Chevron U.S.A. Inc.
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February 28, 1991

~~Mr. Larry~~ Seto/Lowell Miller
Alameda County Health Agency
Hazmat Section
470 27th Street, Room 324
Oakland, California 94612

Re: Chevron Service Station #9-8139
16304 Foothill Boulevard
San Leandro, California 94578

Dear Mr. Seto,

Please find attached a workplan for additional work to be done at the above site. We are planning to drill out two existing groundwater monitoring wells and re-install them as 4-inch groundwater extraction wells. We are also planning on installing one additional g.w. monitoring well in the median of Foothill Boulevard. This will bring to a total of 3 g.w. extraction wells on-site feeding into our existing groundwater remediation system. We are also planning on installing an oil/water separator prior to the two 2000 lb. carbon beds. The remediation system is temporarily shut down here for maintenance and the addition of the new equipment. We hope to get everything back on-line as soon as possible.

This letter is to inform you that we are proceeding with the work addressed in the attached plan. If I can be of further assistance, please feel free to call me at (415) 842-9040.

Sincerely,

Walter F. Posluszny Jr.
Environmental Engineer
Chevron U.S.A

cc: Ms. Penny Silzer/Rich Hiett, RWQCB, Oakland, Ca.
File(MAC 9-8139R7)

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CHEMICAL PROCESSORS, INC.
Northern California Division

A Burlington Environmental Inc. Company

February 1, 1991
Project No. 1158

Mr. Walt Posluszny
Chevron U.S.A.
2410 Camino Ramon
San Ramon, California 94583

Re: **WORKPLAN FOR ADDITIONAL SOIL AND GROUNDWATER INVESTIGATION:**
Chevron Service Station No. 9-8139
16304 Foothill Boulevard, San Leandro, California

Dear Mr. Posluszny:

Chemical Processors, Inc. (Chempro) is pleased to submit this workplan to perform an additional soil and groundwater investigation at Chevron U.S.A., Inc. (Chevron) Service Station No. 9-8139, located at 16304 Foothill Boulevard in San Leandro, California. The purpose of this investigation is to install additional groundwater extraction and groundwater monitoring wells, determine the downgradient extent of groundwater contamination, and upgrade the remediation system to include an oil/water separator and the additional extraction wells. The interim groundwater remediation system has been turned on as a preliminary measure to stop the migration of groundwater contamination offsite, and initiate groundwater cleanup.

The proposed work includes decommissioning two groundwater monitoring wells, installing two additional groundwater extraction wells and one additional groundwater monitoring well, and upgrading the remediation system. Upon completion of the investigation, a report will be prepared presenting the findings.

BACKGROUND

Background information used to develop this workplan include:

- EA Engineering, Science, and Technology, Inc. 1989. Report of Investigation, Soil Vapor Contaminant Assessment, Chevron Service Station 9-8139. San Leandro, California. July 14, 1989.
- Chemical Processors, Inc. 1990. Soil and Groundwater Investigation, Chevron Service Station 9-8139. San Leandro, California. January 17, 1990.
- Chemical Processors, Inc. 1990. Remedial Investigation Report, Chevron Service Station 9-8139. San Leandro, California. November 7, 1990.

950 Gilman Street, Suite B
Berkeley, California 94710
(415) 524-9372

SITE DESCRIPTION AND HISTORY

The site is occupied by an operating service station located on Foothill Boulevard in southern San Leandro, California (see Figure 1). The service station is located approximately 250 feet east of Highway 580, and 6,000 feet south of Lake Chabot. Properties surrounding the site are occupied primarily by residential housing and small commercial businesses.

Geologic and hydrogeologic data indicate that the site is underlain by low permeability sandy clays, with thin sand and gravel lenses dispersed in the clay. The first-encountered groundwater is contained in sand and gravel lenses under confined conditions. The potentiometric surface of the first encountered water-bearing lense beneath the site is found 15.01 to 19.30 feet below ground level (BGL) (112.08 to 107.49 feet MSL). The potentiometric surface of the confined aquifer slopes to the southwest with a hydraulic gradient of 0.03 ft/ft. (Chempro, 1990)

Chevron has reports of two petroleum leaks detected in the underground storage tanks and pipelines located on-site. The leaks were detected in April 1982 and December 1986. Both leaks were confirmed and repaired shortly after detection.

On June 29, 1989, EA conducted a soil-vapor survey at the Chevron facility. Very low concentrations of light hydrocarbons were detected near the tank field and the west end of the south pump island (see Figure 2). Measurable concentrations of benzene (1 part per million [ppm]) were detected near the west corner of the tank field.

In December 1989 Chempro conducted a soil and groundwater investigation to determine the extent of soil and groundwater contamination. Four soil borings (MW-1, MW-2, MW-3, and MW-4) were drilled and completed as 2-inch-diameter monitoring wells. Low levels of petroleum hydrocarbons were detected in soil samples collected from MW-1, MW-3, and MW-4. The maximum total petroleum hydrocarbon (TPH) level encountered in the soil was 24 ppm. Groundwater samples collected from the two downgradient wells (MW-3 and MW-4) contained elevated concentrations of TPH, and benzene, toluene, ethylbenzene, and xylenes (BTEX).

