Chevron

September 22, 1993

Chevron U.S.A. Products Company
2410 Camino Ramon
San Ramon, CA 94583

Marketing Department
Phone 510 842 9500

Ms. Juliet Shin
Alameda County Health Care Services
Department of Environmental Health
80 Swan Way, Room 200
Oakland, CA 94621

Re: Former Chevron Service Station #9-2384
15526 Hesperian Boulevard, San Lorenzo, CA

Dear Ms. Shin:

Enclosed is the Additional Environmental Assessment Report dated September 3, 1993, prepared by our consultant Groundwater Technology, Inc. for the above referenced site. Three soil borings were advanced and completed as ground water monitor wells. This work was performed to determine the cross and down gradient extent of hydrocarbon impacts to ground water.

Soil samples collected from the drill cuttings were submitted to Superior Precision Analytical (Superior) laboratory for analysis. Concentrations of TPH-G and BTEX were below method detection limits for all samples analyzed.

Ground water samples were collected from all wells at the site and sent to Superior for analysis. Benzene was detected in monitor wells MW-2, MW-3, and MW-6 at concentrations of 45, 73, and 330 ppb, respectively. Depth to ground water was measured at approximately 11.4 to 12.1 feet below grade and the direction of flow is to the west.

The results of this investigation indicate that the dissolved hydrocarbon plume is not defined in the down gradient direction. Chevron will instruct its consultant to perform one more round of quarterly monitoring and sampling to verify hydrocarbon concentrations in the newly installed wells. Following the next quarterly report, our consultant will prepare a work plan for off-site delineation.

If you have any questions or comments, please do not hesitate to contact me at (510) 842-8134.

Sincerely,
CHEVRON U.S.A. PRODUCTS COMPANY

Mark A. Miller
Site Assessment and Remediation Engineer

Enclosure

cc: Mr. Eddy So, RWQCB-Bay Area
Ms. B.C. Owen
File (9-2384 SA2)

93 SEP 24 PM 1:20

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Century 21 Korpi & Associates
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San Leandro, CA 94570

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GROUNDWATER
TECHNOLOGY, INC.

4057 Port Chicago Highway, Concord, CA 94520 (415) 671-2387
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ADDITIONAL
ENVIRONMENTAL ASSESSMENT REPORT
FORMER CHEVRON SERVICE STATION NO. 9-2384
15526 HESPERIAN BOULEVARD
SAN LORENZO, CALIFORNIA

020204376

SEPTEMBER 3, 1993

Prepared for:
Mr. Mark Miller
Chevron U.S.A. Products Company
2410 Camino Ramon
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For:
Wendell Lattz
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West Region

4376R013.020

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ADDITIONAL
ENVIRONMENTAL ASSESSMENT REPORT
FORMER CHEVRON SERVICE STATION NO. 9-2384
15526 HESPERIAN BOULEVARD
SAN LORENZO, CALIFORNIA

SEPTEMBER 3, 1993

1.0 INTRODUCTION

This report summarizes the additional environmental assessment work conducted by Groundwater Technology Inc., at the former Chevron U.S.A. Products Company (Chevron) Service Station No. 9-2384 located at 15526 Hesperian Boulevard, San Lorenzo, California (Figure 1). The scope of work was presented in the *Work Plan for Additional Site Assessment*, dated April 30, 1993 (Groundwater Technology, April 30, 1993). The objective of this work was to evaluate the lateral and vertical extent of hydrocarbons in the soil and groundwater beneath the site. The *Work Plan* was approved by Ms. Juliet Shin of the Alameda County Health Care Services in a letter dated May 11, 1993, to Mr. Mark Miller of Chevron. The assessment work completed during June and July 1993 included: permitting two on-site and one off-site monitoring wells; drilling three soil borings; installing monitoring wells in the borings; soil and groundwater sampling; analyzing the collected samples; removing soil and groundwater generated during assessment activities from the site; and preparing this report.

2.0 BACKGROUND

The following site history and background information is cited from the *Work Plan* letter prepared by Pacific Environmental Group, Inc. (Pacific Environmental Group, November 4, 1991). The site was initially developed as a Bubble Machine Car Wash and Chevron Service Station (Figure 2). The site of former Chevron Service Station No. 9-2384 is currently a vacant lot. To the north, east, and south of the site are residential homes. A shopping center is west, across Hesperian Boulevard.

Gasoline at the site was stored underground in two 10,000-gallon and one 6,000-gallon single-wall fiberglass tanks located in the northwest corner of the site. The underground storage tanks (USTs) were installed in 1972. On December 10, 1981, the supreme unleaded and regular unleaded USTs failed integrity tests. The USTs were subsequently uncovered to isolate the product piping, retested, and passed the integrity tests. On October 18, 1990, the regular-leaded UST failed an integrity test. The regular-leaded UST was uncovered and retested on November 2, 1990. The tank passed the integrity test.

On March 31, 1991, the site ceased operation and the product dispensers were removed. On May 30, 1991, the USTs and associated piping were excavated and removed from the site. A *Tank Closure Report*, dated October 28, 1991, was prepared by Blaine Tech Services. Before backfilling the tank excavation, additional soil was excavated for remediation. The soil excavation and remediation is documented in a *Follow-Up Work Report* prepared by Blaine Tech Services, dated December 13, 1991. The UST pit and product lines were overexcavated to a vertical depth of 14 feet below grade and 12 to 14 feet below grade in the piping trench. Final excavation soil samples collected from the southern piping trench reported nondetectable concentrations. Final excavation soil samples collected at 4 to 5 feet below grade from the side walls of the former UST tank pit reported nondetectable TPH-G concentrations. According to a map in the *Follow-Up Work Report*, the excavation appears to be 35 feet by 35 feet by 14 feet and a trench (5 feet by 35 feet) to the southernmost pump island. Based on these measurements, the total volume of soil excavated was approximately 710 cubic yards. The limiting factors of the overexcavation were groundwater encountered at 13 feet below grade and the sidewalk and the street to the north and west.

Groundwater Technology installed three groundwater monitoring wells (MW-1, MW-2, and MW-3) on May 14, and 20, 1992. Analytical results of soil samples collected during drilling activities reported the highest benzene and total petroleum hydrocarbons-as-gasoline (TPH-G) concentrations in the samples collected from the soil boring for monitoring well MW-3 at 0.34 parts per million (ppm) and 400 ppm, respectively. Groundwater monitoring well MW-3 was abandoned on May 20, 1992, and a replacement monitoring well (MW-3) was drilled on May 20, 1993, within 10 feet of the former UST location. Analytical results of soil samples collected during the installation reported concentrations of benzene, toluene, ethylbenzene, xylenes (BTEX) and TPH-G below the method detection limits (MDLs). Information about the installations of monitoring wells MW-1, MW-2, MW-3, and

replacement monitoring well MW-3 is presented in the Groundwater Technology *Environmental Assessment Report* dated July 16, 1992.

The site has been monitored six times and sampled four times since the installation of monitoring wells MW-1, MW-2, and MW-3. The groundwater flow direction has been consistently calculated to flow toward the west. Analytical results of water samples collected on March 19, 1993, reported TPH-G concentrations in the water samples from monitoring wells MW-2 and MW-3 at 750 part per billion (ppb) and 1,200 ppb, respectively, and benzene concentrations of 37 ppb and 67 ppb, respectively (Groundwater Technology, April 20, 1993).

3.0 WORK SCOPE

3.1 Site-Specific *Health and Safety Plan* and Permitting

Groundwater Technology previously prepared a site-specific *Health and Safety Plan* required by the Occupational Health and Safety Administration (OSHA) Standard "Hazardous Waste Operations and Emergency Response" guidelines (29 CFR 1910.120). The site-specific *Health and Safety Plan* was prepared by Groundwater Technology following a review of site conditions and existing site-specific health and safety plans for the site. The *Health and Safety Plan* was reviewed and signed by Groundwater Technology on-site personnel and subcontractors before performing work at the site.

Groundwater Technology reviewed the site history and information with Chevron representatives before beginning work at the site. A drilling permit to install the monitoring wells was obtained from Zone 7 Alameda County Flood Control and Water Conservation District. A road encroachment permit for the installation of one off-site groundwater monitoring well was obtained from Alameda County Public Works Agency. Copies of the permits are included as Appendix A.

3.2 Soil Borings

On June 23, 1993, Groundwater Technology supervised the drilling of two on-site and one off-site soil borings using a truck-mounted drill rig (CME-75) equipped with 8-inch-diameter, hollow-stem augers (Figure 2). The hollow-stem augers were steam cleaned before drilling each soil boring. The

soil borings were drilled to approximately 25 feet below grade. The soil borings were converted to groundwater monitoring wells MW-4, MW-5, and MW-6. A field geologist, under supervision of a California Registered Geologist, logged the materials encountered during drilling using the Unified Soil Classification System. Copies of the drill logs are included as Appendix B.

The steam cleaning water was stored in labeled 55-gallon drums pending disposal. The soil cuttings generated during drilling activities were characterized, profiled, and transported to the City of Mountain View Public Landfill (Class III) on August 6, 1993. Water generated from steam cleaning, purging, and groundwater sampling activities was removed and transported to the Chevron Terminal in Richmond on July 2, 1993.

3.3 Soil Sampling

During drilling, soil samples were collected at 5-foot intervals from approximately 5 to 25 feet below grade. Samples were collected using a 2.5-inch-outside-diameter split-spoon sampler, lined with three 2-inch-diameter by 6-inch-long brass sample tubes. At each sample point, the sampler was advanced 18 inches ahead of the hollow-stem augers into undisturbed soil. Soil samples were field screened using a photo-ionization detector (PID). One sample from every 5-foot interval was sealed with aluminum foil, capped, taped, labeled, placed on ice in an insulated container, and delivered to a California-certified laboratory. Soil sampling was performed according to Groundwater Technology Standard Operating Procedures (Appendix C).

Two soil samples collected from each soil boring at 4 feet and 9 feet below grade were selected for analyses. The soil samples were analyzed for BTEX and TPH-G using Environmental Protection Agency (EPA) Methods 5030/8020 and modified EPA Method 8015.

3.4 Monitoring Well Installation

Monitoring wells MW-4, MW-5, and MW-6 were constructed of 5 feet of 2-inch-diameter, Schedule 40 polyvinylchloride (PVC) casing with flush threads and 20 feet of 0.020-inch-slot well screen. A sand filter pack was placed around each well screen to a height of approximately 1 foot above the top of the screen interval. The monitoring wells were completed with 1 foot of bentonite and a neat-cement

seal to grade. The wellheads of the monitoring wells were protected by locking caps and traffic-rated street boxes with a watertight bolted lid. Well construction details are presented with the drill logs in Appendix B. On July 6, 1993, the top-of-casing elevation of the monitoring wells at the site were surveyed by a professional licensed surveyor relative to mean sea level (MSL) from an Alameda County benchmark (a brass disk) located at the intersection of Hesperian Boulevard and Lewelling Boulevard.

3.5 Monitoring Well Development

On June 28, 1993, the monitoring wells were developed by surging and bailing groundwater from each well using a PVC baller. This technique promotes an even sand filter pack, removes fine-grain sediments from the well screen and filter pack, and improves the hydraulic communication between the well and aquifer. The groundwater from the monitoring wells was bailed until visibly clear. Approximately 10 well-casing volumes were extracted from each well during development.

3.6 Groundwater Monitoring

On July 2, 1993, each monitoring well was monitored to measure the depth to groundwater and the thickness of separate-phase hydrocarbons, if present. The water levels were measured using an ORS Environmental Equipment INTERFACE PROBE™ Well Monitoring System, which consists of a dual optical sensor and electrical conductivity probe that distinguishes between water and petroleum products. No separate-phase hydrocarbons were detected in the monitoring wells.

