August 22, 1989

Ariu Levi
Alameda County
Environmental Health
470 27th Street, Room 324
Oakland, California 94612

Re: Chevron Station #9-1026
3201 Macarthur Blvd. and Broadway
Oakland, California

Dear Mr. Levi:

Per our telephone conversation enclosed are the remediation alternatives currently being examined by Chevron for the above referenced site. Chevron plans to install a Chempro Environmental Air Stripper unit to treat groundwater. The soils found to be contaminated will be excavated and removed from the site. Chevron is currently working with the property owner to determine the remediation option that will not interfere with his operation at the site.

I declare under penalty of perjury that the information contained in the attached report is true and correct, and that any recommended actions are appropriate under the circumstances, to the best of my knowledge. If you have any questions or require additional information, please contact Lisa Marinaro at (415) 842-9527.

Sincerely,
D. Moller

By_____
Lisa Marinaro, Engineer

CHEMPRO ENVIRONMENTAL SERVICES

Formerly Crowley Environmental Services, Inc.

A Burlington Environmental Inc. Company

AUG 3 '89 H.C.H.

Chevron USA
2410 Camino Ramon
San Ramon, California 94583

July 31, 1989
Job # 887051

Attention: Lisa Marinaro

Dear Ms. Marinaro:

GROUNDWATER REMEDIATION WORKPLAN
FORMER CHEVRON SERVICE STATION #9-1024, 3201 BROADWAY AND MACARTHUR BLVD, OAKLAND, CALIFORNIA

Chempro Environmental Services (CES) is pleased to submit this workplan for soil and groundwater remediation at the above captioned site. This proposal describes removal of soil in the two areas with high concentrations of Total Petroleum Hydrocarbons (TPH). The excavated sites will be backfilled with fill rock. The contaminated groundwater plume will be captured by extraction wells which will transfer groundwater to a water treatment system. The treated water will be disposed to either the local sanitary system or the surface water drainage system. After an aquifer test is performed, it will be determined how many wells and their locations are necessary to contain the contaminated plume. However, for cost estimate purposes four extraction wells will be assumed to be required.

1.0 SITE HISTORY

The project site is located in Oakland, California at the corner of MacArthur Boulevard and Broadway. A Chevron service station which previously occupied the site has been demolished and removed. The station's underground storage tanks were removed in April 1988. The site is currently being used as a parking lot by the Val Strough car dealership whose showroom is located on Broadway, adjacent to the site.

A June 1988 document prepared by EA Engineering, Science, and Technology, Inc. reported petroleum hydrocarbons in the soil underlying the site. TPH in the soil samples have been reported at concentrations of up to 270 mg/kg. There are eleven (11) monitoring wells located at the site. The TPH in the groundwater has been reported at concentrations of up to 180 mg/L. The TPH in the groundwater has been reported above 50 mg/L in all sample wells except the off-site wells EA1, EA2, E, and F, refer to Figure 1.

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Soils underlying the site consist of clayey silt and silty clay to a depth of 20 feet. A silty sand layer is located at about 20 feet in wells A, C, and EA2. The Depth-to-water level varies from 13.3 feet at well B-6 to 17.57 feet at well B-4.

2.0 REMEDIATION ALTERNATIVES

2.1 Soil Treatment

2.1.1 No Action

In the no action alternative, all soils would be left in place and treatment would be based on natural biodegradation and removal of any contaminants that reach the upper aquifer by the groundwater treatment system. With the no action alternative the groundwater treatment system would have to remain in operation for a longer period of time and thus increase total operating cost.

2.1.2 Landfilling

In this alternative the the soils with high concentrations of TPH would be removed and transferred to an appropriate landfill for disposal. The December 1988 Groundwater Technology, Inc. report outlined the soils that have TPH greater than 100 mg/kg. These areas are depicted in Figure 1 and are generally limited to the areas where the gas pump islands were located. The approximate surface area of Location 1 is 135 square yards and Location 2 is 90 square yards. Each location will be excavated to a depth approximately equal to the depth of the groundwater, resulting in a total volume of approximately 1200 cubic yards. To reduce disposal cost, a volume of 600 or 300 cubic yards of soil could be removed and landfilled rather than 1200 cubic yards. The benefits to this would be a substantially lower excavation and disposal cost; however, the drawback would be that the groundwater treatment system would have to be left in operation longer if less contaminated soil is removed.

