Weiss Associates

Environmental and Geologic Services

5500 Shellmound Street, Emeryville, CA 94608-2411

Fax: 510-547-5043 Phone: ***510-450-6000***

May 19, 1994

Juliet Shin
Alameda County Department of
Environmental Health
80 Swan Way, Room 200
Oakland, CA 94621

Re: Subsurface Investigation Workplan
Shell Service Station
WIC #204-5510-0600
4255 MacArthur Boulevard
Oakland, California
WA Job #81-757-03

Dear Ms. Shin:

As you requested in your March 23, 1994 letter to Dan Kirk of Shell Oil Company (Shell), Weiss Associates (WA), on behalf of Shell, is submitting this subsurface investigation workplan for the site referenced above (Figure 1). The investigation objectives are to identify potential onsite and offsite hydrocarbon sources, and assess the extent of hydrocarbons in soil and ground water up- and downgradient of the site. In addition, you requested the records of the 1985 tank replacement and sampling by Gettler-Ryan Inc. As we mentioned in our Subsurface Investigation Report dated March 15, 1994, only incomplete documentation of the 1985 excavation and tank replacement currently exists. We have included copies of what has been located, which consist of the soil and ground water investigation conducted by EMCON Associates dated July 26, 1985 and the analytic results of the 1985 tank excavation and soil stockpile sampling (Attachment A).

Presented below are a summary of the site history, our specific investigation objectives and our proposed scope of work and work schedule.

SITE SUMMARY

1985 Subsurface Investigation: In June 1985, Emcon Associates drilled three soil borings and installed one ground water monitoring well near the underground fuel tanks.[1] One boring contained 15,800 parts per million (ppm) total petroleum hydrocarbons as gasoline (TPH-G) in the 4-ft depth sample. However, only 2 ppm TPH-G were detected in the 10-ft sample from the same boring. No TPH-G were detected in the other four samples collected at depths between 10 and 20 ft. A ground water sample from the monitoring well installed immediately downgradient of the fuel storage tanks contained 840 parts per billion (ppb) gasoline, 76 ppb benzene, 22 ppb toluene, and 57 ppb xylenes and ethylbenzene.

1985 Underground Storage Tank Replacement: In December 1985, the underground fuel storage tanks were excavated and replaced. During the excavation, Gettler-Ryan Inc. collected soil samples for hydrocarbon and heavy metals analyses.[2] Up to 22,000 ppm total volatile hydrocarbons, 500 ppm benzene, 2,200 ppm toluene, and 4,500 ppm xylenes were detected in the soil at depths less than about 8 ft. However, beneath the 10-ft depth, total volatile hydrocarbon concentrations decreased to less than 85 ppm in 9 of the 10 samples. Chromium, copper, zinc, lead and arsenic were also detected in some soil samples. **About 800 cubic yards of hydrocarbon-bearing soil were subsequently excavated from the site and transported to a local disposal facility.**

1992 Site Reconnaissance: In July 1992, GeoStrategies Inc. performed a site reconnaissance and verified that the **ground water monitoring well installed in 1985 had been destroyed during the 1985 tank replacement.**[3]

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1 Emcon Associates, July 26, 1985, Consultant's letter report regarding the soil and ground water investigation at the Shell service station located at MacArthur and High Streets in Oakland, California, prepared for Gettler-Ryan Inc., 2 pages, 1 figure, 4 plates and 1 appendix.

2 Gettler-Ryan Inc., December 2, 1988, Sampling reports from Trace Analysis Laboratory, Inc. of Hayward, California, copy of analytic reports.

3 Shell Oil Company, August 14, 1992, Letter to the Alameda County Health Care Services Department of Environmental Health, Hazardous Materials Division regarding the Shell service station at 4255 MacArthur Boulevard in Oakland.

1993 Subsurface Investigation: In November 1993, WA installed ground water monitoring wells MW-1, MW-2 and MW-3 to assess water quality up- and downgradient of the existing underground fuel storage tanks, and to determine the ground water flow direction and gradient beneath the site (Figure 2).[4] The soil boring analytic data are presented in Table B-1, Attachment B.

