Chevron

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Marketing Department

91 MAR -5 AM 10: 52

February 28, 1991

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

Re: ~~Chevron Service Station #9-~~8139
~~16~~304 Foothill Boulevard
~~San Leandro, California~~ 94578

Dear Mr.Lowell,

Please find attached a document from Chempro detailing our groundwater remediation system. I understand that in a meeting you and Rich Hiett(RWQCB) had with Nancy Vukelich(Chevron) earlier this month, it was said that the RWQCB and the ACHA does not have any correspondence from Chevron regarding the above referenced site since March of 1990. That is an incorrect statement. Copies of all reports and workplans have been sent to a Mr. Larry Seto at the ACHA and to Penny Silzer at the RWQCB. The attached document should already be in the files of the ACHA and RWQCB.

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: File(MAC 9-8139R8)

9-8139

CHEMICAL PROCESSORS, INC.

Northern California Division

KLD MAY 18 '90

CHEMPRO

A Burlington Environmental Inc. Company

May 7, 1990
Project No. 1158

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

WORKPLAN FOR SOIL AND GROUNDWATER INVESTIGATION, AND INTERIM GROUNDWATER REMEDIATION SYSTEM: 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 the second phase of a soil and groundwater investigation, and install an interim groundwater remediation system at Chevron U.S.A., Inc. (Chevron) Service Station No. 9-8139, located at 16304 Foothill Boulevard, San Leandro, California. The purpose of this investigation is to verify the source of contaminants discovered in the phase I soil and groundwater investigation, determine the extent of contamination, and better define the site geology and hydrogeology. The interim groundwater remediation system will be installed as a preliminary measure to stop the migration of groundwater contamination offsite, and initiate groundwater cleanup.

The proposed work includes installing four groundwater monitor wells and one extraction well, conducting a pumping test in the extraction well, installing a groundwater remediation system, and initiating a quarterly groundwater sampling program. 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. <u>Report of Investigation, Soil Vapor Contaminant Assessment, Chevron Service Station 9-8139</u>. San Leandro, California. July 14, 1989

- Chemical Processors, Inc. 1990. <u>Soil and Groundwater Investigation, Chevron Service Station 9-8139</u>. San Leandro, California. January 17, 1990

950 Gilman Street, Suite B
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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 12.00 to 15.54 feet below ground level (BGL) (115.09 to 109.68 feet MSL). The potentiometric surface of the confined aquifer slopes to the southwest with a hydraulic gradient of 0.05 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.

In April 1982, all tanks and lines were tested to confirm the existence of a fuel leak. A corroded section in the regular gasoline vapor line was discovered and a temporary spot repair was performed on the line. Shortly thereafter, the 17-year-old tank and line system was replaced. In addition, two vapor monitor wells were installed in the tank excavation pit.

The two vapor monitor wells installed in the underground storage tank excavation are constructed of 6-inch-diameter schedule 40 polyvinyl chloride (PVC) casing. The observation wells, designated W-1 and W-2 are shown on Figure 2. The internal casing depths of observation wells W-1 and W-2 have depths of 11.2 and 13.5 feet BGL, respectively.

In December 1986, the station reported petroleum inventory losses. A full system tank test was conducted to confirm the existence of a leak. The leak was repaired and retested tight on December 30, 1986 by Gettler-Ryan, Inc.

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. EA noted that high vacuums and long release times were required to obtain vapor samples from most sampling locations. The EA report (1989) stated that the data obtained from the vapor analyses may have been lower than actual hydrocarbon concentrations.

In December 1989, Chempro conducted a soil and groundwater investigation to determine the extent of soil and groundwater contamination. Four soil borings were drilled and completed as 2-inch-diameter monitor 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). The maximum TPH concentration in the groundwater was detected in MW-3 at 24,000 parts per billion (ppb).

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 the site. The scope of work includes the construction of four groundwater monitor wells to determine the source and extent of contamination, and the construction of one extraction well to be used for hydraulic testing and groundwater extraction. The results of the investigation will be presented in a report.

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 Installation

Four monitor wells and one extraction well will be installed to characterize the groundwater contaminant plume and the aquifer parameters. The well locations are shown on Figure 2.

Based on the two reported leaks at the site and the Chempro investigation, the source of contamination is anticipated to be in the vicinity of the tank field and pump islands. To verify the source location, two monitor wells will be installed. One well will be installed hydraulically upgradient of the tank field to verify the upgradient contaminant boundary. The second well will be installed on the northwest side of the western-most pump island to determine if a source of soil or groundwater contamination is present on the northwestern ends of the pump islands. This well may also be used to monitor the groundwater quality on the northwestern edge of the contaminant plume if a source is not detected in the vicinity of the pump islands (see Figure 2).

To monitor the extent of groundwater contamination hydraulically downgradient, two additional monitor wells will be installed. One well will be installed on the southwestern property boundary, and one well will be installed in the median strip of Foothill Boulevard.

An extraction well will be installed hydraulically downgradient from the tank field (see Figure 2). The well will be used for hydraulic testing and groundwater extraction after the interim remediation system has been installed.

The borings in which the monitor wells and extraction well will be installed will be drilled with 8-inch and 12-inch outside-diameter hollow-stem augers, respectively. Soil samples will be collected for soil classification and chemical analysis at 5-foot intervals using a modified-California split-spoon sampler. The soils will be continuously sampled through the suspected aquifer interval for determining the placement of the slotted casing.

