HYDRO
ENVIRONMENTAL
TECHNOLOGIES, INC.

PHASE I REPORT

Former Mobil Service Station No. 10-L1X
15884 Hesperian Boulevard
San Lorenzo, California

Prepared for:

MOBIL OIL CORPORATION
3800 West Alameda Avenue, Suite 2000
Burbank, California
Contract No. 10-L1X

Prepared by
HYDRO-ENVIRONMENTAL TECHNOLOGIES, INC.
2363 Mariner Square Drive, Suite 243
Alameda, California 94501
HETI Job No. 8-018

May 7, 1992

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 test results related to the work performed by Hydro-Environmental Technologies, Inc.

Site conditions are subject to change with time; therefore, our conclusions result only from the interpretation of present conditions and available site information. This report was prepared in accordance with accepted professional standards technical procedures as certified below.

HYDRO-ENVIRONMENTAL TECHNOLOGIES, INC.

Prepared by:

Brian M. Gwinn
Project Geologist

Reviewed by:

Frederick G. Moss, P.E. No. 35162
Senior Engineer

Scott D. Kellstedt
Project Manager

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Mobil Oil Corporation

3800 WEST ALAMEDA AVENUE, SUITE 700
BURBANK, CALIFORNIA 91505-4331

92 MAY 20 PM 1:16

May 17, 1992

Ms. Juliet Shin
Alameda County Department of Environmental Health
Hazardous Materials Division
80 Swan Way, Room 200
Oakland, California 94621

FORMER MOBIL SS# 10-L1X
15884 HESPERIAN BLVD.
SAN LORENZO, CALIFORNIA

Dear Ms. Shin,

Enclosed is the Phase I Report for the above-referenced location, as prepared by our consultant, Hydro-Environmental Technologies, Inc. (HETI).

In January 1992, four borings were drilled at the site and three of these were converted to MWs. A previously installed MW (MW-3) was abandoned due to damage. Two other previously installed MWs (MW-1 and -4) could not be located. Soil samples collected during the drilling of the borings did not contain detectable TPHg or BTEX concentrations.

Groundwater samples were collected from the four existing MWs on February 12, 1992. Samples from MW-2 and MW-6 both contained detectable concentrations of TPHg and BTEX. The sample collected from MW-6 contained the highest TPHg and benzene concentrations, 2700- and 14-ppb, respectively.

We plan to install two additional MWs and to perform a pump test on MW-6 to further define the extent of groundwater contamination and determine if remediation is warranted at this site. A workplan detailing this additional investigation will be submitted to you when received from the consultant.

Please review the enclosed report. Should you have any comments or require additional information, please contact me at (818) 953-2649.

Sincerely,

Randy Begier

Randy Begier
Environmental Project
Engineer

cc: Rich Hiett, CRWQCB - S.F. Bay Region (w/enclosure)
D.J. Hill, Mobil

1.0 INTRODUCTION

1.1 Purpose

The purpose of this report is to present the results of Hydro-Environmental Technologies, Inc.'s (HETI's) investigative work performed at former Mobil Oil Corporation (Mobil) service station No. 10-L1X, located at 15884 Hesperian Boulevard in San Lorenzo, California (the site). A Site Location Map is attached as Figure 1. The station no longer exists but the site is paved. The site is vacant and is used as a parking lot for a shopping mall. Surrounding property use is shown on the Site Vicinity Map, Figure 2.

This report describes the results of onsite monitoring well installation, the collection and analysis of soil and ground water samples, and the abandonment of one monitoring well. A description of field activities is presented in chronological order, followed by a presentation and discussion of the results of each of the activities.

1.2 Background

In March 1986, Kaprealian Engineering, Inc. (KEI) supervised the removal of three underground gasoline storage tanks and one waste oil tank from the site. Soil contamination was detected beneath the tanks. The tanks were replaced by four fiberglass underground gasoline storage tanks in the same location. The waste oil tank was not replaced. After the tank replacement, KEI installed four monitoring wells, designated MW-1 through MW-4, in July 1986.

→ ? Contradicts 4/16/86 KEI report.

In December 1987, the fiberglass tanks were removed in preparation to abandon the site. The tank pit was over-excavated to remove soil contamination detected during the previous tank removal. During this excavation, monitoring well MW-2 was destroyed according to KEI. The well was reinstalled by KEI in approximately the same location. The last ground water sampling event to have occurred at the site appears to have been November 1, 1988 (according to the background information provided by Mobil to HETI). Cumulative analytical results indicate that the dissolved hydrocarbon plume was centered in the vicinity of MW-2.

HETI personnel visited the site on October 30, 1991. Two of the original monitoring wells installed by KEI, MW-2 and MW-3, were present at the site. However, the PVC casing in MW-3 was broken off and debris had filled the well. The other two monitoring wells, MW-1 and MW-4, could not be located during the site visit. The condition and location of these wells could not be verified by HETI.

Mobil retained HETI to continue the environmental investigation at the site. Additional monitoring wells were installed to define the lateral extent of hydrocarbon impacted soils and ground water. Activities performed by HETI during this phase of investigation (and described in this report) included the installation, development and survey of three on-site monitoring wells, and the collection of ground water samples from the pre-existing and newly installed monitoring wells to determine if hydrocarbons were present in the subsurface.

2.0 FIELD ACTIVITIES

2.1 Soil Boring Installation and Soil Sampling

HETI conducted a safety briefing on-site with Bayland Drilling personnel, prior to the start of drilling on January 27 and 28, 1992. At the end of the briefing, all personnel reviewed and signed the Field Crew Health and Safety Plan; a copy is attached in Appendix B. All drilling and soil sampling was performed according to standard HETI protocol (attached) and consistent with Alameda County Department of Environmental Health (ACDEH) and Regional Water Quality Control Board (RWQCB) recommended guidelines and procedures. Copies of Alameda County Flood Control and Water Conservation District - Zone Seven well installation permits are included in Appendix B.

Bayland Drilling of Menlo Park, California, used a CME 75 hollow-stem auger drill rig to drill four onsite soil borings, designated B-5, B-6, B-7 and B-8, in locations shown on Figure 2, the Site Plan. A California-modified split-spoon sampler, lined with brass tubes, was used to collect soil samples from the 5.5 - 6.0 foot, 10.5 - 11.0 foot, and 15.0 - 15.5 foot depth intervals in borings B-5, B-6 and B-8. Soil samples were collected in the aforementioned manner from the 5.5 - 6.0 foot and 10.5 - 11.0 foot depth intervals in boring B-7. The brass tubes were covered with teflon tape and plastic end caps. The soil samples were then labeled, documented on a chain-of-custody, and placed in a cooler for transport to the analytical laboratory.

Soil samples collected from all borings were analyzed for total low to medium boiling point petroleum hydrocarbons (TPHg) and benzene, toluene, ethylbenzene, and total xylenes (BTEX) using EPA Methods 8015 (DHS-modified) and 8020. Soil samples collected from the boring installed near the former waste oil tank were also analyzed for total high boiling point petroleum hydrocarbons (TPHd) using EPA Method 8015 (DHS-modified), halogenated volatile organics (HVO), total oil and grease (TOG) using EPA Method 413.2 (IR), cadmium, chromium, nickel, and zinc (Cd, Cr, Ni, Zn) using EPA Method 6000 series, and organic lead (O-Pb) using methods described in the California LUFT manual (revised). Soil sample analysis

was performed by Sequoia Analytical, a state DHS-certified laboratory, located in Redwood City, California. A copy of the chain-of-custody is attached in Appendix C.

Portions of each soil sample were also retained for visual description by a HETI geologist, using the United Soil Classification System, and for volatile headspace analysis using an Organic Vapor Meter 580B (OVM). Complete soil sample descriptions and OVM readings are presented on the Boring Logs in Appendix A. Soil cuttings generated during drilling were stored on-site and later transported for off-site disposal by a licensed waste hauler.

2.2 Monitoring Well Installation, Development and Survey

HETI installed a monitoring well in borings B-5, B-6 and B-8 on January 27 and 28, 1992. The monitoring wells were designated MW-5, MW-6 and MW-7, respectively. No monitoring well was installed in boring B-7 because the boring was installed within the former tank excavation area. HETI was concerned that ground water, encountered under semi-confined conditions in the other borings, would rise into the tank excavation and come in contact with adsorbed hydrocarbons. Boring B-7, completed at a depth of 15 feet below grade, was subsequently filled to the surface with a cement/grout mixture.

The wells (MW-5, MW-6 and MW-7) were installed near potential on-site hydrocarbon sources. Well MW-5 was installed near the former waste oil tank. Well MW-6 was installed near the former dispenser islands. Well MW-7 was installed downgradient of the former underground gasoline storage tanks. These well locations are shown on Figure 3.

All wells were constructed of four-inch diameter PVC well materials. Each well was constructed according to standard HETI, ACDEH and RWQCB protocols. HETI's well construction protocols are attached. Monitoring well construction details are presented on the Boring Logs in Appendix A.

After installation, each well was developed by a combination of surging and bailing. The wells were developed in order to remove fine-grained sediments from the sandpack, and to increase the hydraulic connection with the aquifer. A copy of HETI's development protocols are attached. Following development, the location and elevation of the top-of-casing of each well was surveyed relative to an existing benchmark, corrected for mean sea level. Survey data is presented on the field data sheets in Appendix B.

2.3 Abandonment of Monitoring Well MW-3

On January 28, 1992, HETI supervised the abandonment of an existing monitoring well (MW-3). Bayland Drilling used a CME 75 drill rig with 8-1/4 inch outside diameter hollow stem augers to destroy the well. Monitoring well MW-3 was destroyed because the casing was broken off at the surface and debris had filled the well. The well was destroyed by overdrilling the existing well casing, through the annular space of the well to the bottom of the original boring. After the casing was removed, the borehole was filled to the surface with a cement/grout mixture. Well destruction was performed in accordance with ACDEH and RWQCB guidelines.

2.4 Ground Water Gauging, Sampling and Analysis

On February 12, 1992, HETI gauged each monitoring well for depth to water and thickness of any separate-phase petroleum with an interface probe. No separate-phase petroleum was detected in any of the wells. Prior to sampling, each well was purged of a minimum of three well volumes or until dry. Purge water was stored on-site in 55-gallon drums. Well purging information is presented on the Field Data Sheets in Appendix B.

Following recovery of water levels in the wells to at least 70% of their original levels, a ground water sample was collected from each well. Samples were then labeled, documented on a chain-of-custody, and stored in a cooler for transport to the analytical laboratory. All sampling was conducted in accordance with HETI standard operating procedure, and using methods consistent with ACDEH and RWQCB guidelines. A copy of HETI's water sampling protocol is attached.

Ground water samples collected from all wells were analyzed for TPHg and BTEX using EPA Methods 8015 (DHS-modified) and 8020. Water samples collected from MW-5, the well near the former waste oil tank, were also analyzed for TPHd using EPA Method 8015 (DHS-modified), HVO using EPA Method 8010, TOG using EPA Method 413.2 (IR), Cd, Cr, Ni and Zn using EPA Method 6000 series, and O-Pb using methods described in the California LUFT manual (revised). Water sample analysis was performed by Sequoia Analytical, Inc. A copy of the chain-of-custody is included with the analytical results in Appendix C.

3.0 RESULTS AND DISCUSSION

3.1 Soil Boring Installation and Soil Sample Analytical Results

Sediments encountered during the drilling of borings B-5, B-6 and B-8 consisted of fill for the first few feet, then sand or silty sand to depths ranging from six to eight

feet below grade. The sand was underlain by predominantly silty clay to depth of 23 feet, the maximum depth explored.

Sediments encountered during the drilling of boring B-7 consisted of fill to a depth of 4.5 feet below grade, then gravelly clay to a depth of 12.5 feet. "Pea" gravel was encountered beneath the gravelly clay to a depth of 15 feet below grade, the maximum depth explored. Ground water was not encountered in B-7.

The boring was terminated at 15 feet below grade because the pea gravel encountered during drilling represented unexcavated fill from the former underground storage tank excavation. Hydrocarbons may have been adsorbed to this gravel, and to prevent the ground water in the semi-confined aquifer from rising in the borehole and into the gravel, the boring was terminated before ground water was encountered.

Ground water was initially encountered in semi-confined conditions at a depth of approximately 18 feet below grade in borings B-5, B-6, and B-8. The potentiometric ground water surface later stabilized at depths ranging from approximately 13 to 14 feet below grade.

Organic vapor meter (OVM) readings from soil samples collected for headspace analysis ranged from 0 ppm to 575 ppm. OVM readings for specific soil samples, along with complete sample descriptions, are presented on the Boring Logs in Appendix A. Organic vapor meter readings displayed by the OVM are not a quantitative determination of true hydrocarbon concentrations in the soil samples, but they are useful for determining the relative magnitude of hydrocarbon concentrations.

Neither TPHg nor BTEX were detected in concentrations exceeding the method detection limit in any of the soil samples collected from borings B-5 through B-8. This data indicates that these compounds are not present in the subsurface soils beneath former potential hydrocarbon sources on-site (underground storage tanks and dispenser islands). Neither TPHd, HVO, nor O-Pb were detected in soil samples collected from boring B-5 in concentrations exceeding the method limit. TOG was detected in all soil samples collected from boring B-5 (installed near the former waste oil tank) in concentrations ranging from 4.2 ppm to 4.8 ppm. Cd, Cr, Ni, and Zn were detected in soil samples collected from boring B-5 in various concentrations. Refer to Table 1 (summary of soil sample analytical results) for specific analyte concentrations. A copy of the laboratory report is attached in Appendix C.

3.2 Monitoring Well Installation and Construction

Four-inch diameter monitoring wells were constructed after borings B-5, B-6 and B-8 had been completed. These monitoring wells were designated MW-5, MW-6 and MW-7, respectively.

Machine-slotted 0.010-inch schedule 40 PVC well screen was extended from a depth of 23 feet below grade, the bottom of borings B-5 and B-6, to 8 feet below grade. Solid well casing was coupled to the well screen and extended to the surface in both borings B-5 and B-6. Machine-slotted 0.010-inch schedule 40 PVC well screen was extended from a depth of 23.5 feet below grade, the bottom of boring B-8, to 18 feet below grade. Solid well casing was coupled with the well screen and extended to the surface. The annulus around the well screen of all the wells was filled with a clean, uniform sand to one foot above the top of the screened interval. A two-feet thick seal of bentonite pellets was placed above the sand pack and hydrated with steam-distilled water. The remainder of each borehole was grouted to the surface, and traffic-rated road boxes were cemented in place flush with the surface. All monitoring wells were constructed according to standard HETI protocol, and consistent with all ACDEH and RWQCB guidelines. Well construction diagrams are provided on the Boring Logs in Appendix A. Copies of the well installation permits are included in Appendix B.

