HYDRO ENVIRONMENTAL TECHNOLOGIES, INC.

rcd 12/8/93 Ltr 12/10/93

PHASE II SUBSURFACE INVESTIGATION REPORT

BP Service Station No. 11120
6400 Dublin Boulevard
Dublin, California

Prepared for:

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

Prepared by:

HYDRO-ENVIRONMENTAL TECHNOLOGIES, INC.
2363 Mariner Square Drive, Suite 243
Alameda, California 94501
HETI Job No. 9-040.1

12/10/93
@Cf. MW logs of 3,4 w/ 6,7
screened same interval?
Yes, ~~not~~ variated
zone, ~16-21' bgs

July 15, 1993

HYDRO ENVIRONMENTAL TECHNOLOGIES, INC.

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1.0 INTRODUCTION

1.1 Purpose and Scope

BP Oil Company (BP) retained Hydro-Environmental Technologies, Inc. (HETI) in March 1993 to conduct a Phase II Subsurface Investigation at BP service station No. 11120, located at 6400 Dublin Boulevard in Dublin, California. A site location map is attached as Figure 1. This phase of the investigation was conducted to further define the extent of petroleum hydrocarbons in the subsurface soil and ground water on-site.

The tasks performed for this investigation included the following:

- Drill and log four soil borings and collect soil samples.
- Install one 4-inch and two 2-inch diameter monitoring wells.
- Develop and survey the new monitoring wells.
- Collect ground water samples from all seven on-site wells to be analyzed for specified hydrocarbon constituents.

1.2 Site Location and Background

The site is located on the southern corner of the intersection of Dublin Boulevard and Dougherty Road in Dublin, California. It is presently an operating service station with three underground gasoline storage tanks and one underground used oil tank. Figure 2 shows the layout of the site and the location of existing underground storage tanks and dispenser islands.

HETI installed four on-site ground water monitoring wells in October 1992, and presented the results to BP in a Preliminary Site Assessment Report dated January 7, 1993. Soil types encountered during drilling consisted generally of clay with some beds of fine sand. Ground water was initially encountered in the soil borings at a depth of approximately 17 feet below grade and rose quickly to approximately 9 feet below grade. Confined ground water appeared to be present in a thin (0.5 to 3 feet thick) saturated zone. The ground water gradient was calculated to be approximately 0.0016 ft/ft in a general southwesterly direction across the site. Laboratory analytical results indicated that petroleum hydrocarbons were present only in the soil and water samples collected from MW-3 and MW-4.

2.0 FIELD ACTIVITIES

All drilling, well construction, and sampling was performed in accordance with state and local agency guidelines. A copy of standard field protocols was submitted as an attachment to the Preliminary Site Assessment Report.

2.1 Soil Borehole Drilling and Soil Sampling

HETI conducted a safety briefing with West Hazmat Drilling personnel prior to the start of drilling. At the end of the briefing, all personnel reviewed and signed the Health and Safety Plan prepared for this work; a copy is attached in Appendix A.

On April 6, 1993, four exploratory borings were drilled by West Hazmat Drilling Corporation of Hayward, California using a truck-mounted CME 75 drilling rig. All soil borings were drilled using 8-inch diameter hollow-stem augers. Boring LB-1 was drilled to a depth of 30.5 feet, and the other three borings (B-5, B-6, and B-7) were drilled to depths of 22 feet below grade. The boring locations are shown on Figure 2, the Site Plan. Ground water was initially encountered at between 16.5 to 20.5 feet below grade. A second water bearing zone was encountered in boring LB-1 at 29.0 feet below grade. Boring LB-1 was backfilled to the surface with neat cement.

Boring LB-1 was continuously sampled from 9.5 to 30.5 feet below grade for the purpose of geologic description only. Soil samples were collected at five-foot intervals in the remaining borings. Selected soil samples (see Table 1 and Appendix A Boring Logs) were delivered to PACE, Inc., a state DHS-certified laboratory located in Novato, California, for petroleum hydrocarbon analysis. Each sample was analyzed for total petroleum hydrocarbons as diesel (TPHd) using EPA Method 8015 (modified), total petroleum hydrocarbons as gasoline (TPHg) using EPA Method 8015 (modified), and benzene, toluene, ethylbenzene, and total xylenes (BTEX) using EPA Method 8020 (modified).

Portions of each soil sample were retained for visual lithologic description by a HETI geologist using the Unified Soil Classification System, and for volatile headspace analysis using a Thermo-Environmental Instruments Model 580B organic vapor meter (OVM). OVM readings for specific soil samples, along with complete sample descriptions, are presented on the Boring Logs in Appendix A. Organic vapor 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. Soil cuttings generated during drilling were enveloped in plastic for future removal.

2.2 Monitoring Well Installation, Development, and Survey

Soil borings B-5, B-6, and B-7 were converted to monitoring wells MW-5, MW-6, and MW-7, respectively. Monitoring wells MW-5 and MW-7 were constructed as 2-inch diameter wells, and MW-6 was completed as a 4-inch diameter well (see Appendix A for construction details).

On April 9, 1993, the three new monitoring were developed by a combination of surging and bailing. Following development, the location and elevation of the top-of-casing of each monitoring well was surveyed relative to a temporary benchmark.

2.3 Ground Water Gauging, Sampling, and Analysis

All monitoring wells were gauged on April 9, 1993. Separate phase petroleum was not detected in any of the monitoring wells. All seven monitoring wells were purged prior to sampling. Purge water was stored on-site in 55 gallon drums. Well purging information is presented on the Purge/Sample Data Sheets in Appendix B.

Following recovery of water levels to at least 80% of their original levels, ground water samples were collected from each of the monitoring wells using dedicated polyethylene bailers. Samples were labelled, documented on a chain-of-custody form, and stored in a cooler for transport to PACE, Inc. The samples were analyzed for TPHd, TPHg, and BTEX.

2.4 Step-Drawdown Aquifer Test

On May 6, 1993, a step-drawdown aquifer test was performed on MW-6 to provide data that will be used to plan a future constant discharge aquifer test. MW-6 was pumped at 0.6 gallons per minute (gpm) for 15 minutes, at 1.8 gpm for 1 hour and 15 minutes, then at 2.9 gpm for the final 35 minutes.

3.0 RESULTS OF INVESTIGATION

3.1 Site Stratigraphy

Sediments encountered during drilling consisted primarily of lean clay with lenses of fine sand, silty sand, or clayey sand. Complete sample descriptions are presented on the Boring Logs in Appendix A. A thin (less than 0.5 feet thick), saturated zone was encountered in all boreholes at depths between 16.0 to 20.5 feet. This saturated zone may consist of a silty sand or a horizontal fracture in the clay.

3.2 Results of Soil Sample Analysis

TPHd, TPHg, nor BTEX were not detected in concentrations exceeding the method detection limits in soil samples collected from the borings MW-5, MW-6, and MW-7 except for the sample collected at the 5.5 foot depth in boring MW-5. Benzene was detected at a concentration of 0.017 parts per million (ppm) in this sample. A summary of analytical results for samples collected from all new soil borings is presented in Table 1. Copies of the laboratory reports and chain-of-custody are attached in Appendix C.

3.3 Ground Water Gradient

On April 9, 1993, depth to ground water in the wells ranged from 4.12 to 5.37 feet below grade. Depth to water measurements and calculated ground water elevations in the wells are presented on Table 2. The depth to water measurements collected and the wellhead elevation data were used to calculate potentiometric surface contours. These contours are shown on Figure 3, the Ground Water Contour Map. Figure 3 shows ground water flow to be to the southwest at an approximate gradient of 0.003 ft/ft (0.3%).

3.4 Results of Ground Water Sample Analysis

TPHd, TPHg, nor BTEX were not detected in concentrations exceeding the method detection limits in the ground water samples collected from new monitoring wells MW-5, MW-6, and MW-7. TPHg and BTEX were detected in ground water samples collected from monitoring wells MW-3 and MW-4, the wells closest to the underground fuel tanks. TPHd was detected in ground water samples collected from MW-1, MW-2, MW-3, and MW-4. The MW-1 sample chromatogram pattern consisted of a single unidentified peak and was not consistent with a standard diesel pattern. The peak could not be further identified using the TPHd analytical method.

Analytical results are presented graphically on Figure 4, the Hydrocarbon Concentration Map. A summary of ground water analytical results is presented in Table 2. Copies of the laboratory reports and the chain-of-custody form are attached in Appendix C.

3.5 Results of Step-Drawdown Aquifer Test

Drawdowns of 2.48 feet and 4.54 feet were measured at the conclusion of the 0.6 gpm and 1.8 gpm steps, respectively. The well went dry, however, when pumped at a flow rate of 2.9 gpm. The step-drawdown test results indicate that the maximum sustainable yield from MW-6 is approximately 2.0 gpm.