Quarterly Ground Water Monitoring: As of this date, ground water beneath the site has been monitored twice since the wells were installed in November 1993.[5] The water table ranges from about 8.5 to 15.5 ft depth across the site. Based on the ground water elevation data from these wells, ground water flows southwestward under a gradient of about 0.10 ft/ft (Figure 2). Quarterly ground water analytic results are presented in Table B-2, Attachment B.

INVESTIGATION OBJECTIVES

The results of our previous subsurface investigation indicate that hydrocarbons occur in ground water in onsite and downgradient monitoring wells. In addition, hydrocarbons are present in ground water upgradient of the underground fuel storage tanks and may originate upgradient of the Shell site. Therefore, our investigation objectives are to review existing information to identify potential hydrocarbon sources in the site vicinity and to define the extent of hydrocarbons in ground water downgradient of the Shell site.

PROPOSED SCOPE OF WORK

To achieve the investigation objectives, our proposed scope of work is described in detail below.

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4 WA, March 15, 1994, Subsurface investigation of the Shell service station at 4255 MacArthur Boulevard, Oakland, California, consultant's letter report prepared for Shell Oil Company, 7 pages, 6 figures, 3 tables and 3 attachments.

5 WA, April 7, 1994, Consultant's letter-report to Juliet Shin of the Alameda County Department of Environmental Health regarding the first quarter 1994 ground water sampling at 4255 MacArthur Boulevard, Oakland, California, 2 pages and 1 attachment.

Site Vicinity Research: WA will conduct a review of nearby businesses to identify potential offsite hydrocarbon sources. The research will consist of regulatory file reviews and title searches. To identify the possible source of elevated hydrocarbons in soil near well MW-3, we will review historic aerial photographs of the site.

Permits: WA will obtain a well installation permit from the Alameda County Flood Control and Water Conservation District, Zone 7 and an encroachment permit from CalTrans to drill on the public right-of-way adjacent to the Highway 580 onramp.

Soil Borings: WA will drill one-to-two 6-in. diameter soil borings to a depth of about 10 ft near the northeast property line (Figure 3) to evaluate whether hydrocarbons from upgradient sources are migrating onto the Shell site. We will collect soil samples from each boring at 5-ft intervals and at lithologic changes noted in the field. Soil sampling procedures are presented in Attachment C. In addition, WA will collect undisturbed ground water samples from just beneath the water table in each boring using a Hydropunch or similar sampler. After sampling, the borings will be tremmied with neat cement grout and finished to match the existing surface materials.

Monitoring Well: WA has conducted a reconnassiance of the site vicinity to identify possible drilling locations. Because Highway 580 exists downgradient (southwest) of the site (Figure 3), only one ideal location for a monitoring well was identified. Therefore, WA will install one ground water monitoring well adjacent to the Highway 580 onramp (Figure 3) to assess the extent of hydrocarbons in ground water downgradient of the site. The boring will be drilled using 8-in. diameter hollow-stem augers to a depth of about 30 ft. The anticipated depth to water at this location is about 20 ft. We will collect soil samples from this boring at 5-ft intervals and at lithologic changes.

Soil and Ground Water Analyses: Selected soil samples, based on subjective or quantitative field screening, and ground water samples will be analyzed for TPH-G by modified EPA Method 8015, and benzene, ethylbenzene, toluene and xylenes by EPA Method 8020.

Waste Disposal: Soil cuttings will be sampled, stored on and covered by plastic sheeting, properly labeled and disposed at an appropriate disposal facility based on analytic results. Steam cleaning rinsate will be transported to the Shell refinery in Martinez, California for recycling.

Reporting: WA will prepare a report presenting the results of the investigation. The report will include:

- A summary of the site background and history;
- A description of potential onsite and offsite hydrocarbon sources;
- Descriptions of the drilling and sampling;
- Boring logs and well construction details;
- Tabulated soil and ground water analytic results;
- Analytic reports and chain-of-custody forms for the soil and ground water samples;
- A figure presenting benzene distribution in ground water; and
- Conclusions.

SCHEDULE

WA will conduct this investigation after receiving your approval of this workplan and obtaining the necessary CalTrans and Zone 7 permits. We will submit a report presenting the results of the investigation after completing all field work.

Please call us if you have any questions.