3.3 Abandonment of Monitoring Well M-3

Well abandonment was performed according to all ACDEH and RWQCB guidelines. The well could not be sounded for total depth prior to abandonment because it was filled with debris. Grout (the well seal) was encountered to a depth of 7 feet below grade in the boring drilled through the existing well MW-3. A clean, uniform sand (the well sandpack) was encountered beneath the grout to a depth of 30 feet below grade. Silty clay was encountered beneath the sand indicating that the bottom of the original boring had been reached. Once the PVC well casing and the annular material were removed, the boring was grouted to the surface

3.4 Ground Water Gauging and Analytical Results

After well installation and development, ground water samples were collected on February 12, 1992. Depth to ground water in each of the wells ranged from approximately 12 to 14 feet below grade, according to the well gauging conducted prior to sampling. The depth to water measurements and wellhead elevation data were used to calculate potentiometric surface contours. These contours are shown on Figure 4, the Potentiometric Surface Map. The ground water flow direction as indicated on Figure 4 is in a southwesterly direction, at a gradient of 0.0025 ft/ft (0.25%).

TPHg and BTEX were detected in water samples collected from MW-2 and MW-6. TPHg was detected in concentrations ranging from 190 parts per billion (ppb) in the water sample collected from MW-2 to 2,700 ppb in the water sample collected from MW-6. Benzene was detected in concentrations ranging from 4.4 ppb in the water sample collected from MW-2 to 14 ppb in the water sample collected from well MW-6.

Neither TPHg nor BTEX were detected in water samples collected from MW-5 or MW-7 in concentrations exceeding the laboratory method detection limit. Neither TPHd, TOG, HVO, Cd, Cr, Ni, Zn, nor O-Pb were detected in concentrations exceeding the method detection limit in the water sample collected from well MW-5, the well nearest the waste oil tank.

Ground water sample analytical results are summarized in Table 2, and are represented graphically on the TPHg (Figure 5) and Benzene (Figure 6) Isoconcentration Maps, respectively.

4.0 SUMMARY

A summary of field activities and results from this phase of investigation is presented below:

1. Three on-site monitoring wells were installed (MW-5, MW-6 and MW-7), developed and surveyed during the period from January 27, 1992 to February 12, 1992. One shallow on-site boring was also drilled on January 28, 1992. Monitoring wells were installed in locations near potential on-site hydrocarbon sources. Sediments encountered during drilling consisted predominantly of silty clay or sand. Neither TPHg nor BTEX compounds were detected in soil samples from any of the borings.

2. Existing monitoring well MW-3 was abandoned by overdrilling and grouting. The well was destroyed because the PVC casing was broken off and debris had filled the well, rendering it unusable.

3. Ground water samples were collected from all monitoring wells (one existing well [MW-2] and three new wells) at the site on February 12, 1992. TPHg and BTEX were detected only in water samples collected from MW-2 and MW-6. Neither TPHg nor BTEX were detected in water samples collected wells MW-5 and MW-7.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Based upon the information summarized above, HETI concludes the following:

1. Volatile hydrocarbons were not detected in soil samples collected during this phase of assessment. Although specific details are unavailable to HETI, previous reports by KEI indicate that during underground storage tank removal and replacement, large volumes of soil were excavated and removed from the site. This over excavation may be the reason that no hydrocarbons were detected during soil sampling of borings.

2. The dissolved hydrocarbon plume appears to be centered in the vicinity of MW-6. The horizontal extent of the dissolved hydrocarbon plume has been defined to the north and east of the site. Additional wells are needed to fully delineate the extent of hydrocarbon impacted ground water.

3. A pump test or slug test should be performed on well MW-6 to determine the hydrologic characteristics of the shallow water bearing zone.

4. Quarterly sampling should be performed to collect depth to water and water quality data. This information will be used to monitor the distribution and migration of dissolved hydrocarbons beneath the site.

5. Following determination of the extent of the dissolved hydrocarbon plume and hydrologic characteristics of the subsurface sediments, the need for ground water extraction and remediation can be evaluated.

Table 1
SOIL SAMPLES

SUMMARY OF ANALYTICAL RESULTS
Former Mobil Station No. 10-L1X
San Lorenzo, California
Sampling Date: January 27 and 28, 1991

Boring-No.-Depth (ft)	TOG	TPHd	TPHg	B	T	E	X	Cd	Cr	Ni	Zn
B-5-5	4.2	ND	ND	ND	ND	ND	ND	ND	31	38	58
B-5-10	4.8	ND	ND	ND	ND	ND	ND	ND	43	43	58
B-5-15	4.8	ND	ND	ND	ND	ND	ND	0.53	29	36	48
B-6-4.5	NT	NT	ND	ND	ND	ND	ND	NT	NT	NT	NT
B-6-9.5	NT	NT	ND	ND	ND	ND	ND	NT	NT	NT	NT
B-6-14.5	NT	NT	ND	ND	ND	ND	ND	NT	NT	NT	NT
B-7-6	NT	NT	ND	ND	ND	ND	ND	NT	NT	NT	NT
B-7-11	NT	NT	ND	ND	ND	ND	ND	NT	NT	NT	NT
B-8-6	NT	NT	ND	ND	ND	ND	ND	NT	NT	NT	NT
B-8-11	NT	NT	ND	ND	ND	ND	ND	NT	NT	NT	NT
B-8-16	NT	NT	ND	ND	ND	ND	ND	NT	NT	NT	NT

All concentrations in mg/kg (ppm)

TOG = Total oil and grease by EPA Method 413.2 (IR)

TPHd = Total high boiling point petroleum hydrocarbons by EPA Method 8015 (DHS-modified)

TPHg = Total low to medium boiling point petroleum hydrocarbons by EPA Method 8015 (DHS-modified)

B = Benzene
T = Toluene
E = Ethylbenzene
X = Total xylenes
BTEX analyzed by EPA 8020 (DHS-modified)

Cd = Cadmium
Cr = Chromium
Ni = Nickel
Zn = Zinc
Cd, Cr, Ni, and Zn analyzed by EPA Method 6000 series

Note: Neither organic lead (O-Pb) nor halogenated volatlie organic (HVO) compounds were detected in concentrations exceeding the method detection limit.

ND = Not detected in concentrations exceeding the laboratory method detection limit.
NT = Not tested

Note: Neither organic lead (O-Pb) nor halongenated volatile organic (HVO) compounds P were detected in concentrations exceeding the method detection limt in all soil samples collected from boring B-5.

Table 2
WATER SAMPLES

SUMMARY OF ANALYTICAL RESULTS
Former Mobil Station No. 10-L1X
15884 Hesperian Boulevard
San Lorenzo, California
Sampling Date: February 12, 1992

MW No.	TPHg	B	T	E	X
MW-2	190	4.4	ND	4.7	3.8
MW-5	ND	ND	ND	ND	ND
MW-6	2,700	14	3.5	27	39
MW-7	ND	ND	ND	ND	ND

All concentrations in µg/l (ppb)

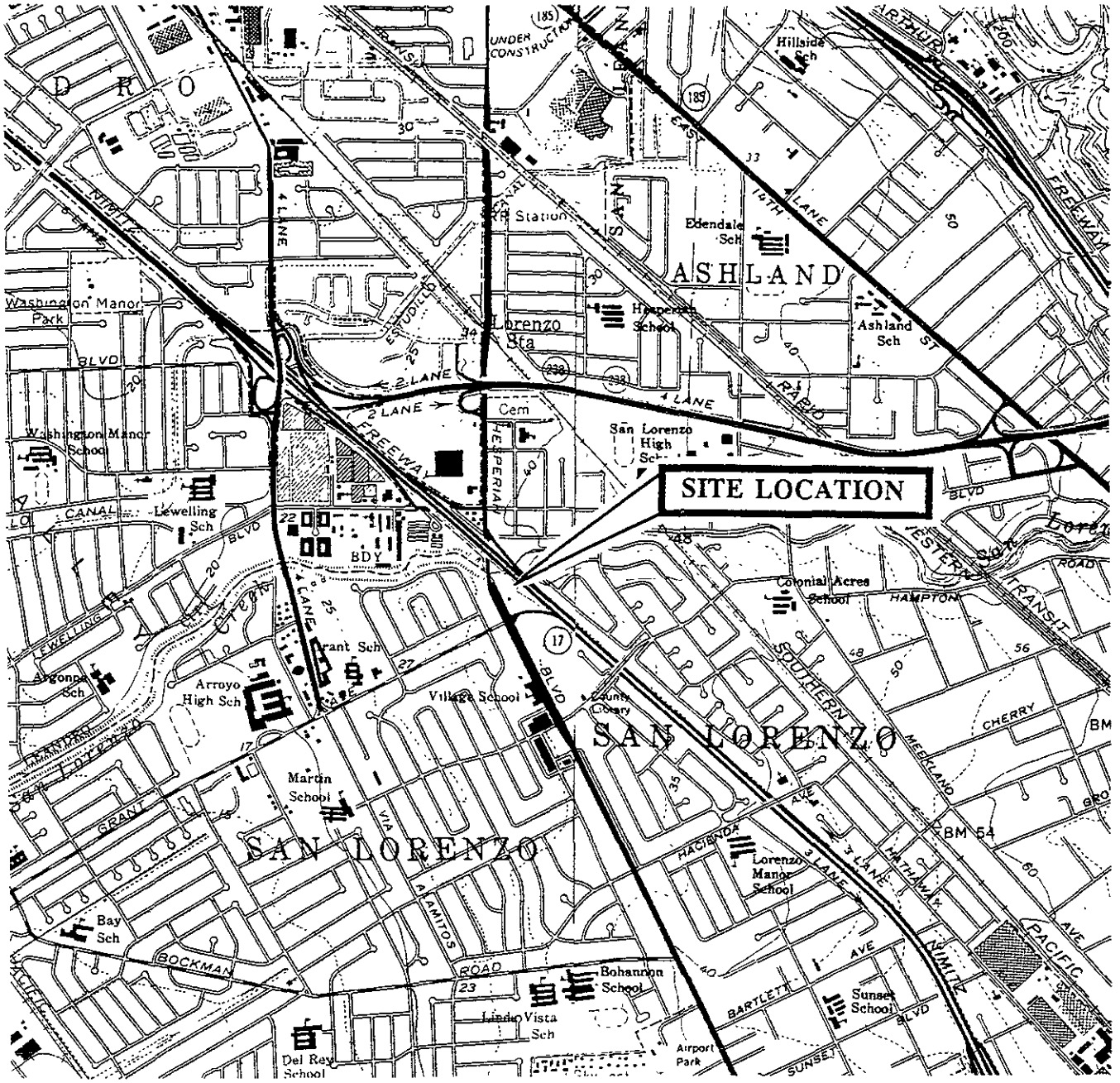
TPHg = Total low to medium boiling point petroleum hydrocarbons by EPA Method 8015 (DHS modified)

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

ND = Not detected in concentrations exceeding the method limit

Note: None of the following compounds were detected in concentrations exceeding the method detection limit in the water sample collected from MW-5:

- Total high boiling point petroleum hydrocarbons (TPHd)
- Total oil and grease (TOG)
- Halogenated volatile organics (HVO)
- Cadmium, chromium, nickel, zinc and organic lead (Cd, CR, Ni, Zn and O-Pb)

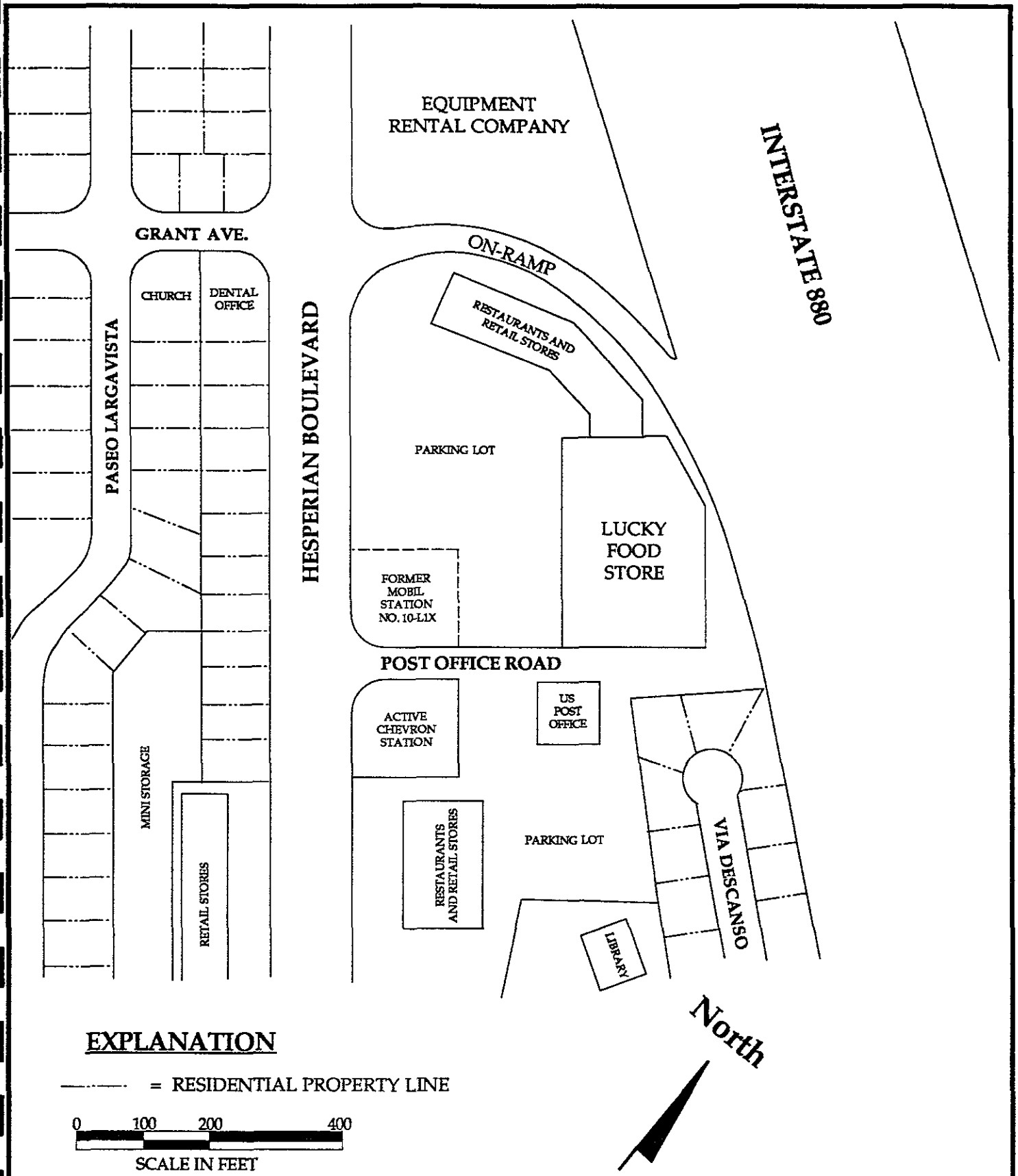


Source: U.S.Geological Survey
7.5 Minute Quadrangle Maps
Entitled: "San Leandro, California"
and "Hayward, California"
Revised 1980

HYDRO ENVIRONMENTAL TECHNOLOGIES, INC.

