Environmental
Science &
Engineering, Inc.

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TO: Alameda County Health Services Agency
Department of Environmental Health
80 Swan Way
Oakland, CA 94621

DATE: February 9, 1993

JOB NUMBER: 6-92-5428

SUBJECT: BP Oil Facility #11105, 3519 Castro Valley Boulevard, Castro Valley, California

WE ARE TRANSMITTING THE FOLLOWING:

Preliminary Site Assessment Report for the subject facility, originally submitted to you by BP on January 26, 1993. Tables 1 and 3 have been amended, and this report supersedes the originally submitted report. We apologize for any inconvenience this may have caused.

CC: Ms. Pauline Reith, BP Oil

DIST:
LB
FILE
ORIGINATOR

ENVIRONMENTAL SCIENCE & ENGINEERING, INC.

BY Michael E. Quillin
Michael E. Quillin
Senior Hydrogeologist

4090 Nelson Avenue, Suite J Concord, CA 94520 Phone (510) 685-4053 Fax (510) 685-5323

Castro Valley Chevron
3519 Castro Valley Boulevard
Castro Valley CA 94546
September 4, 2003

Castro Valley Chevron
3519 Castro Valley Boulevard
Castro Valley CA 94546
September 4, 2003
Used oil tank 2K DW FRP

Castro Valley Chevron
3519 Castro Valley Boulevard
Castro Valley CA 94546
September 4, 2003
Used oil tank 2K DW FRP
No apparent leaks in tank

Castro Valley Chevron
3519 Castro Valley Boulevard
Castro Valley CA 94546
September 4, 2003
Former under dispenser piping connections

Castro Valley Chevron
3519 Castro Valley Boulevard
Castro Valley CA 94546
September 4, 2003
concrete saw cut for removal of piping

Castro Valley Chevron
3519 Castro Valley Boulevard
Castro Valley CA 94546
September 4, 2003
Artifact on frp sw tank

Castro Valley Chevron
3519 Castro Valley Boulevard
Castro Valley CA 94546
September 4, 2003
SW FRP Fuel tank, no apparent faults

Castro Valley Chevron
3519 Castro Valley Boulevard
Castro Valley CA 94546
September 4, 2003
Tank excavation for "old tanks"

Castro Valley Chevron
3519 Castro Valley Boulevard
Castro Valley CA 94546
September 4, 2003
SW FRP Fuel Tank, no apparent faults

Castro Valley Chevron
3519 Castro Valley Boulevard
Castro Valley CA 94546
September 4, 2003
SW FRP Fuel Tanks loaded for disposal at ECI

Castro Valley Chevron
3519 Castro Valley Boulevard
Castro Valley CA 94546
September 4, 2003
SW FRP Piping junction back to tank field

Castro Valley Chevron
3519 Castro Valley Boulevard
Castro Valley CA 94546
September 4, 2003
SW FRP Fuel tanks staged for removal

Castro Valley Chevron
3519 Castro Valley Boulevard
Castro Valley CA 94546
September 4, 2003
SW FRP Fuel tanks staged for removal

Castro Valley Chevron
3519 Castro Valley Boulevard
Castro Valley CA 94546
September 4, 2003
Various tank equipment & drums w/ old fuel

Castro Valley Chevron
3519 Castro Valley Boulevard
Castro Valley CA 94546
September 4, 2003
Used oil tank

Castro Valley Chevron
3519 Castro Valley Boulevard
Castro Valley CA 94546
September 4, 2003
SW FRP in FiberTrench

Castro Valley Chevron
3519 Castro Valley Boulevard
Castro Valley CA 94546
September 4, 2003
Cave-in of soil, asphaltic cement and tank equipment

Castro Valley Chevron
3519 Castro Valley Boulevard
Castro Valley CA 94546
September 4, 2003
Insignificant stain, not a leak in tank

Castro Valley Chevron
3519 Castro Valley Boulevard
Castro Valley CA 94546
September 4, 2003
SW FRP Fuel tank no apparent faults

Castro Valley Chevron
3519 Castro Valley Boulevard
Castro Valley CA 94546
September 4, 2003
Soil water interface sampling in former tank pit

Castro Valley Chevron
3519 Castro Valley Boulevard
Castro Valley CA 94546
September 4, 2003
Soil water interface sampling in former tank pit, stained soil (blue green)

Castro Valley Chevron
3519 Castro Valley Boulevard
Castro Valley CA 94546
September 4, 2003
Evidence of free floating product, with strong odors

Castro Valley Chevron
3519 Castro Valley Boulevard
Castro Valley CA 94546
September 4, 2003
Evidence of free floating product, with strong odors

Castro Valley Chevron
3519 Castro Valley Boulevard
Castro Valley CA 94546
September 4, 2003
Visible color difference at soil/ water interface

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PRELIMINARY SITE ASSESSMENT REPORT

BP Oil Company, U.S.A.
BP Oil Service Station No. 11105
3519 Castro Valley Boulevard
Castro Valley, California

Prepared for:

BP Oil Company
Northwest Division
Southcenter Place Building
16400 Southcenter Parkway, Suite 301
Tukwila, Washington

Prepared by:

Environmental Science & Engineering, Inc. (ESE)
4090 Nelson Avenue, Suite J
Concord, California 94520
510/685-4053

Project No. 6-92-5428
November 23, 1992

This report has been prepared by Environmental Science & Engineering, Inc. for the exclusive use of BP Oil as it pertains to their site located at 3519 Castro Valley Boulevard in Castro Valley, California. Our professional services have been performed using that degree of care and skill ordinarily exercised under similar circumstances by other geologists and engineers practicing in this field. No other warranty, express or implied, is made as to professional advice in this report.

REPORT PREPARED BY:

Christopher H. Valcheff

Christopher H. Valcheff
Staff Geologist

11/19/92
DATE

UNDER THE PROFESSIONAL REVIEW AND SUPERVISION OF:

Michael E. Quillin

Michael E. Quillin, RG 5315
Senior Project Hydrogeologist

REGISTERED GEOLOGIST
MICHAEL E. QUILLIN
#5315
STATE OF CALIFORNIA

11/19/92
DATE

Susan S. Wickham

Susan S. Wickham, RG 3851
Senior Geologist

REGISTERED GEOLOGIST
SUSAN S. WICKHAM
#3851
STATE OF CALIFORNIA

11/19/92
DATE

PROJECT NO. 6-92-5428

TABLE OF CONTENTS

1.0 INTRODUCTION

BP Oil Company retained Environmental Science & Engineering, Inc. (ESE) in September 1992 to conduct a preliminary environmental site assessment at BP Oil Service Station No. 11105, located at 3519 Castro Valley Boulevard, Castro Valley, California. The site vicinity is shown in Figure 1 - Location Map.

1.1 Purpose and Scope

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

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

- Conduct a sensitive receptors survey including existing well search.
- Drill and log exploratory soil borings and collect soil samples.
- Install temporary wells or monitoring wells, if ground water is encountered within the specified depth of the borings.
- Develop and survey monitoring wells and collect ground water samples for laboratory analysis of specified hydrocarbon constituents.
- Analyze data and results and prepare report presenting the findings of the preliminary assessment.

The above tasks and related field and sampling activities were performed in accordance with the requirements of the California Regional Water Quality Control Board (RWQCB) and the governing local implementing agencies for underground storage tank regulations.

1.2 Site Location and Description

BP Oil Service Station No. 11105 is located on the southeast corner of the intersection of Redwood Road and Castro Valley Boulevard in Castro Valley, California. The site is presently an operating service station with three underground fuel storage tanks. An operating competitor's fuel station is located directly west, across Redwood Road, of the site. Figure 2 - Site Map, shows the layout of the site and the locations of existing underground storage tanks and associated piping and dispenser island.

1.3 Sensitive Receptor Survey

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

2.0 FIELD METHODS

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

2.1 Soil Borings and Sampling

On September 28 and 29, 1992, five exploratory borings were drilled at the site. All drilling activities were performed by Soils Exploration Services, Inc. Drilling Company of Benicia, California using a truck-mounted CME-75 drilling rig. All soil borings were drilled using 8-inch-diameter hollow-stem augers to depths ranging from 24 to 30 feet below grade. Borings ESE-2, and ESE-3 were drilled in the vicinity of the existing underground fuel tanks. Boring ESE-3, and ESE-4 were drilled in the vicinity of the dispenser islands and associated piping. Boring ESE-5 was drilled in an upgradient location. Boring ESE-1 was drilled in the vicinity of the waste oil tank. The locations of the soil borings are shown in Figure 2.

Boring logs were prepared using the Unified Soil Classification System including a description of soil characteristics such as color, moisture, consistency, and field readings using an organic vapor meter. The boring logs are included as Appendix C.

2.2 Monitoring Well Installation and Construction

All five of the soil borings were converted into monitoring wells ESE-1, ESE-2, ESE-3, ESE-4 and ESE-5 in accordance with the installation procedures and construction details presented in Appendix B. All the monitoring wells were constructed with clean, 2-inch-diameter, flush threaded, Schedule 40, polyvinyl chloride (PVC) blank casing and 0.020-inch slotted casing to depths ranging from 24 to 30 feet below grade. Well construction details are included in the boring logs presented in Appendix C.

2.3 Monitoring Well Development and Sampling

Well development and sampling procedures were conducted in accordance with the applicable guidelines of the governing regulatory agencies. A description of the general field procedures for well development and sampling is presented in Appendix B.

All monitoring wells were developed on October 5, 1992. Prior to development, each well was first observed for the presence or absence of free floating product. The wells were developed by surging with a bailer and, removing at least 10 casing volumes of water and until the water was free of sand and silt, using either a 2-inch-diameter plastic bailer or a submersible pump.

Prior to sampling, each well was purged of three casing volumes using a disposable bailer or Grundfos pump. During purging and prior to sample collection, pH, specific conductivity, and temperature were measured and allowed to stabilize, indicating that formation water had entered the well. Field observations during well development and sampling are presented in the sampling survey forms included in Appendix D.

Ground water samples were collected in accordance with the guidelines of the regulatory agencies and the standard protocol described in Appendix B. All samples were then transported in an iced cooler to a state-certified laboratory following the proper chain-of-custody procedures.

2.4 Ground Water Level Monitoring and Well Surveying

The monitoring wells were surveyed to the top of each well casing in reference to one another and an established Alameda County Benchmark (CVB25-1979) with an elevation of 179.952 feet above mean sea level. The depth to ground water in the wells were measured form the top of the well casing to the nearest 0.01 foot, using an electronic sounder on October 5, 1992. The survey data and relative ground water elevation measurements are presented in Table 2 - Ground Water Elevations, October 5, 1992, while the graphical interpretation of the ground water gradient beneath the site is shown in Figure 3 - Ground Water Elevations - October 5, 1992.

3.0 ANALYTICAL METHODS

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

Selected soil samples from the borings were analyzed for the following constituents:

- Total petroleum hydrocarbons as gasoline (TPH-G) using EPA Method 8015 Modified.
- Benzene, toluene, ethylbenzene, and total xylenes (BTEX) constituents using EPA Method 8015 Modified.

Soil samples from Boring ESE-1 were additionally analyzed for total oil and grease (TOG) using EPA Method 5520 DF; halogenated volatile organics (HVO) using EPA Method 8010; and Total Petroleum Hydrocarbons as Diesel (TPH-D) using EPA Method 3550/8015.

The **ground water samples** collected from the monitoring wells were analyzed for TPH-G with BTEX distinction. Sample from Monitoring Well ESE-1 was also analyzed for TOG, TPH-D, and Total Purgeable Halocarbons (TPH) by EPA Method 601, due to its proximity to the underground waste oil tank.

The results of the laboratory analysis of soil and ground water samples are summarized in Table 1 and Table 3, while the official laboratory reports and chain of custody records are included in Appendix E.

4.0 DISCUSSION OF RESULTS

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

- Ground water was encountered in the soil borings during drilling at a depth of approximately 21 feet below grade.
- No free product or sheen was observed in any of the monitoring wells.
- **Ground water elevation data indicated a gradient of approximately 0.038 ft/ft in a general easterly direction across the site.**
- Dissolved-phase **TPH-G and benzene were detected in the ground water samples from all monitoring wells at concentrations of up to 2,300 parts per billion (ppb) and 370 ppb, respectively.**
- **The contaminant plume has not been defined on site.**

- Soil types encountered at the site generally consisted of clayey silt and silty clay.

- Analysis of soil samples collected from the borings near dispenser islands and tanks at depths of approximately 10 to 15 feet below grade detected concentrations of petroleum hydrocarbon constituents up to 220,000 parts per billion (ppb) of TPH-G and 1,400 ppb of benzene.

- No TOG or TPH were detected above the reported detection limit in the soil samples from Boring ESE-1, which was drilled within 15 feet of and cross gradient of the waste oil tank.

- Boring ESE-5, located upgradient of the operating dispenser islands and underground storage tanks (USTs), soil samples detected concentrations of TPH-G (51,000 ppb) and Benzene (250 ppb) greater than California MCLs. A possible source of contaminant is the competitor's operating fuel station directly upgradient of boring ESE-5.

- No sensitive receptors were found in the area.

However, shallow soil samples (~10' BG) exhibited elevated HC levels, suggesting an on-site source. Correct prod. distrib. of ESE-5 suggests a former UST pit or dispenser island.

