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WORK PLAN FOR ADDITIONAL INVESTIGATION

At
Chevron Service Station No. 9-0290
1802 Webster Street
Alameda, California
Delta Report No. DG90290C.4C02
Delta Project No. DG90-290

Prepared for:

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October 9, 2001

TABLE OF CONTENTS

FIGURES

APPENDIX

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INTRODUCTION

At the request of Chevron Products Company (Chevron), Delta Environmental Consultants Inc. network associate Gettler-Ryan Inc. (GR) prepared this Work Plan for Additional Investigation at the subject site (Figure 1). In a letter dated September 24, 2001, the Alameda County Health Care Services Agency (ACHCSA) requested further delineation of the contaminant plume north of the site and the confirmation of Total Petroleum Hydrocarbon as gasoline (TPHg) concentrations in the vicinity of soil boring SB-2 (Figure 2). The purpose of this work is to further delineate the contaminant plume north of the site and to confirm the concentration of TPHg in the vicinity of boring SB2.

The proposed scope of work includes: obtaining the necessary drilling permits from Alameda County Public Works Agency (ACPWA); updating the site health and safety plan; installing off-site two groundwater monitoring wells; collecting soil samples for possible chemical analysis; developing and sampling the newly installed groundwater monitoring wells; surveying wellhead elevations of the newly installed wells; drilling one soil boring, collecting soil and representative groundwater samples from the boring; analyzing selected soil and groundwater samples; and preparing a report which presents the findings of the investigation.

The scope of work described in this report is intended to comply with the State of California Water Resources Control Board's *Leaking Underground Fuel Tanks (LUFT) Manual*, the Regional Water Quality Control Board's *Tri-Regional Board Staff Recommendations for Preliminary Investigation and Evaluation of Underground Tank Sites*, and ACHCSA guidelines.

SITE DESCRIPTION

The subject site is an operating service station located at the northeast corner of the intersection of Webster Street and Buena Vista Avenue in Alameda, California (Figure 1). Site topography is flat at an elevation of approximately 12 feet above mean sea level (MSL). Four 10,000 gallon gasoline underground storage tanks (USTs) are located in a common pit in the southwestern portion of the site. A waste oil UST is located south of the station building. Two former waste oil USTs were located near the southeastern corner of the gasoline UST pit. Pertinent site features are shown on Figure 2.

The site vicinity is used for residential, commercial, and transportation purposes. The subject site is bounded to the east by an apartment complex, to the north by a Jack In The Box restaurant, to the west by Webster Street, and to the south by Buena Vista Avenue. One of the residential buildings at the apartment complex is situated immediately southeast of the subject service station building. Another building is situated approximately 50 feet northeast of the northern site boundary. Single family houses and a service station are located southeast and south of the site, respectively, across Buena Vista Avenue. Commercial buildings and parking lots are located northwest, west, and southwest of the site, across Webster Street. The subject site vicinity is shown on Figure 2.

PREVIOUS ENVIRONMENTAL WORK

A hydrocarbon leak (approximately 50 gallons of gasoline) was documented at the subject site in 1981. Six groundwater monitoring wells (B-1 through B-6) were installed at the site in January 1982 by Kleinfelder & Associates to evaluate the extent of hydrocarbon impact to groundwater. Groundwater was encountered at a depth ranging from 3.5 to 4.5 feet below ground surface (bgs). No soil or groundwater samples were collected for laboratory analysis however, groundwater samples were analyzed for volatile hydrocarbons using a combustible gas meter. Hydrocarbons vapor concentrations were detected in wells B-1 through B-4 at concentrations ranging from 100 to >1,000 parts per million (ppm). The 10,000 gallon regular gasoline UST was removed from service after a hole was found near the tank fill pipe.

In 1982, the UST system was replaced. A gauge stick hole was observed in the bottom of the regular gasoline UST. Samples were not collected. New gasoline, diesel and two waste oil USTs were installed. Two backfill monitoring wells (A-1 and A-2) were installed at the time of UST replacement. Monitoring well B-2 was destroyed to accommodate the new UST installation.