SITE LOCATION MAP
Former Mobil Service Station No. 10-L1X
15884 Hesperian Boulevard
San Lorenzo, California

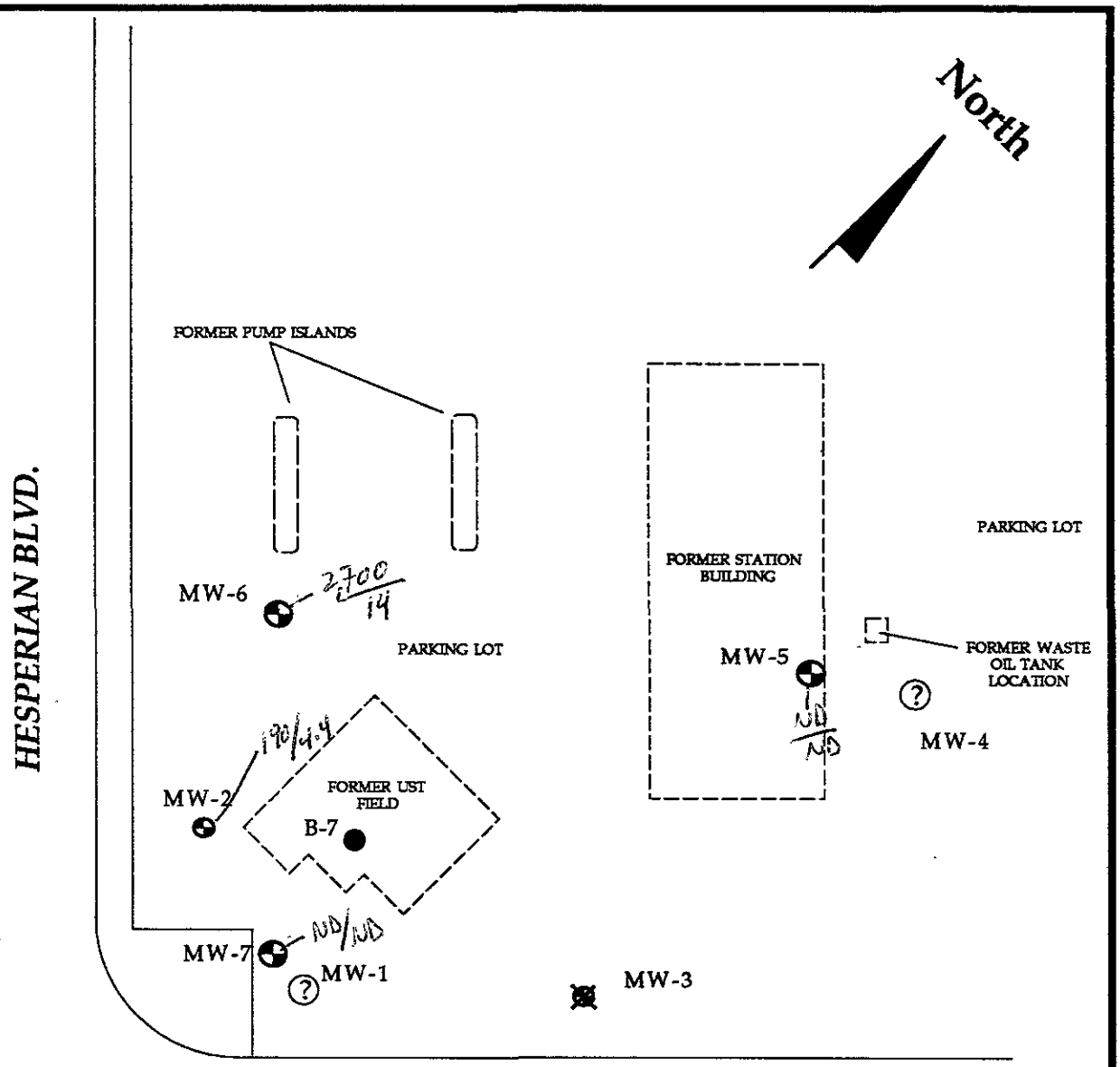
Job No.
8-019
Figure
1



HYDRO ENVIRONMENTAL TECHNOLOGIES, INC.

SITE VICINITY MAP
Former Mobil Service Station No. 10-L1X
15884 Hesperian Boulevard
San Lorenzo, California

Job No. **8-019**
Figure **2**



EXPLANATION

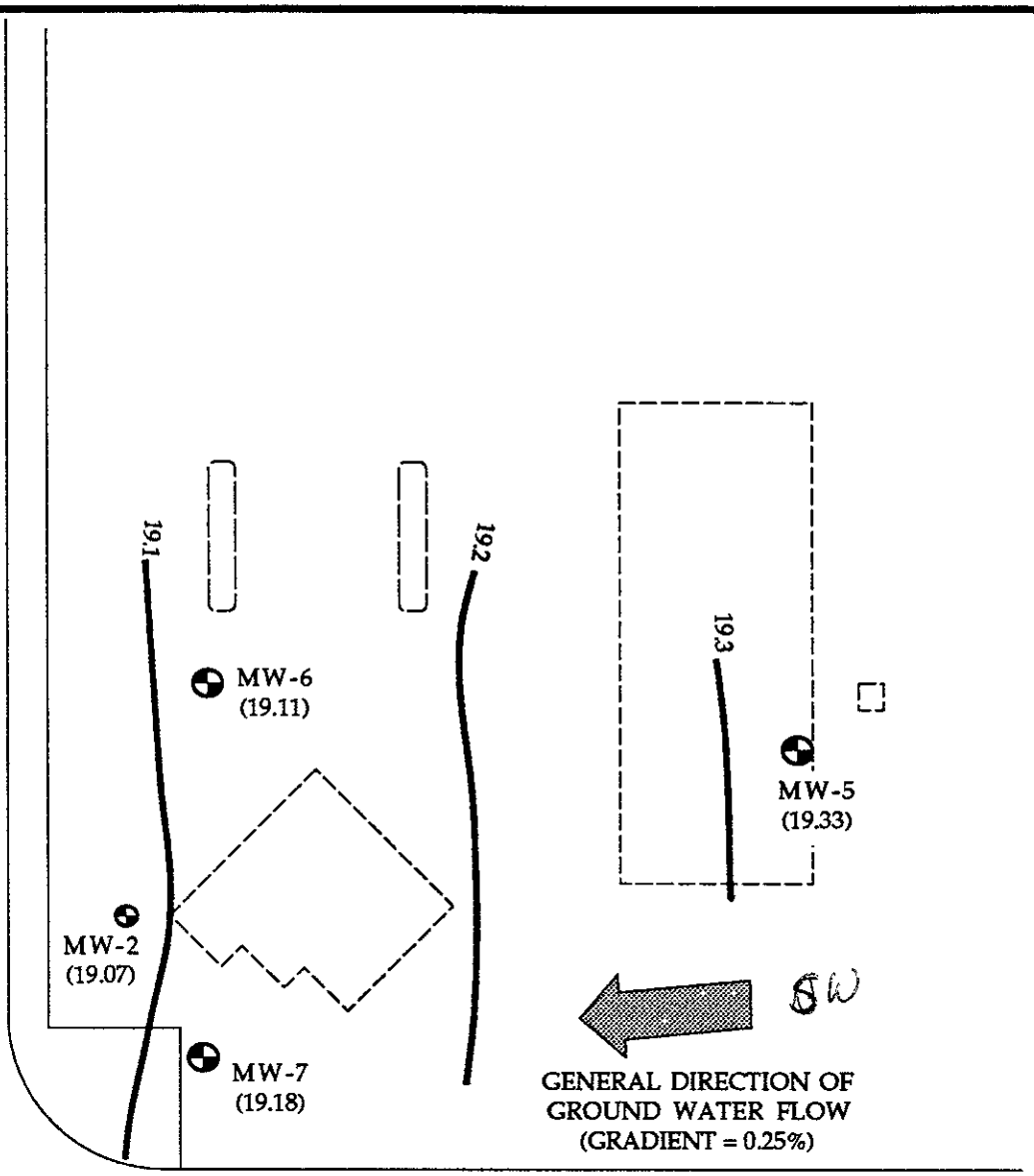
- MW-4 = FOUR-INCH WELL INSTALLED BY HETI
- MW-2 = TWO-INCH WELL INSTALLED BY KEI
- MW-3 = TWO-INCH MONITORING WELL DESTROYED BY HETI
- MW-1 = APPROXIMATE LOCATION OF TWO-INCH WELL INSTALLED BY KEI (EXISTENCE/CONDITION IS UNCERTAIN)
- B-7 = SOIL BORING BY HETI

TPHg (ppb)
Benzene (ppb)

0 30 60 90

SCALE IN FEET

HYDRO ENVIRONMENTAL TECHNOLOGIES, INC.	**SITE PLAN** Former Mobil Station No. 10-L1X 15884 Hesperian Blvd. San Lorenzo, California	Job No. 8-019 Figure 3



EXPLANATION

MW-4 = FOUR-INCH WELL INSTALLED BY HETI

MW-2 = EXISTING TWO-INCH WELL INSTALLED BY KEI

(19.11) = ELEVATION OF GROUND WATER - IN FEET BASED ON PROJECT DATUM

19.1 = ESTIMATED GROUND WATER ELEVATION CONTOUR IN FEET - BASED ON PROJECT DATUM

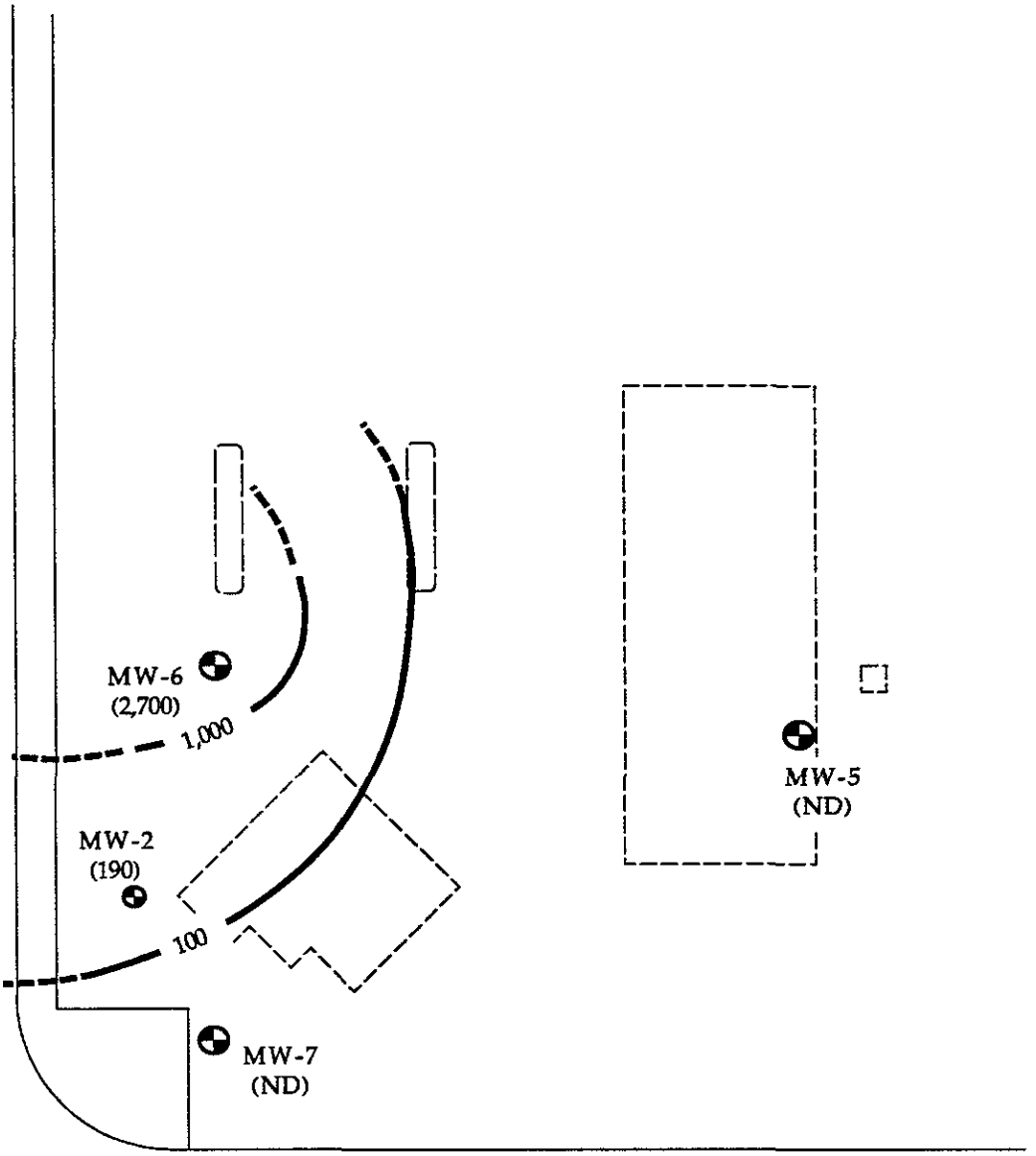
* BASED ON DATA COLLECTED 2/12/92

North

0 30 60 90

SCALE IN FEET

HYDRO ENVIRONMENTAL TECHNOLOGIES, INC.	POTENTIOMETRIC SURFACE MAP Former Mobil Station No. 10-L1X 15884 Hesperian Blvd. San Lorenzo, California	Job No. 8-019 Figure 4



