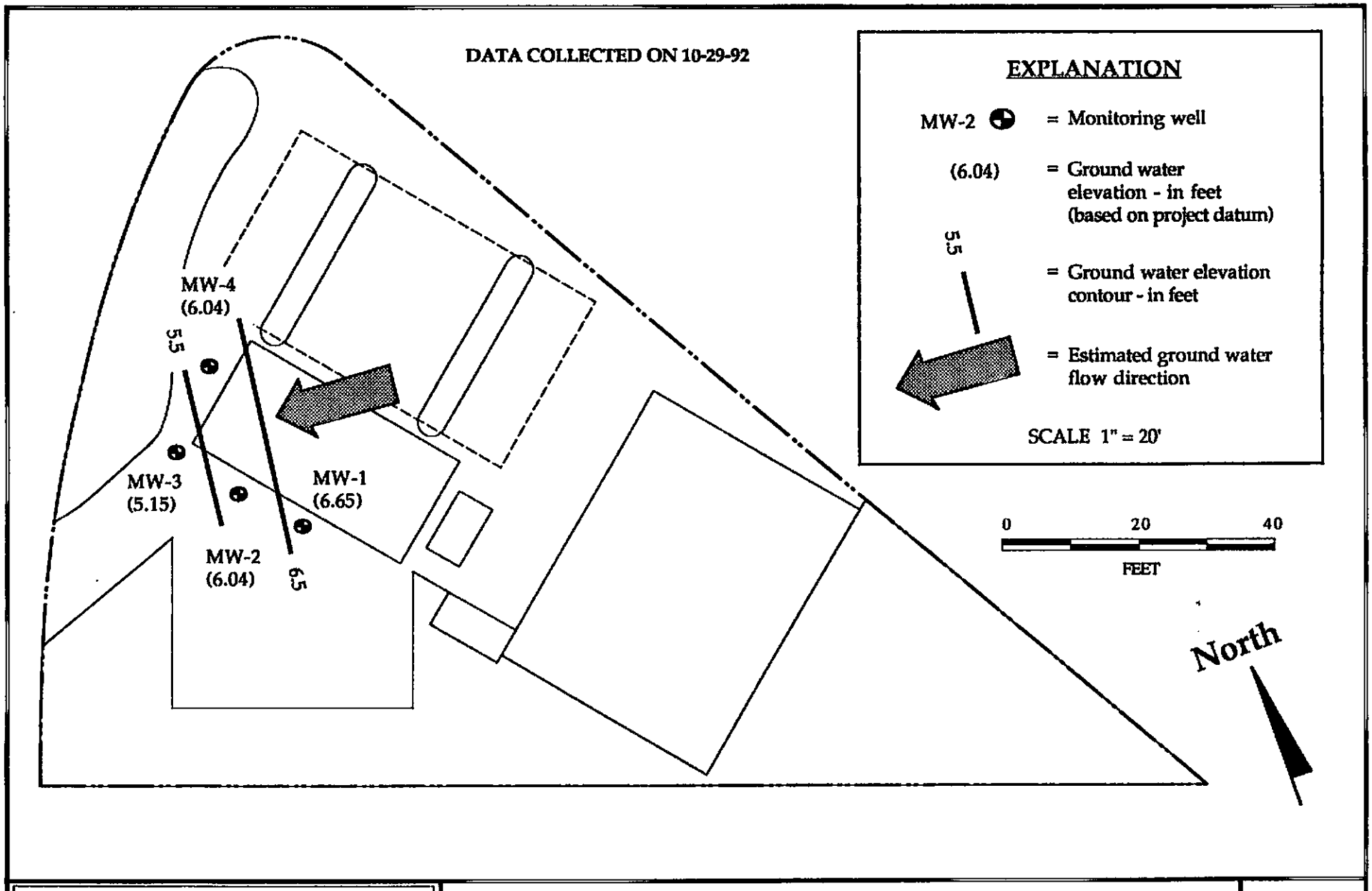


HYDRO-ENVIRONMENTAL TECHNOLOGIES, INC.

SITE PLAN

BP Service Station No. 11270
3255 Mc Cartney Road
Alameda, California

Job No. 9-042
Figure 2

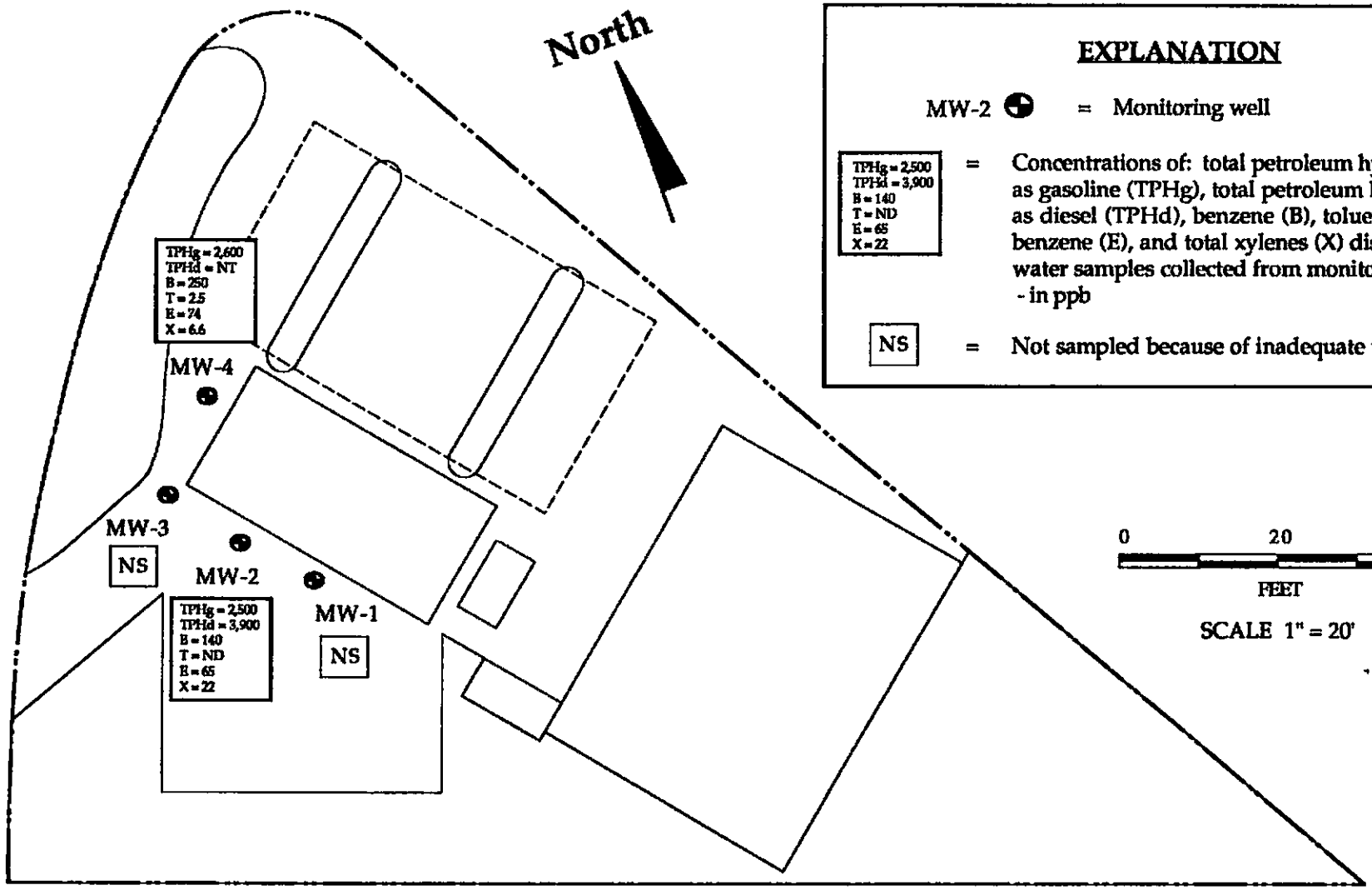


HYDRO-ENVIRONMENTAL TECHNOLOGIES, INC.

