PACIFIC
ENVIRONMENTAL
GROUP, INC.

October 5, 1988
Project No. 330-06.04

Alameda County Health Agency
Division of Hazardous Materials
Department of Environmental Health
80 Swan Way Room 200
Oakland, California 94621

Attn: Mr. Larry Seto

Re: ARCO Station No. 608
17601 Hesperian Boulevard at Hacienda Avenue
San Lorenzo, California

Dear Mr. Seto:

This letter presents a work plan for a remedial investigation to be performed at the above-referenced ARCO station. The investigation is being performed by Pacific Environmental Group, Inc. (PACIFIC) for ARCO Petroleum Products (ARCO) in response to the discovery of free product and dissolved hydrocarbons in groundwater beneath the site. Because the extent of the dissolved hydrocarbon plume has not yet been defined, ARCO has requested PACIFIC to prepare a work plan to delineate the extent of hydrocarbons in groundwater and soils. This work plan presents a summary of previous investigations and findings at the site, an assessment of potential risks posed by site activities, and a proposed scope of work for additional assessment of groundwater conditions.

BACKGROUND

ARCO Service Station No. 608 is an operating service station located at 17601 Hesperian Boulevard, San Lorenzo, California (see Figures 1 and 2). The fueling facility formerly included three 6000-gallon tanks located in a common excavation and one adjacent 6000-gallon tank. A 550-gallon tank located southwest of the station building was used to store waste oil. All underground tanks were removed on June 14, 1988, and were replaced with three 12,000-gallon gasoline tanks in the location of the former gasoline tank complex, and one waste oil tank in the same location as the former waste oil tank (see Figure 3).

Soil and groundwater conditions have been documented in separate investigations performed by EMCON Associates and Applied Geosystems (AGS). Five monitoring wells (MW-1 through MW-5)

were installed at the site during previous investigations, as shown on Figure 3. Wells MW-1 and MW-2 were subsequently destroyed during tank replacement. The native soils at the site consist predominantly of moderately stiff to stiff silt. A medium dense sand was encountered in several boreholes (B-1, B-2, and B-3) between 8 and 12 feet in depth. Groundwater occurs at approximately 11 feet below the ground surface, and flows to the southwest.

All site monitoring wells were sampled by AGS after installation of Well MW-5 in January, 1988. Dissolved gasoline concentrations in the groundwater ranged from a low of 300 parts per billion (ppb) in Well MW-1 to a high of 62,000 ppb in Well MW-4. Benzene concentrations ranged from 20 ppb to 2,700 ppb. Total extractable hydrocarbons were detected in MW-1, adjacent to the waste oil tank, at 200 ppb. Although no floating product was present in any of the site wells during the January 1988 sampling event, free product was noted in soils during drilling of Well MW-5.

Additional soil and groundwater data was collected by PACIFIC during recent fuel and waste oil tank removal and replacement, which commenced on June 14, 1988. PACIFIC collected soil samples from excavation side walls, as well as two samples from beneath each tank (one at each end). To facilitate appropriate disposal of the soils, additional soil samples were collected as the northeastern gasoline tank excavation was enlarged to accommodate the new larger tanks. Floating product was noted on the groundwater in both gasoline tank excavations, and water samples were collected from the two excavations. The groundwater and soil samples from the fuel tank excavation were analyzed for total low boiling hydrocarbons calculated as gasoline, including benzene, toluene, xylenes and ethylbenzene (BTXE). The soil samples from the waste oil tank excavation were analyzed for high boiling hydrocarbons calculated as oil, total oil and grease, and polychlorinated biphenyls (PCBs). The soil and water sampling and analysis and soil aeration procedures followed during tank excavation are presented in a report currently being prepared by PACIFIC.

PACIFIC checked Well MW-4 for depth to groundwater and presence of floating product on September 12, 1988. Approximately 1/16-inch of product was noted in the well on this date, and depth to groundwater was approximately 12.5 feet.

ASSESSMENT OF POTENTIAL RISKS

PACIFIC has performed a preliminary review of the potential risks posed to the community from groundwater impacted by the site. The site is located in an area used primarily for residential and commercial purposes. There do not appear to be any creeks or other surface features which may act as areas of potential groundwater recharge.

Five schools were identified within 1/2-mile of the site, as shown on Figure 1. The closest school is located approximately 550 feet northwest of the site (crossgradient, but in the direction of highest reported gasoline concentrations), and is shown on Figure 2. The other four schools are located 1,200 to 1,500 feet from the site, to the northwest, east, and southwest. It is likely that the water supply for these schools is provided by municipal supplies, as is the water supply for most of the San Lorenzo area.

