Environmental
Science &
Engineering, Inc.
A CILCORP Company

TO: Alameda County Health Care Services Agency
Department of Environmental Health
80 Swan Way, Room 200
Oakland, CA 94621

DATE: January 28, 1994

ATTN: Ms. Juliet Shin

JOB NUMBER: 6-93-5112

SUBJECT: Former Bill Chun's Service Station
2301 Santa Clara Avenue, Alameda, Alameda County, California

WE ARE TRANSMITTING THE FOLLOWING:

Fourth Quarter 1993 Ground Water Monitoring Report

CC: Mr. Wayne Chun

DIST:
LB
FILE
ORIGINATOR

ENVIRONMENTAL SCIENCE & ENGINEERING, INC.

BY _____
Michael E. Quillin, RG
Senior Hydrogeologist

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

Environmental
Science &
Engineering, Inc.

A CILCORP Company

TO: Alameda Fire Department
1300 Park Street
Alameda, CA 94501

DATE: January 28, 1994

ATTN: Captain Steve McKinley

JOB NUMBER: 6-93-5112

SUBJECT: Former Bill Chun's Service Station
2301 Santa Clara Avenue, Alameda, Alameda County, California

WE ARE TRANSMITTING THE FOLLOWING:

Fourth Quarter 1993 Ground Water Monitoring Report

CC: Mr. Wayne Chun
Ms. Juliet Shin, Alameda County HCSA

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ENVIRONMENTAL SCIENCE & ENGINEERING, INC.

BY Michael E. Quillin

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

Environmental
Science &
Engineering, Inc.
A CILCORP Company

TO: Regional Water Quality Control Board
San Francisco Bay Region
2101 Webster Street, 5th Floor
Oakland, CA 94612

DATE: January 28, 1994

ATTN: Toxics Cleanup Division

JOB NUMBER: 6-93-5112

SUBJECT: Former Bill Chun's Service Station
2301 Santa Clara Avenue, Alameda, Alameda County, California

WE ARE TRANSMITTING THE FOLLOWING:

Fourth Quarter 1993 Ground Water Monitoring Report

CC: Mr. Wayne Chun
Ms. Juliet Shin, Alameda County HCSA

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ENVIRONMENTAL SCIENCE & ENGINEERING, INC.

BY _____
Michael E. Quillin, RG
Senior Hydrogeologist

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

FOURTH QUARTER 1993 GROUND WATER MONITORING
FORMER BILL CHUN SERVICE STATION
2301 SANTA CLARA AVENUE
ALAMEDA, ALAMEDA COUNTY, CALIFORNIA

(ESE PROJECT #6-93-5112)

PREPARED FOR:

MR. WAYNE CHUN
265 HERON DRIVE
PITTSBURG, CALIFORNIA 94565

AND

ALAMEDA COUNTY HEALTH CARE SERVICES AGENCY
DEPARTMENT OF ENVIRONMENTAL HEALTH
80 SWAN WAY, ROOM 200
OAKLAND, CALIFORNIA 94621

PREPARED BY:

ENVIRONMENTAL SCIENCE & ENGINEERING, INC.
4090 NELSON AVENUE, SUITE J
CONCORD, CA 94520

JANUARY 6, 1994

ESE
A CILCORP Company

This report has been prepared by Environmental Science & Engineering, Inc. for the exclusive use of Mr. Wayne Chun as it pertains to the former Bill Chun Service Station, located at 2301 Santa Clara Avenue in Alameda, Alameda County, 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:

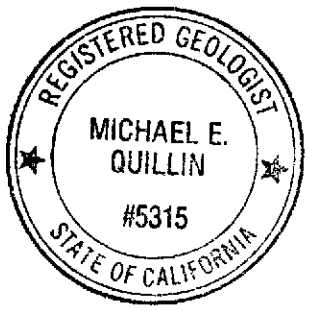
Christopher H. Valcheff
Staff Geologist

JAN. 6, 1994
DATE

UNDER THE PROFESSIONAL REVIEW AND SUPERVISION OF:

Michael E. Quillin
Senior Hydrogeologist
California Registered Geologist No. 5315

JAN. 6, 1994
DATE



ESE PROJECT NO. 6-93-5112

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1.0 INTRODUCTION

This report was prepared by Environmental Science & Engineering, Inc. (ESE), and presents the results of Fourth Quarter 1993 ground water monitoring at the Former Bill Chun Service Station ("site") located at 2301 Santa Clara Avenue in Alameda, Alameda County, California (see Figure 1 - Location Map). Field activities that are the subject of this report were conducted by ESE in November and December 1993. They included measuring static water levels and collecting ground water samples from the existing monitoring wells and analyzing ground water samples for petroleum hydrocarbon content.

1.1 SITE DESCRIPTION

The site is a former service station consisting of a kiosk, a single fuel island with associated canopy, and a separate two-bay repair service building (see Figure 2 - Site Map). An excavation resulting from the July 1992 removal of three underground storage tanks (USTs) remains open. A security fence has been present around the site since January 1993.

The site is relatively flat with an approximate elevation of 30 feet above mean sea level (USGS, 1980). Site physiography and geology were summarized in ESE's March 1993 Preliminary Site Assessment (PSA) report (ESE, 1993a).

1.2 INVESTIGATION BACKGROUND

Site investigation was initiated in July 1992, when Parker Environmental Services (Parker) directed the excavation and removal of three gasoline USTs (two 550-gallon and one 285-gallon) and their associated fuel lines and dispensers. **Parker reported that a two-inch hole was observed at the bottom of the 285-gallon tank**, for which original contents (type of gasoline) were not specified. Parker collected six soil samples in conjunction with the excavation, which was performed by Burnabe & Brinker (B&B): One sample of undisturbed soil from beneath each of the former tanks (approximately nine feet below grade), one from beneath the former fuel island, and two from the stockpiled soil resulting from tank

excavation. Sample locations were reportedly directed by a representative of the Alameda County Health Care Services Agency, Department of Environmental Health (Alameda County). Those locations were shown in Figure 2 - Site Map of ESE's PSA report (ESE, 1993a).

In an August 4, 1992 letter report to B&B, Parker reported the results of soil sample analysis (Parker, 1992). Concentrations of Total Petroleum Hydrocarbons as Gasoline (TPH-gas) up to 16,000 milligrams per Kilogram (mg/Kg) or parts per million (ppm) were reported. Concentrations of Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX) up to 1,400 ppm were reported. By far, the highest concentrations of petroleum hydrocarbons were detected in samples collected from beneath the former tanks. ESE was informed by a Parker representative that overexcavation of soil was not performed (Jim Parker, personal communication, 1993).

A stockpile with an estimated volume of 50-60 cubic yards was generated as a result of tank excavation. As part of ESE's PSA, the stockpile was profiled and appropriately disposed. That work was documented in ESE's PSA report (ESE, 1993a).

In January 1993, ESE performed the referenced PSA, which included drilling three soil borings to a depth of approximately 25 feet below ground surface (bgs), sampling soil at five foot intervals within the borings and having selected samples analyzed for petroleum hydrocarbon content, installing two-inch diameter monitoring wells in the borings (MW-1, MW-2, and MW-3; Figure 2 - Site Map), measuring static water levels in the wells, and collecting ground water samples which were analyzed for petroleum hydrocarbon content. The work was performed in accordance with ESE's Workplan for Preliminary Site Assessment (ESE, 1992), which was approved, with modifications, by Alameda County in a December 30, 1992 letter to Mr. Wayne Chun (Alameda County, 1992).

ESE's PSA determined that soil in the vicinity of the three borings was impacted with petroleum hydrocarbons, particularly at the approximate vadose zone/saturated zone

interface (approximately 10-15 feet bgs). Analytical results for soil samples collected from 10 feet bgs in each boring confirmed that concentrations of petroleum hydrocarbons ranged from 640 to 5,800 ppm. Hydrocarbons detected in soil samples from borings MW-1 and MW-3 were quantified by the analytical laboratory as weathered gasoline. Hydrocarbons in the diesel fuel range were not quantified in any of the samples.

Static water levels in resultant monitoring wells MW-1, MW-2, and MW-3 were approximately nine feet bgs when measured on January 7, 1993. ESE estimated the approximate direction of ground water flow beneath the site as generally westward toward Oak Street (Figure 2). Ground water samples collected from the wells at that time reported TPH-gas concentrations ranging from 8.5 to 110 milligrams per Liter (mg/L) or ppm. In MW-3, the hydrocarbons were quantified as weathered gasoline. No diesel was quantified in any of the samples. BTEX concentrations in the samples ranged from nondetectable to 20 ppm.

In September 1993, ESE performed an additional site investigation to define the extent of petroleum hydrocarbons in site soil and ground water and to further characterize the shallow site subsurface in order to evaluate remedial options. The activities performed included installing four new monitoring wells, collecting soil and ground water samples and analyzing both for petroleum hydrocarbons. The results of this additional investigation are presented in ESE's October 1993 Report of Findings and Additional Site Assessment and Third Quarter 1993 Ground Water Monitoring.