In May and August, 1990 Chempro continued the soil and groundwater investigation to further delineate the source, and determine the extent of onsite contamination at the site. Five soil borings were drilled. Four borings were completed as 2-inch-diameter monitoring wells (MW-5, MW-6, MW-7, and MW-8) and one boring was completed as a 6-inch-diameter extraction well (E-1). MW-8 was drilled offsite, in the median strip of Foothill Boulevard, in a location that is hydraulically downgradient from the site. A pumping test was conducted at the site using extraction well E-1 as the pumping well and wells MW-3, MW-5, and MW-7 as observation wells. Petroleum hydrocarbons were detected in soil samples collected from borings MW-5, MW-6, MW-7, and E-1. The soil sample collected from boring MW-5 had the highest concentration of TPH (as gasoline) in the 15 foot BGL sample, with a concentration of 130 ppm. Detectable concentrations of TPH (as gasoline) and BTEX have been found in the groundwater from wells MW-3, MW-4, MW-5 and E-1. The highest levels of contaminants at the site have been found in well MW-5. During the May 25, 1990, sampling event, 28,000 ppb TPH (as gasoline) and 920 ppb benzene were detected in the groundwater of MW-5. During

the September 7, 1990, quarterly sampling event, 0.04 feet of PSH were found in MW-5 and the well was not sampled. The soil and the groundwater from MW-8 was sampled and was nondetect for petroleum hydrocarbons. No detectable concentrations of chlorinated hydrocarbons were found in any of the groundwater samples analyzed by EPA method 624.

On October 22, 1990, Chempro initiated a semi-weekly phase-separated hydrocarbon removal program for well MW-5.

SCOPE OF WORK

TASK 1.0: SOIL AND GROUNDWATER INVESTIGATION:

The following scope of work has been prepared to further characterize the soil and groundwater beneath and downgradient of the site. The scope of work includes the decommissioning of two onsite groundwater monitoring wells, the replacement of the decommissioned wells with two groundwater extraction wells, the drilling and installation of one offsite groundwater monitoring well, and upgrading the groundwater treatment system to include an oil/water separator and the additional extraction wells. The results of the investigation will be presented in a report which will be signed and stamped by a registered California geologist.

A detailed description of these tasks follows.

1.1 Prefield Activities

To prepare for field activities, Chempro will obtain drilling and county property encroachment permits, arrange for field materials and equipment, and contract an underground utility locating service to clear the boring locations.

1.2 Well Decommissioning, Well Installation and Sampling

Groundwater monitoring wells MW-4 and MW-5 will be decommissioned, and replaced with two extraction wells E-3 and E-2, respectively. In addition, one groundwater monitoring well, MW-9, will be drilled and installed to better define the groundwater contaminant plume. The well locations are shown on Figure 2.

To monitor the extent of groundwater contamination hydraulically downgradient from MW-5 and the underground fuel storage tanks, MW-9 will be drilled and installed in the median strip of Foothill Boulevard. The well will be located approximately 45 feet southeast of MW-8 (see Figure 2).

MW-9 will be drilled with 8-inch outside-diameter (OD) hollow-stem augers (HSA). Soil samples will be collected for soil classification and chemical analysis at 5-foot intervals using a modified-California split-spoon sampler. Soil sample collection and chemical analyses will be conducted under strict chain-of-custody procedures and will follow the guidelines established by Chevron and the EPA. The procedures are presented in Appendix A. Samples will be chosen for analysis using a portable photoionization detector (PID) to determine the presence or absence of total volatile organic compounds in the soil samples.

The total depth of MW-9 will be determined by the depth of the saturated lens encountered during drilling. The boring will be drilled to a maximum depth of 45 feet if the confined water-bearing zone is not encountered. If the confined water-bearing zone is encountered, the boring will be drilled through the saturated interval and terminated. The screened interval will extend 5 to 10 feet across the water-bearing zone, depending on the thickness of the saturated interval.

Well MW-9 will be constructed with 2-inch-diameter, schedule 40 polyvinyl chloride (PVC), and 0.010-inch machine-slotted well screen, according to the procedures described in Appendix A. The data from the grain size analysis that was conducted on two samples previously collected from extraction well E-1, indicates that the use of 0.010-inch well screen is preferable due to the large number of fines present in the soils. The sandpack will consist of No. 2/12 rounded sand packed around the casing to a minimum of 2 feet above the screened section. The sandpack will be capped with a bentonite and cement seal and the wellhead will be protected with a locking vault box, as described in Appendix A. If more than one aquifer zone is encountered, the well design will be modified to prevent cross-communication between separate hydraulic zones.

Two extraction wells, E-2 and E-3, will be installed to improve the remediation system's capability to capture the dissolved hydrocarbons. The wells will be used for groundwater extraction after the wells have been connected to the groundwater treatment system. Extraction well E-2 will be located in the borehole from the decommissioning of MW-5, which is in the southern corner of the site. Extraction well E-3 will be installed in the borehole from the decommissioning of MW-4 (see Figure 2).

MW-4 and MW-5 will be decommissioned by drilling out the PVC well pipe with 10-inch OD HSA to depths of approximately 30 and 31 feet BGL, respectively. The present depths of MW-4 and MW-5 are 26.5 and 30 feet BGL, respectively. Soil samples will be collected for soil classification using a modified-California split-spoon sampler from 28.5 to 30 feet in MW-4 and from 30 to 31 feet BGL in MW-5. Soil sample collection will be conducted for lithological purposes only. E-2 and E-3 will then be installed in the boreholes provided by the decommissioning of the two monitoring wells. The soil and grout produced during the decommissioning activities will be sampled for soil disposal purposes only. The soils will be drummed and subsequently sampled by driving a hand-held drive sampler with brass liners into the drummed soil. The full liners will be removed, the ends covered with foil, capped, taped, and placed in an iced cooler pending laboratory analysis.