3.7 Groundwater Sampling

On July 2, 1993, groundwater monitoring wells MW-1, MW-2, MW-3, MW-4, MW-5, and MW-6 were purged and groundwater samples were collected. Approximately 6 to 7 gallons of water were purged from each well before sample collection. Immediately before each water sample was collected, a distilled water rinsate blank was collected from the sampler as a quality control check on the cleanliness of the sampler. A trip/laboratory blank was also collected for quality control. Each sample was acidified, labeled, placed on ice in an insulated container, and delivered to a California-certified laboratory. The samples were accompanied by a chain-of-custody record during

transportation. The samples were analyzed for BTEX and TPH-G using EPA Methods 5030/8020 and modified EPA Method 8015. Water generated during the purging and development process was stored in drums. The water was then pumped to a water trailer and transported for recycling to the Chevron Refinery in Richmond, California.

4.0 SITE CONDITIONS

4.1 Hydrogeology

Topographically, the site is situated on the east side of the San Francisco Bay Plain. The right-lateral strike-slip Hayward Fault and the Oakland Hills are located approximately 1 mile east of the site. The surface elevation at the site is approximately 36 feet above MSL. The local land surface slopes gently toward the west. The site is approximately 1,500 feet north of the San Lorenzo Creek, which flows west into the San Francisco Bay.

The materials encountered during drilling consisted of interbedded silty and clayey fine sand, sandy clay, and sandy silt. Figure 3 illustrates the location of two cross sections across the site. Two cross sections illustrating the materials encountered during drilling are presented as Figures 4 and 5. Figure 4 illustrates the lithology as interpreted from the drill logs west to east and Figure 5 illustrates the lithology from north to south. Three soil horizons may be interpreted from the well logs of monitoring wells MW-4, MW-5, and MW-6. These horizons are sand, silty sand, and clayey sand. On July 2, 1993, the groundwater levels at the site ranged from 11.37 feet below grade to 12.07 feet below grade. A potentiometric surface map (Figure 6) was prepared using the water-level data collected on July 2, 1993. Figure 6 illustrates a westerly groundwater flow direction and a gradient of approximately 0.008 foot per foot. The groundwater-level data are presented in Table 1.

4.2 Analytical Results for Soil

Analytical results of the soil samples collected from the soil borings for monitoring wells MW-4, MW-5, and MW-6 during the drilling activities on June 23, 1993, reported BTEX and TPH-G concentrations below the MDLs. The results of the soil analyses are summarized in Table 1 and the laboratory reports are included in Appendix D.

4.3 Analytical Results for Groundwater

Analytical results of the groundwater samples collected from monitoring wells MW-1 and MW-5 on July 2, 1993, reported concentrations of BTEX and TPH-G below the MDLs. The highest TPH-G concentrations (2,100 ppb and 14,000 ppb) were detected in samples collected from monitoring wells MW-2 and MW-6, respectively. Concentrations of TPH-G were reported at 610 ppb and 80 ppb in the samples collected from monitoring wells MW-3 and MW-4, respectively. The highest concentrations of benzene were reported for the samples collected from monitoring wells MW-2, MW-3, and MW-6 at 45 ppb, 73 ppb, and 330 ppb, respectively. Figures 7 and 8 illustrate the TPH-G and benzene concentrations, respectively, detected in the groundwater samples collected on July 2, 1993. Results of the water-sample analyses are summarized in Table 2, and the laboratory reports are included in Appendix D.

5.0 REFERENCES

Blaine Technical Services; October 28, 1991; *Tank Removal Report*, Chevron Service Station No. 9-2384, 15526 Hesperian Boulevard, San Lorenzo, California.

Blaine Technical Services; December 13, 1991; *Follow-Up Work Report*, Chevron Service Station No. 9-2384, 15526 Hesperian Boulevard, San Lorenzo, California.

Groundwater Technology Inc.; July 16, 1992; *Environmental Assessment Report*, Chevron Service Station No. 9-2384, 15526 Hesperian Boulevard, San Lorenzo, California.

Groundwater Technology Inc.; April 20, 1993; *Groundwater Monitoring and Sampling Report*, Chevron Service Station No. 9-2384, 15526 Hesperian Boulevard, San Lorenzo, California.

Groundwater Technology Inc.; April 30, 1993; *Work Plan for Additional Site Assessment*, Chevron Service Station No. 9-2384, 15526 Hesperian Boulevard, San Lorenzo, California.

Pacific Environmental Group, Inc.; November 4, 1991; *Work Plan*, Former Chevron U.S.A Service Station No. 9-2384, 15526 Hesperian Boulevard, San Lorenzo, California (unpublished).

FIGURES

Figure 1 Site Location Map

Figure 2 Site Plan

Figure 3 Cross Section Location Map

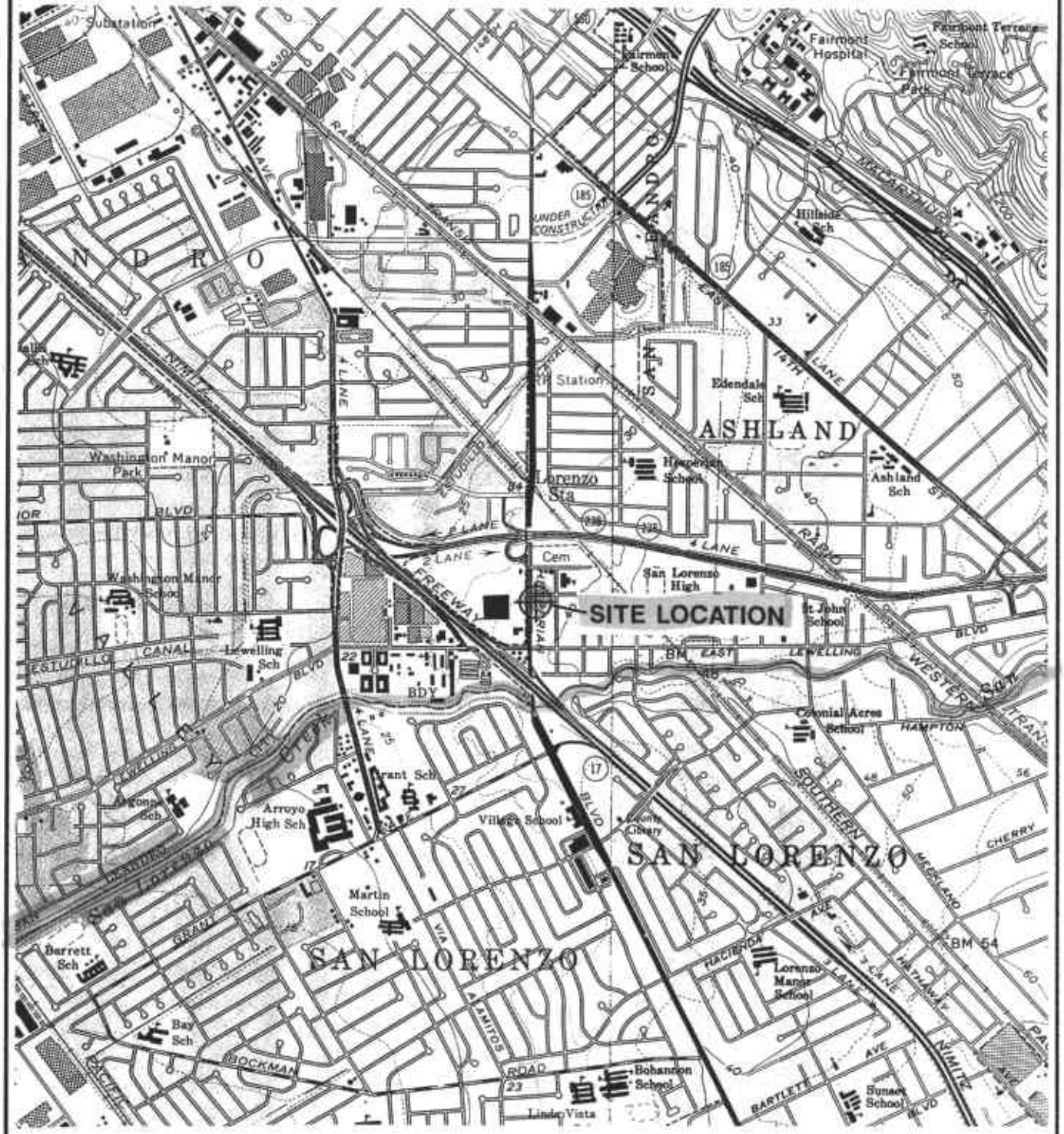
Figure 4 Cross Section A-A'

Figure 5 Cross Section B-B'

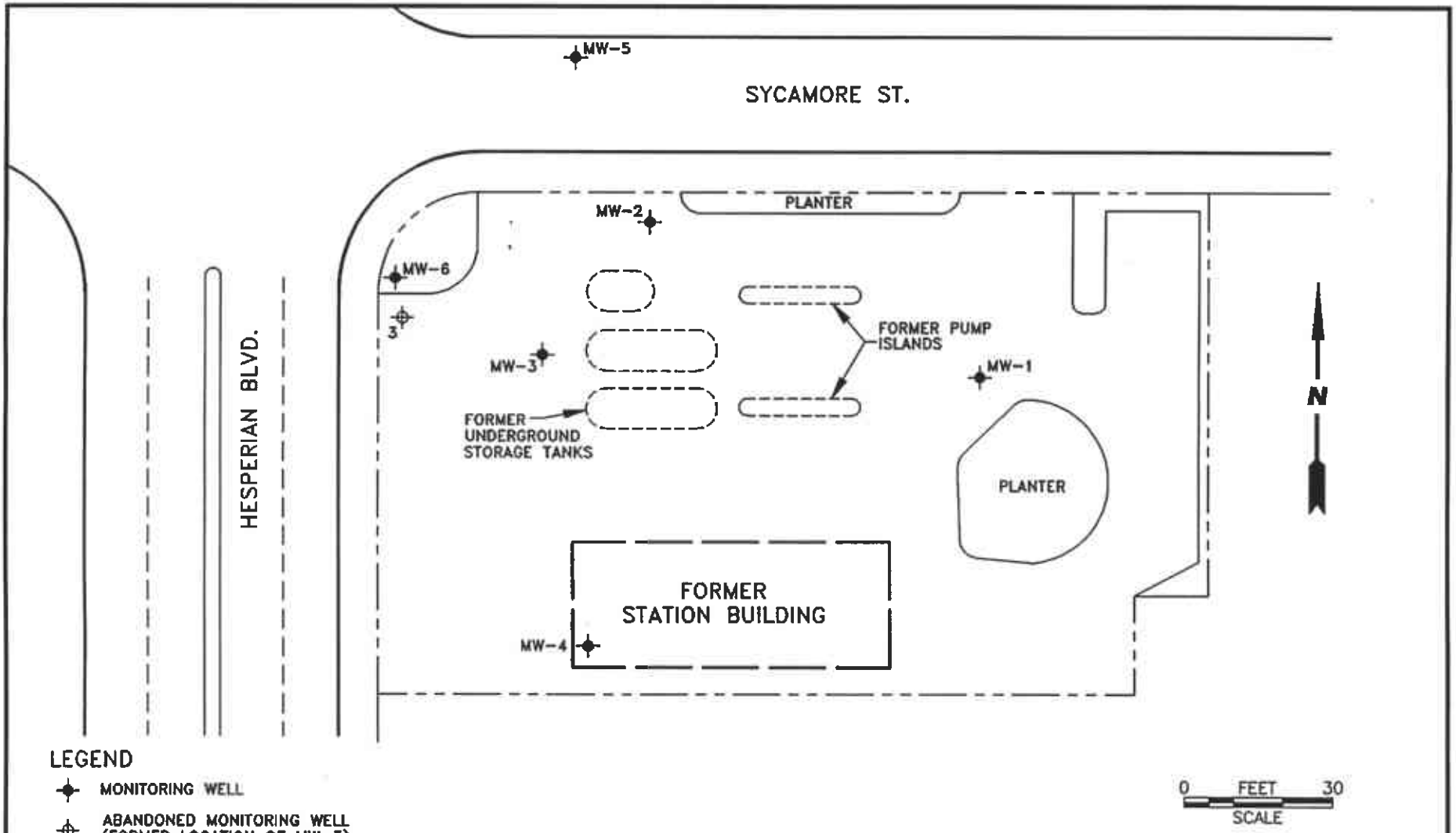
Figure 6 Potentiometric Surface Map (07/02/93)