4.0 SUMMARY

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

- Three additional ground water monitoring wells were installed at the site in early April 1993.
- Soil types encountered at the site generally consisted of clay with some lenses of fine sand, silty sand, or clayey sand.
- Neither TPHd nor TPHg were detected in concentrations exceeding method detection limits in soil samples collected from any of the soil borings. Benzene was detected in only one shallow soil sample.
- Ground water was present in a thin (less than 0.5 feet thick), confined, saturated, zone in all boreholes at depths ranging between 16.0 to 20.5 feet.
- Stabilized ground water levels measured in all wells ranged between 4.12 to 5.37 feet below top-of-casing. The ground water gradient was calculated to be approximately 0.003 ft/ft in a general southwest direction across the site.
- No free product or sheen was observed in any of the monitoring wells.
- Neither TPHd, TPHg, nor BTEX were detected in concentrations exceeding the method detection limits in the ground water samples collected from monitoring wells MW-5, MW-6, and MW-7.
- Hydrocarbons were detected in water samples collected from MW-1, MW-2, MW-3, and MW-4. A single peak was detected in the MW-1 water sample chromatogram and could not be further identified using the TPHd test method.
- MW-6 can sustain a maximum flow rate of approximately 2.0 gpm.

5.0 CERTIFICATION

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

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

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

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

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

HYDRO-ENVIRONMENTAL TECHNOLOGIES, INC.

Prepared by:

for

Henry A. Hurkmans
Staff Geologist

Reviewed by:

Owen C. Ratchye, P.E.
Project Engineer

REGISTERED PROFESSIONAL ENGINEER
OWEN C. RATCHYE
No. C47949
Exp. 12/31/93
CIVIL
STATE OF CALIFORNIA

Table 1
Summary of Soil Sample Analytical Results
BP Service Station No. 11120
6400 Dublin Boulevard
Dublin, California

Sample	Date	TPHd (ppm)	TPHg (ppm)	B (ppm)	T (ppm)	E (ppm)	X (ppm)
MW-5-5.5'	4/6/93	ND<5.0	ND<1.0	0.017	ND<0.005	ND<0.005	ND<0.005
MW-5-15.5'	4/6/93	ND<5.0	ND<1.0	ND<0.005	ND<0.005	ND<0.005	ND<0.005
MW-6-5.5'	4/6/93	ND<5.0	ND<1.0	ND<0.005	ND<0.005	ND<0.005	ND<0.005
MW-6-10.5'	4/6/93	ND<5.0	ND<1.0	ND<0.005	ND<0.005	ND<0.005	ND<0.005
MW-7-5.5'	4/6/93	ND<5.0	ND<1.0	ND<0.005	ND<0.005	ND<0.005	ND<0.005
MW-7-15.5'	4/6/93	ND<5.0	ND<1.0	ND<0.005	ND<0.005	ND<0.005	ND<0.005

Notes:

Sample: Soil boring designation and soil sample collection depth (ft)
Date: Soil sample collection date
TPHd : Total petroleum hydrocarbons as diesel by EPA Method 8015 (modified)
TPHg : Total petroleum hydrocarbons as gasoline by EPA Method 8015 (modified)
BTEX : Benzene, Toluene, Ethylbenzene and total Xylenes by EPA Method 8020 (modified)
ND : Not detected in concentrations exceeding the indicated laboratory method detection limit

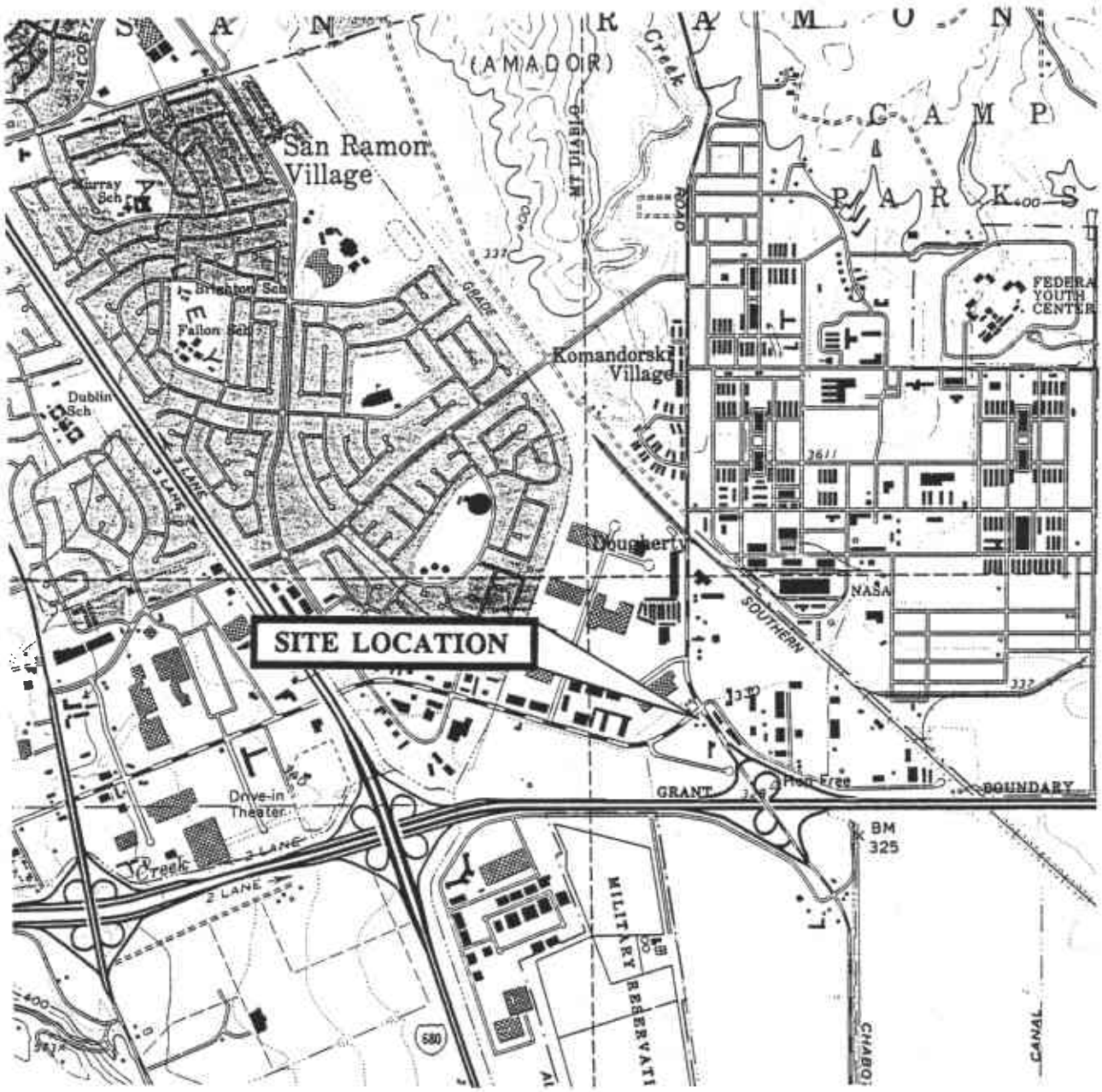
Table 2
Summary of Ground Water Elevations and Analytical Results
BP Service Station No. 11120
6400 Dublin Boulevard
Dublin, California

Well	Date	TOC (feet)	DTW (feet)	GW Elev. (feet)	TPHd (ppb)	TPHg (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)
MW-1	10/27/92 (OA)	328.96	8.19	320.77	ND<50	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	4/9/93	328.96	4.79	324.17	100 (AT)	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5
MW-2	10/27/92	328.50	7.64	320.86	ND<50	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	4/9/93	328.50	4.12	324.38	80	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5
MW-3	10/27/92	329.36	8.43	320.93	ND<50	210	3	0.7	0.9	30
	4/9/93	329.36	4.90	324.46	260	400 (MT)	6.1	ND<0.5	ND<0.5	ND<0.5
MW-4	10/27/92	329.45	8.61	320.84	190	2300	23	54	50	320
	4/9/93	329.45	5.25	324.20	500	1600	78 (MT)	3.5	68	1.0
MW-5	4/9/93	329.60	5.18	324.42	ND<50	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5
MW-6	4/9/93	329.55	5.37	324.18	ND<50	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5
MW-7	4/9/93	329.49	5.36	324.13	ND<50	ND<50	ND<0.5	ND<0.5	ND<0.5	ND<0.5

Notes:

Well: Monitoring well designation
Date: Ground water sample collection date
TOC : Elevation at the north side top of the well casing, based on project datum
DTW : Depth to water in well
GW Elev. : Ground water elevation in well
TPHd : Total petroleum hydrocarbons as diesel by EPA Method 8015 (modified)
TPHg : Total petroleum hydrocarbons as gasoline by EPA Method 8015 (modified)
BTEX : Benzene, Toluene, Ethylbenzene and total Xylenes by EPA Method 8020 (modified)
ND : Not detected in concentrations exceeding the indicated laboratory method detection limit
OA: Other analyses on this date: samples collected from MW-1 were ND< 0.5-2.0 ppb for halogenated volatile organics by EPA Method 8010 (modified) and ND< 5,000 ppb for total oil and grease by Standard Method 5520
MT: A peak eluting before benzene and suspected to be Methyl Tert Butyl Ether (see pg. #10 of PACE, Inc. reports in Appendix D for more information)
AT: Chromatogram consisted mainly of a single peak and was not consistent with a typical diesel pattern