Wells E-2 and E-3 will be constructed with 4-inch-diameter, schedule 40 PVC, and 0.010-inch machine-slotted well screen. Additionally, E-2 and E-3 will have a 5-foot sump placed below the screen to collect fines that are pulled into the wells during groundwater extraction. The screened interval of E-2 and E-3 will extend from 15 to 25 feet BGL. The sandpack will consist of No. 2/12 rounded sand packed around the casing to a minimum of 2 feet above the screened section. The sandpack will be capped with a bentonite and cement seal and the wellhead will be protected with a locking vault box, as described in Appendix A.

The soil samples collected from the borings and the well decommissioning will be analyzed for TPH (as gasoline) using modified EPA Method 8015, and BTEX using EPA Method 8020. One soil sample will be analyzed for total organic lead and total lead for soil disposal purposes using California Department of Health Services

method 338 and EPA method 7420, respectively. Soil sample analyses will be performed by Superior Precision Analytical Laboratory (Superior Laboratory) of San Francisco, California.

The groundwater monitoring and extraction wells will be developed to remove trapped sediments from within the gravel pack prior to sampling (see Appendix A). The wells will be sampled within 24 hours of development. Groundwater sampling procedures are presented in Appendix B. The groundwater samples will be analyzed for TPH using modified EPA method 8015 and BTEX using EPA method 602.

1.3 Report Preparation

Following completion of the site characterization, a Soil and Groundwater Investigation Report will be prepared and submitted to Chevron. The report will be reviewed, signed, and stamped by a California registered geologist.

TASK 2.0: EXTRACTION AND TREATMENT SYSTEM MODIFICATION

The groundwater extraction and treatment system will be modified by connecting the additional groundwater extraction wells to the treatment system. The additional extraction wells will be connected to the treatment system by trenching and connecting the wells to the system with schedule 80 PVC piping. The treatment system will be modified by installing an oil/water separator.

2.1 Extraction System Modification

Chempro proposes to modify the groundwater extraction and treatment system by the following:

* install two electric submersible well pumps in the new extraction wells
* trench from wells to treatment system
* install three flow meters
* determine if a pretreatment sump is required for optimum extraction efficiency

2.2 Oil/Water Separator Design and Installation

Based on the presence of the phase-separated hydrocarbons in MW-5 found during the phase II site investigation (Chempro, 1990), Chempro recommends that the groundwater treatment system be upgraded to include an oil/water separator. The proper separator will be researched, designed, and installed.

DRUM REMOVAL

During the drilling and soil sampling operations, soil cuttings will be produced. All soil cuttings will be drummed during the site investigation. Soil samples will be analyzed by Superior Laboratory to assist in the determination of the appropriate disposal facility. Chempro will haul and dispose of the soil for Chevron, to the landfill of their choice. The drums will be manifested, if necessary, and hauled by Chempro to the drum recycling center of Chevron's choice.

Water collected during the steam cleaning, well development, and groundwater sampling operations will be stored onsite and disposed of by a Chevron subcontractor. Once empty, the drums will be manifested by Chevron and hauled by Chempro to the drum recycling center of Chevron's choice.

If you have any questions regarding this workplan, please do not hesitate to call.

