# Canonie Environmental

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Pleasanton, California 94588

February 1995

94-247-002-10

SUBSURFACE ENVIRONMENTAL INVESTIGATION REPORT CHEVRON SERVICE STATION 9-0329 340 HIGHLAND AVENUE PIEDMONT, CALIFORNIA

Prepared for:

Chevron U.S.A. Products Company

Canonie Environmental Services Corp. 7901 Stoneridge Drive, Suite 100 Pleasanton, CA 94588

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1

Soil Analytical Results

#### LIST OF PLATES

PLATE NUMBER	DRAWING <u>NUMBER</u>	TITLE
1	94-247-A1	Site Vicinity Map
2	94-247-A4	Generalized Site Plan

#### LIST OF APPENDICES

<u>APPENDIX</u>	<u>TITLE</u>
Α	Permits
В	Field Procedures
С	Boring Logs
D	Laboratory Analytical Reports and Chain of Custody Records

#### SUBSURFACE ENVIRONMENTAL INVESTIGATION REPORT CHEVRON SERVICE STATION 9-0329 340 HIGHLAND AVENUE PIEDMONT, CALIFORNIA

#### 1.0 INTRODUCTION

At the request of Chevron U.S.A. Products Company (Chevron), Canonie Environmental Services Corp. (Canonie) (formerly RESNA Industries Inc. [RESNA], which was purchased by Canonie on January 13, 1995) performed a subsurface environmental investigation at Chevron Service Station 9-0329 located 340 Highland Avenue in Piedmont, California. The approximate location of the site is shown on the Site Vicinity Map (Figure 1). The purpose of the investigation was to evaluate the extent of petroleum hydrocarbons in soil and groundwater in the vicinity of the site.

Work conducted for the investigation included:

- Preparing a site safety plan and obtaining appropriate drilling permits.
- Engaging a utility locator service prior to drilling at the site.
- Drilling one off-site soil boring, collecting soil samples from the boring at 5-foot intervals, at obvious changes in sediment type, where subjective evidence of petroleum hydrocarbons was observed, from just above groundwater, and from the bottom of the boring.
- Constructing one off-site 2-inch-diameter monitoring well in the soil boring (B6/MW6).
- Submitting soil samples to Chevron's contracted laboratory for analysis.
- Preparing a report summarizing field and laboratory procedures and findings.

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#### 2.0 BACKGROUND

We understand from conversations with Chevron personnel that in January 1983, Gettler-Ryan of Hayward, California, installed four groundwater monitoring wells (C-1 through C-4). In November 1990, GeoStrategies Inc. of Hayward, California, drilled six exploratory soil borings at the site. Concentrations of gasoline hydrocarbons have been detected in groundwater samples collected from Monitoring Well C-2, located adjacent to the waste oil underground storage tank. In April 1993, RESNA handaugered four off-site soil borings (B-1 through B-4), installed temporary groundwater monitoring wells in the borings, collected groundwater samples, and performed an investigation of potential sources of petroleum hydrocarbons within a 1-mile radius of the site. Petroleum hydrocarbons were not detected in soil samples collected from Borings B-1 through B-4. Groundwater in temporary groundwater Monitoring Wells B-2 and B-4 ranged from approximately 3.0 to 3.7 feet below ground surface. Groundwater was not present above siltstone bedrock encountered in Borings B-1 and B-3. Petroleum hydrocarbons were not detected in groundwater samples collected from temporary groundwater monitoring wells constructed in off-site Borings B-2 and The Piedmont City Hall was identified as an off-site source of diesel hydrocarbons (RESNA Industries, June 25, 1993).

#### 3.0 FIELD INVESTIGATION

#### 3.1 Site-Specific Health and Safety Plan/Permitting

A Site-Specific Health and Safety Plan was prepared as 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 (HSP) was prepared by field personnel, following a review of site conditions. The HSP was reviewed by the project manager, field personnel, and subcontractor personnel before beginning field operations at the site.

All applicable permits pertaining to drilling the soil boring and installing the groundwater monitoring well were obtained from the Alameda County Flood Control and Water Conservation District, Zone 7 Water Agency and City of Piedmont Public Works Department. Copies of permits are in Appendix A.

#### 3.2 Soil Boring and Sampling

At Chevron's request, a geologist was at the site on May 18, 1994, to observe West Hazmat Drilling Corporation (West Hazmat) drill one soil boring (B6/MW-6) to a depth of 20 feet below ground surface (bgs) at a location selected by Chevron, using a Mobile B-61 truck-mounted drill rig equipped with 8-inch hollow-stem augers. West Hazmat installed one 2-inch-diameter monitoring well (MW-6) in Boring B-6. Boring B5-MW5 was eliminated from the drilling program because bedrock was anticipated at the shallow depth at the proposed location. The locations of the borings and wells are shown on Plate 2. During field operations, field personnel followed standard operating procedures for drilling the soil boring and installing the groundwater monitoring well. Standard operating procedures are presented in Appendix B.

During drilling of Boring B6/MW-6, soil samples were collected at 5-foot intervals, at obvious changes in sediment type, where subjective evidence of petroleum hydrocarbons was observed, from just above first encountered groundwater and from the bottom of the borings. Samples were collected using a 2.5-inch outside diameter

California-modified split-spoon sampler, lined with cleaned 2-inch-diameter by 6-inch-long brass sample tubes. At each sampling depth, an attempt was made to drive the sampler 12 inches ahead of the augers. Soil samples were screened in the field using a photoionization detector (PID), and readings were recorded on the boring logs. One sample from each sample interval was sealed with aluminum foil, capped, labeled, placed on ice in an insulated container, and delivered to a California-certified laboratory selected by Chevron for chemical analysis. Soil sampling equipment was decontaminated with a solution of phosphate-free soap between sampling to minimize the possibility of cross-contamination. The field geologist logged the earth materials encountered during drilling using the Unified Soil Classification System. A log of the boring is in Appendix C.

