GROUNDWATER TECHNOLOGY, INC.

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ENVIRONMENTAL ASSESSMENT REPORT
CHEVRON SERVICE STATION NO. 9-6991
2920 CASTRO VALLEY BOULEVARD
CASTRO VALLEY, CALIFORNIA

DEC 23 '92 JST

020202778

DECEMBER 11, 1992

Prepared for:
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Vice President, General Manager
West Region

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ENVIRONMENTAL ASSESSMENT REPORT
FORMER CHEVRON SERVICE STATION NO. 9-6991
2920 CASTRO VALLEY BOULEVARD
CASTRO VALLEY, CALIFORNIA

DECEMBER 11, 1992

1.0 INTRODUCTION

This report summarizes the environmental assessment work conducted by Groundwater Technology, Inc. (Groundwater Technology) at the Chevron Service Station No. 9-6991 located at 2920 Castro Valley Boulevard in Castro Valley, California (Figure 1). The objective of this work was to further evaluate the lateral extent of gasoline and diesel fuel hydrocarbons in the soil and groundwater beneath the site. Another objective was to compare the data collected from 3/4-inch-diameter monitoring wells with the data collected from 2-inch-diameter monitoring wells. The assessment work completed during September and October 1992 included drilling four soil borings, installing 2-inch groundwater monitoring wells in three of the borings, sampling soil and groundwater, analyzing the collected samples, evaluating the data, and preparing this report.

2.0 BACKGROUND

The site is located in west Alameda County, southeast Castro Valley, on the northeast corner of the intersection of Castro Valley Boulevard and Anita Road (Figure 2). The parking lot of a small shopping mall abuts the site to the north and east. Commercial-business buildings are located across Castro Valley Boulevard to the south. A former service station site is across Anita Road on the northwest corner of the intersection of Anita Road and Castro Valley Boulevard. The aboveground structures of that former station, including the pump island foundations, are still in place. Currently, that site is the location of an automobile interiors business.

The surface elevation at the site is approximately 170 feet above mean sea level. The land surface slopes gently toward South Reservoir located approximately 0.7 mile to the south.

In September 1990, Groundwater Technology was retained by Chevron U.S.A. Products Company (Chevron) to perform soil sampling operations in conjunction with the removal of two underground storage tanks: a 1,000-gallon waste-oil tank and a 6,000-gallon unleaded gasoline tank. Both tanks and the associated product lines were excavated and removed from the site on September 11, 1990. The two remaining underground storage tanks were left in place, and new product lines were installed in preparation for the completion of a service station and mini-market.

Based on results of chemical analyses performed on soil samples collected from the excavation side walls, additional soil was removed from the waste-oil tank and product line excavations. This additional excavation was conducted on September 18, 1990, until field analytical results indicated that hydrocarbon concentrations were below method detection limits (MDLs) or until excavation north and west of the waste-oil tank pit became impractical. The soil analyses were performed in the field by a California-certified mobile laboratory. In December 1990, Groundwater Technology issued a Summary Tank Excavation Report, which summarized the details of the tank removal.

On September 24 and 30, 1991, three soil borings (MW-1, MW-2, and MW-3) were drilled using a 2-inch-diameter hydraulically driven coring system. The borings were advanced to a depth of 20 to 21 feet below grade. A 3/4-inch monitoring well was installed in each of the 2-inch-diameter borings to monitor the potentiometric surface below the site and to collect water samples. The analytical results of soil samples collected during boring activities reported benzene and total petroleum hydrocarbons-as-gasoline (TPH-G) concentrations below MDLs. Analytical results of groundwater samples reported benzene and TPH-G concentrations ranging from 1.9 to 45 parts per billion (ppb) and from 81 to 230 ppb, respectively. Details of the well installation may be found in the November 11, 1991, Groundwater Technology Well installation Report.

The site was monitored and sampled monthly during the last quarter of 1991. The site was also monitored and sampled during June 1992. Analytical results of groundwater samples reported benzene and TPH-G concentrations ranging from <0.5 to 120 ppb and from <50 to 440 ppb, respectively. Total petroleum hydrocarbons-as-diesel fuel (TPH-D) concentrations were reported up to 170 ppb in groundwater samples collected on October 4, 1991. Monitoring and sampling data are summarized in the July 8, 1992, Groundwater Technology report Groundwater Monitoring and Sampling Activities.

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3.0 WORK SCOPE

3.1 Site-Specific Health and Safety Plan and Permitting

Groundwater Technology 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 available Site-Specific Health and Safety Plans for the site. The health and safety plan was reviewed and signed by all of Groundwater Technology's personnel and subcontractors before performing work at the site.

Groundwater Technology reviewed the site history and site information with Chevron representatives before beginning work at the site. Drilling permits to install the monitoring wells were obtained from Alameda County Flood Control and Water Conservation District Zone 7 Water Agency. Encroachment permits were obtained from the Alameda County Public Works Department. Copies of the permits are included in Appendix A.

3.2 Soil Borings

On September 25 and October 10, 1992, Groundwater Technology supervised the drilling of four soil borings (MW-4, MW-5, MW-5A, and MW-6) as shown in Figure 2. The soil boring for MW-5A was abandoned on September 25, 1992, because flowing sands encountered during the well installation obstructed efforts to set the well casing. A new soil boring (MW-5) was drilled on October 8, 1992, using a wooden plug in the augers to keep the flowing sand out of the boring. Each soil boring was drilled with a truck-mounted drill rig equipped with 8-inch hollow stem augers. Monitoring wells MW-4 and MW-5 were drilled to 20 feet below grade. Monitoring well MW-6 was drilled to 24 feet below grade. The augers were steam cleaned between each monitoring well installation. A Groundwater Technology field geologist, under the supervision of a California-registered geologist, logged the materials encountered during drilling of the soil borings using the Unified Soil Classification System.

The steam cleaning water was stored in labeled 55-gallon drums pending disposal. The soil cuttings generated during the drilling activities were placed on, and covered by, polyethylene plastic. Soil cuttings were then characterized, profiled, and transported to City of Mountain View Public Landfill in Mountain View, California. Water generated from steam cleaning, purging and sampling activities was removed and transported to the Chevron Terminal in Richmond.

3.3 Soil Sampling

During drilling, soil samples were collected at 5-foot intervals starting from approximately 5 feet below grade to the bottom of the boring. Soil samples were collected using a 2-inch-outside-diameter split-spoon sampler, lined with three 2-inch-diameter by 6-inch-long brass sample tubes. The sampler was driven 18 inches ahead of the hollow-stem augers at each sample point 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. All sampling was performed according to Groundwater Technology Standard Operating Procedures (SOPs), which are included in Appendix C.

The soil samples were submitted to a California-certified laboratory for benzene, toluene, ethylbenzene, xylenes (BTEX) and TPH-G analyses using EPA Methods 5030/8020 and modified EPA Method 8015. Additional analyses for TPH-D Modified EPA SW-846 Method 8015 were performed on samples collected on September 25, 1992.

3.4 Monitoring Well Installation

Monitoring wells MW-4 and MW-5 were constructed of 5 feet of 2-inch-diameter, Schedule 40 polyvinyl chloride (PVC) casing with flush threads, and 15 feet of 0.020-inch-slot well screen. The well screen of each monitoring well was installed from 5 to 20 feet below grade. Monitoring well MW-6 (also a 2-inch well) was constructed of 9 feet of 2-inch-diameter casing and screened from 9 to 24 feet below grade. A sand filter was placed around the well screen in monitoring wells MW-5 and MW-6 to approximately 1 foot above the top of the screen. The sand filter in monitoring well MW-4 was placed to approximately 0.5 foot above the top of the screen. Monitoring wells MW-4

and MW-6 were completed with 2 feet of hydrated bentonite and a neat-cement seal to grade. Monitoring well MW-5 was completed with 1 foot of hydrated bentonite and a neat-cement seal to grade. The wellhead was protected by a locking cap and a traffic-rated street box with a water-tight bolted lid. Well construction details are included with the drill logs (Appendix B). The top of casing elevation of each monitoring well was surveyed to Alameda County Benchmark No. CVB-2G by a professional licensed surveyor.

3.5 Monitoring Well Development

On September 28 and October 13, 1992, the monitoring wells were developed by surging and bailing groundwater using a PVC bailer. This technique promotes a uniform 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 each well was bailed until the fine-grain sediments were removed. Approximately 13 gallons were removed from monitoring well MW-4 before the well went dry, 40-gallons were removed from monitoring well MW-5, and 20 gallons were removed from monitoring well MW-6 during development activities.

3.6 Groundwater Monitoring

On October 27, 1992, 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, consisting 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 October 27, 1992, the monitoring wells were purged and groundwater samples were collected from monitoring wells MW-1 through MW-6 using a Teflon® sampler. Immediately before collecting each water sample, a distilled water rinsate blank was collected from the Teflon® sampler as a quality control check on the cleanliness of the sampler. A trip/lab blank was also prepared 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 transport. Each sample was analyzed for BTEX and TPH-G using EPA Methods 5030/8020 and modified EPA Method 8015. Additional samples were collected and analyzed for TPH-D using Modified EPA SW-846 Method 8015. Water generated during the purging and sampling process was stored in a Department of Transportation (DOT)-approved water trailer and transported for recycling to the Chevron refinery in Richmond, California.