Sincerely,
Weiss Associates

Janet K. Macdonald
Senior Staff Hydrogeologist

James W. Carmody, C.E.G.
Senior Project Hydrogeologist

JKM/JWC:jm

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Attachments: Figures
A - Previous Reports and Records
B - Previous Analytic Data
C - Standard Field Procedures

cc: Dan Kirk, Shell Oil Company, P.O. Box 5278, Concord, California 94520-9998
Lester Feldman, Regional Water Quality Control Board - San Francisco Bay, 2101 Webster Street, Suite 500, Oakland, California 94612

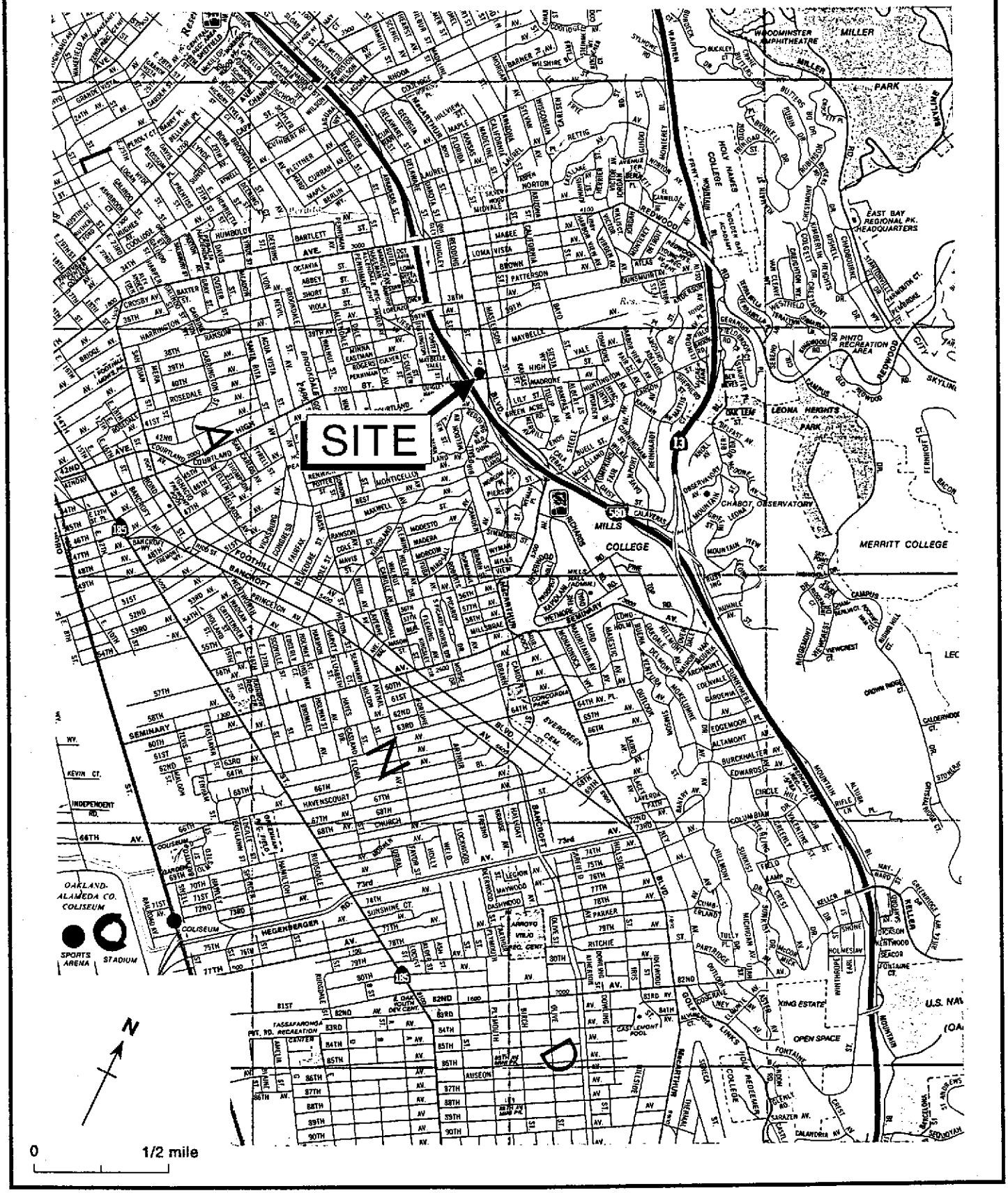

Figure 1. Site Location Map - Shell Service Station WIC# 204-5510-0600, 4255 MacArthur Boulevard, Oakland, California

