

Treadwell&Rollo

9 October 1998
Project No. 2323.02

Mr. Mark Johnson
California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, CA 94612

Subject: Arsenic Investigation Report
South BGR Site, Emeryville, California

Dear Mr. Johnson:

On behalf of Shell Oil Company, Treadwell & Rollo, Inc. (T&R) has prepared the enclosed *Arsenic Investigation Report* to summarize the field work as described in the approved *Arsenic Investigation Work Plan* (T&R, 3 April 1998).

The objective of this investigation was to characterize the extent of arsenic in ground water with respect to potential on-site and off-site sources that may have affected the water quality in monitoring well LF-28 located in Horton Street. The field work was conducted during the period of 7 July through 16 July, 1998. The ground water level study results and the chemical analytical data indicate that the arsenic contamination detected in ground water at LF-28 is not due to a source on the Former Shell Research Facility. The elevated concentration of arsenic in LF-28 is likely due to the known source of arsenic contamination at the adjacent Sherwin-Williams site.

If you have any questions or need additional information, please call me at (925) 253-4980, ext. 420.

Sincerely yours,
TREADWELL & ROLLO, INC.



Margaret K. (Peggy) Peischl, P.E.
Senior Project Engineer

Enclosure
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ARSENIC INVESTIGATION REPORT
South BGR Property
Emeryville, California

Shell Oil Company
Houston, Texas

9 October 1998
Project 2323.02

Treadwell&Rollo
Environmental and Geotechnical Consultants

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ARSENIC INVESTIGATION REPORT

**South BGR Property
Emeryville, California**

1.0 INTRODUCTION

On behalf of Shell Oil Company, Treadwell & Rollo, Inc., (T&R) conducted an investigation of arsenic in ground water at the former Shell Research Facility on the South BGR (SBGR) property (the Site), in Emeryville, California. The purpose of this investigation was to characterize the extent of arsenic in ground water with respect to potential on-site and off-site sources that may have affected the water quality in a monitoring well located in Horton Street (Sherwin-Williams ground water monitoring well LF-28).

The Site is located on Horton Street between 45th and 53rd Streets (see Figure 1, Site Location Map). The eastern boundary of the site abuts a Pacific Gas and Electric (PG&E) work yard. The Site occupies approximately 7.5 acres of land, much of which is covered by buildings or paving. The Shell Research Facility, formerly located on the Site, consisted of approximately 61 activity areas, including office buildings, pilot plant structures, above- and below-ground storage tanks, reaction testing equipment, and related infrastructure. Figure 2 presents the layout of the former Shell facility on the Site, based on a Shell facilities map dated 24 May 1962. Currently, all aboveground portions of the facility have been removed, with the exceptions of Buildings N, Q, R and V. Current site usage includes office buildings, laboratories, parking and live-work spaces (see Figure 3).

2.0 SUMMARY OF THE FIELD INVESTIGATION PROGRAM

The scope of work for this investigation was presented to the Regional Water Quality Control Board (RWQCB) in the *Arsenic Investigation Work Plan* (T&R, 3 April 1998) (the Work Plan). Oral concurrence with the plan was given by RWQCB staff (Mark Johnson, personal communication, 18 June 1998).

The field work was conducted between 7 July and 16 July 1998, scheduled to coincide with the quarterly ground water monitoring event performed by Levine-Fricke-Recon at the Sherwin-Williams plant. A total of 13 soil borings were advanced during the investigation, and 3 soil borings were converted into temporary piezometers (the locations are shown on Figure 3). The investigation also included the collection of one-time ground water grab samples from ten soil borings; the receipt of split ground water samples from four Sherwin-Williams ground water monitoring wells (LF-27, LF-28, LF-29 and LF-30); and a ground water level study. The three temporary piezometers (TRP-1, TRP-2 and TRP-3) were decommissioned on 16 July 1998 following the completion of water level measurements. Details of the field investigation program are presented in Appendix A.

One-time ground water grab samples were collected on 14 and 15 July 1998 at 10 locations (TRG-1 through TRG-10). As part of Sherwin-Williams' quarterly ground water monitoring program, Levine-Fricke-Recon (LFR) field personnel purged and sampled ground water from four Sherwin-Williams' ground water monitoring wells located in Horton Street (LF-27, LF-28, LF-29, LF-30) on 14 July 1998 and provided split samples to T&R field personnel. The ground water grab and well samples were analyzed for arsenic by EPA Method 7060. The chemical analytical results are summarized in Table 1 and presented on Figure 3. A copy of the chain of custody and the analytical laboratory report are included in Appendix B.

Two duplicate water samples were prepared and analyzed to provide a measure of the overall precision of the sampling and analysis procedures, confirmation of the primary sample analytical results, and the means of evaluating random error. The primary samples from TRG-9 (grab sample) and LF-28 (monitoring well sample) were split at the laboratory. The duplicate samples were labeled DUP1 (from LF-28) and DUP2 (from TRG-9). Table 1 includes the duplicate sample results for arsenic.

Ground water levels were measured in the temporary piezometers on 13, 15 and 16 July 1998. LFR measured ground water levels in four Sherwin-Williams' ground water monitoring wells located in Horton Street (LF-27, LF-28, LF-29, LF-30) on 13 July 1998 and provided the data to T&R field personnel. The measurements are summarized in Table A-3 and presented on Figure 4.

3.0 SUMMARY OF THE CHEMICAL ANALYTICAL TESTING PROGRAM

The chemical analytical testing program presented in the Work Plan included arsenic by EPA 7060 for all water samples and additional analyses on a composite soil sample representative of the drilling waste for profiling purposes. A description of the chemical analytical program, review of the chemical analytical data, and field and laboratory quality control sample results are presented in Appendix B. The chemical analytical results for the ground water grab and monitoring well split samples are summarized on Table 1 and presented on Figure 3.

The chemical analyses were conducted by Chromalab, Inc., and Clayton Laboratory Services, both located in Pleasanton, California. Chromalab, Inc., was the main contract laboratory where all samples were initially delivered following collection. The arsenic analyses for all water samples were subcontracted to Clayton Laboratory Services since this laboratory had the facilities to perform the analyses by EPA Method 7060. EPA Method 7060 (atomic adsorption) was selected to be consistent with the analytical method used by LFR for the investigations and

monitoring at the Sherwin-Williams site. Chromalab, Inc. performed all other chemical analyses requested to characterize the drilling waste (soil), including Total Petroleum Hydrocarbons as gasoline (TPH/gas) and TPH as diesel by EPA Method 8015M; benzene, toluene, ethyl benzene, xylenes (BTEX) and methyl tert butyl ether (MTBE) by EPA Method 8020A; volatile organic compounds (VOCs) by EPA Method 8010; and arsenic, barium, cadmium, chromium, lead, selenium, silver and mercury (by various EPA methods; see Appendix B).

4.0 DISCUSSION AND CONCLUSIONS

This focused ground water investigation was performed to evaluate whether arsenic detected on-site in the past (*Preliminary Site Investigation Report - BGR and Chapman Properties*, prepared by Erler & Kalinowski, Inc., for Chiron Corporation, dated 10 January 1994) is contributing to the arsenic plume migrating from the nearby Sherwin-Williams plant. The seven ground water grab locations (TRG-1 through TRG-10) were located in the on-site area upgradient of monitoring well LF-28 (located in Horton Street), and three ground water grab locations (LF-8, LF-9 and LF-10) were located in Horton Street in line with the existing four LFR ground water monitoring wells.

The results of the ground water level study indicate that the on-site ground water direction generally trends towards the northwest (see Figure 4). The distribution of the arsenic in ground water shown on Figure 3 indicates that arsenic levels are highest at LF-28 (0.45 milligrams per liter (mg/L)) and decrease significantly in the upgradient direction towards the Site. The highest on-site arsenic concentration was 0.044 mg/L at TRG-5, which is near LF-28. The concentration of arsenic at TRG-8 (0.32 mg/L) was the same order of magnitude as that measured at LF-28 (TRG-8 was located in Horton Street, directly between and in line with LF-27 and LF-28).

It is apparent that the arsenic contamination detected in ground water at LF-28 is not due to a source on the Former Shell Research Facility. The elevated concentration of arsenic in LF-28 is

likely due to the known source of arsenic contamination at the adjacent Sherwin-Williams site, due to historical leakage from the adjacent underground sewer line or other routes of preferential migration. LF-28 is located about one foot from the sewer pipe alignment in Horton Street.

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TABLE 1: CHEMICAL ANALYTICAL RESULTS--GROUND WATER SAMPLES**Arsenic Investigation
Former Shell Research Facility
Emeryville, California**

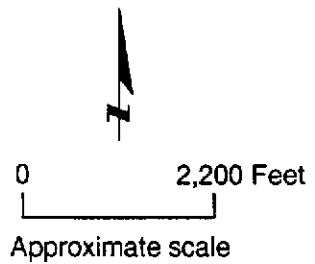
Sample ID	Date Collected	Date Analyzed	Arsenic (mg/L)
TRG-1	15-Jul-98	23-Jul-98	0.019
TRG-2	14-Jul-98	23-Jul-98	<0.005
TRG-3	15-Jul-98	23-Jul-98	0.022
TRG-4	14-Jul-98	23-Jul-98	0.010
TRG-5	14-Jul-98	23-Jul-98	0.044
TRG-6	14-Jul-98	23-Jul-98	0.027
TRG-7	14-Jul-98	23-Jul-98	0.040
TRG-8	15-Jul-98	23-Jul-98	0.32
TRG-9	15-Jul-98	23-Jul-98	<0.005
DUP2 (of TRG-9)	15-Jul-98	23-Jul-98	<0.005
TRG-10	15-Jul-98	23-Jul-98	<0.005
LF-27	14-Jul-98	23-Jul-98	0.020
LF-28	14-Jul-98	23-Jul-98	0.45
DUP1 (of LF-28)	14-Jul-98	23-Jul-98	0.46
LF-29	14-Jul-98	23-Jul-98	<0.005
LF-30	14-Jul-98	23-Jul-98	<0.005

Notes:

1. Well samples (LF series) collected as splits from LFR personnel (LFR equipment).
2. Grab samples (TRG series) collected using stainless steel bailer by Gregg Drilling.
3. Arsenic analytical method is EPA Method 7060, Reporting Limit = 0.005 mg/L (lab filtered).
4. mg/L = milligrams per liter
5. <0.005 = arsenic was not reported/detected at the laboratory reporting level of 0.005 mg/L
6. No equipment or field blanks collected with grab sampling event.



Base map: The Thomas Guide
Alameda County
1993



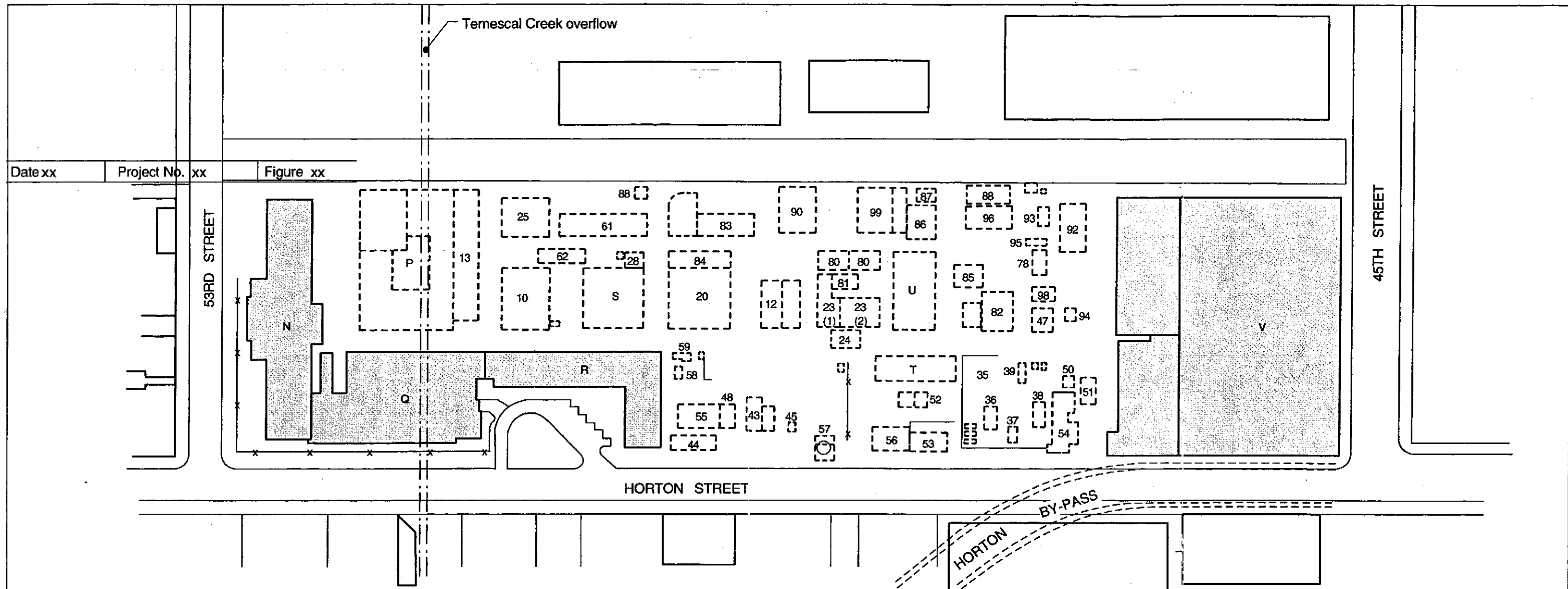
**FORMER SHELL RESEARCH FACILITY
SOUTH BGR SITE
Emeryville, California**

