Chevron

December 3, 1995

Chevron U.S.A. Products Company
6001 Bollinger Canyon Rd., Bldg. L
P.O. Box 5004
San Ramon, CA 94583-0804

Mark A. Miller
SAR Engineer
Phone No. 510 842-8134
Fax No. 510 842-8252

Ms. Juliet Shin
Alameda County Health Care Services
Department of Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

Re: Former Chevron Service Station #9-1153
3126 Fernside Boulevard, Alameda, CA

Dear Ms. Shin:

Enclosed is the Additional Site Assessment Report dated October 31, 1995, prepared by our consultant Groundwater Technology, Inc. for the above referenced site. Three off-site soil borings were advanced and completed as ground water monitor wells (MW-8, MW-9, MW-10). This work was done to further define the down gradient extent of dissolved hydrocarbons in ground water.

Soil samples collected were submitted to Sequoia Analytical for analysis. Laboratory results indicate that concentrations of TPH-G and BTEX were below method detection limits in all samples collected. Ground water samples will be collected from the new wells in conjunction with the regularly scheduled quarterly event. This information will assist in determining if the extent of the plume is defined and contained. If you have any questions or comments, please feel free to contact me at (510) 842-8134.

Sincerely,
CHEVRON U.S.A. PRODUCTS COMPANY

Mark A. Miller
Site Assessment and Remediation Engineer

cc: Ms. B.C. Owen

Mr. Larry Bolton
State Farm Insurance
2509 Santa Clara Avenue
Alameda, CA 94501

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GROUNDWATER TECHNOLOGY ®

Groundwater Technology, Inc.
4057 Port Chicago Highway, Concord, CA 94520 USA
Tel: (510) 671-2387 Fax: (510) 685-9148

ADDITIONAL SITE ASSESSMENT REPORT
CHEVRON SERVICE STATION NO. 9-1153
3126 FERNSIDE BOULEVARD
ALAMEDA, CALIFORNIA

GTI Project 020200124

October 31, 1995

Prepared for:
Mr. Mark Miller
Chevron U.S.A. Products Company
6001 Bollinger Canyon Road, Building L
San Ramon, California 94583-0804

Groundwater Technology, Inc.
Submitted by:

Michael A. Chamberlain
Project Manager

Groundwater Technology, Inc.
Approved by:

E. K. Simonis, R.G.
Senior Geologist

REGISTERED GEOLOGIST
EDVARDAS (ED) K. SIMONIS
No. 4422
STATE OF CALIFORNIA

For:
Wendell W. Lattz
Vice President, General Manager
West Region

20200124.SAR

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1.0 INTRODUCTION

This report summarizes the environmental assessment work conducted by Groundwater Technology, Inc., at the former Chevron U.S.A. Products Company (Chevron) Service Station No. 9-1153 located at 3126 Fernside Boulevard in Alameda, California (figure 1). A *Work Plan for Additional Site Assessment* (Groundwater Technology 1995) presented the scope of the work performed. The objective of the work was to evaluate the lateral and vertical extent of petroleum hydrocarbons in the soil and groundwater in the vicinity of the site. The assessment was performed during October 1995 and included drilling three soil borings (MW-8, MW-9, and MW-10), collecting soil samples, completing the three soil borings as 2-inch-diameter monitoring wells, developing the new monitoring wells, analyzing the collected soil samples, evaluating the data, and preparing this report.

2.0 BACKGROUND

The site is located in the city of Alameda in Alameda County, California, on the west corner of the intersection of Fernside Boulevard and Gibbons Drive (figure 2). The city of Alameda is located on an island with the San Francisco Bay to the north and west, the Brooklyn Basin Tidal Canal to the east, and San Leandro Bay to the south. The site is located in the southeastern portion of the island. The site is currently an occupied single family residential building. Residential buildings are located north, west, and south of the site. Commercial building are located to the west of the site. The surface elevation at the site is approximately 8 feet above mean sea level.

According to existing historical assessment reports and information provided by Chevron, the existing Chevron station was demolished and the underground storage tanks (USTs) removed in June 1986. Environmental investigation at the site began in August 1986 with the installation of three groundwater monitoring wells (C-1 through C-3). Prior to the current investigation, a total of 7 groundwater monitoring wells and one extraction well have been installed at the site. The groundwater monitoring wells have been gauged and sampled regularly since August 1986 with analytical results documenting impact to groundwater.

3.0 WORK SCOPE

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

Groundwater Technology prepared a site-specific *Health and Safety Plan* required by the Occupational Health and Safety Administration Standard Hazardous Waste Operations and Emergency Response guidelines (29 Code of Federal Regulations [CFR] 1910.120). The site-specific *Health and Safety Plan* was prepared after a review of site conditions and existing available site-specific health and safety plans. The *Health and Safety Plan* was reviewed and signed by Groundwater Technology personnel and subcontractors before beginning work at the site.

Groundwater Technology personnel reviewed site history and information with Chevron representatives before beginning work at the site. An encroachment permit was obtained from the City of Alameda on October 4, 1995. A drilling permit to install three monitoring wells was approved by Mr. Wyman Hong of the Alameda County Zone 7 Water Agency on August October 11, 1995. Copies of the permits are included in appendix A.

3.2 Soil Borings

On October 13, 1995, Groundwater Technology supervised the drilling of three soil borings, MW-8, MW-9, and MW-10 (figure 2). 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. Drilling was completed on October 13, 1995. The soil borings were each drilled to total depths of 9 feet below surface grade (bsg). The boreholes of the soil borings were completed as a groundwater monitoring wells. Drilling logs are presented in appendix B.

The soil cuttings generated during the drilling activities were placed in 55-gallon drums, sealed and labeled at the site. Soil cuttings were then characterized, profiled, and removed for disposal.