On September 19, 1991, approximately 1,400 gallons of diesel were accidentally pumped into tank backfill well A-1 during UST testing activities. Product removal commenced immediately. Approximately 1,600 gallons of separate-phase hydrocarbon (SPH) were removed from well A-1. An additional 346 gallons of SPH were removed during a SPH recovery program conducted by Pacific Environmental Group Inc. from September 1991 through July 1992. Laboratory analysis of the free product suggested that waste-oil must also have been inadvertently disposed of into well A-1. A groundwater sampling program was initiated in September 1991.

In March 1993, one additional on-site groundwater monitoring well (B-8) and two off-site wells (B-7 and B-9) were installed by Groundwater Technology Inc. to delineate the lateral extent of hydrocarbon impacted soil and groundwater at the site. Groundwater was encountered in well borings B-7 through B-9 at 5 feet bgs. Soil samples collected from the well borings at 5 feet bgs did not contain TPHg, Total Petroleum Hydrocarbons as diesel (TPHd), or benzene, toluene, ethylbenzene, and xylenes (BTEX).

In April and May 1994, Touchstone Development collected samples during the removal of one 1,000 gallon waste oil UST, one 350 gallon waste oil UST, and fuel product lines. Hydrocarbons were detected in soil beneath the 1,000 gallon waste oil UST (up to 440 ppm TPHg, 410 ppm TPHd, and 77 ppm Total Oil and Grease [TOG]), beneath the 350 gallon waste oil UST (1,200 ppm TPHg, 580 ppm TPHd, 580 ppm TOG, and 0.64 ppm benzene), and beneath the product lines (up to 4,900 ppm TPHg and 4.6 ppm benzene).

Volatile organic compounds (VOCs) or semivolatile organic compounds (SVOCs) were not detected in the samples collected from the waste oil UST excavation, with the exception of trichloroethylene (0.017 ppm). Approximately 700 cubic yards of soil was excavated from the waste oil UST pits and from beneath product lines and removed from the site. Monitoring wells A-2, B-3, and B-4 were destroyed during UST removal activities.

In March 1995, four additional on-site groundwater monitoring wells (B-10 through B-13) were installed at the site by GR to further assess the extent of hydrocarbons within the subsurface. Groundwater was encountered at approximately 7 feet bgs in well borings B-10, B-12, and B-13 and at 1 foot bgs in well boring B-11. TPHg were detected in the soil samples collected from boring B-10 through B-12 at concentrations ranging from 69 to 1,900 ppm, and were not detected in the soil sample from well boring B-13. TPHd (1.1 to 330 ppm) were detected in soil samples collected from all well borings.

Benzene (0.78 ppm) was detected in the soil sample collected from well boring B-10, and was reported as not detected in samples collected from well borings B-11 and B-12. Methyl-tert butyl ether (MtBE) was detected in soil samples collected from well borings B-11 (17 ppm) and B-12 (8.2 ppm).

On May 15 and 16, 2001, GR advanced eleven hand auger borings (SB-1 through SB-11). Refusal, due to a concrete obstruction at 4 feet bgs, was encountered in borings SB-5, SB-7, SB-9, SB-10, and SB-11. Refusal, due to pea gravel at 4 feet bgs, was encountered in soil boring SB-3. On-site borings SB-1 and SB-2 were advanced to depths of approximately 9.5 and 10 feet bgs, respectively. Off-site borings SB-4, SB-6, and SB-8 were advanced to depths between 7 and 8 feet bgs.

MtBE (0.12 ppm) was detected in the soil sample collected from soil boring SB-8 at 5.5 feet bgs. TPHg were detected in four of the five soil samples analyzed at concentrations ranging from 1.1 (SB-2-6.5) to 81 ppm (SB-4-5.5). Only one soil sample, SB-4-5.5, contained TPHd at concentrations of 2.4 ppm. Benzene was detected in soil samples SB-2-6.5 and SB-1-5 at concentrations of 0.0099 and 0.023 ppm, respectively.