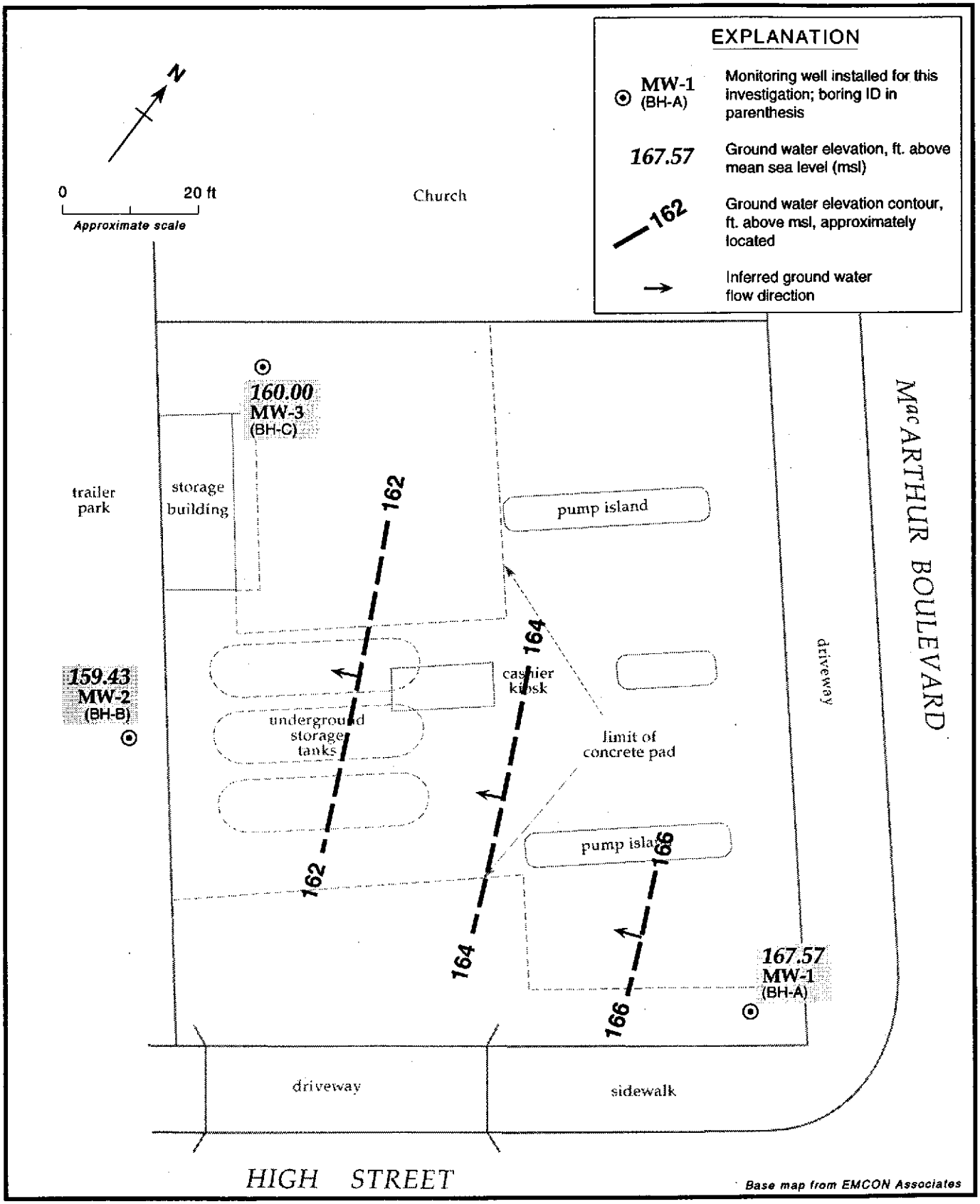

Figure 2. Monitoring Well Locations and Ground Water Elevations - January 20, 1994 - Shell Service Station WIC #204-5510-0600, 4255 MacArthur Boulevard, Oakland, California