Figure 7 Dissolved TPH-as-Gasoline Concentration Map (07/02/93)

Figure 8 Dissolved Benzene Concentration Map (07/02/93)



GROUNDWATER TECHNOLOGY 4057 PORT CHICAGO HWY CONCORD, CA 94520 (510) 671-2387	N	SCALE: 0 FEET 2000	**SITE LOCATION MAP**
		CLIENT: CHEVRON U.S.A. PRODUCTS CO. SERVICE STATION No. 9-2384	DATE: 5/13/92
		LOCATION: 15526 HESPERIAN BLVD. SAN LORENZO, CALIFORNIA	FIGURE: 1

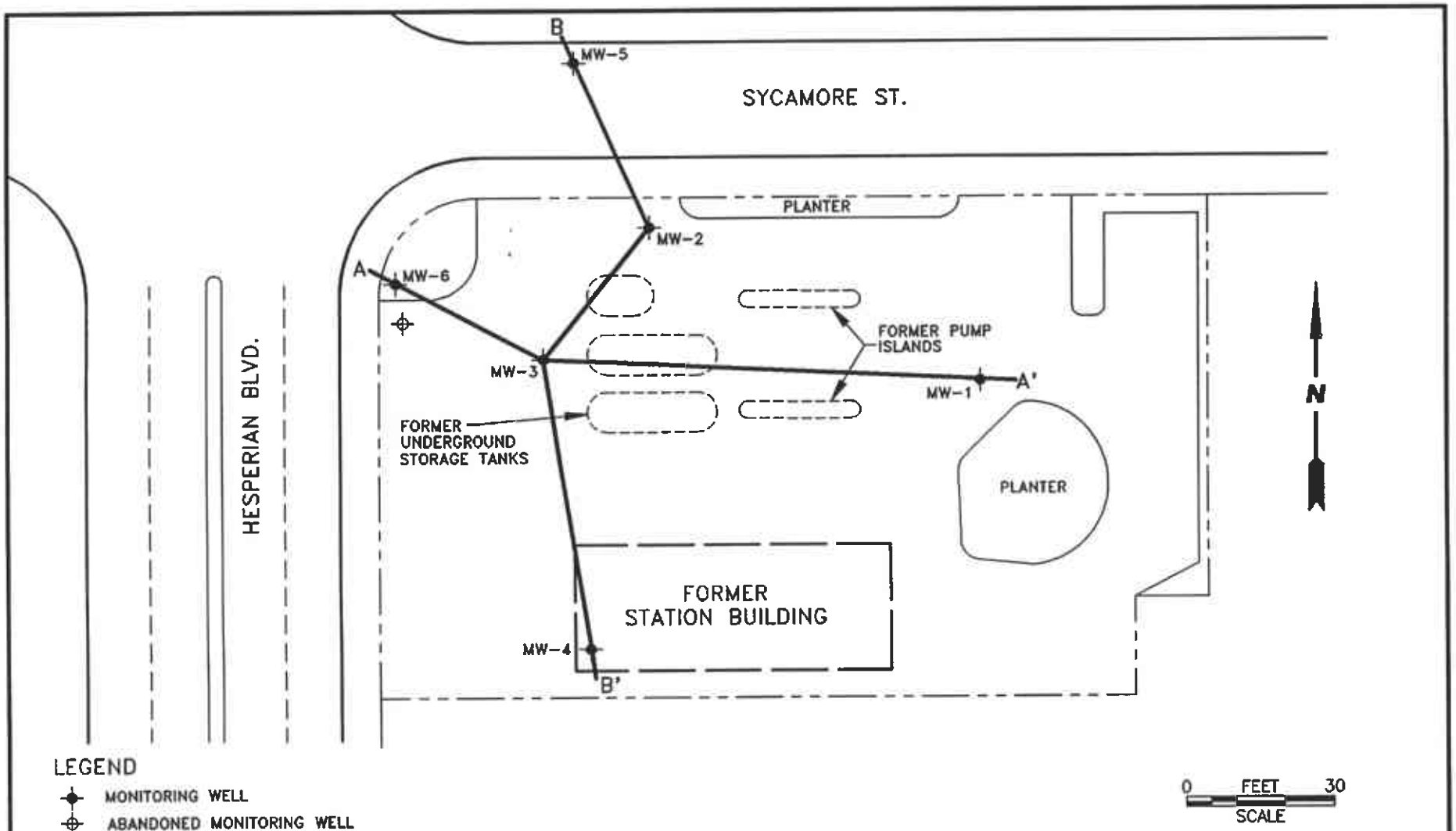


GROUNDWATER TECHNOLOGY 4057 PORT CHICAGO HWY CONCORD, CA 94520 (510) 671-2387

SITE PLAN

CLIENT:	LOCATION:	REV. NO.:	DATE:
CHEVRON U.S.A. PRODUCTS CO. SERVICE STATION No. 9-2384	15526 HESPERIAN BLVD. SAN LORENZO, CALIFORNIA	1	9/8/93

PM	PE/RG	DESIGNED	DETAILED	ACAD FILE:	PROJECT NO.:	FIGURE:
JAW	DRK	TW	ML	SP993	020204376	2



GROUNDWATER TECHNOLOGY
4057 PORT CHICAGO HWY
CONCORD, CA 94520
(510) 671-2387

CROSS SECTION LOCATION MAP

CLIENT:	LOCATION:	REV. NO.:	DATE:
CHEVRON U.S.A. PRODUCTS CO. SERVICE STATION No. 9-2384	15526 HESPERIAN BLVD. SAN LORENZO, CALIFORNIA	1	9/8/93

PM	PE/RG	DESIGNED	DETAILED	ACAD FILE:	PROJECT NO.:	FIGURE:
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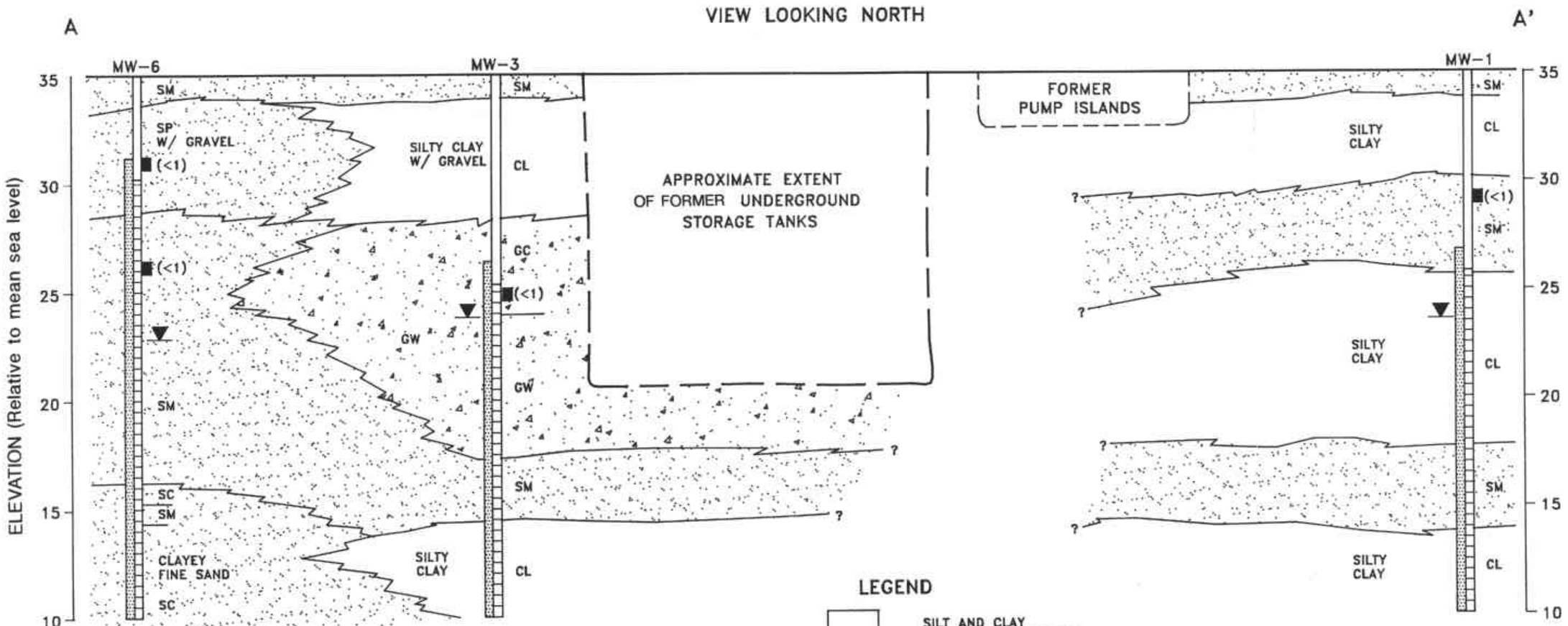

Looks like extent of gravel may be defined enough to determine location of relocated well.
- Why would Sandy gravel be on top of fill if used for trench pit backfill?

GROUNDWATER TECHNOLOGY
4057 PORT CHICAGO HWY
CONCORD, CA 94520
(510) 671-2387

REV. NO.:	DATE:	ACAD FILE:
0	9/10/93	CSECAA

CROSS SECTION A-A'

CLIENT:	PM
CHEVRON U.S.A. PRODUCTS CO. SERVICE STATION No. 9-2384	IJW
LOCATION:	PE/RG
15526 HESPERIAN BLVD. SAN LORENZO, CALIFORNIA	DRK

DESIGNED	DETAILED	PROJECT NO.:	FIGURE:
TW	ML	020204376	4

VIEW LOOKING EAST

B — SYCAMORE STREET — B'

MW-5 | MW-2 | MW-3 | MW-4

ELEVATION (Relative to mean sea level)

35 30 25 20 15 10

COARSE BASE-AGGREGATE
SP (<1)
SM (<1)
SILTY SAND
CL SANDY CLAY
SC SM CLAYEY SAND SC
CLAYEY SILT
SILTY CLAY
CLAYEY SILT
SILTY CLAY CL
ML (<1)
CL (<1)
CL
ML
CL
APPROXIMATE EXTENT OF FORMER UNDERGROUND STORAGE TANKS
SILTY CLAY W/ GRAVEL
CL
CLAYEY GRAVEL
GC/GW
WELL SORTED GRAVEL
SILTY FINE SAND
SILTY CLAY
CL
SM
GC (<1)
GC/GW
GW
SM
SILTY SAND
SM SP (<1) (<1) SM SM

LEGEND

- SILT AND CLAY DOMINATED LITHOLOGY (CL)
- SAND DOMINATED LITHOLOGY (SM, SC, SP)
- GRAVEL DOMINATED LITHOLOGY (GC, GW)
- MONITORING WELL
- FILTER PACK
- SOIL SAMPLE LOCATION
- (<1) TPH-AS-GASOLINE CONCENTRATION (ppb)
- SCREENED INTERVAL
- GROUNDWATER ELEVATION (7/2/93)