FIGURES



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

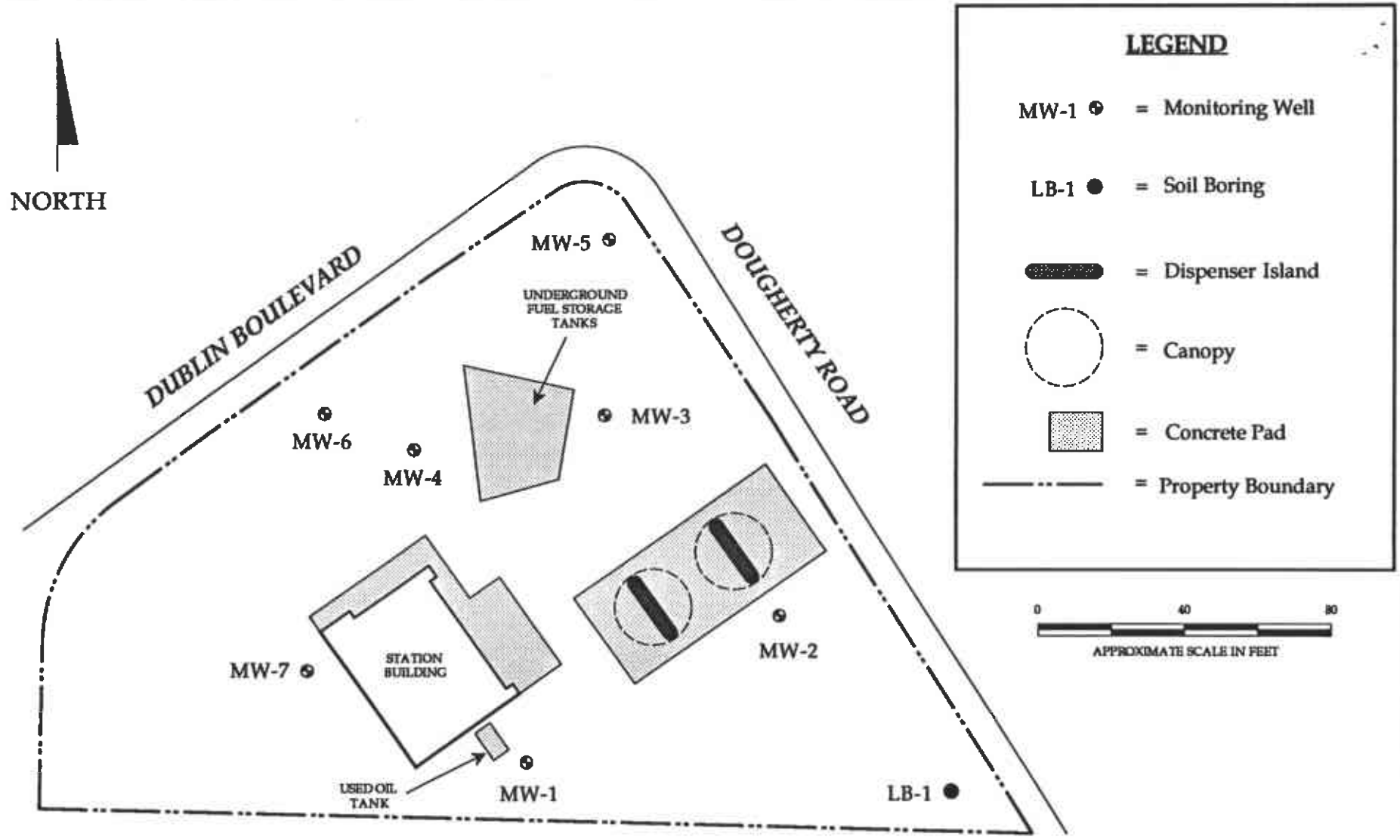
North

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

HYDR◆
ENVIR◆MENTAL
TECHN◆LOGIES, INC.

Site Location Map
BP Service Station No. 11120
6400 Dublin Boulevard
Dublin, California

Job No.
9-040
Figure
1



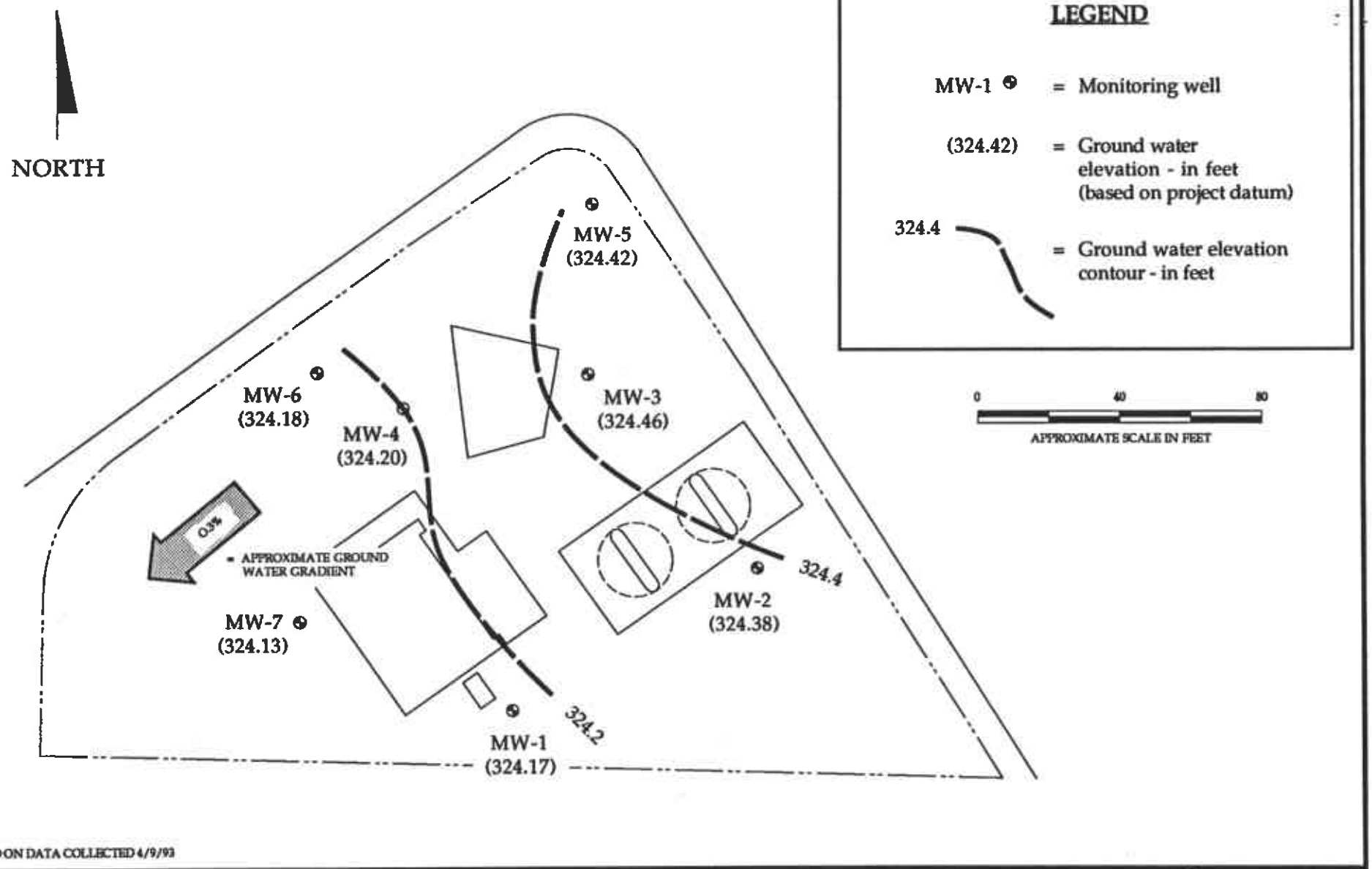
HYDRO-ENVIRONMENTAL TECHNOLOGIES, INC.