2.0 GROUND WATER MONITORING

2.1 Ground Water Elevations

On November 16 and December 7, 1993, ESE measured the static water levels in the seven wells using an electric interface probe. Measurements were made relative to the surveyed datum for each well. ESE calculated the relative ground water elevations for the purpose of preparing ground water elevation contour maps, from which ESE estimated the general direction and magnitude of ground water gradient.

2.4 Ground Water Sampling and Analysis

On December 7, 1993, ESE purged each well and collected ground water samples in accordance with ESE Standard Operating Procedure (SOP) No. 3 for Ground Water Monitoring and Sampling from Monitoring Wells (Appendix A). Purge water was stored in appropriately labeled DOT-rated drums and stored onsite pending analysis and recycling.

Ground water samples were preserved for analysis and transferred under chain of custody documentation to Sequoia Analytical (Sequoia), a State-certified laboratory. Sequoia analyzed each sample for total purgeable petroleum hydrocarbons (TPHg) with BTEX distinction using EPA Method 5030/8015/8020, and for total extractable petroleum hydrocarbons (TEPH) using EPA Method 3510/3520/8015.

As a measure of field quality assurance and quality control (QA/QC), ESE transported a laboratory-supplied trip blank consisting of deionized water, with ground water samples in the same cooler and analyzed it for TPHg and BTEX. This provides a check on ESE's sample handling and transport procedures.

3.0 RESULTS

3.1 Ground Water Elevations

Historical ground water elevation data for monitoring events at the site are presented in Table 1 - Historical Ground Water Elevation Data. Ground water elevations for the current monitoring events are contoured in Figure 3 - Ground Water Elevations, November 16, 1993 and Figure 4 - Ground Water Elevations, December 7, 1993. The estimated direction of ground water flow was observed to be to the north-northeast with an approximate gradient of 35 ft/mile (0.007) for the November event and again towards the north-northeast with a gradient of approximately 33 ft/mile (0.006) for the December event. Free phase product was observed in well MW-5 for both events. Elevation data presented in Figures 3 and 4 have been corrected for the presence of free product, using a specific gravity for gasoline of 0.82.

Sample data sheets for each well, showing purge volumes and results of physical sample characterization (pH, temperature, and conductivity) are presented in Appendix B - Sample Data Sheets.

3.2 Ground Water Chemistry

Analytical results for ground water samples collected by ESE since monitoring was initiated in January 1993 are summarized in Table 2 - Historical Analytical Results for Ground Water Samples. Concentrations of petroleum hydrocarbons detected in each well during the December sampling event are presented in Figure 5 - Concentrations of Petroleum Hydrocarbons, December 7, 1993. Laboratory reports and chain of custody documentation for the samples are presented in Appendix C - Analytical Results and Chain of Custody Documentation for Ground Water Samples.

Results shown in Figure 5 document that ground water at all monitoring locations sampled has been impacted by petroleum hydrocarbons. These hydrocarbons are primarily in the

gasoline range, but extractable hydrocarbons (diesel and non-diesel mixtures) were also detected in each sample. The highest concentrations of all ranges of petroleum hydrocarbons occur in wells downgradient of the former fuel island and USTs. Free product found in well MW-5 during the last two water level measurement events indicates that the former fuel island may be a source of petroleum hydrocarbons in ground water in addition to the former USTs.

TEPH detected in samples from downgradient wells MW-1 and MW-7 were quantitated by Sequoia as non-diesel mixtures. TEPH detected in samples from each of the remaining downgradient wells (MW-2 and MW-6) and upgradient wells (MW-3 and MW-4) were quantitated as both diesel and non-diesel mixtures. These results appear to indicate that a large proportion of extractable petroleum hydrocarbons in ground water at the site are actually weathered gasoline.

Evaluation of current data presented in Table 2 demonstrates that the volatile fraction of petroleum hydrocarbons (TPHg, benzene, and toluene) has generally declined in wells MW-1 and MW-2 since the previous sampling event (September 1993), whereas the less volatile fraction (ethylbenzene, total xylenes, and TEPH) has increased in those wells over the same interval. Concentrations of petroleum hydrocarbons detected in upgradient wells MW-3 and MW-4 show modest increases over the interval, but are significantly lower than those observed in downgradient wells. Downgradient wells MW-6 and MW-7 show dramatic increases in concentrations of all petroleum hydrocarbon fractions over the interval. Ground water was not sampled from well MW-5 due to the presence of free phase product.

3.3 Quality Assurance Sample

A trip blank collected by ESE (Trip; Table 2), preserved with the remaining samples and analyzed for BTEX reported nondetectable concentrations of those constituents. The trip blank is a quality control sample collected as a check on ESE's sample handling and transport procedures. The results indicate that ESE's sample handling and transport procedures did not result in sample cross-contamination.

4.0 CONCLUSIONS

- The general direction of ground water flow beneath the site is to the north-northeast, which will be the generally preferred direction of migration for dissolved petroleum hydrocarbons in ground water.

- Ground water in all monitoring locations at the site has been impacted with petroleum hydrocarbons. The highest concentrations of hydrocarbons, primarily in the gasoline and apparent weathered gasoline ranges, occur in wells downgradient from the former USTs and fuel island at the site.

- Although a large proportion of petroleum hydrocarbons in ground water samples appears to be weathered gasoline, high concentrations of volatile hydrocarbons (TPHg, benzene, and toluene), as well as free product in well MW-5, indicate that the release is relatively recent.

- Free phase product present during the Fourth Quarter 1993 in well MW-5 indicates that the former fuel island, located directly upgradient from the well, is a possible source of petroleum hydrocarbons in addition to the former USTs.

- The increase in petroleum hydrocarbon concentrations in wells along the downgradient margin of the site indicates that there is a high probability of offsite migration of dissolved (and possibly free phase) petroleum hydrocarbons in ground water. As yet, characterization of petroleum hydrocarbons in ground water downgradient and offsite has not been performed.

5.0 REFERENCES

Alameda County Health Care Services Agency, Department of Environmental Health, 1992, Written Communication to Mr. Wayne Chun, December 30, 1992.

Environmental Science & Engineering, Inc. (ESE), 1992, Workplan for Preliminary Site Assessment at Bill Chun Service Station located at 2301 Santa Clara Avenue, Alameda, California; Prepared for Alameda County Health Care Services Agency, Department of Environmental Health, December 16, 1992.

___, 1993a, Report on Preliminary Site Assessment at the Former Bill Chun Texaco Service, 2301 Santa Clara Avenue, Alameda, Alameda County, California: Prepared for Mr. Wayne Chun, March 31, 1993.

___, 1993b, Workplan for Remedial Investigation, Former Bill Chun's Service Station, 2301 Santa Clara Avenue, Alameda, Alameda County, California: Prepared for Alameda County Health Care Services Agency, Department of Environmental Health, August 24, 1993.

Parker Environmental Services (Parker), 1992, Underground Tank Removal Soil Sampling and Analysis Report, Letter Report to Mr. Jim Brinker, Burnabe & Brinker, Oakland, California, August 4, 1992.

___, 1993, Personal Communication with James D. Parker, September 22, 1993

United States Geological Survey (USGS), 1959 (Photorevised 1980), Oakland East Quadrangle, 7.5-Minute Series (Topographic), Scale: 1 = 24,000.

TABLE 1

HISTORICAL GROUND WATER ELEVATION DATA

Former Bill Chun Service Center
2301 Santa Clara Avenue
Alameda, California

Well	Date	Datum (ft. AMSL)	Depth to Water	Depth to Product	Product Thickness	Corrected Ground Water Elevation (ft. AMSL)
MW-1	12/07/93	28.53	9.66	NP	--	18.87
	11/16/93		9.89	NP	--	18.64
	09/07/93		9.63	NP	--	18.90
	01/07/93		8.87	NP	--	19.66*
MW-2	12/07/93	28.51	9.54	NP	--	18.97
	11/16/93		9.73	NP	--	18.78
	09/07/93		9.52	NP	--	18.99
	01/07/93		8.78	NP	--	19.73*
MW-3	12/07/93	28.82	9.60	NP	--	19.22
	11/16/93		9.82	NP	--	19.00
	09/07/93		9.62	NP	--	19.20
	01/07/93		8.86	NP	--	19.96*
MW-4	12/07/93	28.57	9.42	NP	--	19.15
	11/16/93		9.60	NP	--	18.97
	09/07/93		9.39	NP	--	19.18
MW-5	12/07/93	28.37	9.88	9.27	0.61	18.99
	11/16/93		9.99	9.45	0.54	18.82
	09/07/93		9.31	NP	--	19.06
MW-6	12/07/93	28.41	9.58	NP	--	18.83
	11/16/93		9.74	NP	--	18.67
	09/07/93		9.53	NP	--	18.88
MW-7	12/07/93	28.56	9.58	NP	--	18.98
	11/16/93		9.86	NP	--	18.70
	09/07/93		9.61	NP	--	18.95