SITE LOCATION MAP

Treadwell & Rollo

Project No. 2323.01

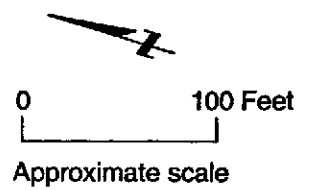
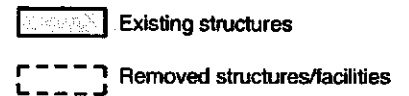
Figure 1



Date xx Project No. xx Figure xx

EXPLANATION

- | | | | | |
|---|--|---|--|---|
| 10 Pilot plant building | 43 Pilot plant structure | 59 Unit sub | 90 Market development building | T Experimental plants field office |
| 12 Drum storage area and storage building | 44 Sulfide corrosion laboratory | 61 Aboveground Tank Farm No. 1 | 92 Solvent storage building | U Original motor laboratory - experimental process plant building |
| 13 Laboratory and storage shed | 45 Temporary equipment enclosure | 62 Pump equipment for Tank Farm No. 1 | 93 Twin shell blender | V Motor laboratory, manufacturing facility and warehouse, shops, storage, offices, and laboratories |
| 20 Chemical products building | 47 Exploratory reactions building | 78 Compartment exploratory reactions building | 94 Enclosure | |
| 23 (1) Substation | 48 Pilot plant structure | 80 Fluor cooling water towers | 95 Aboveground Tank Farm No. 5 | |
| 23 (2) Storage | 50 Trash incinerator | 81 Field lavatory and equipment shed | 96 Aboveground Tank Farm No. 3 | |
| 24 Abandoned underground (?) fuel tank | 51 Underground fuel tank for boilers (15,000 gallon) | 82 Oxidation pilot plant building | 98 Two compartment exploratory reaction building | |
| 25 Chemical process unit | 52 Pilot plant structure | 83 Aboveground Tank Farm No. 2 | 39 Product development building | |
| 28 70 foot tower | 53 Aboveground Tank Farm No. 4 | 84 Pump equipment for Tank Farm No. 2 | N Original laboratory and office building | |
| 35 Utility area (boilers, etc.) | 55 Furnace building | 85 Pilot plant with flare stack | P Plastics and polymers building | |
| 36 Keeler boiler | 56 Drum packaging unit | 86 Compressor house | Q Office and laboratory building | |
| 37 Erie boiler and stack | 57 Waste hydrocarbon disposal unit (incinerator?) | 87 Pilot plant structure | R Office building | |
| 38 B&W boiler | 58 Smoke house | 88 Tank car unloading racks (2) | S Laboratory and high process plant | |
| 39 Hot oil furnace | | | | |

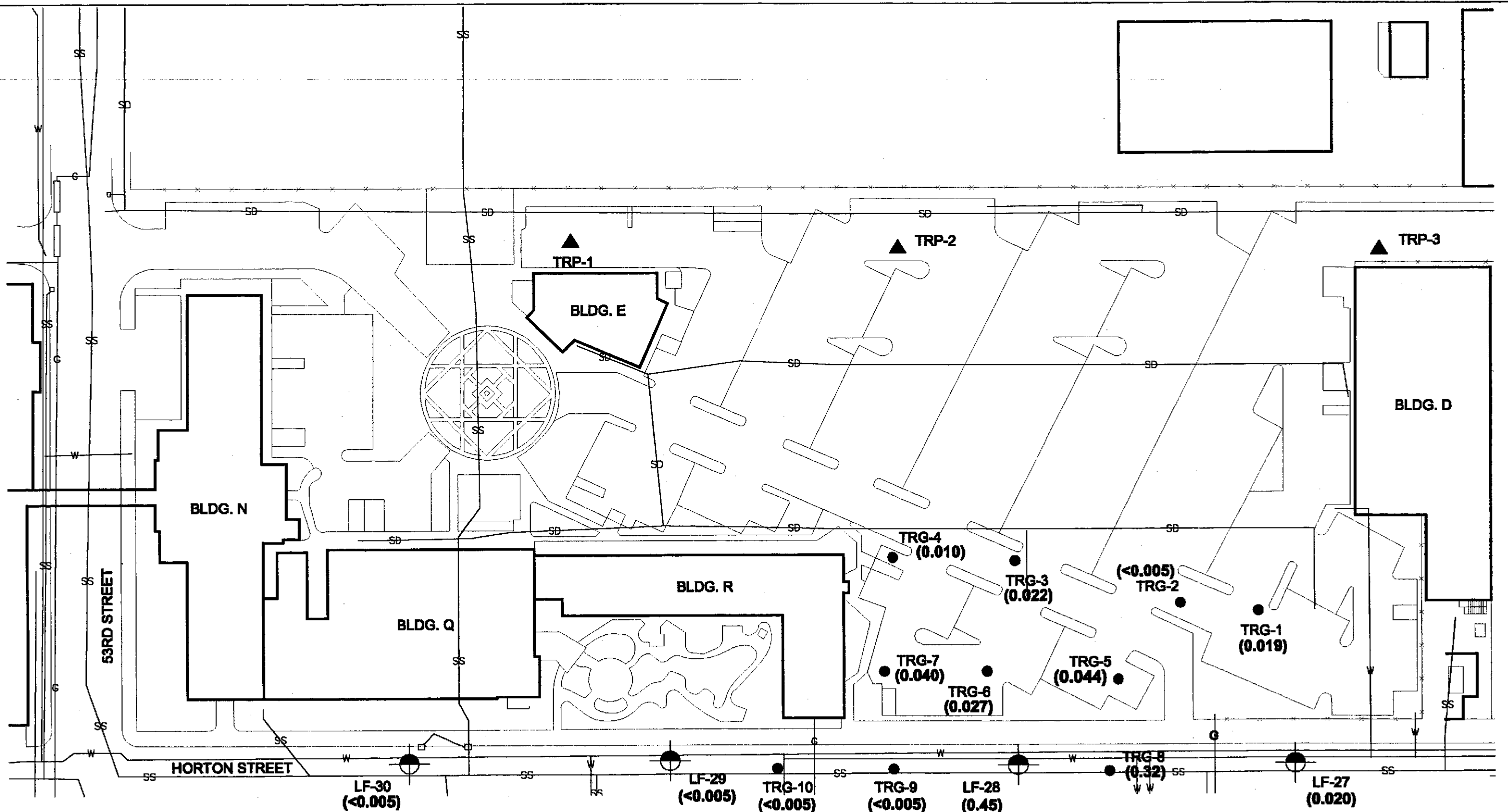


**FORMER SHELL RESEARCH FACILITY
SOUTH BGR SITE
Emeryville, California**

**LOCATION OF FORMER
SHELL FACILITIES**

Date 8/17/98 Project No. 2323.02 Figure 2

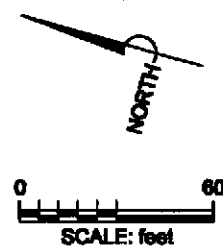
Treadwell&Rollo



EXPLANATION:
 (0.019) Arsenic concentration (milligrams per liter)

- Wells/borings**
- A-zone groundwater monitoring well
 - A-zone boring
 - ▲ A-zone temporary piezometer

- Underground Utilities**
- G — Gas
 - SD — Storm drain
 - SS — Sanitary sewer
 - W — Water



SOURCE: Parking plan existing as of July 1, 1998, Drawing No. PARK-1B (Chiron)
 Existing utilities, Drawing Nos. C2-03 and C2-05, dated 14 April 1998 (Chiron)

FORMER SHELL RESEARCH FACILITY
 SOUTH BGR SITE
 Emeryville, California

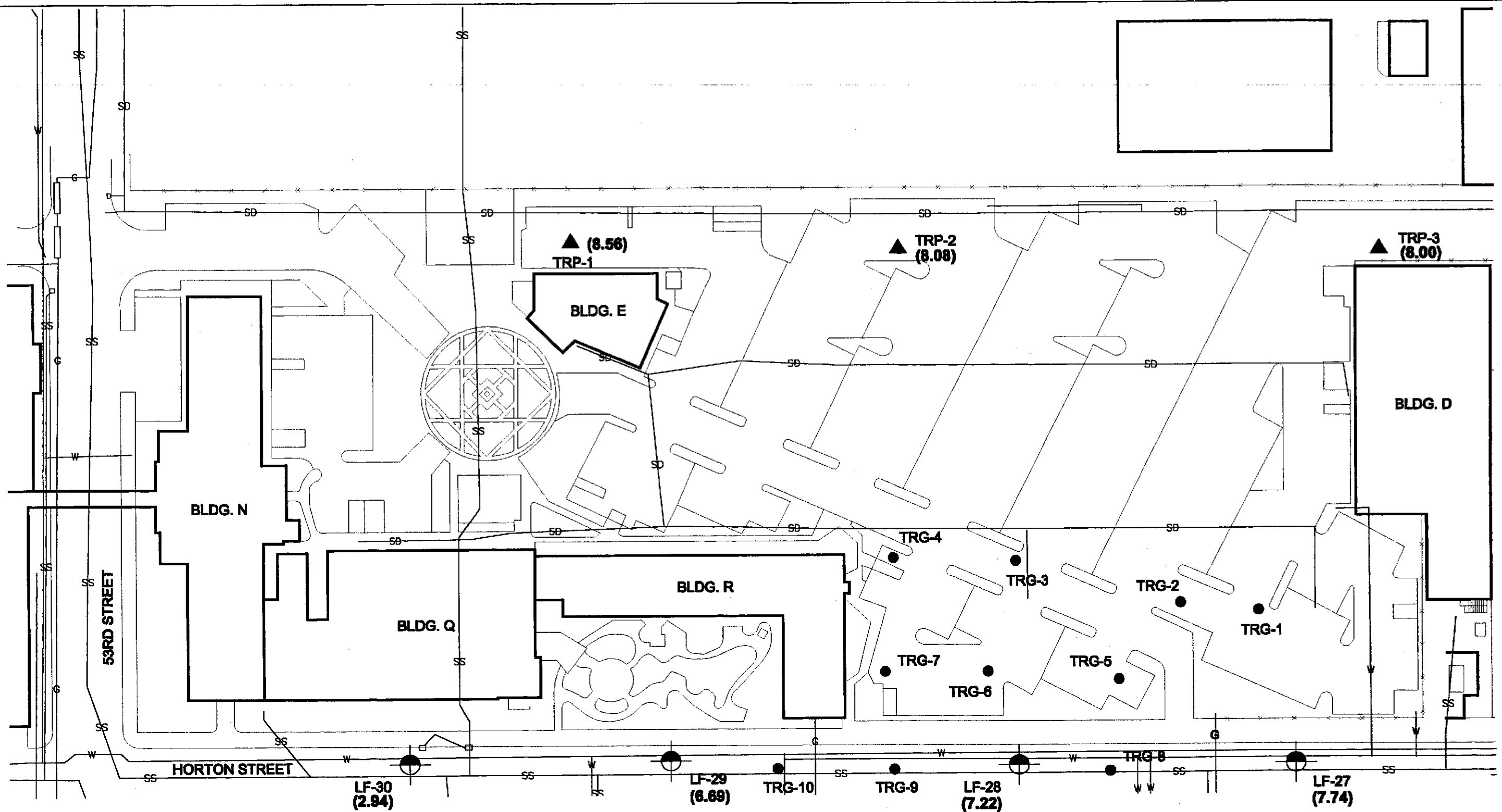
**ARSENIC INVESTIGATION
 SAMPLING LOCATIONS**

Project No. 2323.02

Figure 3

Treadwell & Rollo

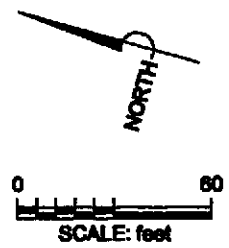
FILE: SITE-DET.DWG 062498



(2.94) Groundwater Elevation (feet)

- Wells/borings**
- ⊕ A-zone groundwater monitoring well
 - A-zone boring
 - ▲ A-zone temporary piezometer

- Underground Utilities**
- G — Gas
 - SD — Storm drain
 - SS — Sanitary sewer
 - W — Water



FORMER SHELL RESEARCH FACILITY
SOUTH BGR SITE
Emeryville, California

**A-ZONE GROUNDWATER
ELEVATIONS, JULY 1998**

Project No. 2323.02

Figure 4

Treadwell & Rollo

FILE: SITE-DET.DWG 082498

SOURCE: Parking plan existing as of July 1, 1998, Drawing No. PARK-1B (Chiron)
Existing utilities, Drawing Nos. C2-03 and C2-05, dated 14 April 1996 (Chiron)

APPENDIX A

FIELD INVESTIGATION PROGRAM

Between 7 July and 16 July 1998, the arsenic investigation was conducted at the former Shell research facility and adjacent Horton Street (the Site), Emeryville, California. This work was conducted by Treadwell & Rollo, Inc., (T&R) on behalf of Shell Oil Company under the supervision of California Professional Engineer, Margaret K. (Peggy) Peischl, P.E. A total of 13 soil borings were advanced during the investigation, and 3 soil borings were converted into temporary piezometers. The investigation also included the collection of one-time ground water grab samples from ten soil borings; the receipt of split ground water samples from four Sherwin-Williams ground water monitoring wells; and a ground water level study. The procedures used during each of the above tasks are described below.