The total depth of each boring will be determined by the depth of the saturated lense encountered during drilling. The borings will be drilled to a maximum depth of 45 feet, or 20 feet past the vertical extent of contaminated soil if the confined aquifer is not encountered. If the confined aquifer is encountered, the borings will be drilled through the saturated interval and terminated.

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 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.

The soil samples collected from the borings will be analyzed for TPH (as gasoline) using EPA Method 8015, and BTEX using EPA Method 8020. Soil sample analyses will be performed by a Chevron-approved analytical laboratory.

If groundwater is encountered during drilling, 2-inch-diameter groundwater monitor wells and a 6-inch diameter extraction well will be constructed in the borings, according to the procedures described in Appendix A. The screened interval will extend 5 to 10 feet across the aquifer depending on the thickness of the aquifer. If more than one aquifer zone is encountered, the well design will be modified to prevent cross-communication between separate hydraulic zones. Schedule 40 polyvinyl chloride (PVC), 0.020-inch machine-slotted well screen will be used, and No. 3 rounded sand will be 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. A water-tight locking cap and a traffic-rated vault box will be installed to provide protection and access to the well heads, as described in Appendix A.

The wells will be developed to remove trapped sediments from within the gravel pack prior to sampling or hydraulic testing (see Appendix A).

1.3 Hydraulic Testing

Aquifer characteristics at the site will be determined by performing hydraulic tests in the extraction well. The hydraulic tests will consist of four parts: 1) baseline water-level measurements, 2) step-drawdown test, 3) constant-discharge test, and 4) water-level recovery. The tests will be conducted using the extraction well as the pumping well and two or three monitor wells as observation wells.

Baseline water-level measurements will be collected to record any diurnal trends which may affect the water levels during the pumping tests. A step-drawdown test will be conducted to determine the appropriate sustainable pumping rate to be used in the performance of the constant-discharge test. The constant-discharge test will be conducted at a discharge rate determined from the step-drawdown test which will stress the aquifer without dewatering the well. At the end of the constant-discharge test, water-level recovery data will be collected from the pumping well and the observation wells.

A six- to eight-hour constant-discharge test is anticipated for this site. A detailed description of the hydraulic testing procedures are presented in Appendix B.

1.4 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: PROPOSED INTERIM REMEDIAL ACTION

Based on the soil and groundwater contamination data summarized in the phase I site investigation (Chempro, 1990), Chempro recommends that a groundwater extraction and treatment system be installed at the site to capture the contaminated groundwater plume before it can migrate off-site. In addition, we recommend that a soil vapor extraction pilot test be performed at the site to determine if there is significant soil contamination in the vadose zone soils that can be extracted with a soil vapor extraction system.

2.1 Soil Vapor Extraction Pilot Test

A soil vapor extraction pilot test will be conducted to determine if soil remediation is required at this site. If the pilot test results indicate that soil remediation is necessary, then one or all of the proposed groundwater extraction wells can be used later for *in-situ* soil vapor extraction. Soil vapor extraction is accomplished by exerting a vacuum on one or more extraction wells and pulling air through the contaminated soils. The volatile compounds (gasoline) will evaporate into the passing air and the extracted soil vapors will pass into the extraction well(s) and out through the vapor extraction piping to the vacuum blower. The extracted soil vapors will then be discharged to an appropriate vapor treatment unit. Permits for the pilot test will be obtained as necessary.

Chempro will perform the pilot test with our mobile pilot test unit. This unit consists of a 15-horsepower, positive displacement vacuum blower capable of moving 500 ft^3/minute of air at a vacuum of 15-inches of mercury, a header assembly to connect the unit to the extraction well, and a trailer-mounted generator. The extracted soil vapors generated during the pilot test are discharged through two 55-gallon vapor phase carbon units to ensure that hydrocarbons are not discharged to the atmosphere during the pilot test.

During the pilot test two samples of the extracted soil vapors will be obtained and analyzed for total volatile hydrocarbons. Evaluation of the analytical results will determine whether a soil venting system is necessary at this site.

While the vacuum is applied to the extraction well, a manometer is used to measure the observed vacuum at the adjacent monitor wells. This is done at several different levels of applied vacuum. These data will help establish the soil venting radius of influence for extraction well E-1, and will determine the size of vacuum blower that will be required if soil venting is required at this site.

2.2 Groundwater Remediation

The proposed groundwater extraction and treatment system is designed to capture the groundwater contamination from beneath the site. The extracted groundwater will be passed through a treatment system that is designed to remove at least 99% of the hydrocarbon contaminants from the extracted groundwater. The treated water will then be discharged to a 550-gallon water storage tank with an overflow line to the sewer or storm drain system. This will allow for a portion of the treated water to be re-used at the site for irrigation and cleaning purposes. The treatment system location is shown on Figure 3. A schematic diagram of the proposed groundwater treatment system is included as Figure 4.

2.2.1 Groundwater Extraction System Design and Installation

The groundwater extraction system design will be based on the results of a pumping test to be performed by Chempro on well E-1. The pumping test results (hydraulic conductivity and capture zone) will be used to properly locate and space additional extraction wells if they prove to be necessary.