NOTES:

ft. AMSL = Feet Above Mean Sea Level
NP = No free product observed
* = Elevation corrected to reflect standardization of survey data

f:\6935112\Table.1

TABLE 2

HISTORICAL ANALYTICAL RESULTS FOR GROUND WATER SAMPLES

Former Bill Chun Service Center
2301 Santa Clara Avenue
Alameda, California

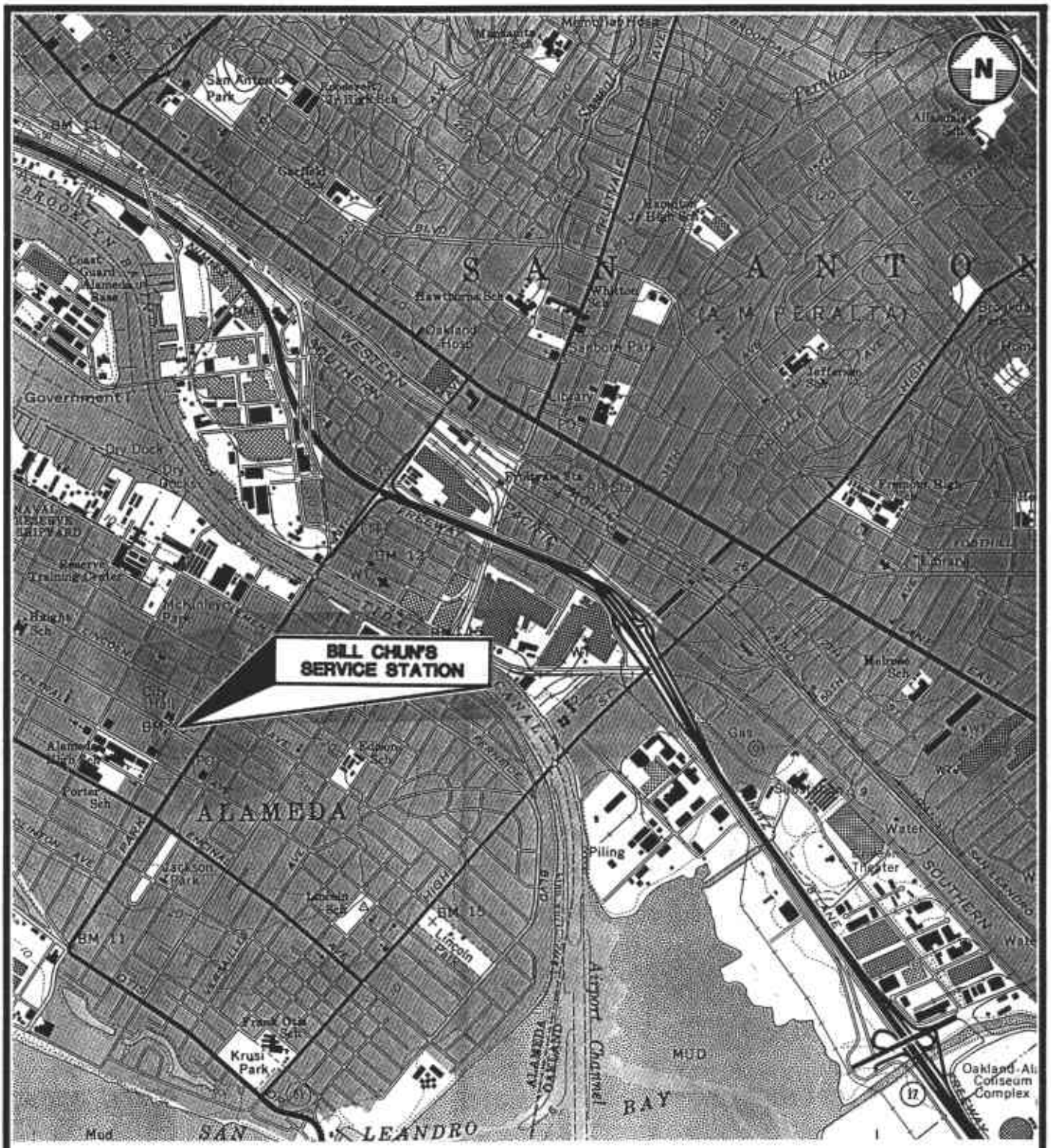
Analytical Results (in µg/L)

Well	Date	TPH-g	Benzene	Toluene	Ethylbenzene	Total Xylenes	TEPH
MW-1	12/07/93	17,000	10,000	3,000	610	2,000	1,800 (1)
	09/07/93	28,000	11,000	2,100	380	1,200	1,000 (2)
	01/07/93	110,000	14,000	17,000	2,500	8,800	ND<3,000
MW-2	12/07/93	86,000	28,000	17,000	35,000	16,000	8,200 (2)
	09/07/93	140,000	46,000	28,000	3,300	15,000	8,200 (2)
	01/07/93	85,000	20,000	8,500	1,500	4,300	ND<3,000
MW-3	12/07/93	3,000	17	43	13	28	520 (2)
	09/07/93	2,800	19	46	7.7	23	2,500 (1)
	01/07/93	8,500 (3)	170	70	ND<30	ND<30	ND<3,000
MW-4	12/07/93	610	6.6	ND<0.5	0.61	2.5	460 (2)
	09/07/93	440	2.7	1.2	1	1.9	330 (2)
MW-5	12/07/93	NS	NS	NS	NS	NS	NS
	09/07/93	37,000	2,700	1,700	870	4,600	1,700 (2)
MW-6	12/07/93	17,000	4,300	1,200	600	2,700	2,400 (2)
	09/07/93	10,000	1,300	540	370	1,600	1,400 (2)
MW-7	12/07/93	95,000	28,000	24,000	1,600	8,700	2,200 (1)
	09/07/93	24,000	6,800	4,800	490	2,300	1,300 (1)

NOTES:

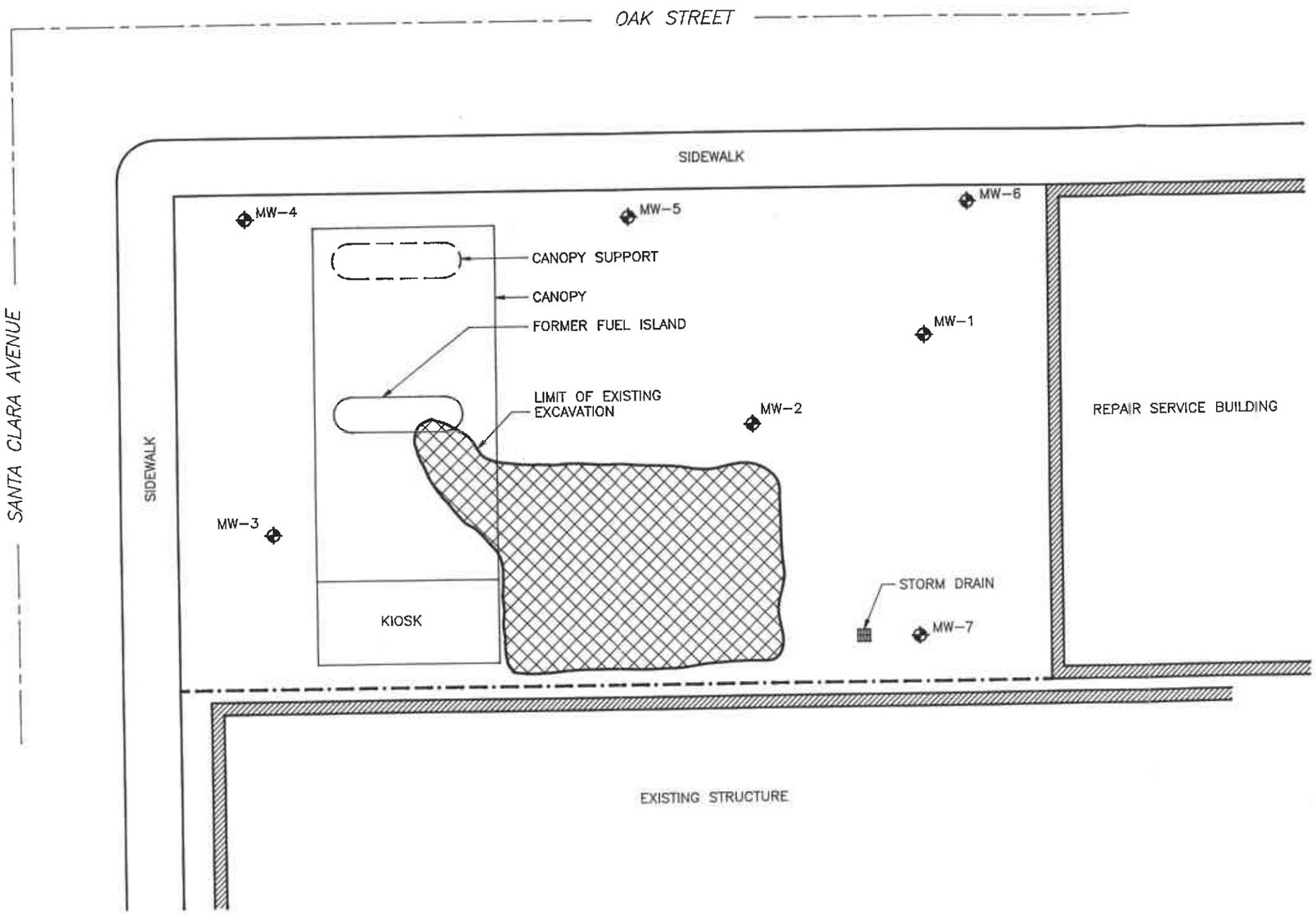
TPH-g = Total Petroleum Hydrocarbons as Gasoline
µg/L = Micrograms per liter or parts per billion (ppb)
TEPH = Total Extractable Petroleum Hydrocarbons
NS = Not Sampled - Free Product present
ND = Not Detected
< = Less than listed quantitation limit
(1) = Quantitated as a non-diesel mixture (<C16)
(2) = Quantitated as a diesel and non-diesel mixture (<C16)
(3) = Quantitated as weathered gasoline