2.1.3 On-site Aeration

Of the soils removed (1200, 600, or 300 cubic yards) the total volume could be stockpiled and covered on-site for future on-site aeration. According to the Bay Area Air Quality Management District (BAAQMD) Regulation 8, Rule 40, a maximum of 120 cubic yards of soil can be added for aeration per day. Because of the site limitations, 10, 5, and 2.5 soil aeration cycles would be required to aerate 1200, 600, and 300 cubic yards of soil, respectively. An aeration cycle will consist of: 1) remove the soil from the stockpile and spread it on the surface 2) wait for 24 hours 3) turn soil 4) wait for 24 hours 5) sample and test soil to confirm hydrocarbon removal 6) replace soil back in excavation hole. One aeration cycle requires approximately one week and therefore the entire aeration would require approximately 10, 5, and 2.5 weeks, respectively. A temporary fence would be placed around the site during excavation and soil treatment. The areas where the soil was not removed for aeration would depend on natural biodegradation for treatment. If the contamination left in place were to reach the upper aquifer, it would be extracted with the groundwater being removed for treatment; refer to section 2.2. On-site aeration has been ruled out because of the long site tie-up period.

2.1.4 Vapor Extraction

Vapor extraction involves pulling a vacuum on vadose zone soils. The suction causes air to be pulled down through the soil and into vapor extraction wells. As the air flows through the soil, any gasoline which the air contacts will be stripped from the soil into the air stream. The air stream will then exit the well for air treatment. A catalytic oxidation unit will be used for air treatment. The areas of TPH greater than 100 mg/kg will be treated in this manner. In the areas where vapor extraction is not used, treatment will depend on natural biodegradation of the contaminants; any contamination which does reach the upper aquifer will be extracted by the water treatment system. However, since the soils are silty clay and clayey silt, the radius of influence associated with the wells would be relatively small; thus several wells would be required for gasoline extraction of the recommended locations. If this alternative is selected it is recommended that a pilot test be performed at this site to insure that the soils are suitable for vapor extraction. The difficulties of obtaining a permit to operate a catalytic oxidation unit may substantially delay the project. The cost for vapor extraction would be higher than the other alternatives. The high cost, the permitting difficulties, along with the relatively small volume of soil requiring treatment and the necessity for pilot studies make vapor extraction unattractive.

2.2 Groundwater Treatment

An aquifer test will be used to determine the number of extraction wells and their locations necessary to contain the contaminated plume. The location of the well to be installed for the aquifer test is shown in Figure 1. This location was selected because there are three monitoring wells located in the vicinity and it is on the downgradient perphery of the contaminated groundwater plume identified by the June 1988 document prepared by EA Engineering, Science, and Technology, Inc. Once the water is being pumped from the initial extraction well, the effect of the water table can be seen from the three monitoring wells. This information can be used to determine the radius of influence of the extraction well and thus aid in determining the number and location of subsequent wells required to contain the plume. For cost estimate purposes four recovery wells will be assumed to be required. The proposed locations of the wells are depicted in Figure 1.

The groundwater treatment system will be designed to remove petroleum hydrocarbons from the extracted groundwater to a concentration less than 50 µg/L TPH, the detection limit for EPA analysis method 8015. The system will be designed to allow discharge of the treated groundwater to either the sanitary sewer or the storm water drainage system, which typically discharges to surface waterways. Selection of the discharge route will be based on the ease of obtaining a permit to discharge the treated water. Generally permission to discharge to the sanitary sewer can be obtained far more rapidly than the NPDES permit required for discharge to the storm drain system. Permitting is discussed further in Section 3.0.