TABLE 1

ANALYTICAL RESULTS FOR SOIL SAMPLES
FOR BP OIL SITE NO. 11105
3519 CASTRO VALLEY BOULEVARD, CASTRO VALLEY, CALIFORNIA

Boring No.	Depth Collected (ft BGS)*	Date Collected	TPH-Gas (µg/Kg)	Benzene (µg/Kg)	Toluene (µg/Kg)	Ethyl Benzene (µg/Kg)	Total Xylenes (µg/Kg)	TPH-Diesel (mg/Kg)	Oil and Grease (mg/Kg)	Halogenated Volatile Compounds (µg/Kg)
ESE-1	15	09/29/92	70,000	870	2,000	1,200	5,760	ND	ND	ND
ESE-1	20	09/29/92	ND	ND	ND	ND	ND	ND	ND	ND
ESE-2	10.5	09/28/92	ND	ND	ND	ND	ND	--	--	--
ESE-2	20	09/28/92	ND	ND	ND	ND	ND	--	--	--
ESE-3	10.5	09/29/92	220,000	1,400	8,200	3,300	18,000	--	--	--
ESE-3	20	09/29/92	ND	ND	ND	ND	ND	--	--	--
ESE-4	6.5	09/28/92	ND	ND	ND	ND	ND	--	--	--
ESE-4	10	09/28/92	24,000	150	170	230	820	--	--	--
ESE-5	10	09/28/92	51,000	250	240	300	170	--	--	--
ESE-5	14	09/28/92	ND	ND	ND	ND	ND	--	--	--

NOTES:

* Feet Below Ground Service (ft BGS)
TPH-Gas by EPA Method 8015 Modified
BTEX by EPA Method 8020 Modified
Halogenated volatile compounds by EPA Method 8010
ND - Not detected at or above method detection limit

-- Sample not analyzed for these
TPH-Diesel by EPA Method 3550/8015
Oil and Grease by SM5520
µg/Kg - micrograms per kilogram or parts per billion (ppb)

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TABLE 2

GROUND WATER ELEVATIONS, OCTOBER 5, 1992
FOR BP OIL SITE NO. 11105
3519 CASTRO VALLEY BOULEVARD, CASTRO VALLEY, CALIFORNIA

Well Number	Reference Elevation (feet)	Depth to Water (feet)	Elevation to Water (feet)	Casing Elevation (feet)
ESE-1	264	11.22	171.272	182.492
ESE-2	264	11.68	170.272	181.952
ESE-3	264	10.58	171.422	182.002
ESE-4	264	10.33	172.142	182.472
ESE-5	264	9.22	174.872	184.092

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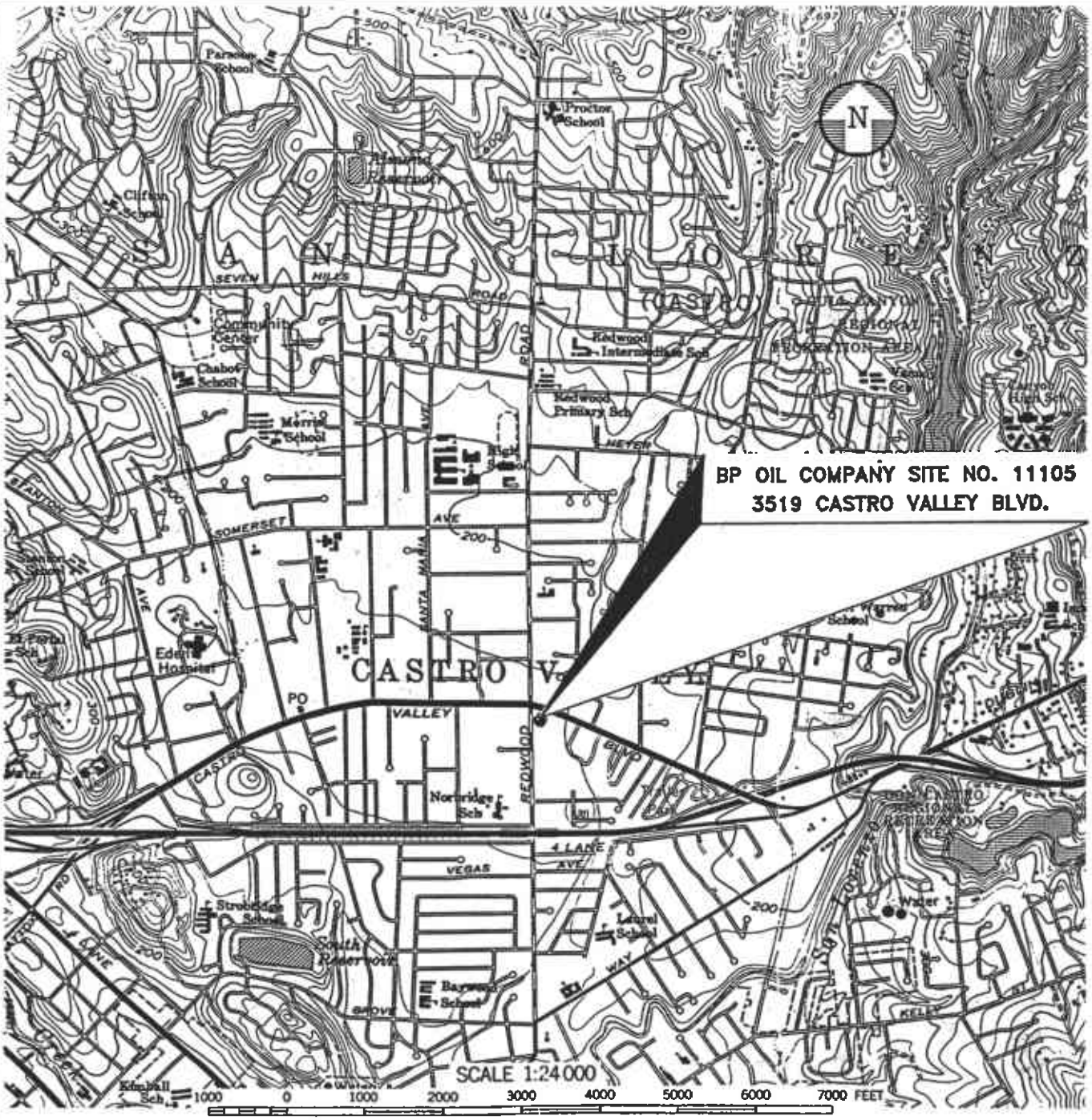
TABLE 3

ANALYTICAL RESULTS FOR GROUND WATER SAMPLES
FOR BP OIL SITE NO. 11105
3519 CASTRO VALLEY BOULEVARD, CASTRO VALLEY, CALIFORNIA

Well No.	Date Collected	TPH-Gas (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl Benzene (µg/L)	Total Xylenes (µg/L)	Oil and Grease SM 5520 (mg/L)	Total Purgeable Halocarbons[1] (µg/L)	TPH-Diesel (mg/L)
ESE-1	10/05/92	2,100	370	150	17	110	ND	[illegible]	0.096
ESE-1D	10/05/92	2,300	370	160	16	110	--	--	--
ESE-2	10/05/92	300	5.4	16	3.9	45	--	--	--
ESE-3	10/05/92	430	97	31	3.6	34	--	--	--
ESE-4	10/05/92	98	7.2	1.3	1.1	6.1	--	--	--
ESE-5	10/05/92	1,300	200	3.8	1.2	18	--	--	--

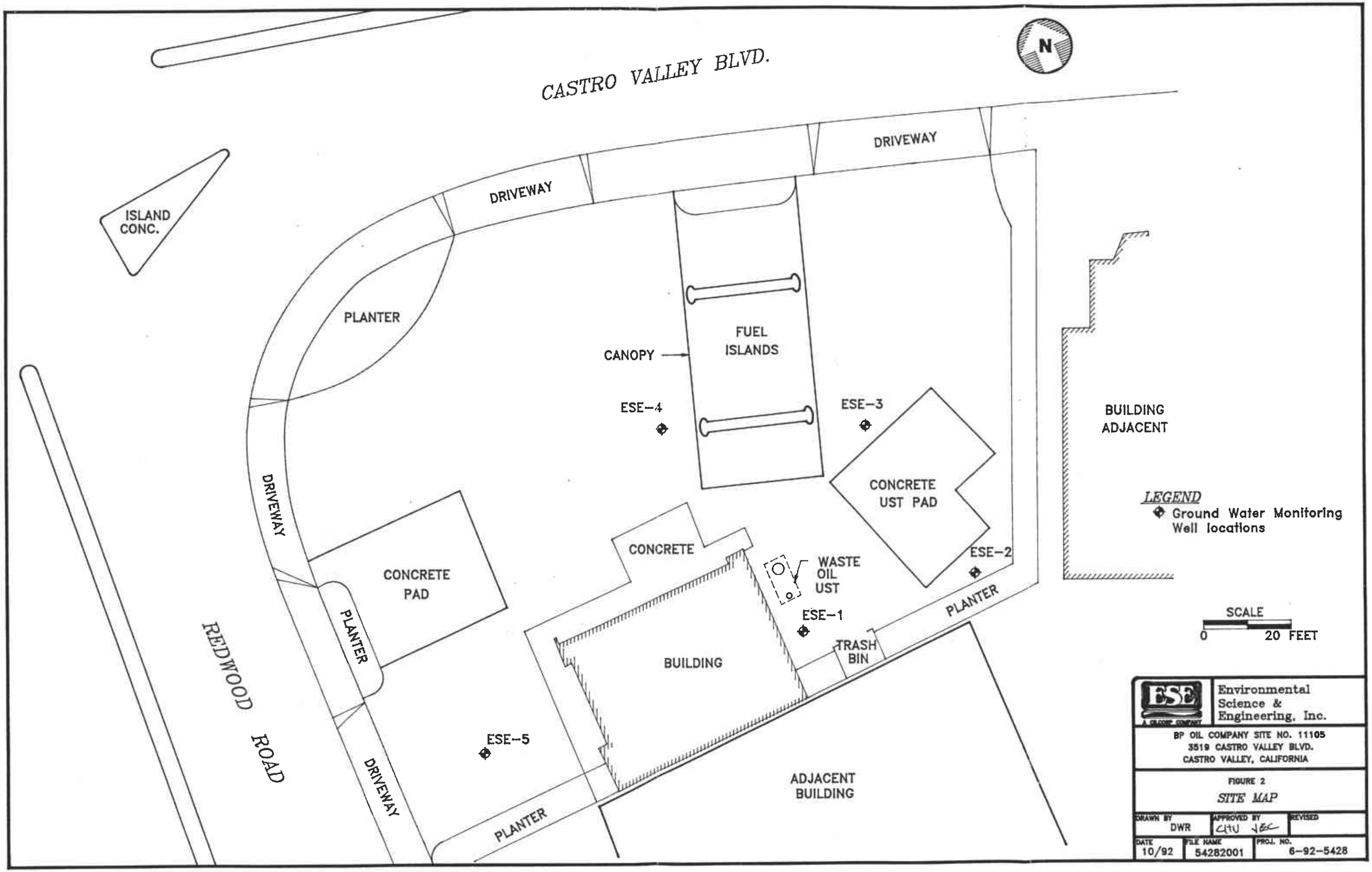
NOTES:

TPH-Gas by EPA Method 8015 Modified
BTEX by EPA Method 8020 Modified
Oil and Grease by SM5520
Total Purgeable Hydrocarbons by EPA Method 601
-- Sample not analyzed for these
ND - Not detected at or above method detection limit
µg/L - micrograms per liter or parts per billion (ppb)
mg/L - milligrams per liter or parts per million (ppm)
1 - only analytes detected above reporting limit are shown
*** Only 1,2 Dichloroethane was detected by the 601 analysis**



SOURCE: USGS 7.5 Minute Quadrangle Map
Hayward, California (1959: Photorevised 1980)

ESE A CH2M HILL COMPANY	Environmental Science & Engineering, Inc.
BP OIL COMPANY SITE NO. 11105 CASTRO VALLEY & REDWOOD ROAD CASTRO VALLEY, CALIFORNIA	
FIGURE 1 LOCATION MAP	
DRAWN BY: DWR	APPROVED BY: CHV
REVISED:	
DATE: 10/92	FILE NAME: CASTRO10
PROJ. NO.: 6-92-5428	



ESE
A CH2M HILL COMPANY

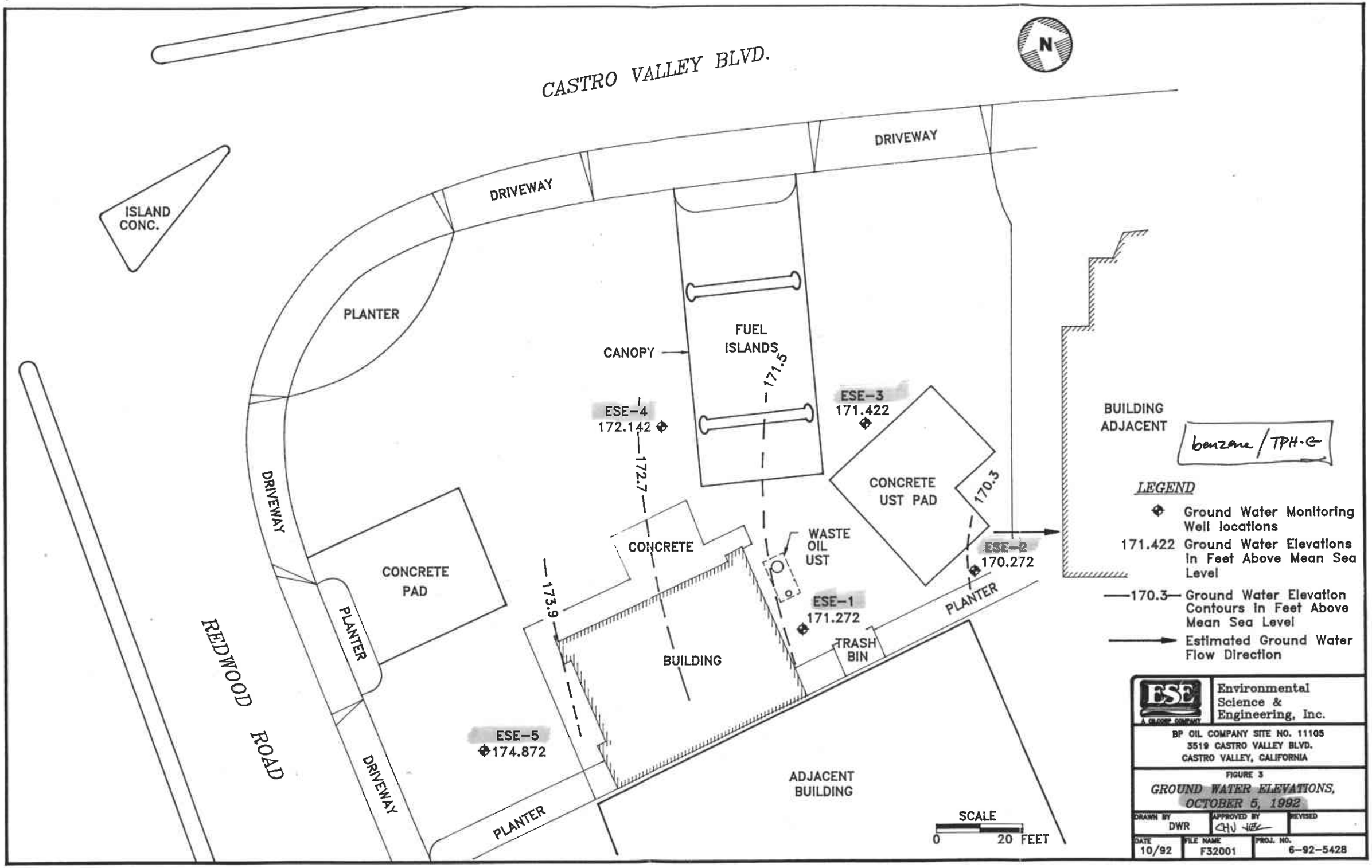
Environmental Science & Engineering, Inc.