EXPLANATION

MW-4 = FOUR-INCH WELL INSTALLED BY HETI

MW-2 = EXISTING TWO-INCH WELL INSTALLED BY KEI

(190) = CONCENTRATION OF DISSOLVED TPHg DETECTED IN GROUND WATER SAMPLE - IN PPB

100 = ESTIMATED LIMIT OF DESIGNATED CONCENTRATION OF TPHg DISSOLVED IN GROUND WATER - IN PPB (DASHED WHERE INFERRED)

* BASED ON DATA COLLECTED 2/12/92

North

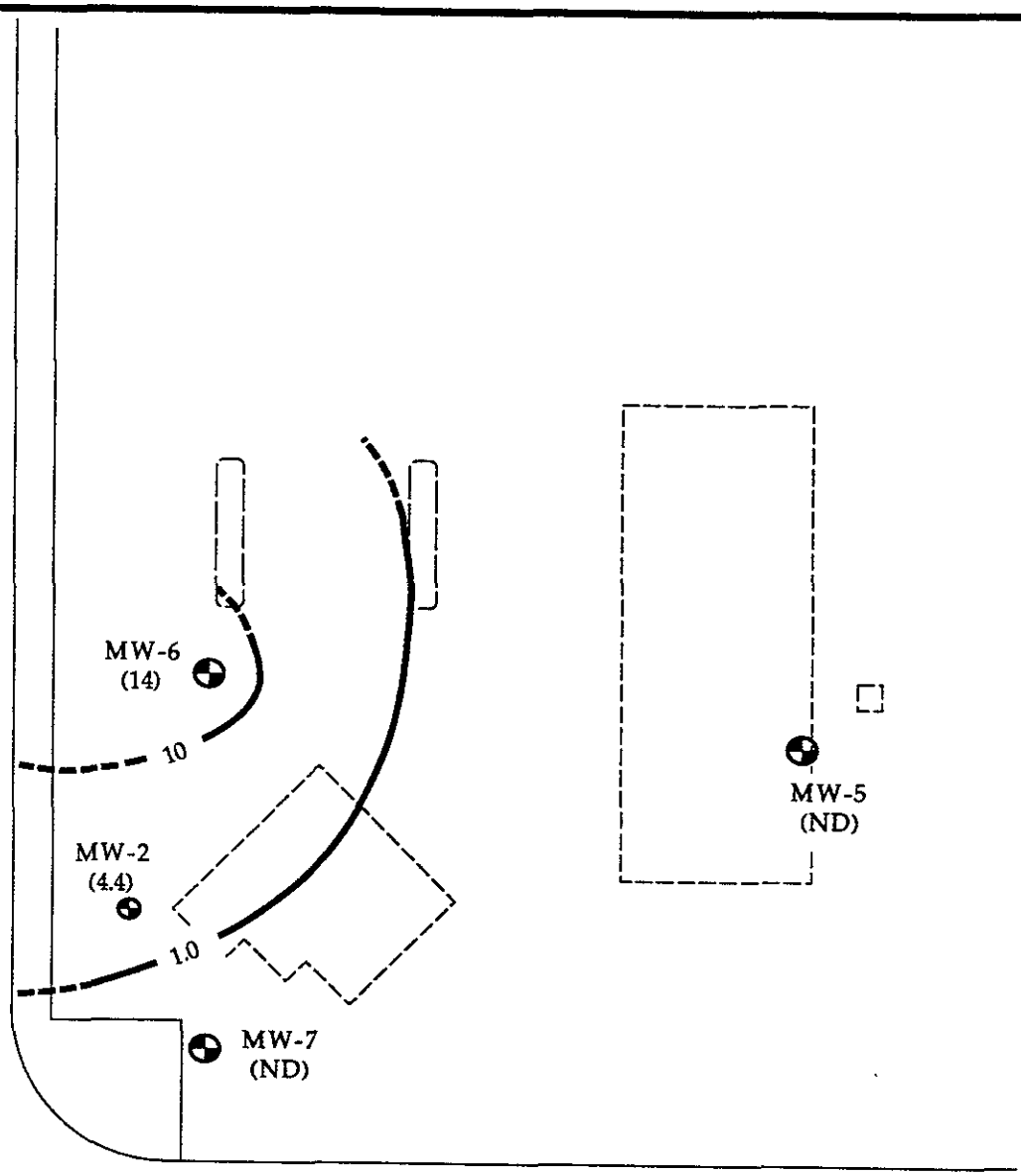
0 30 60 90

SCALE IN FEET

HYDRO ENVIRONMENTAL TECHNOLOGIES, INC.

TPHg ISOCONCENTRATION MAP
Former Mobil Station No. 10-L1X
15884 Hesperian Blvd.
San Lorenzo, California

Job No. 8-019
Figure 5



EXPLANATION

MW-4 = FOUR-INCH WELL INSTALLED BY HETI

MW-2 = EXISTING TWO-INCH WELL INSTALLED BY KEI

(190) = CONCENTRATION OF DISSOLVED BENZENE DETECTED IN GROUND WATER SAMPLE - IN PPB

100 = ESTIMATED LIMIT OF DESIGNATED CONCENTRATION OF BENZENE DISSOLVED IN GROUND WATER - IN PPB (DASHED WHERE INFERRED)

* BASED ON DATA COLLECTED 2/12/92

North

0 30 60 90

SCALE IN FEET

HYDRO ENVIRONMENTAL TECHNOLOGIES, INC.

BENZENE ISOCONCENTRATION MAP
Former Mobil Station No. 10-L1X
15884 Hesperian Blvd.
San Lorenzo, California

Job No. 8-019
Figure 6

UNIFIED SOIL CLASSIFICATION SYSTEM

(ASTM D-1586)

MAJOR DIVISIONS		LTR	DESCRIPTION
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	GW	Well-graded gravels or gravel-sand mixtures, little or no fines.
		GP	Poorly-graded gravels or gravel sand mixture, little or no fines.
		GM	Silty gravels, gravel-sand-clay mixtures.
		GC	Clayey gravels, gravel-sand-clay mixtures.
	SAND AND SANDY SOILS	SW	Well-graded sands or gravelly sands, little or no fines.
		SP	Poorly-graded sands or gravelly sands, little or no fines.
		SM	Silty sands, sand-silt mixtures.
		SC	Clayey sands, sand-clay mixtures.
FINE GRAINED SOILS	SILTS AND CLAYS LL<50	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
		OL	Organic silts and organic silt-clays of low plasticity.
	SILTS AND CLAYS LL>50	MH	Inorganic silts, micaceous or diatamaceous fine sandy or silty soils, elastic silts.
		CH	Inorganic clays of high plasticity, fat clays.
		OH	Organic clays of medium to high plasticity.
HIGHLY ORGANIC SOILS		Pt	Peat and other highly organic soils.

Retained for Analysis { } Sample Interval

SANDS & GRAVELS	BLOWS/FT*
VERY LOOSE	0 - 4
LOOSE	4 - 10
MED. DENSE	10 - 30
DENSE	30 - 50
VERY DENSE	OVER 50

SILTS & CLAYS	BLOWS/FT*
SOFT	0 - 4
FIRM	4 - 8
STIFF	8 - 16
VERY STIFF	16 - 32
HARD	OVER 32

Approximate stabalized water level

Approximate first encountered water level

NR = No Recovery
NT = Not Tested
NFWE = No Free Water Encountered
PHO = Petroleum Hydrocarbon Odor

S = Sampler sank into medium under the weight of the hammer (no blow count)
P = Sampler was pushed into medium by drilling rig (no blow count)

NOTE: Blow count represents the number of blows of a 140-lb hammer falling 30 inches per blow required to drive a sampler through the last 12 inches of an 18-inch penetration.

* Blows per foot using a standard penetrometer

No warranty is provided as to the continuity of soil strata between borings. Logs represent the soil section observed at the boring location on the date of drilling only.

HYDRO ENVIRONMENTAL TECHNOLOGIES, INC.

BORING LOG LEGEND

APPENDIX A

PLATE A-1

SITE/LOCATION: 15884 Hesperian Blvd, San Lorenzo, CA	BEGUN: 1/27/92	BORING DIAMETER: 10 inches	ANGLE/BEARING: 90°	BORING NO: B-5
DRILLING CONTRACTOR: Bayland Drilling	COMPLETED: 1/27/92	FIRST ENCOUNTERED WATER DEPTH: 19 feet		
OPERATOR: Robert Rogers	LOGGED BY: B. Gwinn	STATIC WATER DEPTH/DATE: 14 feet		
DRILL MAKE & MODEL: CME 75	SAMPLING METHOD: California Modified Split-Spoon (2.5" OD)			BOTTOM OF BORING: 23 feet
WELL MATERIAL: 4" SCH 40 PVC	SLOT SIZE: 0.010"	FILTER PACK: #2/16	WELL SEAL: Neat cement over bentonite	WELL NO.: MW-5

FIELD HEADSPACE *	DEPTH	SAMPLE	WATER LEVEL	WELL CONSTR.	GRAPHIC LOG	MATERIAL CLASSIFICATION & PHYSICAL DESCRIPTION
	1					ASPHALT and BASEROCK
	2					
	3					SAND (SP); yellow-brown, loose, dry, poorly graded, very fine grained, sub-rounded, trace fines.
	4					
0.0 ppm	5					
	6					
	7					
	8					
	9					Silty CLAY (CL); dark brown, firm, damp, low plasticity, 15-20% silt.
0.0 ppm	10					
	11					
	12					
	13					
	14		▼			
0.0 ppm	15					Sandy CLAY (CL); yellow-brown, firm, damp, low plasticity, 5-10% fine sand.
	16					
	17					
	18					
	19		▽			
	20					Silty CLAY (CL); olive yellow-brown, stiff, wet, low plasticity, 5-10% silt, trace charcoal bits.
	21					
	22					
	23					
	24					
	25					
	26					
	27					
	28					
	29					
*PID	30					

HYDRO ENVIRONMENTAL TECHNOLOGIES, INC.

DATE:

APPROVED BY: Frederick G. Moss, PE No. 35162

SOIL BORING LOG B-5 AND WELL CONSTRUCTION MW-5

Former Mobil Service Station No. 10-L1X
15884 Hesperian Boulevard
San Lorenzo, California

PLATE
A-2

JOB NO.
8-019

SITE/LOCATION 15884 Hesperian Blvd, San Lorenzo, CA	BEGUN 1/27/92	BORING DIAMETER 10 inches	ANGLE/BEARING 90°	BORING NO B-6	
DRILLING CONTRACTOR Bayland Drilling	COMPLETED 1/27/92	FIRST ENCOUNTERED WATER DEPTH 18 feet			
OPERATOR Robert Rogers	LOGGED BY H. Hurkmans	STATIC WATER DEPTH/DATE 13 feet			
DRILL MAKE & MODEL CME 75	SAMPLING METHOD California Modified Split-Spoon (2.5" OD)			BOTTOM OF BORING 23 feet	
WELL MATERIAL 4" SCH 40 PVC	SLOT SIZE 0.010"	FILTER PACK #2/16	WELL SEAL Neat cement over bentonite		WELL NO. MW-6

FIELD HEADSPACE *	DEPTH	SAMPLE	WATER LEVEL	WELL CONSTR.	GRAPHIC LOG	MATERIAL CLASSIFICATION & PHYSICAL DESCRIPTION
	1					ASPHALT and BASEROCK
	2					
	3					
0.0 ppm	4					Gravelly SAND (SW); tan, loose, dry, well graded, medium grained, sub-angular to sub-rounded, 10-15% sub-rounded pebble gravel.
	5					
	6					
	7					
	8					
6.0 ppm	9					Silty CLAY (CL); dark brown, firm, damp, low plasticity, 10-15% silt, trace root holes (1-4 mm in diameter).
	10					
	11					
	12					
	13		▼			
11 ppm	14					Silty CLAY (CL); olive green, stiff, damp, low plasticity, 10-15% silt.
	15					
	16					
	17					
	18		▽			
	19					
	20					At 20 feet; as above, tan, wet, trace fine pebble gravel.
	21					
	22					
	23					
	24					
	25					
	26					
	27					
	28					
	29					
*PID	30					

HYDRO ENVIRONMENTAL TECHNOLOGIES, INC.

DATE:

APPROVED BY: Frederick G. Moss, PE No. 35162

SOIL BORING LOG B-6 AND WELL CONSTRUCTION MW-6

Former Mobil Service Station No. 10-L1X
15884 Hesperian Boulevard
San Lorenzo, California

PLATE
A-3

JOB NO.
8-019

SITE/LOCATION	BEGUN	BORING DIAMETER	ANGLE/BEARING	BORING NO
15884 Hesperian Blvd, San Lorenzo, CA	1/28/92	10 inches	90°	B-7
DRILLING CONTRACTOR	**COMPLETED**	**FIRST ENCOUNTERED WATER DEPTH**		
Bayland Drilling	1/28/92	Not encountered		
OPERATOR	**LOGGED BY**	**STATIC WATER DEPTH/DATE**		
Robert Rogers	H. Hurkmans	NA		
DRILL MAKE & MODEL	**SAMPLING METHOD**			**BOTTOM OF BORING**
CME 75	California Modified Split-Spoon (2.5" OD)			15 feet
WELL MATERIAL	**SLOT SIZE**	**FILTER PACK**	**BORING SEAL**	**WELL NO.**
NA	NA	NA	Neat cement	NA

FIELD HEADSPACE *	DEPTH	SAMPLE	WATER LEVEL	WELL CONSTR.	GRAPHIC LOG	MATERIAL CLASSIFICATION & PHYSICAL DESCRIPTION
	1–4			No Well Installed		ASPHALT and BASEROCK
14 ppm	5–11					Gravelly CLAY (CL); brown, very stiff, damp, low plasticity, 10-15% fine pebble gravel, trace to 5% silt and fine grained sand.
183 ppm						
110 ppm	12–15					GRAVEL (GP); brown, dense, damp, poorly graded, fine pebble gravel, rounded, 3-5% fines.
	16–30					

*PID

HYDRO ENVIRONMENTAL TECHNOLOGIES, INC.