Groundwater extraction will be accomplished by installing electric, submersible well pumps in the extraction wells, and pumping contaminated groundwater from the aquifer to the treatment system. The efficiency of the groundwater extraction system will be monitored by measuring the groundwater elevations in the surrounding monitor wells immediately before start up, and monthly after start up. The groundwater elevations will be used to construct groundwater elevation contour maps which can be used to document the progress of the groundwater remediation project.

The extracted groundwater will be pumped to the treatment system via underground piping which will be contained in an underground utility trench. The utility trench will also contain electrical conduit, and a soil vapor extraction line which may be needed at a later date.

2.2.2 Groundwater Treatment System Design and Installation

The most feasible groundwater treatment system options considered for use at this site are, (1) air stripping, and (2) aqueous phase carbon adsorption. An economic comparison was performed for these two options based on (i) the contamination levels present at the site, (ii) a 10 gpm groundwater extraction rate, and (iii) a five-year project duration. Based on the results of this comparison, Chempro recommends the use of an air stripper unit at this site.

The proposed groundwater treatment system will consist of a Chempro SB-10 Air Stripper unit followed by two aqueous phase carbon adsorption units connected in series. Because of the strict air emission standards in the Bay Area, the exit air from the air stripper unit will be passed through two vapor phase carbon adsorption units connected in series prior to discharge to the atmosphere (see Figure 4). The entire groundwater treatment system is designed to remove at least 99% of the dissolved volatile organic compounds (gasoline) from the extracted groundwater.

The Chempro SB-10 Air Stripper is a modular unit which provides minimal visual impact. The totally enclosed unit consists of four 1-foot-diameter by 8-foot-high stripper columns connected in series, each containing approximately 4 ft^3 of random polyethylene packing material. The packing was selected to provide a maximum amount of surface area for efficient air/water contact. As the air contacts the water, the volatile hydrocarbons (gasoline) volatilize into the air stream. The removal efficiency is typically 99%. The unit is equipped with safety shutoff switches and an automatic telemetry unit that notifies Chempro if a process upset has occurred.

The water exiting the air stripper will be passed through the aqueous phase carbon adsorption units as a polishing step prior to discharge to the sewer or storm drain. The aqueous phase carbon units serves more as a backup than as a necessary treatment step and are installed to assure the regulatory agencies involved that treated water sent to the storm drain or sewer is of acceptable quality. For this treatment system we are proposing to use two Westates ASC-200 units connected in series. Each carbon unit contains 6.5 ft^3 of activated aqueous phase carbon (bituminous coal based) contained in a re-usable steel vessel. These units can handle flow rates up to 10 gpm. The treated water flow rate through the carbon units will be approximately 10 gpm. Sample taps will be installed before, between, and after the two carbon units.

The air exiting the air stripper will be passed through the vapor phase carbon adsorption units to remove at least 95% of the desorped hydrocarbons from the stripper air prior to being discharged to the atmosphere. This step is usually necessary in California because of the strict air emission limits. For this system we are proposing to install two Westates VSC-2000 units connected in series. Each of these units contains 65 ft^3 of virgin activated vapor phase carbon (coconut shell based) contained in a re-usable, skid mounted, steel vessel. These units are designed for flow rates up to 500 ft^3/minute. The air stripper exit air flow rate will be approximately 110 ft^3/minute. Sample taps will be located before, between, and after the two carbon units.

The treated water will flow into the 550-gallon water storage tank. This tank will be connected to a $^1/_2$-horsepower discharge pump that will provide water for on-site irrigation, radiator fill water and other non-potable uses. The treated water will be used by the station at the station manager's discretion. The treated water that is not used on site will flow into the overflow pipe and into the storm drain.

A mechanical-type totalizing flow meter will be installed downstream from the treatment unit to document the total amount of water treated. Another mechanical-type totalizing flow meter will be placed downstream from the treated water storage tank to document the total amount of water discharged to the sewer or storm drain. This meter will be placed so that it can be read from outside the treatment system compound. This will allow the regulators to determine how much treated water has been discharged to date without entering the treatment system compound.

The treatment system will be placed on a 20-foot by 10-foot concrete pad that will be enclosed by an 8-foot-high chain link fence with slats and a locking gate. This will make the treatment equipment inconspicuous and will prevent unauthorized entry to the treatment system compound.

All piping and conduit will be set below grade, except in the treatment system compound. All trenching will use 100% import fill sand and Class 2 base rock. Excavated soils from trenching will be sampled and analyzed to determine if they are contaminated. The soils will be disposed of at a Chevron pre-approved Class I, II, or III landfill depending on the levels of contamination in the soils. All work will be performed in accordance with state and local building code regulations.

2.3 Permitting

The preferred discharge route for treated water is to the sanitary sewer system. This site is in the Oro Loma Sanitary District. The Oro Loma Sewage Treatment Facility will consider accepting treated water from this site, but they must process the application before they will decide. If rejected by the Oro Loma Sanitary District, the treated water will be discharged to the storm drain system under the authority of the Regional Water Quality Control Board (RWQCB). For this option, a National Pollutant Discharge Elimination System (NPDES) permit application must be submitted to the RWQCB. Since the water discharged to the storm drain system will eventually drain into the San Francisco Bay it must meet San Francisco Bay water quality standards.

To operate the air stripper unit, an air discharge permit will need to be obtained from the Bay Area Air Quality Management District (BAAQMD). An air dispersion modeling program will be run for this treatment system before the air discharge permit application is sent to BAAQMD to make sure that the vapor phase carbon units will be required.