BP OIL COMPANY SITE NO. 11105
3519 CASTRO VALLEY BLVD.
CASTRO VALLEY, CALIFORNIA

FIGURE 2
SITE MAP

DRAWN BY	APPROVED BY	REVISED
DWR	CHW JEC	

DATE	FILE NAME	PROJ. NO.
10/92	54282001	6-92-5428


CASTRO VALLEY BLVD.
N
DRIVEWAY
DRIVEWAY
ISLAND CONC.
PLANTER
DRIVEWAY
CANOPY
FUEL ISLANDS
171.5
ESE-4
172.142
172.7
ESE-3
171.422
CONCRETE UST PAD
170.3
BUILDING ADJACENT
benzene / TPH-G
WASTE OIL UST
CONCRETE
ESE-2
170.272
CONCRETE PAD
PLANTER
173.9
ESE-1
171.272
PLANTER
TRASH BIN
BUILDING
REDWOOD ROAD
DRIVEWAY
ESE-5
174.872
PLANTER
ADJACENT BUILDING
SCALE
0
20 FEET
LEGEND
Ground Water Monitoring Well locations
171.422 Ground Water Elevations In Feet Above Mean Sea Level
170.3 Ground Water Elevation Contours In Feet Above Mean Sea Level
Estimated Ground Water Flow Direction
ESE A CH2M HILL COMPANY
Environmental Science & Engineering, Inc.
BP OIL COMPANY SITE NO. 11105
3519 CASTRO VALLEY BLVD.
CASTRO VALLEY, CALIFORNIA
FIGURE 3
GROUND WATER ELEVATIONS, OCTOBER 5, 1992
DRAWN BY DWR
APPROVED BY CHU
REVISED
DATE 10/92
FILE NAME F32001
PROJ. NO. 6-92-5428

APPENDIX A

SENSITIVE RECEPTORS SURVEY AND WELL SURVEY RESULTS

SENSITIVE RECEPTORS SURVEY
Site Survey and Literature Research

Store No: 11105
Location: 3519 Castro Valley Boulevard
City/State Castro Valley, CA

I. Provide answers to the following questions:

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

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

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

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

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

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

II. Describe type of local water supply:

Public
*Supplier's Name East Bay Municipal Utility District
*Supplier's Source Mokeloumme River
*Distance to Site 80 Miles
Private _____

III. Aquifer Classification, if available:

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

_____ Class II: Current and Potential Drinking Water

_____ Class III: Not Potential Source of Drinking Water

IV. Describe observation wells, if any:

Number 5
Free Product N (y/n)

V. Signature of Preparer Chris Valkoff Jr. Date 11/19/92

APPENDIX B

DRILLING, WELL INSTALLATION AND SAMPLING PROCEDURES

ENVIRONMENTAL SCIENCE & ENGINEERING, INC.
CONCORD, CALIFORNIA OFFICE

STANDARD OPERATING PROCEDURE NO. 1
FOR SOIL BORINGS AND SOIL SAMPLING WITH HOLLOW-STEM AUGERS IN UNCONSOLIDATED FORMATIONS

Environmental Science & Engineering, Inc. (ESE) typically drills soil borings using a truck-mounted, continuous-flight, hollow-stem auger drill rig. The drill rig is owned and operated by a drilling company possessing a valid State of California C-57 license. The soil borings are conducted under the direct supervision and guidance of an experienced ESE geologist. The ESE geologist logs each borehole during drilling in accordance with the Unified Soil Classification System (USCS). Additionally, the ESE geologist observes and notes the soil color, relative density or stiffness, moisture content, odor (if obvious) and organic content (if present). The ESE geologist will record all observations on geologic boring logs.

Soil samples are collected during drilling at a minimum of five-foot intervals by driving an 18-inch long Modified California Split-spoon sampler (sampler), lined with new, thin-wall brass sleeves, through the center of and ahead of the hollow stem augers, thus collecting a relatively undisturbed soil sample core. The brass sleeves are typically 2-inches in diameter and 6-inches in length. The sampler is driven by dropping a 140-pound hammer 30-inches onto rods attached to the top of the sampler. Soil sample depth intervals and the number of hammer blows required to advance the sampler each six-inch interval are recorded by the ESE geologist on geologic boring logs. The ends of one brass sleeve are covered with Teflon sheeting, then covered with plastic end caps. The end caps are sealed to the brass sleeve using duct tape. Each sample is then labeled and placed on ice in a cooler for transport under chain of custody documentation to the designated analytical laboratory. A portion of the remaining soil in the sampler is placed in either a new Ziploc® bag or a clean Mason Jar® and set in direct sunlight to enhance the volatilization of any Volatile Organic Compounds (VOCs) present in the soil. After approximately 15-minutes that sample is screened for VOCs using a photoionization detector (PID). The PID measurements will be noted on the geologic boring logs. The PID provides qualitative data for use in selecting samples for laboratory analysis. Soil samples from the saturated zone (beneath the ground-water table) are collected as described above, are not screened with the PID, and are not submitted to the analytical laboratory. The samples from the saturated zone are used for descriptive purposes. Soil samples from the saturated zone may be retained as described above for physical analyses (grain size, permeability and porosity testing).

If the soil boring is not going to be completed as a well, then the boring is typically terminated upon penetrating the saturated soil horizon or until a predetermined interval of soil containing no evidence of contamination is penetrated. This predetermined interval is typically based upon site specific regulatory or client guidelines. The boring is then backfilled using either neat cement, neat cement and bentonite powder mixture (not exceeding 5% bentonite), bentonite pellets, or a sand and cement mixture (not exceeding a 2:1 ratio of sand to cement). However, if the boring is to be completed as a monitoring well, then the boring is continued until either a competent, low estimated-permeability, lower confining soil layer is found or 10 to 15-feet of the saturated soil horizon is penetrated, whichever occurs first. If a low estimated-permeability soil layer is found, the soil boring will be advanced approximately five-feet into that layer to evaluate its competence as a lower confining layer, prior to the termination of that boring.

All soil sampling equipment is cleaned between each sample collection event using an Alconox® detergent and tap water solution followed by a tap water rinse. Additionally, all drilling equipment and soil sampling equipment is cleaned between borings, using a high pressure steam cleaner, to prevent cross-contamination. All wash and rinse water is collected and contained onsite in Department of Transportation approved containers (typically 55-gallon drums) pending laboratory analysis and proper disposal/recycling.

ENVIRONMENTAL SCIENCE & ENGINEERING, INC.
CONCORD, CALIFORNIA OFFICE

STANDARD OPERATING PROCEDURE NO. 2
FOR MONITORING WELL INSTALLATION AND DEVELOPMENT
PAGE 1

Environmental Science & Engineering, Inc. (ESE) typically installs ground-water monitoring wells in unconsolidated sediments drilled using a truck-mounted hollow-stem auger drill rig. The design and installation of all monitoring wells is performed and supervised by an experienced ESE geologist. Figure A - Typical ESE Monitoring Well Construction Diagram (attached) graphically displays a typical ESE well completion. Prior to the construction of the well, the portion of the borehole that penetrates a lower confining layer (if any) is filled with bentonite pellets. The monitoring well is then constructed by inserting polyvinylchloride (PVC) pipe through the center of the hollow stem augers. The pipe (well-casing) is fastened together by joining the factory threaded pipe ends. ESE typically uses two-inch or four-inch diameter pipe for ground-water monitoring wells. The diameter of the borehole is typically 6-inches greater than that of the diameter of the well-casing, but is at least four-inches greater than that of the well casing. The lowermost portion of the well-casing will be factory perforated (typically having slot widths of 0.010-inch or 0.020-inch). The slotted portion of the well-casing will extend from the bottom of the boring up to approximately five-feet above the occurrence of ground water. A PVC slip or threaded cap will be placed at the bottom end of the well-casing, and a locking expandable well cap will be placed over the top (or surface) end of the well-casing. A sand pack (typically No. 2/12 or No. 3 Monterey sand) will be placed in the borehole annulus, from the bottom of the well-casing up to one to two-feet above the top of the slotted portion, by pouring the clean sand through the hollow stem augers. One to two-feet of bentonite pellets will be placed on top of the sand pack. The bentonite pellets will then be hydrated with three to four-gallons of potable water, to protect the sand pack from intrusion during the placement of the sanitary seal. The sanitary seal (grout) will consist of either neat cement, a neat cement and bentonite powder mixture (containing no more than 5% bentonite), or a neat cement and sand mixture (containing no more than a 2:1 sand to cement ratio). If, the grout seal is to be greater than 30-feet in depth or if standing water is present in the boring on top of the bentonite pellet seal, then the grout mixture will be tremied into the boring from the top of the bentonite seal using either a hose, pipe or the hollow-stem augers, which serve as a tremie. The well will be protected at the surface by a water tight utility box. The utility box will be set into the grout mixture so that it is less than 0.1-foot above grade, to prevent the collection of surface water at the well head. If the well is set within the public right of way, then the utility box will be Department of Transportation (DOT) traffic rated, and the top of the box will be set flush to grade. If the well is constructed in a vacant field a brightly painted metal standpipe may be used to protect the well from traffic. If a standpipe is used, it will be held in place with a grout mixture and will extend one to two-feet above ground surface. All well completion details will be recorded by the ESE geologist on the geologic boring logs.

Subsequent to the solidification of the sanitary seal of the well (a minimum of 72 hours), the new well will be developed by an ESE geologist or field technician. Well development will be performed using surging, bailing and overpumping techniques. Surging is performed by raising and lowering a surge block through the water column within the slotted interval of the well casing. The surge block utilized has a diameter just smaller than that of the well casing, thus, forcing water flow through the sand pack due to displacement and vacuum caused by the movement of the surge block. Bailing is performed by lowering a bailer to the bottom of the well and gently bouncing the bailer off of the well end cap, then removing the full bailer and repeating the procedure. This will bring any material (soil or PVC fragments) that may have accumulated in the well into suspension for removal. Overpumping is performed by lowering a submersible pump to the bottom of each well and pumping at the highest sustainable rate without completely evacuating the well casing. Effective well development will settle the sand pack surrounding the well-casing, which will improve the filtering properties of the sand pack and allow water to flow more easily through the sand pack; improve the communication between the aquifer and the well by aiding the removal of any smearing of fine sediments along the borehole penetrating the aquifer; and, remove fine sediments and any foreign objects (PVC fragments) from the well casing. The ESE geologist or

technician will monitor the ground water purged from the well during development for clarity, temperature, pH and conductivity. Development of the well will proceed until the well produces relatively clear, sand-free water with stable temperature, pH and conductivity measurements. At a minimum, 10 well-casing volumes of ground water will be removed during the development process. Measurements of temperature, conductivity, pH and volume of the purged water and observations of purge water clarity and sediment content will be recorded on the ESE Well Development Data Forms. All equipment used during the well development procedure will be cleaned using an Alconox® detergent and tap water solution followed by a tap water rinse prior to use in each well. All ground water purged during the well development process and all equipment rinse water will be collected and contained onsite in DOT approved containers (typically 55-gallon drums) pending analytical results and proper disposal or recycling.

ENVIRONMENTAL SCIENCE & ENGINEERING, INC.
CONCORD, CALIFORNIA OFFICE

STANDARD OPERATING PROCEDURE NO. 3
FOR GROUND-WATER MONITORING AND SAMPLING FROM MONITORING WELLS

Environmental Science & Engineering, Inc. (ESE) typically performs ground-water monitoring at project sites on a quarterly basis. As part of the monitoring program an ESE staff member will first gauge the depth to water and free product (if present) in each well, then collect ground-water samples from each well. Depth to water measurements are taken by lowering an electric fiberglass tape measure into the well and recording the occurrence of water in feet below a fixed datum set on the top of the well-casing. If free-phase liquid hydrocarbons (free product) are known or suspected to be present in the well, then an electric oil/water interface probe is used to determine the depth to the occurrence of ground-water and the free product in feet below the fixed datum on the top of the well-casing. Depth to water and depth to product measurements are measured and recorded within an accuracy of 0.005-foot. The electric tape and the electric oil/water interface probe are washed with an Alconox® detergent and tap water solution then rinsed with tap water between uses in different wells.

Ground-water samples are collected from a well subsequent to purging a minimum of three to four well-casing volumes of ground water from the well, if the well bails dry prior to the removal of the required minimum volume, then the samples are collected upon the recovery of the ground water in that well to 80% of its initial static level. Ground water is typically purged from monitoring wells using either a hand-operated positive displacement pump, constructed of polyvinylchloride (PVC); a new (precleaned), disposable polyethylene bailer; or, a variable-flow submersible pump, constructed of stainless steel and Teflon®. The hand pumps and the submersible pumps are cleaned between each use with an Alconox® detergent and tap water solution followed by a tap water rinse. During the well purging process the conductivity, pH and temperature of the ground water are monitored by the ESE staff member. Ground-water samples are collected from the well subsequent to the stabilization of the of the conductivity, pH and temperature of the purge water, and the removal of four well-casing volumes of ground-water (unless the well bails dry). The parameters are deemed to have stabilized when two consecutive measurements are within 10% of each other, for each respective parameter. The temperature, pH, conductivity and purge volume measurements, and observations of water clarity and sediment content will be documented by the ESE staff member on ESE Ground-Water Sampling Data Forms.

Ground-water samples are collected by lowering a new (precleaned), disposable polyethylene bailer into the well using new, disposable nylon cord. The filled bailer is retrieved, emptied, then filled again. The ground water from this bailer is decanted into appropriate laboratory supplied glassware and/or plastic containers (if sample preservatives are required, they are added to the empty containers at the laboratory prior to the sampling event). The containers are filled carefully so that no headspace is present to avoid volatilization of the sample. The filled sample containers are then labeled and placed in a cooler with ice for transport under chain of custody documentation to the designated analytical laboratory. The ESE staff member will document the time and method of sample collection, and the type of sample containers and preservatives (if any) used. These facts will appear on the ESE Ground-Water Sampling Data Forms. ESE will collect a duplicate ground-water sample from one well for every ten wells sampled at each site. The duplicate will be a blind sample (its well designation will be unknown to the laboratory). The duplicate sample is for Quality Assurance and Quality Control (QA/QC) purposes, and provides a check on ESE sampling procedures and laboratory sample handling procedures. When VOCs are included in the laboratory analyses, ESE will include a trip blank, if required, in the cooler with the ground-water samples for analysis for the identical VOCs. The trip blank is supplied by the laboratory and consists of deionized water. The trip blank is for QA/QC purposes and provides a check on both ESE and laboratory sample handling and storage procedures. Since disposable bailers are used for sample collection, and are not reused, no equipment blank (rinsate) samples are collected.