DATE:

APPROVED BY: Frederick G. Moss, PE No. 35162

SOIL BORING LOG B-7

Former Mobil Service Station No. 10-L1X
15884 Hesperian Boulevard
San Lorenzo, California

PLATE
A-4

JOB NO.
8-019

SITE/LOCATION 15884 Hesperian Blvd, San Lorenzo, CA	BEGUN 1/28/92	BORING DIAMETER 10 inches	ANGLE/BEARING 90°	BORING NO B-8	
DRILLING CONTRACTOR Bayland Drilling	COMPLETED 1/28/92	FIRST ENCOUNTERED WATER DEPTH 19 feet			
OPERATOR Robert Rogers	LOGGED BY H. Hurkmans	STATIC WATER DEPTH/DATE 13 feet			
DRILL MAKE & MODEL CME 75	SAMPLING METHOD California Modified Split-Spoon (2.5" OD)			BOTTOM OF BORING 23.5 feet	
WELL MATERIAL 4" SCH 40 PVC	SLOT SIZE 0.010"	FILTER PACK #2/12	WELL SEAL Neat cement over bentonite		WELL NO. MW-7

FIELD HEADSPACE *	DEPTH	SAMPLE	WATER LEVEL	WELL CONSTR.	GRAPHIC LOG	MATERIAL CLASSIFICATION & PHYSICAL DESCRIPTION
	1–4					ASPHALT and BASEROCK
0.0 ppm	5–8					Silty SAND (SM); light brown, loose, damp, moderately graded, fine grained, sub-rounded, 10-15% silt, trace fine pebble gravel, trace root fragments.
0.0 ppm	9–12					Silty CLAY (CL); dark brown, firm, damp, low plasticity, 10-15% silt, trace root holes (1-4 mm in diameter).
575 ppm	13–18		▼			Silty CLAY (CL); olive green, stiff, damp, low plasticity, 10-15% silt, laminae of very fine sand (<1 mm).
	19–23		▽			At 20 feet; as above, olive-tan, wet, trace fine pebble gravel.
*PID	24–30					

HYDRO ENVIRONMENTAL TECHNOLOGIES, INC.

DATE:

APPROVED BY: Frederick G. Moss, PE No. 35162

SOIL BORING LOG B-8 AND WELL CONSTRUCTION MW-7

Former Mobil Service Station No. 10-L1X
15884 Hesperian Boulevard
San Lorenzo, California

PLATE
A-5

JOB NO.
8-019

RECEIVED DEC 2 [illegible]

8-019
well permits

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
5997 PARKSIDE DRIVE • PLEASANTON, CALIFORNIA 94588 • (510) 484-2600

19 December 1991

Hydro Environmental Technologies, Inc.
2363 Mariner Square Drive, Suite 243
Alameda, CA 94501

Gentlemen:

Enclosed is Drilling permit 91703 for a monitoring well construction project at 15884 Hesperian Boulevard in San Lorenzo for Mobil Oil Corporation.

Please note that permit condition A-2 requires that a well construction report be submitted after completion of the work. The report should include drilling and completion logs, location sketch, and permit number.

If you have any questions, please contact Wyman Hong or me at 484-2600.

Very truly yours,

Craig A. Mayfield

Craig A. Mayfield
Water Resources Engineer

WH:mm
Enc.

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

5997 PARKSIDE DRIVE • PLEASANTON, CALIFORNIA 94588 • (510) 484-2600

DRILLING PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

LOCATION OF PROJECT 15884 Hesperian Blvd., San Lorenzo, CA

CLIENT
Name Mobil Oil Corporation
Address 3800 W. Alameda Av, Suite 2000 Phone (818) 953-2626
City Burbank, CA Zip 91505

APPLICANT
Name Hydro-Environmental Technologies
Address 2363 Mariner Square Dr., Ste. 243 Phone (510) 521-2684
City Alameda, CA Zip 94501

TYPE OF PROJECT

Well Construction		Geotechnical Investigation	
Cathodic Protection	___	General	___
Water Supply	___	Contamination	___
Monitoring	3	Well Destruction	1

PROPOSED WATER SUPPLY WELL USE
Domestic ___ Industrial ___ Other Monitoring
Municipal ___ Irrigation ___

DRILLING METHOD:
Mud Rotary ___ Air Rotary ___ Auger X
Cable ___ Other ___

DRILLER'S LICENSE NO. C57-374152

WELL PROJECTS
Drill Hole Diameter 10 in. Maximum
Casing Diameter 4 in. Depth 25 ft.
Surface Seal Depth 9 ft. Number 3

GEOTECHNICAL PROJECTS
Number of Borings ___ Maximum
Hole Diameter ___ in. Depth ___ ft.

ESTIMATED STARTING DATE 1/15/91
ESTIMATED COMPLETION DATE 1/30/92

I hereby agree to comply with all requirements of this permit and Alameda County Ordinance No. 73-68.

APPLICANT'S SIGNATURE [signature] Date 12/16/91
Brian Gwinn - Staff Geologist

FOR OFFICE USE

PERMIT NUMBER 91703
LOCATION NUMBER ___

PERMIT CONDITIONS

Circled Permit Requirements Apply

(A.) GENERAL
1. A permit application should be submitted so as to arrive at the Zone 7 office five days prior to proposed starting date.
2. Submit to Zone 7 within 60 days after completion of permitted work the original Department of Water Resources Water Well Drillers Report or equivalent for well projects, or drilling logs and location sketch for geotechnical projects.
3. Permit is void if project not begun within 90 days of approval date.

(B.) WATER WELLS, INCLUDING PIEZOMETERS
1. Minimum surface seal thickness is two inches of cement grout placed by tremie.
2. Minimum seal depth is 50 feet for municipal and industrial wells or 20 feet for domestic and irrigation wells unless a lesser depth is specially approved. Minimum seal depth for monitoring wells is the maximum depth practicable or 20 feet.

C. GEOTECHNICAL. Backfill bore hole with compacted cuttings or heavy bentonite and upper two feet with compacted material. In areas of known or suspected contamination, tremied cement grout shall be used in place of compacted cuttings.

D. CATHODIC. Fill hole above anode zone with concrete placed by tremie.

E. WELL DESTRUCTION. See attached.

Approved Wyman Hong Date 18 Dec 91
Wyman Hong

51991

FIELD CREW HEALTH & SAFETY PLAN

PRE-ACTIVITY BRIEFING

Project Location: 15884 Hesperian Blvd, San Lorenzo CA

Client: Mobil Oil Corp. Job No. 8-019

POTENTIAL PHYSICAL HAZARDS AT WORKSITE: Underground/overhead utility lines; flying/falling objects; pinch points/caught between objects; exertion or strain; lifting, slipping, tripping, falling, moving equipment and vehicle traffic at worksite; noise creating a hazardous situation; burns from steam or engine parts; heat stress or exhaustion. Trash with nails; broken glass, fires, explosion, electrical shock.

CHEMICAL HAZARDS: May involve exposure to methane gas at landfills; gasoline vapors, solvents, etc. Chemical hazards may include respiratory and skin contact.

RESPIRATORY PROTECTIVE EQUIPMENT: None required unless organic vapor levels in work area exceed current state or federal minimum, then half-face respirator with appropriate vapor filter cartridge as required.

PROTECTIVE CLOTHING AND EQUIPMENT: Normal work clothes: No shorts, hardhat mandatory for all personnel working at site; steel-toed boots recommended for geologist, required for driller and helper. Ear and eye protection as needed. Hazardous conditions require nitrile gloves, Tyvek coveralls, and respirators.

SITE SPECIFIC INSTRUCTIONS: Driller will examine all wires/cables and ropes daily. Drilling equipment will be maintained in safe operating condition and meet state safety requirements. Know location of first aid kit, fire extinguisher, and telephone. Block/chock rig as required. No drilling or working at site without project geologist being present. Use hand tools safely. Driller and helper will wear hard hat at all times while at job.

Driller's Signature _____ Date: 2/7/92

Helper _____ Date: 2/7/92

Project Geologist _____ Date: 1/27/92

NEAREST HOSPITAL OR CLINIC Kaiser Permanente Med. Center

HOSPITAL ADDRESS & DIRECTIONS FROM JOB SITE Proceed South on Hesperian Blvd (4 miles). Hospital at Hesperian Blvd and W. Tennyson Road.

EMERGENCY PROCEDURE: Begin appropriate first-aid, Send person for help. Call 911

HYDRO-ENVIRONMENTAL TECHNOLOGIES, INC.

SITE SURVEY DATA SHEET

Location: 15884 Hesperian Boulevard, San Lorenzo, CA

Client: Mobil Oil Corporation **Job No.** 8-019

Station No.	Backshot	Height of Instrument	Foreshot	Well No	Elevation of Top of Casing	Description of Backshot
1	3.34	38.34		BM-1		Temporary Benchmark - Fire Hydrant
			6.53	MW-2	31.81	
			5.42	MW-5	32.92	
			5.66	MW-6	32.68	
			5.26	MW-7	33.08	
	3.34					Closure

TOC = Top of PVC Casing – North Edge

All measurements in feet & hundredths

TBM (Temporary Benchmark)
35 ft. arbitrary datum =
LOCATION & DESCRIPTION:
Top of Fire Hydrant -
NE Corner of Hesperian Blvd
and Post Office Rd

HYDRO-ENVIRONMENTAL TECHNOLOGIES, INC.

WATER TABLE ELEVATION DATA

Location: 15884 Hesperian Blvd., San Lorenzo, California

Client: MOBIL OIL CORP. **Job No.** 8-019

MW No.	Elev. T.C.*	D T W	Date Measured	Elev. Water	Remarks/Observations
MW-2	31.81	12.74	2/12/92	19.07	
MW-5	32.92	13.59	2/12/92	19.33	
MW-6	32.68	13.57	2/12/92	19.11	
MW-7	33.08	13.90	2/12/92	19.18	

T. C.* = Top of PVC Casing – North Edge

Project Datum:
Top of Fire Hydrant -
Northeast Corner of
Hesperian and Post Office Rd.
Assumed Elev = 35 MSL

PURGED/SAMPLED BY: BC/MA DATE: 2/12/92

GAUGING DATA:

Depth to bottom: 28.35 ft.

Depth to water: 12.74 ft.

Saturated Thickness: 15.61 ft.

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

Well casing volume 2.49 gallons

volumes to purge x 10 vols.

*Total volume to purge = 24.9 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
	1155	0			
	1210	25			
Sample at					
After sampling					

Color: Olive-tan Turbidity: Moderate

Recharge: Good Petroleum hydrocarbon odor: faint or SPP Ø 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	8250 8270

Other: _____

HYDRO ENVIRONMENTAL TECHNOLOGIES, INC.

MONITORING WELL PURGE/SAMPLE SHEET

WELL # MW-2

LOCATION Mobil / San Lorenzo

JOB NO. 8-019

PURGED/SAMPLED BY: BG/HH DATE: 2/12/92

GAUGING DATA:

Depth to bottom: 22.44 ft.

Depth to water: 13.59 ft.

Saturated Thickness: 8.85 ft.

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

Well casing volume 5.75 gallons

volumes to purge x 10 vols.

*Total volume to purge = 57.5 gallons

* unless chemical parameters stabilize earlier

PURGING DATA:

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

	Time	Volume (gallons)	Temp. (°F)	Conductivity (mS/cm)	pH
	1130	0			
dry→	1140	20			
dry→	1215	35			
Sample at					
After sampling					

Color: Tan Turbidity: Moderate

Recharge: Poor Petroleum hydrocarbon odor: None or SPP 0 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 # MW-5

LOCATION Mobil / San Lorenzo

JOB NO. 8-019

PURGED/SAMPLED BY: BG & HH DATE: 2/12/92

GAUGING DATA:

Depth to bottom: 22.50 ft.

Depth to water: 13.57 ft.

Saturated Thickness: 8.93 ft.

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

Well casing volume 5.80 gallons

volumes to purge x 10 vols.

*Total volume to purge = 58.0 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
	1142	0			
dry→	1146	15			
dry→	1230	45			
Sample at					
After sampling					

Color: Tan Turbidity: Moderate

Recharge: Poor Petroleum hydrocarbon odor: None or SPP Ø 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 # MW-6

LOCATION Mobil / San Lorenzo

JOB NO. 8-019

PURGED/SAMPLED BY: RS & DD DATE: 2/12/02

GAUGING DATA:

Depth to bottom: 21.25* ft.

Depth to water: 13.90 ft.

Saturated Thickness: 7.35 ft.

Lots of sediment @ bottom

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

Well casing volume 4.77 gallons

volumes to purge x 10 vols.