f:\6935112\Table.2



ADAPTED FROM U.S.G.S. OAKLAND EAST 7.5 MINUTE TOPOGRAPHIC QUADRANGLE MAP, 1959, PHOTOREVISED 1980.

ESE A DILORP Company — Environmental Science & Engineering, Inc.	DATE 8/93	LOCATION MAP	FIGURE NO. 1
4090 NELSON AVENUE, SUITE J CONCORD, CA 94520	REVISED	BILL CHUN'S SERVICE STATION 2301 SANTA CLARA AVENUE ALAMEDA, CALIFORNIA	
	CAD FILE 51121001		PROJ. NO. 6-93-5112



LEGEND

- EXISTING MONITORING WELL LOCATION
- PROPERTY BOUNDARY

SCALE
0 10 FEET

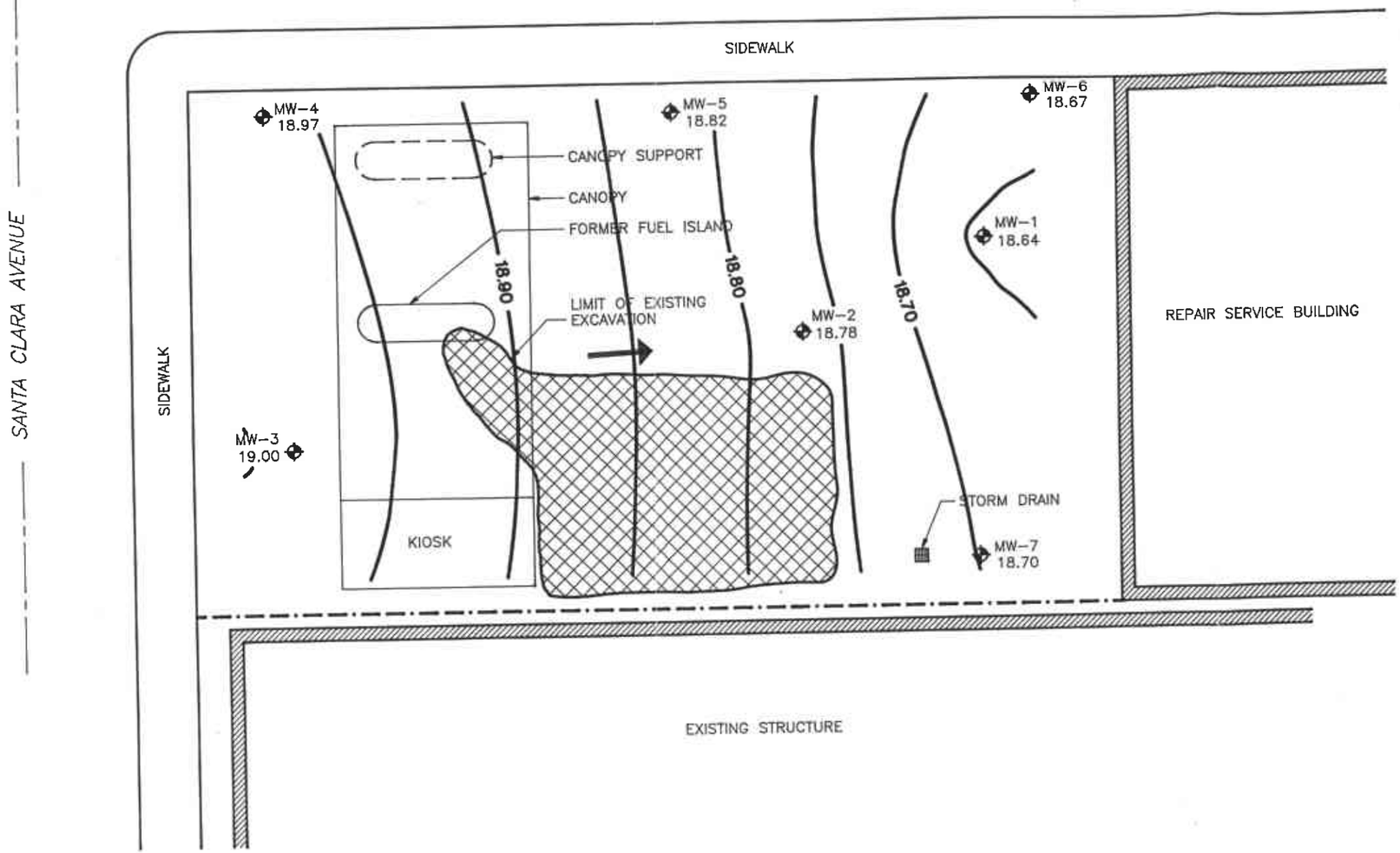
Environmental Science & Engineering, Inc.
A CELCORP Company
4090 NELSON AVENUE, SUITE J
CONCORD, CA 94520

DATE 8/93
REVISED 9/93 MEQ
CAD FILE 51121002

SITE MAP

BILL CHUN'S SERVICE STATION
2301 SANTA CLARA AVENUE
ALAMEDA, CALIFORNIA

FIGURE NO. 2
PROJ. NO. 6-93-5112



LEGEND

- EXISTING MONITORING WELL LOCATION
- PROPERTY BOUNDARY
- 18.97 GROUND WATER ELEVATION IN FEET ABOVE MEAN SEA LEVEL (MSL)
- 18.80 GROUND WATER ELEVATION CONTOUR IN FEET ABOVE MSL
- APPROXIMATE DIRECTION OF GROUND WATER FLOW