A.1 FIELD PROCEDURES

A.1.1 Mobilization for Field Work

Various activities were conducted prior to the start of field work. The appropriate permits were filed with the Alameda County Department of Environmental Health Services (ACDEHS) and the City of Emeryville Department of Public Works. The proposed boring locations were marked at the Site during a site visit on 24 June 1998 (T&R personnel were accompanied by Mr. Ric Notini, Chiron Corporation). Underground utility clearances were conducted on 7 July 1998 by CU Surveys, located in San Ramon, California. Other activities included the preparation of a Health and Safety Plan to provide the basis for health and safety protocol during the field investigation.

A.1.2 Temporary Piezometer Installation Procedures

The initial pilot borings for the temporary piezometers were advanced by Gregg Drilling & Testing, located in Martinez, California using a hollow-stem auger rig (with an 8-inch outside diameter (OD) auger). Asphalt and concrete coring (as needed) was conducted by Superior Coring and Cutting, Inc., located in Belmont, California. T&R field personnel were present during drilling to obtain samples of subsurface materials, maintain logs of borings, make observations of the work area conditions, conduct health and safety monitoring for possible organic vapors during drilling, screen and log samples, and provide technical assistance as required.

Relatively undisturbed soil samples were obtained at approximately 5-foot intervals using a modified California split spoon sampler. The sample barrel was lined with three 2-inch OD, 6-inch long stainless steel tubes. The sampler was driven 18 inches ahead of the lead auger using a

140-pound hammer with an approximate 30-inch fall. The number of blows required to drive the sampler each 6-inch increment was recorded on the boring logs. Prior to collecting each sample, the sampler was cleaned with a Liquinox™ in water solution, then double rinsed with potable water, and reassembled with pre-cleaned stainless steel tubes.

Upon retrieval from the borehole, the sampler was disassembled, and the tubes were removed. Graphic logs of the wells are included in this Appendix (see Figures A-1 through A-3). Soils were then classified according to the Unified Soil Classification System (see Figure A-14), and the soil colors were identified using the Munsell color chart. The samples were screened using an Organic Vapor Monitor (OVM), and the results were noted on the boring logs. Following description of the sample, soils were discarded along with drill cuttings.

The temporary piezometers (TRP-1, TRP-2 and TRP-3) were constructed on 13 July 1998 under permit from the ACDEHS. The piezometer completion details are summarized in Table A-1. TRP-1 and TRP-2 were completed at a depth of approximately 15 and 15.5 feet below ground surface (bgs), respectively. TRP-3 was completed at a depth of approximately 21.5 feet bgs. The piezometers were installed using 2-inch diameter Schedule 80 PVC casing and a 5-foot section of screen (0.02-inch slot size) fitted with a threaded PVC end cap. A slip cap was placed on top of each casing. Lonestar #3 sand filter pack was placed in the annulus from the bottom of the borehole to approximately two feet above the top of the slotted screen. After installation of the sand filter pack, the remaining annular space was filled with bentonite chips. The piezometers were completed with flush-mounted traffic-rated Christie boxes.

Prior to mobilization of the equipment, the drill rig, augers, sampling equipment, and associated equipment were cleaned with a high pressure steam cleaner. Soil generated during soil sampling and piezometer installation was stored in 55-gallon drums at the parking lot directly across Horton Street (the former Rifkin property, now owned by Chiron Corporation). Small volumes of water generated during decontamination of sampling equipment was added to the soil. Section A.4 discusses the disposal of waste generated during drilling and sampling activities.

A.1.3 Temporary Piezometer Decommissioning Procedures

The three temporary piezometers were decommissioned on 16 July 1998 following the completion of water level measurements. The Christie boxes, casings and end caps were removed. The boreholes were reamed and subsequently grouted to the surface using the tremie method. The grout consisted of Portland cement, 5 percent bentonite, and water. The surface was patched with black colored concrete. Excess soil was stored in 55-gallon drums, as discussed above in Section A.1.2.

A.1.4 Ground Water Grab Sampling Procedures

Ground water grab samples were collected on 14 and 15 July 1998 at 10 locations by Gregg Drilling & Testing, Inc., of Martinez, California, following the completion of pilot borings. The pilot borings were advanced using a Geoprobe Model 5400 sampling rig. Asphalt and concrete coring (as needed) was conducted by Superior Coring and Cutting, located in Belmont, California. T&R field personnel were present during drilling to obtain samples of subsurface materials, maintain logs of borings, make observations of the work area conditions, conduct health and safety monitoring for possible organic vapors during drilling, screen and log samples, and provide technical assistance as required.

The borings were continuously advanced using a hydraulic hammer to drive the sampling device. The soil is collected in a 1- $\frac{3}{4}$ -inch diameter, 4-foot long sample barrel that is attached to the end of a rod. Soil samples were retained in 1- $\frac{1}{2}$ -inch by 4-foot long acrylic tubes that are placed inside the sample barrel. Prior to collecting each sample, the sampler was cleaned with a Liquinox™ in water solution, then double rinsed with potable water, and reassembled with a pre-cleaned acrylic tube.

After being advanced 4 feet, the sample barrel was removed from the borehole. The sampler was disassembled, and the tube was removed. Graphic logs of the wells are included in this Appendix (see Figures A-4 through A-13). Soils were then classified according to the Unified Soil Classification System (see Figure A-14), and the soil colors were identified using the Munsell color chart. The samples were screened using an OVM, and the results were noted on the boring logs. Following description of the sample, soils were discarded along with drill cuttings.

One-time ground water grab samples were collected from soil borings TRG-1 through TRG-10. Upon completion of the boring, a $\frac{3}{4}$ -inch diameter, 0.020-inch screen temporary PVC casing was placed in the boring. The PVC casing was screened between approximately 11 and 16 feet bgs. Using a $\frac{1}{2}$ -inch OD stainless steel bailer, ground water samples were retrieved from within the PVC screen. Ground water grab samples were placed directly into laboratory-supplied bottles, sealed, labeled, and placed in an iced cooler for transport to the laboratory under chain-of-custody protocol. All sampling materials were cleaned with a Liquinox™ in water solution, then double rinsed with potable water, and reassembled.

Upon completion of the ground water sampling, the PVC casing was removed from the hole. The boring was then grouted to the surface with using the tremie method. The grout consisted of Portland cement, 5 percent bentonite, and water. The surface was patched with black colored concrete. Soil generated during soil boring was stored in 55-gallon drums at the parking lot directly across Horton Street (the former Rifkin property, now owned by Chiron Corporation). Small volumes of water generated during decontamination of sampling equipment was added to the soil. Section A.4 discusses the disposal of waste generated during drilling and sampling activities.

A.1.5 Well Sampling Procedures

As part of Sherwin-Williams' quarterly ground water monitoring program, Levine-Fricke-Recon (LFR) field personnel purged and sampled ground water from four Sherwin-Williams' ground water monitoring wells located in Horton Street (LF-27, LF-28, LF-29, LF-30) on 14 July 1998 and provided split samples to T&R field personnel. The samples were placed in coolers containing ice and transported to Chromalab, Inc., for analysis under chain-of-custody protocol. A copy of the chain of custody and the analytical laboratory report are included in Appendix B of this report.

A.2 SURVEYING

Following completion of the soil borings and temporary piezometer installations, the locations were surveyed by Moran Engineering, licensed surveyors located in Berkeley, California. All locations were surveyed for horizontal control and referenced to the California Coordinate System. Top of casing elevations were surveyed for vertical control to the nearest 0.01 foot and referenced to the North American Datum 83. The survey data are summarized in Table A-2.

A.3 GROUND WATER ELEVATION MEASUREMENTS

Ground water levels were measured in the temporary piezometers on 13, 15 and 16 July 1998. LFR measured ground water levels in four Sherwin-Williams' ground water monitoring wells located in Horton Street (LF-27, LF-28, LF-29, LF-30) on 13 July 1998 and provided the data to T&R field personnel. The measurements are summarized in Table A-3.

A.4 SOIL AND WATER DISPOSAL

Soil cuttings and small amounts of decontamination water were contained in six 55-gallon drums. Discrete grab soil samples were collected from the drums on 16 July 1998 and submitted for chemical analyses for waste disposal profiling purposes. The samples were placed in coolers containing ice and transported to Chromalab, Inc., for analysis under chain-of-custody protocol.

The discrete soil samples were composited by the laboratory prior to analysis. The analytical program included Total Petroleum Hydrocarbons as gasoline (TPH/gas) and TPH as diesel by EPA Method 8015M; benzene, toluene, ethyl benzene, xylenes (BTEX) and methyl tert butyl ether (MTBE) by EPA Method 8020A; and volatile organic compounds (VOCs) by EPA Method 8010. The chemical analytical results are summarized in Table A-4. A copy of the chain of custody and the analytical laboratory report are included in Appendix B of this report.

At the request of Chiron Corporation, the drums were stored at their parking lot located immediately across Horton Street until characterization was completed. Equilon Enterprises,

LLC, arranged for the disposal of the drilling waste. On 25 August 1998, the drums were transported to the Crosby & Overton, Inc., TSD Facility located in Long Beach, California, for subsequent off-site landfill disposal. A copy of the Non-Hazardous Waste Data Form is included in this Appendix.

The following are included in this Appendix:

Table A-1	Summary of Piezometer Completion Details
Table A-2	Summary of Survey Data
Table A-3	Water Level Measurements
Table A-4	Chemical Analytical Results--Drilling Spoils Samples
Figures A-1 through A-13	Logs of Boring
Figure A-14	Classification Chart
Attachment 1	Non-Hazardous Waste Data Form

TABLE A-1: SUMMARY OF PIEZOMETER COMPLETION DETAILS

**Arsenic Investigation
Former Shell Research Facility
Emeryville, California**

Piezometer Number	Date Installed	Borehole Depth (ft bgs)	Borehole Diameter (inches)	Casing Depth (ft bgs)	Casing Diameter (inches)	Screen Interval (ft bgs)	Screen Length (ft)	Screen Slot Size (inches)	Sandpack Size	Thickness of Unit (ft)	Screened Lithology
TRP-1	13-Jul-98	15	8	15	2	10-15	5	0.02	Lonestar #3	0.5 0.5 1.5 2 0.5	medium sand clay coarse sand sandy clay coarse gravel and sand
TRP-2	13-Jul-98	15.5	8	15.5	2	10.5-15.5	5	0.02	Lonestar #3	2.5 2.5	clayey fine sand clay with fine sand
TRP-3	13-Jul-98	21.5	8	21.5	2	16.5-21.5	5	0.02	Lonestar #3	5	gravelly silty sand

Notes:

1. Piezometers TRP-1, TRP-2 and TRP-3 were decommissioned (by complete removal) on 16 July 1998.
2. Boring logs are presented in Appendix A.

TABLE A-2: SUMMARY OF SURVEY DATA**Arsenic Investigation
Former Shell Research Facility
Emeryville, California**

Piezometer or Boring Number	Date Installed	Top of Casing Elevation	Ground Surface Elevation	Horizontal Coordinates	
				Northing	Easting
TRP-1	13-Jul-98	18.23	18.52	2130981.3373	6045356.1753
TRP-2	13-Jul-98	18.53	18.82	2131254.0625	6045279.5013
TRP-3	13-Jul-98	17.34	17.64	2131431.6634	6045230.0324
TRG-1	15-Jul-98	N/A	19.20	2130988.9372	6045135.0592
TRG-2	14-Jul-98	N/A	19.40	2131037.9645	6045123.0135
TRG-3	15-Jul-98	N/A	19.22	2131133.9256	6045122.5200
TRG-4	14-Jul-98	N/A	18.42	2131205.6145	6045104.5802
TRG-5	14-Jul-98	N/A	18.95	2131057.4791	6045071.1701
TRG-6	14-Jul-98	N/A	19.26	2131131.2366	6045053.5779
TRG-7	14-Jul-98	N/A	18.95	2131190.8290	6045038.2763
TRG-8	15-Jul-98	N/A	14.94	2131047.4529	6045020.2611
TRG-9	15-Jul-98	N/A	14.43	2131174.0853	6044984.3426
TRG-10	15-Jul-98	N/A	14.14	2131242.6836	6044964.8990

Notes:

1. Elevations referenced to North American Datum 83.
2. Horizontal coordinates referenced to California Coordinate System.
3. N/A = not applicable
4. TRP-1, TRP-2 and TRP-3 were surveyed on 13 July 1998 and decommissioned on 16 July 1998.

TABLE A-3: WATER LEVEL MEASUREMENTS

**Arsenic Investigation
Former Shell Research Facility
Emeryville, California**

Piezometer or Well Number	Top of Casing Elevation	Date	Measured Depth to Water (ft)	Ground Water Elevation (ft)	Average
TRP-1	18.23	13-Jul-98	10.0	8.23	8.56
		15-Jul-98	9.71	8.52	
		16-Jul-98	9.62	8.61	
TRP-2	18.53	13-Jul-98	10.5	8.03	8.08
		15-Jul-98	10.29	8.24	
		16-Jul-98	10.60	7.93	
TRP-3	17.34	13-Jul-98	11.5	5.84	8.00
		15-Jul-98	9.33	8.01	
		16-Jul-98	9.34	8.00	
LF-27	15.13	13-Jul-98	7.38	7.75	7.74
		14-Jul-98	7.41	7.72	
LF-28	14.39	13-Jul-98	7.17	7.22	7.22
LF-29	13.70	13-Jul-98	7.01	6.69	6.69
		14-Jul-98	7.02	6.68	
LF-30	13.16	13-Jul-98	10.21	2.95	2.94
		14-Jul-98	10.23	2.93	

Notes:

1. Elevation referenced to North American Datum 83.
2. Data for the Sherwin-Williams wells (LF series) obtained by Levine-Fricke-Recon field personnel and provided to T&R field personnel at the time of measurement.
3. TRP-1, TRP-2 and TRP-3 were surveyed on 13 July 1998 and decommissioned on 16 July 1998.
4. Average ground water elevation based on two consecutive days measurements, not including the day of piezometer installation.