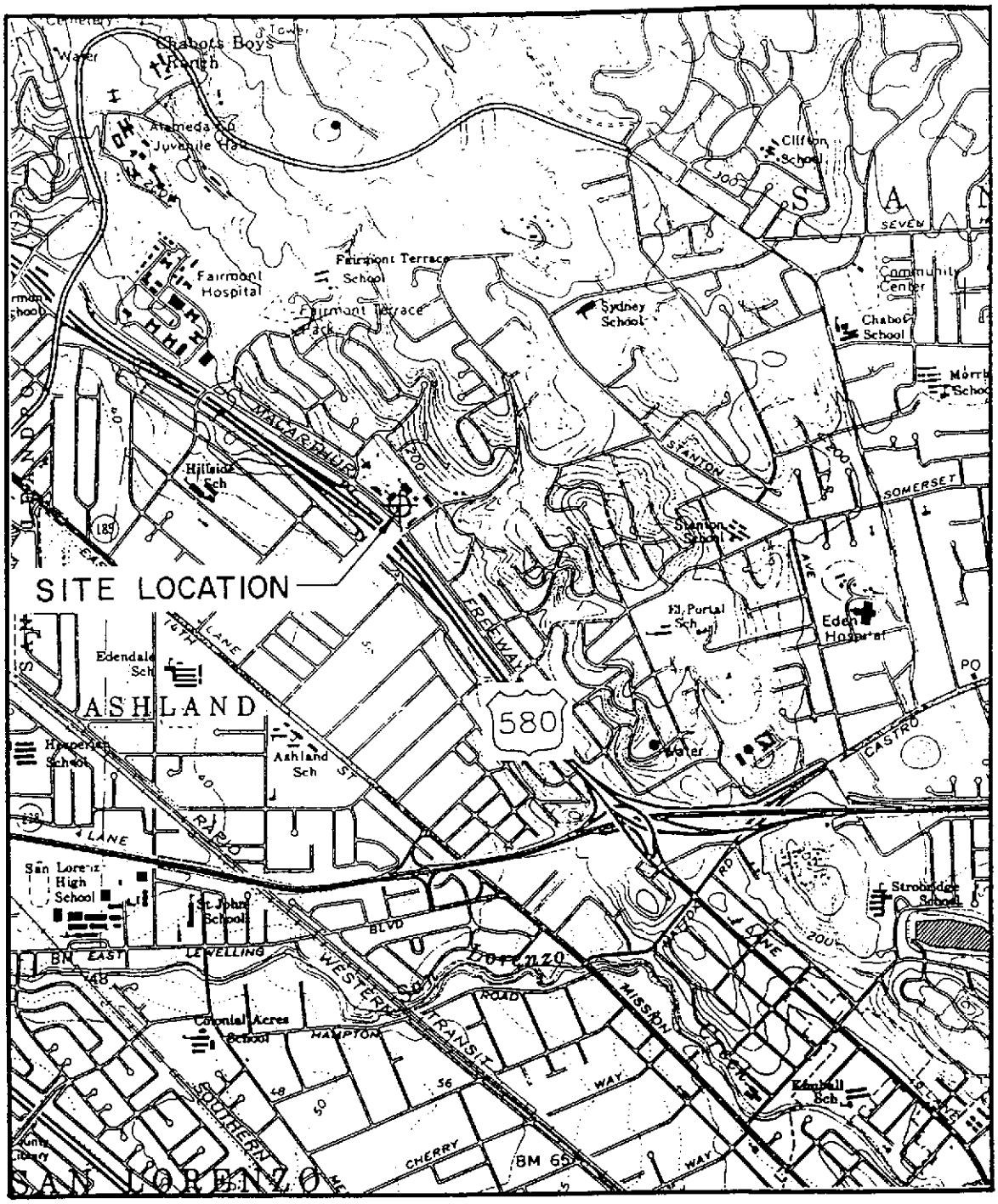
Very truly yours,
CHEMICAL PROCESSORS, INC.