SITE PLAN

BP Service Station No. 11120
6400 Dublin Boulevard
Dublin, California

Figure 2

9-040.1 6/93



BASED ON DATA COLLECTED 4/9/93

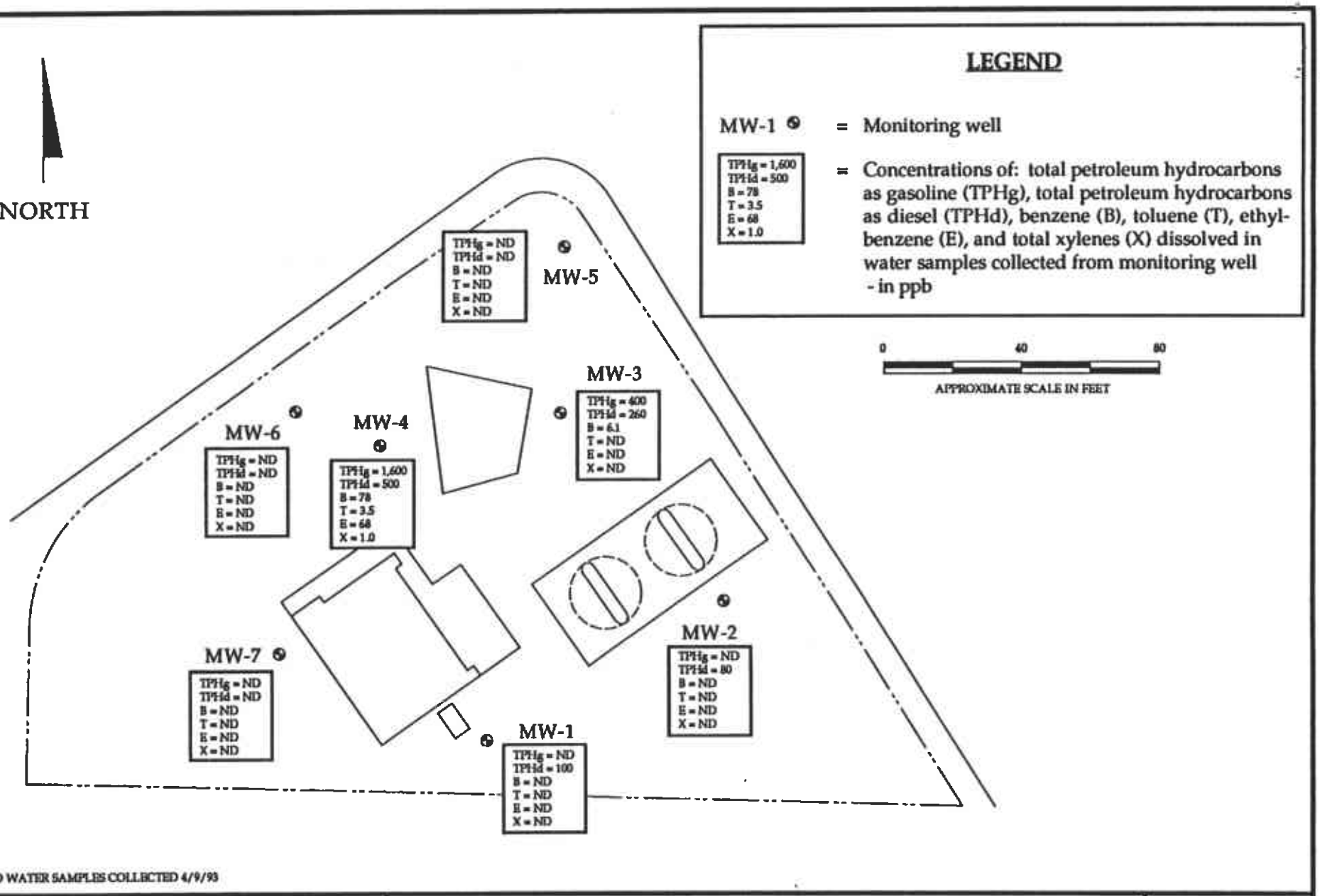
HYDRO-ENVIRONMENTAL TECHNOLOGIES, INC.

GROUND WATER CONTOUR MAP

BP Service Station No. 11120
6400 Dublin Boulevard
Dublin, California

Figure 3

9-040.1 6/93



GROUND WATER SAMPLES COLLECTED 4/9/93

HYDRO-ENVIRONMENTAL TECHNOLOGIES, INC.

HYDROCARBON CONCENTRATION MAP

BP Service Station No. 11120
6400 Dublin Boulevard
Dublin, California

Figure 4

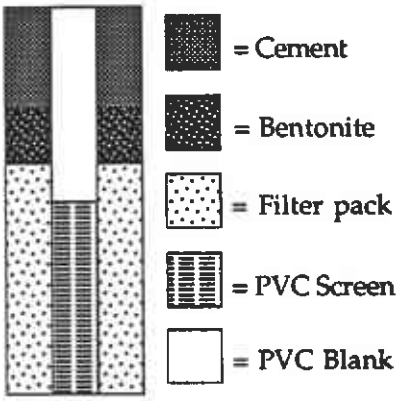
9-040.1 6/93

APPENDIX A

UNIFIED SOIL CLASSIFICATION SYSTEM - VISUAL CLASSIFICATION OF SOILS
(ASTM D-2488)

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

WELL CONSTRUCTION DETAILS




Approximate first encountered water level

Approximate stabilized water level

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.

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.

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)
NR = No Recovery

SANDS & GRAVELS	BLOWS/FT
VERY LOOSE	0 - 5
LOOSE	5 - 12
MED. DENSE	12 - 37
DENSE	37 - 62
VERY DENSE	OVER 62

SILTS & CLAYS	BLOWS/FT
SOFT	0 - 5
FIRM	5 - 10
STIFF	10 - 20
VERY STIFF	20 - 40
HARD	OVER 40

HYDRO-ENVIRONMENTAL TECHNOLOGIES, INC.

SOIL BORING AND WELL CONSTRUCTION LOG LEGEND

APPENDIX A

PLATE A-1

SITE/LOCATION	BEGUN	BORING DIAMETER	ANGLE/BEARING	BORING NO
6400 Dublin Blvd., Dublin, CA	4/6/93	8 Inches	90 Degrees	LB-1
DRILLING CONTRACTOR	**COMPLETED**	**FIRST ENCOUNTERED WATER DEPTH**		**BOTTOM OF BORING**
West Hazmat Drilling Corp.	4/6/93	17-18 Feet		30.5 Feet
OPERATOR	**LOGGED BY**	**SECOND ENCOUNTERED WATER DEPTH**		
Thomas Wright	H. Hurkmans	29 Feet		
DRILL MAKE & MODEL	**SAMPLING METHOD**			**BOTTOM OF WELL**
CME 75	California modified split-spoon			N/A
WELL MATERIAL	**SLOT SIZE**	**FILTER PACK**	**BORING SEAL**	**WELL NO.**
N/A	N/A	N/A	Neat cement	N/A

BLOWS/FOOT	ADVANCE/RECOVERY (INCHES)	DEPTH	SAMPLE	WATER LEVEL	WELL CONSTR.	GRAPHIC LOG	MATERIAL CLASSIFICATION & PHYSICAL DESCRIPTION
		1			No well installed		Asphalt & Baserock fill
		2					
		3					Lean CLAY (CL); olive-black, damp, high plasticity, logged from cuttings
		4					
		5					
		6					
		7					
		8					
		9					Lean CLAY (CL); olive-tan with olive-green mottle, moist, medium-high plasticity
		10					
22	18/18	11					Clayey SAND (SC); tan, moist, fine, layer 6" thick
18	18/18	12					Lean CLAY(CL); like above, with 2 cm layer of friable, white, fine gravel (white clasts) in clay
		13					
14	18/18	14					similar to above clay with occassional (5%) white clasts to 1 cm dia.
21	18/18	15					
		16					
12	6/18	17		▽			same as above, (2/3 loss of core)
							Silty SAND (SM); light olive, wet, fine
17	18/18	18					same as above clay
		19					
21	12/18	20					same as above clay, 1/3 loss of core may have been saturated sand like above
24	12/18	21					Fat CLAY, olive-brown with rusty-olive mottle, high plasticity, 2 cm layer @ 21'
		22					
26	18/18	23					Lean CLAY (CL), green-olive with 2% black spots with rust coatings, moist, high plasticity
22	18/18	24					
		25					
24	18/18	26					
25	18/18	27					same as above clay, silty @26.5, very silty @ 27'
		28					same as above clay, trace white coarse sand
22	18/18	29		▽			Clayey SAND (SC), ~~saturated~~, moderate grading, medium-coarse grained, subrounded-subangular, 15-40% clay,
S	3/18	30					5/6 of core lost, may have been less clayey sand

HYDRO-ENVIRONMENTAL TECHNOLOGIES, INC.