TABLE A-4: CHEMICAL ANALYTICAL RESULTS--DRILLING SPOILS SAMPLES

**Arsenic Investigation
Former Shell Research Facility
Emeryville, California**

Composite Sample D2,3,4,5,6	Analytical Method	Date Sampled	Date Analyzed	Results (mg/kg)
Total Petroleum Hydrocarbon as Gasoline	8015M	16-Jul-98	17-Jul-98	<1.0
Total Petroleum Hydrocarbon as Diesel	8015M	16-Jul-98	17-Jul-98	2.6
Volatile organic compounds (VOCs)	8010	16-Jul-98	20-Jul-98	<.025
Methyl tert butyl ether (MTBE)	8020A	16-Jul-98	17-Jul-98	<.0050
Benzene	8020A	16-Jul-98	17-Jul-98	<.0050
Toluene	8020A	16-Jul-98	17-Jul-98	<.0050
Ethyl benzene	8020A	16-Jul-98	17-Jul-98	<.0050
Xylenes	8020A	16-Jul-98	17-Jul-98	<.0050
Antimony	6010A	16-Jul-98	13-Aug-98	<2.0
		16-Jul-98	18-Jul-98	3.4
Arsenic	6010A	16-Jul-98	13-Aug-98	4.0
		16-Jul-98	18-Jul-98	83
Barium	6010A	16-Jul-98	13-Aug-98	78
Beryllium	6010A	16-Jul-98	13-Aug-98	<0.50
		16-Jul-98	18-Jul-98	<0.50
Cadmium	6010A	16-Jul-98	13-Aug-98	<0.50
		16-Jul-98	18-Jul-98	28
Chromium	6010A	16-Jul-98	13-Aug-98	26
Cobalt	6010A	16-Jul-98	13-Aug-98	7.3
Copper	6010A	16-Jul-98	13-Aug-98	15
		16-Jul-98	18-Jul-98	6.5
Lead	6010A	16-Jul-98	13-Aug-98	5.2
Molybdenum	6010A	16-Jul-98	13-Aug-98	<1.0
Nickel	6010A	16-Jul-98	13-Aug-98	34
	6010A	16-Jul-98	18-Jul-98	<2.0
Selenium	6010A	16-Jul-98	13-Aug-98	<2.0
	6010A	16-Jul-98	18-Jul-98	<1.0
Silver	6010A	16-Jul-98	13-Aug-98	<1.0
Thallium	6010A	16-Jul-98	13-Aug-98	<1.0
Vanadium	6010A	16-Jul-98	13-Aug-98	22
Zinc	6010A	16-Jul-98	13-Aug-98	41
		16-Jul-98	18-Jul-98	0.16
Mercury	7471A	16-Jul-98	13-Aug-98	0.072

Notes:

1. One discrete soil grab sample was collected from five of six drums containing drilling spoils. The five discrete soil samples were composited by the laboratory prior to analyses.
2. mg/kg = milligrams per kilogram.
3. <1.0 indicates that compound was not reported/detected at the laboratory reporting level shown.

Boring location: See Figure 3	Logged by: A. Andrews
Date started: 7/13/98	Date finished: 7/13/98
Drilling method: 8-inch hollow-stem auger	
Hammer weight/drop: 140 lbs./30 inches	Hammer type: Safety
Sampler: California Modified split-barrel sampler	

DEPTH (feet)	SAMPLES			OVM	LITHOLOGY	MATERIAL DESCRIPTION
	Sampler Type	Sample	Blows/foot			
Ground Surface Elevation: 18.52 feet ¹						
1						10 inches asphalt
2					GP	GRAVEL with SAND (GP) yellow-brown, loose, moist
3						
4						
5						SANDY CLAY (CL) yellow-brown, stiff, moist
6	CA		14	0	CL	
7						
8						
9						
10					SP	SAND (SP) gray, loose, wet
11	CA		3	0	CL	CLAY (CL) gray, soft, wet
12					SP	SAND (SP) gray, loose, wet
13					CL	CLAY with SAND (CL) yellow-brown, stiff, wet, fine sand
14	CA		10	0	GM	GRAVEL with SILT and SAND (GM) gray, loose to medium dense, wet
15						
16						Boring terminated at a depth of 15 feet. Boring backfilled with cement/bentonite grout.
17						¹ Elevation referenced to North American Datum.
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PROJECT: ARSENIC INVESTIGATION
SOUTH BGR PROPERTY
Emeryville, California

Log of Boring TRP-2

PAGE 1 OF 1

Boring location: See Figure 3

Logged by: A. Andrews

Date started: 7/13/98

Date finished: 7/13/98

Drilling method: 8-inch hollow-stem auger

Hammer weight/drop: 140 lbs./30 inches

Hammer type: Safety

Sampler: California Modified split-barrel sampler

DEPTH (feet)	SAMPLES			OVM	LITHOLOGY	MATERIAL DESCRIPTION
	Sampler Type	Sample	Blows/ foot			
Ground Surface Elevation: 18.82 feet ²						
1						4 inches asphalt
2						SANDY CLAY (CL) dark gray, medium stiff, moist, with silt
3						
4						
5					CL	
6	CA		7	0		
7						
8						
9						SANDY CLAY (CL) gray, soft, wet, with silt and fine sand
10						
11	CA		2	0	CL	
12						
13						
14	CA		5	0	CL	CLAY (CL) gray, medium stiff, wet
15						
16						Boring terminated at a depth of 15.5 feet. Boring backfilled with cement/bentonite grout.
17						¹ Elevation referenced to North American Datum.
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PROJECT: **ARSENIC INVESTIGATION
SOUTH BGR PROPERTY
Emeryville, California**

Log of Boring TRP-3

PAGE 1 OF 1

Boring location: See Figure 3

Logged by: A. Andrews

Date started: 7/13/98

Date finished: 7/13/98

Drilling method: 8-inch hollow-stem auger

Hammer weight/drop: 140 lbs./30 inches

Hammer type: Safety

Sampler: California Modified split-barrel sampler

DEPTH (feet)	SAMPLES			OVM	LITHOLOGY	MATERIAL DESCRIPTION
	Sampler Type	Sample	Blows/foot			
Ground Surface Elevation: 17.64 feet ¹						
1						3.5 inches asphalt and 12 inches baserock
2					GP	GRAVEL with SAND (GP) yellow-brown, loose, moist
3						SANDY CLAY (CL) yellow-brown, stiff, moist, with some silt
4						
5						CLAYEY SAND (SC) gray, medium stiff, wet, fine sand
6	CA		4	0	CL	
7						CLAY (CL) gray, medium stiff, wet, with fine sand and minor fine gravel
8						
9						SILTY SAND with GRAVEL (SM) gray, medium dense, wet
10						
11	CA		5	0	SC	SILT (ML) yellow-brown, stiff, wet, with trace of clay
12						
13						Boring terminated at a depth of 21.5 feet. Boring backfilled with cement/bentonite grout. ¹ Elevation referenced to North American Datum.
14						
15						Boring terminated at a depth of 21.5 feet. Boring backfilled with cement/bentonite grout. ¹ Elevation referenced to North American Datum.
16	CA		13	62	SM	
17						Boring terminated at a depth of 21.5 feet. Boring backfilled with cement/bentonite grout. ¹ Elevation referenced to North American Datum.
18						
19						Boring terminated at a depth of 21.5 feet. Boring backfilled with cement/bentonite grout. ¹ Elevation referenced to North American Datum.
20						
21	CA		10	28	ML	Boring terminated at a depth of 21.5 feet. Boring backfilled with cement/bentonite grout. ¹ Elevation referenced to North American Datum.
22						
23						Boring terminated at a depth of 21.5 feet. Boring backfilled with cement/bentonite grout. ¹ Elevation referenced to North American Datum.
24						
25						Boring terminated at a depth of 21.5 feet. Boring backfilled with cement/bentonite grout. ¹ Elevation referenced to North American Datum.
26						
27						Boring terminated at a depth of 21.5 feet. Boring backfilled with cement/bentonite grout. ¹ Elevation referenced to North American Datum.
28						
29						Boring terminated at a depth of 21.5 feet. Boring backfilled with cement/bentonite grout. ¹ Elevation referenced to North American Datum.
30						

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PROJECT:		ARSENIC INVESTIGATION SOUTH BGR PROPERTY Emeryville, California		Log of Boring TRG-1		PAGE 1 OF 1
Boring location: See Figure 3					Logged by: A. Andrews	
Date started: 7/15/98			Date finished: 7/15/98			
Drilling method: Geoprobe						
Hammer weight/drop: ---lbs./--- inches			Hammer type: ---			
Sampler: Continuous hydraulic core						
DEPTH (feet)	SAMPLES			OVM	LITHOLOGY	MATERIAL DESCRIPTION
	Sampler Type	Sample	Blows/foot			
Ground Surface Elevation: 19.20 feet ¹						
1						5 inches asphalt over 5 inches baserock over 4 inches concrete
2						SANDY CLAY with GRAVEL (CL) dark brown, soft, moist, with some organics
3	C				CL	
4						SANDY CLAY (CL) dark brown, soft, moist, with some organics
5				0		
6						CLAY (CL) gray, soft, wet
7	C				CL	
8						8 inch gravel lens
9						SANDY CLAY (CL) olive-brown, soft, moist, with some organics
10						CLAY (CL) gray, soft, wet
11	C				CL	
12						CLAYEY SAND (SC) gray, loose, wet
13				0	CL	
14						CLAY (CL) yellow-brown, soft, wet
15	C				SC	
16						Boring terminated at a depth of 17 feet. Boring backfilled with cement/bentonite grout.
17				0	CL	
18						Boring terminated at a depth of 17 feet. Boring backfilled with cement/bentonite grout. ¹ Elevation referenced to North American Datum.
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FILL

PROJECT: **ARSENIC INVESTIGATION
SOUTH BGR PROPERTY
Emeryville, California**

Log of Boring TRG-2

PAGE 1 OF 1

Boring location: See Figure 3 Logged by: A. Andrews

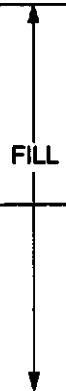
Date started: 7/14/98 Date finished: 7/14/98

Drilling method: Geoprobe

Hammer weight/drop: ---lbs./--- inches Hammer type: ---

Sampler: Continuous hydraulic core

DEPTH (feet)	SAMPLES			OVM	LITHOLOGY	MATERIAL DESCRIPTION
	Sampler Type	Sample	Blows/ foot			
						Ground Surface Elevation: 19.40 feet ¹
1						4 inches asphalt and 6 inches concrete
2					GP	GRAVEL with SAND (GP) olive-brown, loose, moist
3	C			0		
4						
5					CL	SANDY CLAY with GRAVEL (CL) dark brown, soft, moist, with some organics, and some brick fragments
6	C			0		
7						
8					CL	CLAY with SAND (CL) olive-brown, soft, moist
9						
10	C			0		
11					CL	with gray mottling
12						
13	C			0		
14						
15						
16						Boring terminated at a depth of 16 feet. Boring backfilled with cement/bentonite grout.
17						¹ Elevation referenced to North American Datum.
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PROJECT: **ARSENIC INVESTIGATION
SOUTH BGR PROPERTY
Emeryville, California**

Log of Boring TRG-3

PAGE 1 OF 1

Boring location: See Figure 3

Logged by: A. Andrews

Date started: 7/15/98

Date finished: 7/15/98

Drilling method: Geoprobe

Hammer weight/drop: ---lbs./--- inches

Hammer type: ---

Sampler: Continuous hydraulic core

DEPTH (feet)	SAMPLES			OVM	LITHOLOGY	MATERIAL DESCRIPTION
	Sampler Type	Sample	Blows/ foot			
						Ground Surface Elevation: 19.22 feet ¹
1						3 inches asphalt over 8 inches baserock over 5 inches concrete
2	C			0	CL	SANDY CLAY (CL) olive-brown, soft, moist dark brown with some organics, at 3 feet glass fragments
3						
4						brick fragments
5	C					
6				0	CL	
7						
8						
9	C				CL	CLAY with SAND (CL) olive, soft, moist, with some organics
10				0	CL	
11					CL	GRAVELLY CLAY (CL) olive, soft, wet
12					CL	CLAY with SAND (CL) olive, soft, wet
13	C				SC	CLAYEY SAND (SC) gray, loose, moist, medium sand
14				0	CL	
15					CL	CLAY (CL) olive-brown, soft, wet, with some fine sand
16						Boring terminated at a depth of 15 feet. Boring backfilled with cement/bentonite grout.
17						¹ Elevation referenced to North American Datum.
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FILL