APPENDIX C

BORING LOGS AND WELL CONSTRUCTION DETAILS

UNIFIED SOIL CLASSIFICATION SYSTEM (USC)

MAJOR DIVISIONS			GROUP SYMBOLS	DESCRIPTION	GRAPHIC LOG
COARSE GRAINED SOILS: 50% or more retained on the No. 200 sieve.	GRAVELS: More than half of coarse fraction retained on the No. 4 sieve.	Clean sands	GW	Well-graded gravels, gravel-sand mixtures, little or no fines.	
			GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines.	
		Gravels with fines	GM	Silty gravels, gravel-sand mixtures.	
			GC	Clayey gravels, gravel-sand-clay mixtures.	
	SANDS: More than half of coarse fraction passing the No. 4 sieve.	Clean sands	SW	Well-graded sands, gravelly sands, little or no fines.	
			SP	Poorly-graded sands, gravelly sands, little or no fines.	
		Sands with fines	SM	Silty sands, sand-silt mixtures.	
			SC	Clayey sands, sand clay mixtures.	
FINE GRAINED SANDS: More than 50% passing the No. 200 sieve.	SILTS AND CLAYS	Liquid Limit below 50%	ML	Inorganic silts and very fine sands.	
			CL	Inorganic clays, gravelly clays, sandy clays, lean clays.	
			OL	Organic silts and organic clays.	
		Liquid Limit 50% and above	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.	
			CH	Inorganic fat clays.	
			OH	Organic clays or organic silts.	
Highly organic soils			Pt	Peat, organic content greater than 60%.	

BEDROCK

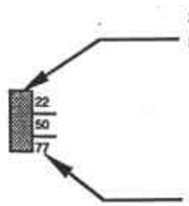
Sandstone		Metamorphics	
Shale		Volcanics or Intrusives	
Siltstone			

WELL INSTALLATION

SYMBOL	DESCRIPTION
	Bentonite/cement grout
	Bentonite Pellets
	Sand
	Screen section of well or piezometer
	Blank section of well or piezometer with centralizer
	Traffic rated well box with locking water-tight cap

See log for details of installation.

LEGEND



Vapor

Field Photoionization detector reading in parts per million (ppm). See remarks on log for background readings and comments.

ESE A CALCOMP COMPANY
Environmental Science & Engineering, Inc.
4090 Nelson Avenue, Suite J
Concord, CA 94520
(415) 685-4053

LEGEND TO LOGS

DRAWN BY	DATE	FILE NAME
CVS	3/91	LEGEND

Environmental Science & Engineering, Inc.

A CILCORP Company

BORING LOG AND WELL COMPLETION SUMMARY

MW-1

WELL COMPLETION

Completion Depth: 30 Feet

	Size/Type	From	To
Casing:	2" Diam. Sched. 40 PVC	10 Feet	0 Feet
Screen:	2" Diam. Sched. 40 Slotted (0.02") PVC	30 Feet	10 Feet
Filter:	#3 Sand	30 Feet	9 Feet
Seal:	Bentonite	9 Feet	7.5 Feet
	Grout	7.5 Feet	0 Feet

Well Cap or Box: Flush Mounted Well Box

Project Name: BP Oil Company Project No: 6-92-5428

Location: BP Station #11105
3519 Castro Valley Boulevard
Castro Valley, CA

Driller: Solis Exploration Services, Inc.
Method: HSA
Hole Diameter: 8" Total Depth: 30 Feet
Ref. Elevations:
Logged By: Chris Valcheff

Dates:
Start: 9-29-92
Finish: 9-29-92

Depth (ft)	Lithologic Description	USC	Graphic Log: Sample/Blows	Graphic Log: Lithology	Graphic Log: Well Installation	Vapor	Remarks: Water, drilling/completion, summary, sample type
0	Asphalt Fill GRAVEL [redacted] CLAY SILT, black, stiff, damp, no odor.	GM CL					
5	CLAY, black, 10-20% coarse, very stiff, damp, no odor.		2 7 9			7	SAMPLE @ 5 FEET
	SANDY SILT [redacted], 10-20% coarse, very stiff, damp, heavy hydrocarbon odor.						
10	As above, with orange mottles.	ML	4 8 11			170	SAMPLE @ 10.5 FEET
15	SANDY SILT, [redacted] 5-10% medium grained sand, stiff, damp, heavy hydrocarbon odor.		3 7 8			200	SAMPLE @ 15 FEET 70/80.870
	As above, no odor.						
20	SILTY SAND, red-brown, 10-20% coarse sand, 70-80% medium sand, dense, moist, no odor.	SM	2 4 5			6	SAMPLE @ 20 FEET Ground Water @ 20 Feet ND
	As above, wet.		2 3 5				
25	SANDY SILT, grey with orange mottles, 30-40% medium grained sand, stiff, moist, no odor.						
	CLAY, grey, damp, stiff, no odor.	CL	2 3 4				
30							TOTAL DEPTH = 30 FEET

REGISTERED GEOLOGIST
SUSAN G. WICKHAM
#3551
STATE OF CALIFORNIA

TPH / benzene (ppm)

ESE Environmental Science & Engineering, Inc.
A CILCORP Company

BORING LOG AND WELL COMPLETION SUMMARY

[redacted]

WELL COMPLETION

Completion Depth: 30 Feet

Size/Type	From	To
Casing: 2" Diam. Sched. 40 PVC	10 Feet	0 Feet
Screen: 2" Diam. Sched. 40 Slotted (0.02") PVC	30 Feet	10 Feet
Filter: #3 Sand	30 Feet	9 Feet
Seal: Bentonite	9 Feet	7.5 Feet
Grout	7.5 Feet	0 Feet

Well Cap or Box: Flush Mounted Well Box

Project Name: BP Oil Company Project No: 6-92-5428
Location: BP Station #11105
3519 Castro Valley Boulevard
Castro Valley, CA

Driller: Soils Exploration Services, Inc.
Method: HSA
Hole Diameter: 8" Total Depth: 31 Feet
Ref. Elevations:
Logged By: Chris Valcheff

Dates:
Start: 9-28-92
Finish: 9-29-92

Depth (ft)	Lithologic Description	USC	Sample/Blows	Vapor	Remarks (Water, drilling/completion, summary, sample type)
0	Asphalt [redacted] GRAVEL	GP			
5	[redacted], black, stiff, damp, no odor.	CL	3 / 3 / 6	20	SAMPLE @ 4.5 FEET
	CLAY SILT, grey with orange mottles, stiff, damp, slight [redacted]				
10	As above, [redacted]	ML	5 / 7 / 9	25	SAMPLE @ 10.5 FEET ND
15	CLAY SILT, orange with grey mottles, stiff, damp, heavy [redacted]		8 / 13 / 16	15	SAMPLE @ 14.5 FEET
20	SANDY SILT, orange, 50-60% medium to coarse grained sand, stiff, damp, no odor.		6 / 14 / 14		SAMPLE @ 20 FEET ND
				10	[redacted]
25	SILTY SAND, orange-brown, 5-10% silt, medium to coarse grained sand, dense, wet, no odor.	SM	9 / 15 / 13		
30	CLAY SILT, grey, stiff, wet, no odor.	ML	3 / 5 / 6 / 3 / 5 / 6		STANDARD PEN.
					TOTAL DRILLED DEPTH = 30 FEET
					TOTAL DEPTH = 31 FEET

REGISTERED GEOLOGIST
SUSAN S. WICKHAM
#3851
STATE OF CALIFORNIA

Environmental Science & Engineering, Inc.
A CILCORP Company

BORING LOG AND WELL COMPLETION SUMMARY

MW-2

Page 1 of 1

WELL COMPLETION

Completion Depth: 30 Feet

Size/Type	From	To
Casing: 2" Diam. Sched. 40 PVC	10 Feet	0 Feet
Screen: 2" Diam. Sched. 40 Slotted (0.02") PVC	30 Feet	10 Feet
Filter: #3 Sand	30 Feet	9 Feet
Seal: Bentonite	9 Feet	7.5 Feet
Grout	7.5 Feet	0 Feet

Well Cap or Box: Flush Mounted Well Box

Project Name: BP Oil Company Project No: 6-92-5428
Location: BP Station #11105
3519 Castro Valley Boulevard
Castro Valley, CA

Driller: Soils Exploration Services, Inc.
Method: HSA
Hole Diameter: 8" Total Depth: 30.5 Feet
Ref. Elevations:
Logged By: Chris Valcheff

Dates:
Start: 9-29-92
Finish: 9-29-92

Depth (ft)	Lithologic Description	USC	Graphic Log: Sample/Blows	Graphic Log: Lithology	Graphic Log: Well Installation	Vapor	Remarks: Water, drilling/completion, summary, sample type
0	Asphalt						
	SANDY SILT, reddish brown, 20-30% medium to coarse grained sand, dense, damp, no odor.						
	SANDY SILT, black, 5-10% medium to coarse grained sand, stiff, damp, no odor.						
5	As above, with orange-red mottles.		2, 5, 5			4	SAMPLE @ 5 FEET
	SANDY SILT, olive, 5-10% fine grained sand, stiff, damp, no odor.						
	SANDY SILT, orange-yellow-brown, 20-30% medium grained sand, stiff, damp, slight hydrocarbon odor.	ML					
10	As above, grey mottling, heavy hydrocarbon odor.		10, 15, 22			200	SAMPLE @ 10.5 FEET 220/1.4
	As above, 30-40% medium to coarse grained sand, no odor.		7, 14, 19, 10, 11, 16			5	SAMPLE @ 15.5 FEET
	CLAYEY SILT, light brown, some sand, 5-10% medium, stiff, damp, no odor.						
20	SILTY SAND, light brown, 10-20% silt, medium grained sand, dense, wet, no odor.		5, 10, 11			10	SAMPLE @ 20 FEET ND
							[redacted]
25	As above.	SM	7, 13, 13				NO SAMPLE COLLECTED
	CLAY, light brown, stiff, damp, no odor.	CL	1, 4, 5				STANDARD PEN. TOTAL DRILLED DEPTH = 30 FEET TOTAL DEPTH = 30.5 FEET
30							

REGISTERED GEOLOGIST
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#3851
STATE OF CALIFORNIA

Environmental Science & Engineering, Inc.
A GILCORP Company

BORING LOG AND WELL COMPLETION SUMMARY

[redacted]

Page 1 of 1

WELL COMPLETION

Completion Depth: 25 Feet

	Size/Type	From	To
Casing:	2" Diam. Sched. 40 PVC	7 Feet	0 Feet
Screen:	2" Diam. Sched. 40 Slotted (0.02") PVC	25 Feet	7 Feet
Filter:	#3 Sand	25 Feet	6 Feet
Seal:	Bentonite	6 Feet	4 Feet
	Grout	4 Feet	0 Feet

Well Cap or Box: Flush Mounted Well Box

Project Name: BP Oil Company Project No: 6-92-5428
Location: BP Station #11105
3519 Castro Valley Boulevard
Castro Valley, CA

Driller: Soils Exploration Services, Inc.
Method: HSA
Hole Diameter: 8" Total Depth: 25 Feet
Ref. Elevations:
Logged By: Mike Edmonson

Dates:
Start: 9-28-92
Finish: 9-28-92

Depth (ft)	Lithologic Description	USC	Graphic Log: Sample/Blows	Graphic Log: Lithology	Graphic Log: Well Installation	Vapor	Remarks (Water, drilling/completion, summary, sample type)
0	Asphalt [redacted]GRAVEL [redacted] SILTY CLAY, brown, 10-20% fine to coarse sand, stiff, damp.	GP					
	SILTY CLAY, black, medium stiff, damp [redacted]	CL					
5	CLAYEY SILT, olive, medium stiff, damp, hydrocarbon odor.		4 6 8			0	SAMPLE @ 5-6.5 FEET ND
10	SANDY SILT, brown with olive mottling, 10-25% fine sand, 20-35% fine to coarse sand (10.5-11 feet), stiff, damp.		7 12 16			0	SAMPLE @ 10-11.5 FEET 24/0.150
15	As above, grey mottling, wet, increase in sand content at 16.2 feet.	ML	6 8 8				SAMPLE @ 15-16.5 FEET
20	As above, brown.		6 9 11				SAMPLE @ 20-21.5 FEET
	CLAYEY SILT, brown, medium stiff, moist.		2 3 4				SAMPLE @ 21.5-23 FEET
	SILTY SAND, brown, 40% fines, fine grained sand, medium dense, wet.	SM	3 5 7				SAMPLE @ 23-24.5 FEET
25							TOTAL DEPTH = 25 FEET
30							

REGISTERED GEOLOGIST
SUSAN S. WORKMAN
#3851
STATE OF CALIFORNIA

Environmental Science & Engineering, Inc.
A CRLCORP Company

BORING LOG AND WELL COMPLETION SUMMARY

MW-5

Page 1 of 1

WELL COMPLETION

Completion Depth: 24 Feet

	Size/Type	From	To
Casing:	2" Diam. Sched. 40 PVC	9 Feet	0 Feet
Screen:	2" Diam. Sched. 40 Slotted (0.02") PVC	24 Feet	9 Feet
Filter:	#3 Sand	24 Feet	8 Feet
Seal:	Bentonite	8 Feet	5.5 Feet
	Grout	5.5 Feet	0 Feet

Well Cap or Box: Flush Mounted Well Box

Project Name: BP Oil Company Project No: 6-92-5428
Location: BP Station #11105
3519 Castro Valley Boulevard
Castro Valley, CA

Driller: Soils Exploration Services, Inc.
Method: HSA
Hole Diameter: 8" Total Depth: 27 Feet
Ref. Elevations:
Logged By: Chris Valcheff

Dates:
Start: 9-28-92
Finish: 9-28-92

Depth (ft)	Lithologic Description	USC	Graphic Log: Sample/Blows	Graphic Log: Lithology	Graphic Log: Well Installation	Vapor	Remarks: Water, drilling/completion, summary, sample type
0	Asphalt						
	GRAVEL, cement fragment at 0.7 feet with hydrocarbon odor.	GP					
	CLAY SILT, black-grey, 20-30% medium to coase grained sand, stiff, damp, slight hydrocarbon odor.						
5	CLAY SILT, olive with blue-grey mottling, 25-30% fine to coarse grained sand, stiff, damp, slight hydrocarbon odor.		3, 4, 5			40	SAMPLE @ 5 FEET
	CLAY SILT, olive, decrease in sand content, stiff, damp, slight hydrocarbon odor.					175	
10	CLAY SILT, olive with blue-grey mottle, 60-90% silt and clay, stiff, damp.		5, 8, 11				SAMPLE @ 10 FEET 51 / 0.250
	SANDY SILT, orange-brown with minor mottling, 30-40% fine to coarse grained sand, stiff, damp.	ML					
	CLAY SILT, light brown, stiff, damp, no odor.		7, 12, 12			8.5	SAMPLE @ 14 FEET UD
15			6, 9, 12				STANDARD PEN.
	As above, wet, slight increase in sand content.		8, 10, 10				Ground Water @ 18 Feet
20							
	As above, orange-brown, dry.		10, 21, 22				
25	As above, damp.		8, 12, 12				TOTAL DRILLED DEPTH = 24 FEET TOTAL DEPTH = 27 FEET
30							