4.0 SITE CONDITIONS

4.1 Analytical Results for Soil

Laboratory analytical results for soil samples collected during soil boring activities in September and October 1992 reported toluene concentrations in each soil sample analyzed. Concentrations of TPH-G were below MDLs in each soil sample analyzed. The highest concentrations of toluene and xylenes (0.26 and 0.011 parts per million [ppm], respectively) were detected in soil samples collected at a depth of 5 feet in the off-site soil boring for monitoring well MW-6. Benzene was not detected in the soil samples analyzed. Concentrations of TPH-D (at 5 ppm) were also detected in this sample. Results of soil sample analyses are summarized in Table 1 and laboratory reports are included in Appendix D.

4.2 Analytical Results for Groundwater

Analytical results for groundwater samples collected on October 27, 1992, reported detectable BTEX and TPH-G concentrations in samples collected from monitoring wells MW-1, MW-2, MW-4, MW-5, and MW-6. The highest concentrations of benzene (22 ppb) and TPH-G (600 ppb) were reported in the samples collected from monitoring well MW-6. Concentrations of TPH-D were reported in the samples collected from monitoring wells MW-1, MW-2, and MW-3 at 54, 110, and 120 ppb, respectively. Analytical results of the samples collected from wells MW-4, MW-5, and MW-6 reported TPH-D concentrations below the MDL. The TPH-G and benzene analytical results for groundwater samples collected on October 27, 1992, are illustrated in Figures 3 and 4, respectively. A summary of the groundwater sample analytical results is presented in Table 2. Copies of the laboratory reports are included in Appendix D.

Comparison of analytical results for groundwater samples collected from monitoring wells MW-3 (3/4-inch-diameter) and MW-4 (2-inch-diameter), which were drilled in close proximity for this purpose, showed nondetectable TPH-G concentrations in the samples from each well. A TPH-D concentration of 120 ppb was reported in the sample from monitoring well MW-3 and below the MDL (50 ppb) in the sample from MW-4. Analytical results reported detectable concentrations of toluene, ethylbenzene, and xylenes in the sample collected from monitoring well MW-4 but not in the sample from well MW-3.

4.3 Hydrogeology

The site is located in west Alameda County within Castro Valley and the Castro Valley Groundwater Basin. Castro Valley is situated in an intermountain valley of the Diablo Range. The unconsolidated sediments are characteristic of older alluvium of the Pleistocene Epoch of the Quaternary Period. These unconsolidated materials overlie the Chico Formation. This formation is considered to be non-water-bearing because of poor water yield in this area. The younger Quaternary Age sediments beneath the site consist of unconsolidated sands, silts, and clays, and are the major water-bearing units in the area. Groundwater in these unconsolidated sediments is mainly unconfined. The eastern and northern slopes of the Castro Valley are the principal recharge areas with low rates of recharge. Regional groundwater flow is generally to the southwest with outflow probably to the Santa Clara Valley. The site is not located within a major groundwater basin (Western Alameda County Water Resources).

The materials encountered during drilling consisted of clays, silty clays, sand, and sandy gravels. Figure 5 shows the location of cross sections A-A' and B-B'. Figure 6 shows cross sections A-A' and B-B'. Groundwater levels measured on October 27, 1992, are indicated next to the screen interval of the monitoring wells. Analytical results of the soil samples analyzed are indicated at the respective soil sample collection depths. The lithology of the shallow subsurface, as interpreted from the soil boring logs, indicated predominately clay material from 0 to 20 feet with sands and gravels at depths greater than 20 feet.

On October 27, 1992, the groundwater levels at the site ranged from 9.95 feet below grade in monitoring well MW-5 to 12.54 feet below grade in well MW-6. A potentiometric surface map

(Figure 7) was prepared using the water level data collected on October 27, 1992. The potentiometric surface has been mapped for monitoring wells MW-1, MW-2, and MW-3 (3/4-inch-diameter) and monitoring wells MW-4, MW-5, and MW-6 (2-inch-diameter). A comparison of the potentiometric surfaces shows that the groundwater flow direction and gradient are nearly the same. Figure 7 shows a southwesterly groundwater flow with a gradient between 0.01 and 0.02 foot per foot (ft/ft). Groundwater level data are presented in Table 2.

5.0 SUMMARY

- On September 25 and October 8, 1992, Groundwater Technology supervised the drilling of four soil borings (MW-4, MW-5, MW-5A, and MW-6) using a mobile B-53 drilling rig. The original soil boring for MW-5 was abandoned and re-drilled because of flowing sands. The borings for the monitoring wells were drilled to a depth of 20 to 24 feet below grade. The materials encountered during drilling consisted of clays, silty clays, sands, and gravelly sands.

- Analytical results of the soil samples collected during drilling activities indicated that TPH-G concentrations were below MDLs. Concentrations of TPH-D at 5 ppm were reported in the soil samples collected at a depth of 5 feet in monitoring well MW-6. Benzene was not detected in the soil samples tested.

- On October 27, 1992, groundwater levels were measured in each of the monitoring wells at the site. The depth to water ranged between 9 and 13 feet below grade. Analysis of the monitoring data indicated a groundwater flow direction toward the southwest with a gradient between 0.01 and 0.02 ft/ft.

- A comparison of the groundwater flow direction and gradient direction calculated using the data collected from the 3/4-inch-diameter monitoring wells versus the data collected from the 2-inch-diameter monitoring wells, showed that the groundwater flow direction and gradient are nearly the same.

- Analytical results of the groundwater samples collected from monitoring wells MW-1 through MW-6 on October 27, 1992, reported the highest TPH-G concentration (600 ppb) in the sample collected from monitoring well MW-6. The highest benzene concentration (22 ppb) was reported for the sample collected from well MW-6. Analytical results of the groundwater samples collected from monitoring wells MW-1, MW-2, and MW-3 reported concentrations of TPH-D ranging from 54 ppb to 120 ppb.

- A comparison of analytical results for groundwater samples collected from the 2-inch-diameter wells with those for samples collected from the 3/4-inch-diameter wells revealed nondetectable levels of TPH-G in both samples. However, analytical results reported TPH-D concentrations in the samples from the 3/4-inch-diameter

wells and monitoring well MW-6 but not in the samples from 2-inch-diameter wells MW-4 and MW-5. Toluene, ethylbenzene, and xylene concentrations were detected in the samples collected from monitoring well MW-4 but not in those collected from well MW-3.

6.0 CONCLUSIONS

The comparison of potentiometric data from the 3/4-inch-diameter and 2-inch-diameter monitoring wells showed that the gradients and estimated flow directions are nearly the same. The comparison of analytical results from water samples collected from monitoring wells MW-3 (3/4-inch-diameter) and MW-4 (2-inch-diameter) revealed that TPH-G concentrations were below MDLs in each well. However, TPH-D concentrations were detected in the sample collected from monitoring well MW-3 and not in the sample collected from MW-4.

The analytical results of the groundwater samples report that off-site monitoring well MW-6 has the highest TPH-G concentrations. The dissolved hydrocarbon plume appears to be defined to the northeast and east. Based on the October 27, 1992, groundwater sampling event, the TPH-D hydrocarbon plume is confined to on-site wells MW-1, MW-2, and MW-3. Groundwater elevations calculated from the current data show a groundwater flow direction to the southwest.

7.0 REFERENCES

Groundwater Technology, Inc., Summary Tank Excavation Report, Chevron Service Station No. 9-6991, 2920 Castro Valley Boulevard, Castro Valley, California, December 1990.

Groundwater Technology, Inc., Well Installation Report, Chevron Service Station No. 9-6991, 2920 Castro Valley Boulevard, Castro Valley, California, November 11, 1991.

Groundwater Technology, Inc., Groundwater Monitoring and Sampling Activities, Chevron Service Station No. 9-6991, 2920 Castro Valley Boulevard, Castro Valley, California, July 8, 1992.

Western Alameda County Water Resources, Alameda County Flood Control and Conservation District, Groundwater in the San Leandro and San Lorenzo Alluvial Cones of the East Bay Plain of Alameda County, 1984.

Chevron U.S.A. Products Company
2410 Camino Ramon, San Ramon, California • Phone (510) 842-9500
Mail Address: P.O. Box 5004, San Ramon, CA 94583-0804

January 4, 1993

Mr. Scott Seery
Alameda County Health Care Services
Department of Environmental Health
Hazardous Materials Division
80 Swan Way, Room 200
Oakland, CA 94621

Re: Chevron Service Station #9-6991
2920 Castro Valley Boulevard, Castro Valley, CA

Dear Mr. Seery:

Enclosed we are forwarding the Environmental Assessment Report dated December 11, 1993, prepared by our consultant Groundwater Technology, Inc. for the above referenced site. As indicated in the report, three (3) borings were advanced and completed into ground water monitor wells designated MW-4 through MW-6. This work was performed to assess the extent of the dissolved petroleum hydrocarbon plume and evaluate the effectiveness of the previously installed 3/4-inch wells.