SCALE
0 10 FEET

CONTOUR INTERVAL = 0.05 FEET

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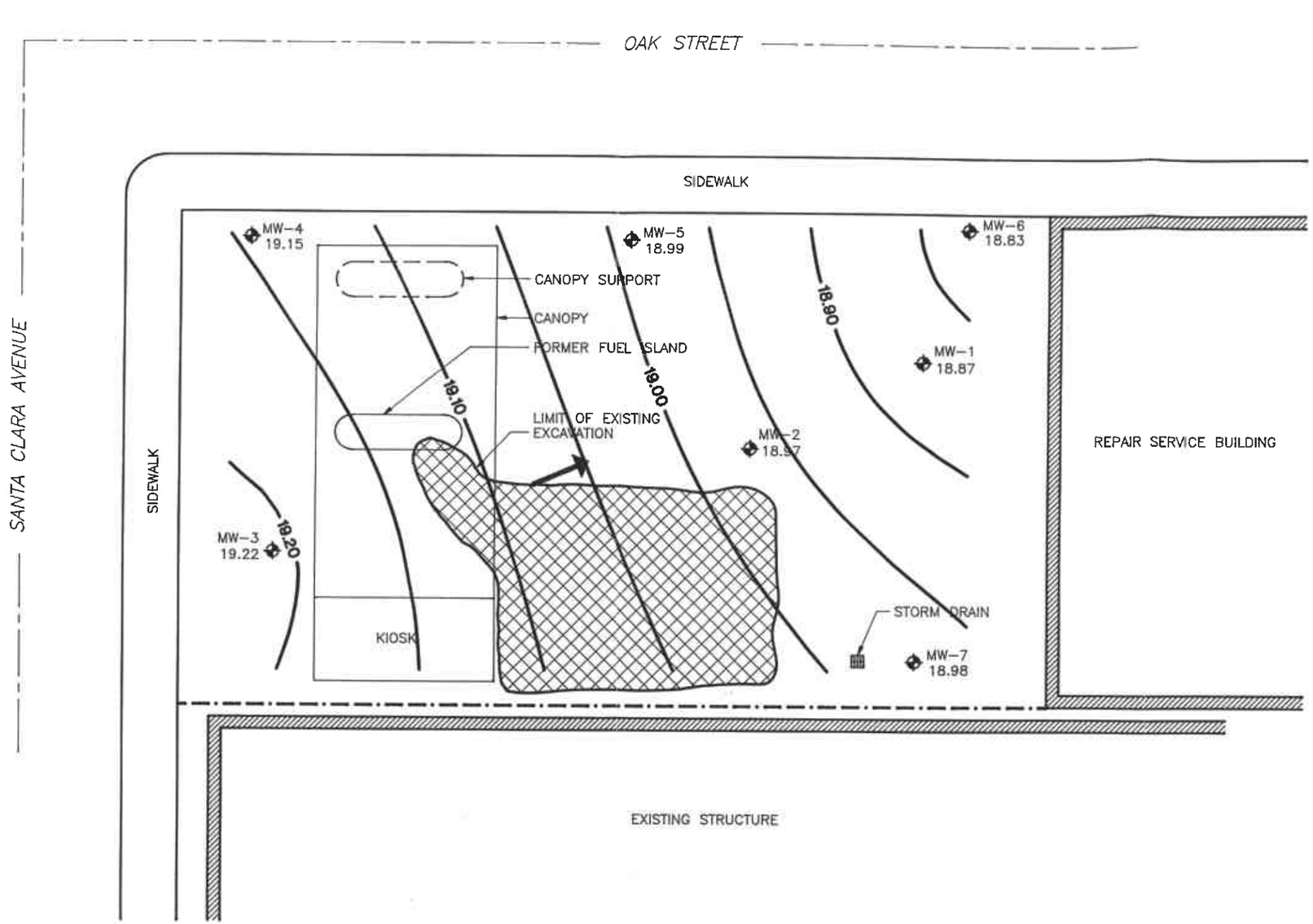
Environmental Science & Engineering, Inc.
4090 NELSON AVENUE, SUITE J
CONCORD, CA 94520

DATE 9/93
REVISED 1/94 MEQ
CAD FILE 51121003

GROUND WATER ELEVATIONS
NOVEMBER 16, 1993

BILL CHUN'S SERVICE STATION
2301 SANTA CLARA AVENUE
ALAMEDA, CALIFORNIA

FIGURE NO. 3
PROJ. NO. 6-93-5112



LEGEND

- ◆ EXISTING MONITORING WELL LOCATION
- PROPERTY BOUNDARY
- 18.97 GROUND WATER ELEVATION IN FEET ABOVE MEAN SEA LEVEL (MSL)
- 19.00 GROUND WATER ELEVATION CONTOUR IN FEET ABOVE MSL
- APPROXIMATE DIRECTION OF GROUND WATER FLOW

SCALE
0 10 FEET

CONTOUR INTERVAL = 0.05 FEET

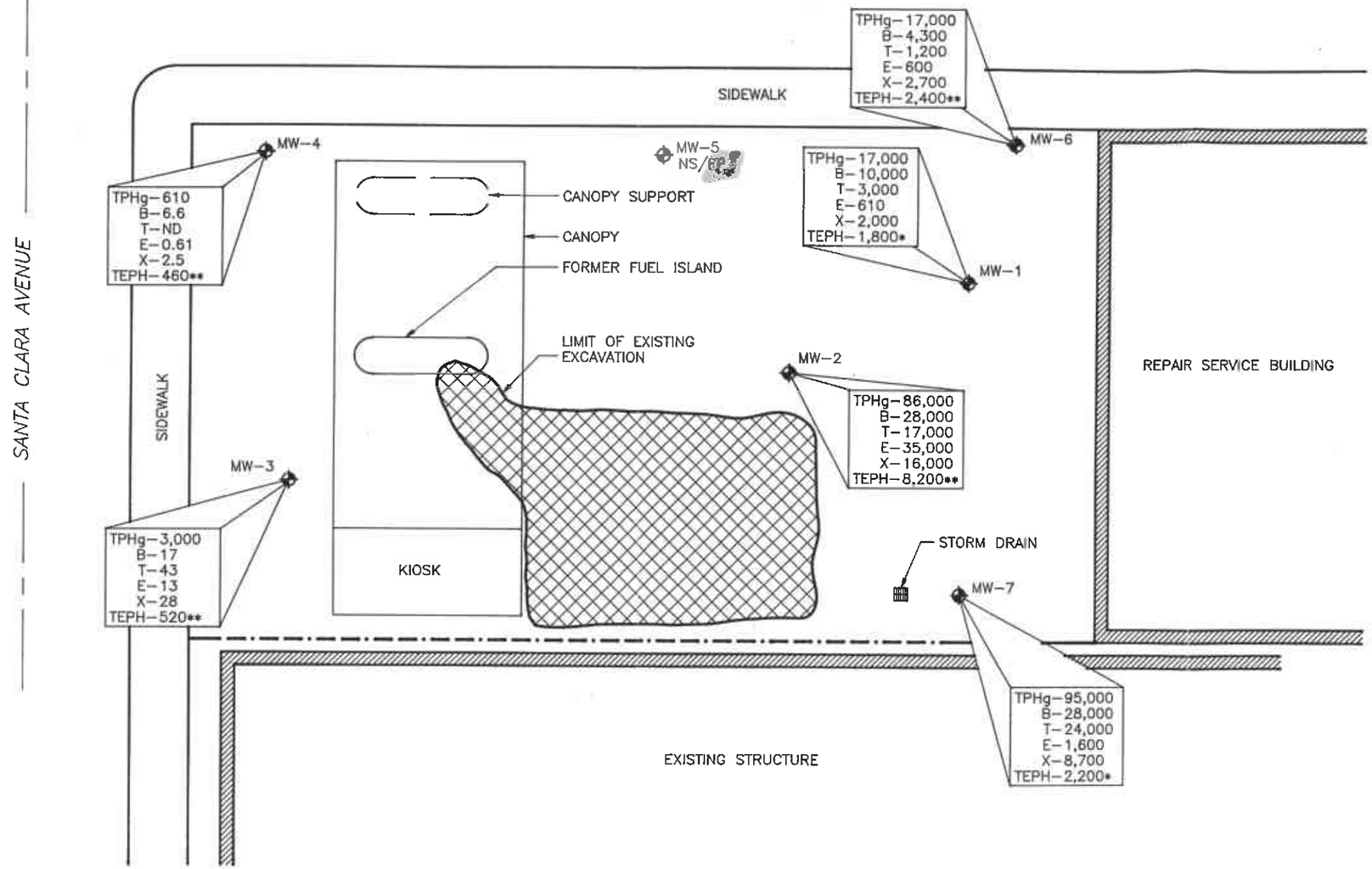
ESE Environmental Science & Engineering, Inc.
A CLCORP Company
4090 NELSON AVENUE, SUITE J
CONCORD, CA 94520

DATE 9/93
REVISED 1/94 MEQ
CAD FILE 51121003

GROUND WATER ELEVATIONS
DECEMBER 7, 1993

BILL CHUN'S SERVICE STATION
2301 SANTA CLARA AVENUE
ALAMEDA, CALIFORNIA

FIGURE NO. 4
PROJ. NO. 6-93-5112



LEGEND

- EXISTING MONITORING WELL LOCATION
- PROPERTY BOUNDARY

TPHg	TOTAL PETROLEUM HYDROCARBONS AS GASOLINE (ppb)
B	BENZENE (ppb)
T	TOLUENE (ppb)
E	ETHYLBENZENE (ppb)
X	XYLENES (ppb)
TEPH	TOTAL EXTRACTABLE PETROLEUM HYDROCARBONS (ppb)
NS/FP	NOT SAMPLED/FREE PRODUCT PRESENT
*	QUANTITATED BY SEQUOIA AS A NON-DIESEL MIXTURE (<C16)
**	QUANTITATED BY SEQUOIA AS A DIESEL AND NON-DIESEL MIXTURE (<C16)

SCALE
0 10 FEET

ESE A CELCORP Company
Environmental Science & Engineering, Inc.
4090 NELSON AVENUE, SUITE J
CONCORD, CA 94520

DATE 1/94
REVISED
CAD FILE 51121008

CONCENTRATIONS OF PETROLEUM HYDROCARBONS IN GROUND WATER
DECEMBER 7, 1993

BILL CHUN'S SERVICE STATION
2301 SANTA CLARA AVENUE
ALAMEDA, CALIFORNIA

FIGURE NO. 5
PROJ. NO. 6-93-5112

APPENDIX A

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

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 B

SAMPLE DATA SHEETS

Environmental Science & Engineering, Inc.
A CRCORP Company

SAMPLE COLLECTION LOG

PROJECT NAME: WAYNE CHUN - ALAMEDA
PROJECT NO.: 6-93-5112
DATE: DEC. 7, 1993

SAMPLE LOCATION I.D.: MW-1
SAMPLER: CHRIS VALCHEFF
PROJECT MANAGER: MIKE QUILLIN

CASING DIAMETER

2" X
4" ____
Other ____

SAMPLE TYPE

Ground Water X
Surface Water ____
Treat. Influent ____
Treat. Effluent ____
Other ____

WELL VOLUMES PER UNIT

Well Casing I.D. (inches)	Gal/Ft.
2.0	0.1632
4.0	0.6528
6.0	1.4690

DEPTH TO PRODUCT: — (ft.)
DEPTH TO WATER: 9.66 (ft.)
DEPTH OF WELL: 19.40 (ft.)