*Total volume to purge = 47.70 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
	1150	0			
dry→	1200	8			
dry→	1255	22			
Sample at					
After sampling					

Color: tan Turbidity: moderate

Recharge: poor Petroleum hydrocarbon odor: none or SPP Ø 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 # MW-7

LOCATION Mobil/San Lorenzo

JOB NO. 8-019

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

RECEIVED FEB 0 9 1992

Hydro Environmental	Client Project ID:	10-L1X, #8-019, Mobil	Sampled:	1/27-28/92
2363 Mariner Square Dr., Bldg. 3, Ste 243	Matrix Descript:	Soil	Received:	Jan 30, 1992
Alameda, CA 94501	Analysis Method:	EPA 5030/8015/8020	Analyzed:	1/31-2/1/92
Attention: Brian Gwinn	First Sample #:	201-4614	Reported:	Feb 6, 1992

TOTAL PETROLEUM FUEL HYDROCARBONS with BTEX DISTINCTION (EPA 8015/8020)

Sample Number	Sample Description	Low/Medium B.P. Hydrocarbons mg/kg (ppm)	Benzene mg/kg (ppm)	Toluene mg/kg (ppm)	Ethyl Benzene mg/kg (ppm)	Xylenes mg/kg (ppm)
201-4614	B-5-5'	N.D.	N.D.	N.D.	N.D.	N.D.
201-4615	B-5-10'	N.D.	N.D.	N.D.	N.D.	N.D.
201-4616	B-5-15'	N.D.	N.D.	N.D.	N.D.	N.D.
201-4617	B-6-4.5'	N.D.	N.D.	N.D.	N.D.	N.D.
201-4618	B-6-9.5'	N.D.	N.D.	N.D.	N.D.	N.D.
201-4619	B-6-14.5'	N.D.	N.D.	N.D.	N.D.	N.D.
201-4620	B-7-6'	N.D.	N.D.	N.D.	N.D.	N.D.
201-4621	B-7-11'	N.D.	N.D.	N.D.	N.D.	N.D.
201-4622	B-8-6'	N.D.	N.D.	N.D.	N.D.	N.D.
201-4623	B-8-11'	N.D.	N.D.	N.D.	N.D.	N.D.
Detection Limits:		**1.0**	**0.0050**	**0.0050**	**0.0050**	**0.0050**

Low to Medium Boiling Point Hydrocarbons are quantitated against a gasoline standard.
Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Maile A. Springer
Project Manager

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Hydro Environmental	Client Project ID:	10-L1X, #8-019, Mobil	Sampled:	Jan 28, 1992
2363 Mariner Square Dr., Bldg. 3, Ste 243	Matrix Descript:	Soil	Received:	Jan 30, 1992
Alameda, CA 94501	Analysis Method:	EPA 5030/8015/8020	Analyzed:	Jan 31, 1992
Attention: Brian Gwinn	First Sample #:	201-4624	Reported:	Feb 6, 1992

TOTAL PETROLEUM FUEL HYDROCARBONS with BTEX DISTINCTION (EPA 8015/8020)

Sample Number	Sample Description	Low/Medium B.P. Hydrocarbons mg/kg (ppm)	Benzene mg/kg (ppm)	Toluene mg/kg (ppm)	Ethyl Benzene mg/kg (ppm)	Xylenes mg/kg (ppm)
201-4624	B-8-16'	N.D.	N.D.	N.D.	N.D.	N.D.
Detection Limits:		**1.0**	**0.0050**	**0.0050**	**0.0050**	**0.0050**

Low to Medium Boiling Point Hydrocarbons are quantitated against a gasoline standard.
Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Maile A. Springer
Project Manager

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Hydro Environmental	Client Project ID:	10-L1X, #8-019, Mobil	Sampled:	Jan 27, 1992
2363 Mariner Square Dr., Bldg. 3, Ste 243	Matrix Descript:	Soil	Received:	Jan 30, 1992
Alameda, CA 94501	Analysis Method:	EPA 3550/8015	Extracted:	Jan 31, 1992
Attention: Brian Gwinn	First Sample #:	291-4514	Analyzed:	Jan 31, 1992
			Reported:	Feb 6, 1992

TOTAL PETROLEUM FUEL HYDROCARBONS (EPA 8015)

Sample Number	Sample Description	High B.P. Hydrocarbons mg/kg (ppm)
291-4514	B-5-5'	N.D.
291-4515	B-5-10'	N.D.
291-4516	B-5-15'	N.D.

Detection Limits:	**1.0**

High Boiling Point Hydrocarbons are quantitated against a diesel fuel standard.
Analytes reported as N.D. were not present above the stated limit of detection.

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Maile A. Springer
Project Manager

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Hydro Environmental	Client Project ID:	10-L1X, #8-019, Mobil	Sampled:	Jan 27, 1992
2363 Mariner Square Dr., Bldg. 3, Ste 243	Matrix Descript:	Soil	Received:	Jan 30, 1992
Alameda, CA 94501	Analysis Method:	EPA 413.2 (I.R.)		
Attention: Brian Gwinn	First Sample #:	201-4614	Analyzed:	Feb 4, 1992
			Reported:	Feb 6, 1992

TOTAL RECOVERABLE OIL & GREASE

Sample Number	Sample Description	Oil & Grease mg/kg (ppm)
201-4614	B-5-5'	4.2
201-4615	B-5-10'	4.8
201-4616	B-5-15'	4.8

Detection Limits:	**3.0**

Analytes reported as N.D. were not present above the stated limit of detection.

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Project Manager

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(415) 364-9600 • FAX (415) 364-9233

Hydro Environmental	Client Project ID:	10-L1X, #8-019, Mobil	Sampled:	Jan 27, 1992
2363 Mariner Square Dr., Bldg. 3, Ste 243	Sample Descript:	Soil, B-5-5'	Received:	Jan 30, 1992
Alameda, CA 94501	Analysis Method:	EPA 5030/8010	Analyzed:	Feb 5, 1992
Attention: Brian Gwinn	Lab Number:	201-4614	Reported:	Feb 6, 1992

HALOGENATED VOLATILE ORGANICS (EPA 8010)

Analyte	Detection Limit µg/kg	Sample Results µg/kg
Bromodichloromethane	5.0	N.D.
Bromoform	5.0	N.D.
Bromomethane	5.0	N.D.
Carbon tetrachloride	5.0	N.D.
Chlorobenzene	5.0	N.D.
Chloroethane	5.0	N.D.
2-Chloroethylvinyl ether	5.0	N.D.
Chloroform	5.0	N.D.
Chloromethane	5.0	N.D.
Dibromochloromethane	5.0	N.D.
1,2-Dichlorobenzene	5.0	N.D.
1,3-Dichlorobenzene	5.0	N.D.
1,4-Dichlorobenzene	5.0	N.D.
1,1-Dichloroethane	5.0	N.D.
1,2-Dichloroethane	5.0	N.D.
1,1-Dichloroethene	5.0	N.D.
cis-1,2-Dichloroethene	5.0	N.D.
trans-1,2-Dichloroethene	5.0	N.D.
1,2-Dichloropropane	5.0	N.D.
cis-1,3-Dichloropropene	5.0	N.D.
trans-1,3-Dichloropropene	5.0	N.D.
Methylene chloride	50	N.D.
1,1,2,2-Tetrachloroethane	5.0	N.D.
Tetrachloroethene	5.0	N.D.
1,1,1-Trichloroethane	5.0	N.D.
1,1,2-Trichloroethane	5.0	N.D.
Trichloroethene	5.0	N.D.
Trichlorofluoromethane	5.0	N.D.
Vinyl chloride	5.0	N.D.

Analytes reported as N.D. were not present above the stated limit of detection.

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Project Manager

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(415) 364-9600 • FAX (415) 364-9233

Hydro Environmental	Client Project ID:	10-L1X, #8-019, Mobil	Sampled:	Jan 27, 1992
2363 Mariner Square Dr., Bldg. 3, Ste 243	Sample Descript:	Soil, B-5-10'	Received:	Jan 30, 1992
Alameda, CA 94501	Analysis Method:	EPA 5030/8010	Analyzed:	Feb 5, 1992
Attention: Brian Gwinn	Lab Number:	201-4615	Reported:	Feb 6, 1992

HALOGENATED VOLATILE ORGANICS (EPA 8010)

Analyte	Detection Limit µg/kg	Sample Results µg/kg
Bromodichloromethane	5.0	N.D.
Bromoform	5.0	N.D.
Bromomethane	5.0	N.D.
Carbon tetrachloride	5.0	N.D.
Chlorobenzene	5.0	N.D.
Chloroethane	5.0	N.D.
2-Chloroethylvinyl ether	5.0	N.D.
Chloroform	5.0	N.D.
Chloromethane	5.0	N.D.
Dibromochloromethane	5.0	N.D.
1,2-Dichlorobenzene	5.0	N.D.
1,3-Dichlorobenzene	5.0	N.D.
1,4-Dichlorobenzene	5.0	N.D.
1,1-Dichloroethane	5.0	N.D.
1,2-Dichloroethane	5.0	N.D.
1,1-Dichloroethene	5.0	N.D.
cis-1,2-Dichloroethene	5.0	N.D.
trans-1,2-Dichloroethene	5.0	N.D.
1,2-Dichloropropane	5.0	N.D.
cis-1,3-Dichloropropene	5.0	N.D.
trans-1,3-Dichloropropene	5.0	N.D.
Methylene chloride	50	N.D.
1,1,2,2-Tetrachloroethane	5.0	N.D.
Tetrachloroethene	5.0	N.D.
1,1,1-Trichloroethane	5.0	N.D.
1,1,2-Trichloroethane	5.0	N.D.
Trichloroethene	5.0	N.D.
Trichlorofluoromethane	5.0	N.D.
Vinyl chloride	5.0	N.D.

Analytes reported as N.D. were not present above the stated limit of detection.

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Maile A. Springer
Project Manager

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680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Hydro Environmental	Client Project ID:	10-L1X, #8-019, Mobil	Sampled:	Jan 27, 1992
2363 Mariner Square Dr., Bldg. 3, Ste 243	Sample Descript:	Soil, B-5-15'	Received:	Jan 30, 1992
Alameda, CA 94501	Analysis Method:	EPA 5030/8010	Analyzed:	Feb 5, 1992
Attention: Brian Gwinn	Lab Number:	201-4616	Reported:	Feb 6, 1992

HALOGENATED VOLATILE ORGANICS (EPA 8010)

Analyte	Detection Limit µg/kg	Sample Results µg/kg
Bromodichloromethane	5.0	N.D.
Bromoform	5.0	N.D.
Bromomethane	5.0	N.D.
Carbon tetrachloride	5.0	N.D.
Chlorobenzene	5.0	N.D.
Chloroethane	5.0	N.D.
2-Chloroethylvinyl ether	5.0	N.D.
Chloroform	5.0	N.D.
Chloromethane	5.0	N.D.
Dibromochloromethane	5.0	N.D.
1,2-Dichlorobenzene	5.0	N.D.
1,3-Dichlorobenzene	5.0	N.D.
1,4-Dichlorobenzene	5.0	N.D.
1,1-Dichloroethane	5.0	N.D.
1,2-Dichloroethane	5.0	N.D.
1,1-Dichloroethene	5.0	N.D.
cis-1,2-Dichloroethene	5.0	N.D.
trans-1,2-Dichloroethene	5.0	N.D.
1,2-Dichloropropane	5.0	N.D.
cis-1,3-Dichloropropene	5.0	N.D.
trans-1,3-Dichloropropene	5.0	N.D.
Methylene chloride	50	N.D.
1,1,2,2-Tetrachloroethane	5.0	N.D.
Tetrachloroethene	5.0	N.D.
1,1,1-Trichloroethane	5.0	N.D.
1,1,2-Trichloroethane	5.0	N.D.
Trichloroethene	5.0	N.D.
Trichlorofluoromethane	5.0	N.D.
Vinyl chloride	5.0	N.D.

Analytes reported as N.D. were not present above the stated limit of detection.

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Project Manager

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Hydro Environmental	Client Project ID:	10-L1X, #8-019, Mobil	Sampled:	Jan 27, 1992
2363 Mariner Square Dr., Bldg. 3, Ste 243	Sample Descript:	Soil, B-5-5'	Received:	Jan 30, 1992
Alameda, CA 94501			Extracted:	Jan 31, 1992
Attention: Brian Gwinn	Lab Number:	201-4614	Analyzed:	1/31-2/3/92
			Reported:	Feb 6, 1992

LABORATORY ANALYSIS

Analyte	Detection Limit mg/kg	Sample Results mg/kg
Cadmium	0.50	N.D.
Chromium	0.50	31
Nickel	2.5	38
Zinc	0.50	58
Organic Lead	0.050	N.D.

Analytes reported as N.D. were not present above the stated limit of detection.

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Project Manager

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Hydro Environmental	Client Project ID:	10-L1X, #8-019, Mobil	Sampled:	Jan 27, 1992
2363 Mariner Square Dr., Bldg. 3, Ste 243	Sample Descript:	Soil, B-5-10'	Received:	Jan 30, 1992
Alameda, CA 94501			Extracted:	Jan 31, 1992
Attention: Brian Gwinn	Lab Number:	201-4615	Analyzed:	1/31-2/3/92
			Reported:	Feb 6, 1992

LABORATORY ANALYSIS

Analyte	Detection Limit mg/kg	Sample Results mg/kg
Cadmium	0.50	N.D.
Chromium	0.50	43
Nickel	2.5	43
Zinc	0.50	58
Organic Lead	0.050	N.D.

Analytes reported as N.D. were not present above the stated limit of detection.

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Maile A. Springer
Project Manager

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Hydro Environmental	Client Project ID:	10-L1X, #8-019, Mobil	Sampled:	Jan 27, 1992
2363 Mariner Square Dr., Bldg. 3, Ste 243	Sample Descript:	Soil, B-5-15'	Received:	Jan 30, 1992
Alameda, CA 94501			Extracted:	Jan 31, 1992
Attention: Brian Gwinn	Lab Number:	201-4616	Analyzed:	1/31-2/3/92
			Reported:	Feb 6, 1992

LABORATORY ANALYSIS

Analyte	Detection Limit mg/kg	Sample Results mg/kg
Cadmium	0.50	0.53
Chromium	0.50	29
Nickel	2.5	36
Zinc	0.50	48
Organic Lead	0.050	N.D.

Analytes reported as N.D. were not present above the stated limit of detection.