Soil samples collected from the drill cuttings were analyzed for total petroleum hydrocarbons as gasoline (TPH-G), total petroleum hydrocarbons as diesel (TPH-D), and BTEX. All results reported concentrations below the method detection limits for these constituents with only two exceptions. Toluene was detected at negligible concentrations in all soil samples, and a sample taken from MW-6 at 5 feet below grade reported a TPH-D concentration of 5ppm. Ground water samples were collected and analyzed for the same constituents. Benzene was detected in monitor wells MW-1, MW-2, and MW-6 at concentrations of 11, 13, and 22 ppb, respectively.

A comparison of the ground water flow direction and gradient calculated using the data collected from the 3/4-inch diameter monitor wells versus the data collected from the 2-inch monitor wells showed that ground water flow direction and gradient are nearly the same. Depth to ground water was measured at approximately 10.0 feet to 12.5 feet below grade and the direction of flow is to the southwest. Additionally, analytical data indicates similar hydrocarbon concentrations were found in both monitor wells MW-3 (3/4-inch) and MW-4 (2-inch). The only significant discrepancy is that TPH-D was detected in monitor well MW-3, but not MW-4. To ensure the validity of the gathered data, depth to ground water in all wells at the site will be monitored monthly for the next quarter. Chevron will continue to monitor and sample all wells on a quarterly basis thereafter.

Chevron will instruct its consultant to perform an investigation of the history of the surrounding area to identify possible sources of hydrocarbons found in monitor wells MW-5 and MW-6. If the history of the area reveals a possible offsite source, the a file search of RWQCB records will be performed. Additionally, locations of underground utilities will be identified to assist in the investigation.

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

Very truly yours,
CHEVRON U.S.A. PRODUCTS COMPANY

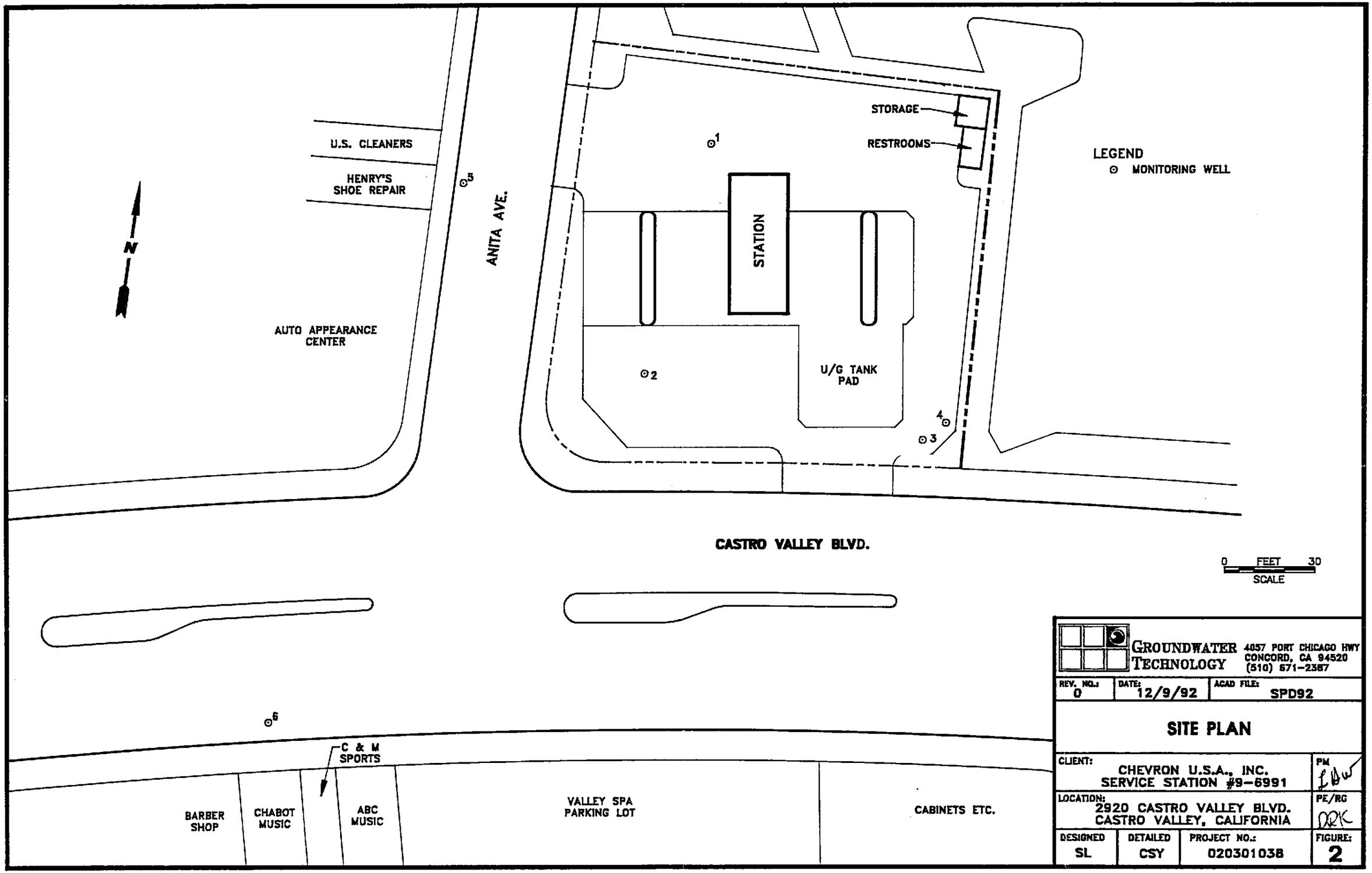
Mark A. Miller
Site Assessment and Remediation Engineer

Enclosure

cc: Mr. Rich Hiett, RWQCB-Bay Area
Mr. S.A. Willer
File (9-6991 A1)

FIGURES

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., INC. SERVICE STATION #9-6991	DATE: 1/29/92
		LOCATION: 2920 CASTRO VALLEY BLVD. CASTRO VALLEY, CALIFORNIA	FIGURE: 1



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

REV. NO.:	DATE:	ACAD FILE:
0	12/9/92	SPD92

SITE PLAN

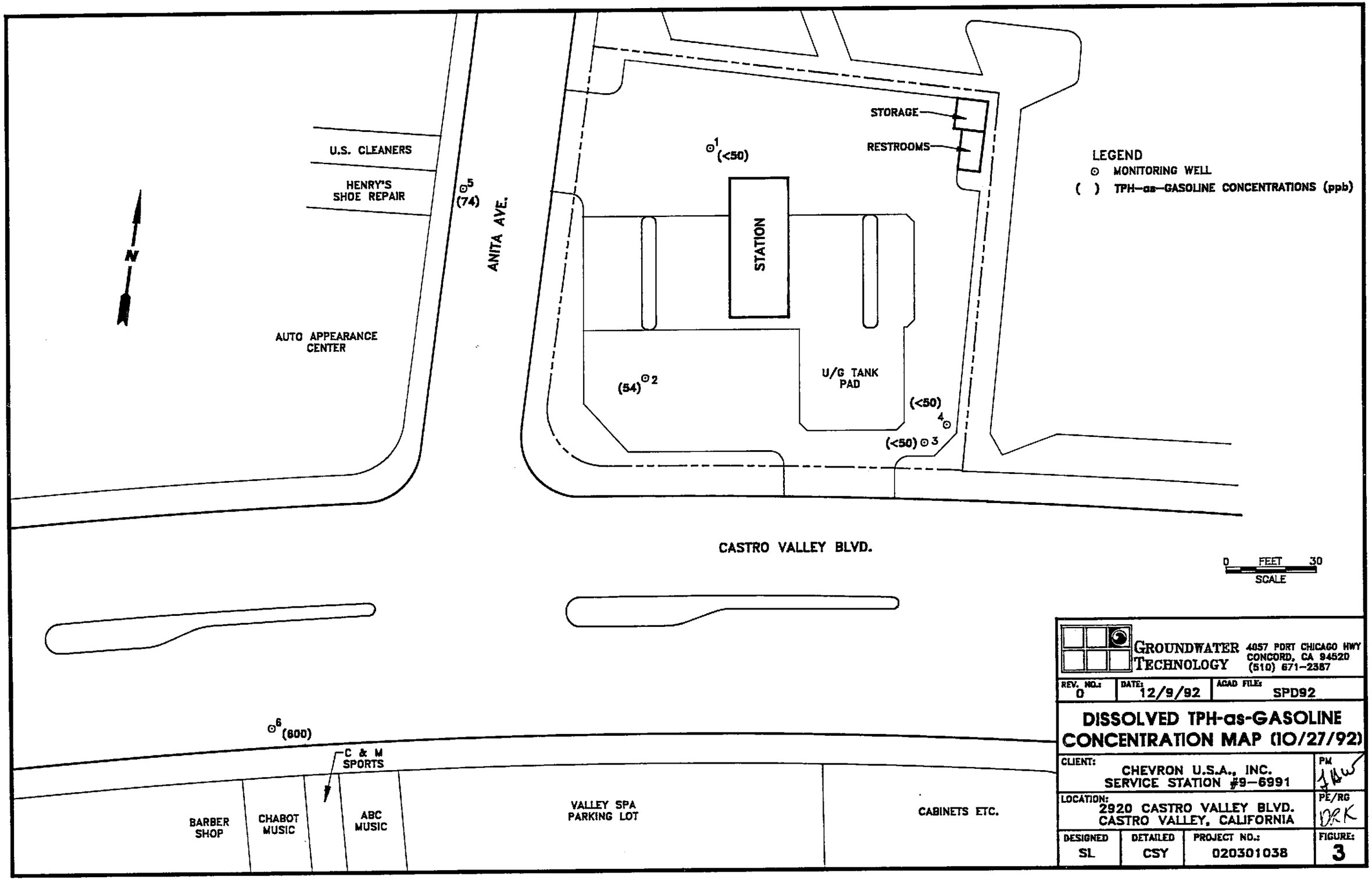
CLIENT: CHEVRON U.S.A., INC.
SERVICE STATION #9-6991

PM: EDW

LOCATION: 2920 CASTRO VALLEY BLVD.
CASTRO VALLEY, CALIFORNIA

PE/RG: DRK

DESIGNED	DETAILED	PROJECT NO.:	FIGURE:
SL	CSY	020301038	2



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REV. NO.:	DATE:	ACAD FILE:
0	12/9/92	SPD92