DATE:

APPROVED BY: Owen C. Ratchye

SOIL BORING LOG LB-1

BP Oil Station No. 11120
6400 Dublin Blvd.
Dublin, California

PLATE
A-2
SHEET 1 OF 1

JOB NO.
9-040.1

SITE/LOCATION: 6400 Dublin Blvd., Dublin, CA	BEGUN: 4/6/93	BORING DIAMETER: 8 Inches	ANGLE/BEARING: 90 Degrees	BORING NO: MW-5
DRILLING CONTRACTOR: West Hazmat Drilling Corp.	COMPLETED: 4/6/93	FIRST ENCOUNTERED WATER DEPTH: Between 16.5-20.5 Feet		BOTTOM OF BORING: 22.0 Feet
OPERATOR: Thomas Wright	LOGGED BY: H. Hurkmans	STATIC WATER DEPTH/DATE: 5.18 Feet/4-9-93		
DRILL MAKE & MODEL: CME 75	SAMPLING METHOD: California modified split-spoon			BOTTOM OF WELL: 21.0 Feet
WELL MATERIAL: 2" dia. sch. 40 pvc	SLOT SIZE: 0.020	FILTER PACK: #3 sand	BORING SEAL: Neat cement over hydrated bentonite	WELL NO.: MW-5

BLOWS/FOOT	FIELD HEAD-SPACE *	DEPTH	SAMPLE	WATER LEVEL	WELL CONSTR.	GRAPHIC LOG	MATERIAL CLASSIFICATION & PHYSICAL DESCRIPTION
		1–4					Asphalt & Baserock fill
		1–4					Lean CLAY (CL); brown, damp, low plasticity, silty
		5					Poorly-graded SAND (SP); olive, moist, fine-medium gr.
11	0.0	6		▼			Lean CLAY (CL); blue-gray, moist, stiff, medium plasticity, silty
		7–10					
11	0.0	11					Lean CLAY (CL); mottled tan & olive-green, moist, stiff, medium plasticity
		12–14					
23	0.0	15–16					Lean CLAY (CL); olive, moist, very stiff, low-medium plasticity
		17					Saturated zone
		18		▽			
		19–20					Lean CLAY (CL); mottled olive & green-olive, moist, stiff, medium plasticity; trace 1 cm dia. pockets of white, friable, material; at 21 ft contains a thin lamination (2cm) of black clay containing burned wood fragments
17		21–22					
		23–30					

*PID (ppm)

HYDRO-ENVIRONMENTAL TECHNOLOGIES, INC.

DATE:

APPROVED BY: Owen C. Ratchye

SOIL BORING AND WELL CONSTRUCTION LOG MW-5

BP Oil Station No. 11120
6400 Dublin Blvd.
Dublin, California

PLATE A-3

SHEET 1 OF 1

JOB NO. 9-040.1

SITE/LOCATION 6400 Dublin Blvd., Dublin, CA	BEGUN 4/6/93	BORING DIAMETER 10 Inches	ANGLE/BEARING 90 Degrees	BORING NO MW-6
DRILLING CONTRACTOR West Hazmat Drilling Corp.	COMPLETED 4/6/93	FIRST ENCOUNTERED WATER DEPTH 16 Feet		BOTTOM OF BORING 22.0 Feet
OPERATOR Thomas Wright	LOGGED BY H. Hurkmans	STATIC WATER DEPTH/DATE 5.37 Feet/4-9-93		
DRILL MAKE & MODEL CME 75	SAMPLING METHOD California modified split-spoon			BOTTOM OF WELL 20.0 Feet
WELL MATERIAL 4" dia. sch. 40 pvc	SLOT SIZE 0.020	FILTER PACK #3 sand	BORING SEAL Neat cement over hydrated bentonite	WELL NO. MW-6

BLOWS/FOOT	FIELD HEADSPACE *	DEPTH	SAMPLE	WATER LEVEL	WELL CONSTR.	GRAPHIC LOG	MATERIAL CLASSIFICATION & PHYSICAL DESCRIPTION
		1					Red pumice/planter box fill Baserock fill
		2					
		3					
		4					
		5		▼			Lean CLAY with gravel (CL); tan with rust, damp, stiff; 20% subrounded gravel
18	0.0	6					
		7					
		8					
		9					
		10					similar to above
20	0.0	11					Silty SAND (SM), gray, moist-wet, fine, sub-rounded
		12					
		13					
		14					
		15					Lean CLAY (CL); olive, moist, very stiff, high plasticity
26	0.0	16		▽			saturated
		17					
		18					
		19					
25		20					Lean CLAY (CL); olive, moist, very stiff, high plasticity; trace white, coarse sand
		21					
		22					
		23					
		24					
		25					
		26					
		27					
		28					
	*PID (ppm)	29					
		30					

HYDRO-ENVIRONMENTAL TECHNOLOGIES, INC.

DATE:

APPROVED BY: Owen C. Ratchye

SOIL BORING AND WELL CONSTRUCTION LOG
MW-6

BP Oil Station No. 11120
6400 Dublin Blvd.
Dublin, California

PLATE
A-4
SHEET 1 OF 1

JOB NO.
9-040.1

SITE/LOCATION: 6400 Dublin Blvd., Dublin, CA	BEGUN: 4/6/93	BORING DIAMETER: 8 Inches	ANGLE/BEARING: 90 Degrees	BORING NO: MW-7
DRILLING CONTRACTOR: West Hazmat Drilling Corp.	COMPLETED: 4/6/93	FIRST ENCOUNTERED WATER DEPTH: 20.5 Feet		BOTTOM OF BORING: 22.0 Feet
OPERATOR: Thomas Wright	LOGGED BY: H. Hurkmans	STATIC WATER DEPTH/DATE: 5.36 Feet/4-9-93		
DRILL MAKE & MODEL: CME 75	SAMPLING METHOD: California modified split-spoon			BOTTOM OF WELL: 22.0 Feet
WELL MATERIAL: 2" dia. sch. 40 pvc	SLOT SIZE: 0.020	FILTER PACK: #3 sand	BORING SEAL: Neat cement over hydrated bentonite	WELL NO.: MW-7

BLOWS/FOOT	FIELD HEAD-SPACE *	DEPTH	SAMPLE	WATER LEVEL	WELL CONSTR.	GRAPHIC LOG	MATERIAL CLASSIFICATION & PHYSICAL DESCRIPTION
		1					Asphalt & Baserock fill
		2					
		3					
		4					Lean CLAY (CL); rusty-tan, damp, firm, high plasticity, 5-10% fine pebble gravel
13	0.0	5		▼			
		6					Silty SAND (SM); gray, moist, medium dense, fine
		7					
		8					
		9					
19	0.0	10					Lean CLAY (CL); mottled olive-black & rust, moist, stiff, high plasticity
		11					
		12					
		13					
		14					
26	0.0	15					Lean CLAY (CL); light olive with rust mottle, moist, stiff, high plasticity; 10% white, friable, fine gravel
		16					
		17					
		18					same as above
18		19					
		20		▽			thin, confined, saturated zone
17		21					Lean CLAY (CL); olive-black, moist, stiff, high plasticity
		22					Lean CLAY (CL); olive, damp, stiff, high plasticity; 5% white, friable, fine gravel; 5-10% medium-coarse sand
		23					
		24					
		25					
		26					
		27					
		28					
	*PID (ppm)	29					
		30					

HYDRO-ENVIRONMENTAL TECHNOLOGIES, INC.

DATE:

APPROVED BY: Owen C. Ratchye

SOIL BORING AND WELL CONSTRUCTION LOG
MW-7

BP Oil Station No. 11120
6400 Dublin Blvd.
Dublin, California

PLATE
A-5
SHEET 1 OF 1

JOB NO.
9-040.1

FIELD CREW HEALTH & SAFETY PLAN

PRE-ACTIVITY BRIEFING

Project Location: 6400 Dublin Blvd., Dublin, CA

Client: BP Oil Job No. 9-040.1

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 [illegible] Date: 4-6-93

Helper [illegible] Date: 4-6-93

Project Geologist Henry Workman Date: 4-6-93

NEAREST HOSPITAL OR CLINIC Amador Valley Med. Clinic

HOSPITAL ADDRESS & DIRECTIONS FROM JOB SITE From BP left on Dougherty, proceed through Dublin Blvd. to Amador Valley Blvd. take left, clinic on right

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

APPENDIX B

PURGED/SAMPLED BY: HH/TR DATE: 4-9-93

GAUGING DATA:

Depth to bottom: 19.20 ft.

Depth to water: 4.79 ft.

Saturated Thickness: 13.41 ft.

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

Well casing volume 2.14 gallons

volumes to purge x 3 vols.

*Total volume to purge = 6.44 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
1:00	0	—	—	—
C	4	64.4	—	8.04
1:10	7	64.9	—	8.09

Color: tan Turbidity: moderate

Recharge: fair SPP 0 ft.

SAMPLING DATA:

Sampling method: (Dedicated bailer) / _____

Sample for: (circle)

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

Other: _____

HYDRO-ENVIRONMENTAL TECHNOLOGIES, INC.

MONITORING WELL PURGE/SAMPLE SHEET

WELL # MW-1

LOCATION BP/Dublin Blvd.

Job No. 9-040.1

SHEET 1 of 1

PURGED/SAMPLED BY: HH/TR DATE: 4-9-93

GAUGING DATA:

Depth to bottom: 18.25 ft.

Depth to water: 4.12 ft.

Saturated Thickness: 14.13 ft.

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

Well casing volume 2.26 gallons

volumes to purge x 3 vols.

*Total volume to purge = 6.8 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
1:15	0	—	—	—
1:20	4	68.5	—	7.64
1:23	7	69.1	—	7.45

Color: tan Turbidity: moderate

Recharge: fair SPP 6 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-2

LOCATION BP/Dublin Blvd.