SCALE IN FEET: 5, 0, 0, 10

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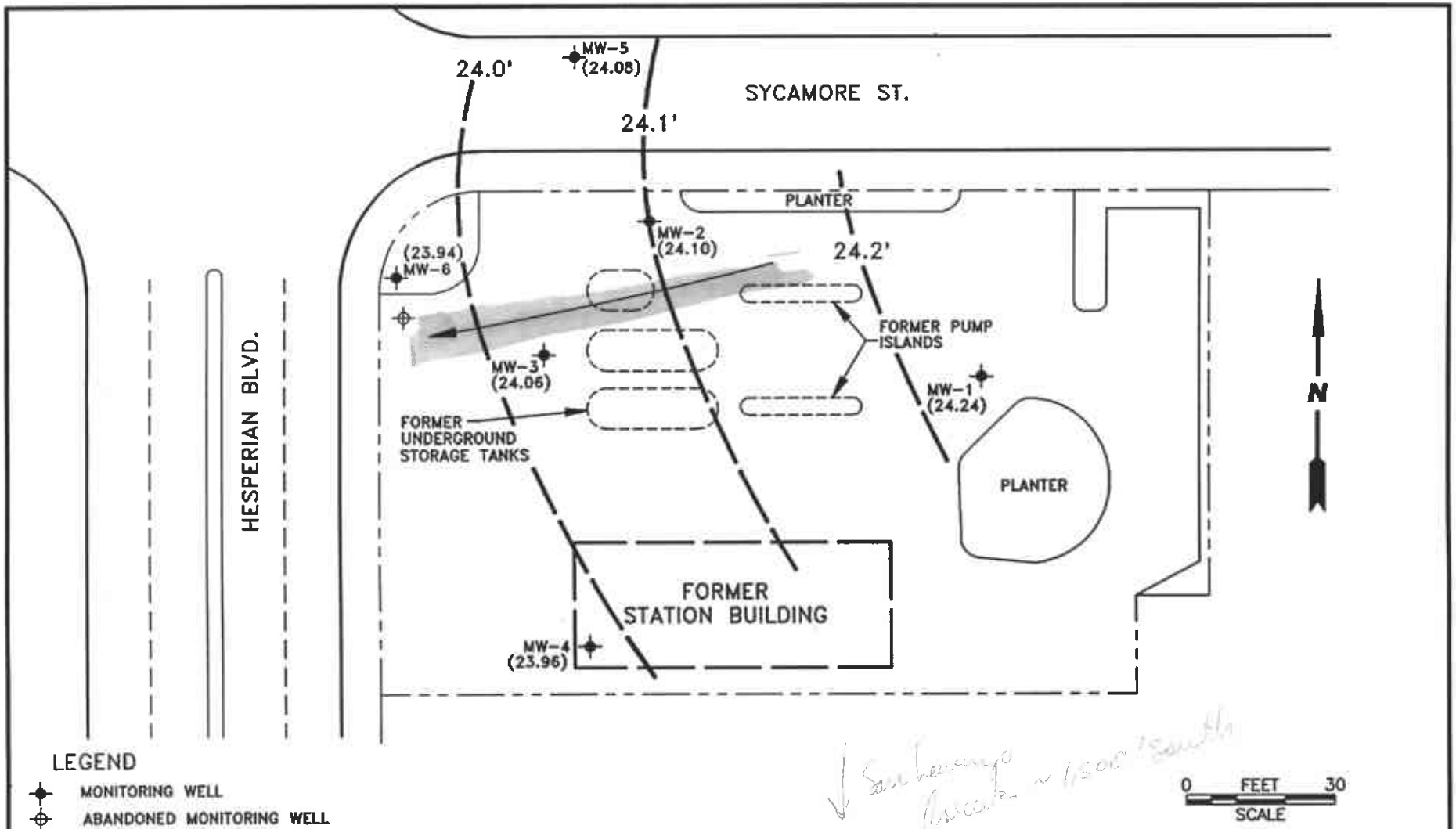
CONCORD, CA 94520
(510) 671-2387

REV. NO.:	DATE:	ACAD FILE:
0	9/14/93	CSECBB

CROSS SECTION B-B'

CLIENT:	PM
CHEVRON U.S.A. PRODUCTS CO. SERVICE STATION No. 9-2384	
LOCATION: 15526 HESPERIAN BLVD. SAN LORENZO, CALIFORNIA	PE/RG DRK

DESIGNED	DETAILED	PROJECT NO.:	FIGURE:
TW	ML	020204376	5



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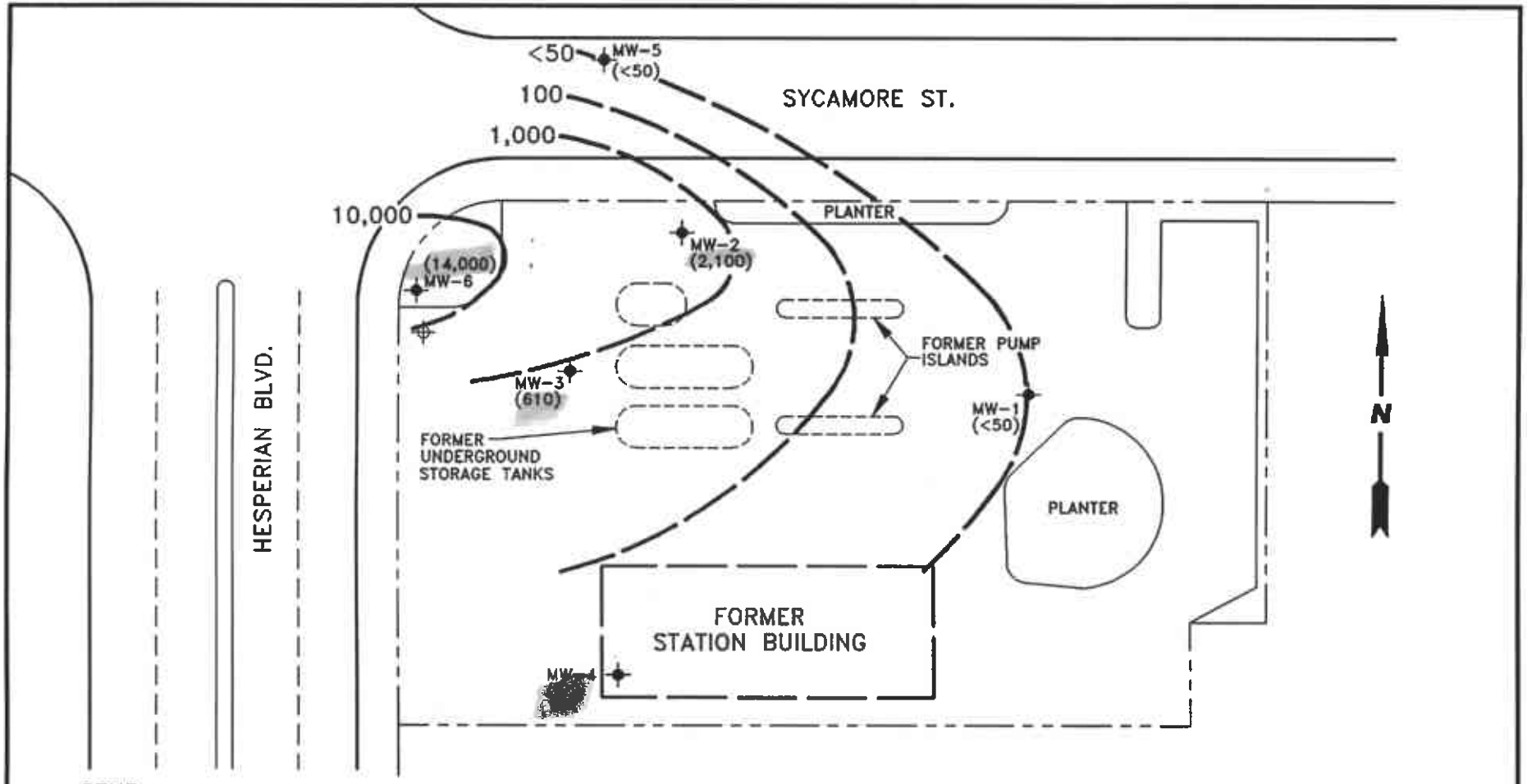
4057 PORT CHICAGO HWY
CONCORD, CA 94520
(510) 671-2387

POTENTIOMETRIC SURFACE MAP (7/2/93)

CLIENT:	LOCATION:	REV. NO.:	DATE:
CHEVRON U.S.A. PRODUCTS CO. SERVICE STATION No. 9-2384	15526 HESPERIAN BLVD. SAN LORENZO, CALIFORNIA	1	9/8/93

PM	PE/RG	DESIGNED	DETAILED	ACAD FILE:	PROJECT NO.:	FIGURE:
JAW	DRK	TW	ML	PSM7293/SP993	020204376	6

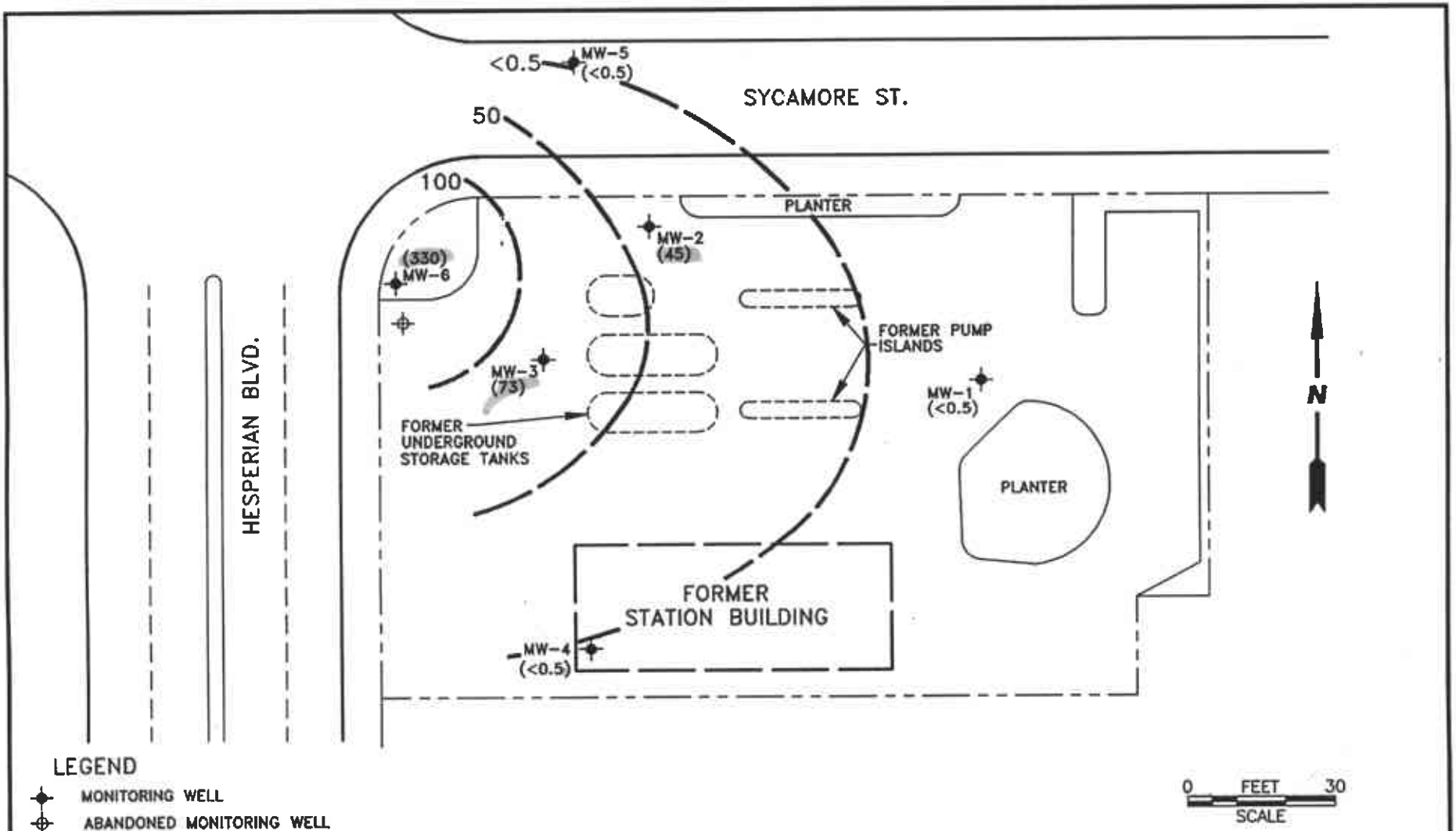


GROUNDWATER TECHNOLOGY
4057 PORT CHICAGO HWY
CONCORD, CA 94520
(510) 671-2387

DISSOLVED TPH-AS-GASOLINE CONCENTRATION MAP (7/2/93)