DISSOLVED TPH-as-GASOLINE CONCENTRATION MAP (10/27/92)

CLIENT:	PM
CHEVRON U.S.A., INC. SERVICE STATION #9-6991	JBW
LOCATION: 2920 CASTRO VALLEY BLVD. CASTRO VALLEY, CALIFORNIA	PE/RG DRK

DESIGNED	DETAILED	PROJECT NO.:	FIGURE:
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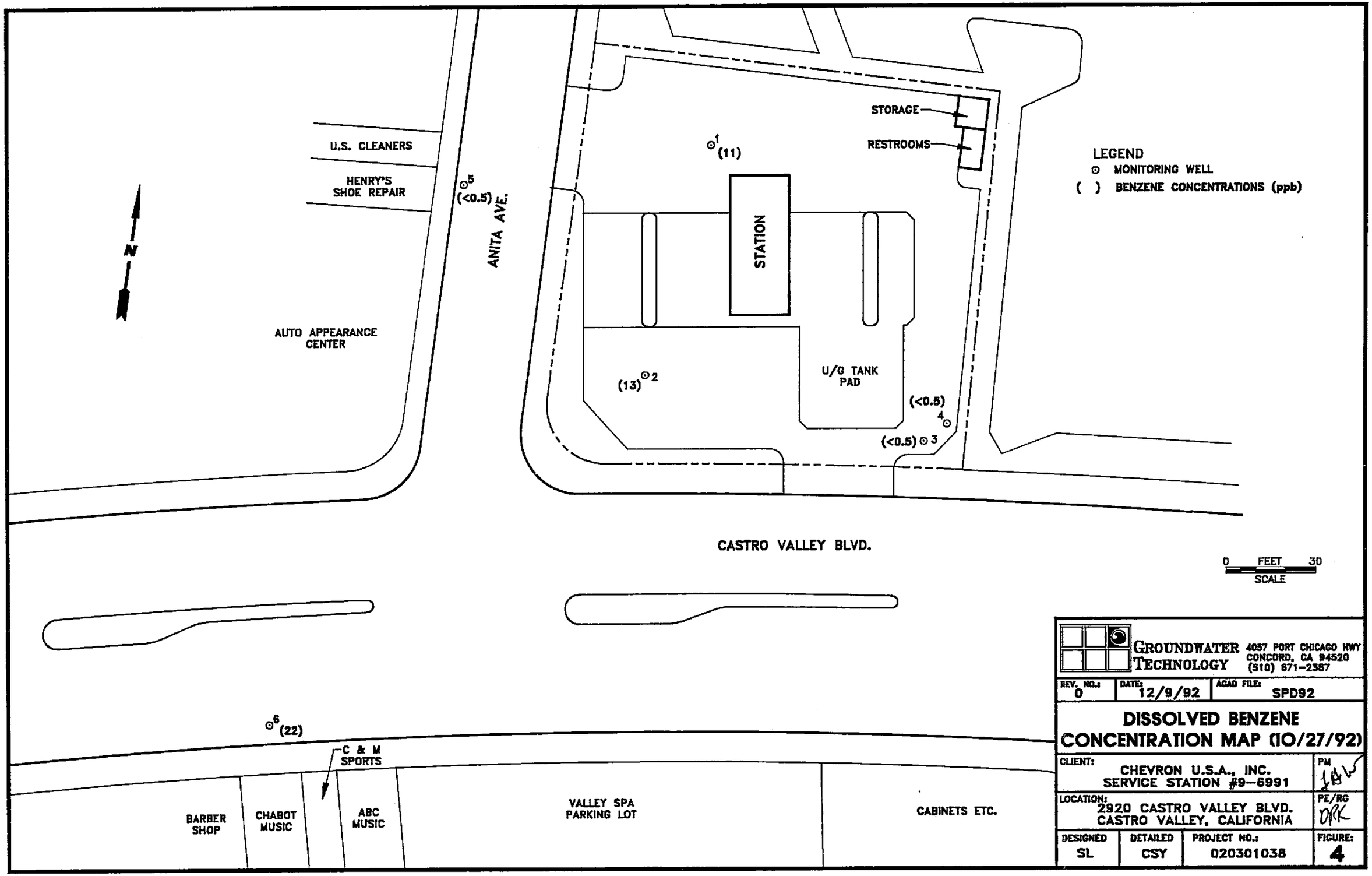

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(510) 671-2387

REV. NO.:	DATE:	ACAD FILE:
0	12/9/92	SPD92

DISSOLVED BENZENE CONCENTRATION MAP (10/27/92)

CLIENT: CHEVRON U.S.A., INC. SERVICE STATION #9-6991	PM: JBW
LOCATION: 2920 CASTRO VALLEY BLVD. CASTRO VALLEY, CALIFORNIA	PE/RG: DRK

DESIGNED	DETAILED	PROJECT NO.:	FIGURE:
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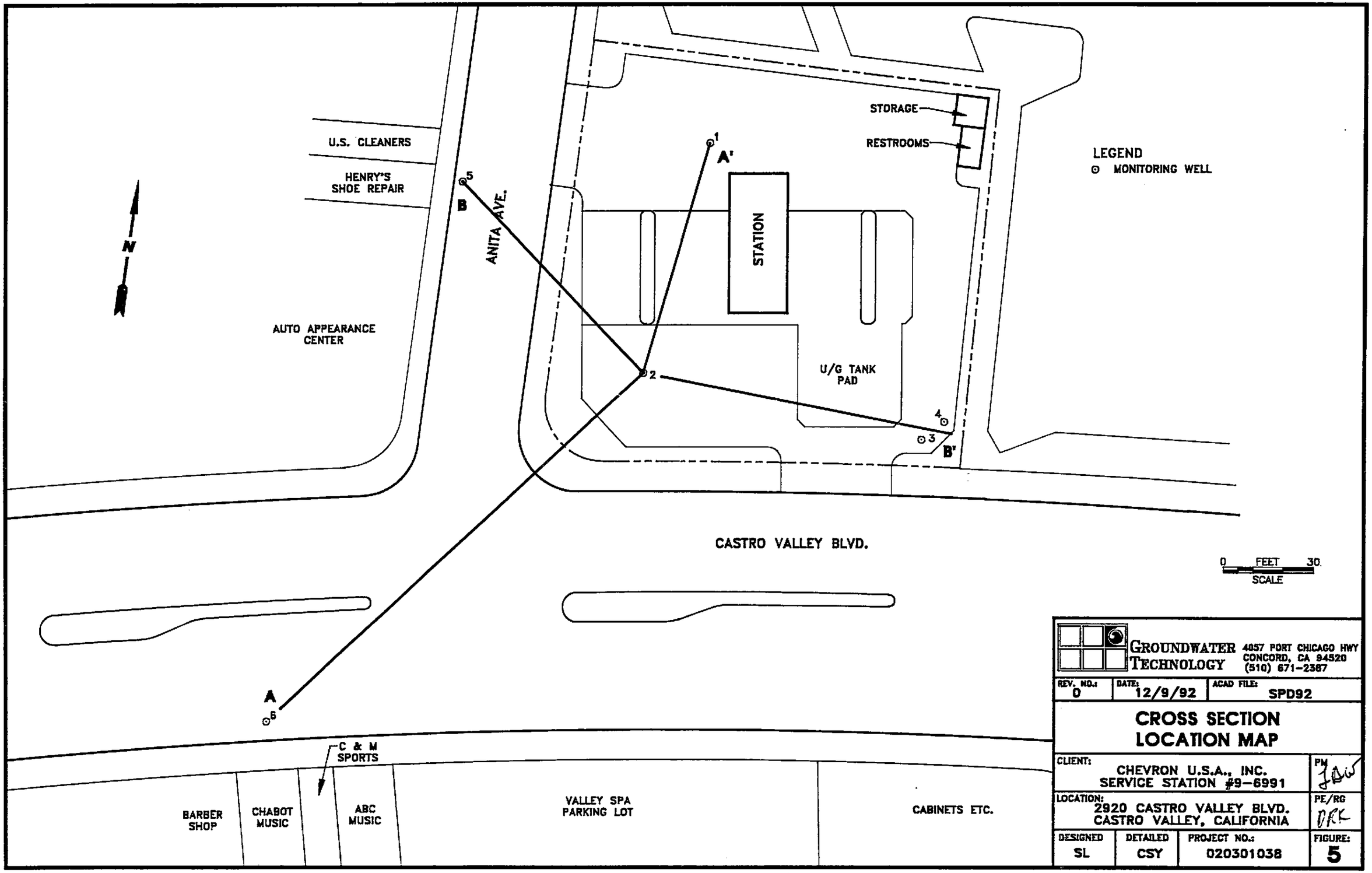