Chempro will obtain all permits required to install and operate the groundwater treatment system including:

- Building, electrical, and plumbing permits from the City of San Leandro
- An Oro Loma Sewer Discharge Permit or an NPDES discharge permit from the RWQCB
- An Authority to Construct/Permit to Operate from BAAQMD
- A transportable treatment unit (TTU) permit by rule notification from the California Department of Health Services (DHS)

All permit applications will be completed by Chempro in the name of Chevron USA, Inc., and presented to Chevron for review and signature.

2.4 Remediation System Operation

The groundwater extraction and treatment system will require little maintenance except for influent and effluent water sampling, exit air sampling, and periodic carbon replacement. The proposed sampling frequency is weekly for the first month of operation and then once per month for the project duration.

During a regular sampling event, water samples will be obtained from the sample ports located before and after the air stripper unit, and between the two aqueous phase carbon units. These water samples will be analyzed for TPH as gasoline and BTEX by EPA methods 8015 (modified) and 8020, respectively. The exit air from the air stripper will be analyzed with a portable flame ionization detector (FID) after the air stripper, between the two vapor phase carbon units, and at the final discharge point. The first vapor phase carbon unit will be changed out when 10 parts per million by volume volatile hydrocarbons are detected by an FID for the air flowing between the two carbon units (this procedure is taken from previous operating permits and may be different at this site). Regular sampling will be used to (1) evaluate the treatment system performance, (2) predict and verify carbon breakthrough, (3) provide evidence of site clean-up, and (4) provide data on effluent quality as required by the operating permits. The sample port located at the extraction well will be used to provide samples for quarterly groundwater monitoring.

The estimated aqueous phase carbon usage rate for the first year of operation is negligible. The estimated vapor phase carbon usage rate for the first year of operation is 16 pounds per day. When breakthrough occurs in the first vapor phase carbon unit, the carbon in that unit will be replaced. According to the available site data, the first carbon unit may need to be replaced approximately every 125 days. Spent carbon will be transported to a carbon regeneration facility by a licensed hazardous waste hauler.

The proposed extraction and treatment system will include automatic controls to shut the entire system down in case of a process upset. A remote telephone dialer calls Chempro operations at Berkeley if the system shuts down. A totalizing flow meter located the treatment system discharge will document the total quantity of water extracted from each well and the total quantity of water treated and discharged to the storm drain.

QUARTERLY MONITORING

A quarterly groundwater monitoring program is proposed for the site. The program will consist of collecting groundwater samples every three months in each of the monitor wells. A complete description of the sampling procedures are presented in Appendix C.

The groundwater samples will be analyzed for TPH (as gasoline) by EPA method 8015, and BTEX using EPA Method 8020/602. During the first sampling event conducted by Chempro in December 1989, each well was analyzed for ethylene dibromide. In addition, wells MW-1 and MW-2 were analyzed for total oil and grease, and the selected total metals; lead, chromium, cadmium, and zinc. Only TPH (as gasoline), BTEX, and low levels of Cd and Zn were detected. It is therefore recommended that groundwater samples collected from these wells only be analyzed for TPH and BTEX. All new wells will need to be evaluated for the appropriate chemical analysis after the initial analytical results have been received.

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 a Chevron certified 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.

SCHEDULE

The duration of this project is estimated as follows:

Acceptance of Workplan:	Week 0
Install Groundwater Monitor and Extraction Wells:	Week 2
Perform Aquifer Testing and Soil Vapor Extraction Pilot Test/Analyze Results:	Week 4
Install Additional Extraction Wells if Needed:	Week 6
Order Equipment, Prepare Construction Plans, Prepare Permit Applications:	Week 4
Submit Air/Water Discharge, Building, Electrical, and Plumbing Permits:	Week 4
Begin Site Construction:	Week 7
Complete Site Construction:	Week 9
Submit Investigation Report to Chevron:	Week 12
Receive Air/Water Discharge Permits:	Week 12
Submit TTU Notification:	Week 13
Begin System Operation:	Week 18

This schedule assumes that all required permits can be obtained in a timely manner. Any delays imposed by the regulatory agencies will affect the start-up date. The permit application process will be initiated promptly upon acceptance of this workplan by Chevron. Al other work required for this project will be completed in accordance with the above schedule.

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

Very truly yours,
CHEMICAL PROCESSORS, INC.