CLIENT:	LOCATION:	REV. NO.:	DATE:
CHEVRON U.S.A. PRODUCTS CO. SERVICE STATION No. 9-2384	15526 HESPERIAN BLVD. SAN LORENZO, CALIFORNIA	1	9/8/93

PM	PE/RG	DESIGNED	DETAILED	ACAD FILE:	PROJECT NO.:	FIGURE:
JAW	DRK	TW	ML	TPH7293/SP993	020204376	7



GROUNDWATER TECHNOLOGY 4057 PORT CHICAGO HWY CONCORD, CA 94520 (510) 671-2387				**DISSOLVED BENZENE CONCENTRATION MAP (7/2/93)**			
CLIENT: CHEVRON U.S.A. PRODUCTS CO. SERVICE STATION No. 9-2384				LOCATION: 15526 HESPERIAN BLVD. SAN LORENZO, CALIFORNIA		REV. NO.: 1	DATE: 9/8/93
PM: JDW	PE/RG: DRK	DESIGNED: TW	DETAILED: ML	ACAD FILE: BNZ7293/SP993	PROJECT NO.: 020204376		FIGURE: 8

TABLES

Table 1 Analytical Results for Soil Samples Collected on June 23, 1993

Table 2 Monitoring Data and Analytical Results of Water Samples

TABLE 1
ANALYTICAL RESULTS OF SOIL SAMPLES
COLLECTED ON JUNE 23, 1993
(Concentrations in parts per billion)

Date	Sample ID	Sample Depth (ft)	Benzene	Toluene	Ethyl-benzene	Xylenes	TPH-G
06/23/93	MW-4	4	<0.005	<0.005	<0.005	<0.015	<1
		9	<0.005	<0.005	<0.005	<0.015	<1
	MW-5	4	<0.005	<0.005	<0.005	<0.015	<1
		9	<0.005	<0.005	<0.005	<0.015	<1
	MW-6	4	<0.005	<0.005	<0.005	<0.015	<1
		9	<0.005	<0.005	<0.005	<0.015	<1

TPH-G = Total petroleum hydrocarbons-as-gasoline

TABLE 2
MONITORING DATA AND ANALYTICAL RESULTS OF WATER SAMPLES
(Concentration in parts per billion)

Well ID	Date	TOC Elevation (MSL)	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPH-G	DTW (feet)	SPT (feet)	GWE (feet)
MW-1	06/04/92	35.65	<0.5	<0.5	<0.5	<0.5	<50	13.12	0.00	22.52
	07/30/92		---	---	---	---	---	13.82	0.00	21.82
	08/25/92		---	---	---	---	---	14.20	0.00	21.44
	09/23/92		<0.5	<0.5	<0.5	<0.5	<50	14.59	0.00	21.05
	12/29/92		<0.5	<0.5	<0.5	<0.5	<50	14.28	0.00	21.36
	03/19/93		<0.5	<0.5	<0.5	<1.5	<50	10.90	0.00	24.74
	07/02/93		<0.5	<0.5	<0.5	<1.5	<50	11.41	0.00	24.24
MW-2	06/04/92	35.86	910	17	210	30	6,700	13.48	0.00	22.73
	07/30/92		---	---	---	---	---	14.17	0.00	21.68
	08/25/92		---	---	---	---	---	14.56	0.00	21.29
	09/23/92		110	1.2	81	<0.5	1,500	14.95	0.00	20.90
	12/29/92		51	1.1	27	<0.5	1,200	14.61	0.00	21.24
	03/19/93		37	1.0	34	1.6	750	11.24	0.00	24.61
	07/02/93		45	1.4	87	4.8	2,100	11.76	0.00	24.10
MW-3	06/04/92	35.43	12	0.8	5.8	14	460	13.12	0.00	22.30
	07/30/92		---	---	---	---	---	13.81	0.00	21.61
	08/25/92		---	---	---	---	---	14.20	0.00	21.22
	09/23/92		62	1.5	110	4.0	1,100	14.58	0.00	20.84
	12/29/92		21	0.7	12	3.0	450	14.22	0.00	21.20
	03/19/93		67	1.3	96	5.5	1,200	10.87	0.00	24.55
	07/02/93		73	0.5	42	<1.5	610	11.37	0.00	24.06
MW-4	07/02/93	35.73	<0.5	0.6	<0.5	<1.5	80	11.77	0.00	23.96
MW-5	07/02/93	35.50	<0.5	<0.5	<0.5	<1.5	<50	11.42	0.00	24.08

TABLE 2
MONITORING DATA AND ANALYTICAL RESULTS OF WATER SAMPLES
(Concentration in parts per billion)

Well ID	Date	TOC Elevation (MSL)	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPH-G	DTW (feet)	SPT (feet)	GWE (feet)
MW-6	07/02/93	36.01	330	28	980	580	14,000	12.07	0.00	23.94
Trip Blank	06/04/92		<0.5	<0.5	<0.5	<0.5	<50	---	---	---
	09/23/92		<0.5	<0.5	<0.5	<0.5	<50	---	---	---
	12/29/92		<0.5	<0.5	<0.5	<0.5	<50	---	---	---
	03/19/93		<0.5	<0.5	<0.5	<1.5	<50	---	---	---

TOC = Top of casing
MSL = Mean sea level
TPH-G = Total petroleum hydrocarbons-as-gasoline
DTW = Depth to water
SPT = Separate-phase hydrocarbons
GWE = Groundwater elevation in feet above mean sea level relative to an Alameda County benchmark

APPENDIX A

Well Installation Permits

ZONE 7 WATER AGENCY

5997 PARKSIDE DRIVE PLEASANTON, CALIFORNIA 94588 VOICE (510) 484-2600
FAX (510) 462-3914

DRILLING PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

LOCATION OF PROJECT 15526 Hesperian Blvd.
San Lorenzo, California

CLIENT
Name Chevron U.S.A. Products Company
Address P.O. Box 5004 Phone 842-8134
City San Ramon Zip 94583-0804

APPLICANT
Name Groundwater Technology
Address 4057 Port Chicago Hwy Phone 510 671-2387
City Concord, California Zip 94520

TYPE OF PROJECT

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

PROPOSED WATER SUPPLY WELL USE
Domestic ___ Industrial ___ Other none
Municipal ___ Irrigation ___

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

DRILLER'S LICENSE NO. 482390

WELL PROJECTS
Drill Hole Diameter 8 in. Maximum
Casing Diameter 2 in. Depth 30 ft.
Surface Seal Depth 10 ft. Number 3

GEOTECHNICAL PROJECTS
Number of Borings 3 Maximum
Hole Diameter 8 in. Depth 30 ft.

ESTIMATED STARTING DATE ~~APRIL 30~~ June 20
ESTIMATED COMPLETION DATE ~~MAY 30~~ July 20

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

APPLICANT'S SIGNATURE Lia Watchus Date 3/25/93

FOR OFFICE USE

PERMIT NUMBER 93323
LOCATION NUMBER

PERMIT CONDITIONS

Circled Permit Requirements Apply

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

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

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

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

E. WELL DESTRUCTION. See attached.

Approved Wyman Hong Date 16 Jun 93
Wyman Hong

31992

APPENDIX B

Drill Logs and Well Construction Specifications

Drilling Log

GROUNDWATER TECHNOLOGY

Monitoring Well [redacted]

Project CHV/15526 Hesparian Blvd. Owner Chevron U.S.A., Inc.
Location San Lorenzo, CA Project No. 020204376 Date drilled 6-23-93
Surface Elev. 36.3 ft. Total Hole Depth 25 ft. Diameter 8 in.
Top of Casing 35.73 ft. Water Level Initial 11 ft. Static (06/28/93) 11.69 ft.
Screen: Dia 2 in. Length 20 ft. Type/Size 0.020 in.
Casing: Dia 2 in. Length 5 ft. Type PVC sch 40
Filter Pack Material #3 sand Rig/Core Type CME-75/Mod. Split Spoon
Drilling Company SES, Inc. Method Hollow Stem Auger Permit # 93323
Driller Morris Peterson Log By Doug Ford/Chip Hurley
Checked By David Kleesattel License No. RG# 5136 David Kleesattel

See Site Map For Boring Location

COMMENTS:

The well was set at approximately 25 feet below grade. The decon water was stored in 55-gallon drums. The soil was placed on and covered with plastic. The decon water and soil were left on site until they could be properly analyzed for disposal.

Depth to water was approximately 11 feet below grade on 6-23-93.

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / Blow Count / % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2						
0						Unpaved grade
2					SM	Silty SAND, gray-brown, about 30% fine sand, about 30% silt, about 20% medium sand, (loose, slightly moist, no hydrocarbon odor)
4		0.3	5 — 5 6 5		SP	SAND, brown, about 90% fine sand, about 10% silt, (subangular, medium dense, moist, no hydrocarbon odor)
6						
8						
10		0.7	10 — 1 2 3			Silty SAND, gray-brown, about 60% fine sand, about 20% silt, about 20% clay, (loose, wet, no hydrocarbon odor)
12						
14		1.4	15 — 2 3 4		SM	
16						
18						
20		0.5	20 — 3 4 6			
22					SM	Silty SAND, mottled orange-brown, about 60% fine sand, about 20% silt, about 20% clay, (stiff, saturated, no hydrocarbon odor)
24		0.5	25 — 4 6 8			End of boring at 25 feet below grade.
26						
28						
30						

Drilling Log

GROUNDWATER TECHNOLOGY

Monitoring Well [redacted]

Project CHV/15526 Hesparian Blvd. Owner Chevron U.S.A., Inc.
Location San Lorenzo, CA Project No. 020204376 Date drilled 6-23-93
Surface Elev. 35.68 ft. Total Hole Depth 25 ft. Diameter 8 in.
Top of Casing 35.50 ft. Water Level Initial 10 ft. Static (06/28/93) 11.34 ft.
Screen: Dia 2 in. Length 20 ft. Type/Size 0.020 in.
Casing: Dia 2 in. Length 5 ft. Type PVC sch 40
Filter Pack Material #3 sand Rig/Core Type CME-75/Mod. Split Spoon
Drilling Company SES, Inc. Method Hollow Stem Auger Permit # 93323
Driller Morris Peterson Log By Doug Ford/Chip Hurley
Checked By David Kleesattel License No. RG# 5136 D. Kleesattel

See Site Map For Boring Location

COMMENTS:

The well was set at approximately 25 feet below grade. The decon water was stored in 55-gallon drums. The soil was placed on and covered with plastic. The decon water and soil were left on site until they could be properly analyzed for disposal.

Depth to water was approximately 10 feet below grade on 6-23-93.