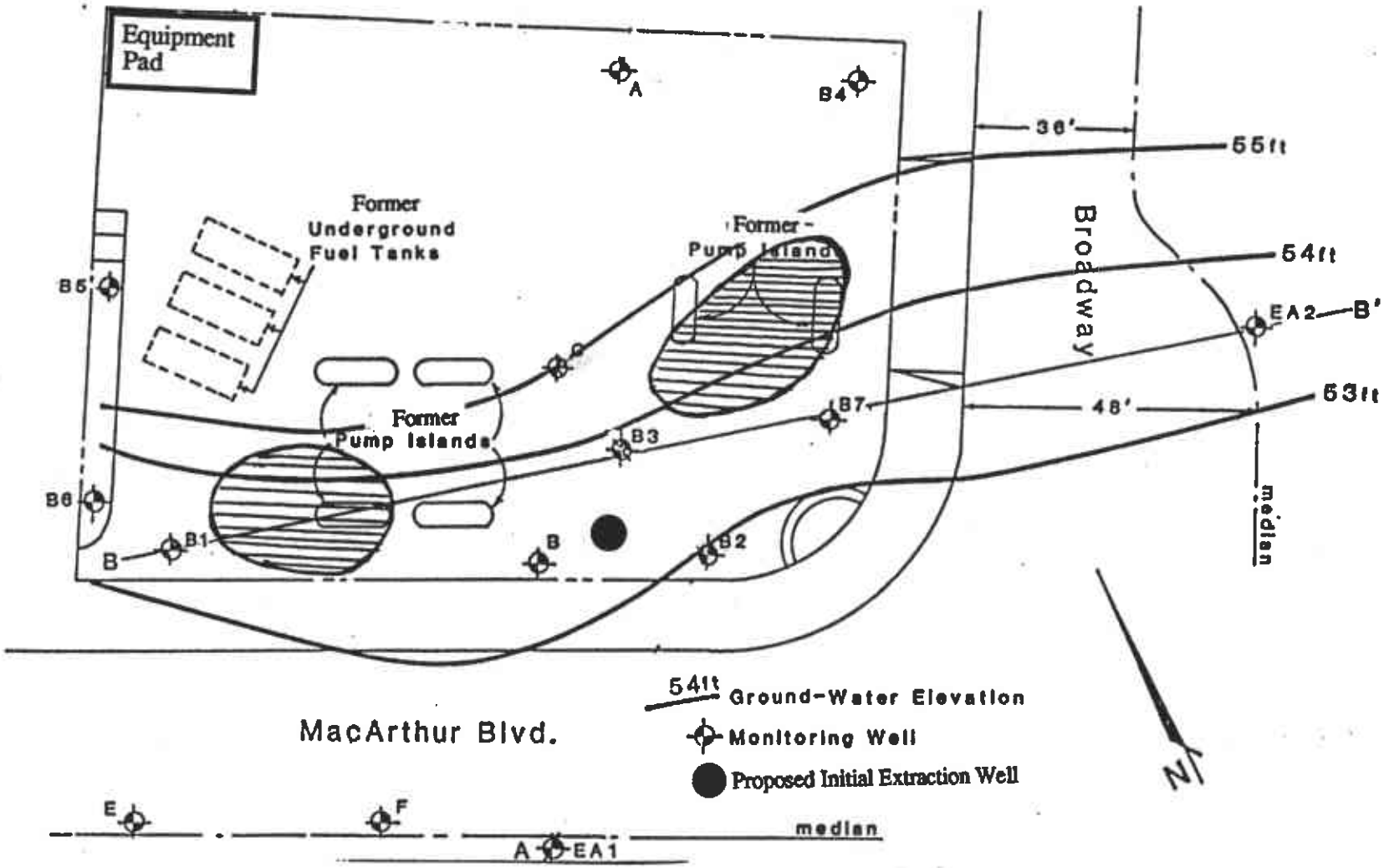
The groundwater treatment system will be an air stripper module followed by activated carbon polishing. The air stripper will remove volatile hydrocarbons from the extracted groundwater by contacting the water with air. The volatile constituents will evaporate from the water into the air and then be discharged into the atmosphere. This air stream will be discharged at approximately 25 feet above ground level with a velocity sufficient to provide good dispersion, so no odors will be detectable at ground level. Both the air stripper and the initial carbon module will include process control systems which will shut down the entire extraction and treatment system if any critical component fails. Totalizing flowmeters on the extraction wells will document the total quantity of water treated and discharged. An effluent monitoring program will be instituted to assure that the treatment system performs properly.

Periodically, the carbon media will become saturated with hydrocarbons and subsequently will be replaced. Discarded carbon will be disposed of by interment in a Class 1 landfill. The carbon treatment system will be designed with two stages of carbon contactors in series, each of which will be adequate to treat the entire water stream. This redundant design will assure that no water can be discharged untreated, even if the first stage of carbon treatment is exhausted between routine effluent sampling events.

The groundwater treatment system will be set on a concrete pad enclosed by an eight-foot chain link fence. The fence will be equipped with slats to minimize the visual impact of the treatment system. The treatment equipment enclosure will measure 10 feet by 18 feet and will contain all treatment equipment. The proposed location for the treatment equipment enclosure is shown in Figure 1. The enclosure will be equipped with lockable gates to deter unauthorized entry. The air stripper module is a completely enclosed painted steel box, six feet square by ten feet high. This is the only piece of equipment that will be visible above the six foot high fence. The discharge stack for the air stripper module is a 25-foot flagpole or light pole which will be installed adjacent to the treatment equipment enclosure.