The grab groundwater sample collected from boring SB-8 did not contain TPHg, TPHd, or BTEX. TPHg was detected in four grab groundwater samples SB-1, SB-2, SB-4, and SB-6 at concentrations ranging from 200 (SB-6) to 910,000 ppb (SB-2). Concentrations of TPHd were detected in four grab groundwater samples SB-1, SB-2, SB-4, and SB-6 ranging from 110 (SB-6) to 5,600 ppb (SB-2). Benzene was detected in three grab groundwater samples SB-2, SB-4 and SB-4 at concentrations ranging from 0.51 (SB-6) to 530 ppb (SB-2). Grab groundwater sample SB-6 and SB-8 contained MtBE at concentrations of 3,600 and 4,300 ppb, respectively. Based upon previous investigations, the material beneath the site consists of sand with silt and silty sand.

Groundwater Monitoring and Sampling

Groundwater monitoring and sampling of site wells began in September 1991. Historically, depth to groundwater beneath the site has ranged between 2 and 8 feet bgs. Groundwater flow was to the southeast prior to January 1993. Recently, the flow direction has been fluctuating between northeast and northwest. The gradient has ranged from 0.005 to 0.02 foot.

The groundwater sampling data indicate that groundwater beneath the site has been impacted by hydrocarbons at concentrations up to 40,000 parts per billion (ppb) of TPHg, 4,900 ppb of benzene, 88,000 ppb of MtBE, 22,000 ppb of TPHd, 8,000 ppb of TOG, and 68,400 ppb of Total Petroleum Hydrocarbons as motor oil (TPHmo). The highest dissolved hydrocarbon concentrations have been present in the vicinity of the dispenser islands. TPHd has been detected only once in off-site wells B-7 and B-9 at concentrations of 53 (5/1/95) and 60 ppb (11/30/94), respectively

SPH have been present in wells A-1 and A-2 (up to 1.58 feet just after the accidental diesel release), and on few occasions in wells B-3 and B-4 (up to 0.01 feet). SPH have been removed from the wells by bailing and use of absorbent pads.

Hydrocarbon concentrations in on-site wells have been decreasing, with the exception of well B-6. TPHg (655 ppb) were detected in this well in November 1998 after several quarters with nondetectable results. TPHd concentrations in this well have been increasing. Well B-6 also contains an elevated concentration of MtBE compared to nearest wells in the downgradient direction.

PROPOSED SCOPE OF WORK

The reported TPHg concentration of 910,000 ppb in the grab groundwater sample collected from soil boring SB-2 seems anomalous when compared to TPHg concentrations in groundwater from nearby boring SB-1 (1,000 ppb) and well B-1 (570 ppb, 8/13/01 monitoring event). To confirm the anomalous TPHg concentration, GR proposes to drill one soil boring in the vicinity of boring SB-2 and collect soil samples and a representative groundwater sample from the boring. In order to delineate the downgradient extent of dissolved hydrocarbons at the site, GR proposes to install two groundwater monitoring wells north and northwest of the subject site. GR Field Methods and Procedures are included as Appendix A.

To implement the proposed scope of work, GR proposes the following six tasks:

Task 1. Pre-Field Activities

GR will update the Site Health and Safety Plan. Drilling permits will be obtained from ACPWA. Underground Service Alert (USA) will be notified at least 48 hours prior to initiating well installation activities.

Task 2 Well Installation

GR will install two groundwater monitoring wells at the locations shown on Figure 2. Drilling and well construction will be performed by a California licensed well driller. A GR geologist will monitor the drilling activities and prepare a log of each well boring. The well borings will be drilled with 8-inch diameter hollow-stem augers to approximately 18 feet bgs. Based upon historical monitoring data, GR expects to encounter groundwater at approximately 4 feet bgs. Soil samples for description and possible chemical analysis will be obtained from the borings at five-foot intervals, as a minimum. Sampling procedures are described in Appendix A. Although the actual number of samples submitted for chemical analysis will depend on site conditions and field screening data, we anticipate a minimum of one soil sample collected from above the water table will be submitted for chemical analysis as described in Task 5.

The groundwater monitoring wells will be constructed with 2-inch diameter Schedule 40 polyvinyl chloride (PVC) well casing and 0.02-inch machine slotted well screen, as shown on the Proposed Well Construction Detail (Figure 3). The wells will be constructed with 15 feet of screen from approximately 4 to 19 feet bgs. The actual screen interval will depend on the groundwater depth and lithologic conditions encountered during drilling.