A well survey was performed by AGS which identified a total of 22 water-supply wells within a 1/2-mile radius of the site. Sixteen of the wells are less than 100 feet deep. According to AGS, groundwater within 1/2 mile of the site is used primarily for irrigation and domestic gardening. There are reportedly no municipal wells located within 1/2 mile of the project site. The locations of existing wells were not provided in AGS's report. As discussed in the following section, PACIFIC proposes to obtain specific location information on these wells to better assess whether they may be impacted by site operations.

PROPOSED SCOPE OF WORK

Because the extent of dissolved hydrocarbons in the groundwater underlying the site has not been defined by the existing monitoring wells, PACIFIC proposes that an additional groundwater investigation be performed. Additional investigative tasks should include:

- Completion of the well survey performed by AGS, which will include locating and verifying the existence of the previously-identified water-supply wells within a 1/2-mile radius of the site;

- Performance of a soil gas survey in the project area to provide guidance for further well installation and assessment;

- Installation of additional monitoring wells in locations indicated by the soil gas survey, to delineate the extent of the dissolved hydrocarbon plume; and

- Aquifer testing of selected monitoring wells to evaluate aquifer parameters prior to designing a remedial program;

PACIFIC will contact Alameda County Flood Control and Water Conservation District to obtain more specific information regarding the locations and status of the water-supply wells in the area. If this information is not available, approximate well locations will be determined based on the Department of Water Resources well number assigned to each well upon permitting. Additionally, PACIFIC will investigate the source of drinking water at the four local schools discussed previously in this report. If appropriate, a well canvass will be conducted to assess the status of known wells, and to identify any other wells which may exist in the area.

The soil gas survey will be conducted on site to identify possible hydrocarbon source area(s) as well as the lateral extent of the hydrocarbons detected in the groundwater. The soil gas investigation will then proceed off site to the west and southwest, along Hacienda Avenue and in the alley southwest of the site, in an attempt to define the downgradient extent of hydrocarbons.

Soil gas investigations provide relatively rapid preliminary definition of plumes of volatile hydrocarbon compounds in shallow water. The investigation evaluates the extent of the hydrocarbon plume in groundwater, based on the presence of the volatile compounds in the gaseous phase of the soil above the groundwater. The survey consists initially of driving one-inch diameter hollow steel probes into the shallow soil in the vicinity of the suspected plume within 1 to 2 feet of groundwater. Samples of the soil gas are withdrawn from through the probes, using a vacuum pump. These soil gas samples are then analyzed in the field using a gas chromatograph to determine the concentrations of volatile hydrocarbon compounds. The results of the soil gas survey are then evaluated to determine the most useful locations for groundwater monitoring wells to delineate the hydrocarbon plume.

Locations of additional proposed groundwater monitoring wells will be based on the results of the on-site and off-site soil gas investigation. PACIFIC anticipates that three to four additional downgradient wells will be necessary to further define the extent of both gasoline and waste oil in the groundwater. In addition, one upgradient well is recommended to document background water quality and provide a better well distribution for groundwater contouring. Because the locations of the proposed wells will depend upon the results of the soil gas survey, the locations are not shown on the attached figures.

The proposed monitoring wells will be drilled using eight-inch diameter hollow-stem auger drilling equipment and will be logged by a PACIFIC geologist using the Unified Soil Classification System and standard geologic techniques. Soil samples for logging and chemical analysis will be collected at five-foot intervals by advancing a California-modified split-spoon sampler with brass liners into undisturbed soil beyond the tip of the auger. The sampler will be advanced a maximum of 18 inches, using a 140-pound hammer with a 30-inch drop. The soil samples for chemical analysis will be retained in brass liners, capped with aluminum foil and plastic end caps, and sealed in clean glass containers. The samples will be placed on ice for transport to the laboratory and will be accompanied by chain-of-custody documentation.

The borings will be advanced approximately 20 feet into the water-bearing zone, and will be converted to groundwater monitoring wells by installation of 2-inch diameter, Schedule 40 PVC casing with 0.020-inch factory-slotted screen. Screen will be placed through the entire saturated section, extending approximately 5 feet above the static water level. Graded sand pack will be placed in the annular space across the screened interval, and will extend approximately 2 feet above the top of the screens. A bentonite and neat cement seal will extend from the sand pack to the ground surface. A locking cap and protective vault box will be installed on the top of each well. All new monitoring wells will be surveyed to Mean Sea Level datum, by a licensed surveyor.