REGISTERED GEOLOGIST
SUSAN S. WICKHAM
#3851
STATE OF CALIFORNIA

APPENDIX D

FIELD OBSERVATIONS

WELL SAMPLING FIELD LOG

PROJECT NAME: BP/CASTRO VALLEY - REDWOOD RD. DATE: 10/05/92
PROJECT MANAGER: M. QUILLIN CLIENT: BP
SAMPLER: B. MILLER SAMPLE LOCATION I.D. ESE-1
GROUNDWATER: ______ OTHER: ______ START TIME: 13:55

CASING ELEVATION (FT): 182.492 DATUM: ______ CASING DIAMETER: 2" ✓ 4" __ OTHER __

DEPTH TO WATER (FT): 11.22 DEPTH OF WELL (FT): 29.07 DIFFERENCE (FT): 17.85

WATER ELEVATION (FT): 171.272 CALCULATED WELL VOLUME (GAL): 2.91

ACTUAL PURGE VOLUME (GAL): 30 MINIMUM PURGE VOLUME (~~3~~ 4 x WV): 11.64

FIELD MEASUREMENTS

TIME	Volume (GAL)	pH (Units)	E.C.	Temp.	Clarity & Color	Other
14:04	5	7.15	1153	75.7	Opaque-brown	Fuel odor
14:06	10	6.68	1075	71.6	"	"
14:08	15	6.66	1063	70.3	Translucent	Minor fuel odor
14:10	20	6.67	1031	69.9	"	"
14:12	25	6.62	1023	69.9	"	"

PURGE METHOD

__ Pneumatic Displacement Pump __ Other

__ Bailer (Teflon/PVC/SS) ✓ Submersible Pump

SAMPLE METHOD

__ Bailer (Teflon/PVC/SS) __ Dedicated

✓ Bailer (Disposable) __ Other

WELL INTEGRITY: ______

REMARKS: Well purged until water translucent to clear. Well did not dry at pump rate of 2.5 gpm

SIGNATURE: [signature]

CHECKED BY: Chris Valcheff [signature]

SELECTED WELL CASING DIAMETERS VOLUMES PER UNIT LENGTH

WELL CASING I.D. (inches)	GAL/FT	CUBIC FT/FT
2.0	0.1632	0.0218
4.0	0.6528	0.0873
6.0	1.4690	0.1963

CONVERSION FACTORS

TO CONVERT	INTO	MULTIPLY
Feet of Water	Lbs/Sq. Inch	0.4335
Lbs/Sq. Inch	Feet of Water	2.3070
Cubic Feet	Gallons	7.4800
Gallons	Liters	3.7850
Feet	Meters	0.3048
Inches	Centimeters	2.5400

WELL SAMPLING FIELD LOG

PROJECT NAME: BP/CASTRO VALLEY - REDWOOD RD. DATE: 10/05/92
PROJECT MANAGER: M. QUILLIN CLIENT: BP
SAMPLER: B. MILLER SAMPLE LOCATION I.D. ESE-2
GROUNDWATER: OTHER: START TIME: 11:25

CASING ELEVATION (FT): 181.952 DATUM: CASING DIAMETER: 2" ✓ 4" OTHER

DEPTH TO WATER (FT): 11.68 DEPTH OF WELL (FT): 29.88 DIFFERENCE (FT): 18.2

WATER ELEVATION (FT): 170.272 CALCULATED WELL VOLUME (GAL): 2.97

ACTUAL PURGE VOLUME (GAL): 35 MINIMUM PURGE VOLUME (3/4 x WV): 11.88

FIELD MEASUREMENTS

TIME	Volume (GAL)	pH (Units)	E.C.	Temp.	Clarity & Color	Other
11:29	10	6.92	1131	68.7	Opaque - brown	No odor
11:32	15	7.03	847	68.6	"	"
11:34	20	7.15	856	68.5	"	"
11:35	25	7.07	930	68.5	Translucent	"
11:37	30	7.10	805	68.5	Clear	"

PURGE METHOD

__Pneumatic Displacement Pump __Other
__Bailer (Teflon/PVC/SS) ✓Submersible Pump

SAMPLE METHOD

__Bailer (Teflon/PVC/SS) __Dedicated
✓Bailer (Disposable) __Other

WELL INTEGRITY:

REMARKS: Well purged until water clear. Well did not dry up at pump rate of 2.5 gpm

SIGNATURE: CHECKED BY: Chris Valtcheff JBC

SELECTED WELL CASING DIAMETERS VOLUMES PER UNIT LENGTH

WELL CASING I.D. (inches)	GAL/FT	CUBIC FT/FT
2.0	0.1632	0.0218
4.0	0.6528	0.0873
6.0	1.4690	0.1963

CONVERSION FACTORS

TO CONVERT	INTO	MULTIPLY
Feet of Water	Lbs/Sq. Inch	0.4335
Lbs/Sq. Inch	Feet of Water	2.3070
Cubic Feet	Gallons	7.4800
Gallons	Liters	3.7850
Feet	Meters	0.3048
Inches	Centimeters	2.5400

WELL SAMPLING FIELD LOG

PROJECT NAME: BP/CASTRO VALLEY - REDWOOD RD. DATE: 10/05/92
PROJECT MANAGER: M. QUILLIN CLIENT: BP
SAMPLER: B. MILLER SAMPLE LOCATION I.D. ESE-3
GROUNDWATER: _____ OTHER: _____ START TIME: 12:00

CASING ELEVATION (FT): 182.002 DATUM: _____ CASING DIAMETER: 2" ✓ 4" __ OTHER __

DEPTH TO WATER (FT): 10.58 DEPTH OF WELL (FT): 28.61 DIFFERENCE (FT): 18.03

WATER ELEVATION (FT): 171.422 CALCULATED WELL VOLUME (GAL): 2.9

ACTUAL PURGE VOLUME (GAL): 25 MINIMUM PURGE VOLUME (3/4 x WV): 11.76

FIELD MEASUREMENTS

TIME	Volume (GAL)	pH (Units)	E.C.	Temp.	Clarity & Color	Other
12:01	5	7.55	1086	74.3	Opaque - brown	No odor
12:07	10	7.31	1123	71.9	"	"
12:09	15	7.30	963	71.3	"	"
12:10	20	7.08	902	70.8	Translucent	"
12:12	25	7.06	884	71.0	"	"

PURGE METHOD

__Pneumatic Displacement Pump __Other
__Bailer (Teflon/PVC/SS) ✓Submersible Pump

SAMPLE METHOD

__Bailer (Teflon/PVC/SS) __Dedicated
✓Bailer (Disposable) __Other

WELL INTEGRITY: _____

REMARKS: Well purged until water translucent to clear. Well did not dry at pump rate of 2.5 gpm.

SIGNATURE: [signature] CHECKED BY: Chris Valkhoff IEC

SELECTED WELL CASING DIAMETERS VOLUMES PER UNIT LENGTH

WELL CASING I.D. (Inches)	GAL/FT	CUBIC FT/FT
2.0	0.1632	0.0218
4.0	0.6528	0.0873
6.0	1.4690	0.1963

CONVERSION FACTORS

TO CONVERT	INTO	MULTIPLY
Feet of Water	Lbs/Sq. Inch	0.4335
Lbs/Sq. Inch	Feet of Water	2.3070
Cubic Feet	Gallons	7.4800
Gallons	Liters	3.7850
Feet	Meters	0.3048
Inches	Centimeters	2.5400

WELL SAMPLING FIELD LOG

PROJECT NAME: BP/CASTRO VALLEY - REDWOOD RD. DATE: 10/05/92
PROJECT MANAGER: M. QUILLIN CLIENT: BP
SAMPLER: B. MILLER SAMPLE LOCATION I.D. ESE-4
GROUNDWATER: ______ OTHER: ______ START TIME: 12:30

CASING ELEVATION (FT): 182.472 DATUM: ______ CASING DIAMETER: 2" ✓ 4" __ OTHER __

DEPTH TO WATER (FT): 10.33 DEPTH OF WELL (FT): 24.07 DIFFERENCE (FT): 13.74

WATER ELEVATION (FT): 172.142 CALCULATED WELL VOLUME (GAL): 2.24

ACTUAL PURGE VOLUME (GAL): 25 MINIMUM PURGE VOLUME (~~3~~ 4 x WV): 8.96

FIELD MEASUREMENTS

TIME	Volume (GAL)	pH (Units)	E.C.	Temp.	Clarity & Color	Other
12:40	5	7.25	1257	76.5	Opaque-brown	No odor
12:42	10	7.16	1011	74	"	"
12:44	15	7.24	1073	72.9	"	"
12:47	20	7.21	971	73.3	Translucent	"
12:49	25	7.16	967	73.7	"	"

PURGE METHOD

__ Pneumatic Displacement Pump __ Other

__ Bailer (Teflon/PVC/SS) ✓ Submersible Pump

SAMPLE METHOD

__ Bailer (Teflon/PVC/SS) __ Dedicated

✓ Bailer (Disposable) __ Other

WELL INTEGRITY: ______

REMARKS: Well purged until water translucent to clear. Well did not dry at pump rate of 2.5 gpm

SIGNATURE: [signature]

CHECKED BY: Chris Valcheff [initials]

SELECTED WELL CASING DIAMETERS VOLUMES PER UNIT LENGTH

WELL CASING I.D. (inches)	GAL/FT	CUBIC FT/FT
2.0	0.1632	0.0218
4.0	0.6528	0.0873
6.0	1.4690	0.1963

CONVERSION FACTORS

TO CONVERT	INTO	MULTIPLY
Feet of Water	Lbs/Sq. Inch	0.4335
Lbs/Sq. Inch	Feet of Water	2.3070
Cubic Feet	Gallons	7.4800
Gallons	Liters	3.7850
Feet	Meters	0.3048
Inches	Centimeters	2.5400

WELL SAMPLING FIELD LOG

PROJECT NAME: BP/CASTRO VALLEY - REDWOOD RD. DATE: 10/05/92
PROJECT MANAGER: M. QUILLIN CLIENT: BP
SAMPLER: B. MILLER SAMPLE LOCATION I.D. ESE-5
GROUNDWATER: OTHER: START TIME: 13:15

CASING ELEVATION (FT): 184.092 DATUM: CASING DIAMETER: 2" ✓ 4" OTHER

DEPTH TO WATER (FT): 9.22 DEPTH OF WELL (FT): 23.48 DIFFERENCE (FT): 14.26

WATER ELEVATION (FT): 174.872 CALCULATED WELL VOLUME (GAL): 2.33

ACTUAL PURGE VOLUME (GAL): 11 MINIMUM PURGE VOLUME (3/4 x WV): 9.32

FIELD MEASUREMENTS

TIME	Volume (GAL)	pH (Units)	E.C.	Temp.	Clarity & Color	Other
13:23	5	6.90	2130	79.2	Translucent	No odor
13:25	WELL PUMPED DRY AT 2 gpm RATE					
13:32	10	7.01	1845	78.1	Translucent	No odor
13:35	WELL PUMPED DRY AT 2 gpm RATE					

PURGE METHOD

__Pneumatic Displacement Pump __Other
__Bailer (Teflon/PVC/SS) ✓Submersible Pump

SAMPLE METHOD

__Bailer (Teflon/PVC/SS) __Dedicated
✓Bailer (Disposable) __Other

WELL INTEGRITY:

REMARKS: Well pumped dry twice at pump rate of 2.0 gpm. Water translucent upon completion. Potential for well to have been completed in a perched zone based upon water production characteristics and water elevation relative to other wells

SIGNATURE: CHECKED BY: Chris Valkenhoff SEC

SELECTED WELL CASING DIAMETERS VOLUMES PER UNIT LENGTH

WELL CASING I.D. (inches)	GAL/FT	CUBIC FT/FT
2.0	0.1632	0.0218
4.0	0.6528	0.0873
6.0	1.4690	0.1963

CONVERSION FACTORS

TO CONVERT	INTO	MULTIPLY
Feet of Water	Lbs/Sq. Inch	0.4335
Lbs/Sq. Inch	Feet of Water	2.3070
Cubic Feet	Gallons	7.4800
Gallons	Liters	3.7850
Feet	Meters	0.3048
Inches	Centimeters	2.5400

APPENDIX E

OFFICIAL LABORATORY REPORTS AND CHAIN-OF-CUSTODY RECORDS

October 15, 1992

Mr. Mike Quillin
Environmental Science & Engineering, Inc
4090 Nelson Avenue, Suite J
Concord, CA 94520

RE: PACE Project No. 421001.512
Client Reference: BP OIL #11105 Castro Valley/Redwood

Dear Mr. Quillin:

Enclosed is the report of laboratory analyses for samples received October 01, 1992.

If you have any questions concerning this report, please feel free to contact us.