3.3 Soil Sampling

During drilling, soil samples were collected from the soil borings at 5-foot intervals from approximately 5 to 9 feet bsg. Soil samples were collected using a 2-inch-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. One soil sample from each 5-foot interval was collected, 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's Standard Operating Procedures (SOPs), which are included in appendix C.

Soil samples collected at approximately 5 feet bsg in each soil boring were submitted to a California-certified laboratory for analyses of benzene, toluene, ethylbenzene, and total xylenes (BTEX) and TPH-g using Environmental Protection Agency (EPA) Methods 5030/8020/ modified 8015.

3.4 Monitoring Well Installation

The monitoring wells were constructed using 3 feet of 2-inch-diameter, Schedule 40 polyvinyl chloride (PVC) blank casing and 6 feet of 0.020-inch-slot well screen. A sand filter pack was placed around the well screen to approximately 1 foot above the slotted well screen. The monitoring wells were completed with 0.5 foot of hydrated bentonite and neat cement seal to grade. The wellheads were finished with a locking cap and a street box with a water-tight bolted lid. Well construction details are included with the drilling log (appendix C). The top of casing elevation of the monitoring wells were surveyed relative to mean sea level datum by a licensed land surveyor on October 18, 1995, using a U.S. Geodetic Survey bench mark (FERN-HIGH 1947) located at the southwest corner of the intersection of Fernside Boulevard and High Street.

3.5 Monitoring Well Development, Monitoring, and Sampling

On October 17, 1995, Groundwater Technology developed the three monitoring wells. Development was conducted using surge block and hand bailers. Well development forms are included in appendix D. Monitoring and sampling of the groundwater monitoring wells will be conducted by Chevron's contracted groundwater monitoring and sampling consultant, Blaine Technical Services as part of the site's next scheduled quarterly monitoring and sampling event.

4.0 SITE CONDITIONS

4.1 Hydrogeology

The materials encountered during drilling primarily consisted of sandy clay, to sandy clayey silt. During drilling on October 13, 1995, water was first noticed at approximately 4 feet bsg. The top-of-casing elevations for monitoring wells are presented on the drilling log (appendix C).

4.1 Analytical Results of Soil Samples

Laboratory analytical reports of soil samples collected from soil borings MW-8, MW-9, and MW-10 on October 13, 1995, indicate TPH-g and BTEX concentrations below their respective method detection limits of 1.0 mg/kg and 0.005 mg/kg. The results of the soil analyses are summarized in table 1 and laboratory reports are included in appendix E.

5.0 SUMMARY

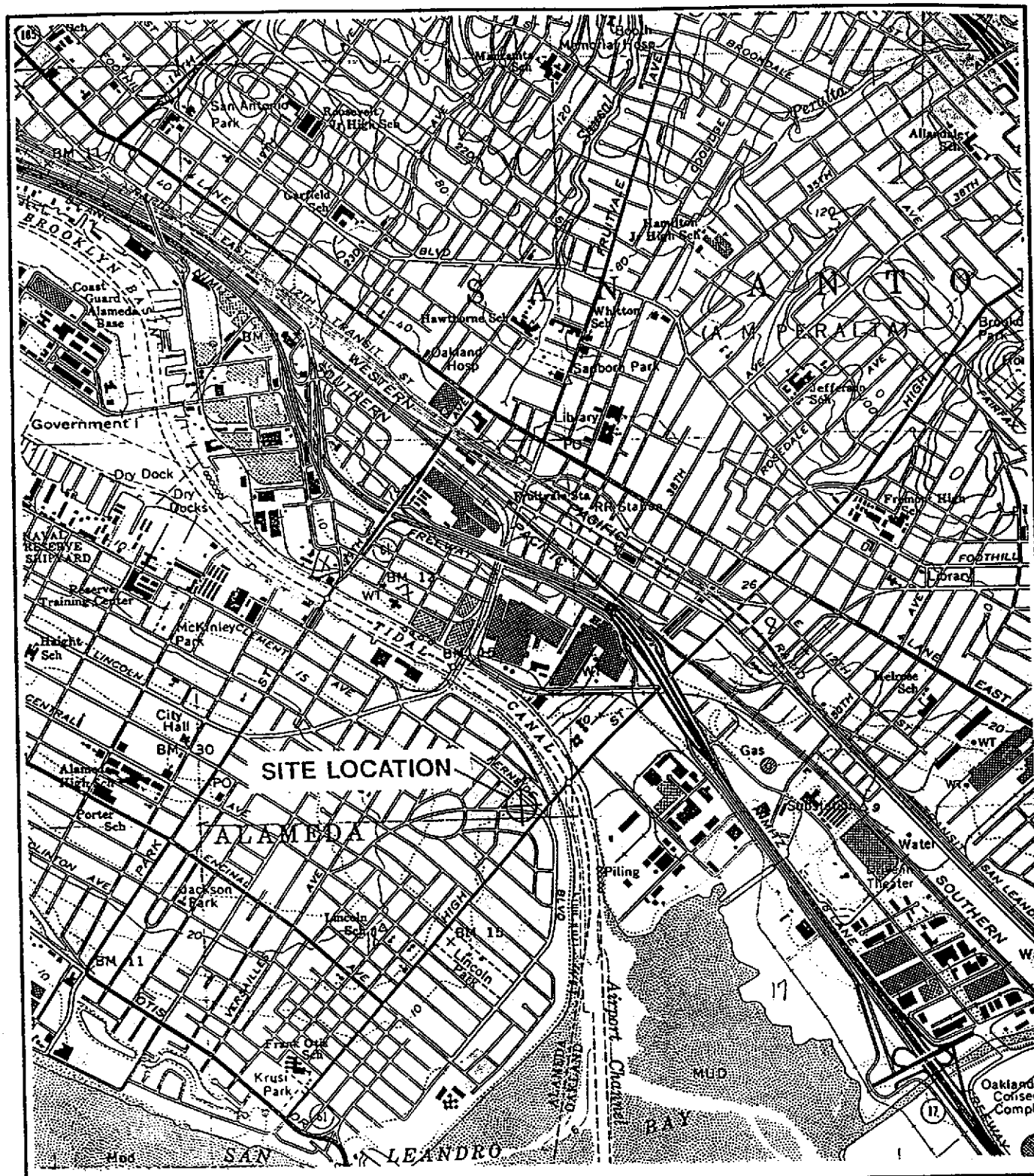
- On October 13, 1995, Groundwater Technology supervised the drilling of three soil borings. The soil borings were advanced to total depths of 9 feet bsg. The soil borings were completed as three 2-inch-diameter groundwater monitoring wells (MW-8, MW-9, and MW-10).
- The materials encountered during drilling primarily consisted of sandy clay to sandy clayey silt. The depth to groundwater encountered during drilling on October 13, 1995, was approximately 4 feet bsg.
- Analytical results of the soil samples collected during drilling activities of soil borings MW-8, MW-9, and MW-10 indicated TPH-g and BTEX concentrations below the reported MDLs.
- Groundwater samples were not collected, but will be collected, analyzed, and reported during the next scheduled quarterly groundwater monitoring and sampling event.