GROUND WATER CONTOUR MAP

BP Service Station No. 11270
3255 Mc Cartney Road
Alameda, California

Job No. 9-042
Figure 3



EXPLANATION

MW-2 = Monitoring well

TPHg = 2,500
TPHd = 3,900
B = 140
T = ND
E = 65
X = 22
= Concentrations of: total petroleum hydrocarbons as gasoline (TPHg), total petroleum hydrocarbons as diesel (TPHd), benzene (B), toluene (T), ethyl-benzene (E), and total xylenes (X) dissolved in water samples collected from monitoring well - in ppb

NS = Not sampled because of inadequate well recharge

GROUND WATER SAMPLES COLLECTED ON 10-29-92

HYDRO-ENVIRONMENTAL TECHNOLOGIES, INC.

TPHg, TPHd & BTEX CONCENTRATION MAP

BP Service Station No. 11270
3255 Mc Cartney Road
Alameda, California

Job No. 9-042
Figure 4

APPENDIX A

239 1970

SENSITIVE RECEPTORS SURVEY
Site Survey and Literature Research

Store No: 11270
Location: 3255 McCartney Rd.
City/State Alameda, CA

I. Provide answers to the following questions:

a. Is a public water supply well within 2500 ft? (y/n)
If yes, Distance (ft)_____

b. Is a private water supply well within 1000 ft? (y/n)
If yes, Distance (ft)_____

c. Is a subway within 1000 ft? (y/n)
If yes, Distance (ft)_____

d. Is a basement within 1000 ft? (y/n)
If yes, Distance (ft)_____

e. Is a School within 1000 ft? (y/n)
If yes, Distance (ft)_____

f. Is a surface body of water within 1000 ft? (y/n)
If yes, Distance (ft) 500

II. Describe type of local water supply:

Public
*Supplier's Name East Bay Municipal District 891-0615
*Supplier's Source American/Mokulumne River - Folsom
*Distance to Site 90 mi
Private _____

III. Aquifer Classification, if available:

_____ Class I: Special Ground Waters
Irreplaceable Drinking Water Sources
N/A Ecologically Vital

_____ Class II: Current and Potential Drinking Water

_____ Class III: Not Potential Source of Drinking Water

IV. Describe observation wells, if any:

Number 4
Free Product _____ (y/n)

V. Signature of Preparer Henry Hurdmans Date 11-4-92

APPENDIX B

HYDRO-ENVIRONMENTAL TECHNOLOGIES, INC.
CALIFORNIA

DRILLING
WELL CONSTRUCTION
AND
SAMPLING PROTOCOLS

November 1992

DRILLING, WELL CONSTRUCTION, AND SAMPLING PROTOCOLS

Drilling Protocol

Prior to any drilling activities, Hydro-Environmental Technologies, Inc. (HETI) will verify that necessary drilling permits have been secured.

Prior to drilling, underground and above ground utilities will be located using Underground Service Alert (USA) and site reconnaissance. To the extent possible, drilling will be conducted so that disruptions of normal business activities at the project site are minimized. HETI shall obtain and review available public data on subsurface geology and, if warranted, the location of wells within a quarter mile of the project site will be identified. Drilling equipment will be inspected for suitability and integrity prior to performing work.

Subsurface investigations are typically performed to assess the lateral and vertical extent of petroleum hydrocarbons or other contaminants which may be present in soils and groundwater. Drilling methods will be selected to optimize field data requirements and to be compatible with known or suspected subsurface geologic conditions.

Shallow soil borings will be drilled dry using a truck-mounted hollow-stem auger drilling rig, unless site conditions favor a different drilling method. Drilling and sampling methods will be consistent with ASTM Method D-1452-80. The auger size will be a minimum of 3-inches nominal outside diameter (O.D.) for borings not to be completed as wells. The auger size will be a minimum of 8-inches nominal O.D. for borings to be completed as wells. No drilling fluids will be used during this drilling method. All augers and drill rods will initially be thoroughly steam cleaned before arriving on-site, to prevent the introduction of contaminants from off-site, and augers and drill rods which are used will be steam cleaned between borings away from boring locations. Working components of the drilling rig (subs, collars and all parts of the rig chassis near the borehole) will also be steam cleaned. Cleaned augers, rods and other tools, if required, will be stored and covered when not in use. Decontamination of drilling equipment will consist of steam cleaning, and/or trisodium phosphate wash. Cleaning operations will be observed and supervised by a representative of HETI. The drilling rig will also be inspected by a representative of HETI to ensure that no fluids (hydraulic or lubricant) are leaking from the equipment.

Soil Sampling Protocol

Soil samples are typically collected at 5-foot intervals, from the ground surface to the total depth of the boring, with a California Modified split-spoon sampler driven 18 to 24 inches ahead of the lead auger by a 140-pound hammer falling a minimum of 30 inches. The sampler will be lined with clean brass or stainless steel tubes. The number of blows necessary to drive the sampler will be recorded on the boring log and well construction diagram (Plate A-1) to help evaluate the consistency of the materials encountered. Additional soil samples may be collected based on significant lithologic changes and/or potential chemical content. All equipment that contacts soil samples will be thoroughly cleaned prior to arrival at the project site and between each individual sample collection point on-site. New and used split-spoon samplers will be steam cleaned or washed with a trisodium phosphate or Alconox solution, rinsed with tap water, air dried or wiped dry with a clean towel. Soil removed from the top two liners (typically each 4 to 6 inches in length) and the end cone will be used for visual logging purposes and disposed with cuttings produced during the drilling operations. The bottom liner, if suitable, will be preserved for laboratory analysis. Soil samples from each sampling interval will be lithologically described, consistent with the Unified Soil Classification System, by a HETI geologist. The exact depth of all borings to the nearest 1/2-

foot will be determined in the field. Exploratory boring logs shall be prepared under the direction of a Registered Geologist or Professional Engineer.

Head-space analysis will be performed in the field to check for the presence of volatile organic compounds. Head-space analysis will be performed using an organic vapor meter (either flame-ionization or photo-ionization). The method used will be consistent with the method described by Fitzgerald (1989). Organic vapor concentrations will be recorded on the HETI Soil Boring Log (Figure 1). The selection of soil samples for chemical analysis are typically based on the following criteria:

a. Soil discoloration
b. Soil odors
c. Visual confirmation of chemical in soil
d. Depth with respect to underground tanks
e. Depth with respect to groundwater
f. Organic vapor meter reading

The soil sampler and liners will be cleaned with a trisodium-phosphate or Alconox solution, rinsed with clean tap water and air dried or wiped dry with a clean towel prior to each sampling event. Soil samples (full liners) selected for chemical analyses will be covered with aluminum foil or teflon tape and the ends will be sealed with plastic end caps. The end caps will then be taped to ensure a more secure seal. The samples will then be labeled and entered onto a Chain-of-Custody document, and placed in a cooler on blue ice (hard shell) for transport to a state certified analytical laboratory.

Where copper and zinc contamination are the subject of the investigation, stainless steel liners will be used in lieu of brass liners. Stainless steel liners will also be used when the client, additional sampling protocol or regulatory agencies require.

Soil borings will be backfilled (sealed) to the ground surface using either a neat cement or cement-bentonite grout mixture in accordance with appropriate local regulations.

Pending the outcome of the results of the laboratory analyses, excess drill cuttings will remain on-site and, when deemed necessary, covered with a plastic tarp or drummed. Confirmed uncontaminated soils may be appropriately disposed of on-site by the client. Soils found to contain concentrations of contaminants above applicable local or state limits will be placed in appropriately labeled 55-gallon D.O.T. drums or in a hazardous materials drop bin and left on-site for proper disposal by the client. At the clients request, HETI will act as the client's agent by assisting in the disposal of the contained material. In no case will HETI personel sign a Hazardous Waste Manifest.