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Maile A. Springer
Project Manager

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Hydro Environmental
2363 Mariner Square Dr., Bldg. 3, Ste 243
Alameda, CA 94501
Attention: Brian Gwinn

Client Project ID: 10-L1X, #8-019, Mobil
QC Sample Group: 201-4621
Reported: Feb 6, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-Benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	A. Miraftab	A. Miraftab	A. Miraftab	A. Miraftab
Reporting Units:	mg/kg	mg/kg	mg/kg	mg/kg
Date Analyzed:	Feb 1, 1992	Feb 1, 1992	Feb 1, 1992	Feb 1, 1992
QC Sample #:	GBLK013192	GBLK013192	GBLK013192	GBLK013192
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	0.20	0.20	0.20	0.60
Conc. Matrix Spike:	0.20	0.20	0.20	0.61
Matrix Spike % Recovery:	100	100	100	102
Conc. Matrix Spike Dup.:	0.22	0.22	0.22	0.66
Matrix Spike Duplicate % Recovery:	110	110	110	110
Relative % Difference:	9.5	9.5	9.5	7.9

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Project Manager

% Recovery:	Conc. of M.S. - Conc. of Sample / Spike Conc. Added	x 100
Relative % Difference:	Conc. of M.S. - Conc. of M.S.D. / (Conc. of M.S. + Conc. of M.S.D.) / 2	x 100

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Hydro Environmental
2363 Mariner Square Dr., Bldg. 3, Ste 243
Alameda, CA 94501
Attention: Brian Gwinn

Client Project ID: 10-L1X, #8-019, Mobil

QC Sample Group: 2014614 - 20, 22-24

Reported: Feb 6, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-Benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	M.Laikhtman	M.Laikhtman	M.Laikhtman	M.Laikhtman
Reporting Units:	mg/kg	mg/kg	mg/kg	mg/kg
Date Analyzed:	Jan 31, 1992	Jan 31, 1992	Jan 31, 1992	Jan 31, 1992
QC Sample #:	GBLK013192	GBLK013192	GBLK013192	GBLK013192
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	0.20	0.20	0.20	0.60
Conc. Matrix Spike:	0.19	0.20	0.20	0.58
Matrix Spike % Recovery:	95	100	100	97
Conc. Matrix Spike Dup.:	0.20	0.20	0.20	0.60
Matrix Spike Duplicate % Recovery:	100	100	100	100
Relative % Difference:	5.1	0.0	0.0	3.4

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Maile A. Springer
Project Manager

% Recovery: $\frac{\text{Conc. of M.S. - Conc. of Sample}}{\text{Spike Conc. Added}} \times 100$

Relative % Difference: $\frac{\text{Conc. of M.S. - Conc. of M.S.D.}}{\text{(Conc. of M.S. + Conc. of M.S.D.) / 2}} \times 100$

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Hydro Environmental
2363 Mariner Square Dr., Bldg. 3, Ste 243
Alameda, CA 94501
Attention: Brian Gwinn

Client Project ID: 10-L1X, #8-019, Mobil
QC Sample Group: 2014614 - 16
Reported: Feb 6, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	Diesel	Ttl. Oil & Grease	Organic Lead	Cadmium	Chromium	Nickel
Method:	EPA 8015	EPA 413.2	LUFT	EPA 6010	EPA 6010	EPA 6010
Analyst:	R.Lee	M.Fazzio	M.Mistry	C.Medefesser	C.Medefesser	C.Medefesser
Reporting Units:	mg/kg	mg/L	mg/kg	mg/kg	mg/kg	mg/kg
Date Analyzed:	Jan 30, 1992	Feb 4, 1992	Jan 31, 1992	Feb 3, 1992	Feb 3, 1992	Feb 3, 1992
QC Sample #:	DBLK012992	201-4614	201-4616	201-4361	201-4361	201-4361
Sample Conc.:	N.D.	4.2	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	15	130	0.60	100	100	100
Conc. Matrix Spike:	13	150	0.54	110	110	110
Matrix Spike % Recovery:	87	112	90	110	110	110
Conc. Matrix Spike Dup.:	12	150	0.57	110	110	110
Matrix Spike Duplicate % Recovery:	80	112	95	110	110	110
Relative % Difference:	8.0	0.0	5.4	0.0	0.0	0.0

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Maile A. Springer
Project Manager

% Recovery:	Conc. of M.S. - Conc. of Sample / Spike Conc. Added	x 100
Relative % Difference:	Conc. of M.S. - Conc. of M.S.D. / (Conc. of M.S. + Conc. of M.S.D.) / 2	x 100

SEQUOIA ANALYTICAL

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Hydro Environmental
2363 Mariner Square Dr., Bldg. 3, Ste 243
Alameda, CA 94501
Attention: Brian Gwinn

Client Project ID: 10-L1X, #8-019, Mobil
QC Sample Group: 2014614 - 16
Reported: Feb 6, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	1,1-Dichloro-ethene	Trichloro-ethene	Chloro-benzene
Method:	EPA 8010	EPA 8010	EPA 8010
Analyst:	L.Duong	L.Duong	L.Duong
Reporting Units:	mg/kg	mg/kg	mg/kg
Date Analyzed:	Feb 5, 1992	Feb 5, 1992	Feb 5, 1992
QC Sample #:	Blank	Blank	Blank
Sample Conc.:	N.D.	N.D.	N.D.
Spike Conc. Added:	10	10	10
Conc. Matrix Spike:	12	9.4	8.5
Matrix Spike % Recovery:	120	94	85
Conc. Matrix Spike Dup.:	12	9.5	9.0
Matrix Spike Duplicate % Recovery:	120	95	9.0
Relative % Difference:	0.0	1.1	5.7

SEQUOIA ANALYTICAL

Maile A. Springer
Project Manager

% Recovery:	Conc. of M.S. - Conc. of Sample / Spike Conc. Added	x 100
Relative % Difference:	Conc. of M.S. - Conc. of M.S.D. / (Conc. of M.S. + Conc. of M.S.D.) / 2	x 100

SEQUOIA ANALYTICAL

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Hydro Environmental
2363 Mariner Square Dr., Bldg. 3, Ste 243
Alameda, CA 94501
Attention: Brian Gwinn

Client Project ID: 10-L1X, #8-019, Mobil

QC Sample Group: 2014614 - 16

Reported: Feb 6, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	Nickel	Zinc
Method:	EPA 6010	EPA 6010
Analyst:	C.Medefesser	C.Medefesser
Reporting Units:	mg/kg	mg/kg
Date Analyzed:	Feb 3, 1992	Feb 3, 1992
QC Sample #:	201-4361	201-4361
Sample Conc.:	N.D.	3.5
Spike Conc. Added:	100	100
Conc. Matrix Spike:	110	110
Matrix Spike % Recovery:	110	107
Conc. Matrix Spike Dup.:	110	110
Matrix Spike Duplicate % Recovery:	110	107
Relative % Difference:	0.0	0.0

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Maile A. Springer
Project Manager

% Recovery:	Conc. of M.S. - Conc. of Sample / Spike Conc. Added	x 100
Relative % Difference:	Conc. of M.S. - Conc. of M.S.D. / (Conc. of M.S. + Conc. of M.S.D.) / 2	x 100

Mobil Chain of Custody

SEQUOIA ANALYTICAL

Redwood City: (415) 364-9600
Concord: (510) 686-9600
Sacramento: (916) 921-9600

COPY

Consulting Firm Name: Hydro-Environmental Tech.	Site SS #: 10-21X	Phase of Work:
Address: 2363 Mariner Square Dr. #243	Mobil Site Address: 15884 Hesperian, San Lorenzo, CA	☐ A. Emrg. Response
City: Alameda State: CA Zip Code: 94501	Mobil Engineer: Randall Begier	☑ B. Site Assessment
Telephone: 510-521-2684 FAX #: 521-5078	Consultant Project #: 8-019	☐ C. Remediation
Project Contact: Brian Gwinn Sampled by: BK	Sequoia's Work Order Release #:	☐ D. Monitoring
		☐ E. OGC/Claims

Turnaround Time: ☑ Standard TAT (5 - 10 Working Days)
☐ Other _____

Analyses Requested

	Client Sample I.D.	Date/Time Sampled	Matrix Description	# of Containers	Sequoia's Sample #	TPH Gas/BTEX	TPH Diesel	TRPH by I.R. EPA 418.1	Oil & Grease EPA 413.2	EPA 8010	Cd, Cr, Ni, Zn	O-Pb		Comments
	B-5-5'	1/27/92 0800	SOIL	1		X	X		X	X	X	X		201461 4
1.	B-5-10'	1/27/92				X	X		X	X	X	X		15
	B-5-15'	1/27/92				X	X		X	X	X	X		16
2.	B-6-4.5'	1/27/92				X								17
	B-6-9.5'	1/27/92				X								18
3.	B-6-14.5'	1/27/92 1600				X								19
	B-7-6"	1/28/92 0900				X								20
4.	B-7-11"					X								21
	B-8-6'					X								22
5.	B-8-11'					X								23
	B-8-16'	1600				X								24
6.														~~26~~ 25
7.														
8.														
9.														
10.														

Relinquished By:	Date: 1-30-92	Time: 10:00 AM	Received By:	Date: 1-30-92	Time: 10:00 AM
Relinquished By:	Date: 1-30-92	Time: 12:35 PM	Received By:	Date: 1/30	Time: 1235
Relinquished By:	Date:	Time:	Received By:	Date:	Time:

RECEIVED FEB 26 1992
-8-019
- Lab Data

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Hydro Environmental	Client Project ID:	#8-019, 10-LIX, Mobil	Sampled:	Feb 12, 1992
2363 Mariner Square Dr., Bldg. 3, Ste 243	Matrix Descript:	Water	Received:	Feb 13, 1992
Alameda, CA 94501	Analysis Method:	EPA 5030/8015/8020	Analyzed:	2/14-16/92
Attention: Brian Gwinn	First Sample #:	202-1951	Reported:	Feb 22, 1992

TOTAL PETROLEUM FUEL HYDROCARBONS with BTEX DISTINCTION (EPA 8015/8020)

Sample Number	Sample Description	Low/Medium B.P. Hydrocarbons µg/L (ppb)	Benzene µg/L (ppb)	Toluene µg/L (ppb)	Ethyl Benzene µg/L (ppb)	Xylenes µg/L (ppb)
202-1951	MW-2	190	4.4	N.D.	4.7	3.8
202-1952	MW-5	N.D.	N.D.	N.D.	N.D.	N.D.
202-1953	MW-6	2,700	14	3.5	27	39
202-1954	MW-7	N.D.	N.D.	N.D.	N.D.	N.D.
Detection Limits:		**30**	**0.30**	**0.30**	**0.30**	**0.30**

Low to Medium Boiling Point Hydrocarbons are quantitated against a gasoline standard.
Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Maile A. Springer
Project Manager

SEQUOIA ANALYTICAL

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Hydro Environmental	Client Project ID:	#8-019, 10-LIX, Mobil	Sampled:	Feb 12, 1992
2363 Mariner Square Dr., Bldg. 3, Ste 243	Sample Descript:	Water, MW-5	Received:	Feb 13, 1992
Alameda, CA 94501	Analysis Method:	EPA 5030/8010	Analyzed:	Feb 20, 1992
Attention: Brian Gwinn	Lab Number:	202-1954	Reported:	Feb 22, 1992

HALOGENATED VOLATILE ORGANICS (EPA 8010)

Analyte	Detection Limit µg/L	Sample Results µg/L
Bromodichloromethane	0.50	N.D.
Bromoform	0.50	N.D.
Bromomethane	0.50	N.D.
Carbon tetrachloride	0.50	N.D.
Chlorobenzene	0.50	N.D.
Chloroethane	0.50	N.D.
2-Chloroethylvinyl ether	0.50	N.D.
Chloroform	0.50	N.D.
Chloromethane	0.50	N.D.
Dibromochloromethane	0.50	N.D.
1,3-Dichlorobenzene	0.50	N.D.
1,4-Dichlorobenzene	0.50	N.D.
1,2-Dichlorobenzene	0.50	N.D.
1,1-Dichloroethane	0.50	N.D.
1,2-Dichloroethane	0.50	N.D.
1,1-Dichloroethene	0.50	N.D.
cis-1,2-Dichloroethene	0.50	N.D.
trans-1,2-Dichloroethene	0.50	N.D.
1,2-Dichloropropane	0.50	N.D.
cis-1,3-Dichloropropene	0.50	N.D.
trans-1,3-Dichloropropene	0.50	N.D.
Methylene chloride	5.0	N.D.
1,1,2,2-Tetrachloroethane	0.50	N.D.
Tetrachloroethene	0.50	N.D.
1,1,1-Trichloroethane	0.50	N.D.
1,1,2-Trichloroethane	0.50	N.D.
Trichloroethene	0.50	N.D.
Trichlorofluoromethane	0.50	N.D.
Vinyl chloride	0.50	N.D.

Analytes reported as N.D. were not present above the stated limit of detection.

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Maile A. Springer
Project Manager

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(415) 364-9600 • FAX (415) 364-9233

Hydro Environmental	Client Project ID:	#8-019, 10-LIX, Mobil	Sampled:	Feb 12, 1992
2363 Mariner Square Dr., Bldg. 3, Ste 243	Matrix Descript:	Water	Received:	Feb 13, 1992
Alameda, CA 94501	Analysis Method:	EPA 3510/8015	Extracted:	Feb 18, 1992
Attention: Brian Gwinn	First Sample #:	202-1954	Analyzed:	Feb 19, 1992
			Reported:	Feb 22, 1992

TOTAL PETROLEUM FUEL HYDROCARBONS (EPA 8015)

Sample Number	Sample Description	High B.P. Hydrocarbons µg/L (ppb)
202-1954	MW-5	N.D.

Detection Limits:	50

High Boiling Point Hydrocarbons are quantitated against a diesel fuel standard.
Analytes reported as N.D. were not present above the stated limit of detection.

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Project Manager

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Hydro Environmental	Client Project ID:	#8-019, 10-LIX, Mobil	Sampled:	Feb 12, 1992
2363 Mariner Square Dr., Bldg. 3, Ste 243	Matrix Descript:	Water	Received:	Feb 13, 1992
Alameda, CA 94501	Analysis Method:	EPA 413.2 (I.R.)		
Attention: Brian Gwinn	First Sample #:	202-1954	Analyzed:	Feb 19, 1992
			Reported:	Feb 22, 1992

TOTAL RECOVERABLE OIL & GREASE

Sample Number	Sample Description	Oil & Grease mg/L (ppm)
202-1954	MW-5	N.D.

Detection Limits:	1.0

Analytes reported as N.D. were not present above the stated limit of detection.

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Hydro Environmental	Client Project ID:	#8-019, 10-LIX, Mobil	Sampled:	Feb 12, 1992
2363 Mariner Square Dr., Bldg. 3, Ste 243	Sample Descript:	Soil	Received:	Feb 13, 1992
Alameda, CA 94501	Analysis Method:	California LUFT Manual, 12/87		
Attention: Brian Gwinn	First Sample #:	202-1954	Analyzed:	Feb 18, 1992
			Reported:	Feb 22, 1992

ORGANIC LEAD

Sample Number	Sample Description	Sample Results mg/kg (ppm)
202-1954	MW-5	N.D.

Detection Limits:	0.050

Analytes reported as N.D. were not present above the stated limit of detection.

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Hydro Environmental	Client Project ID:	#8-019, 10-LIX, Mobil	Sampled:	Feb 12, 1992
2363 Mariner Square Dr., Bldg. 3, Ste 243	Sample Descript:	Water, MW-5	Received:	Feb 13, 1992
Alameda, CA 94501			Analyzed:	Feb 18, 1992
Attention: Brian Gwinn	Lab Number:	202-1954	Reported:	Feb 22, 1992

LABORATORY ANALYSIS

Analyte	Detection Limit mg/L	Sample Results mg/L
Cadmium	0.010	N.D.
Chromium	0.010	N.D.
Nickel	0.050	N.D.
Zinc	0.010	N.D.

Analytes reported as N.D. were not present above the stated limit of detection.