Sincerely,

Caron E. Sontag

Caron E. Sontag
Project Manager

Enclosures

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REPORT OF LABORATORY ANALYSIS

Environmental Science & Engineering, Inc
4090 Nelson Avenue, Suite J
Concord, CA 94520

October 15, 1992
PACE Project Number: 421001512

Attn: Mr. Mike Quillin

Client Reference: BP OIL #11105 Castro Valley/Redwood

PACE Sample Number:			70 0217237	
Date Collected:			09/29/92	
Date Received:			10/01/92	
Client Sample ID:			MW-1-20'	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
EXTRACTABLE FUELS EPA 3550/8015				
Extractable Fuels, as Diesel	mg/kg	5.0	ND	10/13/92
Date Extracted			10/12/92	
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	10/09/92
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/kg wet	1000	ND	10/09/92
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	10/09/92
Benzene	ug/kg wet	5.0	ND	10/09/92
Toluene	ug/kg wet	5.0	ND	10/09/92
Ethylbenzene	ug/kg wet	5.0	ND	10/09/92
Xylenes, Total	ug/kg wet	5.0	ND	10/09/92
OIL AND GREASE, SILICA GEL (LUFT)				
Oil and Grease, Gravimetric (SM5520)	mg/kg wet	50	ND	10/12/92
Date Extracted			10/12/92	
HALOGENATED VOLATILE COMPOUNDS EPA 8010				
Dichlorodifluoromethane	ug/kg	100	ND	10/08/92
Chloromethane	ug/kg	100	ND	10/08/92
Vinyl Chloride	ug/kg	100	ND	10/08/92
Bromomethane	ug/kg	100	ND	10/08/92
Chloroethane	ug/kg	100	ND	10/08/92
Trichlorofluoromethane	ug/kg	100	ND	10/08/92
1,1-Dichloroethene	ug/kg	25	ND	10/08/92
Methylene Chloride	ug/kg	100	ND	10/08/92
trans-1,2-Dichloroethene	ug/kg	25	ND	10/08/92
cis-1,2-Dichloroethene	ug/kg	25	ND	10/08/92

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

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

REPORT OF LABORATORY ANALYSIS

October 15, 1992
PACE Project Number: 421001512

Client Reference: BP OIL #11105 Castro Valley/Redwood

PACE Sample Number:			70 0217237	
Date Collected:			09/29/92	
Date Received:			10/01/92	
Client Sample ID:			MW-1-20'	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
HALOGENATED VOLATILE COMPOUNDS EPA 8010				
1,1-Dichloroethane	ug/kg	25	ND	10/08/92
Chloroform	ug/kg	25	ND	10/08/92
1,1,1-Trichloroethane (TCA)	ug/kg	25	ND	10/08/92
Carbon Tetrachloride	ug/kg	25	ND	10/08/92
1,2-Dichloroethane (EDC)	ug/kg	25	ND	10/08/92
Trichloroethene (TCE)	ug/kg	25	ND	10/08/92
1,2-Dichloropropane	ug/kg	25	ND	10/08/92
Bromodichloromethane	ug/kg	25	ND	10/08/92
2-Chloroethylvinyl ether	ug/kg	25	ND	10/08/92
cis-1,3-Dichloropropene	ug/kg	25	ND	10/08/92
trans-1,3-Dichloropropene	ug/kg	25	ND	10/08/92
1,1,2-Trichloroethane	ug/kg	25	ND	10/08/92
Tetrachloroethene	ug/kg	25	ND	10/08/92
Dibromochloromethane	ug/kg	25	ND	10/08/92
Chlorobenzene	ug/kg	25	ND	10/08/92
Bromoform	ug/kg	25	ND	10/08/92
1,1,2,2-Tetrachloroethane	ug/kg	25	ND	10/08/92
1,3-Dichlorobenzene	ug/kg	25	ND	10/08/92
1,4-Dichlorobenzene	ug/kg	25	ND	10/08/92
1,2-Dichlorobenzene	ug/kg	25	ND	10/08/92
Bromochloromethane (Surrogate Recovery)			130%	10/08/92
1,4-Dichlorobutane (Surrogate Recovery)			93%	10/08/92

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

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REPORT OF LABORATORY ANALYSIS

Mr. Mike Quillin
Page 3

October 15, 1992
PACE Project Number: 421001512

Client Reference: BP OIL #11105 Castro Valley/Redwood

PACE Sample Number:			70 0217253	
Date Collected:			09/29/92	
Date Received:			10/01/92	
Client Sample ID:			MW-3-20'	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	10/08/92
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/kg wet	1000	ND	10/08/92
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	10/08/92
Benzene	ug/kg wet	5.0	ND	10/08/92
Toluene	ug/kg wet	5.0	ND	10/08/92
Ethylbenzene	ug/kg wet	5.0	ND	10/08/92
Xylenes, Total	ug/kg wet	5.0	ND	10/08/92

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

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REPORT OF LABORATORY ANALYSIS

October 15, 1992
PACE Project Number: 421001512

Client Reference: BP OIL #11105 Castro Valley/Redwood

PACE Sample Number:			70 0217288	
Date Collected:			09/28/92	
Date Received:			10/01/92	
Client Sample ID:			MW-5-14'	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	10/08/92
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/kg wet	1000	ND	10/08/92
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	10/08/92
Benzene	ug/kg wet	5.0	ND	10/08/92
Toluene	ug/kg wet	5.0	ND	10/08/92
Ethylbenzene	ug/kg wet	5.0	ND	10/08/92
Xylenes, Total	ug/kg wet	5.0	ND	10/08/92

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

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REPORT OF LABORATORY ANALYSIS

October 15, 1992
PACE Project Number: 421001512

Client Reference: BP OIL #11105 Castro Valley/Redwood

PACE Sample Number:			70 0217300	
Date Collected:			09/28/92	
Date Received:			10/01/92	
Client Sample ID:			MW-2-20'	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	10/08/92
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/kg wet	1000	ND	10/08/92
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	10/08/92
Benzene	ug/kg wet	5.0	ND	10/08/92
Toluene	ug/kg wet	5.0	ND	10/08/92
Ethylbenzene	ug/kg wet	5.0	ND	10/08/92
Xylenes, Total	ug/kg wet	5.0	ND	10/08/92

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

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REPORT OF LABORATORY ANALYSIS

Mr. Mike Quillin
Page 6

October 15, 1992
PACE Project Number: 421001512

Client Reference: BP OIL #11105 Castro Valley/Redwood

PACE Sample Number:			70 0217326	
Date Collected:			09/28/92	
Date Received:			10/01/92	
Client Sample ID:			MW-4-6.5'	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	10/09/92
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/kg wet	1000	ND	10/09/92
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	10/09/92
Benzene	ug/kg wet	5.0	ND	10/09/92
Toluene	ug/kg wet	5.0	ND	10/09/92
Ethylbenzene	ug/kg wet	5.0	ND	10/09/92
Xylenes, Total	ug/kg wet	5.0	ND	10/09/92

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

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REPORT OF LABORATORY ANALYSIS

Mr. Mike Quillin
Page 7

October 15, 1992
PACE Project Number: 421001512

Client Reference: BP OIL #11105 Castro Valley/Redwood

PACE Sample Number:			70 0217334	
Date Collected:			09/29/92	
Date Received:			10/01/92	
Client Sample ID:			MW-1-15*	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
EXTRACTABLE FUELS EPA 3550/8015				
Extractable Fuels, as Diesel	mg/kg	5.0	ND	10/13/92
Date Extracted			10/12/92	
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	10/02/92
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/kg wet	40000	70000	10/02/92
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	10/02/92
Benzene	ug/kg wet	200	870	10/02/92
Toluene	ug/kg wet	200	2000	10/02/92
Ethylbenzene	ug/kg wet	200	1200	10/02/92
Xylenes, Total	ug/kg wet	200	5700	10/02/92
OIL AND GREASE, SILICA GEL (LUFT)				
Oil and Grease, Gravimetric (SM5520)	mg/kg wet	50	ND	10/12/92
Date Extracted			10/12/92	
HALOGENATED VOLATILE COMPOUNDS EPA 8010				
Dichlorodifluoromethane	ug/kg	20	ND	10/07/92
Chloromethane	ug/kg	20	ND	10/07/92
Vinyl Chloride	ug/kg	20	ND	10/07/92
Bromomethane	ug/kg	20	ND	10/07/92
Chloroethane	ug/kg	20	ND	10/07/92
Trichlorofluoromethane	ug/kg	20	ND	10/07/92
1,1-Dichloroethene	ug/kg	5.0	ND	10/07/92
Methylene Chloride	ug/kg	20	ND	10/07/92
trans-1,2-Dichloroethene	ug/kg	5.0	ND	10/07/92
cis-1,2-Dichloroethene	ug/kg	5.0	ND	10/07/92
1,1-Dichloroethane	ug/kg	5.0	ND	10/07/92
Chloroform	ug/kg	5.0	ND	10/07/92
1,1,1-Trichloroethane (TCA)	ug/kg	5.0	ND	10/07/92

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

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REPORT OF LABORATORY ANALYSIS

October 15, 1992
PACE Project Number: 421001512

Client Reference: BP OIL #11105 Castro Valley/Redwood

PACE Sample Number:			70 0217334	
Date Collected:			09/29/92	
Date Received:			10/01/92	
Client Sample ID:			MW-1-15'	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
HALOGENATED VOLATILE COMPOUNDS EPA 8010				
Carbon Tetrachloride	ug/kg	5.0	ND	10/07/92
1,2-Dichloroethane (EDC)	ug/kg	5.0	ND	10/07/92
Trichloroethene (TCE)	ug/kg	5.0	ND	10/07/92
1,2-Dichloropropane	ug/kg	5.0	ND	10/07/92
Bromodichloromethane	ug/kg	5.0	ND	10/07/92
2-Chloroethylvinyl ether	ug/kg	5.0	ND	10/07/92
cis-1,3-Dichloropropene	ug/kg	5.0	ND	10/07/92
trans-1,3-Dichloropropene	ug/kg	5.0	ND	10/07/92
1,1,2-Trichloroethane	ug/kg	5.0	ND	10/07/92
Tetrachloroethene	ug/kg	5.0	ND	10/07/92
Dibromochloromethane	ug/kg	5.0	ND	10/07/92
Chlorobenzene	ug/kg	5.0	ND	10/07/92
Bromoform	ug/kg	5.0	ND	10/07/92
1,1,2,2-Tetrachloroethane	ug/kg	5.0	ND	10/07/92
1,3-Dichlorobenzene	ug/kg	5.0	ND	10/07/92
1,4-Dichlorobenzene	ug/kg	5.0	ND	10/07/92
1,2-Dichlorobenzene	ug/kg	5.0	ND	10/07/92
Bromochloromethane (Surrogate Recovery)			101%	10/07/92
1,4-Dichlorobutane (Surrogate Recovery)			58%	10/07/92

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

REPORT OF LABORATORY ANALYSIS

October 15, 1992
PACE Project Number: 421001512

Client Reference: BP OIL #11105 Castro Valley/Redwood

PACE Sample Number:				70 0217342	
Date Collected:				09/29/92	
Date Received:				10/01/92	
Client Sample ID:				MW-3-10.5'	
Parameter	Units		MDL		DATE ANALYZED
ORGANIC ANALYSIS					
PURGEABLE FUELS AND AROMATICS					
TOTAL FUEL HYDROCARBONS, (LIGHT):				-	10/02/92
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/kg	wet	50000	220000	10/02/92
PURGEABLE AROMATICS (BTXE BY EPA 8020M):				-	10/02/92
Benzene	ug/kg	wet	250	1400	10/02/92
Toluene	ug/kg	wet	250	8200	10/02/92
Ethylbenzene	ug/kg	wet	250	3300	10/02/92
Xylenes, Total	ug/kg	wet	250	16000	10/02/92

MDL Method Detection Limit

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THE ASSURANCE OF QUALITY

REPORT OF LABORATORY ANALYSIS

Mr. Mike Quillin
Page 10

October 15, 1992
PACE Project Number: 421001512

Client Reference: BP OIL #11105 Castro Valley/Redwood

PACE Sample Number:			70 0217350	
Date Collected:			09/28/92	
Date Received:			10/01/92	
Client Sample ID:			MW-5-10'	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	10/05/92
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/kg wet	4000	51000	10/05/92
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	10/05/92
Benzene	ug/kg wet	20	250	10/05/92
Toluene	ug/kg wet	20	240	10/05/92
Ethylbenzene	ug/kg wet	20	300	10/05/92
Xylenes, Total	ug/kg wet	20	170	10/05/92

MDL Method Detection Limit

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THE ASSURANCE OF QUALITY

REPORT OF LABORATORY ANALYSIS

Mr. Mike Quillin
Page 11

October 15, 1992
PACE Project Number: 421001512

Client Reference: BP OIL #11105 Castro Valley/Redwood

PACE Sample Number:			70 0217369	
Date Collected:			09/28/92	
Date Received:			10/01/92	
Client Sample ID:			MW-2-10.5'	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	10/02/92
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/kg wet	1000	ND	10/02/92
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	10/02/92
Benzene	ug/kg wet	5.0	ND	10/02/92
Toluene	ug/kg wet	5.0	ND	10/02/92
Ethylbenzene	ug/kg wet	5.0	ND	10/02/92
Xylenes, Total	ug/kg wet	5.0	ND	10/02/92

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

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TEL: 415-883-6100
FAX: 415-883-2673

REPORT OF LABORATORY ANALYSIS

Mr. Mike Quillin
Page 12

October 15, 1992
PACE Project Number: 421001512

Client Reference: BP OIL #11105 Castro Valley/Redwood

PACE Sample Number:			70 0217377	
Date Collected:			09/28/92	
Date Received:			10/01/92	
Client Sample ID:			MW-4-10'	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	10/05/92
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/kg wet	4000	24000	10/05/92
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	10/05/92
Benzene	ug/kg wet	20	150	10/05/92
Toluene	ug/kg wet	20	170	10/05/92
Ethylbenzene	ug/kg wet	20	230	10/05/92
Xylenes, Total	ug/kg wet	20	820	10/05/92

MDL Method Detection Limit

These data have been reviewed and are approved for release.