Drill cuttings from the boring were placed on plastic sheeting pending characterization, and were subsequently removed from the site for disposal by Chevron's contractor, Integrated Waste Management of Milpitas, California. Water used for decontamination purposes was removed from the site and disposed of at the Chevron Refinery in Richmond, California.

#### 3.3 Monitoring Well Construction

Monitoring Well MW-6 was constructed of schedule 40, flush-threaded, 2-inch diameter blank casing and well screen with 0.020-inch slots. The well screen was installed between approximate depths of 5 and 20 feet below grade in this boring. A sand filter pack was placed around the well screen to a height of approximately 1.5 feet above the top of the screen. A hydrated bentonite plug about 1 foot thick was placed above the sand pack, and the remaining annular space was filled with a neat cement to grade. The wellhead was protected by a locking cap and a traffic-rated utility box with a water-tight, bolted lid. Well construction details are presented in Appendix C.

#### 4.0 SITE CONDITIONS

#### 4.1 Geology and Hydrogeology

During drilling of Boring B6/MW6, unconsolidated sediments consisting of silty gravel, silt, and silty sand were encountered. Descriptions of the materials encountered are shown on the boring log (Appendix C).

Groundwater was first encountered during drilling at approximate depth of 10 feet below grade. However, the water level rose up to the depth of 1 foot below grade after the well was completed. On the next day, May 19, 1994, the field crew checked the depth-to-water and noticed that water in the well was under pressure and clean water was overflowing the well casing. Flowing artesian conditions were observed in the well. The flowing artesian conditions existing in Well MW6 were further investigated and presented by RESNA to Chevron and Alameda County Health Care Services Agency representatives during a field meeting on June 13, 1994. During the site meeting, approximately 7 feet of additional casing was connected to the top of the existing well casing. Water rose inside the well casing to a height of approximately 6 feet above ground surface. The artesian conditions in Well MW6 could be the result of combination of steep local topography and a confined aquifer. Based on the boring log from Well MW-6, the confining layer may simply be the asphalt surface pavement.

Because the top of the well screen in Monitoring Well MW-6 is below the potentiometric surface, the well is inadequate to provide information relating to the investigation of petroleum hydrocarbons in groundwater downgradient of the subject site. Therefore, on September 23, 1994, RESNA and Chevron U.S.A. Products Company submitted letters to Alameda County Health Care Services asking for permission to destroy Monitoring Well MW6 using a pressure-grouting method, which would ensure a proper seal with the flowing artesian conditions observed in the well. To date, Alameda County Health Care Services has not responded to RESNA's and Chevron's written request to destroy Monitoring Well MW6.

#### 5.0 LABORATORY ANALYSES

The soil samples selected for laboratory analysis from Boring B6/MW6 were analyzed for total petroleum hydrocarbons as gasoline (TPHg) using modified Environmental Protection Agency (EPA) Method 8015; and benzene, toluene, ethylbenzene and xylenes (BTEX) using EPA Method 8020.

#### 6.0 ANALYTICAL RESULTS

#### 6.1 Soil

TPHg and BTEX were not detected in soil samples collected from Boring B6/MW-6. Results of laboratory analyses are summarized in Table 1. Laboratory sheets and chain of custody are included in Appendix D.

#### 7.0 LIMITATIONS

This report was prepared in accordance with generally accepted standards of environmental geological practice in California at the time this investigation was performed. This investigation was conducted solely for the purpose of evaluating environmental conditions of soil and ground water beneath the site. No soil engineering or geotechnical recommendations are implied or should be inferred. Evaluation of the geologic conditions at the site for the purpose of this investigation is made from a limited number of observation points. Subsurface conditions may vary away from the data points available. Additional work, including further subsurface investigation, can reduce the inherent uncertainties associated with this type of investigation.

Respectfully submitted,

James A. Lehrman, R.G.

**Project Supervisor** 

Zbigniew L. Ignatowicz Assistant Project Scientist

#### **REFERENCES**

RESNA Industries, 1993, Additional Subsurface Environmental Investigation at Chevron Service Station No. 9-0329, 340 Highland Avenue, Piedmont, California, Project No. 170105.01, June 25.

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#### TABLE 1

# SOIL ANALYTICAL RESULTS CHEVRON SERVICE STATION 9-0329 340 HIGHLAND AVENUE PIEDMONT, CALIFORNIA

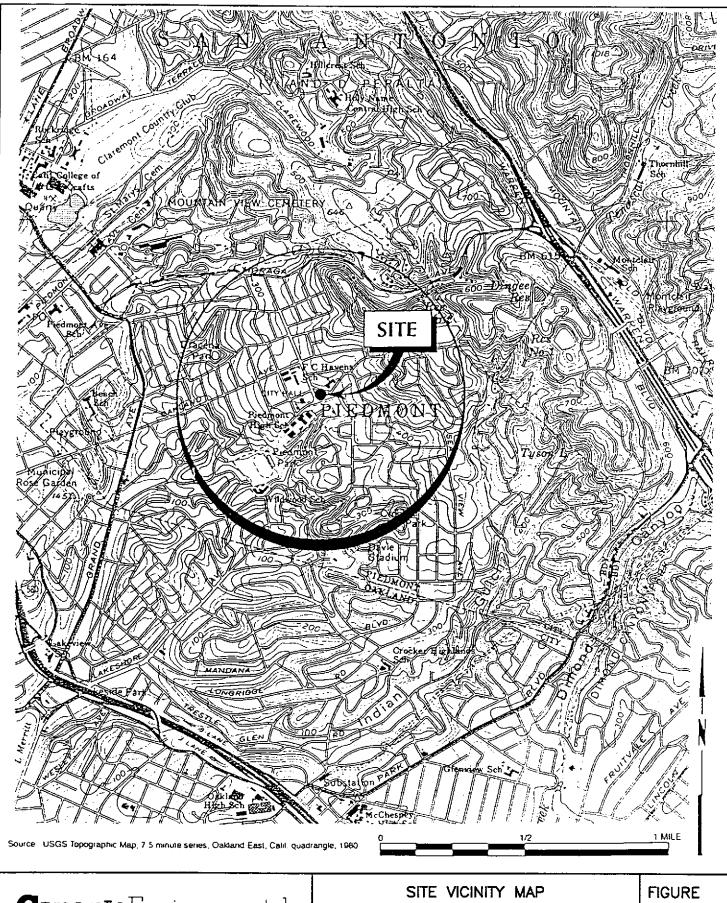
			Conc	entrations in I	ng/kg	
Sample No.	Date	TPH-G	Benzene	Toluene	Ethyl- Benzene	Total Xylenes
S-2.0-B6	05/18/94	<1	< 0.005	< 0.005	<0.005	< 0.015
S-4.5-B6	05/18/94	<1	<0.005	< 0.005	<0.005	<0.015
S-7.5-B6	05/18/94	<1	<0.005	<0.005	< 0.005	<0.015
S-10.0-B6	05/18/94	< 1	< 0.005	<0.005	< 0.005	< 0.015
S-15.0-B6	05/18/94	<1	< 0.005	< 0.005	< 0.005	<0.015