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CONCORD, CA 94520
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REV. NO.:	DATE:	ACAD FILE:
0	12/9/92	SPD92

CROSS SECTION LOCATION MAP

CLIENT: CHEVRON U.S.A., INC.
SERVICE STATION #9-6991

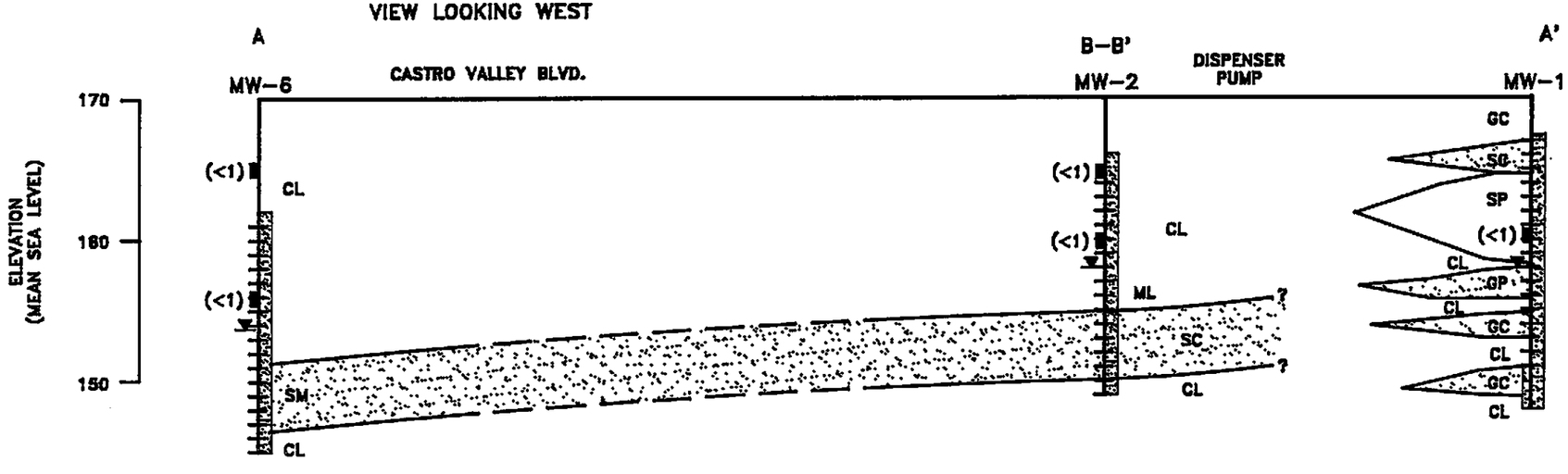
PM: JBW

LOCATION: 2920 CASTRO VALLEY BLVD.
CASTRO VALLEY, CALIFORNIA

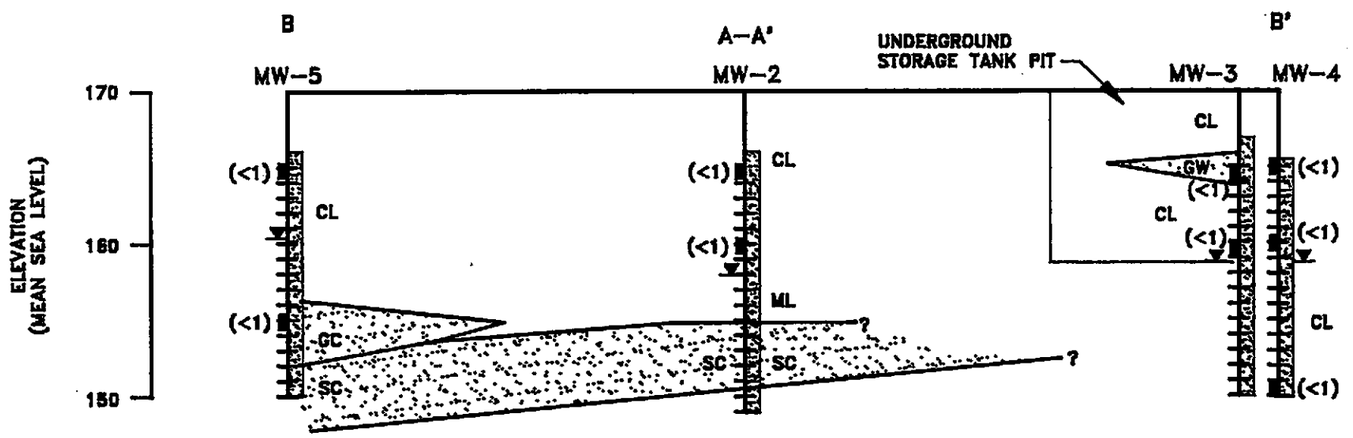
PE/RG: DRK

DESIGNED	DETAILED	PROJECT NO.:	FIGURE:
SL	CSY	020301038	5

VIEW LOOKING WEST



VIEW LOOKING NORTH



LEGEND

- SILT AND CLAY DOMINATED LITHOLOGY (CL, ML)
- SAND AND GRAVEL DOMINATED LITHOLOGY (SC, GC, GW, GP)
- GROUNDWATER LEVEL ELEVATION (10/27/92)
- SOIL SAMPLE LOCATION
- ( ) TPH-gs-GASOLINE CONCENTRATION IN SOIL (ppb)
- SAND FILTER PACK
- SCREENED INTERVAL

SCALE
0 FEET 10

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REV. NO.:	DATE:	ACAD FILE:
2	12/14/91	PSMS791/SP991

GEOLOGIC CROSS SECTIONS A-A', B-B'

CLIENT:	PM
CHEVRON U.S.A., Inc. SERVICE STATION #9-6991	
LOCATION: 2920 CASTRO VALLEY BLVD. CASTRO VALLEY, CALIFORNIA	PE/RG: DRK

DESIGNED	DETAILED	PROJECT NO.:	FIGURE:
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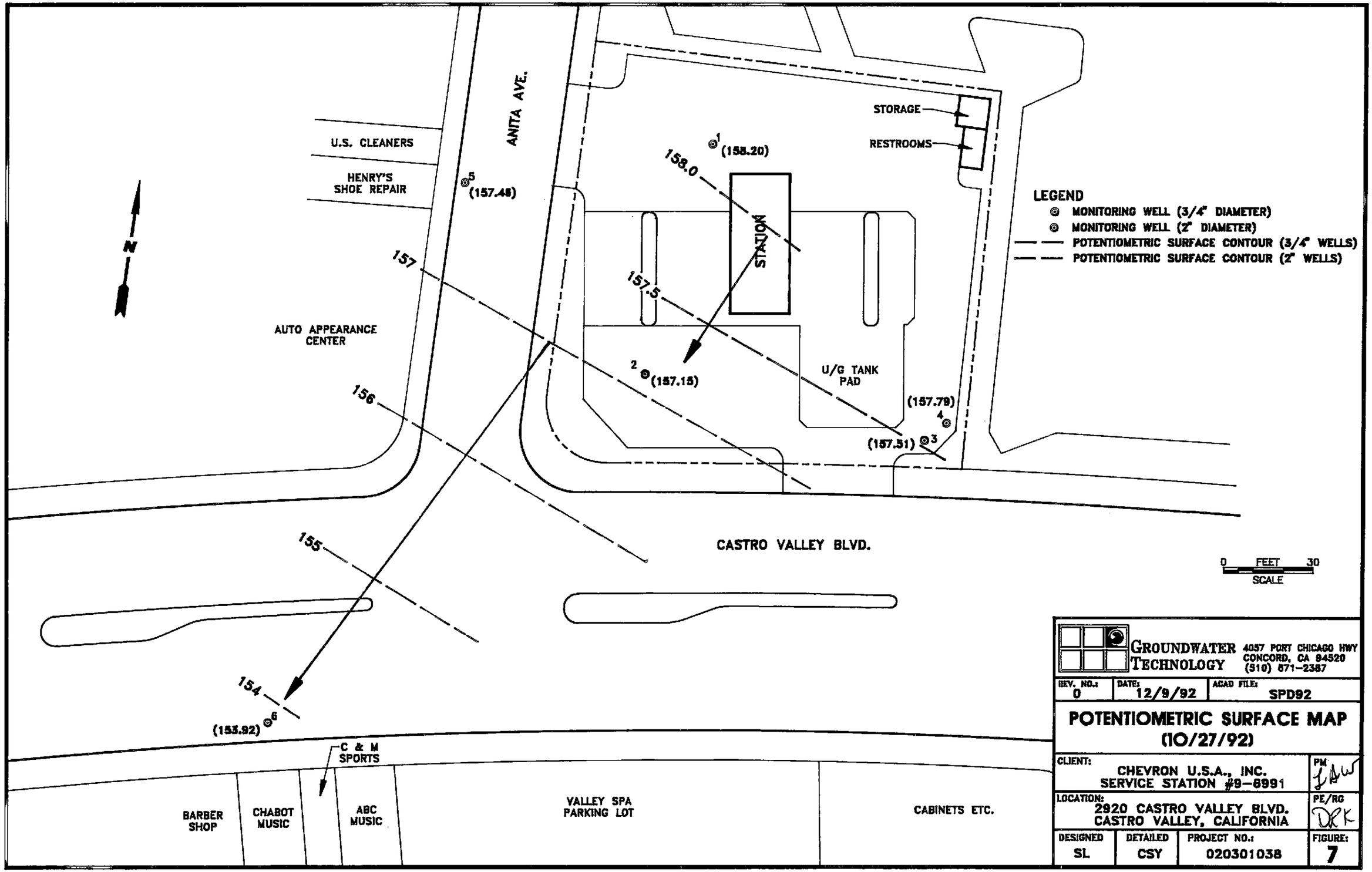