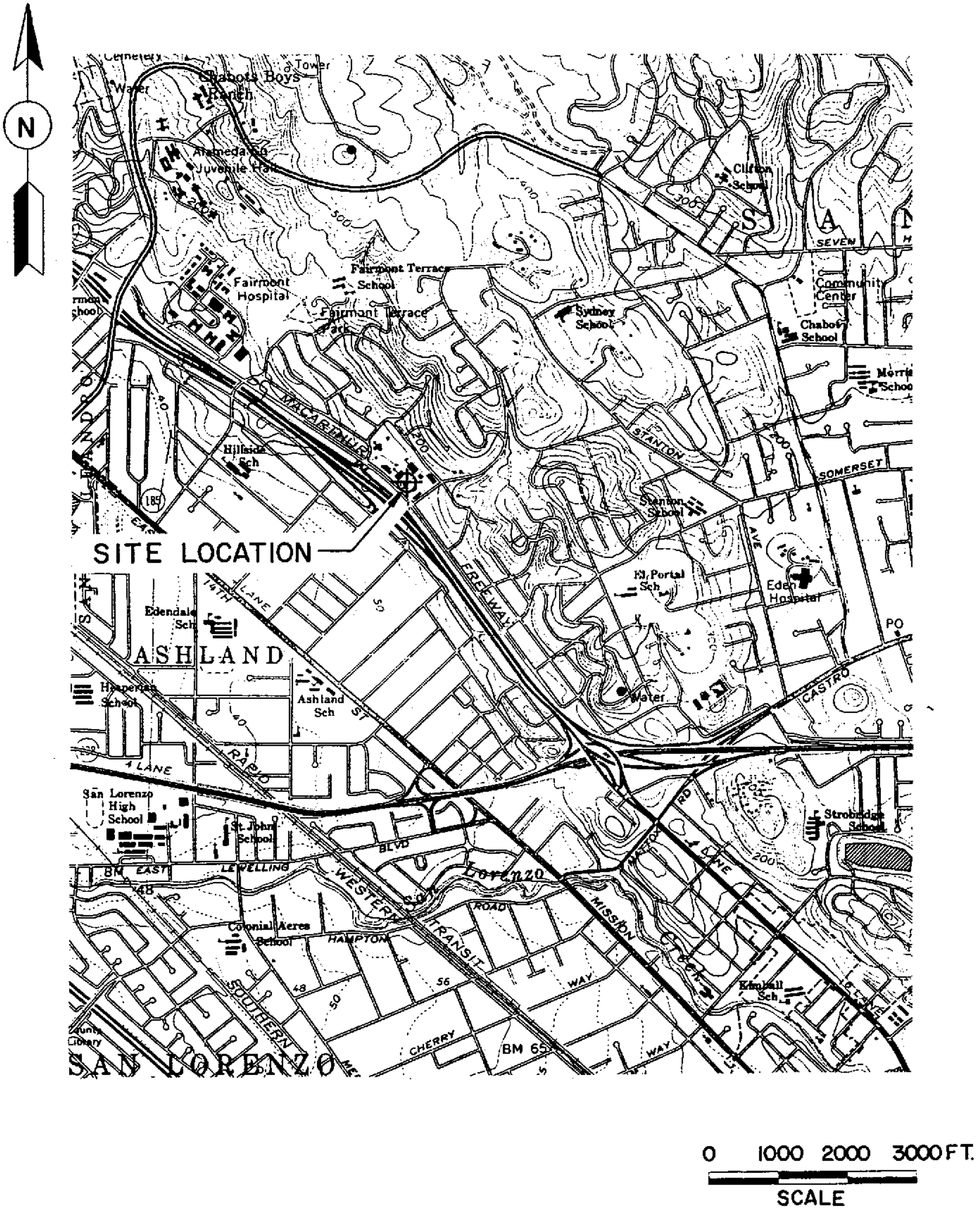
Craig C. Schwyn
Project Hydrogeologist

Justin L. Hawkins
Staff Engineer

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

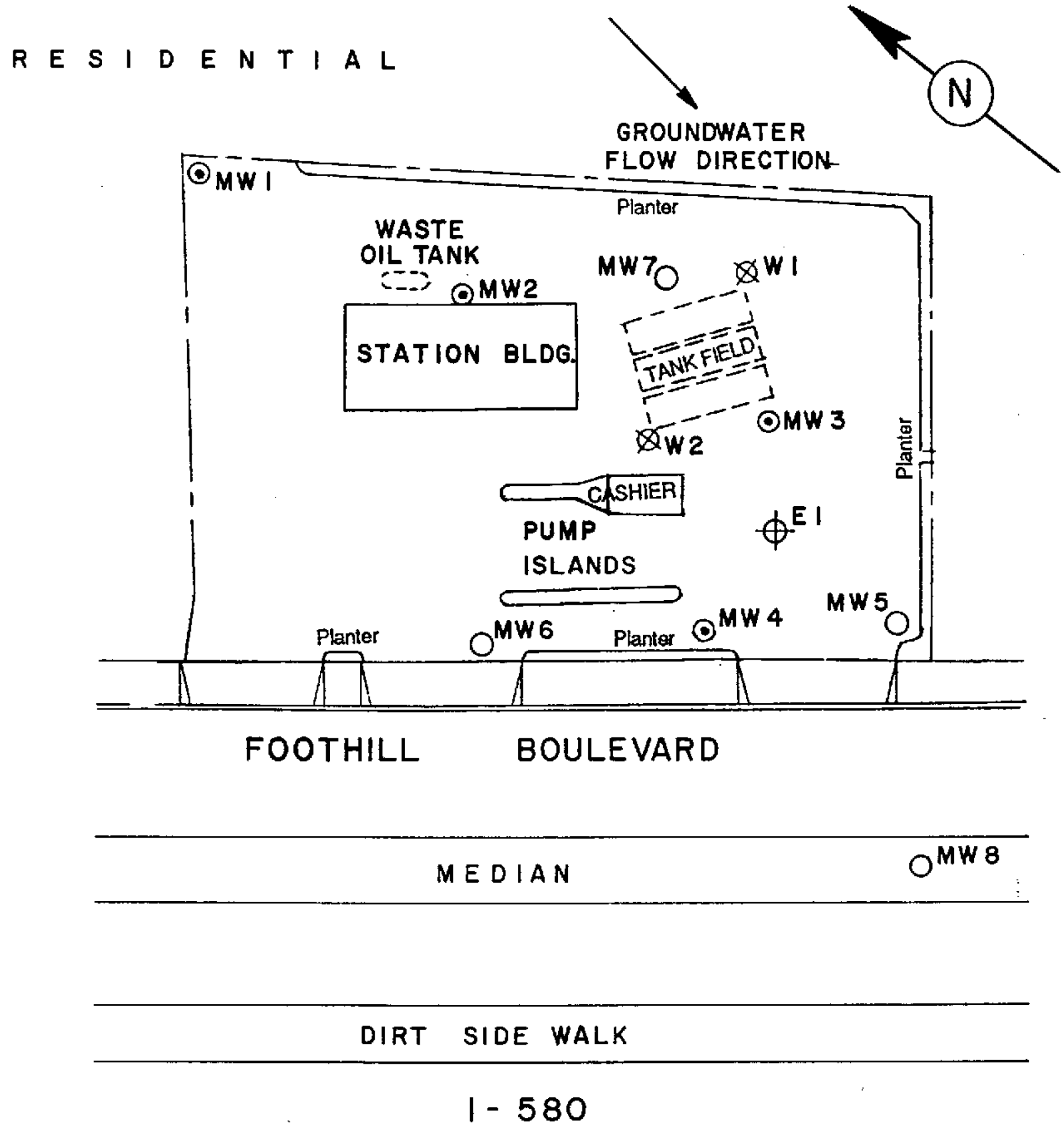
Enclosures

Figure 1 - Site Location
Figure 2 - Site Plan
Figure 3 - Proposed Site Work
Figure 4 - Treatment System Schematic
Appendix A - Exploratory Boring, Soil Sampling, And Well Installation Procedures
Appendix B - Aquifer Testing
Appendix C - Groundwater Sampling And Analysis Procedures



NOTE: (MAP ADAPTED FROM USGS HAYWARD 7.5' QUADRANGLE

CHEMICAL PROCESSORS, INC. 950-B GILMAN STREET BERKELEY, CALIFORNIA	SITE LOCATION MAP CHEVRON SS 9-8139 16304 FOOTHILL BOULEVARD SAN LEANDRO, CALIFORNIA	FIGURE 1 1158