PROJECT: **ARSENIC INVESTIGATION
SOUTH BGR PROPERTY
Emeryville, California**

Log of Boring TRG-4

PAGE 1 OF 1

Boring location: See Figure 3

Logged by: A. Andrews

Date started: 7/14/98

Date finished: 7/14/98

Drilling method: Geoprobe

Hammer weight/drop: ---lbs./--- inches

Hammer type: ---

Sampler: Continuous hydraulic core

DEPTH (feet)	SAMPLES			OVM	LITHOLOGY	MATERIAL DESCRIPTION
	Sampler Type	Sample	Blows/ foot			
						Ground Surface Elevation: 18.42 feet ¹
1						3 inches asphalt over baserock
2	C				CL	CLAY with SAND (CL) black with yellow-brown mottling, soft, moist, fine-grained sand, with some organics
3						FILL
4				0		
5						
6	C				SM	SILTY SAND (SM) olive-brown, loose, moist, with some organics
7						
8				0	ML	SILT (ML) dark brown, soft, moist, with some organics and trace of clay
9						
10	C					
11					SM	SILTY SAND (SM) olive, soft, moist, with some organics and gravel
12				0		
13					SM	SILTY SAND with GRAVEL (SM) olive, loose, wet
14	C					
15						
16				0	CL	CLAY (CL) dark brown, soft, wet, with some fine sand and silt
17						Boring terminated at a depth of 16 feet. Boring backfilled with cement/bentonite grout.
18						¹ Elevation referenced to North American Datum.
19						
20						
21						
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23						
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27						
28						
29						
30						

PROJECT: ARSENIC INVESTIGATION
SOUTH BGR PROPERTY
Emeryville, California

Log of Boring TRG-5

PAGE 1 OF 1

Boring location: See Figure 3

Logged by: A. Andrews

Date started: 7/14/98

Date finished: 7/14/98

Drilling method: Geoprobe

Hammer weight/drop: ---lbs./--- inches

Hammer type: ---

Sampler: Continuous hydraulic core

DEPTH (feet)	SAMPLES			OVM	LITHOLOGY	MATERIAL DESCRIPTION
	Sampler Type	Sample	Blows/ foot			
						Ground Surface Elevation: 18.95 feet ¹
1						4 inches asphalt over 3 inches baserock over 49 inches concrete
2						
3						
4						
5					CL	CLAY (CL) olive- brown, soft, moist
6	C					CLAY (CL) dark brown with red mottling, soft, moist, with some organics and fine sand
7				10		
8						
9					CL	olive-brown
10	C					
11						
12				0		
13					CL	CLAY with SAND (CL) gray, soft, wet, fine sand
14	C				CL	GRAVELLY CLAY (CL) gray, soft, wet, fine gravel
15					CL	CLAY with SAND (CL) gray, soft, wet
16				0		
17						
18						Boring terminated at a depth of 16 feet. Boring backfilled with cement/bentonite grout.
19						¹ Elevation referenced to North American Datum.
20						
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PROJECT: ARSENIC INVESTIGATION
SOUTH BGR PROPERTY
Emeryville, California

Log of Boring TRG-6

PAGE 1 OF 1

Boring location: See Figure 3

Logged by: A. Andrews

Date started: 7/14/98

Date finished: 7/14/98

Drilling method: Geoprobe

Hammer weight/drop: ---lbs./--- inches

Hammer type: ---

Sampler: Continuous hydraulic core

DEPTH (feet)	SAMPLES			OVM	LITHOLOGY	MATERIAL DESCRIPTION
	Sampler Type	Sample	Blows/ foot			
Ground Surface Elevation: 19.26 feet ¹						
1						4 inches asphalt over 7 inches baserock over 4 inches concrete
2						SILTY SAND with some GRAVEL (SM) red-brown, loose, moist <div style="text-align: right; border-left: 1px solid black; border-right: 1px solid black; padding: 0 5px;"> FILL ↑ ↓ </div>
3	C					
4						
5		○		SM		
6				0		
7	C					SANDY SILT (ML) dark brown, stiff, moist, with some organics, fine sand olive-brown
8						
9		○		0		
10						
11				ML		
12	C					SANDY CLAY with GRAVEL (CL) olive-gray, soft, wet SANDY CLAY (CL) olive, soft, wet SILTY SAND with some GRAVEL (SM) red-brown, loose, wet, fine to coarse sand
13				0		
14						
15	C			CL		
16				SM		
17		○		0		Boring terminated at a depth of 18 feet. Boring backfilled with cement/bentonite grout. ¹ Elevation referenced to North American Datum.
18						
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30						

PROJECT: **ARSENIC INVESTIGATION
SOUTH BGR PROPERTY
Emeryville, California**

Log of Boring TRG-7

PAGE 1 OF 1

Boring location: See Figure 3

Logged by: A. Andrews

Date started: 7/14/98

Date finished: 7/14/98

Drilling method: Geoprobe

Hammer weight/drop: ---lbs./--- inches

Hammer type: ---

Sampler: Continuous hydraulic core

DEPTH (feet)	SAMPLES			OVM	LITHOLOGY	MATERIAL DESCRIPTION
	Sampler Type	Sample	Blows/ foot			
Ground Surface Elevation: 18.95 feet ¹						
1					GP	4 inches asphalt over 3 inches concrete
2					GP	GRAVEL (GP)
3					SC	Concrete footing
4					SC	CLAYEY SAND (SC)
5					SC	olive-brown with black mottling, loose, moist, with some organics
6	C					SANDY SILT (ML)
7				0		black with red mottling, very stiff, moist, fine sand, trace of clay
8					ML	
9	C					olive
10						
11				0		
12						
13	C				SM	SILTY SAND (SM)
14						olive, loose, fine to coarse sand, with fine gravel
15				0	ML	SANDY SILT (ML)
16						gray, soft, wet
17						Boring terminated at a depth of 15 feet. Boring backfilled with cement/bentonite grout.
18						¹ Elevation referenced to North American Datum.
19						
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30						

PROJECT: **ARSENIC INVESTIGATION
SOUTH BGR PROPERTY**
Emeryville, California

Log of Boring TRG-8

PAGE 1 OF 1

Boring location: See Figure 3

Logged by: A. Andrews

Date started: 7/15/98

Date finished: 7/14/98

Drilling method: Geoprobe

Hammer weight/drop: ---lbs./--- inches

Hammer type: ---

Sampler: Continuous hydraulic core

DEPTH (feet)	SAMPLES			OVM	LITHOLOGY	MATERIAL DESCRIPTION
	Sampler Type	Sample	Blows/ feet			
Ground Surface Elevation: 14.94 feet ¹						
1						4 inches asphalt over 4 inches concrete
2	C				CL	SANDY CLAY (CL) olive-brown, soft, moist, with some brick fragments
3						
4				0		gray
5						
6	C				CL	
7						
8				0		
9						
10	C				CL	SANDY CLAY (CL) gray, soft, wet, medium-grained sand
11					CL	GRAVELLY CLAY (CL) gray, soft, wet
12		○		0	CL	CLAY (CL) gray, soft, wet
13						Boring terminated at a depth of 12 feet. Boring backfilled with cement/bentonite grout.
14						
15						¹ Elevation referenced to North American Datum.
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PROJECT: ARSENIC INVESTIGATION
SOUTH BGR PROPERTY
Emeryville, California

Log of Boring TRG-9

PAGE 1 OF 1

Boring location: See Figure 3

Logged by: A. Andrews

Date started: 7/15/98

Date finished: 7/15/98

Drilling method: Geoprobe

Hammer weight/drop: ---lbs./--- inches

Hammer type: ---

Sampler: Continuous hydraulic core

DEPTH (feet)	SAMPLES			OVM	LITHOLOGY	MATERIAL DESCRIPTION
	Sampler Type	Sample	Blows/ foot			
						Ground Surface Elevation: 14.43 feet ¹
1						Asphalt over concrete
2	C			0	CL	SANDY CLAY with GRAVEL (CL) olive-brown, soft, moist
3					CL	SANDY CLAY (CL) black, soft, moist, with some silt
4	C			0	CL	SANDY CLAY (CL) olive-gray with red mottling, soft, moist, with some silt
5						
6						
7	C			0	CL	SANDY CLAY (CL) olive-gray with red mottling, soft, moist, with some silt
8						
9	C			0	SP	SAND with GRAVEL (SP) olive-brown, loose, moist, medium sand gray at 10 feet
10						
11						
12						Boring terminated at a depth of 12 feet. Boring backfilled with cement/bentonite grout.
13						
14						¹ Elevation referenced to North American Datum.
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↑
FILL
↓

PROJECT: ARSENIC INVESTIGATION
SOUTH BGR PROPERTY
Emeryville, California

Log of Boring TRG-10

PAGE 1 OF 1

Boring location: See Figure 3

Logged by: A. Andrews

Date started: 7/15/98

Date finished: 7/14/98

Drilling method: Geoprobe

Hammer weight/drop: ---lbs./--- inches

Hammer type: ---

Sampler: Continuous hydraulic core

DEPTH (feet)	SAMPLES			OVM	LITHOLOGY	MATERIAL DESCRIPTION
	Sampler Type	Sample	Blows/ foot			
Ground Surface Elevation: 14.14 feet ¹						
1						4 inches asphalt over 4 inches concrete
2	C				CL	SANDY CLAY with GRAVEL (CL) olive-brown, soft, moist
3						
4				0		SANDY CLAY (CL) black, soft, moist, with some organics
5	C				CL	
6				0		
7	C				CL	SANDY CLAY with GRAVEL (CL) olive-brown with red mottling, soft, moist
8						
9	C				GP	GRAVEL with SAND (GP) gray, loose, wet, gravel 1/8- to 1/2-inch in size
10						yellow-brown at 9 feet
11				0		
12						Boring terminated at a depth of 12 feet. Boring backfilled with cement/bentonite grout.
13						
14						¹ Elevation referenced to North American Datum.
15						
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FILL








UNIFIED SOIL CLASSIFICATION SYSTEM

Major Divisions		Symbols	Typical Names
Coarse-Grained Soils (more than half of soil > no. 200 sieve size)	Gravels (More than half of coarse fraction > no. 4 sieve size)	GW	Well-graded gravels or gravel-sand mixtures, little or no fines
		GP	Poorly-graded gravels or gravel-sand mixtures, little or no fines
		GM	Silty gravels, gravel-sand-silt mixtures
		GC	Clayey gravels, gravel-sand-clay mixtures
	Sands (More than half of coarse fraction < no. 4 sieve size)	SW	Well-graded sands or gravelly sands, little or no fines
		SP	Poorly-graded sands or gravelly sands, little or no fines
		SM	Silty sands, sand-silt mixtures
		SC	Clayey sands, sand-clay mixtures
Fine-Grained Soils (more than half of soil < no. 200 sieve size)	Silts and Clays LL = < 50	ML	Inorganic silts and clayey silts of low plasticity, sandy silts, gravelly silts
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, lean clays
		OL	Organic silts and organic silt-clays of low plasticity
	Silts and Clays LL = > 50	MH	Inorganic silts of high plasticity
		CH	Inorganic clays of high plasticity, fat clays
		OH	Organic silts and clays of high plasticity
Highly Organic Soils		PT	Peat and other highly organic soils

GRAIN SIZE CHART

Classification	Range of Grain Sizes	
	U.S. Standard Sieve Size	Grain Size in Millimeters
Boulders	Above 12"	Above 305
Cobbles	12" to 3"	305 to 76.2
Gravel coarse fine	3" to No. 4	76.2 to 4.76
	3" to 3/4" 3/4" to No. 4	76.2 to 19.1 19.1 to 4.76
Sand coarse medium fine	No. 4 to No. 200	4.76 to 0.074
	No. 4 to No. 10	4.76 to 2.00
	No. 10 to No. 40	2.00 to 0.420
	No. 40 to No. 200	0.420 to 0.074
Silt and Clay	Below No. 200	Below 0.074

SAMPLE DESIGNATIONS/SYMBOLS

- 
Sample taken with split-barrel sampler other than Standard Penetration Test sampler. Darkened area indicates sample obtained
- 
Classification sample taken with Standard Penetration Test sampler
- 
Undisturbed sample taken with thin-walled tube
- 
Disturbed sample
- 
Sampling attempted with no recovery
- 
Core sample
- 
Groundwater level at the time and date indicated

SAMPLER TYPE

- | | |
|--|---|
| <p>C Core barrel</p> <p>CA California split-barrel sampler with 2.5-inch outside diameter and a 1.93-inch inside diameter</p> <p>D&M Dames & Moore piston sampler using 2.5-inch outside diameter, thin-walled tube</p> <p>O Osterberg piston sampler using 3.0-inch outside diameter, thin-walled Shelby tube</p> | <p>PT Pitcher tube sampler using 3.0-inch outside diameter, thin-walled Shelby tube</p> <p>S&H Sprague & Henwood split-barrel sampler with a 3.0-inch outside diameter and a 2.43-inch inside diameter</p> <p>SPT Standard Penetration Test (SPT) split-barrel sampler with a 2.0-inch outside diameter and a 1.5-inch inside diameter</p> <p>ST Shelby tube (3.0-inch outside diameter, thin-walled tube) advanced with hydraulic pressure</p> |
|--|---|

**ARSENIC INVESTIGATION
SOUTH BGR PROPERTY
Emeryville, California**

Treadwell & Rollo

CLASSIFICATION CHART

Date 8/17/98	Project No. 2323.02	Figure A-14
--------------	---------------------	-------------

SEP 04 1998

NON-HAZARDOUS WASTE DATA FORM

TO BE COMPLETED BY GENERATOR

NAME EQUILON ENTERPRISES LLC SONDR A BIENVENU, TSP1341

ADDRESS P. O. BOX 2099

CITY, STATE, ZIP HOUSTON, TX 77252-2099 PHONE NO. 713 241-2258

CONTAINERS: No. 6 VOLUME WEIGHT 2700 Pounds

TYPE: TANK TRUCK DUMP TRUCK DRUMS CARTONS OTHER

WASTE DESCRIPTION DRILLING MUD CONT. W/TPH GENERATING PROCESS ABANDON PIPE LINE

COMPONENTS OF WASTE	PPM	%	COMPONENTS OF WASTE	PPM	%
1. SOIL		70-75	<p>THE REFERENCED WASTE WAS RECEIVED, HANDLED AND STORED FOR SUBSEQUENT OFFSITE DISPOSAL. TREATMENT OF MUDS BY CROSBY & OVERTON, INC. OPERATES THE FACILITY UNDER PERMITS GRANTED TO THEM BY THE DEPARTMENT OF TOXIC SUBSTANCE CONTROL TOGETHER WITH THE ENVIRONMENTAL PROTECTION AGENCY IN ACCORDANCE WITH THE PROVISIONS OF THE RESOURCE CONSERVATION AND RECOVERY ACT OF 1976 TOGETHER WITH APPLICABLE FEDERAL AND STATE REGULATIONS. CROSBY & OVERTON HAS ALL OF THE NECESSARY PERMITS TO ACCEPT THE REFERENCED WASTE AND ALL THE WASTE HAS BEEN HANDLED ACCORDINGLY.</p>		
2. WATER		25-30			
3. PETROLEUM HYDROCARBN		< 1			
4.					