Upon completion, all site monitoring wells will be checked for water level and the presence of free product, using a transparent Teflon bailer. Groundwater samples will be collected if no product is present, by first purging the well of at least three casing volumes with a centrifugal pump, while measuring pH, electrical conductivity, and temperature of the discharge. This operation will also provide some well development to reduce the turbidity of the discharge. After these parameters have stabilized, the groundwater sample will be collected using a Teflon bailer, and placed into appropriate EPA-approved containers. The groundwater samples will be labeled and logged onto chain-of-custody documents, and chilled for transport to the laboratory.

The groundwater samples will be analyzed for the presence of low-boiling hydrocarbons (gasoline and BTXE). Groundwater from the well located downgradient of the waste oil tank will also be analyzed for the presence of high boiling hydrocarbons. The analysis for low-boiling hydrocarbons is performed by gas chromatography followed by flame-ionization and photo-ionization detection. The analysis for high-boiling hydrocarbons is performed by extraction with acetone, and examination of the extract by gas chromatography using a flame ionization detector.

Aquifer testing will be performed in selected monitoring wells prior to designing a remedial program for the site. The test method most effective for determining aquifer parameters will be selected, taking into consideration factors such as geologic conditions and well construction. At a minimum, falling head and rising head ("slug") tests will be performed. These tests consist of introducing a slug of known volume into the well, displacing the water in the casing. The decreasing water levels in the well are monitored at frequent intervals, until the water level is at or close to the static level measured before the test. Then the slug is removed, and the water levels are again monitored as they rise toward the static level. The measurements obtained are then applied to calculations of the approximate permeability of the water-bearing materials in close proximity to the well.

A summary report will be prepared, and will include the results of the soil gas survey, boring logs for the new monitoring wells, analytical data, and aquifer test results. Groundwater and dissolved hydrocarbon contour maps will be prepared and presented. The data collected will be reviewed to develop a remedial concept for the groundwater at the site, and this concept also will be presented in the report.

If you have any questions regarding the contents of this letter, please call Mr. Kyle Christie at 415/371-2434.