6.0 REFERENCES

Groundwater Technology, Inc. July 16, 1992. *Environmental Assessment Report.* Chevron Service Station No. 9-1153, 3126 Fernside Boulevard, Alameda, California.

Groundwater Technology, Inc. January 31, 1994. *Additional Environmental Assessment Report.* Former Chevron Service Station No. 9-1153, 3126 Fernside Boulevard, Alameda, California.

Groundwater Technology, Inc. July 6, 1995. *Work Plan for Additional Site Assessment.* Chevron Service Station No. 9-1153, 3126 Fernside Boulevard, Alameda, California.



GROUNDWATER TECHNOLOGY

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

N

SCALE: 0 FEET 2000

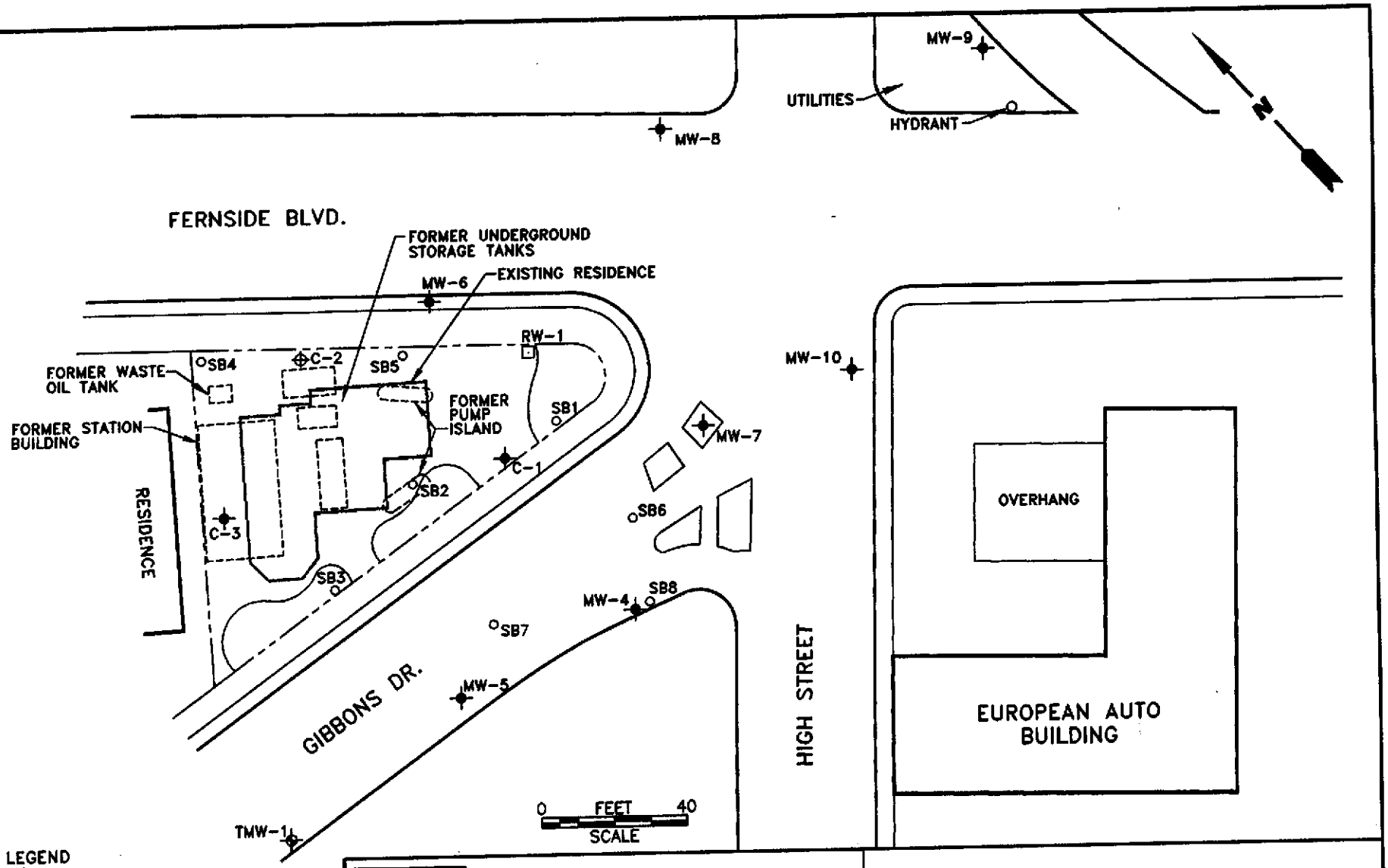
SITE LOCATION MAP

CLIENT: CHEVRON U.S.A. PRODUCTS CO.
SERVICE STATION No. 9-1153

DATE: 7/14/92

LOCATION: 3126 FERNSIDE BLVD.
ALAMEDA, CALIFORNIA

FIGURE: 1



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

SITE PLAN

CLIENT: CHEVRON U.S.A. PRODUCTS CO. SERVICE STATION No. 9-1153				LOCATION: 3126 FERNSIDE BLVD. ALAMEDA, CALIFORNIA	REV. NO.: 0	DATE: 10/18/95
PM	PE/RG-	DESIGNED TW	DETAILED CY	ACAD FILE: SP095	PROJECT NO.: 020200124	FIGURE: 2