PROPERTIES: pH _____ SOLID LIQUID SLUDGE SLURRY OTHER

HANDLING INSTRUCTIONS: PICK UP SIX (6) DRUMS
Generating Site: ACCUM. DATE: 07/13/98

EVERYVILLE REMED. SITE
4560 HORTON STREET
EMERYVILLE, CA94608
J.R. SPEIR
TYPED OR PRINTED FULL NAME & SIGNATURE
25 AUG 98
DATE

TRANSPORTER

NAME CROSBY & OVERTON, INC.

ADDRESS 8430 AMELIA ST. SERVICE ORDER NO. _____

CITY, STATE, ZIP OAKLAND, CA94621 PICK UP DATE _____

PHONE NO. (510) 633-0336
Leonard Reicher
TYPED OR PRINTED FULL NAME & SIGNATURE
8-25-98
DATE

TRUCK, UNIT, I.D. NO. PROFILE # 8920

TSD FACILITY

NAME CROSBY & OVERTON, INC.

ADDRESS 1630 W. 17TH STREET
DISPOSAL METHOD LANDFILL OTHER

CITY, STATE, ZIP LONG BEACH, CA90813

PHONE NO. (562) 432-5445
JE DURAN
TYPED OR PRINTED FULL NAME & SIGNATURE
8/28/98
DATE

GEN	OLD/NEW	L	A	TONS	DISCREPANCY
TRANS		S	B		
C/Q		RT/CD	HWDF NONE		

Attachment 1

APPENDIX B

CHEMICAL ANALYTICAL LABORATORY PROGRAM

The chemical analyses were conducted by Chromalab, Inc., and Clayton Laboratory Services, both located in Pleasanton, California. Chromalab, Inc., was the main contract laboratory where all samples were initially delivered following collection. The arsenic analyses for all water samples were subcontracted to Clayton Laboratory Services since this laboratory had the facilities to perform the analyses by EPA Method 7060 (this method is also referred to as Method 206.2). EPA Method 7060 was selected to be consistent with the analytical method used by Levine-Fricke-Recon for the investigations and monitoring at the Sherwin-Williams site. All other chemical analyses (described below) were performed by Chromalab, Inc.

B.1 GROUND WATER GRAB SAMPLES

Ground water grab samples were collected on 14 and 15 July 1998 at 10 locations (TRG-1 through TRG-10) following the completion of pilot borings. The ground water grab samples were analyzed for arsenic by EPA Method 7060. The chemical analytical results are summarized in Table 1 in the main body of this report. A copy of the chain of custody and the analytical laboratory report are included in this Appendix.

B.2 GROUND WATER WELL SAMPLES

As part of Sherwin-Williams' quarterly ground water monitoring program, Levine-Fricke-Recon (LFR) field personnel purged and sampled ground water from four Sherwin-Williams' ground water monitoring wells located in Horton Street (LF-27, LF-28, LF-29, LF-30) on 14 July 1998 and provided split samples to T&R field personnel. The ground water samples were analyzed for arsenic by EPA Method 7060. The chemical analytical results are summarized in Table 1 in the main body of this report. A copy of the chain of custody and the analytical laboratory report are included in this Appendix.

B.3 WASTE SOIL AND WATER

As described in Appendix A, soil cuttings and small amounts of decontamination water were contained in six 55-gallon drums. Discrete grab soil samples (D2, D3, D4, D5, D6) were collected from the drums on 16 July 1998 and submitted for chemical analyses for waste disposal profiling purposes.

The discrete soil samples were composited by the laboratory prior to analysis. The analytical program included Total Petroleum Hydrocarbons as gasoline (TPH/gas) and TPH as diesel by EPA Method 8015M; benzene, toluene, ethyl benzene, xylenes (BTEX) and methyl tert butyl

ether (MTBE) by EPA Method 8020A; volatile organic compounds (VOCs) by EPA Method 8010; and California Title 26 metals (known as CAM 17, by various EPA methods; see the laboratory reports). CAM 17 metals include antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, molybdenum, nickel, selenium, silver, thallium, vanadium and zinc. Since the results of the total metals analyses for the CAM 17 were less than ten times the respective Soluble Threshold Limit Concentrations (STLCs) for each element, Waste Extraction Test (WET) analyses were not performed for this analytical program. The chemical analytical results are summarized in Table A-4. A copy of the chain of custody and the analytical laboratory reports are included in this Appendix.

B.4 FIELD QUALITY CONTROL SAMPLES

Two duplicate water samples were prepared and analyzed to provide a measure of the overall precision of the sampling and analysis procedures, confirmation of the primary sample analytical results, and the means of evaluating random error. The primary samples from TRG-9 (grab sample) and LF-28 (monitoring well sample) were split at the laboratory. The duplicate samples were labeled DUP1 (from LF-28) and DUP2 (from TRG-9).

Table B-1 presents the duplicate samples results for arsenic. A comparison of the results between the primary and duplicate samples indicates that precision between the samples is good.

No trip blanks were collected or tested since they are applicable to VOCs only. Equipment rinsate blanks are typically used to confirm that the sample container and the sampling procedure are not contaminating the sample (cross-contamination). Due to field error, no equipment rinsate blanks were collected at the time of sampling. However, a review of the analytical results indicates that it is not likely that cross-contamination occurred in the field.

B.5 LABORATORY QUALITY CONTROL SAMPLES

The internal laboratory quality control consisted of method blanks, blank spike samples, and sample surrogate spikes. These quality control samples characterized the precision and accuracy of laboratory results and evaluated if any matrix interference affected analytical results.

Based on the review of the method blanks, blank spikes, and surrogate recoveries, data qualification was not necessary. The TPH as diesel data was qualified by the analytical laboratory as having a hydrocarbon pattern (gas chromatograph) that was not characteristic of the laboratory's diesel profile. The TPH as gasoline data was qualified by the analytical laboratory as including a single peak in the gasoline range that was uncharacteristic of the laboratory's gasoline profile. Differences in spectral signature are likely due to weathering and/or mixing of hydrocarbon types in the subsurface.

B.6 SUMMARY OF DATA QUALITY REVIEW

The field and laboratory quality control results indicate that the sampling and analysis performed for this investigation were conducted as required by the analytical methods. The results of the testing show good accuracy in the procedures. Overall, the results of the field and laboratory quality control analyses indicate that the test results in this report are of sufficient quality to support the conclusions presented.

The following are included in this Appendix:

Attachment 1	Chemical Analytical Report, Clayton Laboratory Services, 24 July 1998
Attachment 2	Chemical Analytical Report, Clayton Laboratory Services, 24 July 1998
Attachment 3	Chemical Analytical Report--Chromalab, Inc., 23 July 1998

San Francisco Regional Office

1252 Quarry Lane
P.O. Box 9019
Pleasanton, CA 94566
(925) 426-2600
Fax (925) 426-0106

Clayton
LABORATORY
SERVICES

July 24, 1998

Mr. Ken Wright
CHROMALAB, INC.
1220 Quarry Lane
Pleasanton, CA 94566

Client Ref.: 9807188
Clayton Project No.: 98071.89

Dear Mr. Wright:

Attached is our analytical laboratory report for the samples received on July 17, 1998. Also enclosed is a copy of the Chain-of-Custody record acknowledging receipt of these samples.

Please note that any unused portion of the samples will be discarded after August 23, 1998, unless you have requested otherwise.

We appreciate the opportunity to assist you. If you have any questions concerning this report, please contact Client Services at (510) 426-2687.

Sincerely,



Karen Dahl
Client Services Representative
San Francisco Regional Office

KMD/kmd

Attachments

California DHS ELAP Certification Number 1196

1186 / 195467-175473

SUBJ #: 5807186 REP: GC
 CLIENT: TREADWELL
 DUE: 07/22/90
 REF #: 40873

Reference #: 40873

CHROMALAB, INC.

Chain of Custody

Environmental Services (SDB) (DOHS 1094)

DATE 7/15/98 PAGE 1 of 1

PROJECT MGR					ANALYSIS REPORT															NUMBER OF CONTAINERS					
COMPANY					TPH (EPA 8015, 8020)	PURGEABLE AROMATICS		TPH-Diesel (EPA 8015M)	TEPH (EPA 8015M)	PURGEABLE HALOCARBONS		VOLATILE ORGANICS		SEMI-VOLATILES	TOTAL OIL AND GREASE	TOTAL RECOVERABLE	PESTICIDES (EPA 8080)		PNA's by		LUFT METALS		CAM 17 METALS	TOTAL LEAD	Total Arsenic
ADDRESS					<input type="checkbox"/> Gas w/ <input type="checkbox"/> BTEX <input type="checkbox"/> MTBE	<input type="checkbox"/> BTEX (EPA 8020)		<input type="checkbox"/> Kerosene, <input type="checkbox"/> Diesel, <input type="checkbox"/> M.O.	(HVOCs) (EPA 8010 by 8260)		(VOCs) (EPA 8260)		(EPA 8270)	(SM 5520 B-F, E-F)	(EPA 418.1)	<input type="checkbox"/> PCB'S (EPA 8080)	<input type="checkbox"/> 8270	<input type="checkbox"/> 8310	<input type="checkbox"/> Spec. Cond.	Cd, Cr, Pb, Ni, Zn		(EPA 6010/7470/7471)	<input type="checkbox"/> W.E.T.		
SAMPLERS (SIGNATURE)																									
SAMPLE ID	DATE	TIME	MATRIX	PRESERV.																					
TRG-1	7/15/98		water	no																					
TRG-3																									
TRG-8																									
TRG-9																									
TRG-10																									

PROJECT INFORMATION

PROJECT NAME: Shell

PROJECT NUMBER: 2323.02.0001

P.O. #: name

TAT: STANDARD SUAY

Report: Routine Level 2 Level 3 Level 4

SPECIAL INSTRUCTIONS/COMMENTS:

- please filter samples
- please fax chain-of-custody to Orinda Off.

SAMPLE RECEIPT

TOTAL NO. OF CONTAINERS: 5

HEAD SPACE

TEMPERATURE

COMMENTS TO RECORD

RECEIVED BY: [Signature]

RECEIVED BY: [Signature]

RELINQUISHED BY

RELINQUISHED BY: [Signature]

RELINQUISHED BY: [Signature]

RELINQUISHED BY

RELINQUISHED BY: [Signature]

RELINQUISHED BY: [Signature]

SAMPLE STATUS CHANGE FORM

Requested by
(Client's name)

Submission#	Client Samp.ID	Old Status Description	Description of Changes	Requested by (Client's name)
9807188	AM	Misc - (As)	Subcontract As by EPA 7060 - Clayton -specify S ppb	Treadwell Orinda
158	"	"	"	"

Changes were done in lims by(login):

On: 7/16/98

CC: ___ Lab.Director ___ Dept.manager ___ Analyst ___ Proj.Manager

CHROMALAB, INC.

Environmental Service (SDB)

Sample Receipt Checklist

Client Name: TREADWELL & ROLLO

Date/Time Received: 07/15/98 | 1324

Reference/Submis: 40873 | 9807188

Received by: Bm

Checklist completed by: Chris Rowley

Signature

7/16/98

Date

Reviewed by: AW

Initials | Date

Matrix: H₂O

Carrier name: Client

C/L

Shipping container/cooler in good condition?

Yes

No

Not Present

Custody seals intact on shipping container/cooler?

Yes

No

Not Present

Custody seals intact on sample bottles?

Yes

No

Not Present

Chain of custody present?

Yes

No

Chain of custody signed when relinquished and received?

Yes

No

Chain of custody agrees with sample labels?

Yes

No

Samples in proper container/bottle?

Yes

No

Sample containers intact?

Yes

No

Sufficient sample volume for indicated test?

Yes

No

All samples received within holding time?

Yes

No

Container/Temp Blank temperature in compliance?

Temp: 3.7 °C

Yes

No

Water - VOA vials have zero headspace?

No VOA vials submitted

Yes

No

Water - pH acceptable upon receipt?

Adjusted?

Checked by AW

chemist for VOAs

Any No and/or NA (not applicable) response must be detailed in the comments section below.