GR will drill one soil boring at the location shown on Figure 2. Drilling will be performed by a California licensed well driller. A GR geologist will monitor the drilling activities and prepare a log of the boring. The well boring will be drilled with 8-inch diameter hollow-stem augers to approximately 14 feet bgs.

Based upon historical monitoring data, GR expects to encounter groundwater at approximately 4 feet bgs. Soil samples for description and possible chemical analysis will be obtained from the boring at five-foot intervals, as a minimum. Sampling procedures are described in Appendix A. Although the actual number of samples submitted for chemical analysis will depend on site conditions and field screening data, we anticipate a minimum of one soil sample collected from above the water table will be submitted for chemical analysis as described in Task 5.

To confirm the anomalous TPHg concentration, a representative groundwater sample will be collected from the boring by placing a temporary well casing and sandpack into the boring. The temporary well will be surged and a representative groundwater sample will be collected. The representative groundwater sample will be submitted for chemical analysis as describe in Task 5. After the representative groundwater sample is collected, the temporary well casing will be removed and the sandpack will be drill out. The boring will then be backfilled with neat cement.

Soil from each sampled interval will be screened in the field for the presence of volatile organic compounds using a photoionization detector (PID). These data will be collected for reconnaissance purposes only, and will not be used as verification of the presence or absence of petroleum hydrocarbons.

Drill cuttings will be stored at the site pending receipt of chemical analytical data. The drill cuttings will be stockpiled on and covered with plastic sheeting pending disposal. Soil samples from the drill cuttings will be collected for disposal characterization as described in Appendix A. Steam cleaning rinsate wastewater will be stored on site in properly labeled drums pending disposal.

Task 3 Well Development and Sampling

The newly installed groundwater monitoring wells will be developed after being allowed to stand a minimum of 72 hours following completion. During development, the clarity of the discharged well water and selected groundwater parameters (pH, temperature, conductivity) will be monitored. When the clarity of the discharge water runs clear and the groundwater parameters have stabilized, groundwater samples will be collected. Groundwater samples will be analyzed as described in Task 5. Groundwater removed during development and sampling will be stored at the site in properly labelled drums pending disposal. Development and groundwater sampling procedures are described in Appendix A.

Task 4 Wellhead Survey

Following installation, the elevation of the top of each well casing will be surveyed to MSL by a California licensed surveyor. Horizontal coordinates will also be measured.

Task .5 Laboratory Analyses

Soil and groundwater samples will be submitted for chemical analysis by Lancaster Laboratories (ELAP #2116). Selected soil and groundwater samples will be analyzed for TPHg, TPHd, BTEX and MtBE by DHS LUFT methods and for TOG by Standard Methods 5520E&F (soil) and 5520C&F (groundwater). The drill cuttings stockpile sample will be analyzed for TPHg, BTEX, and MtBE, by DHS LUFT methods and for total lead by EPA Method 6010.

Task 6. Report Preparation

Following receipt and analysis of all data, a report will be prepared which summarizes the procedures and findings associated with this investigation. This report will be submitted to Chevron for their use and distribution.

PROJECT STAFF

Mr. David W. Herzog, a Registered Geologist in the State of California (R.G. No. 7211), will provide technical oversight and review of the work. Mr. Greg Gurss, Senior Project Manager, will supervise implementation of field and office operations. GR employs a staff of geologists, engineers, and technicians who will assist with the project.

SCHEDULE

Implementation of the proposed scope of work will commence upon receipt of regulatory approval.