#### Notes:

mg/kg denotes milligrams per kilogram.

TPH-G denotes total petroleum hydrocarbons as gasoline.

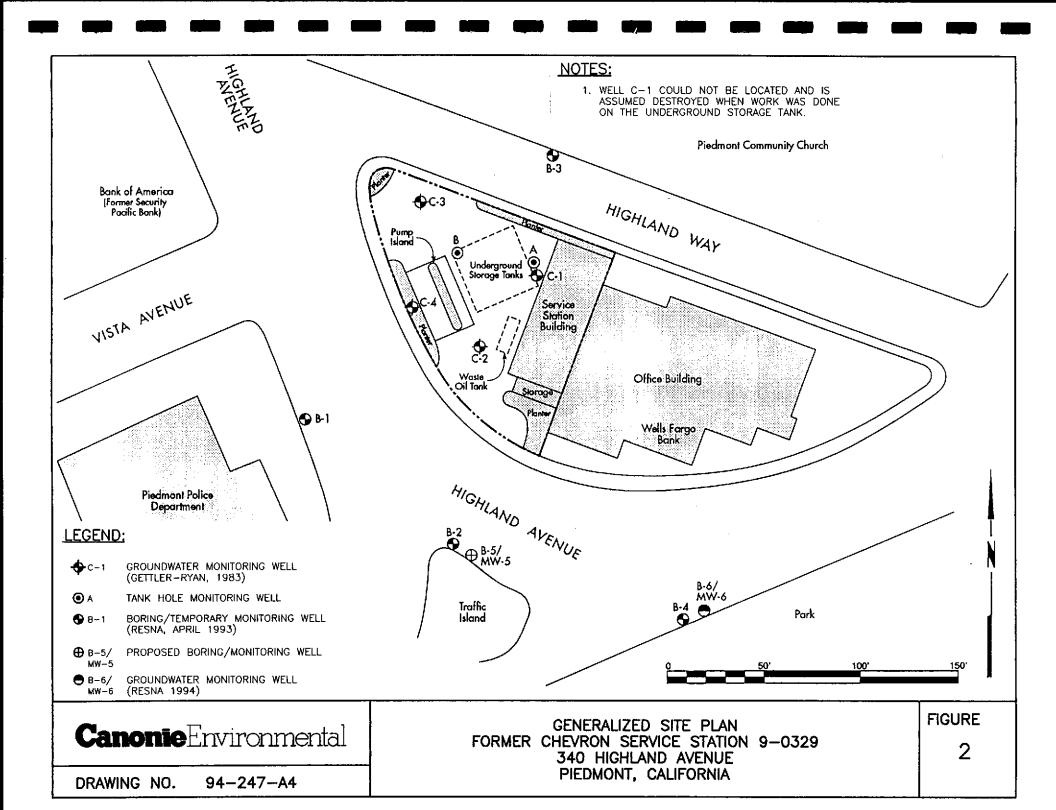
< denotes less than indicated detection limit established by the laboratory.



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94-247-A1 DRAWING NO.

SITE VICINITY MAP CHEVRON SERVICE STATION NO. 9-0329 340 HIGHLAND AVENUE PIEDMONT, CALIFORNIA



APPENDIX A

**PERMITS** 



APPLICANTS

SIGNATURE 5 .... + no C/4/94

## **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	FOR OFFICE USE
LOCATION OF PROJECT 340 HIGHLAND AVE	05005
LOCATION OF PROJECT SYD HIGHLAND Ave.	PERMIT NUMBER 94292 LOCATION NUMBER
	LOCATION NUMBER
CLIENT Name CHEVRON U.S.A. Address 2410 CAMINO LAMON Voice 510)842-8762 City San Ramon Zip 94583	PERMIT CONDITIONS  Circled Permit Requirements Apply
APPLICANT Name RESNA IND. INC. (415)	
Address 73 DIOTHL De Voice 5-10) 382-7415  City Novaro, CA Zip 94949	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
TYPE OF PROJECT  Well Construction Geotechnical Investigation	Drillers Report or equivalent for well Projects, or drilling logs
Well Construction Geotechnical Investigation Cathodic Protection General	and location sketch for geotechnical projects.
Water Supply Contemination	<ol> <li>Permit is void if project not begun within 90 days of approval date.</li> </ol>
Monitoring Well Destruction	B.)WATER WELLS, INCLUDING PIEZOMETERS
<del></del>	Minimum surface seal thickness is two inches of cement grout
PROPOSED WATER SUPPLY WELL USE	placed by tremie,
Domestic Industrial Other  Municipal Irrigation	<ol> <li>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</li> </ol>
DRILLING METHOD:  Mud Rotary Air Rotary August	monitoring wells is the maximum depth practicable or 20 feet.
Mud Rotary Air Rotary Auger X Cable Other	C. GEOTECHNICAL. Backfill bere hole with compacted cuttings or
Other Control	heavy bentonite and upper two leet with compacted material. In areas of known or suspected contamination, tremied cement grout
DRILLER'S LICENSE NO. 554979	shall be used in place of compacted outlings.
, MICH 000 (5070	D. CATHODIC. Fill hale above anode zone with concrete placed by
WELL PROJECTS  Drill Hole Diameter & " in. Maximum	tremie.
Casing Diameter	E. WELL DESTRUCTION. See attached.
Surface Seal Depth 7 ft. Number 2	
GEOTECHNICAL PROJECTS	
Number of Borings Maximum  Hole Diameter In. Depth ft.	
ESTIMATED STARTING DATE 5/194 ESTIMATED COMPLETION DATE 5/194	Warman Alma a 16 Name 11
I hereby agree to comply with all requirements of this permit and Alameda County Ordinance No. 73-58.	Approved Mman Hong Date 16 May 94
	<b>~</b>