Darrell Cain for
Mark A. Valentini, Ph.D.
Regional Director

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

REPORT OF LABORATORY ANALYSIS

Mr. Mike Quillin
Page 13

QUALITY CONTROL DATA

October 15, 1992
PACE Project Number: 421001512

Client Reference: BP OIL #11105 Castro Valley/Redwood

EXTRACTABLE FUELS EPA 3550/8015
Batch: 70 16194
Samples: 70 0217237, 70 0217334

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	92%	89%	3%

MDL Method Detection Limit
RPD Relative Percent Difference

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Mr. Mike Quillin
Page 14

QUALITY CONTROL DATA

October 15, 1992
PACE Project Number: 421001512

Client Reference: BP OIL #11105 Castro Valley/Redwood

HALOGENATED VOLATILE COMPOUNDS EPA 8010
Batch: 70 16068
Samples: 70 0217334

METHOD BLANK:

Parameter	Units	MDL	Method Blank
Dichlorodifluoromethane	ug/kg	20	ND
Chloromethane	ug/kg	20	ND
Vinyl Chloride	ug/kg	20	ND
Bromomethane	ug/kg	20	ND
Chloroethane	ug/kg	20	ND
Trichlorofluoromethane	ug/kg	20	ND
1,1-Dichloroethene	ug/kg	5.0	ND
Methylene Chloride	ug/kg	20	ND
trans-1,2-Dichloroethene	ug/kg	5.0	ND
cis-1,2-Dichloroethene	ug/kg	5.0	ND
1,1-Dichloroethane	ug/kg	5.0	ND
Chloroform	ug/kg	5.0	ND
1,1,1-Trichloroethane (TCA)	ug/kg	5.0	ND
Carbon Tetrachloride	ug/kg	5.0	ND
1,2-Dichloroethane (EDC)	ug/kg	5.0	ND
Trichloroethene (TCE)	ug/kg	5.0	ND
1,2-Dichloropropane	ug/kg	5.0	ND
Bromodichloromethane	ug/kg	5.0	ND
2-Chloroethylvinyl ether	ug/kg	5.0	ND
cis-1,3-Dichloropropene	ug/kg	5.0	ND
trans-1,3-Dichloropropene	ug/kg	5.0	ND
1,1,2-Trichloroethane	ug/kg	5.0	ND
Tetrachloroethene	ug/kg	5.0	ND
Dibromochloromethane	ug/kg	5.0	ND
Chlorobenzene	ug/kg	5.0	ND
Bromoform	ug/kg	5.0	ND
1,1,2,2-Tetrachloroethane	ug/kg	5.0	ND
1,3-Dichlorobenzene	ug/kg	5.0	ND
1,4-Dichlorobenzene	ug/kg	5.0	ND
1,2-Dichlorobenzene	ug/kg	5.0	ND
Bromochloromethane (Surrogate Recovery)			132%

MDL Method Detection Limit

REPORT OF LABORATORY ANALYSIS

Mr. Mike Quillin
Page 15

QUALITY CONTROL DATA

October 15, 1992
PACE Project Number: 421001512

Client Reference: BP OIL #11105 Castro Valley/Redwood

HALOGENATED VOLATILE COMPOUNDS EPA 8010
Batch: 70 16068
Samples: 70 0217334

METHOD BLANK:

Parameter	Units	MDL	Method Blank
1,4-Dichlorobutane (Surrogate Recovery)			112%

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
1,1-Dichloroethane	ug/kg	5.0	10.00	89%	81%	9%
Trichloroethene (TCE)	ug/kg	5.0	10.00	82%	86%	4%
1,1,2-Trichloroethane	ug/kg	5.0	10.00	83%	84%	1%
Tetrachloroethene	ug/kg	5.0	10.00	101%	101%	0%

MDL Method Detection Limit
RPD Relative Percent Difference

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REPORT OF LABORATORY ANALYSIS

Mr. Mike Quillin
Page 16

QUALITY CONTROL DATA

October 15, 1992
PACE Project Number: 421001512

Client Reference: BP OIL #11105 Castro Valley/Redwood

HALOGENATED VOLATILE COMPOUNDS EPA 8010
Batch: 70 16110
Samples: 70 0217237

METHOD BLANK:

Parameter	Units	MDL	Method Blank
Dichlorodifluoromethane	ug/kg	20	ND
Chloromethane	ug/kg	20	ND
Vinyl Chloride	ug/kg	20	ND
Bromomethane	ug/kg	20	ND
Chloroethane	ug/kg	20	ND
Trichlorofluoromethane	ug/kg	20	ND
1,1-Dichloroethene	ug/kg	5.0	ND
Methylene Chloride	ug/kg	20	ND
trans-1,2-Dichloroethene	ug/kg	5.0	ND
cis-1,2-Dichloroethene	ug/kg	5.0	ND
1,1-Dichloroethane	ug/kg	5.0	ND
Chloroform	ug/kg	5.0	ND
1,1,1-Trichloroethane (TCA)	ug/kg	5.0	ND
Carbon Tetrachloride	ug/kg	5.0	ND
1,2-Dichloroethane (EDC)	ug/kg	5.0	ND
Trichloroethene (TCE)	ug/kg	5.0	ND
1,2-Dichloropropane	ug/kg	5.0	ND
Bromodichloromethane	ug/kg	5.0	ND
2-Chloroethylvinyl ether	ug/kg	5.0	ND
cis-1,3-Dichloropropene	ug/kg	5.0	ND
trans-1,3-Dichloropropene	ug/kg	5.0	ND
1,1,2-Trichloroethane	ug/kg	5.0	ND
Tetrachloroethene	ug/kg	5.0	ND
Dibromochloromethane	ug/kg	5.0	ND
Chlorobenzene	ug/kg	5.0	ND
Bromoform	ug/kg	5.0	ND
1,1,2,2-Tetrachloroethane	ug/kg	5.0	ND
1,3-Dichlorobenzene	ug/kg	5.0	ND
1,4-Dichlorobenzene	ug/kg	5.0	ND
1,2-Dichlorobenzene	ug/kg	5.0	ND
Bromochloromethane (Surrogate Recovery)			113%

MDL Method Detection Limit

REPORT OF LABORATORY ANALYSIS

Mr. Mike Quillin
Page 17

QUALITY CONTROL DATA

October 15, 1992
PACE Project Number: 421001512

Client Reference: BP OIL #11105 Castro Valley/Redwood

HALOGENATED VOLATILE COMPOUNDS EPA 8010
Batch: 70 16110
Samples: 70 0217237

METHOD BLANK:

Parameter	Units	MDL	Method Blank
1,4-Dichlorobutane (Surrogate Recovery)			102%

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
1,1-Dichloroethane	ug/kg	5.0	10.00	101%	83%	19%
Trichloroethene (TCE)	ug/kg	5.0	10.00	94%	90%	4%
1,1,2-Trichloroethane	ug/kg	5.0	10.00	94%	90%	4%
Tetrachloroethene	ug/kg	5.0	10.00	112%	107%	4%

MDL Method Detection Limit
RPD Relative Percent Difference

REPORT OF LABORATORY ANALYSIS

Mr. Mike Quillin
Page 18

QUALITY CONTROL DATA

October 15, 1992
PACE Project Number: 421001512

Client Reference: BP OIL #11105 Castro Valley/Redwood

OIL AND GREASE, SILICA GEL (LUFT)
Batch: 70 16131
Samples: 70 0217237, 70 0217334

METHOD BLANK:

Parameter	Units	MDL	Method Blank
Oil and Grease, Gravimetric (SM5520)	mg/kg wet	50	ND

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
Oil and Grease, Gravimetric (SM5520)	mg/kg wet	50	667	97%	96%	1%

MDL Method Detection Limit
RPD Relative Percent Difference

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Mr. Mike Quillin
Page 19

QUALITY CONTROL DATA

October 15, 1992
PACE Project Number: 421001512

Client Reference: BP OIL #11105 Castro Valley/Redwood

PURGEABLE FUELS AND AROMATICS
Batch: 70 15930
Samples: 70 0217334, 70 0217342, 70 0217369

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	364	95%	93%	2%
Benzene	ug/kg wet	1.0	40.0	99%	98%	1%
Toluene	ug/kg wet	1.0	40.0	101%	100%	0%
Ethylbenzene	ug/kg wet	1.0	40.0	96%	95%	1%
Xylenes, Total	ug/kg wet	1.0	80.0	98%	97%	1%

MDL Method Detection Limit
RPD Relative Percent Difference

REPORT OF LABORATORY ANALYSIS

QUALITY CONTROL DATA

Client Reference: BP OIL #11105 Castro Valley/Redwood

PURGEABLE FUELS AND AROMATICS
Batch: 70 15980
Samples: 70 0217350, 70 0217377

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	5.0	ND
Toluene	ug/kg wet	5.0	ND
Ethylbenzene	ug/kg wet	5.0	ND
Xylenes, Total	ug/kg wet	5.0	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	364	95%	90%	5%
Benzene	ug/kg wet	5.0	40.0	96%	92%	4%
Toluene	ug/kg wet	5.0	40.0	101%	98%	3%
Ethylbenzene	ug/kg wet	5.0	40.0	97%	95%	2%
Xylenes, Total	ug/kg wet	5.0	80.0	99%	97%	2%

MDL Method Detection Limit
RPD Relative Percent Difference

Mr. Mike Quillin
Page 21

QUALITY CONTROL DATA

October 15, 1992
PACE Project Number: 421001512

Client Reference: BP OIL #11105 Castro Valley/Redwood

PURGEABLE FUELS AND AROMATICS
Batch: 70 16077
Samples: 70 0217253, 70 0217288, 70 0217300

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	364	95%	97%	2%
Benzene	ug/kg wet	1.0	40.0	100%	101%	0%
Toluene	ug/kg wet	1.0	40.0	102%	103%	0%
Ethylbenzene	ug/kg wet	1.0	40.0	98%	99%	1%
Xylenes, Total	ug/kg wet	1.0	80.0	98%	101%	3%

MDL Method Detection Limit
RPD Relative Percent Difference

REPORT OF LABORATORY ANALYSIS

Mr. Mike Quillin
Page 22

QUALITY CONTROL DATA

October 15, 1992
PACE Project Number: 421001512

Client Reference: BP OIL #11105 Castro Valley/Redwood

PURGEABLE FUELS AND AROMATICS
Batch: 70 16122
Samples: 70 0217237, 70 0217326

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	364	101%	107%	5%
Benzene	ug/kg wet	1.0	40.0	97%	99%	2%
Toluene	ug/kg wet	1.0	40.0	99%	101%	2%
Ethylbenzene	ug/kg wet	1.0	40.0	94%	97%	3%
Xylenes, Total	ug/kg wet	1.0	80.0	96%	99%	3%

MDL Method Detection Limit
RPD Relative Percent Difference

change 8415W 10-1-92

CHAIN OF CUSTODY RECORD

DATE 10/6/92 PAGE 1 OF 1

PROJECT NAME BP - PHASE I

ADDRESS STA. # 11105
3519 CASTRO VLY BLVD
CASTRO VLY, CA

PROJECT NO. 6-92-5428

SAMPLED BY CHRIS VALCHEFF

LAB NAME PACE

ESE Environmental Science & Engineering, Inc.
4090 Nelson Avenue
Suite J
Concord, CA 94520
(415) 685-4053
Fax (415) 685-5323

SAMPLE #	DATE	TIME	LOCATION	TPH-g/BTEX	TOG-5520	TPH-d	8010	MATRIX	NUMBER OF CONTAINERS	REMARKS (CONTAINER, SIZE, ETC.)
								MATRIX		
MW-1@5'	9/29/92	1510		X	X	X	X	SOIL		(HOLD 5' sample)
MW-1@20'	"	1545		X	X	X	X			
MW-2@10.5'	9/28/92	1715		X						
MW-2@20	"	1730		X						
MW-3@10.5'	9/29/92	1040		X						
MW-3@20'	"	1105		X						
MW-4@6.5'	9/28/92	0935		X						
MW-4@10'	"	0945		X						
MW-5@10'	9/28/92	1345		X						
MW-5@14'	"	1350		X						

ANALYSES TO BE PERFORMED

RELINQUISHED BY: (signature)	RECEIVED BY: (signature)	date	time
1.			
2.			
3.			
4.			
5.			

TOTAL NUMBER OF CONTAINERS

REPORT RESULTS TO:

SPECIAL SHIPMENT REQUIREMENTS

INSTRUCTIONS TO LABORATORY (handling, analyses, storage, etc.):

SAMPLE RECEIPT

CHAIN OF CUSTODY SEALS	
REC'D GOOD CONDTN/COLD	
CONFORMS TO RECORD	

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REPORT OF LABORATORY ANALYSIS

OCT 21 [illegible]

October 19, 1992

Mr. Mike Quillin
Environmental Science & Engineering, Inc
4090 Nelson Avenue, Suite J
Concord, CA 94520

RE: PACE Project No. 421006.509
Client Reference: BP-Ph 1/Sta 11105/3519 Castro Vly Blvd.

Dear Mr. Quillin:

Enclosed is the report of laboratory analyses for samples received October 06, 1992.

If you have any questions concerning this report, please feel free to contact us.

Sincerely,

Caron E. Sontag
Project Manager

Enclosures

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REPORT OF LABORATORY ANALYSIS

Environmental Science & Engineering, Inc
4090 Nelson Avenue, Suite J
Concord, CA 94520

October 19, 1992
PACE Project Number: 421006509

Attn: Mr. Mike Quillin

Client Reference: BP-Ph 1/Sta 11105/3519 Castro Vly Blvd.

PACE Sample Number:			70 0220165	
Date Collected:			10/05/92	
Date Received:			10/06/92	
Client Sample ID:			ESE-1	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	10/08/92
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/L	250	2100	10/08/92
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	10/08/92
Benzene	ug/L	2.5	370	10/08/92
Toluene	ug/L	2.5	150	10/08/92
Ethylbenzene	ug/L	2.5	17	10/08/92
Xylenes, Total	ug/L	2.5	110	10/08/92
TOTAL OIL AND GREASE (SM 5520)				
Total Oil & Grease SM 5520	mg/L	5.0	ND	10/15/92
Date Extracted			10/14/92	
TPH DIESEL, BY EPA METHOD 8015				
Extractable Fuels, as Diesel	mg/L	0.050	0.096	10/14/92
Date Extracted			10/13/92	
PURGEABLE HALOCARBONS, EPA METHOD 601				
Dichlorodifluoromethane	ug/L	2.0	ND	10/14/92
Chloromethane	ug/L	2.0	ND	10/14/92
Vinyl Chloride	ug/L	2.0	ND	10/14/92
Bromomethane	ug/L	2.0	ND	10/14/92
Chloroethane	ug/L	2.0	ND	10/14/92
Trichlorofluoromethane (Freon 11)	ug/L	2.0	ND	10/14/92
1,1-Dichloroethene	ug/L	0.5	ND	10/14/92
Methylene Chloride	ug/L	2.0	ND	10/14/92
trans-1,2-Dichloroethene	ug/L	0.5	ND	10/14/92
cis-1,2-Dichloroethene	ug/L	0.5	ND	10/14/92

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

REPORT OF LABORATORY ANALYSIS

October 19, 1992
PACE Project Number: 421006509

Client Reference: BP-Ph 1/Sta 11105/3519 Castro Vly Blvd.

PACE Sample Number:			70 0220165	
Date Collected:			10/05/92	
Date Received:			10/06/92	
Client Sample ID:			ESE-1	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE HALOCARBONS, EPA METHOD 601				
1,1-Dichloroethane	ug/L	0.5	ND	10/14/92
Chloroform	ug/L	0.5	ND	10/14/92
1,1,1-Trichloroethane (TCA)	ug/L	0.5	ND	10/14/92
Carbon Tetrachloride	ug/L	0.5	ND	10/14/92
1,2-Dichloroethane (EDC)	ug/L	0.5	1.8	10/14/92
Trichloroethene (TCE)	ug/L	0.5	ND	10/14/92
1,2-Dichloropropane	ug/L	0.5	ND	10/14/92
Bromodichloromethane	ug/L	0.5	ND	10/14/92
2-Chloroethylvinyl ether	ug/L	0.5	ND	10/14/92
cis-1,3-Dichloropropene	ug/L	0.5	ND	10/14/92
trans-1,3-Dichloropropene	ug/L	0.5	ND	10/14/92
1,1,2-Trichloroethane	ug/L	0.5	ND	10/14/92
Tetrachloroethene	ug/L	0.5	ND	10/14/92
Dibromochloromethane	ug/L	0.5	ND	10/14/92
Chlorobenzene	ug/L	0.5	ND	10/14/92
Bromoform	ug/L	0.5	ND	10/14/92
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND	10/14/92
1,3-Dichlorobenzene	ug/L	0.5	ND	10/14/92
1,4-Dichlorobenzene	ug/L	0.5	ND	10/14/92
1,2-Dichlorobenzene	ug/L	0.5	ND	10/14/92
Bromochloromethane (Surrogate Recovery)			93%	10/14/92
1,4-Dichlorobutane (Surrogate Recovery)			99%	10/14/92

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

REPORT OF LABORATORY ANALYSIS

October 19, 1992
PACE Project Number: 421006509

Client Reference: BP-Ph 1/Sta 11105/3519 Castro Vly Blvd.