Well Construction

Monitoring wells shall be installed using a truck-mounted hollow-stem auger drilling rig or an air or mud-rotary drilling rig. Typically, the hollow stem rig will be used for the installation of wells up to 100 feet deep, if subsurface conditions prove favorable. Wells greater than 100 feet in depth will typically be drilled using air or mud-rotary equipment. Mud-rotary equipment will typically be used when alternate methods have failed or proven ineffective.

Monitoring well casing and screen shall be constructed of a minimum of Schedule 40, flush joint, threaded, polyvinylchloride (PVC) pipe. The well screen will be factory mill-slotted. The screen length shall be determined in the field and shall be placed with the intent of setting the screened interval adjacent to the aquifer material. The screen length shall also be set with the intent of placing the top of the screened interval a minimum of 2 feet above the static water

level. All screens and casings used will be in a contaminant-free condition when placed in the ground. No thread lubrication shall be used, other than teflon tape or distilled water, during the connection of individual lengths of screened and solid well casing. Screen shall not be placed in a borehole that creates hydraulic interconnection of two or more distinctly separate aquifer units. Screen slot size will be chosen to be compatible with the encountered aquifer materials. The screen slot size will be chosen to retain a high percentage of the filter pack or natural formation. The remainder of the well casing, above the screened interval, shall be of solid riser casing. A sand pack shall be placed in the remaining anular space surrounding the well casing to a minimum of 1 foot above the screened interval. Sand pack shall not be placed such that it interconnects two or more distinctly separate aquifer units. Sand pack shall be chosen to be compatible with both the aquifer materials and the screen slot size. Sand pack shall consist of clean, washed, kiln dried silica sand. A minimum 1-foot thick bentonite pellet or bentonite slurry seal shall be placed above the sand pack. All bentonite shall be hydrated by either formation water or steam-distilled water. The remaining annular space above the bentonite seal shall be grouted with a neat cement or bentonite-neat cement mixture and shall be placed from the top of the bentonite pellet seal to within 6 inches of the top of the well. If used, the bentonite content of the mixture shall not exceed 5 percent by weight. Sand pack, bentonite, and cement seal levels will be confirmed during construction by measuring the remaining anular space with a calibrated weighted tape. If shallow water table conditions prevail, the screen interval will be placed such that the screen height above the static water level is reduced and a maximum possible surface seal can be achieved. A field boring log and well construction diagram (Plate A-1) shall be prepared by a representative of HETI for each well completed. Monitoring and extraction wells shall be constructed with Class-A cement/bentonite grout or bentonite pellets tremied into position as a base for the well casing if necessary. The well casing will be set within the aquifer according to the proposed function of the well and the chemistry of the potential contaminants.

In the event a monitoring well is required to be installed in an aquifer unit underlying an existing, shallower aquifer, the well will be completed in the lower aquifer such that only water from the lower aquifer is drawn into the well. The upper aquifer will be sealed by installing a steel conductor casing which extends to the base of the shallow aquifer. The steel casing will be tremied into position with an annular neat cement or cement-bentonite grout seal placed between the outside wall of the casing and the wall of the borehole. The cement grout will be allowed a minimum of 72 hours to set prior to advancing the boring beyond the sealed conductor casing and into the next aquifer. After 72 hours, the boring will be advanced below the seal and completed as a well as described above but within the steel conductor casing.

The tops of all well casings will be sealed and placed in a vandal resistant, traffic rated box to prevent entry of surface contamination, unauthorized entry and tampering.

Monitoring wells will be surveyed to obtain north-end casing elevations to the nearest $\pm$ 0.01 foot. Water level measurements will be recorded with an interface probe to the nearest $\pm$ 0.01 foot and referenced to either a project datum or mean sea level (MSL). A project site datum is typically chosen such that it will remain in the event the project site undergoes a physical change as a result of construction or other cultural disturbance. Where required, the wells will be surveyed by a licensed land surveyor relative to the nearest bench mark and relative to mean sea level. Typically, the establishment of a known, on-site reference by a licensed survey, is enough to allow for the remaining well top elevations to be determined using a survey level and rod. Unless directed otherwise by local regulatory agencies, the well top elevations will be established in this manner.

Well Development

After installation, all monitoring wells shall be developed to remove fine grained sediments from the well and to stabilize sand, gravel and disturbed aquifer materials in the annular area around the screened interval. Well development will be accomplished by air-lift pump, suction-lift pump, submersible pump, bladder pump, surge block, bailer or any combination of the above. All well development equipment will be decontaminated prior to development using a steam cleaner and/or trisodium-phosphate solution wash, clean water rinse, and steam distilled water rinse. Well development will continue until each well is relatively free of turbidity. The adequacy of well development will be assessed by a HETI geologist. Where appropriate, indicator parameters (pH, specific conductance, temperature, and turbidity) will be monitored during well development. Field instrument calibrations will be performed prior to use according to manufacturers specifications.

Well Head Completion and Site Clean-up

Monitoring wells shall be completed below grade unless special conditions exist that require above grade design. Monitoring well casing (including the well locking seal and cap) will be completed approximately two inches below the vandal resistant traffic rated road box cover. Except in areas where snow plows might be used, the road box cover shall be completed approximately one inch above the existing grade surface to allow for precipitation runoff. All concrete work, both inside and outside the road box, shall be completed with a smooth finish.

Above ground completions will be set inside a 2 to 3 foot tall locking steel protective casing. If traffic conditions dictate, three 4-inch diameter steel pipes will be set in concrete in a triangular pattern to act as bumper posts. The posts will be set 2 feet deep and will be filled with concrete. A four foot square, 3-inch thick concrete pad which slopes away from the well will be set around each well. Both the protective steel well casing and the bumper posts will be painted yellow.

The project site shall be left as clean as possible. All soils and excess concrete produced from each monitoring well will be placed in appropriate areas to be disposed as previously described. All monitoring well locations will either be broomed or washed down such that staining of the existing surface cover is minimized.

GROUNDWATER SAMPLING AND ANALYSIS

Quality Assurance/Quality Control Objectives

The sampling and analysis procedures employed by HETI for groundwater sampling and monitoring follow specific Quality Assurance/Quality Control (QA/QC) guidelines. Quality Assurance (QA) objectives have been established by HETI to develop and implement procedures for obtaining field data and evaluating water quality in an accurate, precise and complete manner so that sampling procedures and field measurements provide information that is comparable and representative of the actual field conditions. Quality Control (QC) is maintained by HETI by using specific field protocols and requiring the analytical laboratory to perform internal and external QC checks. It is the goal of HETI to provide data that are accurate, precise, complete, comparable, and representative. The definitions for accuracy, precision, completeness, comparability, and representativeness are as follows:

1. Accuracy - the degree of agreement of a measurement with an accepted reference or true value.

2. Precision - a measure of agreement among individual measurements under similar conditions. Usually expressed in terms of standard deviation.

3. Completeness - the amount of valid data obtained from a measurement system compared to the amount that was expected to meet the project data goals.

4. Comparability - the confidence with which one data set can be compared with another.

5. Representativeness - the degree to which a sample or group of samples reflect the characteristics of a media at a given sampling point. Also includes the degree to which a sampling point represents the actual parameter variations which are under study.

As part of the HETI QA/QC program, applicable federal, state and local reference documents are to be followed. The procedures outlined in these regulations, manuals, handbooks, guidance documents and journals are incorporated into the HETI sampling procedures to assure that: (1) groundwater samples are properly collected, (2) groundwater samples are identified, preserved, and transported in a manner such that they are representative of field conditions, and (3) chemical analyses of samples are accurate and reproducible.