Client contacted: _____

Date contacted: _____

Person contacted: _____

Contacted by: _____

Regarding: _____

Comments: Samples filtered & preserved in-lab

Corrective Action: _____

ORW

(O:JOBCHECK)

ORDER ENTRY CHECK FORM

ENTERED BY: RCHRIS
SALES REP: GC
REFERENCE #: 40873
QUOTATION #: 0
CONF TO REC: Y
RECVD COLD: Y

9807188

SUBMIS #: 9807188 CLIENT_ID: TREADWELL-0 REPORT TYPE: ROUTINE
CLIENT: TREADWELL & ROLLO PROJECT#: 2323.02.0001
PROJ MGR: Peggy Peischl DATE RECEIVED: 07/15/98
PROJECT: SHELL PURCHASE #:

0 07/16/98 06:59

CLIENT SPL ID: TRG-1
DATE SAMPLED: 07/15/98
COMMENT: FILTER SAMPLES IN-LAB
AS

DUE DATE: 07/22/98 MATRIX: WATER
RUSH: 0 CONTAINERS: 1
SUB NOTE:

SPL#: 195469

SOLUBLE MISC METALS W/MERCURY - WATER

TEST NUMBER: M030 LOGGED: 07/16/98

CLIENT SPL ID: TRG-3
DATE SAMPLED: 07/15/98
COMMENT: FILTER SAMPLES IN-LAB
AS

DUE DATE: 07/22/98 MATRIX: WATER
RUSH: 0 CONTAINERS: 1
SUB NOTE:

SPL#: 195470

SOLUBLE MISC METALS W/MERCURY - WATER

TEST NUMBER: M030 LOGGED: 07/16/98

CLIENT SPL ID: TRG-8
DATE SAMPLED: 07/15/98
COMMENT: FILTER SAMPLES IN-LAB
AS

DUE DATE: 07/22/98 MATRIX: WATER
RUSH: 0 CONTAINERS: 1
SUB NOTE:

SPL#: 195471

SOLUBLE MISC METALS W/MERCURY - WATER

TEST NUMBER: M030 LOGGED: 07/16/98

CLIENT SPL ID: TRG-9
DATE SAMPLED: 07/15/98
COMMENT: FILTER SAMPLES IN-LAB
AS

DUE DATE: 07/22/98 MATRIX: WATER
RUSH: 0 CONTAINERS: 1
SUB NOTE:

SPL#: 195472

SOLUBLE MISC METALS W/MERCURY - WATER

TEST NUMBER: M030 LOGGED: 07/16/98

CLIENT SPL ID: TRG-10
DATE SAMPLED: 07/15/98
COMMENT: FILTER SAMPLES IN-LAB
AS

DUE DATE: 07/22/98 MATRIX: WATER
RUSH: 0 CONTAINERS: 1
SUB NOTE:

SPL#: 195473

SOLUBLE MISC METALS W/MERCURY - WATER

TEST NUMBER: M030 LOGGED: 07/16/98

San Francisco Regional Office

1252 Quarry Lane
P.O. Box 9019
Pleasanton, CA 94566
(925) 426-2600
Fax (925) 426-0106

Clayton
LABORATORY
SERVICES

July 24, 1998

Mr. Ken Wright
CHROMALAB, INC.
1220 Quarry Lane
Pleasanton, CA 94566

Client Ref.: 9807158
Clayton Project No.: 98071.90

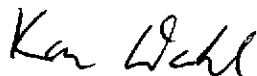
Dear Mr. Wright:

Attached is our analytical laboratory report for the samples received on July 17, 1998. Also enclosed is a copy of the Chain-of-Custody record acknowledging receipt of these samples.

Please note that any unused portion of the samples will be discarded after August 23, 1998, unless you have requested otherwise.

We appreciate the opportunity to assist you. If you have any questions concerning this report, please contact Client Services at (510) 426-2687.

Sincerely,



Karen Dahl
Client Services Representative
San Francisco Regional Office

KMD/kmd

Attachments

California DHS ELAP Certification Number 1196

Analytical Results
for
CHROMALAB, INC.
Client Reference: 9807158
Clayton Project No. 98071.90

Sample Identification: See Below
 Lab Number: 9807190
 Sample Matrix/Media: WATER
 Digestion Method: EPA 206.2
 Method Reference: EPA 206.2

Date Received: 07/17/98
 Date Digested: 07/20/98
 Date Analyzed: 07/23/98

Lab Number	Sample Identification	Date Sampled	Arsenic (mg/L)	Method Detection Limit (mg/L)
-01	LF-27	07/14/98	0.020	0.005
-02	LF-28	07/14/98	0.45	0.005
-03	LF-29	07/14/98	<0.005	0.005
-04	LF-30	07/14/98	<0.005	0.005
-05	TRG-2	07/14/98	<0.005	0.005
-06	TRG-4	07/14/98	0.010	0.005
-07	TRG-5	07/14/98	0.044	0.005
-08	TRG-6	07/14/98	0.027	0.005
-09	TRG-7	07/14/98	0.040	0.005
-10	DUP1	07/14/98	0.46	0.005
-11	METHOD BLANK	--	<0.005	0.005

ND: Not detected at or above limit of detection
 --: Information not available or not applicable

CLAYTON

9807190

CHROMALAB, INC.

1220 Quarry Lane • Pleasanton, California 94566-4758
510/484-1919 • Facsimile 510/484-1096

Chain of Custody

Environmental Services (SDB) (DOHS 1094)

DATE 7-16-98 PAGE 1 OF 1

PROJ MGR _____
 COMPANY _____
 ADDRESS _____

 SAMPLERS (SIGNATURE) _____ (PHONE NO.) _____
 _____ (FAX NO.) _____

ANALYSIS REPORT					NUMBER OF CONTAINERS
SAMPLE ID.	DATE	TIME	MATRIX	PRESTRV.	
LF-27	7/14/98	—	W	HNO ₃	1
LF-28 (split)	↓	—	↓	↓	10
LF-29	↓	—	↓	↓	1
LF-30	↓	—	↓	↓	1
TR6-2	↓	—	↓	↓	1
TR6-4	↓	—	↓	↓	1
TR6-5	↓	—	↓	↓	1
TR6-6	↓	—	↓	↓	1
TR6-7	↓	—	↓	↓	1

As by EPA 7060

PROJECT INFORMATION
 PROJECT NAME _____
 PROJECT NUMBER 9807159
 P.O. # _____
 TAT STANDARD 5-DAY

SAMPLE RECEIPT
 TOTAL NO OF CONTAINERS _____
 HEAD SPACE _____
 RECD GOOD CONDITION/COLD _____
 CONFORMS TO RECORD _____
 24 48 72 OTHER

RELINQUISHED BY 1
 Signature: Clamedy
 (SIGNATURE) _____ (TIME) _____
 Printed Name: Clamedy
 (PRINTED NAME) _____ (DATE) _____
 (COMPANY) _____

RELINQUISHED BY 2
 Signature: Wronski
 (SIGNATURE) _____ (TIME) _____
 Printed Name: Wronski
 (PRINTED NAME) _____ (DATE) _____
 (COMPANY) _____

RELINQUISHED BY 3
 (SIGNATURE) _____ (TIME) _____
 (PRINTED NAME) _____ (DATE) _____
 (COMPANY) _____

SPECIAL INSTRUCTIONS/COMMENTS:
As detection limit = 5 ppb

RECEIVED BY 1
 Signature: Wronski
 (SIGNATURE) _____ (TIME) _____
 Printed Name: Wronski
 (PRINTED NAME) _____ (DATE) _____
 (COMPANY) _____

RECEIVED BY 2
 (SIGNATURE) _____ (TIME) _____
 (PRINTED NAME) _____ (DATE) _____
 (COMPANY) _____

RECEIVED BY (LABORATORY) 3
 Signature: Brian Peterson
 (SIGNATURE) _____ (TIME) 9:55
 Printed Name: Brian Peterson
 (PRINTED NAME) _____ (DATE) 7/17/98
 (COMPANY) Clayton

CHROMALAB, INC.

Environmental Services (SDB) (D01S 1094)

1220 Quarry Lane • Pleasanton, California 94566-4756
510/484-1919 • Facsimile 510/484-1096

Reference #: 40841

Chain of Custody

DATE 14 JULY 98 PAGE 2 OF 2

9807158
2516086

PROJECT INFORMATION					ANALYSIS REPORT																									
PROJ MGR	Peggy Reischl				TPH (EPA 8015, 8020)	PURGEABLE AROMATICS		TPH-Diesel (EPA 8015M)	TEPH (EPA 8015M)	PURGEABLE HALOCARBONS		VOLATILE ORGANICS	SEMIVOLATILES	TOTAL OIL AND GREASE	TOTAL RECOVERABLE	HYDROCARBONS (EPA 418.1)	PESTICIDES (EPA 8080)	PCB'S (EPA 8080)	PNA's by	pH	TSS	LUFT METALS:	Cd, Cr, Pb, Ni, Zn	CAM 17 METALS	TOTAL LEAD	W.E.T.	TCLP	TOTAL Arsenic	NUMBER OF CONTAINERS	
COMPANY	Treadwell & Rollo				<input type="checkbox"/> Gas w/ <input type="checkbox"/> BTEX <input type="checkbox"/> DMTBE	BTX (EPA 8020)		<input type="checkbox"/> Kerosene, <input type="checkbox"/> Diesel, <input type="checkbox"/> M.O.	(HVOCs) (EPA 8010 by 8260)		(VOCs) (EPA 8260)	(EPA 8270)	(SM 5520 B - F, E + F)	(EPA 418.1)		<input type="checkbox"/> EPA 8080	<input type="checkbox"/> EPA 8080	<input type="checkbox"/> 8270 <input type="checkbox"/> 8310	<input type="checkbox"/> Spec. Cond.	<input type="checkbox"/> TDS	Cu, Cr, Pb, Ni, Zn		(EPA 6010/7470/7471)		<input type="checkbox"/> W.E.T. <input type="checkbox"/> TCLP					
ADDRESS	2 Theatre Square, Suite 216																													
CITY/STATE	ORINDA, CA																													
SAMPLER(S) SIGNATURE(S)	Alicia Andrews (SF) 415/955-9040																													
PHONE NO.	415/955-9040																													
FAX NO.	415/955-9041																													
SAMPLE ID.	DATE	TIME	MATRIX	PRESERV.																										
TRG-2	7/14/98		Water	NO																										
TRG-4																														
TRG-5																														
TRG-6																														
TRG-7																														

PROJECT INFORMATION				SAMPLE RECEIPT				REMOVED BY			REMOVED BY			REMOVED BY			
PROJECT NAME	Shell			TOTAL NO OF CONTAINERS	5			SIGNATURE	Alicia Andrews 7/14/98		SIGNATURE	[Signature]		SIGNATURE	B. Morrow 7-14-98		
PROJECT NUMBER	2323.02.0001			HEAD SPACE				PRINTED NAME	Treadwell & Rollo		PRINTED NAME	[Name]		PRINTED NAME	Chromalab		
P.O.#	(same)			TEMPERATURE				COMPANY	Treadwell & Rollo		COMPANY	[Company]		COMPANY	Chromalab		
TAT	STANDARD	24	48	72	OTHER				RECEIVED BY	[Signature]		RECEIVED BY	[Signature]		RECEIVED BY (LABORATORY)	C. Cassidy 7-14-98	
Report: <input type="checkbox"/> Routine <input type="checkbox"/> Level 2 <input type="checkbox"/> Level 3 <input type="checkbox"/> Level 4				SPECIAL INSTRUCTIONS/COMMENTS:				SIGNATURE			SIGNATURE			SIGNATURE			
				<ul style="list-style-type: none"> please filter samples please fax chain-of-custody 				PRINTED NAME			PRINTED NAME			PRINTED NAME			
								DATE			DATE			DATE			

CHROMALAB, INC.

1220 Quarry Lane • Pleasanton, California 94566-4756
510/484-1919 • Facsimile 510/484-1098

Chain of Custody

Environmental Services (SDB) (DOHS 1094)

DATE 7-16-99 PAGE 1 OF 1

CLAYTON

PROJ MGN _____
 COMPANY _____
 ADDRESS _____
 SAMPLERS (SIGNATURE) _____ (PHONE NO.) _____
 (FAX NO.) _____

SAMPLE ID	DATE	TIME	MATRIX	PRESERV.	ANALYSIS REPORT	NUMBER OF CONTAINERS
LF-27	7-14-99	-	W	HNO ₃	SPLIT & ANALYZE - SECOND SAMPLE SHOULD be labelled "DUPI"	1
LF-28	↓	-	↓	↓		1
LF-29	↓	-	↓	↓		1
LF-30	↓	-	↓	↓		1
TR6-2	↓	-	↓	↓		1
TR6-4	↓	-	↓	↓		1
TR6-5	↓	-	↓	↓		1
TR6-6	↓	-	↓	↓		1
TR6-7	↓	-	↓	↓	1	

PROJECT INFORMATION
 PROJECT NAME _____
 PROJECT NUMBER 9907158
 P.O. # _____

SAMPLE RECEIPT
 TOTAL NO. OF CONTAINERS _____
 HEAD SPACE _____
 RECD GOOD CONDITION/COLD _____
 CONFORMS TO RECORD _____

TAT STANDARD 5-DAY 24 48 72 OTHER

RELINQUISHED BY

1. <u>C. Amey</u> (SIGNATURE) _____ (TIME) _____ <u>Cassidy</u> (PRINTED NAME) _____ (DATE) _____ (COMPANY) _____	2. _____ (SIGNATURE) _____ (TIME) _____ (PRINTED NAME) _____ (DATE) _____ (COMPANY) _____	3. _____ (SIGNATURE) _____ (TIME) _____ (PRINTED NAME) _____ (DATE) _____ (COMPANY) _____
---	--	--

RECEIVED BY

1. _____ (SIGNATURE) _____ (TIME) _____ (PRINTED NAME) _____ (DATE) _____ (COMPANY) _____	2. _____ (SIGNATURE) _____ (TIME) _____ (PRINTED NAME) _____ (DATE) _____ (COMPANY) _____	3. _____ (SIGNATURE) _____ (TIME) _____ (PRINTED NAME) _____ (DATE) _____ (COMPANY) _____
--	--	--

SPECIAL INSTRUCTIONS/COMMENTS:
As detection limit = 5 ppb

Charles Gary

CHROMALAB, INC.