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / Blow Count / % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2						
0						8" of Asphalt
2						Road Base
4		0.5	5 — 1 3 4		SP	SAND, brown, about 90% fine sand, about 10% silt, (loose, moist, no hydrocarbon odor)
6						Silty SAND, dark brown, about 75% fine sand, about 20% silt, about 5% clay, (very loose, wet, no hydrocarbon odor)
8						
10		0.3	10 — 1 1 2		SM	
12						
14		1	15 — 1 1 3		CL	Sandy CLAY, dark gray, about 50% clay, about 30% fine sand, about 20% silt, (very soft, plastic, wet, no hydrocarbon odor)
16						
18					SC	Clayey SAND, gray-brown, about 60% fine sand, about 30% clay, about 10% silt, (very loose, plastic, wet, no hydrocarbon odor)
20		0.8	20 — 1 1 3		SM	Silty SAND (Same as above)
22					SC	Clayey SAND (Same as above)
24		0.8	25 — 4 4 5			End of boring at 25 feet below grade.
26						
28						
30						

Drilling Log

GROUNDWATER TECHNOLOGY

Monitoring Well MW8

Project CHV/15526 Hesparian Blvd. Owner Chevron U.S.A., Inc.
Location San Lorenzo, CA Project No. 020204376 Date drilled 6-23-93
Surface Elev. 36.4 ft. Total Hole Depth 25 ft. Diameter 8 in.
Top of Casing 36.01 ft. Water Level Initial 12 ft. Static (06/28/93) 11.83 ft.
Screen: Dia 2 in. Length 20 ft. Type/Size 0.020 in.
Casing: Dia 2 in. Length 5 ft. Type PVC sch 40
Filter Pack Material #3 sand Rig/Core Type CME-75/Mod. Split Spoon
Drilling Company SES, Inc. Method Hollow Stem Auger Permit # 93323
Driller Morris Peterson Log By Doug Ford/Chip Hurley
Checked By David Kleesattel License No. RG# 5136 David Kleesattel

See Site Map For Boring Location

COMMENTS:

The well was set at approximately 25 feet below grade. The decon water was stored in 55-gallon drums. The soil was placed on and covered with plastic. The decon water and soil were left on site until they could be properly analyzed for disposal.

Depth to water was approximately 12 feet below grade on 6-23-93.

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / Blow Count / % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2						
0					SM	Silty SAND, brown, about 40% fine sand, about 20% silt, about 20% fine to coarse gravel, about 20% medium to coarse sand, (loose, slightly moist, no hydrocarbon odor)
2						
4		1	5 / 2 2 2		SP	Silty SAND, brown, about 40% fine sand, about 20% silt, about 20% fine to coarse gravel, about 20% medium to coarse sand, (loose, slightly moist, poorly graded, no hydrocarbon odor)
6						
8						Silty SAND, dark gray-brown, about 50% fine sand, about 30% silt, about 15% clay, about 5% medium to coarse sand, (loose, wet, slight hydrocarbon odor)
10		1	10 / 1 2 2			
12					SM	
14		312	15 / 1 2 2			(saturated, strong hydrocarbon odor)
16						
18						
20		33	20 / 3 3 4		SC	Clayey SAND, dark gray/brown, about 60% fine sand, about 30% clay, about 10% silt, (loose, wet, slight hydrocarbon odor)
					SM	Silty SAND, gray, about 80% fine sand, about 20% silt, (saturated, slight hydrocarbon odor)
22					SC	Clayey SAND, yellow-gray, about 60% fine sand, about 30% clay, about 10% silt, (medium dense, wet, no hydrocarbon odor)
24		6	25 / 3 5 8			End of boring at 25 feet below grade.
26						
28						
30						

APPENDIX C

Groundwater Technology
Standard Operating Procedures (SOPs)

GROUNDWATER TECHNOLOGY, INC.
STANDARD OPERATING PROCEDURE
CONCERNING GROUNDWATER MONITORING
SOP 8

Groundwater monitoring of wells at the site shall be conducted using an ORS Environmental Equipment (ORS) INTERFACE PROBE ™ and SURFACE SAMPLER™. The INTERFACE PROBE ™ is a hand-held, battery-operated device for measuring depth to petroleum product and depth to water as measured from an established datum (*i.e.*, top of the well casing which has ben surveyed). Separate-phase hydrocarbon (product) thickness is then calculated by subtracting the depth to product from the depth to water. In addition, water elevations are adjusted for the presence of fuel with the following calculation:

(Product Thickness) (0.8) + (Water Elevation) = Corrected Water Elevation

Note: The factor of 0.8 accounts for the density difference between water and petroleum hydrocarbons.

The INTERFACE PROBE ™ consists of a dual-sensing probe which utilizes an optical liquid sensor and electrical conductivity to distinguish between water and petroleum products. A coated steel measuring tape transmits the sensor's signals to the reel assembly where an audible alarm sounds a continuous tone when the sensor is immersed in petroleum product and an oscillating tone when immersed in water. The INTERFACE PROBE ™ is accurate to 1/16th inch.

A SURFACE SAMPLER™ shall be used for visual inspection of the groundwater to note sheens (difficult to detect with the INTERFACE PROBE ™), odors, microbial action, etc.

The SURFACE SAMPLER™ used consists of a 12-inch-long case acrylic tube with a Delrin ball which closes onto a conical surface creating a seal as the sampler is pulled up. The sampler is calibrated in inches and centimeters for visual inspection of product thickness.

To reduce the potential for cross contamination between wells, the monitorings shall take place in order from the least to the most contaminated wells. Wells containing separate-phase hydrocarbons (free product) should be monitored last. Between each monitoring the equipment shall be washed with laboratory-grade detergent and double rinsed with distilled water.

GROUNDWATER TECHNOLOGY, INC.
STANDARD OPERATING PROCEDURE
CONCERNING WATER SAMPLING METHODOLOGY
SOP 9

Before water sampling, each well shall be purged by pumping a minimum of four well volumes or until the discharge water indicates stabilization of temperature conductivity and pH. If the well is evacuated before four well volumes are removed or stabilization is achieved, the sample should be taken when the water level in the well recovers to 80 percent of its initial level.

Retrieval of the water sample, sample handling and sample preservation shall be conducted according to Standard Operating Procedure 10 concerning "Sampling for Volatiles in Water." The sampling equipment used shall consist of a Teflon® and/or stainless steel samplers which meet U.S. Environmental Protection Agency (EPA) regulations. Glass vials with Teflon® lids should be used to store the collected samples.

To ensure sample integrity, each vial shall be filled with the sampled water in such a way that the water stands above the lip of the vial. The cap should then be quickly placed on the vial and tightened securely. The vial should then be checked to ensure that air bubbles are not present prior to labeling of the sample. Label information should include a sample identification number, job identification, date, time, type of analysis requested, and sampler's name. Chain-of-custody records shall be completed according to Standard Operating Procedure (SOP) 11 concerning chain of custody.

The vials should be immediately placed in high quality coolers for shipment to the laboratory. The coolers should be packed with sufficient ice or freezer packs to ensure that the samples are kept below 4° Celsius (C). To minimize sample degradation the prescribed analysis shall take place within seven days of sample collection unless specially prepared acidified vials are used.

To minimize the potential for cross contamination between wells, all the well development and water sampling equipment which contacts the groundwater shall be cleaned between each sampling. As a second precautionary measure, the wells shall be sampled in order of increasing contaminant concentrations (the least contaminated well first, the most contaminated well last) as established by previous analysis.

STANDARD OPERATING PROCEDURE 10
CONCERNING SAMPLING FOR VOLATILES IN WATER
(DISSOLVED GASOLINE, SOLVENTS, ETC.)
SOP 10

1. Use only vials properly washed and baked.

2. Use clean sampling equipment. Scrub with Alconox or equivalent laboratory detergent and water followed by a thorough water rinse. Complete with a distilled water rinse.

   Sampling equipment which has come into contact with liquid hydrocarbons (free product) should be regarded with suspicion. Such equipment should have tubing and cables replaced and all resilient parts washed with laboratory detergent solution as indicated above. Visible deposits may have to be removed with hexane. Solvent washing should be followed by detergent washing, as indicated above.

   This procedure is valid for volatile organic analysis only. For extractable organics (for example, pesticides, or base neutrals for U.S. Environmental Protection Agency [EPA] Method 625 a final rinse with pesticide-grade isopropyl alcohol), followed by overnight or oven drying will be necessary.

3. Take duplicate samples. Mark on forms as a single sample with two containers to avoid duplication of analyses.

4. Take a site blank using distilled water or known uncontaminated source. This sample will be run at the discretion of the project manager.

5. Fill out labels and forms as much as possible ahead of time. Use an indelible marker.

6. Preservatives are required for some types of samples. Use specially prepared vials marked as indicated below, or use the appropriate field procedure (SOP 12 for acidification). Make note on forms that samples were preserved. Always have extra vials in case of problems. Samples for volatile analyses should be acidified below pH 2 upright. Eye protection, foot protection, and disposable vinyl gloves are required for handling. Samples designated for expedited service and analyzed within seven (7) days of sampling will be acceptable without preservation. Acid-causing burns. Glasses or goggles (not contact lenses) are necessary for protection of the eyes. Flush eyes with water for 15 minutes if contact occurs and seek medical attention. Rinse off hands frequently with water during handling.

   For sampling chlorinated drinking water supplies for chlorinated volatiles, samples shall be preserved with sodium thiosulfate. Use vials labeled "CONTAINS THIOSULFATE." No particular cautions are necessary.

7. Fill vial to overflowing with water, avoiding turbulence and bubbling as much as possible. Water should stand above lip of vial.

8. Carefully, but quickly, slip cap onto vial. Avoid dropping the Teflon® septum from cap by not inverting cap until it is in contact with the vial. Disc should have Teflon® face toward the water. Also avoid touching white Teflon® face with dirty fingers.

9. Tighten cap securely, invert vial, and tap against hand to see there are not bubbles inside.

10. Label vial, using indelible ink, as follows:

    A. Sample I.D. No.
    B. Job I.D. No.
    C. Date and Time
    D. Type of analysis required
    E. Your name

11. Unless the fabric-type label is used, place Scotch™ tape over the label to preserve its integrity.

12. For chain-of-custody reasons, sample vial should be wrapped end-for-end with Scotch™ tape or evidence tape and signed with indelible ink where the end of the tape seals on itself. The septum needs to be covered.

13. Chill samples immediately. Samples to be stored should be kept at 4° Celsius (C) (30° Fahrenheit [F]). Samples received at the laboratory above 10°C (as measured at glass surface by a thermocouple probe), after overnight shipping, will be considered substandard, so use a high quality cooler with sufficient ice or freezer packs.

14. Fill out Chain-of-Custody Manifest and Analysis Request Form (see Chain of Custody Procedures, SOP 11).

GROUNDWATER TECHNOLOGY, INC.
STANDARD OPERATING PROCEDURE
CONCERNING CHAIN OF CUSTODY
SOP 11

---

1. Samples must be maintained under custody until shipped or delivered to the laboratory. The laboratory will then maintain custody. A sample is under custody if:

    a) It is in your possession
    b) It is in your view after being in your possession
    c) You locked it up after it was in your possession
    d) It is in a designated secure area

2. Custody of samples may be transferred from one person to another. Each transferrer and recipient must date, sign and note the time on the chain-of-custody form.

3. In shipping, the container must be sealed with tape, and bear the sender's signature across the area of bonding at the ends of the tape to prevent undetected tampering. Each sampling jar should be taped and signed as well. Scotch tape works well.

4. Write "sealed by" and sign in the "Remarks" box at the bottom of the form before sealing the box. Place form in a plastic bag and seal it inside the box.

5. The "REMARKS" section of the form is for documenting details such as:

    a) Correlation of sample numbers if samples are split between labs.
    b) QC numbers when lab is logging in the samples.
    c) Sample temperature and condition when received by lab.
    d) Preservation notation.
    e) pH of samples when opened for analysis (if acidified).
    f) Sampling observation or sampling problem.

6. The chain-of-custody form should be included inside the shipping container. A copy should be sent to the project manager.

7. When the samples are received by the lab, the chain-of-custody form will be dated, signed, and the time noted by a laboratory representative. The form will be retained in the laboratory files along with shipping bills and receipts .

8. At the time of receipt of samples by the laboratory, the shipping container will be inspected and the sealing signature will be checked. The samples will be inspected for condition and bubbles, and the temperature of a representative sample container will be measured externally by a thermocouple probe (held tightly between two samples) and recorded. The laboratory QC numbers will be placed on the labels, in the accession log, and on the chain-of-custody form. If samples are acidified, their pH will be measured by narrow range pH paper at the time of opening for analysis. All comments concerning procedures requiring handling of the samples will be dated and initialed on the form by the laboratory person performing the procedure. A copy of the completed chain-of-custody form with the comments on sample integrity will be returned to the sampler.