GUIDANCE AND REFERENCE DOCUMENTS USED TO COLLECT GROUNDWATER SAMPLES

U.S.E.P.A. - 339/9-51-002	NEIC Manual for Groundwater/ Subsurface Investigation at Hazardous Waste Sites
U.S.E.P.A. - 503/SW611	Procedures Manual for Groundwater Monitoring at Solid Waste Disposal Facilities (August, 1977)
U.S.E.P.A. - 600/4-79-020	Methods for Chemical Analysis of Water and Wastes (1983)
U.S.E.P.A. - 600/4-82-029	Handbook for Sampling and Sample Preservation of Water and Wastewater (1982)
U.S.E.P.A. - SW-846#, 3rd Edition	Test Methods for Evaluating Solid Waste - Physical/Chemical Methods (November, 1986) and latter additions
40 CFR 136.3e Table II	Required Containers, Preservation Techniques, and Holding Times
Resources Conservation and Recovery Act (OSWER 9950.1)	Groundwater Monitoring Technical Enforcement Guidance Document (September, 1986)
California Regional Water Quality Control Board (Central Valley Region)	A Compilation of Water Quality Goals (September, 1988); Updates (October, 1988)
California Regional Water Quality Control Board (North Coast, San Francisco Bay, and Central Valley)	Regional Board Staff Recommendations for Initial Evaluations and Investigation of Underground Tanks: Tri-Regional Recommendations (June, 1988)
California Regional Water Quality Control Board (Central Valley Region)	Memorandum: Disposal, Treatment, and Refuse of Soils Contaminated with Petroleum Fractions (August, 1986)
State of California Department of Health Services	Hazardous Waste Testing Laboratory Certification List (March, 1987)
State of California Water Resources Board	Leaking Underground Fuel Tank Control (LUFT) Field Manual (May, 1988), and LUFT Field Manual Revision (April, 1989)

State of California Water Resources 85), Control Board	Title 23 (Register #85.#33-8-17- Subchapter 16: Underground Tank Regulations; Article 3, Sections 2632 and 2634; Article 4, Section 2647 (October, 1986)
Santa Clara Valley Water District	Guidelines for Investigating Fuel Leaks (March, 1989)
Santa Clara Valley Water District	Guidelines for Preparing or Reviewing Sampling Plans for Soil and Groundwater Investigation of Fuel Contamination Sites (January, 1989)
Alameda County Water District	Groundwater Protection Program: Guidelines for Groundwater and Soil Investigations at Leaking Underground Fuel Tank Sites (most recent revision)
American Public Health Association	Standard Methods for the Examination of Water and Wastewaters, 16th Edition
Analytical Chemistry (journal)	Principles of Environmental Analysis Volume 55, pages 2212-18,December, 1983
American Petroleum Institute Environmental Affairs Dept., June, 1983	Groundwater Monitoring & Sample Bias
The Bay Area Air Quality Management District	Regulation 8 - Rule 40 & Rule 48

Because groundwater samples collected by HETI are analyzed in the parts per billion (ppb) range for many analytes, care is exercised to prevent contamination of samples. When volatile or semivolatile organic compounds are included for analysis, HETI sampling crew members will adhere to the following precautions in the field:

1. A new pair of clean, disposable, latex (or comparable material) gloves are to be worn for each well to be sampled.

2. When possible, samples will first be collected from wells known or suspected to contain the fewest contaminants, followed by wells in increasing order of degree of contamination.

3. All sample bottles and equipment are to be kept away from fuels and solvents. When possible, gasoline (used in generators and water pumps) is to be shipped to the project site in separate compartments of the same vehicle or in a separate vehicle as that in which sample bottles are shipped.

4. Sampling bailers are to be composed of polyethylene (when dedicated to the well), Teflon or stainless steel. Other materials, such as acrylic, may contain phthalate esters which can interfere with gas chromatography (GC) analyses. Well purging may be performed with PVC bailers.

5. Volatile organic groundwater samples are collected so that air passage through the sample does not occur or is minimal (to prevent volatiles from being stripped from the samples). Sample bottles are filled by slowly running the sample down the side of the bottle until there is a positive convex meniscus over the neck of the bottle. The Teflon side of the septum (in cap) is positioned against the meniscus and the cap is screwed on tightly. The sample is then inverted and lightly tapped while the sampler inspects the contents of the bottle for an air bubble. The absence of an air bubble indicates a successful seal. If a bubble is evident, the cap is removed and more water is added to the sample. The inspection procedure is repeated and if bubbles persist, the vial is discarded in a container designated for used and broken vials and bottles and the sample filling procedure is repeated with another vial.

6. Extra vials shall be available for use in the event of dropped bottles and/or caps. Any bottle which has come in contact with the ground shall be considered contaminated and shall not be used. When replacing septa, or if septa become inverted, care shall be taken to assure that the Teflon seal faces the interior of the bottle.

7. All preservatives shall be provided by the contract analytical laboratory.

Laboratory and field handling procedures of samples may be monitored by including QC samples for analysis with sample lots from a project site. QC samples may include any combination of the following:

1. Trip Blank - Used for purgable organic compounds only; QC samples shall be collected in 40 milliliter (ml) sample vials filled in the analytical laboratory with organic free water. Trip blanks should be sent to the project site, and travel with the samples from the project site. Trip blanks are <u>not</u> opened, and are returned from the project site with the samples from the project site for analysis.

2 Field Blank - Prepared in the field using steam-distilled water. Field blank QC samples shall accompany project site samples to the laboratory and shall be analyzed for the same chemical parameters as those samples taken from the project site.

3. Equipment Blank - Equipment Blank QC samples shall be prepared in the field using field equipment rinsate between two different wells after the equipment has been washed and rinsed. The equipment blank will consist of deionized water retained in the sampling equipment. These QC samples will only be taken when a dedicated bailer is not used for sampling.

4. Duplicates - Duplicate QC samples shall be collected "second samples" from a selected well and project site. Duplicates shall be collected as either split samples or second-run samples (i.e. later date) from the same well.

The number and types of QC samples shall be determined by HETI on a site-specific basis.

GROUNDWATER SAMPLE COLLECTION

This section describes the routine procedures followed by HETI while collecting groundwater samples for chemical analysis. These procedures include decontamination, water level measurements, well purging, physical parameter measurements, sample collection, sample preservation, and sample handling. Critical sampling objectives for HETI are to:

1. Collect groundwater samples which are representative of the sampled matrix.

2. Maintain sample integrity from the time of sample collection to delivery to the analytical laboratory.

Sample analyses, methods, containers, preservation, and holding times are presented in Table A-1.

Decontamination Procedures

All physical parameter measuring and sampling equipment shall be decontaminated prior to measurement and sample collection using a trisodium phosphate or Alconox solution wash, followed by two separate rinses in tap water, followed by one rinse in steam-distilled water. Any sampling equipment surfaces or parts that might absorb specific contaminants, such as plastic pump valves, impellers, etc., are to be cleaned in the same manner.

Sample bottles, bottle caps, and septa used for sampling volatile organics are thoroughly pre-cleaned in either the laboratory or the factory. All appropriate measures shall be taken to assure continued sterility of the containers issued by the contract laboratory prior to usage at the project site.

During field sampling, equipment which has been placed in a well shall be decontaminated by washing with a trisodium-phosphate or Alconox solution followed by two rinses in tap water and one rinse in steam-distilled water.

Water Level Measurements

Prior to purging and sampling any wells, the static-water level shall be measured by use of an electronic sounder and/or calibrated portable oil-water interface probe. Both static water level and separate phase product thickness shall be measured and noted to the nearest $\pm$0.01 foot. Interface probe results shall be confirmed by sampling the top of the water column with a clear bailer and measuring any floating product thickness to the nearest $\pm$0.01 foot with an engineers scale tape. In all cases a clear bailer sample will be taken from each well to check for color, sheen and undetected floating product. If floating product of any measureable thickness is observed, no sampling will be performed for that well. If visible product sheen is observed, sampling shall proceed under normal protocols.

The line used to lower the bailer shall be discarded after each use to preclude the possibility of cross contamination. Field observations (e.g., well integrity, product odor, turbidity, water color, odors, etc.) shall be recorded on the HETI Purge/Sample Sheet (Plate A-2). Before and after the use of the electric sounder, interface probe, non-dedicated bailer, or any other down well equipment, each will be decontaminated by washing in a trisodium phosphate or Alconox solution, followed by a double rinse with tap water, followed by a rinse with steam-distilled water.