Kyle S. Flory
Project Hydrogeologist

David C. Tight, R.G. No. 4603
Site Remediation Manager

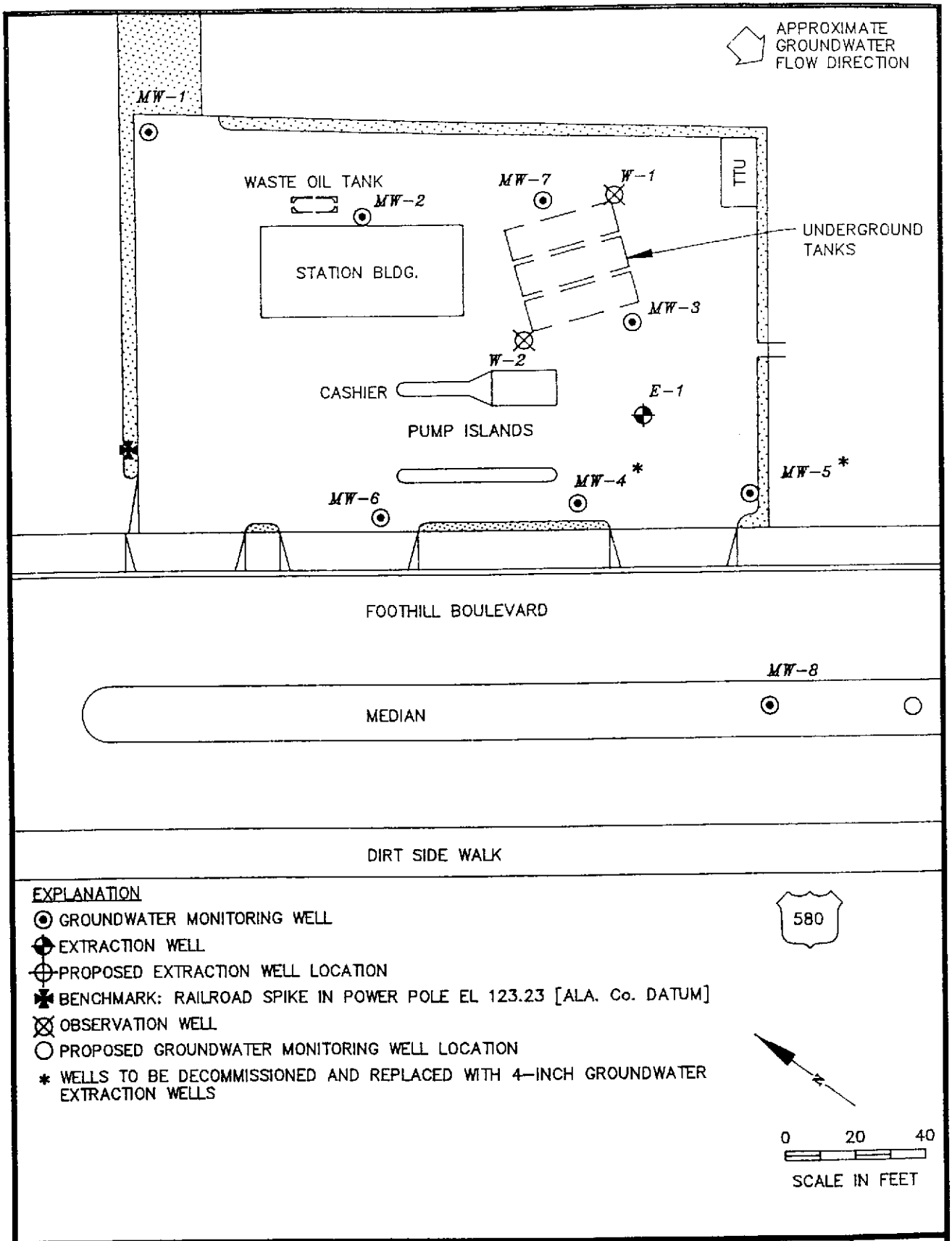
Enclosures

Figure 1 - Site Location
Figure 2 - Site Plan
Appendix A - Exploratory Boring, Soil Sampling, And Well Installation Procedures
Appendix B - Groundwater Sampling And Analysis Procedures



NOTE: (MAP ADAPTED FROM USGS HAYWARD 7.5' QUADRANGLE)

CHEMPRO **CHEMICAL PROCESSORS, INC.** **950-B GILMAN STREET** **BERKELEY, CALIFORNIA**	**SITE LOCATION MAP** Chevron Service Station #9-8139 16304 Foothill Boulevard San Leandro, California	FIGURE 1 1158



CHEMICAL PROCESSORS INC.
950 "B" Gilman Street
Berkeley, CA 94710

SITE VICINITY MAP
CHEVRON SERVICE STATION No. 9-8139
16304 FOOTHILL BOULEVARD
SAN LEANDRO, CALIFORNIA

PROJECT No. 1158

FIGURE 2

Appendix A

EXPLORATORY BORING, SOIL SAMPLING, WELL DECOMMISSIONING, AND WELL INSTALLATION PROCEDURES

Appendix A

Exploratory Boring, Soil Sampling, Well Decommissioning, and Well Installation Procedures

EXPLORATORY BORING

Before the exploratory borings are drilled at Chevron Service Station No. 9-8139, a number of actions will be taken: drilling permits will be obtained from the Alameda County Flood Control and Water District, encroachment permits will be obtained from the county prior to drilling in Foothill Boulevard, and an underground utility-locating service will be hired to clear the proposed drilling sites for subsurface utilities. In addition, Underground Service Alert (USA) will be contacted to schedule visits to the site by public and private utility companies. Each company will locate its utilities with the aid of maps, and the locating service will verify and mark these locations. All utility clearances will be coordinated with the station manager before drilling begins.

Field personnel will begin drilling by excavating the first four feet of soil with a hand auger to ensure that there are no subsurface obstructions. Exploratory borings will be drilled with a Mobile B-61 drill rig. The Exploratory boring to be completed as 2-inch-diameter monitoring well will be drilled with 8-inch outer-diameter (OD) hollow-stem augers (HSA). The borings for the extraction wells will be drilled with 10-inch OD HSA. The augers will be steam cleaned before each boring is drilled.

SOIL SAMPLING

Soil samples will be collected while drilling MW-9 to evaluate the geochemistry and stratigraphy of the soil beneath the boring location. The soil will be sampled by driving an 18-inch-long modified-California split-spoon sampler fitted with 2-inch-diameter brass liners beyond the tip of the auger into undisturbed soil. The split-spoon sampler will be driven into the soil with a 140-pound hammer. As the sampler is driven into the soil, blow counts will be recorded for each 6-inches of penetration. The blows will be recorded on the boring logs. Samples will be collected every 5 feet or less, depending on the lithology encountered. Soil

samples will be classified and logged according to the Unified Soil Classification System. The work shall be supervised by a California State registered geologist to ensure that it meets regulatory standards.

Soil samples will be selected for chemical analysis using a photoionization detector (PID). The PID determines the relative concentration of total volatile organic compounds. The soil samples will be selected for analysis where 1) the PID reading first detects a reading above the background level, 2) at the point above this interval where the PID reading is negligible, 3) at the first point below the contaminated interval where the PID reading is negligible, and 4) at the water table. If no contaminants are detected with the PID, the sample collected 5 feet above the water table will be submitted for analysis

Each soil sample will be sealed inside the brass liners with aluminium foil and polypropylene end caps, and wrapped with tape. The soil samples will be labeled, and stored for shipment to the Chevron-approved laboratory. At the time of sampling, each sample will be logged on a Chain-of-Custody record which accompanies the sample to the laboratory. Soil samples selected for analysis will have the request for analysis noted on the Chain-of-Custody. The remaining soil samples will be sent to the laboratory on a hold for analysis basis.

Soil sampling equipment will be steam cleaned between each boring and washed in an Alconox solution and rinsed in distilled water between each sampling point. The 2-inch-diameter brass liners which are placed in the split-spoon sampler for soil sample collection have previously been steam-cleaned.

Drill cuttings will be drummed and temporarily stored on site. Each drum will be labeled with the soil boring number and depth from which the soils were extracted. Drill cuttings will be disposed of using the appropriate method based on the analyses of the soil samples collected during drilling.

WELL DECOMMISSIONING

Groundwater monitoring wells, MW-4 and MW-5, will be decommissioned by drilling out the polyvinyl chloride (PVC) well pipe with 10-inch OD HSA. The monitor wells will be overdrilled to a depth greater than the bottom of the boring.