GROUNDWATER TECHNOLOGY, INC.
STANDARD OPERATING PROCEDURE
CONCERNING SOIL SAMPLING METHODOLOGY
SOP 14

1. Soil samples should be collected and preserved in accordance with Groundwater Technology Standard Operating Procedure (SOP 15) concerning Soil Sample Collection and Handling when Sampling for Volatile Organics. A hollow stem soil auger should be used to drill to the desired sampling depth. A standard 2 inch diameter split spoon sampler 18 inches in length shall be used to collect the samples. The samples are contained in 2 inch diameter by 6 inch long thin walled brass tube liners fitted into the split spoon sampler (three per sampler).

2. The split spoon sampler should be driven the full depth of the spoon into the soil by a 140 pound hammer. The spoon shall then be extracted from the borehole and the brass tube liners containing the soil sample removed from the sampler. The ends of the liner tubes should be immediately covered with aluminum foil, sealed with a teflon or plastic cap, and taped with duct tape. After being properly identified with sample data entered on a standard chain of custody form the samples shall be placed on dry ice (maintained below 4~C) and transported to the laboratory within 24 hours.

3. One of the three soil samples retrieved at each sample depth shall be analyzed in the field using a photoionization detector and/or explosimeter. The purpose of the field analysis is to provide a means to choose samples to be laboratory analyzed for hydrocarbon concentrations and to enable comparisons between the field and laboratory analyses. The soil sample shall be sealed in a plastic bag and allowed to equilibrate with the air surrounding the soil for approximately 10 minutes. One of the two field vapor instruments shall be used to quantify the amount of hydrocarbon released to the air from the soils. The data shall be recorded on the drill logs at the depth corresponding to the sample point.

GROUNDWATER TECHNOLOGY, INC.
STANDARD OPERATING PROCEDURE
CONCERNING SOIL SAMPLE COLLECTION AND
HANDLING WHEN SAMPLING FOR VOLATILE ORGANICS
SOP 15

1. Use a sampling means which maintains the physical integrity of the samples. The project sampling protocol will designate a preferred sampling tool. A split spoon sampler with liners, or similar tube sampler which can be sealed, is best.

2. The samples should be sealed in the liner, with teflon plugs (The "California Sampler") or plastic caps.

3. For sending whole-core samples (above):

   A. Seal ends of liner with teflon plugs or plastic caps, leaving no free air space inside.

   B. Tape with duct tape.

   C. Label the sample with the following information: sample identification, depth, date and time, project number and required analyses.

   D. Place in plastic bag labeled with indelible marker. Use Well #, depth, date, and job #.

   E. Place inside a second bag and place a labelling tag inside outer bag.

   F. Enclose samples in a cooler with sufficient ice or dry ice to maintain samples at 4 degrees C during shipment.

   G. Seal cooler with a lock, or tape with samplers signature so tampering can be detected.

   H. Package cooler in a box with insulating material. Chain of custody forms can be placed in a plastic bag in this outer box.

   I. If dry ice is used, a maximum of 5 pounds is allowed by Federal Express without special documents(documents are easy to obtain but are not necessary for under 5 pounds). Write "ORM-A dry ice", "_____ pounds, for research" on outside packaging and on regular airbill under classification. UPS does not accept dry ice.

   J. Soil cores kept a 4 degrees C are only viable for up to 7 days when aromatic hydrocarbons are involved. The lab should prepare the samples in methanol once in the lab.

4. Good sampling practice would include preparing 1 out of 5 samples to be prepared in duplicates for analysis. These 4 out of 20 samples will be used for the following purposes:

   A. One in every 20 samples should be analyzed as a field replicate to evaluate the precision of the sampling technique. A minimum of 1 sample per data set is suggested.

   B. An additional 1 in 20 samples should be selected by sampler to be prepared in duplicate as alternative to Step (A). Choose a different soil type if available.

C. The remaining 2 in 20 samples should be used by lab for spiking with reference materials for internal QC.

Other QC procedures can be specified at the project manager's discretion. See Table 3-2 (reference 2) attached.

5. Decontamination of equipment in the field requires a detergent wash, with a distilled water rinse.

REFERENCES

1. Soil Sampling Quality Assurance Users Guide, U.S. EPA Environmental Monitoring Systems Laboratory, Las Vegas, NV, EPA 600/4-84-043, May 1984.

2. Preparation of Soil Sampling Protocol. Techniques and Strategies, U.S. EPA, Environmental Monitoring Systems Laboratory, Las Vegas, NV, EPA 600/4-83-020, August 1983 (PB83-206979).

3. Test Methods for Evaluating Solid Waste, U.S. EPA, Office of Solid Waste and Emergency Response, Washington, D.C., SW 846, July 1982.

GROUNDWATER TECHNOLOGY, INC.
STANDARD OPERATING PROCEDURE
CONCERNING OPERATION/CALIBRATION OF
PHOTOIONIZATION ANALYZER
SOP 19

1. The Thermo Environmental Instruments Inc. Model 580B OVM Photoionization Analyzer shall be used, using photoionization, to measure the concentration of trace gases over a range of less than 1 ppm to 2,000 ppm. The specific instrument used for investigations related to hydrocarbon contamination should be calibrated for direct readings in parts per million (ppm) volume/volume of isobutylene. Specifics of the detection principle/theory and functions of various components can be found in the manufactures instruction manual.

2. To assure optimum performance, the photoionization analyzer should be calibrated with a standard gas mixture of known concentration from a pressurized container. A daily procedure for calibration involves bringing the probe and readout close to the calibration gas, cracking the valve on the tank and checking the instrument reading. This provides a useful spot check for the instrument.

3. A procedure conducted weekly for more accurate calibration of the instrument from a pressurized container is to connect one side of a "T" to the pressurized container of calibration gas, another side of the "T" to a rotameter and the third side of the "T" directly to the 8" extension to the photoionization probe (see Figure 2). Crack the valve of the pressurized container until a slight flow is indicated on the rotameter. The instrument draws in the volume of sample required for detection, and the flow in the rotameter indicates an excess of sample. Now adjust the span pot so that the instrument reads the exact value of the calibration gas. (If the instrument span setting is changed, the instrument should be turned back to the standby position and the electronic zero should be readjusted, if necessary).

APPENDIX D

Laboratory Reports and Chain-of-Custody Records

Superior Precision Analytical, Inc.
825 Arnold Drive, Suite 114 • Martinez, California 94553 • (510) 229-1512 / fax (510) 229-1526

GROUNDWATER TECHNOLOGY, INC.
Attn: TIM WATCHERS

Project 02020
Reported 07/03/93

TOTAL PETROLEUM HYDROCARBONS

Lab #	Sample Identification	Sampled	Analyzed	Matrix
89068- 1	MW 4.4'	06/23/93	07/02/93	Soil
89068- 2	MW 4.9'	06/23/93	07/02/93	Soil
89068- 6	MW 5.4'	06/23/93	07/02/93	Soil
89068- 7	MW 5.9'	06/23/93	07/02/93	Soil

RESULTS OF ANALYSIS

Laboratory Number:	89068- 1	89068- 2	89068- 6	89068- 7
Gasoline:	ND<1	ND<1	ND<1	ND<1
Benzene:	ND<.005	ND<.005	ND<.005	ND<.005
Toluene:	ND<.005	ND<.005	ND<.005	ND<.005
Ethyl Benzene:	ND<.005	ND<.005	ND<.005	ND<.005
Xylenes:	ND<.015	ND<.015	ND<.015	ND<.015
Concentration:	mg/Kg	mg/Kg	mg/Kg	mg/Kg

Superior Precision Analytical, Inc.
825 Arnold Drive, Suite 114 • Martinez, California 94553 • (510) 229-1512 / fax (510) 229-1526

C E R T I F I C A T E O F A N A L Y S I S

ANALYSIS FOR TOTAL PETROLEUM HYDROCARBONS

QA/QC INFORMATION
SET: 89068

NA = ANALYSIS NOT REQUESTED
ND = ANALYSIS NOT DETECTED ABOVE QUANTITATION LIMIT
mg/kg = parts per million (ppm)

OIL AND GREASE ANALYSIS By Standard Methods Method 5520F:
Minimum Detection Limit in Soil: 50mg/kg

Modified EPA SW-846 Method 8015 for Extractable Hydrocarbons:
Minimum Quantitation Limit for Diesel in Soil: 1mg/kg

EPA SW-846 Method 8015/5030 Total Purgable Petroleum Hydrocarbons:
Minimum Quantitation Limit for Gasoline in Soil: 1mg/kg

EPA SW-846 Method 8020/BTXE
Minimum Quantitation Limit in Soil: 0.005mg/kg

ANALYTE	MS/MSD RECOVERY	RPD	CONTROL LIMIT
Gasoline:	76/76	0%	70-130
Benzene:	109/109	0%	70-130
Toluene:	99/101	2%	70-130
Ethyl Benzene:	92/95	3%	70-130
Xylenes:	92/95	3%	70-130

Richard Srna, Ph.D.
Laboratory Director

Superior Precision Analytical, Inc.
825 Arnold Drive, Suite 114 • Martinez, California 94553 • (510) 229-1512 / fax (510) 229-1526

C E R T I F I C A T E O F A N A L Y S I S

ANALYSIS FOR TOTAL PETROLEUM HYDROCARBONS

QA/QC INFORMATION
SET: 89067

NA = ANALYSIS NOT REQUESTED
ND = ANALYSIS NOT DETECTED ABOVE QUANTITATION LIMIT
mg/kg = parts per million (ppm)

OIL AND GREASE ANALYSIS By Standard Methods Method 5520F:
Minimum Detection Limit in Soil: 50mg/kg

Modified EPA SW-846 Method 8015 for Extractable Hydrocarbons:
Minimum Quantitation Limit for Diesel in Soil: 1mg/kg

EPA SW-846 Method 8015/5030 Total Purgable Petroleum Hydrocarbons:
Minimum Quantitation Limit for Gasoline in Soil: 1mg/kg

EPA SW-846 Method 8020/BTXE
Minimum Quantitation Limit in Soil: 0.005mg/kg

ANALYTE	MS/MSD RECOVERY	RPD	CONTROL LIMIT
Gasoline:	76/76	0%	70-130
Benzene:	109/109	0%	70-130
Toluene:	99/101	2%	70-130
Ethyl Benzene:	92/95	3%	70-130
Xylenes:	92/95	3%	70-130

Richard Srna, Ph.D.
Laboratory Director

Fax copy of Lab Report and COC to Chevron Contact: ☐ No 09068

Chain-of-Custody-Record

Chevron U.S.A. Inc. P.O. BOX 5004 San Ramon, CA 94583 FAX (415)842-9591	Chevron Facility Number: 9-2394 Facility Address: 15526 Hesperian Blvd, San Lorenzo Consultant Project Number: 02020 Consultant Name: Groundwater Technology, Inc. Address: 4057 Port Chicago Hwy, Concord CA 94520 Project Contact (Name): Tim Watchers (Phone) (510) 671-2387 (Fax Number)	Chevron Contact (Name): Mark Miller (Phone): 510-842-8134 Laboratory Name: Superior Laboratory Release Number: 5832660 Samples Collected by (Name): Doug Ford Collection Date: 6/23/93 Signature: Doug Ford	