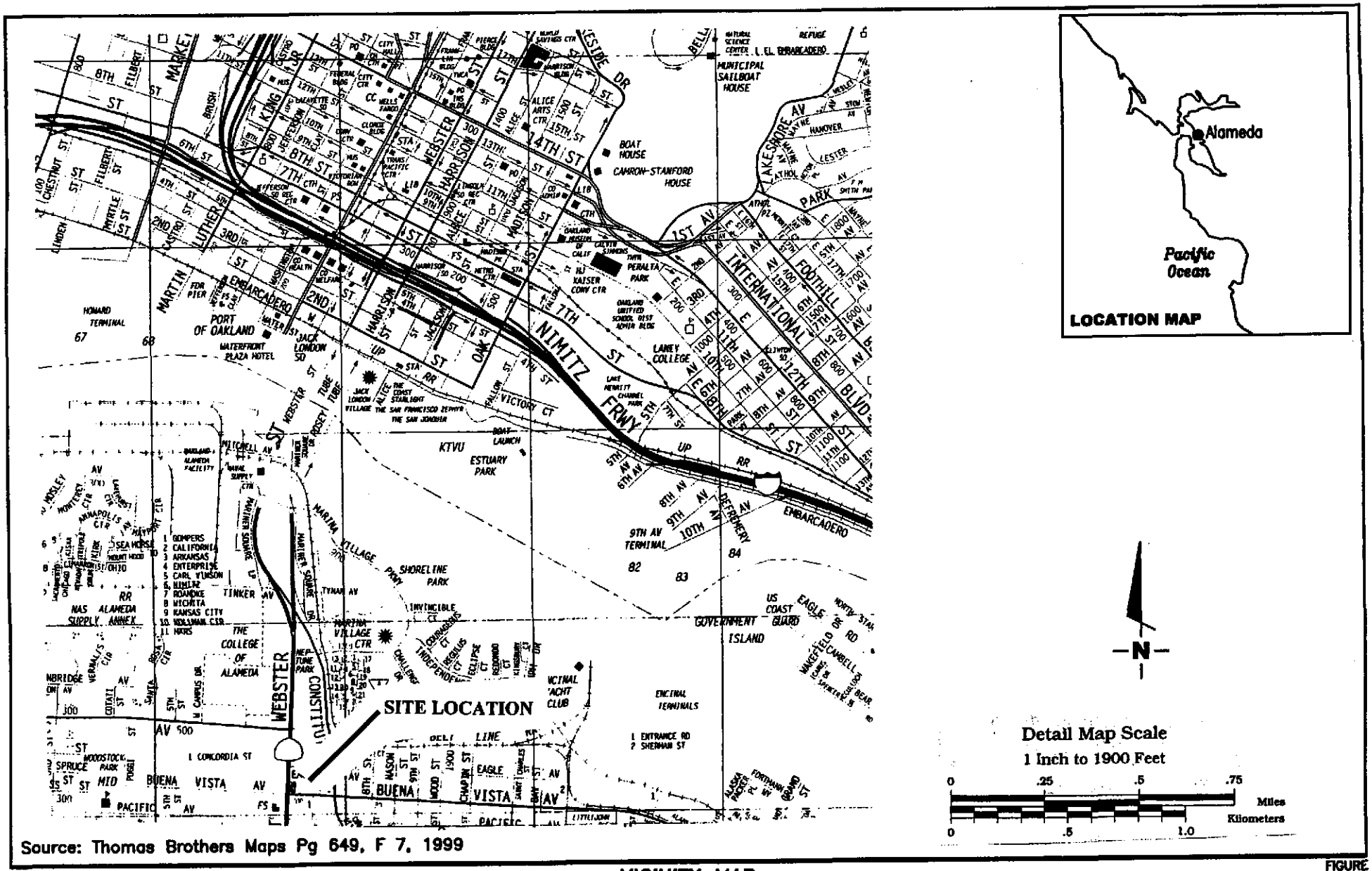

FIGURE 1

VICINITY MAP
Chevron Service Station No. 9-0290
1802 Webster Street
Alameda, California