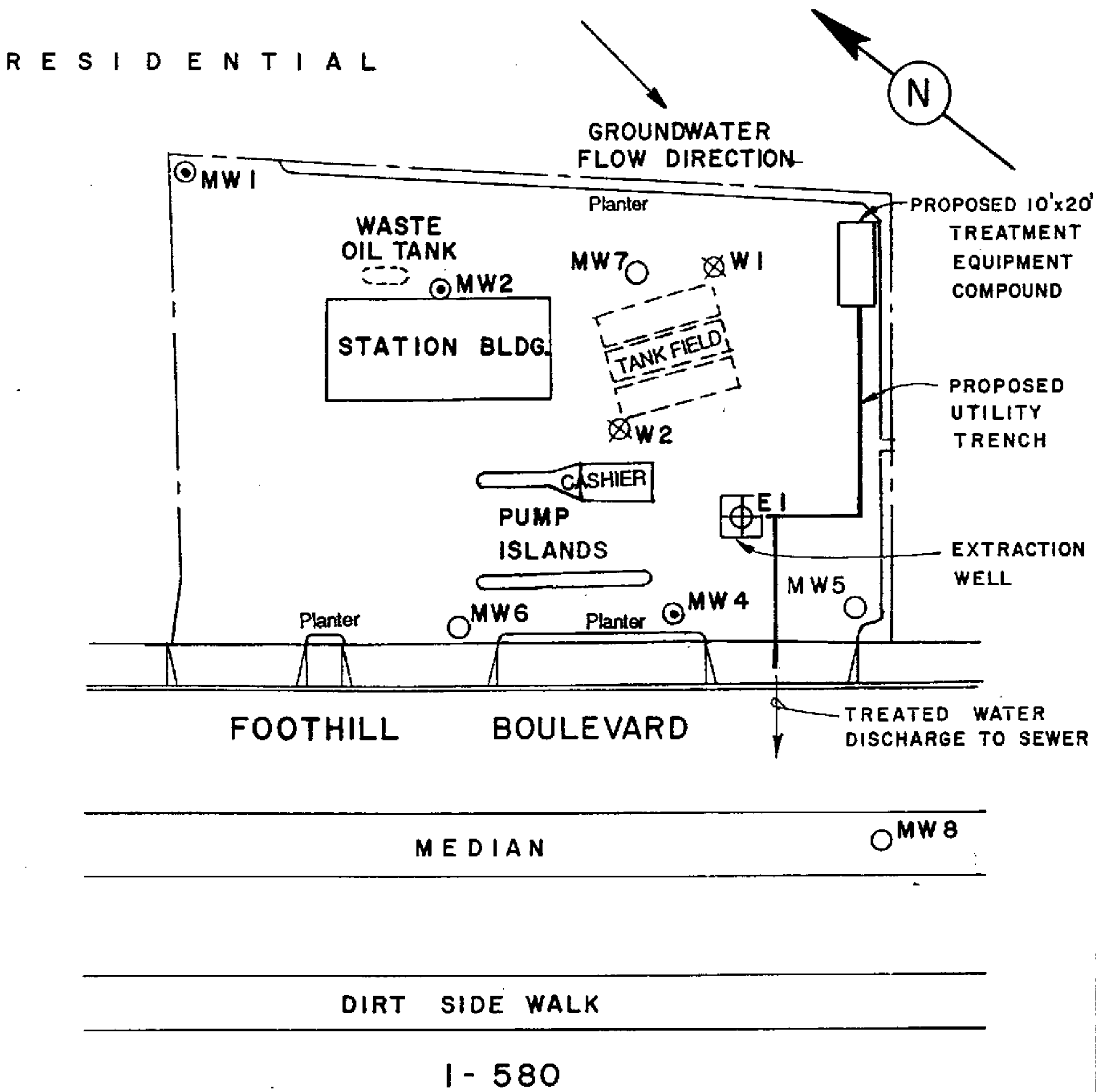


LEGEND

- ○ PROPOSED GROUNDWATER MONITOR WELLS
- ⊙ EXISTING GROUNDWATER MONITOR WELLS
- ⊠ OBSERVATION WELLS
- ⊕ PROPOSED EXTRACTION WELL

0 20 40 60 FT.
SCALE

CHEMICAL PROCESSORS, INC. 950-B GILMAN STREET BERKELEY, CALIFORNIA	SITE PLAN CHEVRON SS 9-8139 16304 FOOTHILL BOULEVARD SAN LEANDRO, CALIFORNIA	FIGURE 2 1158



LEGEND