Analyses To Be Performed

Sample Number	Lab Sample Number	Number of Containers	Matrix S = Soil A = Air W = Water C = Charcoal	Type G = Grab C = Composite D = Discrete	Time	Sample Preservation	Iced (Yes or No)	BTEX + TPH GAS (8020 + 8015)	TPH Diesel (8015)	Oil and Grease (5520)	Purgeable Halocarbons (8010)	Purgeable Aromatics (8020)	Purgeable Organics (8240)	Extractable Organics (8270)	Metals Cd,Cr,Pb,Zn,Ni (ICAP or AA)	hold				Remarks
mw4-4'	1	1	S	D	0908	None	Y	X												
mw4-9'	2	1	S	D	0915		Y	X												
mw4-14'	3	1	S	D	0925		Y									X				
mw4-19'	4	1	S	D	0935		Y									X				
mw4-24'	5	1	S	D	0955		Y									X				SS 40c
mw5-4'	6	1	S	D	1225		Y	X												
mw5-9'	7	1	S	D	1235		Y	X												
mw5-14'	8	1	S	D	1245		Y									X				
mw5-19'	9	1	S	D	1335		Y									X				
mw5-24'	10	1	S	D	1350		Y													

Please Initial:
Samples Stored in ice.
Appropriate containers
Samples preserved
VOA's without headspace
Comments:

Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time	Turn Around Time (Circle Choice)
Doug Ford	GTI	6/23/93	T. Watch	GTI	24 June 93 3:35	24 Hrs. 48 Hrs. 5 Days 10 Days **(As Contracted)**
T. Watch	GTI	6/24/93 3:35 pm	Received By (Signature)	Organization	Date/Time	
Relinquished By (Signature)	Organization	Date/Time	Received For Laboratory By (Signature): [signature]		Date/Time 3:35 06/24/93	

COC-3.DWG/03 91/MLM

Superior Precision Analytical, Inc.
825 Arnold Drive, Suite 114 ▪ Martinez, California 94553 ▪ (510) 229-1512 / fax (510) 229-1526

GROUNDWATER TECHNOLOGY, INC.
Attn: TIM WATCHERS

Project 02020-4376
Reported 07/01/93

TOTAL PETROLEUM HYDROCARBONS

Lab #	Sample Identification	Sampled	Analyzed	Matrix
89066- 1	MW 6-4'	06/23/93	07/01/93	Soil
89066- 2	MW 6-9'	06/23/93	07/01/93	Soil

RESULTS OF ANALYSIS

Laboratory Number: 89066- 1 89066- 2

Gasoline:	ND<1	ND<1
Benzene:	ND<.005	ND<.005
Toluene:	ND<.005	ND<.005
Ethyl Benzene:	ND<.005	ND<.005
Xylenes:	ND<.015	ND<.015
Concentration:	mg/Kg	mg/Kg

Superior Precision Analytical, Inc.
825 Arnold Drive, Suite 114 ▪ Martinez, California 94553 ▪ (510) 229-1512 / fax (510) 229-1526

C E R T I F I C A T E O F A N A L Y S I S

ANALYSIS FOR TOTAL PETROLEUM HYDROCARBONS

QA/QC INFORMATION
SET: 89066

NA = ANALYSIS NOT REQUESTED
ND = ANALYSIS NOT DETECTED ABOVE QUANTITATION LIMIT
mg/kg = parts per million (ppm)

OIL AND GREASE ANALYSIS By Standard Methods Method 5520F:
Minimum Detection Limit in Soil: 50mg/kg

Modified EPA SW-846 Method 8015 for Extractable Hydrocarbons:
Minimum Quantitation Limit for Diesel in Soil: 1mg/kg

EPA SW-846 Method 8015/5030 Total Purgable Petroleum Hydrocarbons:
Minimum Quantitation Limit for Gasoline in Soil: 1mg/kg

EPA SW-846 Method 8020/BTXE
Minimum Quantitation Limit in Soil: 0.005mg/kg

ANALYTE	MS/MSD RECOVERY	RPD	CONTROL LIMIT
Gasoline:	98/85	14%	70-130
Benzene:	89/95	7%	70-130
Toluene:	93/98	5%	70-130
Ethyl Benzene:	96/100	4%	70-130
Xylenes:	93/96	3%	70-130

Richard Srna, Ph.D.
for Sayed Bani
Laboratory Director

Fax copy of Lab Report and COC to Chevron Contact: ☐ Yes ☐ No 89066

Chain-of-Custody-Record

Chevron U.S.A. Inc.
P.O. BOX 5004
San Ramon, CA 94583
FAX (415)842-9591

Chevron Facility Number 9-2384
Facility Address 15526 Hesperian Blvd, San Lorenzo
Consultant Project Number 02020-4376 (coc # 89067)
Consultant Name Groundwater Technology, Inc.
Address 4057 Port Chicago Hwy, Concord CA 94520
Project Contact (Name) Tim Watchers
(Phone) (510)671-2387 (Fax Number)

Chevron Contact (Name) Mark Miller
(Phone) 510 842 8134
Laboratory Name Superior
Laboratory Release Number 5832660
Samples Collected by (Name) Doug Ford
Collection Date 6/23/93
Signature Doug Ford

Analyses To Be Performed

Sample Number	Lab Sample Number	Number of Containers	Matrix S = Soil A = Air W = Water C = Charcoal	Type G = Grab C = Composite D = Discrete	Time	Sample Preservation	Iced (Yes or No)	BTEX + TPH GAS (8020 + 8015)	TPH Diesel (8015)	Oil and Grease (5520)	Purgeable Halocarbons (8010)	Purgeable Aromatics (8020)	Purgeable Organics (8240)	Extractable Organics (8270)	Metals Cd,Cr,Pb,Zn,Ni (ICAP or AA)	hold					Remarks (~~Deposit~~ Report comp on separate report.)
mw6-4'	1	1	S	D	1615	None	Y	X													
mw6-9'	2	1	S	D	1625		Y	X													
mw6-14'	3	1	S	D	1630		Y									X					
mw6-19'	4	1	S	D	1638		Y									X					
mw6-24'	5	1	S	D	1650		Y									X				X	report on separate report
Comp. A		1	S	G	1800	None	Y	X													

Please initial: SS
Samples stored in ice. 4°C
Appropriate containers
Samples preserved
VOA's without headspace
Comments:

Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
Doug Ford	GTI	6/23/93	T. Watch	GTI	6/24/93 3:35
T. Watch	GTI	6/24/93 3:35	Received By (Signature)	Organization	Date/Time
Relinquished By (Signature)	Organization	Date/Time	Received For Laboratory By (Signature): Sapelsiyool		06/24/93 3:35

Turn Around Time (Circle Choice)
24 Hrs.
48 Hrs.
5 Days
~~10 Days~~
(As Contracted) — circled

Superior Precision Analytical, Inc.
P.O. Box 1545 • Martinez, California 94553 • (510) 229-1590 / fax (510) 229-0916

GROUNDWATER TECHNOLOGY, INC.
Attn: TIM WATCHERS

Project 020204376
Reported 07/15/93

TOTAL PETROLEUM HYDROCARBONS

Lab #	Sample Identification	Sampled	Analyzed	Matrix
89159- 1	TB-LB	07/02/93	07/12/93	Water
89159- 2	MW-1	07/02/93	07/12/93	Water
89159- 3	MW-2	07/02/93	07/14/93	Water
89159- 4	MW-3	07/02/93	07/12/93	Water
89159- 5	MW-4	07/02/93	07/15/93	Water
89159- 6	MW-5	07/02/93	07/14/93	Water
89159- 7	MW-6	07/02/93	07/14/93	Water

RESULTS OF ANALYSIS

Laboratory Number:	89159- 1	89159- 2	89159- 3	89159- 4	89159- 5
Gasoline:	ND<50	ND<50	2100	610	80
Benzene:	ND<0.5	ND<0.5	45	73	ND<0.5
Toluene:	ND<0.5	ND<0.5	1.4	0.5	0.6
Ethyl Benzene:	ND<0.5	ND<0.5	87	42	ND<0.5
Xylenes:	ND<1.5	ND<1.5	4.8	ND<1.5	ND<1.5
Concentration:	ug/L	ug/L	ug/L	ug/L	ug/L

Laboratory Number:	89159- 6	89159- 7
Gasoline:	ND<50	14000
Benzene:	ND<0.5	330
Toluene:	ND<0.5	28
Ethyl Benzene:	ND<0.5	980
Xylenes:	ND<1.5	580
Concentration:	ug/L	ug/L

Superior Precision Analytical, Inc.
P.O. Box 1545 ▪ Martinez, California 94553 ▪ (510) 229-1590 / fax (510) 229-0916

C E R T I F I C A T E O F A N A L Y S I S

ANALYSIS FOR TOTAL PETROLEUM HYDROCARBONS

QA/QC INFORMATION
SET: 89159

NA = ANALYSIS NOT REQUESTED
ND = ANALYSIS NOT DETECTED ABOVE QUANTITATION LIMIT
ug/L = parts per billion (ppb)

OIL AND GREASE ANALYSIS By Standard Methods Method 5520F:
Minimum Detection Limit in Water: 5000ug/L

Modified EPA SW-846 Method 8015 for Extractable Hydrocarbons:
Minimum Quantitation Limit for Diesel in Water: 50ug/L

EPA SW-846 Method 8015/5030 Total Purgable Petroleum Hydrocarbons:
Minimum Quantitation Limit for Gasoline in Water: 50ug/L

EPA SW-846 Method 8020/BTXE
Minimum Quantitation Limit in Water: 0.5ug/L

ANALYTE	MS/MSD RECOVERY	RPD	CONTROL LIMIT
Gasoline:	84/90	7%	70-130
Benzene:	116/116	0%	70-130
Toluene:	107/107	0%	70-130
Ethyl Benzene:	106/108	2%	70-130
Xylenes:	107/108	1%	70-130

Richard Srna, Ph.D.
Laboratory Director
7/15/93

Fax copy of Lab Report and COC to Chevron Contact: ☐ Yes ☐ No

07157

Chain-of-Custody-Record

Chevron U.S.A. Inc.
P.O. BOX 5004
San Ramon, CA 94583
FAX (415)842-9591

Chevron Facility Number: 9-[redacted]84
Facility Address: 15526 Hesperian Blvd, San Lo
Consultant Project Number: 02020 4376
Consultant Name: Groundwater Tech Inc.
Address: 4057 Port Chicago Hwy
Project Contact (Name): Tim Watchers
(Phone): 671-2387 (Fax Number): 685-9148

Chevron Contact (Name): Mark Miller
(Phone): 842-8134
Laboratory Name: Superior
Laboratory Release Number: 583 2660
Samples Collected by (Name): Randy Ray Phillips
Collection Date: 7/2/93
Signature: [signature]

Sample Number	Lab Sample Number	Number of Containers	Matrix S = Soil A = Air W = Water C = Charcoal	Type G = Grab C = Composite D = Discrete	Time	Sample Preservation	Iced (Yes or No)	Analyses To Be Performed: BTEX + TPH GAS (8020 + 8015)	TPH Diesel (8015)	Oil and Grease (5520)	Purgeable Halocarbons (8010)	Purgeable Aromatics (8020)	Purgeable Organics (8240)	Extractable Organics (8270)	Metals Cd,Cr,Pb,Zn,Ni (ICAP or AA)	hold				Remarks
TBLB	1	1V	W	G	12:00	HCl	Yes	X												Do not Bill TB-LB
RBmw-1	8	1V			12:00											X				
mw-1	2	3V			12:00			X												
RBmw-2	9	1V			12:50											X				
mw-2	3	3V			12:50			X												
RBmw-3	10	1V			12:10											X				
mw-3	4	3V			12:10			X												
RBmw-4	11	1V			12:20											X				
mw-4	5	3V			12:20			X												
RBmw-5	12	1V			12:30											X				
mw-5	6	3V			12:30			X												
RBmw-6	13	1V			12:40											X				
mw-6	7	3V	↓	↓	12:40	↓	↓	X												

Please initial:
Samples Shipped on Ice.
Appropriate containers
Samples preserved
VOA's without headspace
Comments:

Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
[signature]	GTI	7/6/93 9:25	[signature]	GTI	7/6/93
[signature]	GTI	7/6/93			
			[signature]		7/6/93 1000

Turn Around Time (Circle Choice)
24 Hrs.
48 Hrs.
5 Days
10 Days
As Contracted