MUNICIPAL BUSINESS TAX
CITY OF PIEDMONT . 120 VISTA AVE. . PIEDMONT, CA 94611 . (510)420-3040

Firm RESNA IND., INC. Carri American Home Comp# WC5816698 Expir 07/01/94

License No. 9400548
Expire 08/11/94
State License #
Bus. Phone (415)382-7400
Total Fee \$ 50.00

The Licensee has paid to the City of Piedmont the business license tax required by city ordinance and is hereby authorized to conduct business in the City of Piedmont. This license must be conspicuously posted at any fixed place of business. All other licensees must carry this license or prominently display in their vehicle the sticker provided below.

Resna Ind., Inc 73 Digital Drive Novato CA 94949

City Clerk CITY OF PIEDMONT

fold and detach here

Tax I.D. 9400548 Exp.08/11/94

RESNA IND., INC.
Quarterly Tax

CITY OF PIEDMONT

Business License Sticker

Tax I.D. 9400548 Exp.08/11/94

RESNA IND., INC.
Quarterly Tax

CITY OF PIEDMONT

Business License Sticker

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	_	NAME	-	HIBALAND AVE. PIEDMONT HEVRON U.S.A.	PLEASE READ IMPORTANT
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<b>ը</b> <u>ၓႜ</u>	<u>L</u>	Signal		Aich Flament - RESNA 9/20/23  I hereby affirm that I am exempt from the Contractor's License Law for	3. Pink Concrete-5 lbs. Davis #160 per yard.
			,	the following reason (Sec. 7031.5, Business and Professions Code: Any city or county which requires a permit to construct, after, improve, demolish, or repair any structura, prior to its issuance, also requires the applicant for such permit to file a signed statement that he is licensed pursuant to the provisions of the Contractor's License Law Chapter 9 (commencing with Sec. 7000) of Division 3 of the Business and Profes-	Any recipient of variance or design review must use exact materials, plans, & elevations as approved. No substitution of materials or plans is allowed unless City approval is obtained prior to construction. Penalties will be levied if construction is not as approved drawings.
-				sions Code, or that he is exempt therefrom and the basis for the alleged exemption. Any violation of Section 7031.5 by any applicant for a permit subjects the applicant to a civil penalty of not more than five hundred doftars (\$500).):	Before "final" inspection, a sub-contractor list must be delivered to building department in order to verify all city business licenses.
			/307//	□ I, as owner of the property, or my employees with wages as their sole compensation, will do the work, and the structure if not intended or offered for sale (Sec. 7044, Business and Professions Code: The Con-	DESCRIPTION OF WORK
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			OWW	his own employees, provided that such improvements are not intended or offered for sale. If, however, the building or improvement is sold	SOIL BORINGS IN HIGHLAND AVE.
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	;			contractors to construct the project (Sec. 7044, Business and Professions Code: The Contractor's License Law does not apply to an owner	TO APPROXIMATELY 15 FEET DEED
ω.				of property who builds or improves thereon, and who contracts for such projects with a contractor's licensed pursuant to the Contractor's	AND INSTALLING 2" DIAMETER
	;	,	1	License Law.).  Diam exempt under Sec, B.6/P.C. for this reason	GROUNDWATER MONITORING WELLS
NAN MAN				Signature Date	IN THE BOXINGS.
, <u> </u>		-		I hereby affirm that I have a certificate of consent to self-insure, or a	
				certificate of Workers' Compensation Insurance, or a certified copy thereof (Sec. 3890, Lab. C.).	
				Policy 5816698 Company American Homes    Certified copy is hereby furnished.	
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PERMIT NUMBER:	٠.			the Labor Code, you must forthwith comply with such provisions or this permit shall be deemed revoked.	VITOF PIEDWOSPT.
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- 5	£		3	LENDERS ADDRESS	
	4			I CERTIFY THAT I HAVE READ THIS APPLICATION AND STATE THAT THE INFORMATION GIVEN IS TRUE AND CORRECT, I AGREE TO COM-	UNIFORM BUILDING CODE  Permit Expiration, Every permit issued by the building official under the provisions of
-	£			PLY WITH ALL LOCAL ORDINANCES AND STATE LAWS RELATING TO BUILDING CONSTRUCTION AND I MAKE THIS STATEMENT UNDER	this code shall expire by limitation and become null and void If the building or work authorized by such permit is not commenced within 180 days from the date of such per-
	٢			PENALTY OF LAW. I HEREBY AUTHORIZE REPRESENTATIVES OF THIS CITY/COUNTY TO ENTER UPON THE ABOVE MENTIONED PROPERTY	mit, or if the building or work authorized by such permit is suspended or abandoned at any time after the work is commenced for a period of 180 days. Before such work can
<b>.</b>	rghl		٤	FOR INSPECTION PURPOSES, DO NOT CONCEAL OR COVER ANY CON- STRUCTION UNTIL THE WORK IS INSPECTED AND THE INSPECTION IS	be recommenced, a new permit shall be first obtained to do so, and the fee therefor shall be one half the amount required for a new permit for such work, provided no changes
_	¥	ᄖ	nauci,	RECORDED ON THE BACK OF THE JOB COPY OF THIS PERMIT, ALL IN- SPECTION REQUESTS ARE REQUIRED 24 HOURS IN ADVANCE OF THE	have been made or will be made in the original plans and specifications for such work; and provided further that such suspension or abandonment has not exceeded one year. In order to renew action on a permit after expiration, the permitee shall pay a new full
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DING RESS:	34	O NOT W		Scontractor Owner × Signature of Contractor Owner or Agent Agent for Contractor Owner or Owner	which work may commence under that permit when the permittee is unable to commence work within the time required by this section for good and satisfactory reasons. The building official may extend the time for action by the permittee for a period not exceeding 180 days on written request by the permittee showing that circumstances beyond the control
BUIL		A B		Address of AgentCTY STATE ZIP TELEPHONE	of the permittee have prevented action from being taken. (No permit shall be extended more than once.)
11.50 E0.50	S	ran e	-70 h	INICPECTOR	'S COPY