Job No. 4-040.1

SHEET 1 of 1

PURGED/SAMPLED BY: HH/TR DATE: 4-9-93

GAUGING DATA:

Depth to bottom: 18.61 ft.

Depth to water: 4.90 ft.

Saturated Thickness: 13.71 ft.

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

Well casing volume 2.19 gallons

volumes to purge x 3 vols.

*Total volume to purge = 6.6 gallons

* unless chemical parameters stabilize earlier

PURGING DATA:

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

Time	Volume (gallons)	Temp. (°F)	Conductivity (mS/cm)	pH
1:30	0	—	—	—
↓	4	68.5	—	8.45
1:40	7	68.7	—	8.28

Color: tan Turbidity: moderate

Recharge: good SPP 6 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-3

LOCATION BP/Dublin Blvd.

Job No. 4-040.1

SHEET 1 of 1

PURGED/SAMPLED BY: HH/TR DATE: 4-9-93

GAUGING DATA:

Depth to bottom: 18.15 ft.

Depth to water: 5.25 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 2.06 gallons

volumes to purge x 3 vols.

*Total volume to purge = 6.2 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
2:15	0	—	—	—
2:25	4	68.1	—	7.85
2:30	7	68.1	—	7.75

Color: tan Turbidity: moderate

Recharge: good SPP 0 ft.

SAMPLING DATA:

Sampling method: (Dedicated bailer) / _____

Sample for: (circle)

(TPHg/BTEX)	METALS	TOG	8010
(TPHd)	O-Pb	TEL	8021
TPH mo	Total Pb	EDB	8240
601	602	Nitrates	8260 8270

Other: _____

HYDRO-ENVIRONMENTAL TECHNOLOGIES, INC.

MONITORING WELL PURGE/SAMPLE SHEET

WELL # MW-4

LOCATION BP/Dublin Blvd.

Job No. 4-040.1

SHEET 1 of 1

PURGED/SAMPLED BY: HH/AR DATE: 4-9-93

GAUGING DATA:

Depth to bottom: 21.35 ft.

Depth to water: 5.18 ft.

Saturated Thickness: 16.17 ft.

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

Well casing volume 2.59 gallons

volumes to purge x 10 vols.

*Total volume to purge = 25.9 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
11:22	0	—	—	—
	5	74.4	—	8.58
	10	73.1	—	8.40
	15	72.1	—	8.18
↓	20	71.5	—	8.12
11:51	26	71.1	—	8.00

Color: tan Turbidity: heavy

Recharge: good SPP: 0 ft.

SAMPLING DATA:

Sampling method: Dedicated bailer / disposable bailer

Sample for: (circle)

(TPHg/BTEX) METALS TOC 8010

(TPHd) O-Pb TEL 8020

TPH mo Total Pb EDB 8240

601 602 Nitrates 8260 8270

Other: _____

HYDRO-ENVIRONMENTAL TECHNOLOGIES, INC.

MONITORING WELL PURGE/SAMPLE SHEET

WELL # MW-5

LOCATION BP/Dublin

Job No. 9-040.1

SHEET 1 of 1

PURGED/SAMPLED BY: HH/AR DATE: 4-9-93

GAUGING DATA:

Depth to bottom: 19.25 ft.

Depth to water: 5.37 ft.

Saturated Thickness: 13.88 ft.

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

Well casing volume 9.02 gallons

volumes to purge x 10 vols.

*Total volume to purge = 90.2 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
12:32	0	—	—	—
	5	70.9	—	8.97
	10	71.3	—	8.76
	15	71.4		8.56
	20	70.1		8.43
	25	69.1		8.19
	30	69.2		8.15
	35	68.1		8.09
	40	67.6		8.05
▽	45	67.8		8.01

Color: _____ Turbidity: _____

Recharge: _____ SPP _____ ft.

SAMPLING DATA:

Sampling method: Dedicated bailer / disposable bailer

Sample for: (circle)

TPHg/BTEX METALS TOC 8010

TPHd O-Pb TEL 8021

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 BP/Dublin

Job No. 9-040.1

SHEET 1 of 2

PURGED/SAMPLED BY: HH/TR DATE: 4/9/92

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
	50	67.6	—	8.08
	55	68.4	—	8.03
	60	67.8	—	8.02
	65	67.5	—	7.97
	70	67.7	—	7.92
	75	66.7	—	7.82
	80	67.9	—	7.80
	85	67.7	—	7.79
	70	68.1	—	7.80

Color: tan Turbidity: heavy

Recharge: Good 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-6

LOCATION BP/Dublin

Job No. 9-040.1

SHEET 1 of 2

PURGED/SAMPLED BY: HH/AR DATE: 4-9-93

GAUGING DATA:

Depth to bottom: 20.25 ft.

Depth to water: 5.36 ft.

Saturated Thickness: 14.89 ft.

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

Well casing volume 2.38 gallons

volumes to purge x 10 vols.

*Total volume to purge = 23.8 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
10:40a	0	—	—	—
	5	68.9	—	8.52
	10	69.2	—	8.56
	15	69.2	—	8.44
▽	20	69.1	—	8.31
11:17	25	68.7	—	8.14

Color: tan Turbidity: heavy

Recharge: good SPP 0 ft.

SAMPLING DATA:

Sampling method: Dedicated bailer / disposable 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 BP / Dublin

Job No. 9-040.1

SHEET 1 of 1

APPENDIX C

pace INCORPORATED
THE ASSURANCE OF QUALITY

REPORT OF LABORATORY ANALYSIS

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

April 21, 1993
PACE Project Number: 430407513

Attn: Mr. Owen Ratchye

Client Reference: BP Station # 11120

PACE Sample Number:			70 0044189	
Date Collected:			04/06/93	
Date Received:			04/07/93	
			MW-5-5.5'	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	04/17/93
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/kg wet	1000	ND	04/17/93
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	04/17/93
Benzene	ug/kg wet	5.0	17	04/17/93
Toluene	ug/kg wet	5.0	ND	04/17/93
Ethylbenzene	ug/kg wet	5.0	ND	04/17/93
Xylenes, Total	ug/kg wet	5.0	ND	04/17/93
EXTRACTABLE FUELS EPA 3550/8015				
Extractable Fuels, as Diesel	mg/kg	5.0	ND	04/16/93
Date Extracted			04/13/93	

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

REPORT OF LABORATORY ANALYSIS

April 21, 1993
PACE Project Number: 430407513

Client Reference: BP Station # 11120

PACE Sample Number:			70 0044197	
Date Collected:			04/06/93	
Date Received:			04/07/93	
Client Sample ID:			MW-5-15.5'	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	04/17/93
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/kg wet	1000	ND	04/17/93
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	04/17/93
Benzene	ug/kg wet	5.0	ND	04/17/93
Toluene	ug/kg wet	5.0	ND	04/17/93
Ethylbenzene	ug/kg wet	5.0	ND	04/17/93
Xylenes, Total	ug/kg wet	5.0	ND	04/17/93
EXTRACTABLE FUELS EPA 3550/8015				
Extractable Fuels, as Diesel	mg/kg	5.0	ND	04/16/93
Date Extracted			04/13/93	

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FAX: 415-883-2673

REPORT OF LABORATORY ANALYSIS

April 21, 1993
PACE Project Number: 430407513

Client Reference: BP Station # 11120

Parameter	Units	MDL		DATE ANALYZED
PACE Sample Number:			70 0044200	
Date Collected:			04/06/93	
Date Received:			04/07/93	
Client Sample ID:			MW-6-5.5'	
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	04/17/93
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/kg wet	1000	ND	04/17/93
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	04/17/93
Benzene	ug/kg wet	5.0	ND	04/17/93
Toluene	ug/kg wet	5.0	ND	04/17/93
Ethylbenzene	ug/kg wet	5.0	ND	04/17/93
Xylenes, Total	ug/kg wet	5.0	ND	04/17/93
EXTRACTABLE FUELS EPA 3550/8015				
Extractable Fuels, as Diesel	mg/kg	5.0	ND	04/16/93
Date Extracted			04/13/93	

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pace INCORPORATED
THE ASSURANCE OF QUALITY

REPORT OF LABORATORY ANALYSIS

Mr. Owen Ratchye
Page 4

April 21, 1993
PACE Project Number: 430407513

Client Reference: BP Station # 11120

PACE Sample Number:			70 0044219	
Date Collected:			04/06/93	
Date Received:			04/07/93	
Client Sample ID:			MW-6-10.5'	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	04/17/93
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/kg wet	1000	ND	04/17/93
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	04/17/93
Benzene	ug/kg wet	5.0	ND	04/17/93
Toluene	ug/kg wet	5.0	ND	04/17/93
Ethylbenzene	ug/kg wet	5.0	ND	04/17/93
Xylenes, Total	ug/kg wet	5.0	ND	04/17/93
EXTRACTABLE FUELS EPA 3550/8015				
Extractable Fuels, as Diesel	mg/kg	5.0	ND	04/16/93
Date Extracted			04/13/93	

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REPORT OF LABORATORY ANALYSIS