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0	12/9/92	SPD92

POTENTIOMETRIC SURFACE MAP (10/27/92)

CLIENT: CHEVRON U.S.A., INC. SERVICE STATION #9-6991

PM: LAW

LOCATION: 2920 CASTRO VALLEY BLVD. CASTRO VALLEY, CALIFORNIA

PE/RG: DRK

DESIGNED	DETAILED	PROJECT NO.:	FIGURE:
SL	CSY	020301038	7

TABLES

TABLE 1
ANALYTICAL RESULTS FOR SOIL SAMPLES
COLLECTED ON SEPTEMBER 25, 1992
(Concentrations in parts per million)

DATE	SAMPLE ID	SAMPLE DEPTH (feet)	BENZENE	TOLUENE	ETHYL-BENZENE	XYLENES	TPH-AS-GASOLINE	TPH-AS DIESEL
09/25/92	MW-4	5	<0.005	0.030	<0.005	<0.005	<1	<1
		10	<0.005	0.042	<0.005	<0.005	<1	<1
		20	<0.005	0.030	<0.005	<0.005	<1	<1
09/25/92	MW-5	5	<0.005	0.052	<0.005	<0.005	<1	<1
		10	<0.005	0.067	<0.005	<0.005	<1	<1
09/25/92	MW-6	5	<0.005	0.26	<0.005	0.011	<1	5
		10	<0.005	0.021	<0.005	<0.008	<1	<1

TPH = Total petroleum hydrocarbons

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TABLE 2
MONITORING DATA AND ANALYTICAL RESULTS
FOR GROUNDWATER SAMPLES COLLECTED ON OCTOBER 27, 1992
(Concentrations in parts per billion)

WELL ID	TOC ELEVATION (msl)	BENZENE	TOLUENE	ETHYL-BENZENE	XYLENES	TPH-AS-GASOLINE	TPH-AS-DIESEL FUEL	DTW (ft)	SPT (ft)	GWE (ft)
MW-1	169.30	11	<0.5	<0.5	<0.5	<50	54	11.10	0.00	158.20
MW-2	169.15	13	<0.5	<0.5	<0.5	54	110	12.00	0.00	157.15
MW-3	169.11	<0.5	<0.5	<0.5	<0.5	<50	120	11.60	0.00	157.51
MW-4	169.18	<0.5	0.6	0.5	4.3	<50	<50	11.39	0.00	157.79
MW-5	167.41	<0.5	<0.5	0.6	7.1	74	<50	9.95	0.00	157.46
MW-6	166.46	22	22	24	130	600	<50	12.54	0.00	153.92

$\overline{\text{TPH}}$ = Total petroleum hydrocarbons
DTW = Depth to water
SPT = Separate-phase hydrocarbon thickness
GWE = Groundwater elevation in feet above mean sea level relative to a County of Alameda benchmark stamped CVB-2G.
MSL = Mean sea level
TOC = Top of casing

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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 2920 Castro Valley Blvd.
Castro Valley, CA

CLIENT
Name Chevron USA Products Company
Address 2410 Camino Ramon Phone 510-842-9500
City San Ramon Zip 94583-0804

APPLICANT
Name Groundwater Technology Inc.
Address 4057 Port Chicago HWY Phone 510-671-2387
City Concord 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 observation
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	20	ft.
Surface Seal Depth	3	ft.	Number	3	

GEOTECHNICAL PROJECTS

Number of Borings			Maximum		
Hole Diameter		in.	Depth		ft.

ESTIMATED STARTING DATE 8/13/92
ESTIMATED COMPLETION DATE 8/15/92

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

APPLICANT'S SIGNATURE Angy A. Mitchell Date 7-21-92

FOR OFFICE USE

PERMIT NUMBER 92365
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 27 Jul 92
Wyman Hong

31992

ALAMEDA COUNTY PUBLIC WORKS
399 ELMHURST STREET, HAYWARD, CALIFORNIA 94544
ROAD ENCROACHMENT PERMIT

(In accordance with Chapter 1 of Title 5, Streets and Highways, Ordinance Code, County of Alameda, an ordinance providing for the protection of Public Highways and rights of way thereof resulting the use thereof; and the manner in which the same may be altered, excavated under, obstructed or encroached upon; and providing penalties for the violation of the provisions thereof)

Issued To: GROUNDWATER TECH,
4057 PORT CHICAGO HIGHWAY
CONCORD, CA 94520
Phone: 671-2387

Permit Number: R00-920493
Issue Date: 4/27/1992
Expiration Date: 4/27/93
Permit Issue Receipt: 004037
Assessor Number: 084A-0128-002-08
Work Order Number: 83500

Job Site: 2920 CASTRO VALLEY BLVD.
Township: CV

in compliance with and subject to all the terms, conditions and restrictions contained in Chapter 1 of Title 5 of said Ordinance Code and as stated below or printed as general or special provisions on any part of or attached to and made a part of this encroachment permit.

THE ABOVE APPLICANT HEREBY REQUESTS PERMISSION TO:
INSTALL AND OPERATE TWO GROUNDWATER MONITORING WELLS IN THE ROAD RIGHT-OF-WAY ADJACENT TO 2920 CASTRO VALLEY BOULEVARD, CASTRO VALLEY.

Attention is directed to the general provisions printed on the attached sheets of this permit and to the special provisions attached hereto and made a part hereof.

ALL MISCELLANEOUS GENERAL PROVISIONS AND THE FOLLOWING SPECIAL PROVISION NUMBERS:

K, L

THIS PERMIT AUTHORIZES INSTALLATION AND OPERATION OF THE WELLS FOR A PERIOD OF ONE YEAR. THE PERMITTEE MAY REQUEST AN EXTENSION OF THIS PERMIT FOR CONTINUING OPERATION. SEPARATE PERMITS FROM PUBLIC WORKS AND FROM ZONE 7 WILL BE REQUIRED FOR REMOVAL OF THE WELLS AND RESTORATION OF THE ROADWAY.

THE WELLS SHOULD BE LOCATED ADJACENT TO THE GUTTER SECTIONS. WELL OPERATION SHALL BE RESTRICTED TO THE HOURS OF 9AM TO 3:30 PM. MONDAY THROUGH FRIDAY.

ALL FLUIDS TAKEN FROM THE WELL SHALL BE DISPOSED OF IN AN AUTHORIZED DISPOSAL SITE; NO DISCHARGES ARE PERMITTED TO THE STORM DRAIN SYSTEM OR TO THE ROADWAY GUTTERS.

This permit does not authorize, and it shall not be construed to authorize any infringement upon the property rights of owners of the fee title of the highway referred to herein. Notice of start of work and other required notices shall be given to the Field office, 22341 Redwood Road, Castro Valley Phone (415) 582-7781.

Other Required Permits: ZONE 7 DRILLING PERMIT #92122
Bond Information: LETTER OF CREDIT #286-796
Inspection Deposit: $ 70.70 CASH

By SEE APP. Applicant Reviewed By: JKR
Work Completed: __/__/__
By ALAMEDA COUNTY Inspector: _____

Where no maps or plats are furnished, a sketch of the proposed work, showing location, name of road and other information must be made on a separate sheet, in triplicate.

APPENDIX B

DRILL LOGS AND WELL CONSTRUCTION SPECIFICATIONS

Drilling Log

GROUNDWATER TECHNOLOGY

Monitoring Well **MW-4**

Project *CHV/2920 Castro Valley Blvd.* Owner *Chevron U.S.A. Products Co.*
Location *Castro Valley, CA* Project No. *02020 2778* Date drilled *09/25/92*
Surface Elev. *169.43 ft.* Total Hole Depth *21.5 ft.* Diameter *8 inches*
Top of Casing *169.18 ft.* Water Level Initial *14 ft.* Static *10/27/92 11.39 ft.*
Screen: Dia *2 in.* Length *15 ft.* Type/Size *0.020 in.*
Casing: Dia *2 in.* Length *5 ft.* Type *SCH 40 PVC*
Filter Pack Material *Lapis Lustre #3* Rig/Core Type *Mobile B-53/Split Spoon*
Drilling Company *Kvilhaug Well Drilling* Method *Hollow Stem Auger* Permit # *92365*
Driller *Joel Visil* Log By *Jason Fedota*
Checked By *David Kleesattel* License No. *RG# 5136* *David Kleesattel*

See Site Map For Boring Location

COMMENTS:

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 to 24		0	9, 11, 13			Orange mottled brown CLAY (stiff and moist)
		0	7, 11, 16		CL	Orange mottled brown silty CLAY (stiff and moist)
14						*Encountered groundwater at 14 feet on 09/25/92.*
		0	4, 6, 10			Orange mottled brown silty CLAY (saturated).
			10, 11, 12			Orange mottled brown silty CLAY (saturated).
22						End of boring at 21.5 feet. Installed groundwater monitoring well.