**APPENDIX B** 

FIELD PROCEDURES

#### FIELD PROTOCOL

The following presents RESNA Industries' field protocol for a typical site investigation involving hydrocarbon-impacted soil and/or groundwater.

#### Site Safety Plan

The Site Safety Plan describes the safety requirements for the evaluation of hydrocarbons in soil, groundwater, and the vadose-zone at the site. The site Safety Plan is applicable to personnel of RESNA Industries and its subcontractors. RESNA Industries personnel and subcontractors of RESNA Industries scheduled to perform the work at the site are briefed on the contents of the Site Safety Plan before work begins. A copy of the Site Safety Plan is available for reference by appropriate parties during the work. A site Safety Officer is assigned to the project.

#### Soil Borings

Prior to the drilling of borings and construction of monitoring wells, permits are acquired from the appropriate regulatory agency. In addition to the above-mentioned permits, encroachment permits from the City or State are acquired if drilling of borings off-site on City or State property is necessary. Copies of the permits are included in the appendix of the project report. Prior to drilling, Underground Service Alert (USA) is notified of our intent to drill, and known underground utility lies and structures are approximately marked.

The borings are drilled by a truck-mounted drill rig equipped with 8- or 10-inch-diameter, solid-stem or hollow-stem augers. Other methods such as rotary or casing hammer may be used if special conditions are encountered. The augers, sampling equipment and other equipment that comes into contact with the soil are steam-cleaned prior to drilling each boring to minimize the possibility of cross-contamination. Sampling equipment is cleaned with a trisodium phosphate solution and rinsed with clean water between samples. After drilling the borings, monitoring wells are constructed in the borings, or neat-cement grout with bentonite is used to backfill the borings to the ground surface.

Borings for groundwater monitoring wells are drilled to a depth of no more than 20 feet below the depth at which a saturated zone is first encountered, or a short distance into a stratum beneath the saturated zone which is of sufficient texture, moisture, and consistency to be judged as a perching layer by the field geologist, whichever is shallower. Drilling into a deeper aquifer below the shallowest aquifer is begun only after a conductor casing is properly installed and allowed to set, to seal the shallow aquifer.



#### **Drill Cuttings**

Drill cuttings subjectively evaluated as containing hydrocarbons at levels greater than 100 parts per million (ppm) are separated from those subjectively evaluated as containing hydrocarbons at levels less than 100 ppm. Evaluation is based either on subjective evidence of soil discoloration, or on measurements made using a field calibrated OVM. Readings are taken by placing a soil sample into a ziplock-type plastic bag and allowing volatilization to occur. The intake probe of the OVM is then inserted into the head space created in the plastic bag immediately after opening it. Field instruments such as the OVM are useful for measuring relative concentrations of vapor content, but cannot be used to measure levels of hydrocarbons with the accuracy of laboratory analysis. The drill cuttings from the borings are placed in labeled 55-gallon drums approved by the Department of Transportation, or on plastic at the site, and covered with plastic. The cuttings remain the responsibility of the client.

#### Sampling of Stockpiled Soil

One composite soil sample is collected for each 50 cubic yards of stockpiled soil, and for each individual stockpile composed of less than 50 cubic yards. Composite soil samples are obtained by first evaluating relatively high, average, and low areas of hydrocarbon concentration by digging approximately one to two feet into the stockpile and placing the intake probe of a field calibrated OVM against the surface of the soil; and then collecting one sample from the "high" reading area, and three samples from the "average" areas. Samples are collected by removing the top one to two feet of soil, then driving laboratory-cleaned brass sleeves into the soil. The samples are sealed in the sleeves using aluminum foil, plastic caps, and plastic zip-lock bags or aluminized duct tape; labeled; and promptly placed in iced storage for transport to the laboratory, where compositing is performed.

#### Soil Sampling in Borings

Soil samples are collected at no greater than 5-foot intervals from the ground surface to the total depth of the borings. The soil samples are collected by advancing the boring to a point immediately above the sampling depth, and then driving a California-modified, split-spoon sampler containing brass sleeves through the hollow center of the auger into the soil. (A standard penetrometer, which does not contain liners, may be used to collect samples when laboratory analysis for volatile components is not an issue. The sampler and brass sleeves are laboratory-cleaned, steam-cleaned, or washed thoroughly with Alconox® and water, prior to each use. The sampler is driven with a standard 140-pound hammer repeatedly dropped 30 inches. The number of blows to drive the sampler each successive six inches are counted and recorded to evaluate the relative consistency of the soil. When necessary, the sampler may be

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pushed by the drill rig hydraulics. In this case, the pressure exerted (in pounds per square inch) is recorded.

The samples selected for laboratory analysis are removed from the sampler and quickly sealed in their brass sleeves with aluminum foil, plastic caps, and plastic ziplock bags or aluminized duct tape. The samples are then labeled, promptly placed in iced storage, and delivered to a laboratory certified by the State of California to perform the analyses requested.

One of the samples in brass sleeves not selected for laboratory analysis at each sampling interval is tested in the field using an OVM that is field calibrated at the beginning of each day it is used. This testing is performed by inserting the intake probe of the OVM into the head space in the plastic bag containing the soil sample as described in the Drill Cuttings section above. The OVM readings are presented in Logs of Borings included in the project report.