Well Purging

Before sampling commences, well casing storage water and interstitial water in the artificial sand pack shall be purged from the well using: (1) a positive displacement bladder pump constructed of inert non-wetting Teflon and stainless steel; (2) a pneumatic-airlift pumping system; (3) a centrifugal pumping system; or (4) a PVC, Teflon or stainless steel bailer. Methods of purging will be assessed based on the well size, location, depth, accessibility, and known chemical conditions. Individual well purge volumes are calculated from the casing volumes. In general, a minimum of 3 to 5 casing volumes will be purged. Wells which dewater or demonstrate slow recharge capacities (i.e., low yield wells which only recover to 70 percent of initial water column height after 1 hour) during purging activities may be sampled after fewer than 3 to 5 purging cycles. If a low yield well is to be sampled, sampling shall not take place until at least 70 percent of the previously measured water column has been replaced by recharge. Monitoring wells shall be purged according to the protocol flowchart presented in Plate A-3. Water removed from the wells will either be disposed or stored in 55-gallon DOT drums for future disposal according to proceedures outlined for contaminated soil cuttings in the Soil Sampling Protocol section above. Where appropriate, physical parameters (pH, specific conductance, and temperature) will be monitored by HETI field crew during well purging operations. If necessary, purging may continue until all three physical parameters have stabilized. Stability shall be defined as a change of less than 0.2 pH units, less than 10 percent in micro mhos, and less than 1.0 degree Centigrade. The pH meters shall be read to the nearest $\pm$ 0.1 pH units. Specific conductance meters shall be read to the nearest $\pm$ 10 micro-mhos per centimeter. Both types of meters shall be calibrated daily to manufacturer's specifications. Temperature shall be read to the nearest $\pm$ 0.1 degree centigrade. Field data collected while developing, purging and sampling the wells will be entered onto the HETI Purge/Sample Sheet (Plate A-2). Copies of the Purge/Sample Sheets will be reviewed for accuracy and completeness for each well sampled.

DOCUMENTATION

Sample Container Labels

Each sample container shall be labeled immediately after the sample is collected and sealed. The label shall include:

- Company Name (HETI)
- Source (i.e., well number or code)
- Sampler's identification
- Project number
- Date and time of collection
- Type of preservation (if any) used

Field Sampling Data Sheets

In the field, the HETI sampling crew will record the following information on the Purge/Sample Sheet (Plate A-2) for each well sampled:

- Project number
- Client
- Location
- Source (i.e., well number or code)
- Time and date of development, purging and sampling
- Well accessibility and integrity
- Pertinent well data (e.g., total depth, product thickness, static water level)
- Physical parameters when appropriate (e.g., specific conductance, pH, temperature) - may be more than one reading
- Gallons and well casing volumes purged

Chain-of-Custody

A chain-of-custody record shall be completed and will accompany every shipment of samples to the analytical laboratory in order to establish documentation tracing sample possession from the time of collection until delivery to the laboratory. The record will contain the following information:

- Sample or station number or code (ID)
- Signature of the collector, sampler, or recorder
- Date and time of collection
- Place of collection (project address and name of business)
- Sample type (soil or water)
- Type of analysis requested
- Signatures of persons involved in chain of possession (in chronological order)
- Dates and times of individual possession (inclusive)
- Laboratory comments regarding the sample receptacle conditions

Samples will always be accompanied by a Chain-of-Custody record. When transferring the samples, the individuals relinquishing and receiving the samples will sign, date and note the time on the Chain-of-Custody record.

Sample Collection, Handling, Storage and Transport

All water samples will be collected in an order such that those parameters most sensitive to volatilization will be sampled first. A general order of collection for some common groundwater parameters is as follows:

- Volatile Organic Compounds (VOC's)
- Total Organic Halogens (TOH)
- Total Organic Carbon (TOC)
- Extractable Organics
- Total Metals
- Dissolved Metals
- Phenols
- Sulfate and Chloride
- Nitrate and Ammonia
- Turbidity

All samples from the same well shall be collected immediately after purging or when the well recovers to 70 percent of the original water column height. All samples from one sampling set from a single well should be collected on the same day.

All chemical sample handling and storage will be conducted under the direction of HETI's consulting analytical chemist. All laboratory chemical testing will be accomplished by a state approved analytical laboratory.

All water samples will be held at 4°C by packing them in a water-tight container inside an ice chest and covering with hard shelled "blue ice™". In no event shall the time between sample collection and delivery to the contract laboratory be greater than 72 hours. Preservatives will not be added to any sample by the sampling crew, unless instructed by the consulting analytical chemist. If added in the field, preservatives shall be supplied by the contract analytical laboratory. No one will open the samples other than laboratory personnel who will perform the specified chemical analyses.

If it is necessary for samples or sample ice chests to leave the immediate control of the sampling crew prior to delivery to the laboratory or laboratory courier, such as shipment by a common carrier (e.g., UPS™), a custody seal will be placed on each sample container and/or sample chest. Custody seals will be placed to ensure that the samples have not been tampered with during shipment and will contain the samplers signature, the date and time the seal was emplaced.

TABLE A-1

SAMPLE ANALYSIS METHODS, CONTAINERS, PRESERVATIVES, AND HOLDING TIMES

Parameter	Analytical Method	Reporting Units	Container*	Preservation†	Maximum Holding Time
Total Petroleum Hydrocarbons (low to med. b.p. i.e. gasoline)	EPA 8015 (DHS modified)	ppb ug/l	40ml glass vial, Teflon lined septum	4°C HCl to pH<2**	14 days
Benzene Toluene Ethylbenzene Xylenes (BTEX)	EPA 8020	ppb ug/l	40ml glass vial, Teflon lined septum	4°C HCl to pH<2**	7 days(w/o preservative) 14 days (w/preservative)
Oil & Grease	SM 503A&E	ppb ug/l	1L glass jar, Teflon lined cap	4°C H2SO4 to pH<2	28 days
Total Petroleum Hydrocarbons (high. b.p. i.e. diesel)	EPA 8015 (DHS modified)	ppb ug/l	1L glass jar, Teflon lined cap	4°C	14 days
Halogenated Volatile Organics (chlorinated solvents)	EPA 8010	ppb ug/l	40ml glass vial, Teflon lined septum	4°C	14 days
Non-Chlorinated Solvents	EPA 8020	ppb ug/l	as above	4°C	14 days
Volatile Organics (GC/MS)	EPA 8240	ppb ug/l	as above	4°C	14 days
Semi-Volatile Organics (GC/MS)	EPA 8270	ppb ug/l	as above	4°C	14 days
Metals	ICP-EPA 200.7 or A.A.EPA-	ppb ug/l	100 ml	4°C HNO3 to pH<2	6 months

* Containers listed are for water - soil containers are to be brass or stainless steel tubes with plastic end caps.

† Applies only to liquid samples.

** May vary depending on lab requirements.

SITE/LOCATION	BEGUN	BORING DIAMETER	ANGLE/BEARING	BORING NO
DRILLING CONTRACTOR	COMPLETED	FIRST ENCOUNTERED WATER DEPTH		
OPERATOR	LOGGED BY	STATIC WATER DEPTH/DATE		
DRILL MAKE & MODEL	SAMPLING METHOD			BOTTOM OF BORING
WELL MATERIAL	SLOT SIZE FILTER PACK	BORING SEAL		WELL NO.

BLOWS/FOOT	FIELD HEAD-SPACE *	DEPTH	SAMPLE	WATER LEVEL	WELL CONSTR.	GRAPHIC LOG	MATERIAL CLASSIFICATION & PHYSICAL DESCRIPTION
		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30					

*PID (ppm)

HYDRO-ENVIRONMENTAL TECHNOLOGIES, INC.

DATE:

APPROVED BY:

SOIL BORING LOG MW-4
AND
WELL CONSTRUCTION MW-4

PLATE
A-1

JOB NO.

PURGED/SAMPLED BY: _____ DATE: _____

GAUGING DATA:

Depth to bottom: _____ ft.

Depth to water: _____ ft.

Saturated Thickness: _____ ft.