TABLE

TABLE 1
Analytical Results of Soil Samples

(Results expressed as milligrams per kilogram)

Chevron Service Station No. 9-1153
3126 Fernside Boulevard
Alameda, California

Date	Sample ID	Sample Depth (ft)[a]	Benzene	Toluene	Ethyl-benzene	Xylenes	TPH-g[b]
10-13-95	MW-8	5	<0.005	<0.005	<0.005	<0.005	<1
10-13-95	MW-9	5	<0.005	<0.005	<0.005	<0.005	<1
10-13-95	MW-10	5	<0.005	<0.005	<0.005	<0.005	<1
10-13-95	COMP	N/A	<0.005	<0.005	<0.005	<0.005	<1

[a] feet below surface grade
[b] total petroleum hydrocarbons as gasoline

APPENDIX A

CITY OF ALAMEDA ENCROACHMENT AND ZONE 7 WELL INSTALLATION PERMITS

CITY OF ALAMEDA
ENGINEERING OFFICE
2263 Santa Clara Ave. Room 207
Alameda, CA 94501 748-4614 or 748-4518

ENCROACHMENT PERM Permit No: EN95-079
STATUS: PENDING
Applied : 10/04/95
Approved :

JOB ADDRESS : 3126 FERNSIDE BLVD
Parcel number : 069 -0121-010-00
OWNER : BOLTON J L & JANE L
3135 GIBBONS DR
ALAMEDA CA 94501
APPLICANT : GROUNDWATER TECHNOLOGY
4057 PORT CHICAGO
CONCORD, CA 94520
671-2387
Repair Order # : 2 NON-METERED SPACES 10/12-1
Project Desc. : 2 NON-METERED SPACES 10/12-13

HOURS OF CONSTRUCTION
MONDAY - FRIDAY 7 A.M. TO 7 P.M.
SATURDAY & SUNDAY 8 A.M. TO 5 P.M.

Terry Gillis
Signature

Fee description	Units	Fee/Unit	Ext fee	Data
- NON-METERED SPACES	8.00		8.00	
"NO PARKING" SIGNS	4.00		4.00	

*** Fees Required ***

Account No.	Fees:	12.00
001-300-4210-3341	Adjustments:	.00
001-300-4210-3341	Total Fees:	12.00
TOTAL THIS DATE		

*** Fees Collected & Credits ***

Receipt No.	Date	Payment
R9504865	10/04/95	8.00
R9504865	10/04/95	4.00
	**********	12.00
	Total Credits:	.00
	Total Payments:	12.00
	Balance Due:	.00

FORMS MUST BE INSPECTED PRIOR TO CONCRETE POUR.
CALL 748-4614 OR 748-4518 FOR INSPECTION.
==========

NOTE: ALL CONSTRUCTION WITHIN THE PUBLIC RIGHT OF WAY MUST HAVE BARRICADES WITH FLASHERS FOR NIGHT TIME PROTECTION.
Contractor's "NAME AND DATE" to be impressed in all concrete work.

THIS IS TO CERTIFY THAT THE ABOVE WORK HAS BEEN COMPLETED TO MY SATISFACTION AND APPROVAL.

Date_____ _____
INSPECTOR

CALL 748-4614 OR 748-4518 FOR INSPECTION FOR FORMS AND AFTER COMPLETION. INSPECTION MUST BE MADE BEFORE DEPOSIT CAN BE PROCESSED FOR REFUND. REFUNDS TAKE 3 WEEKS AFTER FINAL INSPECTION.

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 Former Chevron Station 9-4153
3126 Fernside Blvd
Alameda CA

CLIENT
Name CHEVRON USA PRODUCTS COMPANY
Address 6001 Bollinger Canyon, Bldg L Voice (510) 842-8134
City San Ramon Zip 94583-0904

APPLICANT
Name GROUNDWATER TECHNOLOGY Fax (510) 685-9148
Address 4057 Port Chicago Hwy Voice (510) 671-2387
City Concord Zip 94520

TYPE OF PROJECT

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

PROPOSED WATER SUPPLY WELL USE
Domestic ___ Industrial ___ Other ___
Municipal ___ Irrigation ___

DRILLING METHOD:
Mud Rotary ___ Air Rotary ___ Auger X
Cable ___ Other CREGG DRILLING Geo Environmental

DRILLER'S LICENSE NO. C57 485165 676923

WELL PROJECTS
Drill Hole Diameter 8 in. Maximum
Casing Diameter 2 in. Depth 10 ft.
Surface Seal Depth 4 ft. Number 3 (MW-8, MW-9, MW-10)

GEOTECHNICAL PROJECTS
Number of Borings ___ Maximum
Hole Diameter ___ in. Depth ___ ft.