3.0 PERMITTING

CES will apply for the following permits as required for operation of the proposed treatment system: A sewer discharge permit from the East Bay Municipal Utilities District to allow discharge of treated groundwater to the local sanitary sewer. If this permit cannot be obtained, CES will apply for an NPDES permit from the Regional Water Quality Control Board. This NPDES permit will be required for discharge of treated water to the storm drainage system, the alternative to the preferred sanitary sewer discharge route. CES will apply for "Authority to Construct" and a "Permit to Operate" the air stripping module from the Bay Area Air Quality Management District (BAAQMD). As recently required by the California State Department of Health Services (DHS), CES will apply for permission to operate both the initial carbon module and the air stripping module as a Transportable Treatment Unit (TTU). CES will also apply for all required electrical inspections, sewer hookup inspections, and building permits (if required).



CHEMPRO ENVIRONMENTAL SERVICES Job 887051 Dwg by SBR Date 7/17/89	SITE PLAN 3201 BROADWAY OAKLAND, CALIFORNIA	FIGURE 1

CHEMPRO ENVIRONMENTAL SERVICES

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Attention: Lisa Marinaro

Dear Ms. Marinaro:

SCOPE OF WORK AND COST ESTIMATE
FORMER CHEVRON SERVICE STATION #9-1024, 3201 BROADWAY AND MACARTHUR BLVD, OAKLAND, CALIFORNIA

Chempro Environmental Services (CES) is pleased to provide this scope of work and cost estimate in conjunction with the CES workplan dated July 31, 1989 for the above captioned site. We propose to perform the design, installation, and site work aspects of the work on a time and expense basis, in accordance with our standing contract with Chevron USA. Process equipment will be provided on a fixed price basis. This cost estimate is for soil and groundwater remediation activities at the site.

1.0 SCOPE OF WORK

The purpose, design basis, and description of the proposed soil and groundwater remediation plan is provided in the CES Workplan for the site. Our proposed scope of work, including soil excavation and disposal (Option 2.1.2), is outlined below.

1.1 Permit Applications

CES will apply for the following permits for the soil excavation and disposal and the installation and operation of the groundwater treatment system.

- East Bay Municipal Utilities District (EBMUD) Sewer Discharge Permit
- Bay Area Air Quality Management District (BAAQMD) Air Discharge Permit
- Electrical Permit with Inspection
- Plumbing Permit with Inspection
- Transportable Treatment Unit Permit by Rule Site Specific Notification (TTU) to the California Department of Health Services (DHS)

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1.2 Groundwater recovery well testing

CES will conduct an aquifer test to determine the expected groundwater extraction rate and radius of influence. From this information the number and locations of wells required to adequately capture the contaminated plume will be determined.

1.3 Groundwater extraction and treatment system

The expected groundwater extraction system will consist of four submersible, centrifugal pumps. The pumps will be placed in wells drilled as per the conclusions of the aquifer test.

The groundwater treatment system will consist of a modular, skid mounted air stripper, CES model SB-10 and a modular, skid mounted liquid phase carbon adsorption unit. The air stripped module consists of four 1-ft. ID x 9-ft. high, packed columns, 1-in. spherical polypropylene packing, a 200 SCFM air blower, circulating and discharge pumps, a control system, automatic telephone alarm unit, and totalizing flowmeter. This equipment is packaged into a 10-ft. high x 6-ft. x 6-ft. skid mounted module for easy installation and inconspicuous appearance.

The liquid phase carbon adsorption unit consists of two Calgon Disposorb 55-gallon, disposable carbon contactors connected in series. The two contacters are connected in series to ensure that the treated groundwater is of acceptable quality before discharge to the sewer.

1.4 Site work

CES will perform the following work for soil remediation and preparation to install the groundwater extraction and treatment system as described in Option 2.1.2 of the workplan:

- Install temporary fence around site perimeter
- Construct an 18' x 10' concrete equipment pad and compound fencing
- Install the wells as determined necessary by the aquifer testing (this estimate allows for a total of four 25-ft. recovery wells)
- Excavate an 18" wide x 36" deep utility trench from the recovery wells to the equipment pad and from the equipment pad to the sewer
- Install piping and electrical conduit in the trenches
- Backfill, compact, and blacktop the trenches
- Install an electrical utility box with meter and service disconnect on the equipment pad and connect this box to the PG&E power supply system
- Install a telephone line for the treatment unit's process upset alarm system
- Install the groundwater extraction pumps in the recovery wells and connect the pumps to the power source and piping
- Install the groundwater treatment module and connect it to the power source and to the piping
- Excavate the two areas of high concentrations of Total Petroleum Hydrocarbons
- Complete backfilling and compaction of excavations
- Blacktop excavations and return site to original or better condition
- Remove temporary fence