Conversion	
diam.	gals/ft.
2 in.	x 0.16
4 in.	x 0.65
6 in.	x 1.44

Well casing volume _____ gallons

volumes to purge x_____ vols.

*Total volume to purge = _____ gallons

* unless chemical parameters stabilize earlier

PURGING DATA:

Purge method: PVC bailer/ Submersible pump/ Suction lift pump/ _____
(circle one)

Time	Volume (gallons)	Temp. (°F)	Conductivity (mS/cm)	pH

Color: _____ Turbidity: _____

Recharge: _____ SPP_____ft.

SAMPLING DATA:

Sampling method: Dedicated bailer /_____

Sample for: (circle)

TPHg/BTEX	METALS	TOG	8010	
TPHd	O-Pb	TEL	8020	
TPH mo	Total Pb	EDB	8240	
601	602	Nitrates	8260	8270

Other: _____

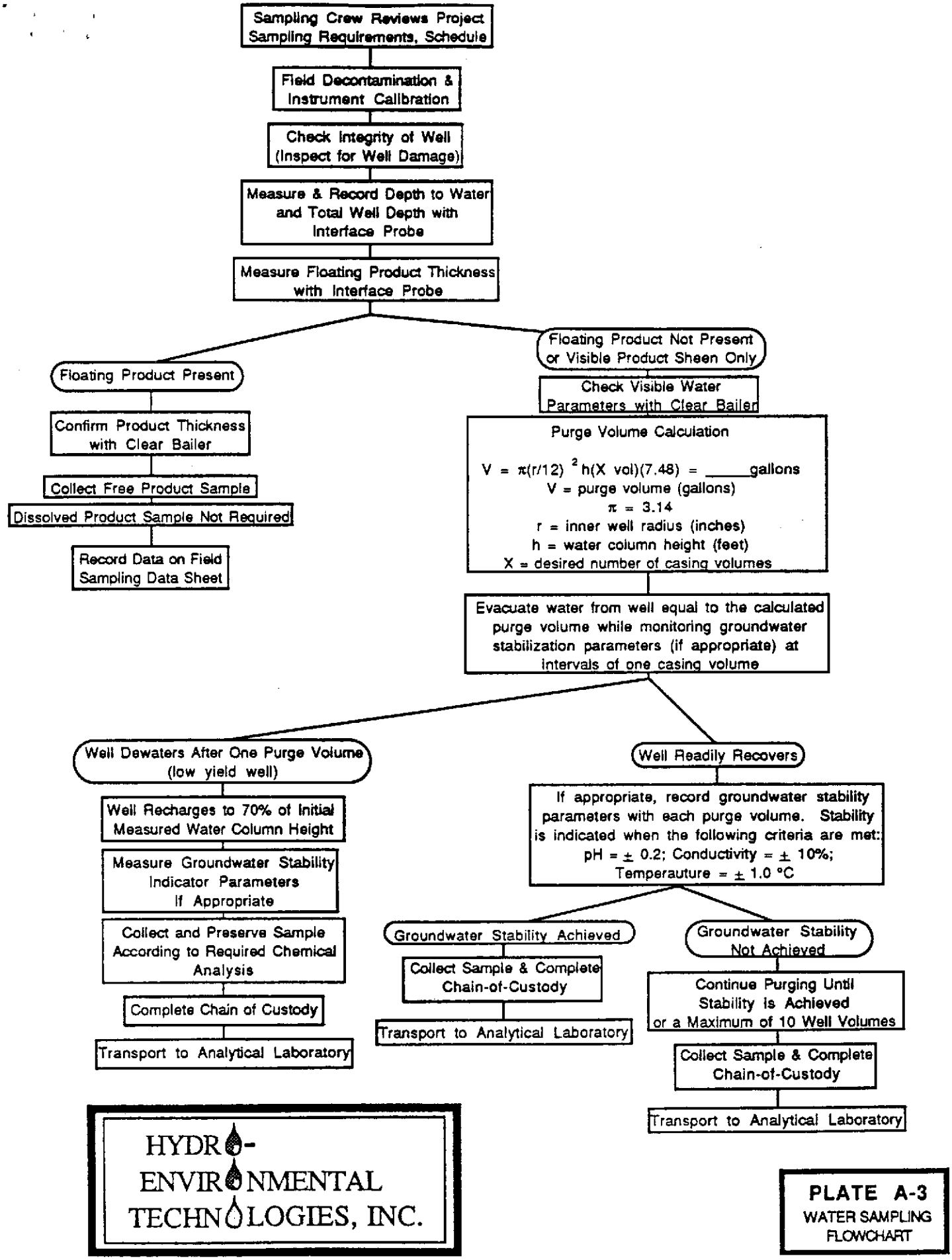
HYDRO ENVIRONMENTAL TECHNOLOGIES, INC.

MONITORING WELL PURGE/SAMPLE SHEET

WELL # _____

LOCATION _____

PLATE A-2



HYDRO-ENVIRONMENTAL TECHNOLOGIES, INC.

PLATE A-3
WATER SAMPLING FLOWCHART

APPENDIX C

WATER TABLE
ELEVATION DATA

BP Service Station No. 11270
3255 McCartney Road
Alameda, California

Monitoring well number	Top of casing elevation (ft)	Depth to water (ft)	Ground water elevation (ft)
MW-1	12.50	7.28	5.22
MW-2	12.08	6.84	5.24
MW-3	12.09	7.14	4.95
MW-4	12.14	6.90	5.24

Notes:

Groundwater gauging conducted by HETI on 10/26/92.

All monitoring wells are 2 inches in diameter.

Top of casing data is based on temporary benchmark (assumed elevation = 15 ft)--top of fire hydrant located in site's northwest planter box.

PURGED/SAMPLED BY: HH / TR DATE: 10-29-92

GAUGING DATA:

Depth to bottom: 8.31 ft.

Depth to water: 5.85 ft.

Saturated Thickness: 2.46 ft.

Conversion	
diam.	gals/ft.
~~2 in.~~	~~x 0.16~~
4 in.	x 0.65
6 in.	x 1.44

Well casing volume 1.60 gallons

volumes to purge x 3 vols.

*Total volume to purge = 5 gallons

* unless chemical parameters stabilize earlier

PURGING DATA:

Purge method: (PVC bailer) / Submersible pump / Suction lift pump / _____ (circle one)

Time	Volume (gallons)	Temp. (°F) °C	Conductivity (mS/cm)	pH
3:49	0	—	—	—
dry → 3:56	2.5	19.3	0.96	7.81

Color: olive Turbidity: high

Recharge: poor SPP Ø ft. sheen on bail water

SAMPLING DATA: insufficient recharge samples not submitted

Sampling method: (Dedicated bailer) / _____

Sample for: (circle)

(TPHg/BTEX)	METALS	(VOC)	8010
(TPHd)	O&G	TEL	8020
TPH mo	Total Pb	EDB	8240
(601)	602	Nitrate	8260 8270

Other: _____

HYDRO ENVIRONMENTAL TECHNOLOGIES, INC.

MONITORING WELL PURGE/SAMPLE SHEET

WELL # MW-1

LOCATION 3255 McCartney Rd., Alameda

JOB NO. 9-042

PURGED/SAMPLED BY: HH/TR DATE: 10-29-92

GAUGING DATA:

Depth to bottom: 9.02 ft.

Depth to water: 6.04 ft.

Saturated Thickness: 2.98 ft.

Conversion	
diam.	gals/ft.
2 in.	x 0.16
(4 in.)	x 0.65
6 in.	x 1.44

Well casing volume 1.94 gallons

volumes to purge x 3 vols.