Soil samples will not be collected during the drilling of the extraction wells. The soil and grout produced during the decommissioning activities will be sampled for soil disposal purposes only. The soils will be drummed and subsequently sampled by driving a hand-held drive sampler with brass liners into the drummed soil. The full liners will be removed, the ends covered with foil, capped, taped, and placed in an iced cooler pending laboratory analysis.

WELL INSTALLATION

One soil boring will be converted to a monitoring well by installing 2-inch-diameter, flush-threaded, PVC casing inside the boring. Two decommissioned wells, MW-4 and MW-5, will be converted to extraction wells by installing 4-inch diameter, flush-threaded, PVC casing inside the borehole provided by the decommissioning. No solvent cements will be used on the casing. The screened casing will be machine-slotted with 0.010-inch slots. Screened sections of casing will extend across the saturated interval to 5 to 10 feet across the aquifer. A threaded bottom cap will be attached to the bottom of the casing. The annular space surrounding the casing will be at least 2 inches thick, and packed with No. 2/12 sand to approximately 2 feet above the top of the screened interval. A minimum of 1 foot of bentonite seal will be set above the sandpack and neat cement will be tremie-grouted to the surface.

A traffic-rated vault box with a locking device will be set in concrete to protect the wells. Well tags will be affixed to the casing for identification. Well locations will be surveyed to the closest 1-foot Northing and Easting and top-of-casing elevations will be measured to the nearest 0.01 foot. Detailed well completion diagrams will then be prepared.

Well Development

Monitoring and extraction wells will be developed by surging, swabbing, and bailing, until a non-turbid discharge is obtained. All development equipment will be steam cleaned between wells. Development and steam-cleaning water will be contained in 55-gallon drums until a Chevron contractor can collect the water and transport it off-site for treatment.

Appendix B

GROUNDWATER SAMPLING AND ANALYSIS PROCEDURES

Appendix B

Groundwater Sampling and Analysis Procedures

INTRODUCTION

The sampling and analysis procedures for water-quality monitoring programs are contained in this Appendix. These procedures will ensure that consistent and reproducible sampling methods will be used, proper analytical methods will be applied, analytical results will be accurate, precise, and complete, and the overall objectives of the monitoring program will be achieved.

SAMPLE COLLECTION

Sample collection procedures include: equipment cleaning, water-level and total well-depth measurements, and well purging and sampling.

Equipment Cleaning

Pre-cleaned sample bottles, caps, and septa will be provided by a Chevron-approved laboratory. All sampling containers will be used only once and discarded after analyses are completed.

Before starting the sampling event and between each event, all equipment to be placed in the well or come in contact with groundwater will be disassembled and cleaned thoroughly with detergent water, steam cleaned with tap water, and rinsed with Arrowhead™ distilled water. Any parts that may absorb contaminants, such as plastic pump valves or bladders, will be cleaned as described above or replaced. The water-level sounder will be washed with detergent and rinsed with distilled water before use in the each well. The rinse water will be stored in 55-gallon drums onsite and will be disposed of by Chevron.

Quality Control Samples

To determine if the Teflon™ (Teflon) bailer used for sampling is sufficiently decontaminated, rinse samples will be taken. One rinse sample will be collected

at the beginning of each day and additional rinse samples will collected every 20 samples. The samples will be collected by filling the Teflon sampling bailer with distilled water and then decanting that water into the sample vails. The rinse samples will be analyzed for the same parameters as the groundwater.

Water-Level, Floating-Hydrocarbon, and Total Well-Depth Measurements

Before purging and sampling, the depth to water, floating hydrocarbon thickness, and the total well depth will be measured using an electric sounder, a bottom-filling clear Lucite™ bailer, and/or an oil/water interface probe. The electric sounder, manufactured by Slope-Indicator, Inc., is a transistorized instrument that uses a reel-mounted, two conductor, coaxial cable that connects the control panel to the sensor. Cable markings are stamped at 1-foot intervals. An engineer's rule will be used to measure the depths to the nearest 0.01 foot. The water level will be measured by lowering the sensor into the monitoring well. A low current circuit is completed when the sensor contacts the water, which serves as an electrolyte. The current is amplified and fed across an indicator light and audible buzzer, signaling contact with water. A sensitivity control compensates for very saline or conductive water. After the water level is determined, the bailer will be lowered to a point just below the liquid level, retrieved, and inspected for floating hydrocarbons.

If floating product is encountered, its thickness will be measured with an oil/water interface probe. This instrument's dual-sensing probe utilizes an optical liquid sensor and electrical conductivity probe. The instrument emits a solid tone when immersed in oil, and an oscillating tone when immersed in water. If floating product greater than 1/32-inch in thickness is detected, a sample will not be collected from that well.

All liquid measurements will be recorded to the nearest 0.01 foot in the field logbook. The groundwater elevation at each monitoring well will be calculated by subtracting the measured depth to water from the surveyed well-casing elevation. Total well depth will be measured by lowering the sensor to the bottom of the well. Total well depth, used to calculate purge volumes and to determine whether the well screen is partially obstructed by silt, will be recorded to the nearest 0.5 foot in the field logbook.