ESTIMATED STARTING DATE 10-12-95
ESTIMATED COMPLETION DATE 10-13-95

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

APPLICANT'S SIGNATURE ___ Date 10/13/95

FOR OFFICE USE

PERMIT NUMBER 95663
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 11 Oct 95
Wyman Hong

APPENDIX B

DRILL LOGS AND WELL CONSTRUCTION SPECIFICATIONS

Drilling Log

GROUNDWATER TECHNOLOGY

Monitoring Well **MW-8**

Project CHV/9-1153 Owner CHV/USA
Location 3126 Fernside Alameda Project No. 020200124 Date drilled 10/13/95
Surface Elev. 7.39 ft. Total Hole Depth 9 ft. Diameter 6.25 in.
Top of Casing 6.96 ft. Water Level Initial 4 ft. Static 4.40 ft.
Screen: Dia 2 in. Length 6 ft. Type/Size PVC/0.020 in.
Casing: Dia 2 in. Length 3 ft. Type PVC
Filter Pack Material #3 Monterey Sand Rig/Core Type Simco 2400 SK-1/Splitspoon
Drilling Company Geo-Environmental Method Hollow Stem Auger Permit # 95663
Driller Jim Condry Log By Terry James
Checked By Mike Blundell License No. R.G. 5146

See Site Map For Boring Location

COMMENTS:

Well is located on Fernside Blvd. in front of a driveway

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						Asphalt: very thick
2						Aggregate base Cobbles: up to 10 in., former road surface. Clayey SAND: fine sand, dark brown, slightly plastic, damp, no hydrocarbon odor
4						*Groundwater encountered during drilling* *Static water level prior to development, 10/17/95*
6			3 4 MW-8 4		SC	Grades wet, slight light brown mottling Clayey SAND (40,60): fine sand, light olive gray, medium stiff, slightly plastic, wet, no hydrocarbon odor
8						
10						End of boring (All percentages are approximate.)
12						
14						
16						
18						
20						
22						
24						

Not confined, so screened intervals for these wells are acceptable

Drilling Log

GROUNDWATER TECHNOLOGY

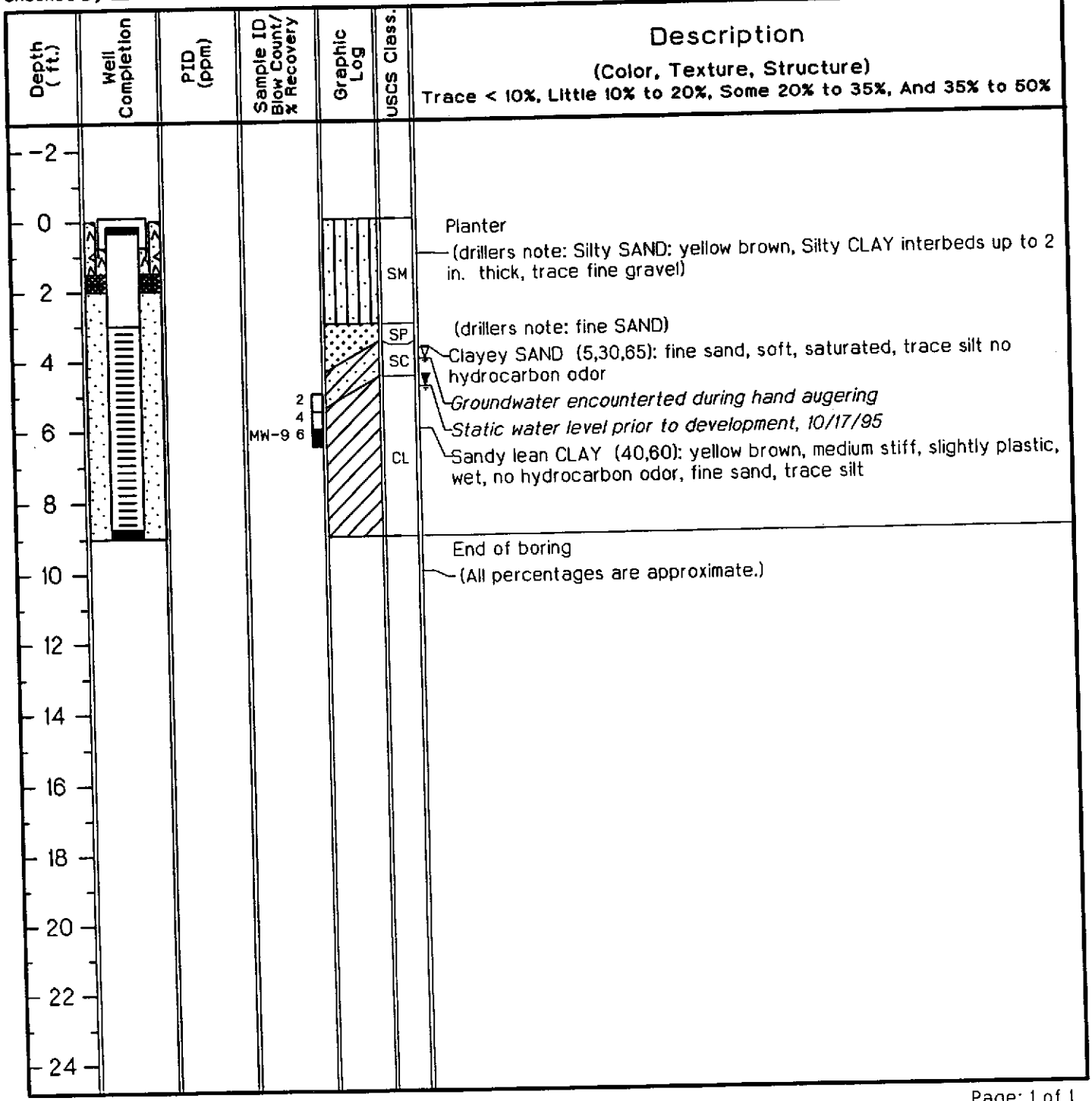
Monitoring Well **MW-9**

Project CHV/9-1153 Owner CHV/USA
Location 3126 Fernside Alameda Project No. 020200124 Date drilled 10/13/95
Surface Elev. 7.90 ft. Total Hole Depth 9 ft. Diameter 6.25 in.
Top of Casing 7.21 ft. Water Level Initial 4 ft. Static 4.80 ft.
Screen: Dia 2 in. Length 6 ft. Type/Size PVC/0.020 in.
Casing: Dia 2 in. Length 3 ft. Type PVC
Filter Pack Material #3 Monterey Sand Rig/Core Type Simco 2400 SK-1/Splitspoon
Drilling Company Geo-Environmental Method Hollow Stem Auger Permit # 95663
Driller Jim Condry Log By Terry James
Checked By Mike Blundell License No. R.G. 5146

See Site Map For Boring Location

COMMENTS:

Well is located in a landscaped median, at the intersection of Fernside Blvd. and High Street.