*Total volume to purge = 6 gallons

* unless chemical parameters stabilize earlier

PURGING DATA:

Purge method: (PVC bailer)/ Submersible pump/ Suction lift pump/ _____
(circle one)

Time	Volume (gallons)	Temp. (°F)	Conductivity (mS/cm)	pH
4:45	0	—	—	—
4:48	3	20.0	1.45	7.15
4:55	6	20.6	1.49	7.06

Color: olive Turbidity: moderate

Recharge: good SPP 0 ft. sheen on soil water

SAMPLING DATA:

Sampling method: (Dedicated bailer) / _____

Sample for: (circle)

(TPHg/BTEX) METALS (TOC) (8010)

(TPHd) O-Pb TEL 8020

TPH mo Total Pb EDB 8240

601 602 Nitrates 8260 8270

Other: _____

HYDRO ENVIRONMENTAL TECHNOLOGIES, INC.

MONITORING WELL PURGE/SAMPLE SHEET

WELL # MW-2

LOCATION 3255 McLaughlin Rd, Alameda

JOB NO. 9-042

PURGED/SAMPLED BY: HH / TR DATE: 10-29-92

GAUGING DATA:

Depth to bottom: 9.04 ft.

Depth to water: 6.94 ft.

Saturated Thickness: 2.10 ft.

Conversion	
diam.	gals/ft.
2 in.	x 0.16
(4 in.)	x 0.65
6 in.	x 1.44

Well casing volume 1.37 gallons

volumes to purge x 3 vols.

*Total volume to purge = 4.1 gallons

* unless chemical parameters stabilize earlier

PURGING DATA:

Purge method: (PVC bailer) / Submersible pump / Suction lift pump / _____ (circle one)

Time	Volume (gallons)	Temp. ~~(°F)~~ °C	Conductivity (mS/cm)	pH
5:10	0	—	—	—
dry → 5:16	2	19.4	1.12	7.04

Color: olive Turbidity: high

Recharge: poor SPP 0 ft. sheen on soil water

SAMPLING DATA:

insufficient recharge samples not submitted →

Sample for: (circle)

(TPHg/BTEX) METALS TOG 8010

TPHd Pb TEL 8020

TPH mo Total Pb EDB 8240

601 602 Nitrates 8260 8270

Other: _____

Sampling method: (Dedicated bailer) / _____

HYDRO ENVIRONMENTAL TECHNOLOGIES, INC.

MONITORING WELL PURGE/SAMPLE SHEET

WELL # MW-3

LOCATION 3255 McLaughrey Rd, Alameda

JOB NO. 9-042

PURGED/SAMPLED BY: HH/TR DATE: 10-29-92

GAUGING DATA:

Depth to bottom: 12.57 ft.

Depth to water: 6.10 ft.

Saturated Thickness: 6.47 ft.

Conversion	
diam.	gals/ft.
2 in.	x 0.16
4 in.	x 0.65
~~6 in.~~	x 1.44

Well casing volume 9.32 gallons

volumes to purge x 3 vols.

*Total volume to purge = 28 gallons

* unless chemical parameters stabilize earlier

PURGING DATA:

Purge method: (PVC bailer)/ Submersible pump/ Suction lift pump/ _____ (circle one)

Time	Volume (gallons)	Temp. (°F)	Conductivity (mS/cm)	pH
4:10	0	—	—	—
4:16	5	19.9	1.75	7.26
4:20	10	19.9	0.76	7.25
4:28	15	19.8	1.54	7.27
4:32	20	20.2	1.62	7.22
4:36	25	19.7	1.65	7.16
4:40	28	19.9	1.61	7.15

Color: ~~gray~~ olive Turbidity: light

Recharge: good SPP Ø ft. sheen on rail water

SAMPLING DATA:

Sampling method: (Dedicated bailer) /_____

Sample for: (circle)

(TPHg/BTEX)	METALS	TOC	8010	
TPHd	O-Pb	TEL	8020	
TPH mo	Total Pb	EDB	8240	
601	602	Nitrates	8260	8270

Other: _____

HYDRO ENVIRONMENTAL TECHNOLOGIES, INC.

MONITORING WELL PURGE/SAMPLE SHEET

WELL # MW-4

LOCATION 3255 McLaughrey Rd, Alameda

JOB NO. 9-042

APPENDIX D

pace INCORPORATED
THE ASSURANCE OF QUALITY

REPORT OF LABORATORY ANALYSIS

Hydro-Environmental Tech., Inc.
2363 Mariner Square Dr., Ste. 243
Alameda, CA 94501

November 13, 1992
PACE Project Number: 421030513
WPPLab Number: 1609 d-042

Attn: Mr. Henry Hurkmans

Client Reference: BP Station # 11270

PACE Sample Number:			70 0241367	
Date Collected:			10/29/92	
Date Received:			10/30/92	
			MW-2	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	11/04/92
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/L	1000	2500	11/04/92
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	11/04/92
Benzene	ug/L	10	140	11/04/92
Toluene	ug/L	10	ND	11/04/92
Ethylbenzene	ug/L	10	65	11/04/92
Xylenes, Total	ug/L	10	22	11/04/92
HALOGENATED VOLATILE COMPOUNDS EPA 8010				
Dichlorodifluoromethane	ug/L	2.0	ND	11/09/92
Chloromethane	ug/L	2.0	ND	11/09/92
Vinyl Chloride	ug/L	2.0	ND	11/09/92
Bromomethane	ug/L	2.0	ND	11/09/92
Chloroethane	ug/L	2.0	ND	11/09/92
Trichlorofluoromethane (Freon 11)	ug/L	2.0	ND	11/09/92
1,1-Dichloroethene	ug/L	0.5	ND	11/09/92
Methylene Chloride	ug/L	2.0	ND	11/09/92
trans-1,2-Dichloroethene	ug/L	0.5	ND	11/09/92
cis-1,2-Dichloroethene	ug/L	0.8	ND	11/09/92
1,1-Dichloroethane	ug/L	0.5	ND	11/09/92
Chloroform	ug/L	0.5	ND	11/09/92
1,1,1-Trichloroethane (TCA)	ug/L	0.5	ND	11/09/92
Carbon Tetrachloride	ug/L	0.5	ND	11/09/92
1,2-Dichloroethane (EDC)	ug/L	0.5	ND	11/09/92
Trichloroethene (TCE)	ug/L	0.5	ND	11/09/92
1,2-Dichloropropane	ug/L	0.5	ND	11/09/92
Bromodichloromethane	ug/L	0.5	ND	11/09/92
2-Chloroethylvinyl ether	ug/L	0.5	ND	11/09/92
cis-1,3-Dichloropropene	ug/L	0.5	ND	11/09/92

11 Digital Drive
Novato, CA 94949
TEL: 415-883-6100
FAX: 415-883-2673

REPORT OF LABORATORY ANALYSIS

Mr. Henry Hurkmans
Page 2

November 13, 1992
PACE Project Number: 421030513

Client Reference: BP Station # 11270

PACE Sample Number:			70 0241367	
Date Collected:			10/29/92	
Date Received:			10/30/92	
Client Sample ID:			MW-2	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
HALOGENATED VOLATILE COMPOUNDS EPA 8010				
trans-1,3-Dichloropropene	ug/L	0.5	ND	11/09/92
1,1,2-Trichloroethane	ug/L	0.5	ND	11/09/92
Tetrachloroethene	ug/L	0.5	ND	11/09/92
Dibromochloromethane	ug/L	0.5	ND	11/09/92
Chlorobenzene	ug/L	0.5	ND	11/09/92
Bromoform	ug/L	0.5	ND	11/09/92
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND	11/09/92
1,3-Dichlorobenzene	ug/L	0.5	ND	11/09/92
1,4-Dichlorobenzene	ug/L	0.5	ND	11/09/92
1,2-Dichlorobenzene	ug/L	0.5	ND	11/09/92
Bromochloromethane (Surrogate Recovery)			134%	11/09/92
1,4-Dichlorobutane (Surrogate Recovery)			118%	11/09/92
EXTRACTABLE FUELS EPA 3510/8015				
Extractable Fuels, as Diesel	mg/L	0.050	3.9	11/06/92
Date Extracted			11/04/92	
OIL AND GREASE, SILICA GEL (LUFT)				
Oil and Grease, Gravimetric (SM5520)	mg/L	5.0	(*)	11/06/92
Date Extracted			11/05/92	

pace INCORPORATED
THE ASSURANCE OF QUALITY

REPORT OF LABORATORY ANALYSIS

Mr. Henry Hurkmans
Page 3

November 13, 1992
PACE Project Number: 421030513

Client Reference: BP Station # 11270

PACE Sample Number:			70 0241375	
Date Collected:			10/29/92	
Date Received:			10/30/92	
Client Sample ID:			MW-4	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	11/03/92
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/L	100	2600	11/03/92
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	11/03/92
Benzene	ug/L	1.0	250 (MT)	11/03/92
Toluene	ug/L	1.0	2.5	11/03/92
Ethylbenzene	ug/L	1.0	74	11/03/92
Xylenes, Total	ug/L	1.0	6.6	11/03/92

These data have been reviewed and are approved for release.