PRODUCT THICKNESS: — (ft.)
WATER COLUMN: 9.74 (ft.)
WELL CASING VOLUME: 1.59 (gal)

MINIMUM PURGE VOLUME
(3)or # WCV): 4.77 (gal)
ACTUAL VOLUME PURGED: 6.00 (gal)

TIME	Volume (GAL)	pH (Units)	E.C. (Micromhos)	Temperature (F°)	Turbid. (NTU)	Other
1113	0	7.64	0.66	67.6	—	TRANSLUCENT/ODOR
1115	2	6.75	0.68	69.0	—	"
1117	4	6.64	0.66	69.0	—	"
1119	6	6.71	0.58	69.4	—	"

INSTRUMENT CALIBRATION

pH/COND./TEMP.: TYPE HYDAC UNIT# 9308A DATE: 12-7-93 TIME: 0800 BY: CHV
TURBIDITY: TYPE ____ UNIT# ____ DATE: ____ TIME: ____ BY: ____

PURGE METHOD

___Displacement Pump
___Bailer (Teflon/PVC/SS)
___Other
X Submersible Pump

SAMPLE METHOD

___Bailer (Teflon/PVC/SS)
X Bailer (Disposable)
___Dedicated
___Other

SAMPLES COLLECTED

	ID	TIME	DATE	LAB	ANALYSES
SAMPLE	MW-1	1230	12-7-93	SEQUOIA	TPH-G/BTEX/TPH-D
DUPLICATE					
SPLIT					
FIELD BLANK					

COMMENTS: ____

SAMPLER: Chris Valcheff PROJECT MANAGER ____

4080 Nelson Avenue, Suite J Concord, CA 94520 Phone (510) 685-4053 Fax (510) 685-5323

Environmental Science & Engineering, Inc.
A CILCORP Company

SAMPLE COLLECTION LOG

PROJECT NAME: WAYNE CHUN - ALAMEDA
PROJECT NO.: 6-93-5112
DATE: DEC. 7, 1993

SAMPLE LOCATION I.D.: MW-2
SAMPLER: CHRIS VALCHEFF
PROJECT MANAGER: MIKE QUILLIN

CASING DIAMETER

2" X
4" ____
Other ____

SAMPLE TYPE

Ground Water X
Surface Water ____
Treat. Influent ____
Treat. Effluent ____
Other ____

WELL VOLUMES PER UNIT

Well Casing I.D. (inches)	Gal/Ft.
2.0	0.1632
4.0	0.6528
6.0	1.4690

DEPTH TO PRODUCT: — (ft.)
DEPTH TO WATER: 9.54 (ft.)
DEPTH OF WELL: 20.91 (ft.)

PRODUCT THICKNESS: — (ft.)
WATER COLUMN: 11.37 (ft.)
WELL CASING VOLUME: 1.86 (gal)

MINIMUM PURGE VOLUME
(3) or 4 WCV): 5.57 (gal)
ACTUAL VOLUME PURGED: 6.00 (gal)

TIME	Volume (GAL)	pH (Units)	E.C. (x1000 Micromhos)	Temperature (F°)	Turbid. (NTU)	Other
1144	0	6.88	0.94	66.6	—	GREY/GREEN/ODOR
1146	2	6.54	0.99	68.0	—	TRANS/ODOR
1148	4	6.50	1.01	68.4	—	"
1150	6	6.43	1.01	68.9	—	"

INSTRUMENT CALIBRATION

pH/COND./TEMP.:	TYPE HYDAC	UNIT# 9308A	DATE: 12-7-93	TIME: 0800	BY: CHV
TURBIDITY:	TYPE ____	UNIT# ____	DATE: ____	TIME: ____	BY: ____

PURGE METHOD

___Displacement Pump
___Bailer (Teflon/PVC/SS)
___Other
X Submersible Pump

SAMPLE METHOD

___Bailer (Teflon/PVC/SS)
X Bailer (Disposable)
___Dedicated
___Other

SAMPLES COLLECTED

	ID	TIME	DATE	LAB	ANALYSES
SAMPLE	MW-2	1240	12-7-93	SEQUOIA	TPH-G/BTEX/TPH-D
DUPLICATE					
SPLIT					
FIELD BLANK					

COMMENTS: ____

SAMPLER: C. H. Valcheff PROJECT MANAGER ____

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Environmental Science & Engineering, Inc.
A CILCORP Company

SAMPLE COLLECTION LOG

PROJECT NAME: WAYNE CHUN - ALAMEDA
PROJECT NO.: 6-93-5112
DATE: DEC. 7, 1993

SAMPLE LOCATION I.D.: MW-3
SAMPLER: CHRIS VALCHEFF
PROJECT MANAGER: MIKE QUILLIN

CASING DIAMETER

2" X
4" ____
Other ____

SAMPLE TYPE

Ground Water X
Surface Water ____
Treat. Influent ____
Treat. Effluent ____
Other ____

WELL VOLUMES PER UNIT

Well Casing I.D. (Inches)	Gal/Ft.
2.0	0.1632
4.0	0.6528
6.0	1.4690

DEPTH TO PRODUCT: — (ft.)
DEPTH TO WATER: 9.60 (ft.)
DEPTH OF WELL: 20.79 (ft.)

PRODUCT THICKNESS: — (ft.)
WATER COLUMN: 11.19 (ft.)
WELL CASING VOLUME: 1.83 (gal)

MINIMUM PURGE VOLUME
(3 or 4 WCV): 5.48 (gal)
ACTUAL VOLUME PURGED: 6.00 (gal)

TIME	Volume (GAL)	pH (Units)	E.C. x1000 (Micromhos)	Temperature (F°)	Turbid. (NTU)	Other
1027	0	7.78	0.57	63.5	—	BLACK
1029	2	6.96	0.51	67.1	—	TRANSLUCENT
1031	4	6.72	0.51	68.8	—	TRANSLUCENT
1033	6	6.60	0.50	69.2	—	"

INSTRUMENT CALIBRATION

pH/COND./TEMP.: TYPE HYDAC UNIT# 9308A DATE: 12-7-93 TIME: 0800 BY: CHV
TURBIDITY: TYPE ____ UNIT# ____ DATE: ____ TIME: ____ BY: ____

PURGE METHOD

___Displacement Pump
___Bailer (Teflon/PVC/SS)
___Other
X Submersible Pump

SAMPLE METHOD

___Bailer (Teflon/PVC/SS)
X Bailer (Disposable)
___Dedicated
___Other

SAMPLES COLLECTED

	ID	TIME	DATE	LAB	ANALYSES
SAMPLE	MW-3	1215	12-7-93	SEQUOIA	TPH-G/BTEX/TPH-D
DUPLICATE					
SPLIT					
FIELD BLANK					

COMMENTS: ____

SAMPLER: C. H. Valcheff PROJECT MANAGER ____

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Environmental Science & Engineering, Inc.
A CILCORP Company

SAMPLE COLLECTION LOG

PROJECT NAME: WAYNE CHUN - ALAMEDA
PROJECT NO.: 6-93-5112
DATE: DEC. 7, 1993

SAMPLE LOCATION I.D.: MW-4
SAMPLER: CHRIS VALCHEFF
PROJECT MANAGER: MIKE QUILLIN

CASING DIAMETER

2" X
4" ____
Other ____

SAMPLE TYPE

Ground Water X
Surface Water ____
Treat. Influent ____
Treat. Effluent ____
Other ____

WELL VOLUMES PER UNIT

Well Casing I.D. (inches)	Gal/Ft.
2.0	0.1632
4.0	0.6528
6.0	1.4690

DEPTH TO PRODUCT: — (ft.)
DEPTH TO WATER: 9.42 (ft.)
DEPTH OF WELL: 22.24 (ft.)