○ PROPOSED GOUNDWATER MONITOR WELLS

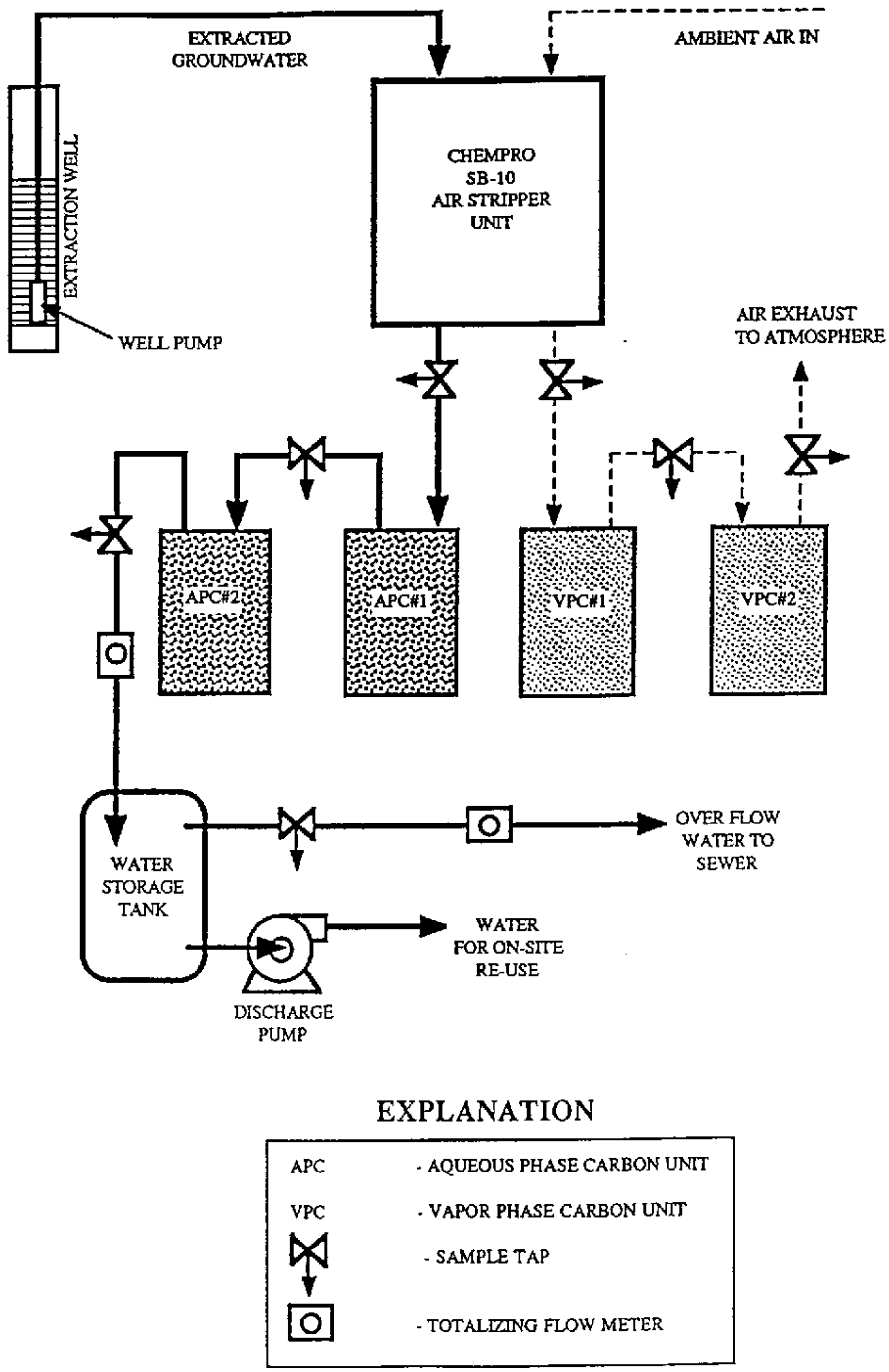
⊙ EXISTING GROUNDWATER MONITOR WELLS

⊠ OBSERVATION WELLS

⌖ PROPOSED EXTRACTION WELL

0 20 40 60 FT.
SCALE

CHEMICAL PROCESSORS, INC. 950-B GILMAN STREET BERKELEY, CALIFORNIA	PROPOSED SITE WORK CHEVRON SS 9-8139 16304 FOOTHILL BOULEVARD SAN LEANDRO, CALIFORNIA	FIGURE 3 1158



CHEMICAL PROCESSORS, INC.