Darrell Cain

Darrell C. Cain
Regional Director

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Mr. Henry Hurkmans
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FOOTNOTES
for pages 1 through 3

November 13, 1992
PACE Project Number: 421030513

Client Reference: BP Station # 11270

MDL Method Detection Limit
ND Not detected at or above the MDL.

Special footnote for page 2 (sample 70 0241367):

(*) Positive result. Unable to quantitate.

Special footnote for page 3 (sample 70 0241375):

(MT) A peak eluting earlier than Benzene and suspected to be Methyl Tert Butyl Ether was present at approximately 170 ppb.

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QUALITY CONTROL DATA

November 13, 1992
PACE Project Number: 421030513

Client Reference: BP Station # 11270

HALOGENATED VOLATILE COMPOUNDS EPA 8010
Batch: 70 16851
Samples: 70 0241367

METHOD BLANK:

Parameter	Units	MDL	Method Blank
Dichlorodifluoromethane	ug/L	2.0	ND
Chloromethane	ug/L	2.0	ND
Vinyl Chloride	ug/L	2.0	ND
Bromomethane	ug/L	2.0	ND
Chloroethane	ug/L	2.0	ND
Trichlorofluoromethane (Freon 11)	ug/L	2.0	ND
1,1-Dichloroethene	ug/L	0.5	ND
Methylene Chloride	ug/L	2.0	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.8	ND
1,1-Dichloroethane	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,1,1-Trichloroethane (TCA)	ug/L	0.5	ND
Carbon Tetrachloride	ug/L	0.5	ND
1,2-Dichloroethane (EDC)	ug/L	0.5	ND
Trichloroethene (TCE)	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
2-Chloroethylvinyl ether	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
1,3-Dichlorobenzene	ug/L	0.5	ND
1,4-Dichlorobenzene	ug/L	0.5	ND
1,2-Dichlorobenzene	ug/L	0.5	ND
Bromochloromethane (Surrogate Recovery)			125%
1,4-Dichlorobutane (Surrogate Recovery)			114%

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QUALITY CONTROL DATA

November 13, 1992
PACE Project Number: 421030513

Client Reference: BP Station # 11270

HALOGENATED VOLATILE COMPOUNDS EPA 8010
Batch: 70 16851
Samples: 70 0241367

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
1,1-Dichloroethane	ug/L	0.5	10.00	80%	89%	10%
Trichloroethene (TCE)	ug/L	0.5	10.00	83%	86%	3%
1,1,2-Trichloroethane	ug/L	0.5	10.00	98%	90%	8%
Tetrachloroethene	ug/L	0.5	10.00	112%	98%	13%

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QUALITY CONTROL DATA

November 13, 1992
PACE Project Number: 421030513

Client Reference: BP Station # 11270

OIL AND GREASE, SILICA GEL (LUFT)
Batch: 70 16757
Samples: 70 0241367

METHOD BLANK:

Parameter	Units	MDL	Method Blank
Oil and Grease, Gravimetric (SM5520)	mg/L	5.0	ND

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
Oil and Grease, Gravimetric (SM5520)	mg/L	5.0	20	75%	80%	6%

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QUALITY CONTROL DATA

November 13, 1992
PACE Project Number: 421030513

Client Reference: BP Station # 11270

PURGEABLE FUELS AND AROMATICS
Batch: 70 16722
Samples: 70 0241367

METHOD BLANK:

Parameter	Units	MDL	Method Blank
TOTAL FUEL HYDROCARBONS, (LIGHT):			-
Purgeable Fuels, as Gasoline (EPA 8015M	ug/L	50	ND
PURGEABLE AROMATICS (BTXE BY EPA 8020M)			-
Benzene	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Ethylbenzene	ug/L	0.5	ND
Xylenes, Total	ug/L	0.5	ND

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
Purgeable Fuels, as Gasoline (EPA 8015M	ug/L	50	331	92%	95%	3%
Benzene	ug/L	0.5	40.0	101%	100%	0%
Toluene	ug/L	0.5	40.0	97%	97%	0%
Ethylbenzene	ug/L	0.5	40.0	101%	101%	0%
Xylenes, Total	ug/L	0.5	80.0	100%	99%	1%

Mr. Henry Hurkmans
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QUALITY CONTROL DATA

November 13, 1992
PACE Project Number: 421030513

Client Reference: BP Station # 11270

TPH GASOLINE/BTEX
Batch: 70 16671
Samples: 70 0241375

METHOD BLANK:

Parameter	Units	MDL	Method Blank
TOTAL FUEL HYDROCARBONS, (LIGHT):			-
Purgeable Fuels, as Gasoline (EPA 8015M	ug/L	50	ND
PURGEABLE AROMATICS (BTXE BY EPA 8020M)			-
Benzene	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Ethylbenzene	ug/L	0.5	ND
Xylenes, Total	ug/L	0.5	ND

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
Purgeable Fuels, as Gasoline (EPA 8015M	ug/L	50	346	96%	97%	1%
Benzene	ug/L	0.5	40.0	91%	93%	2%
Toluene	ug/L	0.5	40.0	93%	94%	1%
Ethylbenzene	ug/L	0.5	40.0	101%	101%	0%
Xylenes, Total	ug/L	0.5	80.0	98%	98%	0%

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REPORT OF LABORATORY ANALYSIS

FOOTNOTES
for pages 5 through 9

November 13, 1992
PACE Project Number: 421030513

Client Reference: BP Station # 11270

MDL	Method Detection Limit
ND	Not detected at or above the MDL.
RPD	Relative Percent Difference

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B.P. OIL MARKET... COMPANY

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CHAIN OF CUSTODY

421050.013

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Consultant's Name: Hydro-Environmental Technologies, Inc. Page 1 of 1

Address: 2363 Mariner Square Dr. #243, Alameda, CA 94501

Project Contact: Henry Hurkmans | Consultant Project #: 9-042 | Phone #: (510) 521-2684 Fax #: (510) 521-5079

Sampled by (print): Henry Hurkmans | Sampler's Signature: Henry Hurkmans

Shipment Method: lab courier | B.P. Site Location #: 1290 | B.P. Site Location: 3255 McLaney Rd. Alameda

TAT: ☐ 24 hr ☐ 48 hr ☐ 72 hr ☒ Standard (10 day)

ANALYSIS REQUIRED

Sample Condition as Received
Temperature ° C: _____
Cooler #: _____
Inbound Seal Yes No
Outbound Seal Yes No

Sample Description	Collection Date/Time	Matrix Soil/Water	Pres	# of Cont	PACE Sample #	TPH/GAS/BTEX EPA 8015/8020	TPH/Diesel EPA 8015	Oil & Grease SM 5520	HVOC 8010	COMMENTS
MW-2	10-29-92	H_2O	HCl	6	24136.7	X			X	
MW-3	10-29-92	H_2O	no	2	1		X	X		
MW-4	10-29-92	H_2O	HCl	3	37.5	X				
~~MW-4~~	~~10-29-92~~	~~H_2O~~	~~no~~	~~1~~						

Relinquished by/Affiliation	Date	Time	Accepted by/Affiliation	Date	Time	Additional Comments:
Henry Hurkmans	10-30-92	1145	[signature]	10/30	1145	BP Phase I
Elliott Tice	10/30	1725	[signature] PACE	10/30	1725	assessments