Drilling Log

GROUNDWATER TECHNOLOGY

Monitoring Well **MW-5**

Project CHV/2920 Castro Valley Blvd. Owner Chevron U.S.A. Products Co.
Location Castro Valley, CA Project No. 02020 2778 Date drilled 10/08/92
Surface Elev. 168.0 ft. Total Hole Depth 21.5 ft. Diameter 8 inches
Top of Casing 167.41 ft. Water Level Initial 13 ft. Static 10/27/92 9.95 ft.
Screen: Dia 2 in. Length 15 ft. Type/Size 0.020 in.
Casing: Dia 2 in. Length 5 ft. Type SCH 40 PVC
Filter Pack Material Lapis Lustre #3 Rig/Core Type Mobile B-53/Split Spoon
Drilling Company Kvilhaug Well Drilling Method Hollow Stem Auger Permit # 92365
Driller Joel Visil Log By Jason Fedota
Checked By David Kleesattel License No. RG# 5136 David Kleesattel

See Site Map For Boring Location

COMMENTS:

Orginal soilboring for MW-5 was abandoned on September 25, 1992, because flowing sands obstructed installation of the well. The second boring for MW-5 was relocated approximately 5 feet from the orginal boring on October 10, 1992.

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						
2						
4		0	3 5 5		CL	Dark brown CLAY (soft and moist) (abundant roots)
6						
8						
10		0	4 6 6			Orange mottled brown silty CLAY (soft and moist)
12						
14						*Encountered groundwater at 13 feet on 09/25/92.*
16		0	9 9 11		GC	Brown clayey sandy GRAVEL (loose and saturated).
18						
20			10 10 12		SC	Brown gravelly clayey fine SAND (loose and saturated).
22						End of boring at 21.5 feet. Installed groundwater monitoring well.
24						

Drilling Log

GROUNDWATER TECHNOLOGY

Monitoring Well **MW-6**

Project *CHV/2920 Castro Valley Blvd.* Owner *Chevron U.S.A. Products Co.*
Location *Castro Valley, CA* Project No. *02020 2778* Date drilled *09/25/92*
Surface Elev. *166.68 ft.* Total Hole Depth *26.5 ft.* Diameter *8 inches*
Top of Casing *166.46 ft.* Water Level Initial *15 ft.* Static *10/27/92 12.54 ft.*
Screen: Dia *2 in.* Length *15 ft.* Type/Size *0.020 in.*
Casing: Dia *2 in.* Length *9 ft.* Type *SCH 40 PVC*
Filter Pack Material *Lapis Lustre #3* Rig/Core Type *Mobile B-53/Split Spoon*
Drilling Company *Kvilhaug Well Drilling* Method *Hollow Stem Auger* Permit # *92365*
Driller *Joel Visil* Log By *Jason Fedota*
Checked By *David Kleesattel* License No. *RG# 5136* *David P. Kleesattel*

See Site Map For Boring Location

COMMENTS:

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						
2						
4						
6		0	4 5 8			Black CLAY (soft and moist)
8					CL	
10		0	4 6 7			Brown sandy silty CLAY (soft and moist)
12						
14						
16		0	9 9 12			*Encountered groundwater at 15 feet on 09/25/92 (0925).*
18						Brown gravelly silty fine to medium SAND (saturated)
20		0	7 10 11		SM	
22						Orange mottled brown sandy silty CLAY (stiff and saturated)
24					CL	

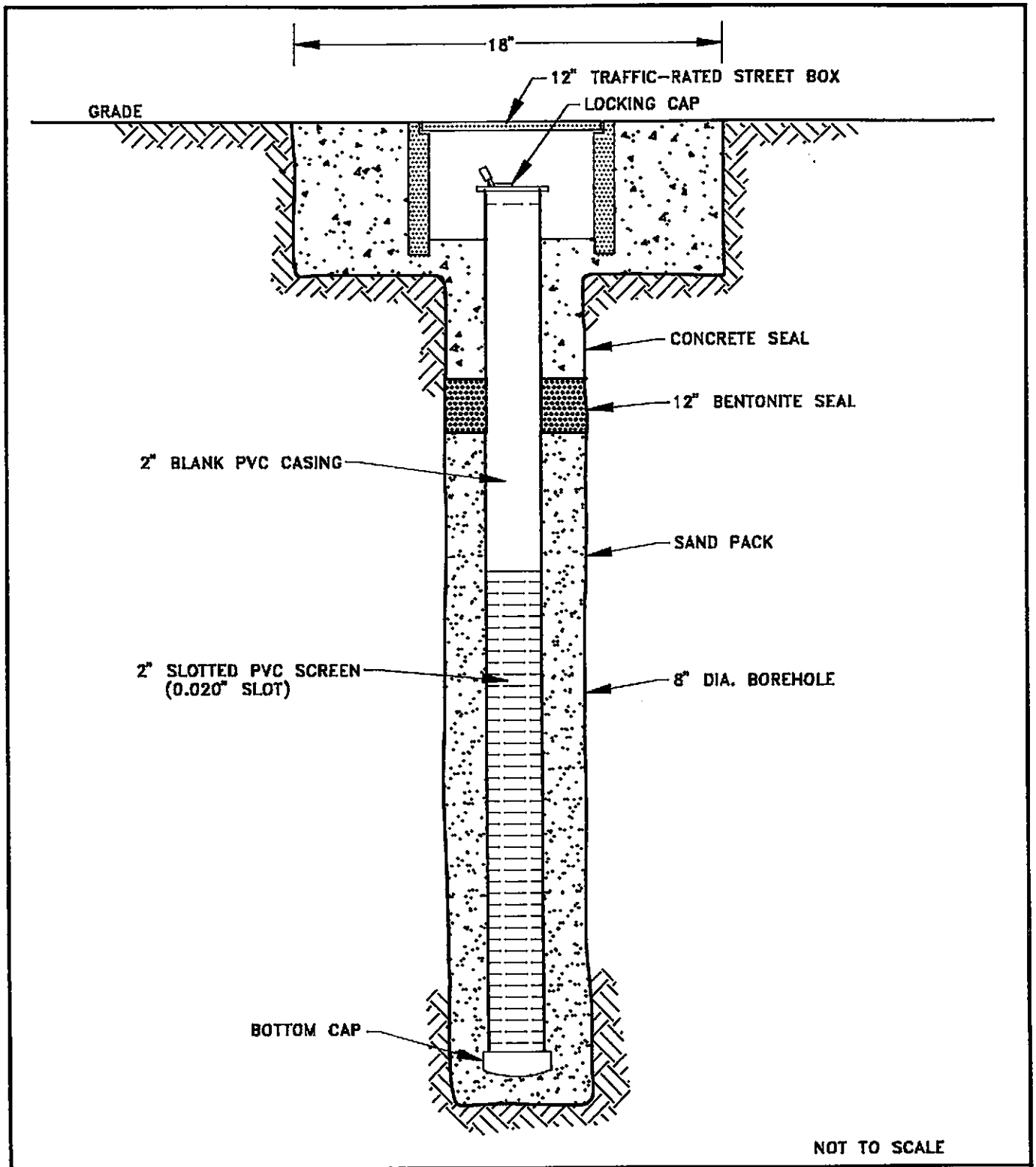
GROUNDWATER TECHNOLOGY

Drilling Log

Monitoring Well MW-6

Project CHV/2920 Castro Valley Blvd. Owner Chevron U.S.A. Products Co.
Location Castro Valley, CA Project No. 02020 2778 Date drilled 09/25/92

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%
24		0	8		CL	Brown silty clayey SAND (firm and saturated)
26			27		SC	
			40			End of boring at 26.5 feet. Installed groundwater monitoring well.
28						
30						
32						
34						
36						
38						
40						
42						
44						
46						
48						
50						
52						
54						
56						



NOT TO SCALE

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

TYPICAL MONITORING WELL CONSTRUCTION

CLIENT:	LOCATION:	REV. NO.:	DATE:
CHEVRON U.S.A. PRODUCTS CO.			

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

APPENDIX C

GROUNDWATER TECHNOLOGY'S 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.