PRODUCT THICKNESS: — (ft.)
WATER COLUMN: 12.82 (ft.)
WELL CASING VOLUME: 2.09 (gal)

MINIMUM PURGE VOLUME (3 or 4 WCV): 6.28 (gal)
ACTUAL VOLUME PURGED: 7.00 (gal)

TIME	Volume (GAL)	pH (Units)	E.C. (x1000 Micromhos)	Temperature (F°)	Turbid. (NTU)	Other
1037	0	11.12	0.86	64.7	—	TRANSLUCENT
1039	2	11.34	0.85	67.6	—	"
1041	4	11.30	0.77	68.7	—	"
1043	6	11.28	0.73	69.8	—	"

INSTRUMENT CALIBRATION

pH/COND./TEMP.: TYPE HYDAC UNIT# 9308A DATE: 12-7-93 TIME: 0800 BY: CHV
TURBIDITY: TYPE ____ UNIT# ____ DATE: ____ TIME: ____ BY: ____

PURGE METHOD

___ Displacement Pump
___ Bailer (Teflon/PVC/SS)
___ Other
X Submersible Pump

SAMPLE METHOD

___ Bailer (Teflon/PVC/SS)
X Bailer (Disposable)
___ Dedicated
___ Other

SAMPLES COLLECTED

	ID	TIME	DATE	LAB	ANALYSES
SAMPLE	MW-4	1220	12-7-93	SEQUOIA	TPH-G/BTEX/TPH-D
DUPLICATE					
SPLIT					
FIELD BLANK					

COMMENTS: ____

SAMPLER: C. H. Valcheff PROJECT MANAGER ____

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Environmental Science & Engineering, Inc.
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SAMPLE COLLECTION LOG

PROJECT NAME: WAYNE CHUN - ALAMEDA
PROJECT NO.: 6-93-5112
DATE: DEC. 7, 1993

SAMPLE LOCATION I.D.: MW-5
SAMPLER: CHRIS VALCHEFF
PROJECT MANAGER: MIKE QUILLIN

CASING DIAMETER

2" X
4" ____
Other ____

SAMPLE TYPE

Ground Water X
Surface Water ____
Treat. Influent ____
Treat. Effluent ____
Other ____

WELL VOLUMES PER UNIT

Well Casing I.D. (inches)	Gal/Ft.
2.0	0.1632
4.0	0.6528
6.0	1.4690

DEPTH TO PRODUCT: 9.27 (ft.)
DEPTH TO WATER: 9.88 (ft.)
DEPTH OF WELL: 21.13 (ft.)

PRODUCT THICKNESS: 0.61 (ft.)
WATER COLUMN: 11.25 (ft.)
WELL CASING VOLUME: 1.84 (gal)

MINIMUM PURGE VOLUME (3 or 4 WCV): 5.51 (gal)
ACTUAL VOLUME PURGED: — (gal)

TIME	Volume (GAL)	pH (Units)	E.C. (Micromhos)	Temperature (F°)	Turbid. (NTU)	Other

INSTRUMENT CALIBRATION

pH/COND./TEMP.:	TYPE HYDAC	UNIT# 9308A	DATE: 12-7-93	TIME: 0800	BY: CHV
TURBIDITY:	TYPE ____	UNIT# ____	DATE: ____	TIME: ____	BY: ____

PURGE METHOD

___Displacement Pump
___Bailer (Teflon/PVC/SS)
___Other
X Submersible Pump

SAMPLE METHOD

___Bailer (Teflon/PVC/SS)
X Bailer (Disposable)
___Dedicated
___Other

SAMPLES COLLECTED

	ID	TIME	DATE	LAB	ANALYSES
SAMPLE	NONE TAKEN		12-7-93	SEQUOIA	TPH-G/BTEX/TPH-D
DUPLICATE					
SPLIT					
FIELD BLANK					

COMMENTS: NO SAMPLE - PRODUCT

SAMPLER: _____ PROJECT MANAGER

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Environmental Science & Engineering, Inc.
A CILCORP Company

SAMPLE COLLECTION LOG

PROJECT NAME: WAYNE CHUN - ALAMEDA
PROJECT NO.: 6-93-5112
DATE: DEC. 7, 1993

SAMPLE LOCATION I.D.: MW-6
SAMPLER: CHRIS VALCHEFF
PROJECT MANAGER: MIKE QUILLIN

CASING DIAMETER

2" X
4" ____
Other ____

SAMPLE TYPE

Ground Water X
Surface Water ____
Treat. Influent ____
Treat. Effluent ____
Other ____

WELL VOLUMES PER UNIT

Well Casing I.D. (inches)	Gal/Ft.
2.0	0.1632
4.0	0.6528
6.0	1.4690

DEPTH TO PRODUCT: — (ft.)
DEPTH TO WATER: 9.58 (ft.)
DEPTH OF WELL: 17.58 (ft.)

PRODUCT THICKNESS: — (ft.)
WATER COLUMN: 8.00 (ft.)
WELL CASING VOLUME: 1.31 (gal)

MINIMUM PURGE VOLUME (3 or 4 WCV): 3.92 (gal)
ACTUAL VOLUME PURGED: 4 (gal)

TIME	Volume (GAL)	pH (Units)	E.C. (X1000 Micromhos)	Temperature (F°)	Turbid. (NTU)	Other
1133	0	7.73	0.77	66.6	—	TRANS/ODOR
1135	2	7.00	0.79	68.6	—	"
1137	4	6.77	0.86	69.9	—	"
	6					

INSTRUMENT CALIBRATION

pH/COND./TEMP.: TYPE HYDAC UNIT# 9308A DATE: 12-7-93 TIME: 0800 BY: CHV
TURBIDITY: TYPE ____ UNIT# ____ DATE: ____ TIME: ____ BY: ____

PURGE METHOD

___Displacement Pump
___Bailer (Teflon/PVC/SS)
___Other
X Submersible Pump

SAMPLE METHOD

___Bailer (Teflon/PVC/SS)
X Bailer (Disposable)
___Dedicated
___Other

SAMPLES COLLECTED

SAMPLE	ID	TIME	DATE	LAB	ANALYSES
DUPLICATE	MW-6	1300	12-7-93	SEQUOIA	TPH-G/BTEX/TPH-D
SPLIT					
FIELD BLANK					

COMMENTS: ____

SAMPLER: Chris H. Valcheff PROJECT MANAGER

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Environmental Science & Engineering, Inc.
A CILCORP Company

SAMPLE COLLECTION LOG

PROJECT NAME: WAYNE CHUN - ALAMEDA
PROJECT NO.: 6-93-5112
DATE: DEC. 7, 1993

SAMPLE LOCATION I.D.: MW-7
SAMPLER: CHRIS VALCHEFF
PROJECT MANAGER: MIKE QUILLIN

CASING DIAMETER

2" X
4" ____
Other ____

SAMPLE TYPE

Ground Water X
Surface Water ____
Treat. Influent ____
Treat. Effluent ____
Other ____

WELL VOLUMES PER UNIT

Well Casing I.D. (inches)	Gal/Ft.
2.0	0.1632
4.0	0.6528
6.0	1.4690

DEPTH TO PRODUCT: — (ft.)
DEPTH TO WATER: 9.58 (ft.)
DEPTH OF WELL: 22.06 (ft.)

PRODUCT THICKNESS: — (ft.)
WATER COLUMN: 12.48 (ft.)
WELL CASING VOLUME: 2.04 (gal)

MINIMUM PURGE VOLUME (3 or 4 WCV): 6.11 (gal)
ACTUAL VOLUME PURGED: 6.50 (gal)

TIME	Volume (GAL)	pH (Units)	E.C. (Micromhos)	Temperature (F°)	Turbid. (NTU)	Other
1054	0	8.45	0.45	64.2	—	TRANSLUCENT/ODOR
1056	2	7.79	0.49	65.4	—	LT. BROWN/ODOR
1058	4	7.37	0.47	66.2	—	"
1100	6	7.15	0.49	66.5	—	"

INSTRUMENT CALIBRATION

pH/COND./TEMP.:	TYPE HYDAC	UNIT# 9308A	DATE: 12-7-93	TIME: 0800	BY: CHV
TURBIDITY:	TYPE ____	UNIT# ____	DATE: ____	TIME: ____	BY: ____

PURGE METHOD

___Displacement Pump
___Bailer (Teflon/PVC/SS)
___Other
X Submersible Pump

SAMPLE METHOD

___Bailer (Teflon/PVC/SS)
X Bailer (Disposable)
___Dedicated
___Other

SAMPLES COLLECTED

	ID	TIME	DATE	LAB	ANALYSES
SAMPLE	MW-7	1310	12-7-93	SEQUOIA	TPH-G/BTEX/TPH-D
DUPLICATE					
SPLIT					
FIELD BLANK					

COMMENTS: ____

SAMPLER: Chris H. Valcheff
PROJECT MANAGER

4990 Nelson Avenue, Suite I Concord, CA 94520 Phone (510) 685-4053 Fax (510) 685-5323

APPENDIX C

ANALYTICAL RESULTS AND CHAIN OF CUSTODY DOCUMENTATION FOR GROUND WATER SAMPLES

SEQUOIA ANALYTICAL

1900 Bates Avenue • Suite LM • Concord, California 94520
(510) 686-9600 • FAX (510) 686-9689

Environmental Science & Engineering, Inc.	Client Project ID:	Wayne Chun - Alameda / 6-93-5112	Sampled:	Dec 7, 1993
4090 Nelson Ave., Ste J	Sample Matrix:	Water	Received:	Dec 7, 1993
Concord, CA 94520	Analysis Method:	EPA 5030/8015/8020	Reported:	Dec 22, 1993
Attention: Mike Quillin	First Sample #:	312-0420		