PACE Sample Number:			70 0220173	
Date Collected:			10/05/92	
Date Received:			10/06/92	
Client Sample ID:			ESE-2	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	10/08/92
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/L	50	300	10/08/92
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	10/08/92
Benzene	ug/L	0.5	5.4	10/08/92
Toluene	ug/L	0.5	16	10/08/92
Ethylbenzene	ug/L	0.5	3.9	10/08/92
Xylenes, Total	ug/L	0.5	45	10/08/92

MDL Method Detection Limit

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REPORT OF LABORATORY ANALYSIS

Mr. Mike Quillin
Page 4

October 19, 1992
PACE Project Number: 421006509

Client Reference: BP-Ph 1/Sta 11105/3519 Castro Vly Blvd.

PACE Sample Number:			70 0220181	
Date Collected:			10/05/92	
Date Received:			10/06/92	
Client Sample ID:			ESE-3	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	10/08/92
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/L	50	430	10/08/92
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	10/08/92
Benzene	ug/L	0.5	57	10/08/92
Toluene	ug/L	0.5	31	10/08/92
Ethylbenzene	ug/L	0.5	3.6	10/08/92
Xylenes, Total	ug/L	0.5	34	10/08/92

MDL Method Detection Limit

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REPORT OF LABORATORY ANALYSIS

October 19, 1992
PACE Project Number: 421006509

Client Reference: BP-Ph 1/Sta 11105/3519 Castro Vly Blvd.

PACE Sample Number:			70 0220190	
Date Collected:			10/05/92	
Date Received:			10/06/92	
Client Sample ID:			ESE-4	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	10/08/92
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/L	50	98	10/08/92
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	10/08/92
Benzene	ug/L	0.5	7.2	10/08/92
Toluene	ug/L	0.5	1.3	10/08/92
Ethylbenzene	ug/L	0.5	1.1	10/08/92
Xylenes, Total	ug/L	0.5	6.1	10/08/92

MDL Method Detection Limit

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

REPORT OF LABORATORY ANALYSIS

October 19, 1992
PACE Project Number: 421006509

Client Reference: BP-Ph 1/Sta 11105/3519 Castro Vly Blvd.

PACE Sample Number:			70 0220203	
Date Collected:			10/05/92	
Date Received:			10/06/92	
Client Sample ID:			ESE-5	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	10/12/92
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/L	120	1300	10/12/92
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	10/12/92
Benzene	ug/L	1.2	200	10/12/92
Toluene	ug/L	0.5	3.8	10/12/92
Ethylbenzene	ug/L	0.5	1.2	10/12/92
Xylenes, Total	ug/L	0.5	18	10/12/92

MDL Method Detection Limit

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

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REPORT OF LABORATORY ANALYSIS

October 19, 1992
PACE Project Number: 421006509

Client Reference: BP-Ph 1/Sta 11105/3519 Castro Vly Blvd.

PACE Sample Number:			70 0220211	
Date Collected:			10/05/92	
Date Received:			10/06/92	
Client Sample ID:			ESE-1-D	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	10/10/92
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/L	250	2300	10/10/92
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	10/10/92
Benzene	ug/L	2.5	370	10/10/92
Toluene	ug/L	2.5	160	10/10/92
Ethylbenzene	ug/L	2.5	16	10/10/92
Xylenes, Total	ug/L	2.5	110	10/10/92

MDL Method Detection Limit

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

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THE ASSURANCE OF QUALITY

REPORT OF LABORATORY ANALYSIS

Mr. Mike Quillin
Page 8

October 19, 1992
PACE Project Number: 421006509

Client Reference: BP-Ph 1/Sta 11105/3519 Castro Vly Blvd.

PACE Sample Number:			70 0220220	
Date Collected:			10/05/92	
Date Received:			10/06/92	
Client Sample ID:			Trip	
Parameter	Units	MDL		DATE ANALYZED
ORGANIC ANALYSIS				
PURGEABLE FUELS AND AROMATICS				
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	10/09/92
Purgeable Fuels, as Gasoline (EPA 8015M)	ug/L	50	ND	10/09/92
PURGEABLE AROMATICS (BTXE BY EPA 8020M):			-	10/09/92
Benzene	ug/L	0.5	ND	10/09/92
Toluene	ug/L	0.5	ND	10/09/92
Ethylbenzene	ug/L	0.5	ND	10/09/92
Xylenes, Total	ug/L	0.5	ND	10/09/92

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

These data have been reviewed and are approved for release.

Darrell Caen for
Mark A. Valentini, Ph.D.
Regional Director

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

REPORT OF LABORATORY ANALYSIS

QUALITY CONTROL DATA

Client Reference: BP-Ph 1/Sta 11105/3519 Castro Vly Blvd.

EXTRACTABLE FUELS EPA 3510/8015
Batch: 70 16229
Samples: 70 0220165

METHOD BLANK:

Parameter	Units	MDL	Method Blank
Extractable Fuels, as Diesel	mg/L	0.050	ND

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
Extractable Fuels, as Diesel	mg/L	0.050	1.00	77%	85%	9%

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

11 Digital Drive
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FAX: 415-883-2673

Mr. Mike Quillin
Page 10

QUALITY CONTROL DATA

October 19, 1992
PACE Project Number: 421006509

Client Reference: BP-Ph 1/Sta 11105/3519 Castro Vly Blvd.

OIL AND GREASE, SILICA GEL (LUFT)
Batch: 70 16219
Samples: 70 0220165

METHOD BLANK:

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

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
Oil and Grease, Gravimetric (SM5520)	mg/L	5.0	20.0	100%	100%	0%

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

11 Digital Drive
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FAX: 415-883-2673

Mr. Mike Quillin
Page 11

QUALITY CONTROL DATA

October 19, 1992
PACE Project Number: 421006509

Client Reference: BP-Ph 1/Sta 11105/3519 Castro Vly Blvd.

TPH GASOLINE/BTEX
Batch: 70 16086
Samples: 70 0220165, 70 0220173, 70 0220181, 70 0220190

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	427	98%	99%	1%
Benzene	ug/L	0.5	40.0	102%	99%	2%
Toluene	ug/L	0.5	40.0	99%	92%	7%
Ethylbenzene	ug/L	0.5	40.0	108%	102%	5%
Xylenes, Total	ug/L	0.5	80.0	111%	105%	5%

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

Mr. Mike Quillin
Page 12

QUALITY CONTROL DATA

October 19, 1992
PACE Project Number: 421006509

Client Reference: BP-Ph 1/Sta 11105/3519 Castro Vly Blvd.

TPH GASOLINE/BTEX
Batch: 70 16127
Samples: 70 0220203, 70 0220211

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	427	102%	101%	0%
Benzene	ug/L	0.5	40.0	99%	98%	1%
Toluene	ug/L	0.5	40.0	99%	100%	1%
Ethylbenzene	ug/L	0.5	40.0	105%	108%	2%
Xylenes, Total	ug/L	0.5	80.0	108%	111%	2%

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

Mr. Mike Quillin
Page 13

QUALITY CONTROL DATA

October 19, 1992
PACE Project Number: 421006509

Client Reference: BP-Ph 1/Sta 11105/3519 Castro Vly Blvd.

VOLATILE HALOCARBONS AND AROMATICS
Batch: 70 16251
Samples: 70 0220165

METHOD BLANK:

Parameter	Units	MDL	Method Blank
VOLATILE HALOCARBONS BY EPA 8010			-
Dichlorodifluoromethane	ug/L	2.0	ND
Chloromethane	ug/L	2.0	ND
Vinyl Chloride	ug/L	2.0	ND
Bromomethane	ug/L	2.0	ND
Chloroethane	ug/L	2.0	ND
Trichlorofluoromethane (Freon 11)	ug/L	2.0	ND
1,1-Dichloroethene	ug/L	0.5	ND
Methylene Chloride	ug/L	2.0	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,1,1-Trichloroethane (TCA)	ug/L	0.5	ND
Carbon Tetrachloride	ug/L	0.5	ND
1,2-Dichloroethane (EDC)	ug/L	0.5	ND
Trichloroethene (TCE)	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
2-Chloroethylvinyl ether	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
1,3-Dichlorobenzene	ug/L	0.5	ND
1,4-Dichlorobenzene	ug/L	0.5	ND

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

Mr. Mike Quillin
Page 14

QUALITY CONTROL DATA

October 19, 1992
PACE Project Number: 421006509

Client Reference: BP-Ph 1/Sta 11105/3519 Castro Vly Blvd.

VOLATILE HALOCARBONS AND AROMATICS
Batch: 70 16251
Samples: 70 0220165

METHOD BLANK:

Parameter	Units	MDL	Method Blank
1,2-Dichlorobenzene	ug/L	0.5	ND
Bromochloromethane (Surrogate Recovery)			89%
1,4-Dichlorobutane (Surrogate Recovery)			88%
VOLATILE AROMATICS BY EPA 8020			-
Benzene	ug/L	0.3	ND
Toluene	ug/L	0.3	ND
Ethylbenzene	ug/L	0.5	ND
Xylenes, Total	ug/L	0.5	ND
Fluorobenzene (Surrogate Recovery)			113%

LABORATORY CONTROL SAMPLE AND CONTROL SAMPLE DUPLICATE:

Parameter	Units	MDL	Reference Value	Recv	Dupl Recv	RPD
1,1-Dichloroethane	ug/L	0.5	10.00	130%	119%	8%
Trichloroethene (TCE)	ug/L	0.5	10.00	123%	114%	7%
trans-1,3-Dichloropropene	ug/L	0.5	3.8	89%	84%	5%
Tetrachloroethene	ug/L	0.5	10.00	132%	121%	8%
Benzene	ug/L	0.3	10.00	96%	95%	1%
Toluene	ug/L	0.3	10.00	103%	101%	1%
Xylenes, Total	ug/L	0.5	20.00	109%	108%	0%

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

421006.509 *see FAX 6/01/C

CHAIN OF CUSTODY RECORD

DATE 10/05/92 PAGE 1 OF 1

PROJECT NAME BP/CASTRO VALLEY - REDWOOD

ADDRESS 3519 CASTRO VALLEY BLVD.
CASTRO VALLEY, CA

PROJECT NO. 6-92-5428

SAMPLED BY [signature] BART MILLER

LAB NAME

ESE Environmental Science & Engineering, Inc.
A CH2M HILL Company
4090 Nelson Avenue
Suite J
Concord, CA 94520
(415) 685-4053
Fax (415) 685-5323

SAMPLE #	DATE	TIME	LOCATION	PNAs	TBA	Oil & Grease (SM5520E&F)	Dissolved Pb	8010	MATRIX	NUMBER OF CONTAINERS	REMARKS (CONTAINER, SIZE, ETC.)
ESE-1	10/05/92	16:30		X	X	X	X	X	WATER	7	RUN 8010 / 6 VOAS BACK FROM
ESE-2	"	15:30							"	6	3 VOAS IF POSSIBLE, PER
ESE-3	"	15:45							"	6	MIKE QUILLIN CONVERSATION
ESE-4	"	16:00							"	6	W/ CARON SONTAG
ESE-5	"	16:15							"	6	
ESE-1-D	"	16:30							"	6	
TRIP	"	9:00							"	1	

ANALYSES TO BE PERFORMED

RELINQUISHED BY: (signature)	RECEIVED BY: (signature)	date	time
1. [signature]	M. Quillin	10/6/92	0800
2. M. Quillin	Donald Johnson for Pace	10/6/92	1035
3. Donald Johnson Pace	[signature] ESE	10/6/92	1640
4.			
5.			

38 TOTAL NUMBER OF CONTAINERS

REPORT RESULTS TO: MICHAEL QUILLIN

SPECIAL SHIPMENT REQUIREMENTS: COLD TRANSPORT

INSTRUCTIONS TO LABORATORY (handling, analyses, storage, etc.):
NORMAL TA

SAMPLE RECEIPT

CHAIN OF CUSTODY SEALS	
REC'D GOOD CONDTN/COLD	
CONFORMS TO RECORD	

421006.509

This use^FAX'd copy of cloic per M. Quillin

CHAIN OF CUSTODY RECORD

DATE 10/6/92 PAGE 1 OF 1

PROJECT NAME BP- PHASE I

ADDRESS STA # 11105
3519 CASTRO VLY BLVD
~~CASTRO VALLEY, CA~~

PROJECT NO. 10-92-5428

SAMPLED BY BART MILLER

LAB NAME PACE

ESE Environmental Science & Engineering, Inc.
1990 Newell Avenue
Suite J
Concord, CA 94520
(415) 685-4053
Fax (415) 685-5323

SAMPLE #	DATE	TIME	LOCATION	TPH-g/BTEX	TPH-5520	TPH-d	8010	HALO						MATRIX	NUMBER OF CONTAINERS	REMARKS (CONTAINER, SIZE, ETC.)
				ANALYSES TO BE PERFORMED										MATRIX		
ESE-1	10/5/92	1630	22016.5	X	X	X	X							H2O		
ESE-2		1530	17.3	X												
ESE-3		1545	18.1	X												
ESE-4		1600	19.0	X												
ESE-5		1615	20.3	X												
ESE-1-D		1630	21.1	X												
TRIP		0900	22.0	X	X	X	X		delete							
X LITER			23.8					X								

RELINQUISHED BY: (signature)	RECEIVED BY: (signature)	date	time
1.			
2. VIA FAX	Quinton / PACE	10/7/92	10:15
3.			
4.			
5.			

TOTAL NUMBER OF CONTAINERS

REPORT RESULTS TO:

SPECIAL SHIPMENT REQUIREMENTS

INSTRUCTIONS TO LABORATORY (handling, analyses, storage, etc.):
REC'D ONE GL W/ NO I.D. - LOGGED IN ON HOLD PER CES - CC 10/7

SAMPLE RECEIPT

CHAIN OF CUSTODY SEALS	
REC'D GOOD CONDTN/COLD	
CONFORMS TO RECORD	

PRES S/3, M/1, A/S

10/06/92 17:58 FAX 1 510 685 5323 ESE-CONCORD 003