Mr. Owen Ratchye
Page 5

April 21, 1993
PACE Project Number: 430407513

Client Reference: BP Station # 11120

PACE Sample Number:			70 0044227	
Date Collected:			04/06/93	
Date Received:			04/07/93	
Client Sample ID:			MW-7-5.5'	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	04/17/93
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/kg wet	1000	ND	04/17/93
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	04/17/93
Benzene	ug/kg wet	5.0	ND	04/17/93
Toluene	ug/kg wet	5.0	ND	04/17/93
Ethylbenzene	ug/kg wet	5.0	ND	04/17/93
Xylenes, Total	ug/kg wet	5.0	ND	04/17/93
EXTRACTABLE FUELS EPA 3550/8015				
Extractable Fuels, as Diesel	mg/kg	5.0	ND	04/16/93
Date Extracted			04/13/93	

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pace INCORPORATED
THE ASSURANCE OF QUALITY

REPORT OF LABORATORY ANALYSIS

Mr. Owen Ratchye
Page 6

April 21, 1993
PACE Project Number: 430407513

Client Reference: BP Station # 11120

Parameter	Units	MDL		DATE ANALYZED
PACE Sample Number:			70 0044235	
Date Collected:			04/06/93	
Date Received:			04/07/93	
Client Sample ID:			MW-7-15.5'	
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	04/17/93
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/kg wet	1000	ND	04/17/93
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	04/17/93
Benzene	ug/kg wet	5.0	ND	04/17/93
Toluene	ug/kg wet	5.0	ND	04/17/93
Ethylbenzene	ug/kg wet	5.0	ND	04/17/93
Xylenes, Total	ug/kg wet	5.0	ND	04/17/93
EXTRACTABLE FUELS EPA 3550/8015				
Extractable Fuels, as Diesel	mg/kg	5.0	ND	04/19/93
Date Extracted			04/13/93	

These data have been reviewed and are approved for release.

Darrell C. Cain
Regional Director

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FAX: 415-883-2673

Client Reference: BP Station # 11120

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

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Mr. Owen Ratchye
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QUALITY CONTROL DATA

April 21, 1993
PACE Project Number: 430407513

Client Reference: BP Station # 11120

EXTRACTABLE FUELS EPA 3550/8015
Batch: 70 20456
Samples: 70 0044189, 70 0044197, 70 0044200, 70 0044219, 70 0044227
70 0044235

METHOD BLANK:

Parameter	Units	MDL	Method Blank
Extractable Fuels, as Diesel	mg/kg	5.0	ND

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
Extractable Fuels, as Diesel	mg/kg	5.0	33.3	62%	59%	4%

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PURGEABLE FUELS AND AROMATICS
Batch: 70 20396
Samples: 70 0044197, 70 0044200

METHOD BLANK:

Parameter	Units	MDL	Method Blank
TOTAL FUEL HYDROCARBONS, (LIGHT):			-
Purgeable Fuels, as Gasoline (EPA 8015M	ug/kg wet	200	ND
PURGEABLE AROMATICS (BTXE BY EPA 8020M)			-
Benzene	ug/kg wet	1.0	ND
Toluene	ug/kg wet	1.0	ND
Ethylbenzene	ug/kg wet	1.0	ND
Xylenes, Total	ug/kg wet	1.0	ND

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
Purgeable Fuels, as Gasoline (EPA 8015M	ug/kg wet	200	1000	95%	100%	5%
Benzene	ug/kg wet	1.0	40.0	106%	107%	0%
Toluene	ug/kg wet	1.0	40.0	117%	111%	5%
Ethylbenzene	ug/kg wet	1.0	40.0	112%	113%	0%
Xylenes, Total	ug/kg wet	1.0	120	115%	115%	0%

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Mr. Owen Ratchye
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QUALITY CONTROL DATA

April 21, 1993
PACE Project Number: 430407513

Client Reference: BP Station # 11120

PURGEABLE FUELS AND AROMATICS
Batch: 70 20416
Samples: 70 0044219, 70 0044227, 70 0044235

METHOD BLANK:

Parameter	Units	MDL	Method Blank
TOTAL FUEL HYDROCARBONS, (LIGHT):			-
Purgeable Fuels, as Gasoline (EPA 8015M	ug/kg wet	200	ND
PURGEABLE AROMATICS (BTXE BY EPA 8020M)			-
Benzene	ug/kg wet	1.0	ND
Toluene	ug/kg wet	1.0	ND
Ethylbenzene	ug/kg wet	1.0	ND
Xylenes, Total	ug/kg wet	1.0	ND

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
Purgeable Fuels, as Gasoline (EPA 8015M	ug/kg wet	200	1000	103%	107%	3%
Benzene	ug/kg wet	1.0	40.0	103%	105%	1%
Toluene	ug/kg wet	1.0	40.0	106%	108%	1%
Ethylbenzene	ug/kg wet	1.0	40.0	108%	111%	2%
Xylenes, Total	ug/kg wet	1.0	120	109%	113%	3%

Mr. Owen Ratchye
Page 11

QUALITY CONTROL DATA

April 21, 1993
PACE Project Number: 430407513

Client Reference: BP Station # 11120

PURGEABLE FUELS AND AROMATICS
Batch: 70 20479
Samples: 70 0044189

METHOD BLANK:

Parameter	Units	MDL	Method Blank
TOTAL FUEL HYDROCARBONS, (LIGHT):			-
Purgeable Fuels, as Gasoline (EPA 8015M	ug/kg wet	200	ND
PURGEABLE AROMATICS (BTXE BY EPA 8020M)			-
Benzene	ug/kg wet	1.0	ND
Toluene	ug/kg wet	1.0	ND
Ethylbenzene	ug/kg wet	1.0	ND
Xylenes, Total	ug/kg wet	1.0	ND

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
Purgeable Fuels, as Gasoline (EPA 8015M	ug/kg wet	200	1000	98%	98%	0%
Benzene	ug/kg wet	1.0	40.0	102%	102%	0%
Toluene	ug/kg wet	1.0	40.0	108%	107%	0%
Ethylbenzene	ug/kg wet	1.0	40.0	111%	110%	0%
Xylenes, Total	ug/kg wet	1.0	120	115%	114%	0%

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Mr. Owen Ratchye
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FOOTNOTES
for pages 8 through 11

April 21, 1993
PACE Project Number: 430407513

Client Reference: BP Station # 11120

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

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PACE INCORPORATED
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B.P. OIL COMPANY

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16400 Southcenter Parkway, Suite 301, Tukwila, WA 98188

CHAIN OF CUSTODY

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☐ Huntington Beach, CA, 5702 Bolsa Avenue, 92649
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Page 1 of 1

Consultant's Name: Hydro-Environmental Tech, Inc. | Consultant Project #: 9-040.1

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

Project Contact: Owen Ratchye | Phone #: (510) 521-2684 Fax #: (510) 521-9078 | Consultant Work Order #: F956211

Sampled by (print): Henry Hurkmans | Sampler's Signature: Henry Hurkmans | B.P. Site Location #: 11120

Shipment Method: lab courier | Airbill #: | Shipment Date: 4-7-93 | B.P. Site Location: Dublin Blvd., Dublin

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

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

Sample Description	Collection Date/Time	Matrix Soil/Water	Prsv	# of Cont	PACE Sample #	TPH/GAS/BTEX EPA 8015/8020	TPH/Diesel EPA 8015	TRPH EPA 418.1	HVOC 8010									COMMENTS
MW-5-5.5'	4-6-93 10 am	soil	chilled	1	4418.9	X	X											
MW-5-15.5'	↓	↓	↓	↓	4419.7	↓	↓											
MW-6-5.5'	4-6-93 12:00 pm				4420.0													
MW-6-10.5'	↓				4421.9													
MW-7-5.5'	4-6-93 1:30 pm				4422.7													
MW-7-15.5'	↓	↓	↓	↓	4423.5	↓	↓											

Relinquished by/Affiliation	Date	Time	Accepted by/Affiliation	Date	Time
Henry Hurkmans HED	4-7-93	11:30a	[signature]	4/7/93	11:30a
[signature]	4/7/93	12:40p	[signature] - Pace	4/7	1231
[signature] - Pace	4/7	1700	Owen Ratchye, PACE	4/7	1700

Additional Comments:
B/4

White - Lab Yellow - PACE Pink - Lab Goldenrod - Consultant Field Staff

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REPORT OF LABORATORY ANALYSIS

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

April 27, 1993
PACE Project Number: 430413517
WPPLab Number: 2338

Attn: Mr. Owen Ratchye

Client Reference: BP Station # 11120

PACE Sample Number:			70 0048087	
Date Collected:			04/09/93	
Date Received:			04/13/93	
			MW-1	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	04/22/93
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/L	50	ND	04/22/93
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	04/22/93
Benzene	ug/L	0.5	ND	04/22/93
Toluene	ug/L	0.5	ND	04/22/93
Ethylbenzene	ug/L	0.5	ND	04/22/93
Xylenes, Total	ug/L	0.5	ND	04/22/93
EXTRACTABLE FUELS EPA 3510/8015				
Extractable Fuels, as Diesel	mg/L	0.05	0.10 (AT)	04/16/93
Date Extracted			04/16/93	