#### Logging of Borings

A geologist is present to log the soil cuttings and samples using the Unified Soil Classification System. Samples not selected for chemical analysis, and the soil in the sampler shoe, are extruded in the field for inspection. Logs include texture, color, moisture, plasticity, consistency, blow counts, and any other characteristics noted. Logs also include subjective evidence for the presence of hydrocarbons, such as soil staining, noticeable or obvious product odor, and OVM readings.

#### **Monitoring Well Construction**

Monitoring wells are constructed in selected borings using clean 2- or 4-inch-diameter, thread-jointed, Schedule 40 polyvinyl chloride (PVC) casing. No chemical cements, glues, or solvents are used in well construction. Each casing bottom is sealed with a threaded end-plug, and each casing top with a locking plug. The screened portions of the wells are constructed of machine-slotted PVC casing with 0.020-inch-wide (typical) slots for initial site wells. Slot size for subsequent wells may be based on sieve analysis and/or well development data. The screened sections in groundwater monitoring wells are placed to allow monitoring during seasonal fluctuations of groundwater levels.

The annular space of each well is backfilled with No. 2 by 12 sand or similar sorted sand (groundwater monitoring wells), or pea gravel (vapor extraction wells) to approximately two feet above the top of the screened casing for initial site wells. The sand pack grain size for subsequent wells may be based on sieve analysis and/or well development data. A 1- to 2-foot-thick bentonite plug is placed above the sand as a seal against cement entering the filter pack. The remaining annulus is then backfilled

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with a slurry of water, neat cement, and bentonite to approximately one foot below the ground surface.

An aluminum utility box with a PVC apron is placed over each wellhead and set in concrete placed flush with the surrounding ground surface. Each wellhead cover has a seal to protect the monitoring well against surface-water infiltration and requires a special wrench to open. The design discourages vandalism and reduces the possibility of accidental disturbance of the well.

#### **Groundwater Monitoring Well Development**

The monitoring wells are developed by bailing or over-pumping and surge-block techniques. The wells are either bailed or pumped, allowed to recharge, and bailed or pumped again until the water removed from the wells is evaluated to be clear. Turbidity measurements (in NTUs) are recorded during well development and are used in evaluating well development. The development method used, initial turbidity measurement, volume of water removed, final turbidity measurement, and other pertinent field data and observations are recorded. The wells are allowed to equilibrate for at least 48 hours after development prior to sampling. Water generated by well development is stored in 17E Department of Transportation (DOT) 55-gallon drums on site, and remains the responsibility of the client.

#### **Groundwater Sampling**

The static water level in each well is measured to the nearest 0.01-foot using a Solinst® electric water-level sounder or oil/water interface probe (if the wells contain floating product) cleaned with Alconox® and water before use in each well. The depth of each well is also measured. The liquid in the wells is examined for visual evidence of hydrocarbons by gently lowering approximately half the length of a Teflon® bailer (cleaned with Alconox® and water) past the air/water interface. The sample is then retrieved and inspected for floating product, sheen, emulsion, color, sediment, and clarity. Obvious product odor is recorded if noted. If floating product is present in the well, the thickness of floating product is measured using an oil/water interface probe and is recorded to the nearest 0.01 foot. Floating product is removed from wells on site visits.

Groundwater samples from the wells are collected in approximate order of increasing product concentration, as best known or estimated. Wells which do not contain floating product are purged using a submersible pump. Equipment which comes in contact with the interior of the well or the groundwater is cleaned with Alconox® and deionized or distilled water prior to use in each well. The wells are purged until withdrawal is of sufficient duration to result in stabilized pH, temperature, and electrical conductivity of the water. These parameters are measured to the nearest 0.1 pH unit, 0.1 degree F, and 10 umhos/cm, respectively, using portable meters

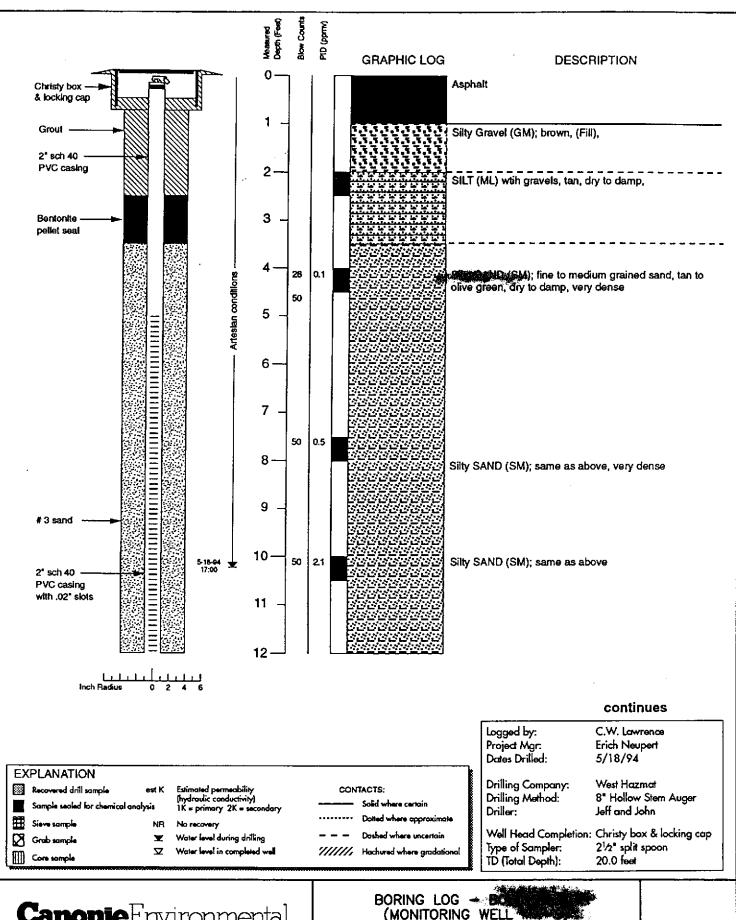
calibrated daily to a buffer and conductivity standard, according to the manufacturer's specifications. A minimum of four well volumes is purged from each well. If the well becomes dewatered, the water level is allowed to recover to at least 80 percent of the initial water level. When recovery of the water level has not reached at least 0 percent of the static water level after two hours, a groundwater sample will be collected when sufficient volume is available to fill the sample container. Prior to the collection of each groundwater sample, the Teflon® bailer is cleaned with Alconox® and rinsed with tap water and deionized water, and the latex gloves worn by the sampler changed. Hydrochloric acid is added to the sample vials as a preservative (when applicable). Sample containers remain sealed until usage at the site. A sample method blank is collected by pouring distilled water into the bailer and then into sample vials. Method blanks are analyzed periodically to verify effective cleaning procedures. A sample of the formation water is then collected from the surface of the water in each of the wells using the Teflon® bailer. The water samples are then gently poured into laboratory-cleaned, 40-milliliter (ml) glass vials, 500 ml plastic bottles or 1-liter glass bottles (as required for specific laboratory analysis), sealed with Teflon®lined caps, and inspected for air bubbles to check for head space, which would allow volatilization to occur. If a bubble is evident, the cap is removed, more sample is added, and the bottle resealed. The samples are then labeled and promptly placed in iced storage, and the wellhead is secured. A field log documenting sampling procedures and parameter monitoring is maintained. Water generated by the purging of wells is stored in 17E DOT 55-gallon drums, and floating product bailed from the wells is stored in double containment on-site; this water and product remains the responsibility of the client.