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

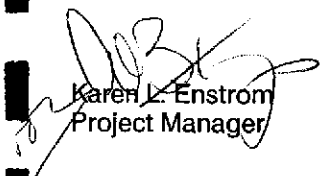
Analyte	Reporting Limit µg/L	Sample I.D. 312-0420 MW-1	Sample I.D. 312-0421 MW-2	Sample I.D. 312-0422 MW-3	Sample I.D. 312-0423 MW-4	Sample I.D. 312-0424 MW-6	Sample I.D. 312-0425 MW-7
Purgeable Hydrocarbons	50	17,000	86,000	3,000	610	17,000	95,000
Benzene	0.5	10,000	28,000	17	6.6	4,300	28,000
Toluene	0.5	3,000	17,000	43	N.D.	1,200	24,000
Ethyl Benzene	0.5	610	35,000	13	0.61	600	1,600
Total Xylenes	0.5	2,000	16,000	28	2.5	2,700	8,700
Chromatogram Pattern:		Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline

Quality Control Data

Report Limit Multiplication Factor:	50	200	1.0	1.0	1.0	400
Date Analyzed:	12/17/93	12/17/93	12/17/93	12/16/93	12/17/93	12/18/93
Instrument Identification:	HP-2	HP-2	HP-2	HP-4	HP-2	HP-4
Surrogate Recovery, %: (QC Limits = 70-130%)	103	106	380	290	108	98

Purgeable Hydrocarbons are quantitated against a fresh gasoline standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

SEQUOIA ANALYTICAL



Karen L. Enstrom
Project Manager

SEQUOIA ANALYTICAL

1900 Bates Avenue • Suite LM • Concord, California 94520
(510) 686-9600 • FAX (510) 686-9689

Environmental Science & Engineering, Inc.	Client Project ID:	Wayne Chun - Alameda / 6-93-5112	Sampled:	Dec 7, 1993
4090 Nelson Ave., Ste J	Sample Matrix:	Water	Received:	Dec 7, 1993
Concord, CA 94520	Analysis Method:	EPA 5030/8015/8020	Reported:	Dec 22, 1993
Attention: Mike Quillin	First Sample #:	312-0426		

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit µg/L	Sample I.D. 312-0426 Trip
Purgeable Hydrocarbons	50	N.D.
Benzene	0.5	N.D.
Toluene	0.5	N.D.
Ethyl Benzene	0.5	N.D.
Total Xylenes	0.5	N.D.
Chromatogram Pattern:		--

Quality Control Data

Report Limit Multiplication Factor:	1.0
Date Analyzed:	12/16/93
Instrument Identification:	HP-4
Surrogate Recovery, %: (QC Limits = 70-130%)	100

Purgeable Hydrocarbons are quantitated against a fresh gasoline standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

SEQUOIA ANALYTICAL

Karen L. Enstrom
Project Manager

SEQUOIA ANALYTICAL

1900 Bates Avenue • Suite LM • Concord, California 94520
(510) 686-9600 • FAX (510) 686-9689

Environmental Science & Engineering, Inc.	Client Project ID:	Wayne Chun - Alameda / 6-93-5112	Sampled:	Dec 7, 1993
4090 Nelson Ave., Ste J	Sample Matrix:	Water	Received:	Dec 7, 1993
Concord, CA 94520	Analysis Method:	EPA 3510/3520/8015	Reported:	Dec 22, 1993
Attention: Mike Quillin	First Sample #:	312-0420		

TOTAL EXTRACTABLE PETROLEUM HYDROCARBONS

Analyte	Reporting Limit µg/L	Sample I.D. 312-0420 MW-1	Sample I.D. 312-0421 MW-2	Sample I.D. 312-0422 MW-3	Sample I.D. 312-0423 MW-4	Sample I.D. 312-0424 MW-6	Sample I.D. 312-0425 MW-7
Extractable Hydrocarbons	50	1,800	8,200	520	460	2,400	2,200
Chromatogram Pattern:		Non-Diesel Mixture (<C16)	Diesel and Non-Diesel Mixture (<C16)	Diesel and Non-Diesel Mixture (<C16)	Diesel and Non-Diesel Mixture (<C16)	Diesel and Non-Diesel Mixture (<C16)	Non-Diesel Mixture (<C14)

Quality Control Data

Report Limit Multiplication Factor:	1.0	10	1.0	1.0	1.0	10
Date Extracted:	12/14/93	12/14/93	12/14/93	12/14/93	12/14/93	12/14/93
Date Analyzed:	12/17/93	12/17/93	12/17/93	12/17/93	12/17/93	12/17/93
Instrument Identification:	HP-3A	HP-3B	HP-3A	HP-3A	HP-3A	HP-3A

Extractable Hydrocarbons are quantitated against a fresh diesel standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

SEQUOIA ANALYTICAL

Karen L. Enstrom
Project Manager

SEQUOIA ANALYTICAL

1900 Bates Avenue • Suite LM • Concord, California 94520
(510) 686-9600 • FAX (510) 686-9689

Environmental Science & Engineering, Inc.
4090 Nelson Ave., Ste J
Concord, CA 94520
Attention: Mike Quillin

Client Project ID: Wayne Chun - Alameda / 6-93-5112
Matrix: Liquid

QC Sample Group: 3120420-26

Reported: Dec 22, 1993

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl Benzene	Xylenes	Diesel
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020	EPA 8015
Analyst:	A. Tuzon	A. Tuzon	A. Tuzon	A. Tuzon	K. Wimer
MS/MSD Batch#:	3120335	3120335	3120335	3120335	BLK121493
Date Prepared:	12/17/93	12/17/93	12/17/93	12/17/93	12/14/93
Date Analyzed:	12/17/93	12/17/93	12/17/93	12/17/93	12/17/93
Instrument I.D.#:	HP-2	HP-2	HP-2	HP-2	HP-3B
Conc. Spiked:	20 µg/L	20 µg/L	20 µg/L	60 µg/L	300 µg/L
Matrix Spike % Recovery:	95	100	100	100	99
Matrix Spike Duplicate % Recovery:	100	100	100	103	90
Relative % Difference:	4.9	0.0	0.0	3.0	8.8
LCS Batch#:	LCS121793	LCS121793	LCS121793	LCS121793	BLK121493
Date Prepared:	12/17/93	12/17/93	12/17/93	12/17/93	12/14/93
Date Analyzed:	12/17/93	12/17/93	12/17/93	12/17/93	12/17/93
Instrument I.D.#:	HP-2	HP-2	HP-2	HP-2	HP-3B
LCS % Recovery:	100	100	101	103	99
% Recovery Control Limits:	71-133	72-128	72-130	71-120	80-120

SEQUOIA ANALYTICAL

Karen L. Enstrom
Project Manager

Please Note:
The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

DATE Dec 7, 1993 PAGE 1 OF 1

CHAIN OF CUSTODY RECORD

PROJECT NAME Wayne Chun - Alameda

ADDRESS 2301 Santa Clara Ave.
Alameda, CA

PROJECT NO. 6-93-5112

SAMPLED BY Chris Valcheff

LAB NAME Sequoia Analytical

ESE Environmental Science & Engineering, Inc.
A GILCORP Company
4090 Nelson Avenue
Suite J
Concord, CA 94520
Phone (510) 685-4053
Fax (510) 685-5323

SAMPLE #	DATE	TIME	LOCATION	TPH-G	BTEX	TPH-D							MATRIX	NUMBER OF CONTAINERS	REMARKS (CONTAINER, SIZE, ETC.)
				ANALYSES TO BE PERFORMED									MATRIX		
MW-1	12-7-93	1230	Alameda	X	X	X							Water	3	2 VOAs & 1 LTR @1204 20 A.C
MW-2		1240		X	X	X								3	0421
MW-3		1215		X	X	X								3	0422
MW-4		1220		X	X	X								3	0423
MW-6		1300		X	X	X								3	0424
MW-7		1310		X	X	X								3	0425
TRIP					X									1	1 VOA @ 0420

RELINQUISHED BY: (signature)	RECEIVED BY: (signature)	date	time
1. Chris Valcheff		12-7-93	1520
2.			
3.			
4.			
5.			

19 TOTAL NUMBER OF CONTAINERS

REPORT RESULTS TO: Mike Quillin

SPECIAL SHIPMENT REQUIREMENTS: Cold Transport

SAMPLE RECEIPT

CHAIN OF CUSTODY SEALS

REC'D GOOD CONDTN/COLD

CONFORMS TO RECORD

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

Standard TAT

Lab supplied trip blank had bubble in it.