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Hydro Environmental
2363 Mariner Square Dr., Bldg. 3, Ste 243
Alameda, CA 94501
Attention: Brian Gwinn

Client Project ID: #8-019, 10-LIX, Mobil

QC Sample Group: 2021952, 54

Reported: Feb 22, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-Benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	M.Nipp	M.Nipp	M.Nipp	M.Nipp
Reporting Units:	µg/L	µg/L	µg/L	µg/L
Date Analyzed:	Feb 14, 1992	Feb 14, 1992	Feb 14, 1992	Feb 14, 1992
QC Sample #:	GBLK021492	GBLK021492	GBLK021492	GBLK021492
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	10	10	10	30
Conc. Matrix Spike:	9.6	9.6	9.6	29
Matrix Spike % Recovery:	96	96	96	97
Conc. Matrix Spike Dup.:	9.3	9.5	9.4	28
Matrix Spike Duplicate % Recovery:	93	95	94	93
Relative % Difference:	3.2	1.0	2.1	3.5

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$$\% \text{ Recovery:} \quad \frac{\text{Conc. of M.S. - Conc. of Sample}}{\text{Spike Conc. Added}} \times 100$$

$$\text{Relative \% Difference:} \quad \frac{\text{Conc. of M.S. - Conc. of M.S.D.}}{\text{(Conc. of M.S. + Conc. of M.S.D.) / 2}} \times 100$$

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Hydro Environmental
2363 Mariner Square Dr., Bldg. 3, Ste 243
Alameda, CA 94501
Attention: Brian Gwinn

Client Project ID: #8-019, 10-LIX, Mobil

QC Sample Group: 2021951, 53

Reported: Feb 22, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-Benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	A.Miraftab	A.Miraftab	A.Miraftab	A.Miraftab
Reporting Units:	µg/L	µg/L	µg/L	µg/L
Date Analyzed:	Feb 16, 1992	Feb 16, 1992	Feb 16, 1992	Feb 16, 1992
QC Sample #:	BLK021692	BLK021692	BLK021692	BLK021692
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	10	10	10	30
Conc. Matrix Spike:	9.6	9.5	9.5	29
Matrix Spike % Recovery:	96	95	96	97
Conc. Matrix Spike Dup.:	9.9	9.9	9.4	29
Matrix Spike Duplicate % Recovery:	99	99	97	97
Relative % Difference:	3.1	4.1	2.1	0.0

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Project Manager

% Recovery:	$\frac{\text{Conc. of M.S. - Conc. of Sample}}{\text{Spike Conc. Added}}$	x 100
Relative % Difference:	$\frac{\text{Conc. of M.S. - Conc. of M.S.D.}}{\text{(Conc. of M.S. + Conc. of M.S.D.) / 2}}$	x 100

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Hydro Environmental
2363 Mariner Square Dr., Bldg. 3, Ste 243
Alameda, CA 94501
Attention: Brian Gwinn

Client Project ID: #8-019, 10-LIX, Mobil
QC Sample Group: 202-1954
Reported: Feb 22, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	1,1-Dichloro-ethene	Trichloro-ethene	Chloro-benzene	Diesel	Ttl.Oil & Grease	Organic Lead
Method:	EPA 8010	EPA 8010	EPA 8010	EPA 8015	EPA 413.2	LUFT
Analyst:	M.T.	M.T.	M.T.	M.T.	B.Samra	S.Chin
Reporting Units:	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L
Date Analyzed:	Feb 20, 1992	Feb 20, 1992	Feb 20, 1992	Feb 19, 1992	Feb 19, 1992	Feb 18, 1992
QC Sample #:	BLK022092	BLK022092	BLK022092	DBLK021892 X	Blank	202-1954
Sample Conc.:	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	25	25	25	300	40	0.12
Conc. Matrix Spike:	14	23	22	200	46	0.13
Matrix Spike % Recovery:	56	92	88	67	115	110
Conc. Matrix Spike Dup.:	17	24	22	220	49	0.13
Matrix Spike Duplicate % Recovery:	68	96	88	73	123	110
Relative % Difference:	19	4.3	0.0	10	63	0.0

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Project Manager

% Recovery:	Conc. of M.S. - Conc. of Sample / Spike Conc. Added	x 100
Relative % Difference:	Conc. of M.S. - Conc. of M.S.D. / (Conc. of M.S. + Conc. of M.S.D.) / 2	x 100

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Hydro Environmental
2363 Mariner Square Dr., Bldg. 3, Ste 243
Alameda, CA 94501
Attention: Brian Gwinn

Client Project ID: #8-019, 10-LIX, Mobil
QC Sample Group: 202-1954

Reported: Feb 22, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	Nickel	Cadmium	Chromium	Zinc
Method:	EPA 200.7	EPA 200.7	EPA 200.7	EPA 200.7
Analyst:	M.Mistry	M.Mistry	M.Mistry	M.Mistry
Reporting Units:	mg/L	mg/L	mg/L	mg/L
Date Analyzed:	Feb 18, 1992	Feb 18, 1992	Feb 18, 1992	Feb 18, 1992
QC Sample #:	202-1731	202-1731	202-1731	202-1731
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	1.0	1.0	1.0	1.0
Conc. Matrix Spike:	1.1	1.1	1.0	1.1
Matrix Spike % Recovery:	110	110	100	110
Conc. Matrix Spike Dup.:	1.1	1.1	1.0	1.1
Matrix Spike Duplicate % Recovery:	110	110	100	110
Relative % Difference:	0.0	0.0	0.0	0.0

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Maile A. Springer
Project Manager

% Recovery:	$\frac{\text{Conc. of M.S. - Conc. of Sample}}{\text{Spike Conc. Added}}$	x 100
Relative % Difference:	$\frac{\text{Conc. of M.S. - Conc. of M.S.D.}}{\text{(Conc. of M.S. + Conc. of M.S.D.) / 2}}$	x 100

Mobil Chain of Custody

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Reproducibility COPY

Petaluma: (415) 364-9600
Pleasanton: (510) 686-9600
Sacramento: (916) 921-9600

Consulting Firm Name: Hydro-Environmental Tech	Site SS #: 10-LIX	**Phase of Work:**
Address: 2363 Mariner Sq. Dr., Ste 245	Mobil Site Address: 15884 Hesperian Blvd San Lorenzo, CA	☐ A. Emrg. Response
City: Alameda State: CA Zip Code: 94501	Mobil Engineer: R. Bagler	☒ B. Site Assessment
Telephone: 510-521-2684 FAX #: 521-5078	Consultant Project #: 8-019	☐ C. Remediation
Project Contact: B. Gwynn Sampled by: BG/HK	Sequoia's Work Order Release #:	☐ D. Monitoring
		☐ E. OGC/Claims

Turnaround Time: ☒ Standard TAT (5 - 10 Working Days)
☐ Other _____

Client Sample I.D.	Date/Time Sampled	Matrix Description	# of Containers	Sequoia's Sample #	TPH Gas/BTEX	TPH Diesel	TRPH by I.R. EPA 418.1	Oil & Grease EPA 413.2	EPA 8010	Ca, Cr, Ni, Zn	O-Pb		Comments
					Analyses Requested								
1. MW-2	2/12/92	Water	2		X								2021951
2. MW-5			9		X	X		X	X	X	X		54
3. MW-6			2		X					X			52
4. MW-7			2		X								53
5.													Filter prior to analysis
6.													
7.													
8.													
9.													
10.													

Relinquished By:	Date: 2-13-92	Time: 1:25PM	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:

HYDRO-ENVIRONMENTAL TECHNOLOGIES, INC. (HETI) CALIFORNIA

DRILLING WELL CONSTRUCTION AND SAMPLING PROTOCOLS

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 (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 of 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 drumed. 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 clients 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 (Plate A-1) and field well construction diagram (Plate A-2) 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, and if required, 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.

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 ± 0.01 foot. Water level measurements will be recorded with an interface probe to the nearest ± 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 wells top elevations to be determined using a survey level and rod. Unless directed otherwise by local regulatory agencies, the well tops will be established in this manor.

Well Development

After installation, all monitoring wells shall be developed to clean the well and stabilize sand, gravel and disturbed aquifer materials from 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 may 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 a 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 the 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 of 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 Control Board	Leaking Underground Fuel Tank (LUFT) Field Manual (May, 1988), and LUFT Field Manual Revision (April, 1989)

State of California Water Resources Control Board	Title 23 (Register #85.#33-8-17-85), 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) Volume 55, pages 2212-18, December, 1983	Principles of Environmental Analysis.
American Petroleum Institute API Publication 4367; 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 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 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 ± 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 ± 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.

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 Field Sampling Data Sheet (Plate A-3). 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-4. Water removed from the wells will either be disposed of 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 10 percent in micro mhos, less than 0.2 pH units, and less than 1.0 degree Centigrade. Specific conductance meters shall be read to the nearest $\pm$ 10 micro-mhos per centimeter. PH meters shall be read to the nearest $\pm$ 0.1 pH units. Both types of meters shall be calibrated daily to manufacturers 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 Field Sampling Data Sheet shown on Figure 3. Copies of the Field Sampling Data 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)
- Samplers 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 Field Sampling Data Sheet (Plate A-3) 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 (Plate A-5) 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	WELL SEAL			WELL NO.

FIELD HEADSPACE *	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					
*PID	30					

HYDRO-ENVIRONMENTAL TECHNOLOGIES, INC.

SOIL BORING LOG AND WELL CONSTRUCTION

PLATE

JOB NO.

DATE:

APPROVED BY: Frederick G. Moss, PE No. 35162

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
Sample at				
After sampling				

Color: _____ Turbidity: _____

Recharge: _____ Petroleum hydrocarbon odor: _____or 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: _____

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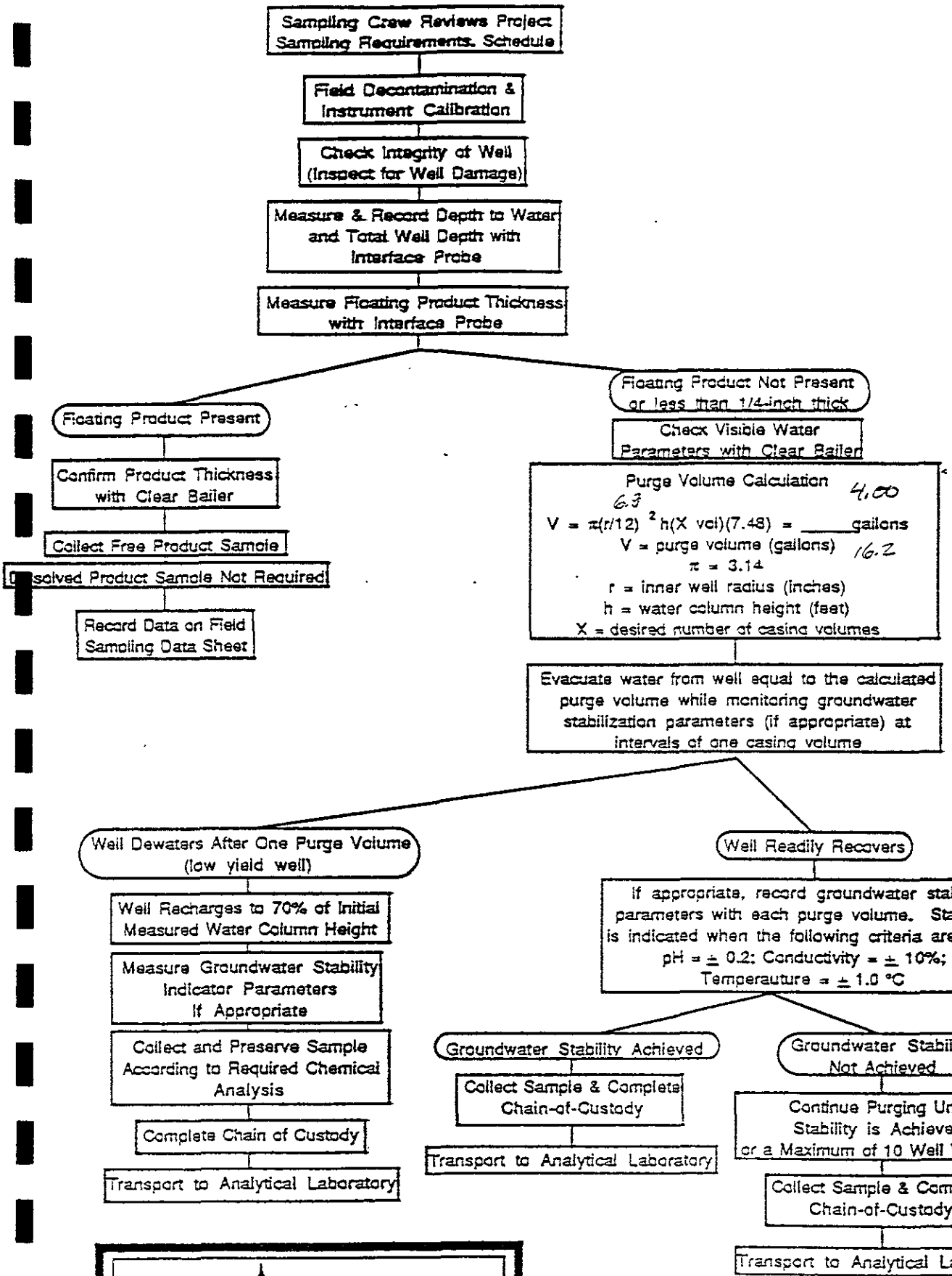
MONITORING WELL PURGE/SAMPLE SHEET

WELL # _____

LOCATION _____

JOB NO. _____



6.3
4.00
16.2

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PLATE A-4
WATER SAMPLING FLOWCHART

SAMPLER
PRINTED NAME:

CHAIN OF CUSTODY RECORD

Signature:

DELIVER TO:

ATTENTION:

SEND RESULTS TO:

HYDRO-ENVIRONMENTAL
TECHNOLOGIES, INC.
2363 MARINER SQUARE DR., SUITE 243
ALAMEDA, CA 94501
(510) 521-2684
(FAX) 521-5078
ATTENTION:

Relenquished by: (Signature)	Received by: (Signature)	Date	Time
Relenquished by:	Received by:		
Relenquished by:	Received by:		
Relenquished by:	Received by: LABORATORY		

HETICAL JOB No.--

PAGE 1 OF

Sample Number	DATE & TIME	No. & Type Container	Analysis Requested							Lab Remarks
			TPHg+BTEX (DHS mod)	TPHd (DHS mod)	Tot. O & G (503)	8010 or 8240	Organic Lead			

Special Instructions: _____

Turnaround:
☐ STANDARD ☐ 72 HOURS
☐ 5 DAY ☐ 24 HOURS