Well Purging

Before sampling, standing water in the casing will be purged from the monitoring well using a piston pump. Samples will be collected after three well casing volumes have been purged, and the pH, specific conductance, and temperature have stabilized, or 5 well volumes have been evacuated. Some low yield monitoring wells are expected to be evacuated to dryness after the removal of less than three casing volumes. Such low yield monitoring wells will be allowed to recover for a minimum of two hours. If the well has recovered to 80% of its original water level after two hours, a sample will be collected. Otherwise, the well will be allowed to recover up to 24 hours prior to sampling. If insufficient water has recharged after 24 hours, the monitoring well will be recorded as dry for the sampling event.

All field measurements will be recorded in a waterproof field logbook. Water sample field data sheets will be prepared to record the field data. These data sheets will be reviewed by the sampling coordinator when the sampling event is completed.

The pH, specific conductance, and temperature meter will be calibrated each day before beginning field activities. The calibration will be checked once each day to verify meter performance. All field meter calibrations will be recorded in the field logbook.

Groundwater generated from well-purging operations will be contained for temporary storage in 55-gallon drums. All drums will be labeled and stored onsite in a location designated by the station manager. The sampler will record the following information on the drum label for each drum generated:

* Drum content (groundwater)
* Source (well designation)
* Date generated
* Client contact
* Project number
* Name of sampler

The groundwater will be stored onsite for a maximum of 90 days. We will notify the Chevron representative that the water is ready for removal and transport the drums off-site when the water has been removed.

Well Sampling

A Teflon bailer will be used for well sampling. Glass bottles of at least 40 milliliters volume and fitted with Teflon-lined septa will be used in sampling for volatile organics. These bottles will be filled completely to prevent air from remaining in the bottle. A positive meniscus forms when the bottles are completely full. A convex Teflon septum will be placed over the meniscus to eliminate air. After capping, the bottles will be inverted and tapped to verify that they do not contain air bubbles. The sample containers for other parameters will be filled, and capped. Duplicate sample analyses will be performed on five percent of the groundwater samples collected.

SAMPLE HANDLING AND DOCUMENTATION

The following section specifies the procedures and documentation used during sample handling.

Sample Handling

All sample containers will be labeled immediately following sample collection. Samples will be kept cool with cold packs until received by the laboratory. Cold packs will be replaced each day to maintain refrigeration. At the time of sampling, each sample will be logged on a Chain-of-Custody record which accompanies the sample to the Chevron approved laboratory.

Sample Documentation

The following procedures will be used during sampling and analysis to provide Chain-Of-Custody control:

* Field logbooks to document sampling activities in the field
* Labels to identify individual samples

* Chain-of-custody record sheets for documenting possession and transfer of samples

Field Logbook

In the field, the sampler will record the following information on the Water Sample Field Data Sheet for each sample collected:

* Project number
* Client name
* Location
* Name of sampler
* Date and time
* Pertinent well data (e.g., casing diameter, depth to water, total well depth)
* Calculated and actual purge volumes
* Purging equipment used
* Sampling equipment used
* Appearance of each sample (e.g., color, turbidity, sediment)
* Results of field analyses (i.e., temperature, pH, specific conductance)
* General comments

The field logbooks will be signed by the sampler.

Labels

Sample labels will contain the following information:

* Project number
* Sample number (i.e., well designation)
* Sampler's initials
* Date and time of collection
* Type of preservative used (if any)

Sampling and Analysis Chain-of-Custody Record

The Sampling and Analysis Chain-of-Custody record, initiated at the time of sampling, contains, but is not limited to, the well designation, sample type, analytical request, date of sampling, and the name of the sampler. The record sheet will be signed, and dated by the sampler when transferring the samples. The number of custodians in the chain of possession will be kept to a minimum.

Appendix B

GROUNDWATER SAMPLING AND ANALYSIS PROCEDURES

Appendix B

Groundwater Sampling and Analysis Procedures

INTRODUCTION

The sampling and analysis procedures for water-quality monitoring programs are contained in this Appendix. These procedures will ensure that consistent and reproducible sampling methods will be used, proper analytical methods will be applied, analytical results will be accurate, precise, and complete, and the overall objectives of the monitoring program will be achieved.

SAMPLE COLLECTION

Sample collection procedures include: equipment cleaning, water-level and total well-depth measurements, and well purging and sampling.

Equipment Cleaning

Pre-cleaned sample bottles, caps, and septa will be provided by a Chevron-approved laboratory. All sampling containers will be used only once and discarded after analyses are completed.

Before starting the sampling event and between each event, all equipment to be placed in the well or come in contact with groundwater will be disassembled and cleaned thoroughly with detergent water, steam cleaned with tap water, and rinsed with Arrowhead™ distilled water. Any parts that may absorb contaminants, such as plastic pump valves or bladders, will be cleaned as described above or replaced. The water-level sounder will be washed with detergent and rinsed with distilled water before use in the each well. The rinse water will be stored in 55-gallon drums onsite and will be disposed of by Chevron.

Quality Control Samples

To determine if the Teflon™ (Teflon) bailer used for sampling is sufficiently decontaminated, rinse samples will be taken. One rinse sample will be collected

at the beginning of each day and additional rinse samples will collected every 20 samples. The samples will be collected by filling the Teflon sampling bailer with distilled water and then decanting that water into the sample vails. The rinse samples will be analyzed for the same parameters as the groundwater.