GETTLER - RYAN INC.
6747 Sierra Ct., Suite J
Dublin, CA 94568
(925) 551-7555

JOB NUMBER	REVIEWED BY	DATE	REVISED DATE
345280.02		02/01	

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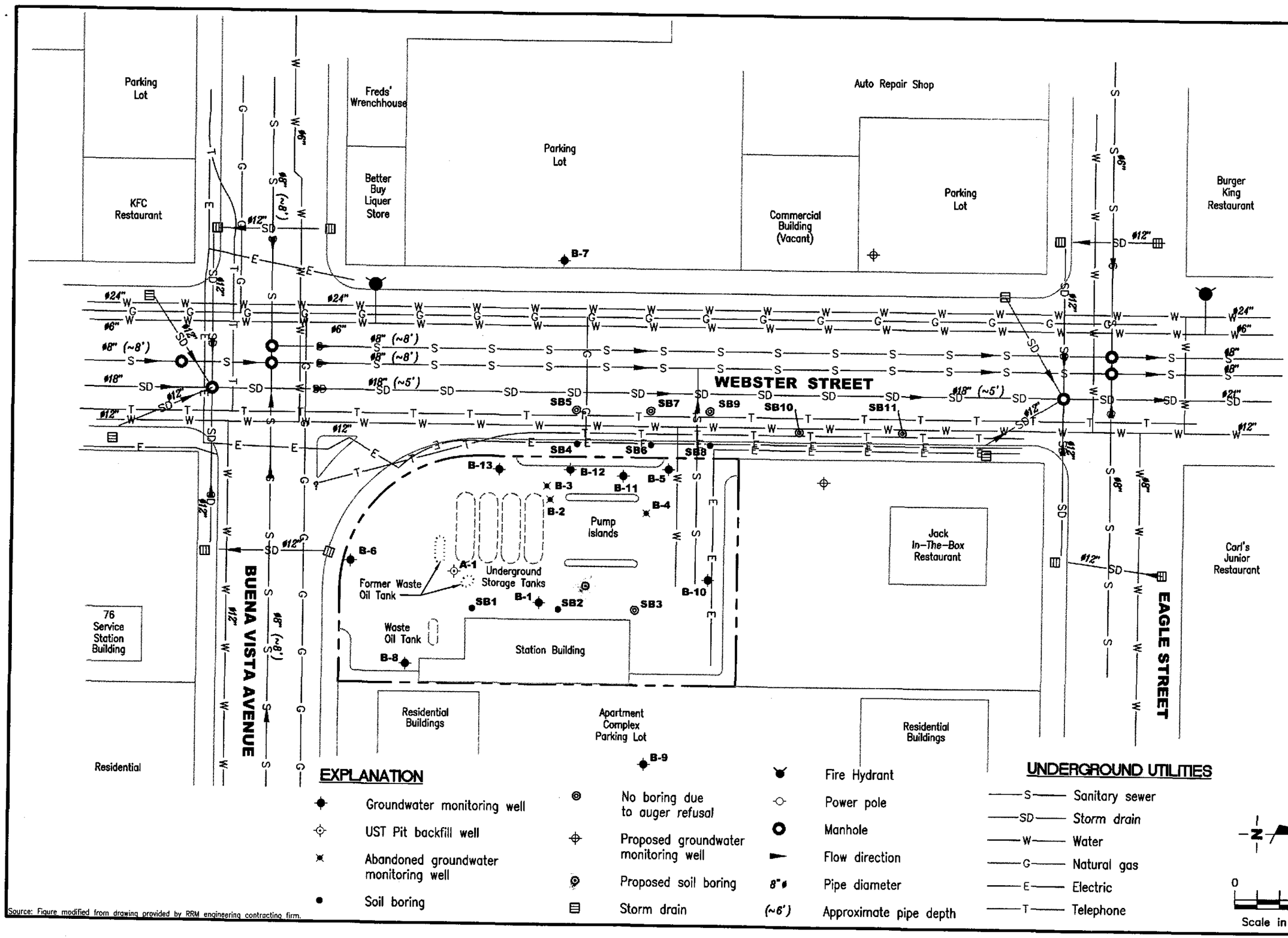


Source: Figure modified from drawing provided by RRM engineering contracting firm.

FIGURE 2

EXTENDED SITE PLAN
Chevron Service Station No. 9-0290
1802 Webster Street
Alameda, California