#### Sample Labeling and Handling

Sample containers are labeled in the field with the job number, unique sample location, depth, and date, and promptly placed in iced storage for transport to the laboratory. A Chain of Custody Record is initiated by the field geologist and updated throughout handling of the samples, and accompanies the samples to a laboratory certified by the State of California for the analyses requested. Samples are transported to the laboratory promptly to help ensure that recommended sample holding times are not exceeded. Samples are properly disposed of after their useful life has expired.

**APPENDIX C** 

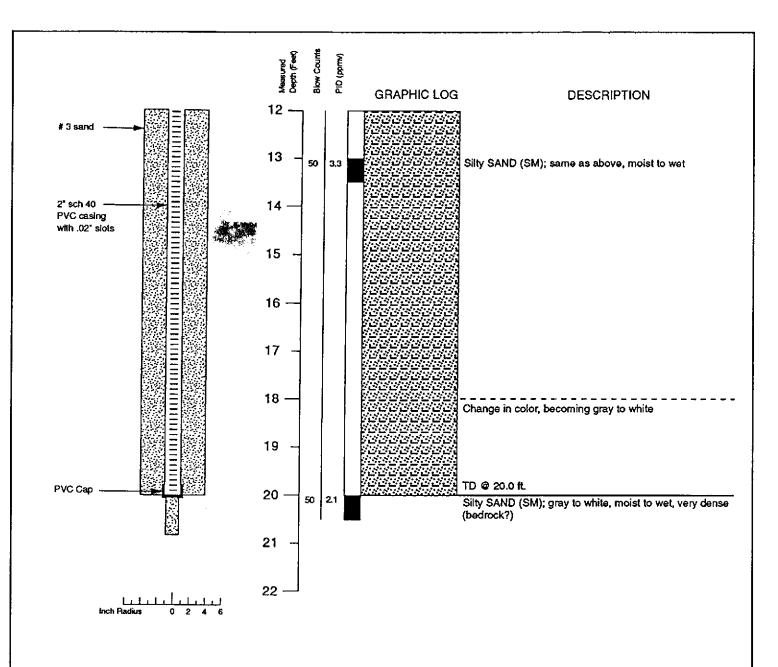
**BORING LOGS** 

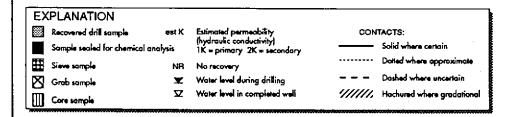


**Canonie** Environmental

DRAWING NO. 94-247-A2

(MONITORING WELL FORMER CHEVRON SERVICE STATION 9-0329 340 HIGHLAND AVENUE PIEDMONT, CALIFORNIA





## **Canonie** Environmental

DRAWING NO. 94-247-A3

BORING LOG - BORING B-6 (MONITORING WELL MW-6) FORMER CHEVRON SERVICE STATION 9-0329 340 HIGHLAND AVENUE PIEDMONT, CALIFORNIA

#### APPENDIX D

LABORATORY ANALYTICAL REPORTS AND CHAIN OF CUSTODY RECORDS



Client Number: RSN15CHV08 Consultant Project Number: 170105.02
Pacility Number: 9-0329
Project ID: 940 Highland Ave. Pledmont, CA
Work Order Number: C4-05-0398

#### **ANALYTICAL RESULTS**

## Aromatic Volatile Organics and Total Petroleum Hydrocarbons as Gasoline in Soil

EPA Methods 5030, 8020, and Modified 8015a

GTEL Sample Number		01	02	03	04
Client Identification		S-2.0-B6	S-4.5-B6	S-7.5-B6	B-10.0-B6
Date Sampled		05/18/94	05/18/94	05/18/94	05/18/94
Date Analyzed		05/27/94	05/27/94	05/27/94	05/27/94
Analyte	Detection Limit, mg/Kg		Concentrat	ion, mg/Kg	
Benzene	0.005	< 0.005	< 0.005	<0.005	< 0.005
Toluene	0.005	< 0.005	< 0.005	< 0.005	< 0.005
Ethylbenzene	0.005	< 0.005	< 0.005	< 0.005	<0.005
Xylene, total	0.015	< 0.015	< 0.015	< 0.015	<0.015
TPH as Gasoline	1	<1	<1	<1	<1
Detection Limit Multiplier		1	1	1	1
Percent solids		90.1	93.6	95.0	91.1
BFB Surrogate, % recovery		69.8	78.9	81.0	87.3

Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Revision 0, US EPA November 1986. Modification for TPH as gasoline as per California State Water Resources Control Board LUFT Manual protocols, May 1988 revision. Results reported on a wet weight basis. Bromofluoroberszene surrogate recovery acceptability limits are 60-119%

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Client Number: RSN15CHV08 Consultant Project Number: 170105.02
Facility Number: 9-0329
Project ID: 340 Highland Ave. Pledmont, CA
Work Order Number: C4-05-0398

#### **ANALYTICAL RESULTS**

# Aromatic Volatile Organics and Total Petroleum Hydrocarbons as Gasoline in Soil

EPA Methods 5030, 8020, and Modified 8015<sup>a</sup>

GTEL Sample Number		05	F05279401	
Client Identification		\$-15.0-B6	METHOD BLANK	
Date Sampled		05/18/94	_	
Date Analyzed		05/27/94	05/27/94	
Analyte	Detection Limit, mg/Kg	<del></del>	Concentration	n, mg/Kg
Benzene	0.005	< 0.005	<0.005	
Toluene	0.005	<0.005	<0.005	
Ethylbenzene	0.005	<0.005	<0.005	
Xylene, total	0.015	<0.015	<0.015	
TPH as Gasoline	1	<1	<1	
Detection illmit Multipiler		1	1	
Percent solids		89.7	NA	
BFB Surrogate, % recovery		79.1	95.7	

Test Mathods for Evaluating Solid Waste, SW-846, Third Edition, Revision 0, US EPA November 1986. Modification for TPH as gaso-line as per California State Water Resources Control Board LUFT Manual protocols, May 1968 revision. Results reported on a wet weight basis. Bromofluorobenzene surrogate recovery acceptability limits are 60-119%. NA = Not Applicable.





Cilent Number: RSN15CHV08
Consultant Project Number: 170105.02
Facility Number: 9-0329
Project ID: 9-0329
Work Order Number: C4-05-0398

## QC Matrix Spike and Duplicate Spike Results

Matrix: Sol

Analyte	Sample ID	Spike Amount	Units	Recovery, %	Duplicate Recovery, %	RPD, %	Control Limits
Modified EPA 8020:							
Benzene	C4050398-01	0.050	mg/Kg	74.6	67.8	9.5	48.8 - 129
Toluene	C4050398-01	0.050	mg/Kg	77.8	71.8	0.0	52.0 - 123
Ethylbenzene	C4050398-01	0.050	mg/Kg	77.2	69.D	11.2	55.4 - 122
Xylene, total	C4050398-01	0.150	mg/Kg	79.5	72.2	9.6	55.1 - 130



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Northwest Region 4080-C Pike Lane Concord, CA 94520 (510) 685-7852 (800) 544-3422 from inside California (800) 423-7143 from outside California (510) 825-0720 (FAX) Client Number: RSN06CHV08 Consultant Project Number: 170105.02 Facility Number: 9-0329 Project Project

Project ID: 340 Highland Ave. Piedmout, CA

Work Order Number: C4-05-0394

May 26, 1994

Erich Neupert RESNA Industries 73 Digital Drive Novato, CA 94949

Enclosed please find the analytical results for samples received by GTEL Environmental Laboratories, Inc. on 05/25/94.

A formal Quality Assurance/Quality Control (QA/QC) program is maintained by GTEL, which is designed to meet or exceed the EPA requirements. Analytical work for this project met QA/QC criteria, unless otherwise stated in the footnotes.

GTEL is certified by the California State Department of Health Services, Laboratory certification number E1075, to perform analyses for drinking water, wastewater, and hazardous waste materials according to EPA protocols.

If you have any questions concerning this analysis or if we can be of further assistance, please call our Customer Service Representative.

Sincerely,

GTEL Environmental Laboratories, Inc.

Rashmi Shah

**Laboratory Director** 

Client Number: RSN06CHV08
Consultant Project Number: 170105.02
Facility Number: 9-0329
Project ID: 340 Highland Ave. Piedmout, CA
Work Order Number: C4-05-0394

#### ANALYTICAL RESULTS

#### Volatile Organics in Soil

#### EPA Methods 8020 and Modified 8015a

GTEL Sample Number	01	F052594-1					
Client Identification		CUTTINGS A,B,C,D	METHOD BLANK		-		
Date Sampled	05/18/94	<del></del>					
Date Analyzed		05/26/94	05/25/94				
Analyte	Detection Limit, mg/kg	Concentration, mg/kg					
Benzene	0.005	<0.005	<0.005				
Toluene	0.005	<0.005	< 0.005				
Ethylbenzene	0.005	<0.005	<0.005				
Xylene, total	0.015	<0.015	<0.015		<del> </del>		
TPH as Gasoline	1	<1	<1				
Detection Limit Multiplier		1	1				
Percent solids	92.5	NA					
BFB surrogate, % recovery	73.6	93.7					

Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Revision 0, US EPA November 1986. Modification for TPH as gasoline as per California State Water Resources Board LUFT Manual procedures. Bromofluorobenzene surrogate recovery acceptability limits are 60 - 119%. NA = Not Applicable.



Client Number: RSN06CHV08
Consultant Project Number: 170105.02
Facility Number: 9-0329
Project ID: 340 Highland Ave. Piedmout, CA
Work Order Number: C4-05-0394

### **QC Matrix Spike and Duplicate Spike Results**

Matrix: Soil

Analyte	Sample ID	Spike Amount	Units	Recovery,	Duplicate Recovery, %	RPD, %	Control Limits
Modified EPA 8020:						<del></del>	
Benzene	C4050310-10	0.050	mg/Kg	70.6	75.2	6.3	48.8 - 129
Toluene	C4050310-10	0.050	mg/Kg	73.2	76.8	4.8	52.0 - 123
Ethylbenzene	C4050310-10	0.050	mg/Kg	72.0	77.4	7.2	55.4 - 122
Xylene, total	C4050310-10	0.150	mg/Kg	76.0	81.3	6.7	55.1 - 130