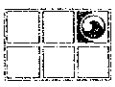
6. Preservatives are required for some types of samples. Use specially prepared vials marked as indicated below, or use the appropriate field procedure (SOP 12 for acidification). Make note on forms that samples were preserved. Always have extra vials in case of problems. Samples for volatile analyses 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 transferer 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: SANDRA LINDSEY

Project 02020-2778
Reported 10/13/92

TOTAL PETROLEUM HYDROCARBONS

Lab #	Sample Identification	Sampled	Analyzed	Matrix
86800- 1	MW4-5	09/25/92	10/02/92	Soil
86800- 2	MW4-10	09/25/92	10/02/92	Soil
86800- 4	MW4-20	09/25/92	10/05/92	Soil
86800- 5	MW5-5	09/25/92	10/05/92	Soil
86800- 6	MW5-10	09/25/92	10/05/92	Soil
86800- 8	MW6-5	09/25/92	10/05/92	Soil
86800- 9	MW6-10	09/25/92	10/05/92	Soil

RESULTS OF ANALYSIS

Laboratory Number:	86800- 1	86800- 2	86800- 4	86800- 5	86800- 6
Diesel:	ND<1	ND<1	ND<1	ND<1	ND<1
Gasoline:	ND<1	ND<1	ND<1	ND<1	ND<1
Benzene:	ND<.005	ND<.005	ND<.005	ND<.005	ND<.005
Toluene:	0.030	0.042	0.030	0.052	0.067
Ethyl Benzene:	ND<.005	ND<.005	ND<.005	ND<.005	ND<.005
Xylenes:	ND<.005	ND<.005	ND<.005	ND<.005	ND<.005
Concentration:	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg

Laboratory Number:	86800- 8	86800- 9
Diesel:	5	ND<1
Gasoline:	ND<1	ND<1
Benzene:	ND<.005	ND<.005
Toluene:	0.26	0.021
Ethyl Benzene:	ND<.005	ND<.005
Xylenes:	0.011	0.008
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: 86800

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	SPIKE LEVEL	MS/MSD RECOVERY	RPD	CONTROL LIMIT
Diesel:	200 ng	101/100	1%	70-130
Gasoline:	200 ng	86/86	0%	70-130
Benzene:	200 ng	97/96	1%	70-130
Toluene:	200 ng	103/101	2%	70-130
Ethyl Benzene:	200 ng	101/104	3%	70-130
Xylenes:	200 ng	104/102	2%	70-130

Richard Srna, Ph.D.
Laboratory Director

Fax copy of Lab Report and COC to Chevron Contact: ☐ Yes ☐ No 86000

Chain-of-Custody-Record

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

Chevron Facility Number: 9-6991
Facility Address: 7920 Castro Valley Blvd, Castro Valley
Consultant Project Number: 02020 2778
Consultant Name: Groundwater Technology Inc.
Address: 4057 Port Chicago HWY, Concord, CA
Project Contact (Name): Sandra Lindsey
(Phone) 510-671-2397 (Fax Number)

Chevron Contact (Name): Nancy Yukelich
(Phone) 510-842-9500
Laboratory Name: Superior Analytical
Laboratory Release Number: 483 7960
Samples Collected by (Name): Jason M. Fedota
Collection Date: September 25 1992
Signature: Jason M. Fedota

Sample Number	Lab Sample Number	Number of Containers	Matrix S = Soil W = Water A = Air 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)	Remarks
MW4-5	1		S	D			Y	X	X							
MW4-10	2															Hold
MW4-15	3															
MW4-20	4															
MW5-5	5															
MW5-10	6															
MW5-15	7															Hold
MW6-5	8															
MW6-10	9															
MW6-15	10															Hold
MW6-20	11															Hold

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
Jason M. Fedota	GTI	9/28/92 1645	M Patton	Express M	9/28/92 1310
Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
	EX IT	11-X 1645			
Relinquished By (Signature)	Organization	Date/Time	Received For Laboratory By (Signature)		Date/Time
					9/28/92 1645

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

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

GROUNDWATER TECHNOLOGY, INC.
Attn: Sandra Lindsey

Project 020302091061004
Reported 11/12/92

TOTAL PETROLEUM HYDROCARBONS

Lab #	Sample Identification	Sampled	Analyzed	Matrix
87006- 1	MW3	10/27/92	11/02/92	Water
87006- 2	MW2	10/27/92	11/02/92	Water
87006- 3	MW1	10/27/92	11/02/92	Water
87006- 4	MW4	10/27/92	11/02/92	Water
87006- 5	MW5	10/27/92	11/02/92	Water
87006- 6	MW6	10/27/92	11/02/92	Water

RESULTS OF ANALYSIS

Laboratory Number:	87006- 1	87006- 2	87006- 3	87006-4	87006-5
Diesel:	120	110	54	ND<50	ND<50
Concentration:	ug/L	ug/L	ug/L	ug/L	ug/L

Laboratory Number:	87006-6
Diesel:	ND<50
Concentration:	ug/L

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: 87006

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	SPIKE LEVEL	MS/MSD RECOVERY	RPD	CONTROL LIMIT
Diesel:	200 ng	120/127	7	75-125

Richard Srna, Ph.D.
Laboratory Director

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

Chain-of-Custody-Record

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

Chevron Facility Number: 9-6991
Facility Address: 2920 Castro Valley Blvd
Consultant Project Number: 020302091.061004
Consultant Name: Groundwater Technology
Address: 4057 Port Chicago Hwy
Project Contact (Name): Sandra Lindsey
(Phone) 671-2387 (Fax Number) 685-9148

Chevron Contact (Name): N. Vukelich
(Phone): 842-91
Laboratory Name: Superior
Laboratory Release Number: 483-7960
Samples Collected by (Name): [redacted]
Collection Date: 10/27/92
Signature: [redacted]

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)					Remarks
MW3		1	W	G		NONE			X											
MW2		1							X											
MW1		1							X											
MW4		1							X											
MW5		1							X											
MW6		1	↓	↓		↓			X											

Please Initial:
Samples Stored in ice: 2
Appropriate containers: ✓
Samples preserved: ✓ NO
VOA's without headspace: ✓
Comments:

Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
[redacted]	GTI	10/27/92			
Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
Relinquished By (Signature)	Organization	Date/Time	Received For Laboratory By (Signature)		Date/Time 10/27/92 15:00

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

COC-3.DWG/03 91/HCH

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

GROUNDWATER TECHNOLOGY, INC.
Attn: Sandra Lindsey

Project 020302091.061004
Reported 11/13/92

TOTAL PETROLEUM HYDROCARBONS

Lab #	Sample Identification	Sampled	Analyzed	Matrix
87029- 1	TB-LB	10/27/92	11/02/92	Water
87029- 2	RBMW-3	10/27/92	11/02/92	Water
87029- 3	MW-3	10/27/92	11/02/92	Water
87029- 5	MW-2	10/27/92	11/04/92	Water
87029- 7	MW-1	10/27/92	11/03/92	Water
87029- 9	MW-4	10/27/92	11/02/92	Water
87029- 11	MW-5	10/27/92	11/02/92	Water
87029- 13	MW-6	10/27/92	11/02/92	Water

RESULTS OF ANALYSIS

Laboratory Number:	87029-1	87029-2	87029-3	87029-5	87029-7
Gasoline:	ND<50	ND<50	ND<50	54	ND<50
Benzene:	ND<0.5	ND<0.5	ND<0.5	13	11
Toluene:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
Ethyl Benzene:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
Xylenes:	ND<0.5	1.3	ND<0.5	ND<0.5	ND<0.5
Concentration:	ug/L	ug/L	ug/L	ug/L	ug/L

Laboratory Number:	87029-9	87029-11	87029-13
Gasoline:	ND<50	74	600
Benzene:	ND<0.5	ND<0.5	22
Toluene:	0.6	ND<0.5	22
Ethyl Benzene:	0.5	0.6	24
Xylenes:	4.3	7.1	130
Concentration:	ug/L	ug/L	ug/L

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: 87029

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	SPIKE LEVEL	MS/MSD RECOVERY	RPD	CONTROL LIMIT
Gasoline:	200 ng	96/95	1	70-130
Benzene:	200 ng	96/92	4	70-130
Toluene:	200 ng	98/93	5	70-130
Ethyl Benzene:	200 ng	101/97	4	70-130
Xylenes:	200 ng	101/96	5	70-130

Richard Srna, Ph.D.
Laboratory Director

Fax copy of Lab Report and COC to Chevron Contact: ☐ No 8707

Chain-of-Custody-Record

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

Chevron Facility Number: 9-6991
Facility Address: 2920 Castro Valley Blvd
Consultant Project Number: 020302091.061004
Consultant Name: Groundwater Technology
Address: 4057 Port Chicago Hwy
Project Contact (Name): Sandra Lindsey
(Phone) 671-2387 (Fax Number) 685-9148

Chevron Contact (Name): N. Vukelich
(Phone): 842-91
Laboratory Name: Superior
Laboratory Release Number: 483-7960
Samples Collected by (Name): HECTOR MERINO
Collection Date: 10/27/92
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)	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	1	W	G		HCl	Yes	X												Analyze but do not charge for TBLB
RB MW3	2	1						X												
MW3	3	3						X												
RB MW2	(4)	1														X				
MW2	5	3						X												
RB MW1	(6)	1																		
MW1	7	3						X												
RB MW4	(8)	1																		
MW4	9	3						X												
RB MW5	(10)	1																		
MW5	11	3						X												
RB MW6	(12)	1														X				
MW6	13	3	X	X		X	X	X												

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

Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
	GTI	10/27/92			
Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
Relinquished By (Signature)	Organization	Date/Time	Received For Laboratory By (Signature)		Date/Time 10/27/92 15:00

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

COC-3.DWG/03 91/HCH