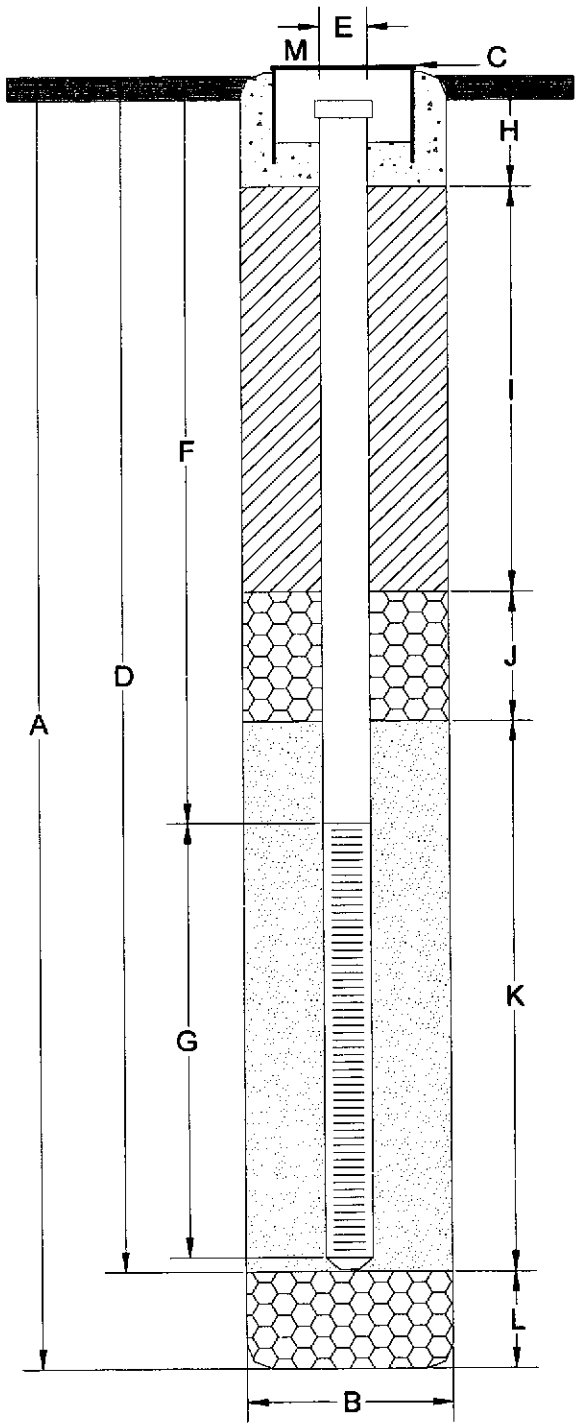
REVISED DATE

GETTLER-RYAN INC.
6747 Sierra Ct., Suite J
Dublin, CA 94568
(925) 551-7555

PROJECT NUMBER DG90290C.4C02
REVIEWED BY
DATE 6/01

FILE NAME: P:\ENVRO\CHEVRON\9-0290\A01-9-0290.DWG | Layout Tab: Work Plan 9-01

WELL CONSTRUCTION DETAIL



A Total Depth of Boring 18 ft.

B Diameter of Boring 8 in.
Drilling Method Hollow Stem Auger

C Top of Casing Elevation ft.
☐ Referenced to Mean Sea Level
☐ Referenced to Project-Datum

D Casing Length 18 ft.
Material Schedule 40 PVC

E Casing Diameter 2 in.

F Depth to Top Perforations 3 ft.

G Perforated Length 15 ft.
Perforated Interval from 3 to 18 ft.
Perforation Size 0.02 in.

H Surface Seal from 0 to 1 ft.
Seal Material Cement

I Backfill from 1 to 2 ft.
Backfill Material Neat Cement

J Seal from 2 to 2.5 ft.
Seal Material Bentonite

K Gravel Pack from 2.5 to 18 ft.
Pack Material Lonestar #3 Sand

L Bottom Seal None ft.
Seal Material

M Water-resistent vault box, Locking well cap, and Lock

Note: Depths measured from initial ground surface.

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Proposed Well Construction Detail
Chevron Service Station No. 9-0290
1802 Webster Street
Alameda, California

FIGURE
3

JOB NUMBER	REVIEWED BY	DATE	REVISED DATE	REVISED DATE
DG90290				

GETTLER-RYAN INC.

FIELD METHODS AND PROCEDURES

Site Safety Plan

Field work performed by Gettler-Ryan Inc. (GR) is conducted in accordance with GR's Health and Safety Plan and the Site Safety Plan. GR personnel and subcontractors who perform work at the site are briefed on the contents of these plans prior to initiating site work. The GR geologist or engineer at the site when the work is performed acts as the Site Safety Officer. GR utilizes a photoionization detector (PID) to monitor ambient conditions as part of the Health and Safety Plan.