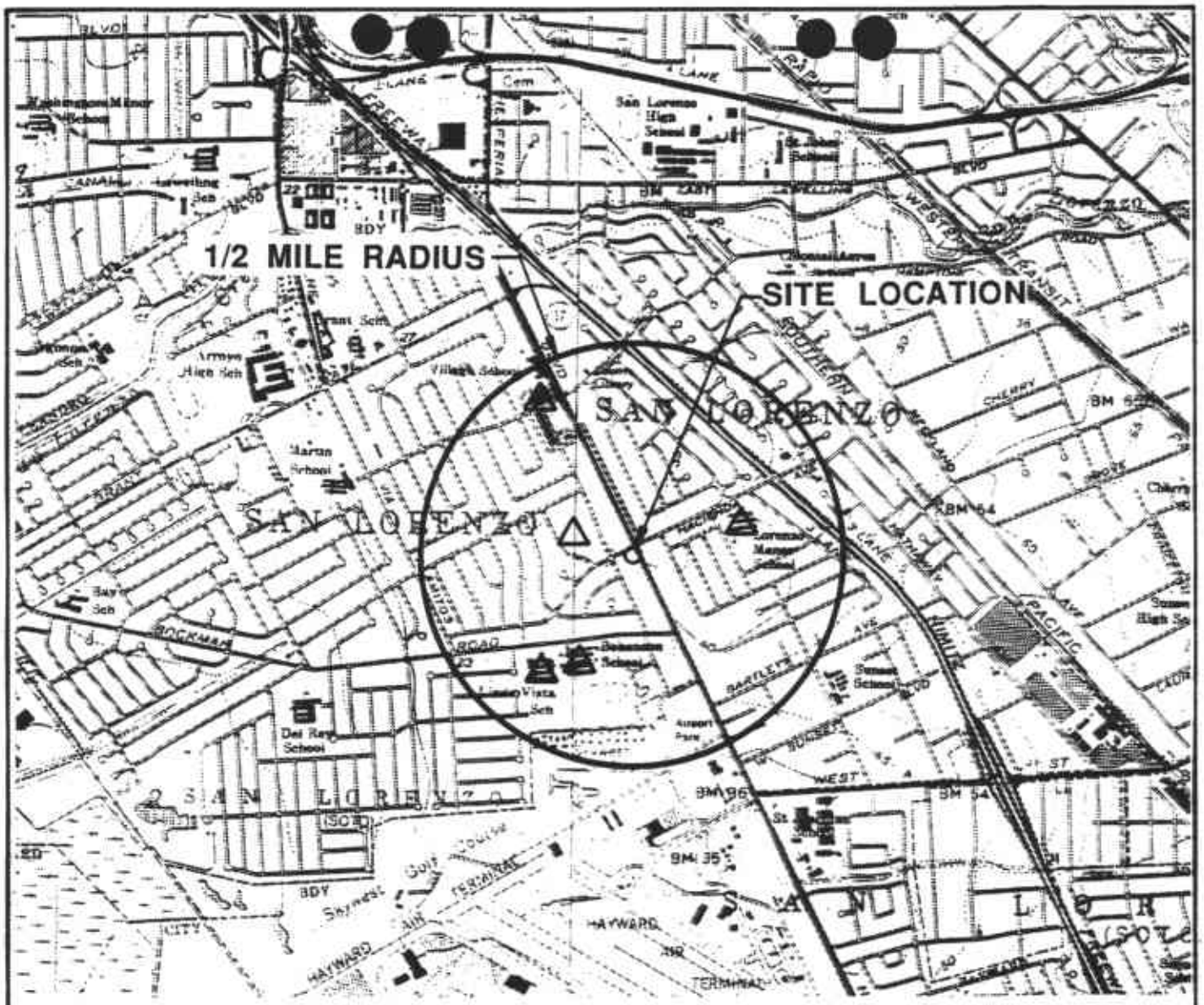
Sincerely,

PACIFIC ENVIRONMENTAL GROUP, INC.

Debra J. Moser
Senior Geologist
CEG 1293

Enclosures

cc: Kyle Christie, ARCO
Chris Winsor, ARCO



QUADRANGLE LOCATIONS

△ SCHOOL

REFERENCE:
USGS 7.5 MIN. TOPOGRAPHIC MAP
TITLED: HAYWARD, CALIFORNIA
DATED: 1959 REVISED: 1980
TITLED: SAN LEANDRO, CALIFORNIA
DATED: 1959 REVISED: 1980

SCALE

2000 0 2000 FEET

PACIFIC ENVIRONMENTAL GROUP, INC.

ARCO STATION #608
17601 Hesperian Boulevard
San Lorenzo, California

SITE LOCATION MAP

FIGURE: 1

PROJECT: 330-06.04

PROJECT NUMBER 330-06.04

CHURCH AND SCHOOL

RESIDENTIAL

RESTAURANT

RESIDENTIAL

VIA MAGDELENA

HACIENDA AVE.

RESIDENTIAL

VIA ENCINO

RESIDENTIAL

VIA ALAMO

VIA ARRIBA

RESIDENTIAL

VIA ROSAS

ARCO STATION

ALLEY

RESIDENTIAL

SHOPS

BANK

SHOPS

CAR WASH

HESPERIAN BOULEVARD

RESTAURANT

RESTAURANT

ROBSCOTT AVE.

RESIDENTIAL

STORE

N

* APPROXIMATE LOCATION OF PROPOSED SOIL VAPOR POINTS

NOTE :
ADDITIONAL VAPOR POINTS MAY BE INSTALLED AT ARCO STATION

BASED ON AERIAL PHOTO BY PACIFIC AERIAL SURVEY

REVISIONS	DRAWN BY	DATE/NUMBER
	ET	9-88

PACIFIC ENVIRONMENTAL GROUP, INC.

SCALE

100 0 100 FEET

ARCO STATION #608
1760 Hesperian Boulevard
San Lorenzo, California

EXTENDED SITE MAP

FIGURE : 2

PROJECT: 330-06.04

LEGEND

MW-1 ◉ GROUNDWATER MONITORING WELL LOCATION AND DESIGNATION

MW-2 ⌀ DESTROYED MONITORING WELL LOCATION AND DESIGNATION

B-3 ● SOIL BORING LOCATION AND DESIGNATION

APPROXIMATE DIRECTION OF REGIONAL GROUNDWATER FLOW

SCALE

0 30 60 FEET

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ARCO STATION #608
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San Lorenzo, California

SITE MAP

FIGURE: 3
PROJECT: 330-06.04