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REPORT OF LABORATORY ANALYSIS

April 27, 1993
PACE Project Number: 430413517

Client Reference: BP Station # 11120

Parameter	Units	MDL		DATE ANALYZED
PACE Sample Number:			70 0048095	
Date Collected:			04/09/93	
Date Received:			04/13/93	
Client Sample ID:			MW-2	
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	04/22/93
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/L	50	ND	04/22/93
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	04/22/93
Benzene	ug/L	0.5	ND	04/22/93
Toluene	ug/L	0.5	ND	04/22/93
Ethylbenzene	ug/L	0.5	ND	04/22/93
Xylenes, Total	ug/L	0.5	ND	04/22/93
EXTRACTABLE FUELS EPA 3510/8015				
Extractable Fuels, as Diesel	mg/L	0.05	0.08	04/16/93
Date Extracted			04/16/93	

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REPORT OF LABORATORY ANALYSIS

Mr. Owen Ratchye
Page 3

April 27, 1993
PACE Project Number: 430413517

Client Reference: BP Station # 11120

PACE Sample Number:			70 0048109	
Date Collected:			04/09/93	
Date Received:			04/13/93	
Client Sample ID:			MW-3	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	04/22/93
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/L	50	400(MT)	04/22/93
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	04/22/93
Benzene	ug/L	0.5	6.1	04/22/93
Toluene	ug/L	0.5	ND	04/22/93
Ethylbenzene	ug/L	0.5	ND	04/22/93
Xylenes, Total	ug/L	0.5	ND	04/22/93
EXTRACTABLE FUELS EPA 3510/8015				
Extractable Fuels, as Diesel	mg/L	0.05	0.26	04/20/93
Date Extracted			04/16/93	

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REPORT OF LABORATORY ANALYSIS

April 27, 1993
PACE Project Number: 430413517

Client Reference: BP Station # 11120

PACE Sample Number:			70 0048117	
Date Collected:			04/09/93	
Date Received:			04/13/93	
Client Sample ID:			MW-4	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	04/22/93
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/L	50	1600	04/22/93
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	04/22/93
Benzene	ug/L	0.5	78 (MT)	04/22/93
Toluene	ug/L	0.5	3.5	04/22/93
Ethylbenzene	ug/L	0.5	68	04/22/93
Xylenes, Total	ug/L	0.5	1.0	04/22/93
EXTRACTABLE FUELS EPA 3510/8015				
Extractable Fuels, as Diesel	mg/L	0.05	0.50	04/20/93
Date Extracted			04/16/93	

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REPORT OF LABORATORY ANALYSIS

Mr. Owen Ratchye
Page 5

April 27, 1993
PACE Project Number: 430413517

Client Reference: BP Station # 11120

PACE Sample Number:			70 0048125	
Date Collected:			04/09/93	
Date Received:			04/13/93	
Client Sample ID:			MW-5	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	04/22/93
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/L	50	ND	04/22/93
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	04/22/93
Benzene	ug/L	0.5	ND	04/22/93
Toluene	ug/L	0.5	ND	04/22/93
Ethylbenzene	ug/L	0.5	ND	04/22/93
Xylenes, Total	ug/L	0.5	ND	04/22/93
EXTRACTABLE FUELS EPA 3510/8015				
Extractable Fuels, as Diesel	mg/L	0.05	ND	04/16/93
Date Extracted			04/16/93	

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REPORT OF LABORATORY ANALYSIS

Mr. Owen Ratchye
Page 6

April 27, 1993
PACE Project Number: 430413517

Client Reference: BP Station # 11120

PACE Sample Number:			70 0048133	
Date Collected:			04/09/93	
Date Received:			04/13/93	
Client Sample ID:			MW-6	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	04/22/93
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/L	50	ND	04/22/93
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	04/22/93
Benzene	ug/L	0.5	ND	04/22/93
Toluene	ug/L	0.5	ND	04/22/93
Ethylbenzene	ug/L	0.5	ND	04/22/93
Xylenes, Total	ug/L	0.5	ND	04/22/93
EXTRACTABLE FUELS EPA 3510/8015				
Extractable Fuels, as Diesel	mg/L	0.05	ND	04/16/93
Date Extracted			04/16/93	

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REPORT OF LABORATORY ANALYSIS

Mr. Owen Ratchye
Page 7

April 27, 1993
PACE Project Number: 430413517

Client Reference: BP Station # 11120

PACE Sample Number:			70 0048141	
Date Collected:			04/09/93	
Date Received:			04/13/93	
Client Sample ID:			MW-7	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	04/22/93
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/L	50	ND	04/22/93
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	04/22/93
Benzene	ug/L	0.5	ND	04/22/93
Toluene	ug/L	0.5	ND	04/22/93
Ethylbenzene	ug/L	0.5	ND	04/22/93
Xylenes, Total	ug/L	0.5	ND	04/22/93
EXTRACTABLE FUELS EPA 3510/8015				
Extractable Fuels, as Diesel	mg/L	0.05	ND	04/16/93
Date Extracted			04/16/93	

These data have been reviewed and are approved for release.

Darrell C. Cain
Regional Director

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Client Reference: BP Station # 11120

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

Special footnote for page 1 (Client sample ID MW-1):
(AT) Chromatogram consisted mainly of a single peak. This is not consistent with a typical Diesel pattern.

Special footnote for pages 3 and 4 (Client sample ID's MW-3 and MW-4):
(MT) A peak eluting before Benzene and suspected to be Methyl Tert Butyl Ether (MTBE) was present at the following approximate concentrations:

Client Sample ID	PACE Sample #	Approx. MTBE Value
MW-3	70 0048109	270 ug/L
MW-4	70 0048117	360 ug/L

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Mr. Owen Ratchye
Page 9

QUALITY CONTROL DATA

April 27, 1993
PACE Project Number: 430413517

Client Reference: BP Station # 11120

EXTRACTABLE FUELS EPA 3510/8015
Batch: 70 20447
Samples: 70 0048087, 70 0048095, 70 0048109, 70 0048117, 70 0048125
70 0048133, 70 0048141

METHOD BLANK:

Parameter	Units	MDL	Method Blank
Extractable Fuels, as Diesel	mg/L	0.05	ND

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
Extractable Fuels, as Diesel	mg/L	0.05	1.00	65%	67%	3%

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Mr. Owen Ratchye
Page 10

QUALITY CONTROL DATA

April 27, 1993
PACE Project Number: 430413517

Client Reference: BP Station # 11120

PURGEABLE FUELS AND AROMATICS
Batch: 70 20565
Samples: 70 0048087, 70 0048095, 70 0048109, 70 0048117, 70 0048125
70 0048133, 70 0048141

METHOD BLANK:

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

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
Purgeable Fuels, as Gasoline (EPA 8015M	ug/L	50	1000	108%	106%	1%
Benzene	ug/L	0.5	100	115%	121%	5%
Toluene	ug/L	0.5	100	106%	110%	3%
Ethylbenzene	ug/L	0.5	100	105%	110%	4%
Xylenes, Total	ug/L	0.5	300	108%	113%	4%

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Mr. Owen Ratchye
Page 11

FOOTNOTES
for pages 9 through 10

April 27, 1993
PACE Project Number: 430413517

Client Reference: BP Station # 11120

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

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4304/3.511

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Consultant's Name: Hydro-Environmental Tech, Inc. | Consultant Project #: 9-040.1 | Page 1 of 1

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

Project Contact: Owen Ratchye | Phone #: (510)521-2684 Fax #: (510)521-5078 | Consultant Work Order #: F956211

Sampled by (print): Henry Hurkmans | Sampler's Signature: Henry Hurkmans | B.P. Site Location #: 11120

Shipment Method: lab courier | Airbill #: | Shipment Date: 4-13-93 | B.P. Site Location: BP Dublin Blvd.

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

ANALYSIS REQUIRED

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

Sample Description	Collection Date/Time	Matrix Soil/Water	Prsv	# of Cont	PACE Sample #	TPH/GAS/BTEX EPA 8015/8020	TPH/Diesel EPA 8015	TRPH EPA 418.1	HVOC 8010									COMMENTS
MW-1	4-9-93/3pm	H_2O	HCl + none	4	4808.7	X	X											
MW-2					4809.5													
MW-3					4810.9													
MW-4					4811.7													
MW-5					4812.5													
MW-6					4813.3													
MW-7	↓	↓	↓	↓	4814.1	↓	↓											

Relinquished by/Affiliation	Date	Time	Accepted by/Affiliation	Date	Time
Henry Hurkmans HETI	4-12-93	2pm	O'Ratchye	4/12/93	2p
	4/13	1120		4/13	1130
	4/13	1715	PACE	4/13	1715

Additional Comments: 9/1, N/4

White - Original Yellow - B.P. Oil Pink - Lab Goldenrod - Consultant Field Staff