Collection of Soil Samples

Soil borings are drilled by a California-licensed well driller. A GR geologist is present to observe the drilling, collect soil samples for description, physical testing, and chemical analysis, and prepare a log of the exploratory soil boring. Soil samples are collected from the soil boring with a split-barrel sampling device fitted with 2-inch-diameter, clean brass tube or stainless steel liners. The sampling device is driven approximately 18 inches with a 140-pound hammer falling 30 inches. The number of blows required to advance the sampler each successive 6 inches is recorded on the boring log. The encountered soils are described using the Unified Soil Classification System (ASTM 2488-84) and the Munsell Soil Color Chart.

After removal from the sampling device, soil samples for chemical analysis are covered on both ends with teflon sheeting or aluminum foil, capped, labeled, and place in a cooler with blue ice for preservation. A chain-of-custody form is initiated in the field and accompanies the selected soil samples to the analytical laboratory. Samples are selected for chemical analysis based in part on:

a. depth relative to underground storage tanks and existing ground surface
b. depth relative to known or suspected groundwater
c. depth relative to areas of known hydrocarbon impact at the site
d. presence or absence of contaminant migration pathways
e. presence or absence of discoloration or staining
f. presence or absence of obvious gasoline hydrocarbon odors
g. presence or absence of organic vapors detected by headspace analysis

Field Screening of Soil Samples

A PID is used to perform head-space analysis in the field for the presence of organic vapors from the soil sample. This test procedure involves removing some soil from one of the sample tubes not retained for chemical analysis and immediately covering the end of the tube with a plastic cap. The PID probe is inserted into the headspace inside the tube through a hole in the plastic cap. Head-space screening results are recorded on the boring log. Head-space screening procedures are performed and results recorded as reconnaissance data. GR does not consider field screening techniques to be verification of the presence or absence of hydrocarbons.

Construction of Monitoring Wells

Monitoring wells are constructed in the exploratory soil borings with Schedule 40 polyvinyl chloride (PVC) casing. All joints are thread-joined; no glues, cements, or solvents are used in well construction. The screened interval is constructed of machine-slotted PVC well screen which generally extends from the total well depth to a point above the groundwater. An appropriately-sized sorted sand is placed in the annular space adjacent to the entire screened interval. A bentonite transition seal is placed in the annular space above the sand, and the remaining annular space is sealed with neat cement or cement grout.

Wellheads are protected with water-resistant traffic-rated vault boxes placed flush with the ground surface. The top of the well casing is sealed with a locking waterproof cap. A lock is placed on the well cap to prevent vandalism and unintentional introduction of materials into the well.

Measurement of Water Levels

The top of the newly-installed well casing is surveyed by a California-licensed Land Surveyor to mean sea level (MSL). Depth-to-groundwater in the well is measured from the top of the well casing with an electronic water-level indicator. Depth-to-groundwater is measured to the nearest 0.01-foot, and referenced to MSL.

Well Development and Sampling

The purpose of well development is to improve hydraulic communication between the well and the surrounding aquifer. Prior to development, each well is monitored for the presence of floating product and the depth-to-water is recorded. Wells are then developed by alternately surging the well with a vented surge block, then purging the well with a pump or bailer to remove accumulated sediments and draw groundwater into the well. Development continues until the groundwater parameters (temperature, pH, and conductivity) have stabilized.

Storing and Sampling of Drill Cuttings

Drill cuttings are stockpiled on and covered with plastic sheeting and samples are collected and analyzed for disposal classification on the basis of one composite sample per 100 cubic yards of soil. Stockpile samples are composed of four discrete soil samples, each collected from an arbitrary location on the stockpile. The four discrete samples are then composited in the laboratory prior to analysis.

Each discrete stockpile sample is collected by removing the upper 3 to 6 inches of soil, and them driving the stainless steel or brass sample tube into the stockpiled material with a hand, mallet, or drive sampler. The sample tubes are then covered on both ends with teflon sheeting or aluminum foil, capped, labeled, and placed in a cooler with blue ice for preservation. A chain-of-custody form is initiated in the field and accompanies the selected soil samples to the analytical laboratory. Stockpiled soils are covered with plastic sheeting after completion of sampling.