Environmental Service (SDB)

Sample Receipt Checklist

Client Name: TREADWELL & ROLLO

Date/Time Received: 07/14/98 | 1622

Reference/Submis: 40841 (9807158)

Received by: BM

Checklist completed by: Chris Rowley

Signature

7/15/98

Date

Reviewed by: [Signature]

Initials | Date

Matrix: H₂O

Carrier name: Client - C/L

Shipping container/cooler in good condition? Yes No Not Present

Custody seals intact on shipping container/cooler? Yes No Not Present

Custody seals intact on sample bottles? Yes No Not Present

Chain of custody present? Yes No

Chain of custody signed when relinquished and received? Yes No

Chain of custody agrees with sample labels? Yes No

Samples in proper container/bottle? Yes No

Sample containers intact? Yes No

Sufficient sample volume for indicated test? Yes No

All samples received within holding time? Yes No

Container/Temp Blank temperature in compliance? Temp: 3.1 °C Yes No

Water - VOA vials have zero headspace? No VOA vials submitted Yes No

Water - pH acceptable upon receipt? Adjusted? Checked by chemist for VOA's

Any No and/or NA (not applicable) response must be detailed in the comments section below.

Client contacted: Date contacted: Person contacted:

Contacted by: Regarding:

Comments:

Corrective Action:

CHROMALAB, INC.

Environmental Services (SDB)

July 23, 1998

Submission #: 9807205

TREADWELL & ROLLO

Atten: Peggy Peischl

Project: SHELL, EMERYVILLE

Project#: 2323.02

Received: July 16, 1998

re: One sample for Volatile Organics by GC/MS analysis.

Method: 8010 Compounds by Method 8260A Sept 1994

Client Sample ID: D 2,3,4,5,6

Spl#: 195609

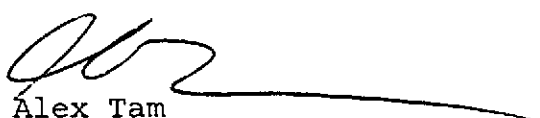
Matrix: SOIL

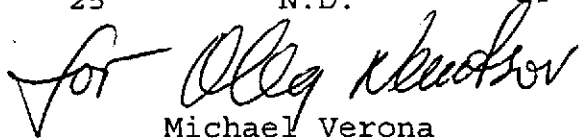
Sampled: July 16, 1998

Run#: 13843

Analyzed: July 20, 1998

ANALYTE	RESULT (ug/Kg)	REPORTING LIMIT (ug/Kg)	BLANK RESULT (ug/Kg)	BLANK SPIKE (%)	DILUTION FACTOR
BROMODICHLOROMETHANE	N.D.	25	N.D.	--	5
BROMOFORM	N.D.	25	N.D.	--	5
BROMOMETHANE	N.D.	50	N.D.	--	5
CARBON TETRACHLORIDE	N.D.	25	N.D.	--	5
CHLOROBENZENE	N.D.	25	N.D.	98.9	5
CHLOROETHANE	N.D.	50	N.D.	--	5
2-CHLOROETHYLVINYLETHER	N.D.	250	N.D.	--	5
CHLOROFORM	N.D.	25	N.D.	--	5
CHLOROMETHANE	N.D.	50	N.D.	--	5
DIBROMOCHLOROMETHANE	N.D.	25	N.D.	--	5
1,2-DICHLOROBENZENE	N.D.	25	N.D.	--	5
1,3-DICHLOROBENZENE	N.D.	25	N.D.	--	5
1,4-DICHLOROBENZENE	N.D.	25	N.D.	--	5
1,2-DIBROMOETHANE	N.D.	50	N.D.	--	5
1,1-DICHLOROETHANE	N.D.	25	N.D.	--	5
1,2-DICHLOROETHANE	N.D.	25	N.D.	--	5
1,1-DICHLOROETHENE	N.D.	25	N.D.	109	5
1,2-DICHLOROETHENE (CIS)	N.D.	25	N.D.	--	5
1,2-DICHLOROETHENE (TRANS)	N.D.	25	N.D.	--	5
1,2-DICHLOROPROPANE	N.D.	25	N.D.	--	5
CIS-1,3-DICHLOROPROPENE	N.D.	25	N.D.	--	5
TRANS-1,3-DICHLOROPROPENE	N.D.	25	N.D.	--	5
METHYLENE CHLORIDE	N.D.	25	N.D.	--	5
1,1,2,2-TETRACHLOROETHANE	N.D.	25	N.D.	--	5
TETRACHLOROETHENE	N.D.	25	N.D.	--	5
1,1,1-TRICHLOROETHANE	N.D.	25	N.D.	--	5
1,1,2-TRICHLOROETHANE	N.D.	25	N.D.	--	5
TRICHLOROETHENE	N.D.	25	N.D.	90.2	5
VINYL CHLORIDE	N.D.	25	N.D.	--	5
TRICHLOROTRIFLUOROETHANE	N.D.	25	N.D.	--	5
TRICHLOROFLUOROMETHANE	N.D.	25	N.D.	--	5


Alex Tam
Analyst


Michael Verona
Operations Manager

CHROMALAB, INC.

Environmental Services (SDB)

July 22, 1998

Submission #: 9807205

TREADWELL & ROLLO

Atten: Peggy Peischl

Project: SHELL, EMERYVILLE
Received: July 16, 1998

Project#: 2323.02

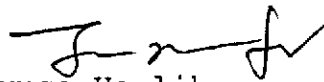
re: 1 sample for TPH - Diesel analysis.
Method: EPA 8015M

Sampled: July 16, 1998 Matrix: SOIL Extracted: July 17, 1998
Run#: 13786 Analyzed: July 17, 1998

Spl#	CLIENT SPL ID	DIESEL (mg/Kg)	REPORTING LIMIT (mg/Kg)	BLANK RESULT (mg/Kg)	BLANK SPIKE (%)	DILUTION FACTOR
195609	D 2,3,4,5,6	2.6	1.0	N.D.	99.8	1

Note: Compounds reported are in diesel range. They do not have a pattern characteristic of our Diesel profile.


Carolyn House
Analyst


Bruce Havlik
Analyst

CHROMALAB, INC.

Environmental Services (SDB)

July 21, 1998

Submission #: 9807205

TREADWELL & ROLLO

Atten: Peggy Peischl

Project: SHELL, EMERYVILLE
Received: July 16, 1998

Project#: 2323.02

re: One sample for Miscellaneous Metals with Mercury analysis.
Method: EPA 3010A/3050A/6010A/7470A/7471A Nov 90

Client Sample ID: D 2,3,4,5,6

Spl#: 195609

Matrix: SOIL

Extracted: July 18, 1998


Sampled: July 16, 1998

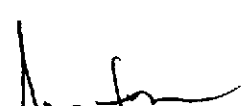
Run#: 13798

Analyzed: July 18, 1998

ANALYTE	RESULT (mg/Kg)	REPORTING LIMIT (mg/Kg)	BLANK RESULT (mg/Kg)	BLANK SPIKE (%)	DILUTION FACTOR
ARSENIC	3.4	1.0	N.D.	105	1
BARIUM	83	1.0	N.D.	100	1
CADMIUM	N.D.	0.50	N.D.	99.0	1
CHROMIUM	28	1.0	N.D.	99.0	1
LEAD	6.5	1.0	N.D.	102	1
SELENIUM	N.D.	2.0	N.D.	102	1
SILVER	N.D.	1.0	N.D.	99.0	1
MERCURY	0.16	0.050	N.D.	102	1

Mercury extracted on and analyzed on July 18, 1998.


Shafi Barekzai
Analyst


Michael Verona
Operations Manager

CHROMALAB, INC.

Environmental Services (SDB)

July 20, 1998

Submission #: 9807205

TREADWELL & ROLLO

Atten: Peggy Peischl

Project: SHELL, EMERYVILLE
Received: July 16, 1998

Project#: 2323.02

re: One sample for Gasoline BTEX MTBE analysis.
Method: SW846 8020A Nov 1990 / 8015Mod

Client Sample ID: D 2,3,4,5,6


Spl#: 195609
Sampled: July 16, 1998

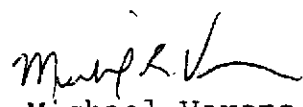
Matrix: SOIL
Run#: 13792

Analyzed: July 17, 1998

ANALYTE	RESULT (mg/Kg)	REPORTING LIMIT (mg/Kg)	BLANK RESULT (mg/Kg)	BLANK SPIKE (%)	DILUTION FACTOR
GASOLINE	N.D.	1.0	N.D.	82	1
MTBE	N.D.	0.0050	N.D.	94	1
BENZENE	N.D.	0.0050	N.D.	100	1
TOLUENE	N.D.	0.0050	N.D.	101	1
ETHYL BENZENE	N.D.	0.0050	N.D.	101	1
XYLENES	N.D.	0.0050	N.D.	102	1

Note: Single peak found in Gasoline Range is uncharacteristic of Gasoline Profile. If quantified using Gasoline's response factor, estimated concentration would equal 1.9mg/Kg.


Vincent Vancil
Analyst


Michael Verona
Operations Manager

CHROMALAB, INC.

Environmental Service (SDB)

Sample Receipt Checklist

Client Name: TREADWELL & ROLLO

Date/Time Received: 07/16/98 | 1546

Reference/Submis: 40887 | 9807205

Received by: BOM

Checklist completed by: Chris Rowley

Date: 7/17/98

Reviewed by: AWD | 7-17-98

Signature

Date

Initials | Date

Matrix: Soil

Carrier name: Client - C/L

Shipping container/cooler in good condition? Yes No Not Present

Custody seals intact on shipping container/cooler? Yes No Not Present

Custody seals intact on sample bottles? Yes No Not Present

Chain of custody present? Yes No

Chain of custody signed when relinquished and received? Yes No

Chain of custody agrees with sample labels? Yes No

Samples in proper container/bottle? Yes No

Sample containers intact? Yes No

Sufficient sample volume for indicated test? Yes No

All samples received within holding time? Yes No

Container/Temp Blank temperature in compliance? Yes No Temp: 5.2 °C

Water - VOA vials have zero headspace? Yes No No VOA vials submitted

Water - pH acceptable upon receipt? Adjusted? Checked by _____ chemist for VOAs

Any No and/or NA (not applicable) response must be detailed in the comments section below.

Client contacted: _____ Date contacted: _____ Person contacted: _____

Contacted by: _____ Regarding: _____

Comments: _____

Corrective Action: _____

CHROMALAB, INC.

Environmental Services (SDB)

August 17, 1998

Submission #: 9808158

TREADWELL & ROLLO

Atten: Peggy Peischl

Project: SHELL, EMERYVILLE
Received: July 16, 1998

Project#: 2323.02

re: One sample for CAM 17 METALS analysis.
Method: EPA 3050A/6010A/7471A Nov 1990

Client Sample ID: D2,3,4,5,6

Spl#: 200271

Matrix: SOIL

Extracted: August 13, 1998

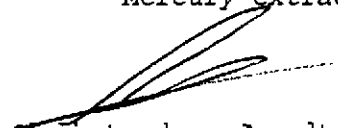
Sampled: July 16, 1998

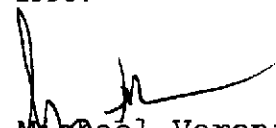
Run#: 14265

Analyzed: August 13, 1998

ANALYTE	RESULT (mg/Kg)	REPORTING LIMIT (mg/Kg)	BLANK RESULT (mg/Kg)	BLANK SPIKE (%)	DILUTION FACTOR
ANTIMONY	N.D.	2.0	N.D.	106	1
ARSENIC	4.0	1.0	N.D.	110	1
BARIUM	78	1.0	N.D.	100	1
BERYLLIUM	N.D.	0.50	N.D.	102	1
CADMIUM	N.D.	0.50	N.D.	105	1
CHROMIUM	26	1.0	N.D.	103	1
COBALT	7.3	1.0	N.D.	104	1
COPPER	15	1.0	N.D.	105	1
LEAD	5.2	1.0	N.D.	106	1
MOLYBDENUM	N.D.	1.0	N.D.	105	1
NICKEL	34	1.0	N.D.	104	1
SELENIUM	N.D.	2.0	N.D.	109	1
SILVER	N.D.	1.0	N.D.	105	1
THALLIUM	N.D.	1.0	N.D.	104	1
VANADIUM	22	1.0	N.D.	104	1
ZINC	41	1.0	N.D.	106	1
MERCURY	0.072	0.050	N.D.	98.8	1

Mercury extracted on and analyzed on August 13, 1998.


Christopher Arndt
Analyst


Michael Verona
Operations Manager