Job:#1158 Dwg by: JLH Date 4-7-90

TREATMENT SYSTEM SCHEMATIC
CHEVRON SS NO. 9-8139
16304 FOOTHILL BOULEVARD
SAN LEANDRO, CALIFORNIA

FIGURE 4

Appendix A

EXPLORATORY BORING, SOIL SAMPLING, AND WELL INSTALLATION PROCEDURES

Appendix A

Exploratory Boring, Soil Sampling, 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 by B & F Drilling Inc., of Rancho Cordova, California, with a Mobile B-61 drill rig. Exploratory borings will be drilled with 8-inch outer-diameter (OD) hollow-stem (4-inch ID) augers. The boring for the extraction well will be drilled with 12-inch outside-diameter augers. The augers will be steam cleaned before each boring is drilled.

SOIL SAMPLING

Soil samples will be collected while drilling to evaluate the geochemistry and stratigraphy of the soil beneath the site. 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 145-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 collected continuously across the suspected aquifer interval for better lithologic definition.

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.

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 INSTALLATION

Four borings will be converted to monitor wells by installing 2-inch-diameter, flush-threaded, PVC casing inside the boring. One well boring will be converted to an extraction well by installing 6-inch diameter, flush-threaded, PVC casing inside the boring. No solvent cements will be used on the casing. The screened casing will be machine-slotted with 0.020-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. 3 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 well. 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

Monitor 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

AQUIFER TESTING

Appendix B

Aquifer Testing

INTRODUCTION

The general procedures for hydraulic testing of aquifers and water-bearing zones are contained in this appendix. The procedures provide for consistent and reproducible testing methods. They are designed to produce data necessary to define the hydraulic characteristics of the aquifer and a consistent analytical approach to quantification of aquifer characteristics.

PUMPING TESTS

In general pumping tests consist of four parts: (1) baseline water-level measurements, (2) step-drawdown test, (3) constant-discharge test, and (4) water-level recovery. The best results are obtained from a test in which the observation wells are located in the same water-bearing zone as the one being pumped. The pumping well should be of sufficient diameter to accommodate a constant-discharge pump and monitoring equipment. The monitoring equipment will consist of electric transducers and will be monitored by an In Situ Hermit^{R} datalogger. To run the pump, a generator or permanent power source of at least 210 volts is required. All equipment will be steam cleaned before and after testing. Discharge water that is pumped from the well will be contained in a 6,500-gallon Baker Tank™ and disposed of by a Chevron contractor.

Baseline Water Level Survey

Before testing, baseline water levels in the pumping and observation wells will be obtained. It is ideal to set up transducers in each well and obtain readings during a 24-hour period before testing. The baseline survey will record diurnal and other water-level trends which will be used to compare with water level changes obtained during testing.

Step Drawdown Testing

A step-drawdown test will be conducted to determine the well's efficiency and an appropriate sustainable pumping rate for the constant discharge test. During a step-drawdown test, water from the well will be pumped at increasing discharge rates over several time periods. The water level in the pumping well will be monitored and recorded in the field with a pressure transducer/datalogger system and an electric sounder. The depth to water data will be plotted versus time to determine the optimum pumping rate for a constant discharge pumping test. Each step will be conducted until the drawdown within the well stabilizes.

Constant Discharge Test

During a constant discharge test, ground water will be pumped from the test well at a constant rate determined from the step-discharge test. The pumping rate will be dependent on the hydraulic properties of the test zone and length of time the well will be pumped. The optimum test stresses the water-bearing zone without dewatering the well during testing. In most cases it will be important to pump the well long enough to overcome borehole storage effects, and to observe drawdown in an adjacent observation well. Tests are generally run for 4 to 24 hours of pumping. After pumping has ceased, recovery will be monitored while the water level in the well returns to a static level or until the water level has returned to 90 percent of static. Drawdown and recovery will be monitored during the test with a pressure transducer and electric well sounder.

There are many different methods (e.g., Jacob, 1963; Theis, 1935; Boulton, 1963) used to analyze pumping test results. The method used will be dependent on the type of aquifer being tested (confined, unconfined, or leaky). Depth-to-water information will be plotted for all wells monitored during testing versus time. Drawdown and recovery data will be used for the analysis. In general, several methods are used to get the best analysis of each test. Depending on the test design and results, it will be possible to calculate hydraulic parameters including transmissivity, storativity, hydraulic conductivity, and radius of influence.

Appendix C

GROUNDWATER SAMPLING AND ANALYSIS PROCEDURES

Appendix C

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 monitor 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 monitor 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 monitor 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 monitor wells are expected to be evacuated to dryness after the removal of less than three casing volumes. Such low yield monitor 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 monitor 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.