Water-Level, Floating-Hydrocarbon, and Total Well-Depth Measurements

Before purging and sampling, the depth to water, floating hydrocarbon thickness, and the total well depth will be measured using an electric sounder, a bottom-filling clear Lucite™ bailer, and/or an oil/water interface probe. The electric sounder, manufactured by Slope-Indicator, Inc., is a transistorized instrument that uses a reel-mounted, two conductor, coaxial cable that connects the control panel to the sensor. Cable markings are stamped at 1-foot intervals. An engineer's rule will be used to measure the depths to the nearest 0.01 foot. The water level will be measured by lowering the sensor into the monitoring well. A low current circuit is completed when the sensor contacts the water, which serves as an electrolyte. The current is amplified and fed across an indicator light and audible buzzer, signaling contact with water. A sensitivity control compensates for very saline or conductive water. After the water level is determined, the bailer will be lowered to a point just below the liquid level, retrieved, and inspected for floating hydrocarbons.

If floating product is encountered, its thickness will be measured with an oil/water interface probe. This instrument's dual-sensing probe utilizes an optical liquid sensor and electrical conductivity probe. The instrument emits a solid tone when immersed in oil, and an oscillating tone when immersed in water. If floating product greater than 1/32-inch in thickness is detected, a sample will not be collected from that well.

All liquid measurements will be recorded to the nearest 0.01 foot in the field logbook. The groundwater elevation at each monitoring well will be calculated by subtracting the measured depth to water from the surveyed well-casing elevation. Total well depth will be measured by lowering the sensor to the bottom of the well. Total well depth, used to calculate purge volumes and to determine whether the well screen is partially obstructed by silt, will be recorded to the nearest 0.5 foot in the field logbook.

Well Purging

Before sampling, standing water in the casing will be purged from the monitoring well using a piston pump. Samples will be collected after three well casing volumes have been purged, and the pH, specific conductance, and temperature have stabilized, or 5 well volumes have been evacuated. Some low yield monitoring wells are expected to be evacuated to dryness after the removal of less than three casing volumes. Such low yield monitoring wells will be allowed to recover for a minimum of two hours. If the well has recovered to 80% of its original water level after two hours, a sample will be collected. Otherwise, the well will be allowed to recover up to 24 hours prior to sampling. If insufficient water has recharged after 24 hours, the monitoring well will be recorded as dry for the sampling event.

All field measurements will be recorded in a waterproof field logbook. Water sample field data sheets will be prepared to record the field data. These data sheets will be reviewed by the sampling coordinator when the sampling event is completed.

The pH, specific conductance, and temperature meter will be calibrated each day before beginning field activities. The calibration will be checked once each day to verify meter performance. All field meter calibrations will be recorded in the field logbook.

Groundwater generated from well-purging operations will be contained for temporary storage in 55-gallon drums. All drums will be labeled and stored onsite in a location designated by the station manager. The sampler will record the following information on the drum label for each drum generated:

* Drum content (groundwater)
* Source (well designation)
* Date generated
* Client contact
* Project number
* Name of sampler

The groundwater will be stored onsite for a maximum of 90 days. We will notify the Chevron representative that the water is ready for removal and transport the drums off-site when the water has been removed.

Well Sampling

A Teflon bailer will be used for well sampling. Glass bottles of at least 40 milliliters volume and fitted with Teflon-lined septa will be used in sampling for volatile organics. These bottles will be filled completely to prevent air from remaining in the bottle. A positive meniscus forms when the bottles are completely full. A convex Teflon septum will be placed over the meniscus to eliminate air. After capping, the bottles will be inverted and tapped to verify that they do not contain air bubbles. The sample containers for other parameters will be filled, and capped. Duplicate sample analyses will be performed on five percent of the groundwater samples collected.

SAMPLE HANDLING AND DOCUMENTATION

The following section specifies the procedures and documentation used during sample handling.

Sample Handling

All sample containers will be labeled immediately following sample collection. Samples will be kept cool with cold packs until received by the laboratory. Cold packs will be replaced each day to maintain refrigeration. At the time of sampling, each sample will be logged on a Chain-of-Custody record which accompanies the sample to the Chevron approved laboratory.

Sample Documentation

The following procedures will be used during sampling and analysis to provide Chain-Of-Custody control:

* Field logbooks to document sampling activities in the field
* Labels to identify individual samples

* Chain-of-custody record sheets for documenting possession and transfer of samples

Field Logbook

In the field, the sampler will record the following information on the Water Sample Field Data Sheet for each sample collected:

* Project number
* Client name
* Location
* Name of sampler
* Date and time
* Pertinent well data (e.g., casing diameter, depth to water, total well depth)
* Calculated and actual purge volumes
* Purging equipment used
* Sampling equipment used
* Appearance of each sample (e.g., color, turbidity, sediment)
* Results of field analyses (i.e., temperature, pH, specific conductance)
* General comments

The field logbooks will be signed by the sampler.

Labels

Sample labels will contain the following information:

* Project number
* Sample number (i.e., well designation)
* Sampler's initials
* Date and time of collection
* Type of preservative used (if any)

Sampling and Analysis Chain-of-Custody Record

The Sampling and Analysis Chain-of-Custody record, initiated at the time of sampling, contains, but is not limited to, the well designation, sample type, analytical request, date of sampling, and the name of the sampler. The record sheet will be signed, and dated by the sampler when transferring the samples. The number of custodians in the chain of possession will be kept to a minimum.