Drilling Log

GROUNDWATER TECHNOLOGY

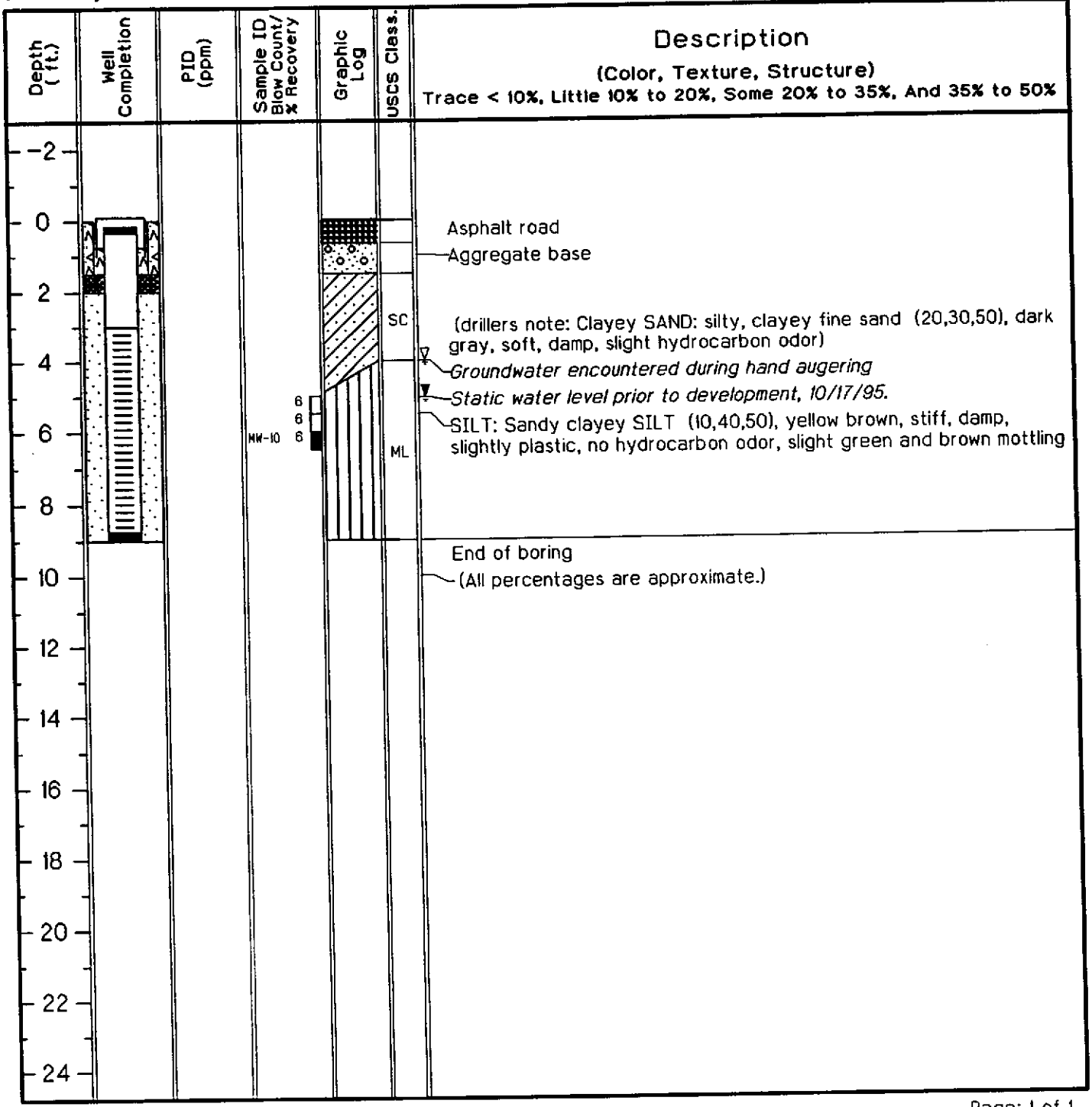
Monitoring Well **MW-10**

Project *CHV/9-1153* Owner *CHV/USA*
Location *3126 Fernside Alameda* Project No. *020200124* Date drilled *10/13/95*
Surface Elev. *7.66 ft.* Total Hole Depth *9 ft.* Diameter *6.25 in.*
Top of Casing *7.28 ft.* Water Level Initial *4 ft.* Static *5.05 ft.*
Screen: Dia *2 in.* Length *6 ft.* Type/Size *PVC/0.020 in.*
Casing: Dia *2 in.* Length *3 ft.* Type *PVC*
Filter Pack Material *#3 Monterey Sand* Rig/Core Type *Simco 2400 SK-1/Splitspoon*
Drilling Company *Geo-Environmental* Method *Hollow Stem Auger* Permit # *95663*
Driller *Jim Condry* Log By *Terry James*
Checked By *Mike Blundell* License No. *R.G. 5146*

See Site Map For Boring Location

COMMENTS:

Well is located in the center of the east bound lane, on High St.



APPENDIX C

GROUNDWATER TECHNOLOGY'S STANDARD OPERATING PROCEDURES (SOPS)

GROUNDWATER TECHNOLOGY, INC.
STANDARD OPERATING PROCEDURE NO. 8
GROUNDWATER MONITORING

Groundwater monitoring of wells at the site shall be conducted using an ORS Environmental Equipment (ORS) INTERFACE PROBE™ or 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 been surveyed). Floating 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 floating product with the following calculation:

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

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

The thickness of dense non-aqueous phase liquids (DNAPLs) is calculated by subtracting the depth at which the DNAPL is encountered from the total depth of the well. Water-level elevations are not typically corrected for the presence of DNAPLs.

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 0.01 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 monitoring 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 NO. 9
WATER SAMPLING METHODOLOGY

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.

GROUNDWATER TECHNOLOGY, INC.
STANDARD OPERATING PROCEDURE NO. 10
SAMPLING FOR VOLATILES IN WATER (DISSOLVED GASOLINE, SOLVENTS, ETC.)

1. Use only vials properly washed and oven dried (prepared by the laboratory).

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. 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. 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) (39.2° 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 NO. 11
CHAIN-OF-CUSTODY PROTOCOL

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 NO. 14
SOIL SAMPLING METHODOLOGY

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 NO. 15
SOIL SAMPLE COLLECTION AND HANDLING WHEN SAMPLING FOR VOLATILE ORGANICS

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 NO. 19
OPERATION/CALIBRATION OF PHOTOIONIZATION ANALYZER

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

WELL DEVELOPMENT FORMS

Project Name: CHV|3126 FERNSIDE

Site Address: 3126 FERNSIDE

Project Number: 020200124.030503

Date: 10/17/95

Page 1 of 3

Project Manager: MIKE CHAMBERLIAN

Well ID: MW-9

Well Diameter: 2

DTW Measurements:
Initial: 4.80
Recharge:
DTB: 8.70

Calc Well Volume: 0.6 gal
Well Volume: X 6 gal

Purge Method
Peristaltic
Gear Drive
Submersible

Pump Depth ft.
Hand Bailed X
Air Lift
Other

Instruments Used
YSI:
Hydac:
Omega:

Other:

WELL DEVELOPMENT

Time	DTW	DTB	Purge Volume Gallons	Turbidity	Comments
9:40	5.85	8.65	1	SILTY Brown	HARD BOTTOM
9:41	6.75	8.65	2		
9:43	7.09	8.65	3		
9:45	7.21	8.65	4		
9:47	8.02	8.65	5		
9:50	8.37	8.65	6		GALLONS DRY

GROUNDWATER TECHNOLOGY

Project Name: CHV

Site Address: FERNSIDE (3126)

Project Number: 020200124.030503

Date: 10/17/95

Page 2 of 3

Project Manager: MIKE CHAMBERLAIN

Well ID: MW-10

Well Diameter: 2

DTW Measurements:
Initial: 5.05
Recharge: _____
DTB: 9.05

Calc Well Volume: 0.6 gal
Well Volume: X10 7 gal

Purge Method
Peristaltic _____
Gear Drive _____
Submersible _____

Pump Depth _____ ft.
Hand Bailed X
Air Lift _____
Other _____

Instruments Used
YSI: _____
Hydac: _____
Omega: _____

Other: _____

WELL DEVELOPMENT

Time	DTW	DTB	Purge Volume Gallons	Turbidity	Comments
8:51	6.00	9.05	1	SLTY BROWN	HARD BOTTOM
8:53	6.95	9.05	2	↓	
8:56	7.95	9.05	3		
8:59	8.20	9.05	4	↓	DRY @ 4 gallons
			5		I SURGED BLOCKED WELL TWICE TO BRING BACK WATER. RECHARGE IS VERY SLOW TO NOTHING.
			6		
			7		

GROUNDWATER TECHNOLOGY

Project Name: CHV

Site Address: 3126 FERNSIDE

Project Number: 020200124-030503

Date: 10/17/95

Page 3 of 3

Project Manager: MIKE CHAMBERLAIN

Well ID: MW-8

Well Diameter: 2

DTW Measurements:
Initial: 4.40
Recharge:
DTB: 9.30

Calc Well Volume: 0.7 gal
Well Volume: X(6) 3 gal

Purge Method
Peristaltic
Gear Drive
Submersible

Pump Depth ft.
Hand Bailed X
Air Lift
Other

Instruments Used
YSI:
Hydac:
Omega:
Other:

WELL DEVELOPMENT

Time	DTW	DTB	Purge Volume Gallons	Turbidity	Comments
10:05	5.45	9.30	2	SLTY BROWN	HARD BOTTOM
10:12	6.95	9.30	4	↓	↓
10:14	6.99	9.30	6		
10:20	7.99	9.30	8	↓	CLOUDY @ 8 gallons.

GROUNDWATER TECHNOLOGY

APPENDIX E

LABORATORY REPORTS
AND
CHAIN-OF-CUSTODY RECORDS

Sequoia Analytical

680 Chesapeake Drive, Redwood City, CA 94063, (415) 364-9600, FAX (415) 364-9233
404 N. Wiget Lane, Walnut Creek, CA 94598, (510) 988-9600, FAX (510) 988-9673
819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

Groundwater Technology	Client Project ID:	Chevron / Fernside	Sampled: Oct 13, 1995
4057 Port Chicago Hwy	Sample Matrix:	Soil	Received: Oct 16, 1995
Concord, CA 94520	Analysis Method:	EPA 5030/8015 Mod./8020	Reported: Oct 23, 1995
Attention: Mike Chamberlain	First Sample #:	510-1324	

QC Batch Number: SP102095 802005A | SP102095 802005A | SP102095 802005A | SP102095 802005A

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit mg/kg	Sample I.D. 510-1324 MW-8	Sample I.D. 510-1325 MW-9	Sample I.D. 510-1326 MW-10	Sample I.D. 510-1327 COMP
Purgeable Hydrocarbons	1.0	N.D.	N.D.	N.D.	N.D.
Benzene	0.0050	N.D.	N.D.	N.D.	N.D.
Toluene	0.0050	N.D.	N.D.	N.D.	N.D.
Ethyl Benzene	0.0050	N.D.	N.D.	N.D.	N.D.
Total Xylenes	0.0050	N.D.	N.D.	N.D.	N.D.
Chromatogram Pattern:		--	--	--	--

Quality Control Data

Report Limit Multiplication Factor:	1.0	1.0	1.0	1.0
Date Analyzed:	10/20/95	10/20/95	10/20/95	10/20/95
Instrument Identification:	HP-5	HP-5	HP-5	HP-5
Surrogate Recovery, %: (QC Limits = 70-130%)	85	79	85	85

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

SEQUOIA ANALYTICAL, #1271

Kenneth L. Wimer
Project Manager

Sequoia Analytical

680 Chesapeake Drive, Redwood City, CA 94063, (415) 364-9600, FAX (415) 364-9233
404 N. Wiget Lane, Walnut Creek, CA 94598, (510) 988-9600, FAX (510) 988-9673
819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

Groundwater Technology
4057 Port Chicago Hwy
Concord, CA 94520
Attention: Mike Chamberlain

Client Project ID: Chevron / Fernside
Matrix: Solid
QC Sample Group: 5100533-36
Reported: Oct 23, 1995

QUALITY CONTROL DATA REPORT

Analyte:	Benzene	Toluene	Ethyl Benzene	Xylenes
QC Batch#:	SPS102095	SPS102095	SPS102095	SPS102095
	8020EXA	8020EXA	8020EXA	8020EXA
Analy. Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Prep. Method:	EPA 5030	EPA 5030	EPA 5030	EPA 5030
Analyst:	K. Nill	K. Nill	K. Nill	K. Nill
MS/MSD #:	5101690	5101690	5101690	5101690
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Prepared Date:	10/20/95	10/20/95	10/20/95	10/20/95
Analyzed Date:	10/20/95	10/20/95	10/20/95	10/20/95
Instrument I.D.#:	HP-5	HP-5	HP-5	HP-5
Conc. Spiked:	0.40 mg/kg	0.40 mg/kg	0.40 mg/kg	1.2 mg/kg
Result:	0.36	0.35	0.36	1.1
MS % Recovery:	90	88	90	91
Dup. Result:	0.36	0.35	0.35	1.1
MSD % Recov.:	90	88	88	89
RPD:	0.0	0.0	2.8	1.9
RPD Limit:	0-20	0-20	0-20	0-20

LCS #:	3LCS102095	3LCS102095	3LCS102095	3LCS102095
Prepared Date:	10/20/95	10/20/95	10/20/95	10/20/95
Analyzed Date:	10/20/95	10/20/95	10/20/95	10/20/95
Instrument I.D.#:	HP-5	HP-5	HP-5	HP-5
Conc. Spiked:	20 µg/L	20 µg/L	20 µg/L	60 µg/L
LCS Result:	21	21	21	63
LCS % Recov.:	104	103	103	105

MS/MSD LCS Control Limits	55-145	47-149	47-155	56-140	S

SEQUOIA ANALYTICAL, #1271

Kenneth L. Wimer
Project Manager

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

** MS=Matrix Spike, MSD=MS Duplicate, RPD=Relative % Difference

SEQUOIA ANALYTICAL
CHAIN OF CUSTODY

❑ 680 Chesapeake Drive • Redwood City, CA 94063 • (415) 364-9600 FAX (415) 364-9233
❑ 819 West Striker Ave. • Sacramento, CA 95834 • (916) 921-9600 FAX (916) 921-0100
❑ 1900 Bates Ave., Suite LM • Concord, CA 94520 • (510) 686-9600 FAX (510) 686-9689

Company Name: Uncontrolled Technology	Project Name: Chevron / Fernside
Address: 1051 Port Chicago Hwy	Billing Address (if different):
City: Concord State: CA Zip Code: 94520	
Telephone: (510) 671-2387 FAX #: (510) 685-9148	P.O. #:
Report To: Mike Chamberlain Sampler: Terry James	QC Data: ❑ Level A (Standard) ❑ Level B ❑ Level C ❑ Level D

Turnaround Time: ❑ 10 Working Days ❑ 3 Working Days ❑ 2 - 8 Hours ❑ 7 Working Days ❑ 2 Working Days ❑ 5 Working Days ❑ 24 Hours CONTRACTED

❑ Drinking Water ❑ Waste Water ❑ Other

Analyses Requested: BTEX/TPH-g

Client Sample I.D.	Date/Time Sampled	Matrix Desc.	# of Cont.	Cont. Type	Sequoia's Sample #	BTEX/TPH-g	Comments
1. MW-8	10/13/12:30	Soil	1	2" Tube Brass	5101324	X	EPA METHOD 8020/5030/8015
2. MW-9	10/13/9:20	"	"	"	5101325	"	"
3. MW-10	10/13/16:15	"	"	"	5101326	"	"
4. COMP	10/13/14:00	"	"	"	5101327	"	"
5.							
6.							
7.							
8.							
9.							
10.							

Relinquished By: Terry James	Date: 10/13/95	Time: 20:00	Received By: Ralf Bainelli	Date: 10/14/95	Time: 9:50
Relinquished By: Ralf Bainelli	Date: 10/16/95	Time: 5:00	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By Lab:	Date: 10/16/95	Time: 1700

Were Samples Received in Good Condition? ❑ Yes ❑ No Samples on Ice? ❑ Yes ❑ No Method of Shipment _____

Page __ of __

Pink - Client
Yellow - Sequoia
White - Sequoia