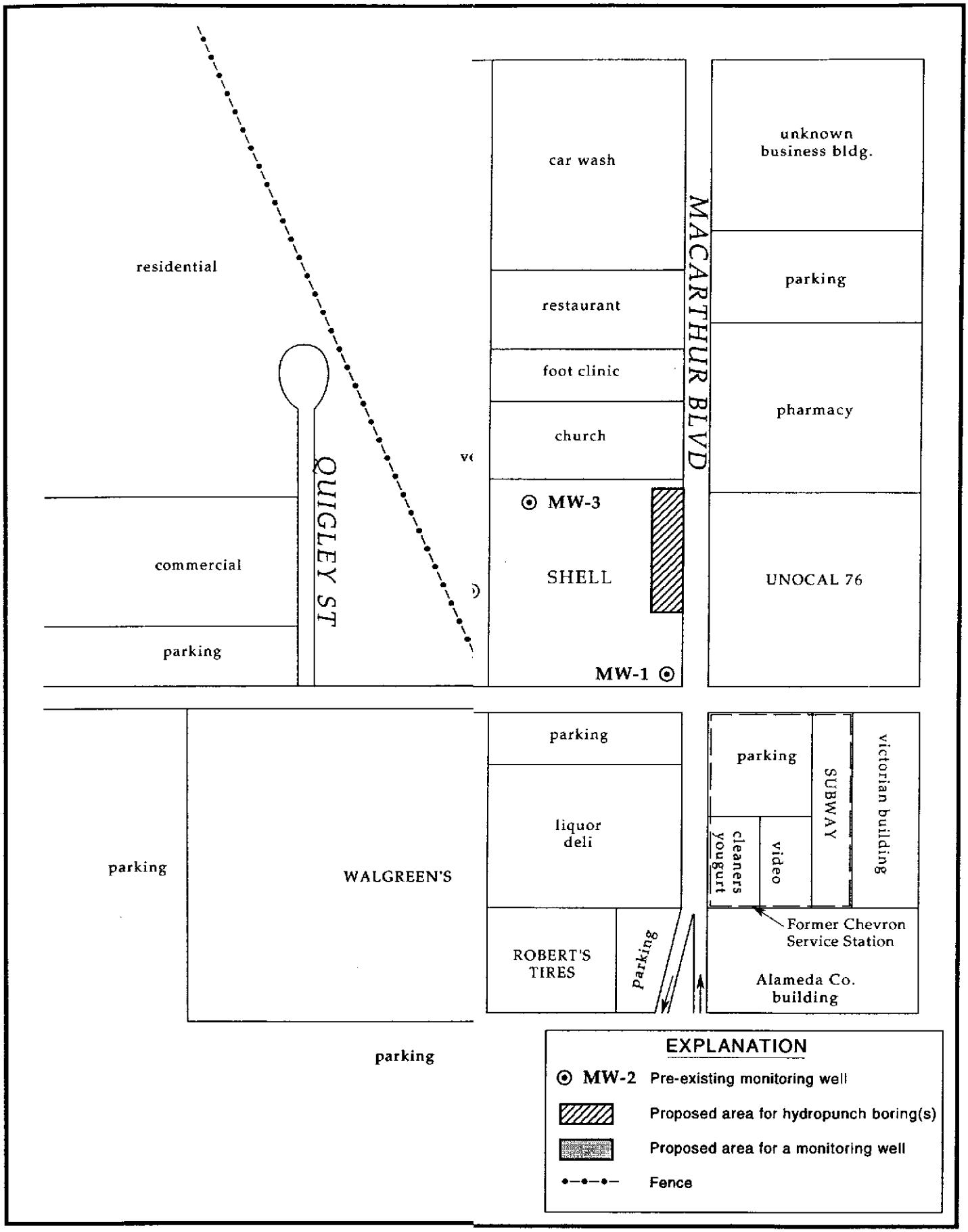

Figure 3. Proposed Boring and Well Locations, Businesse

ATTACHMENT A

PREVIOUS REPORTS AND RECORDS

ATTACHMENT B

PREVIOUS ANALYTIC DATA

Table B-1. Analytic Results for Soil - Shell Service Station WIC #204-5510-0600, 4255 MacArthur Boulevard, Oakland, California

Boring ID (Well ID)	Sample Depth (ft)	Date Sampled	Ground Water Depth (ft)	TPH-G	B	E	T	X
				<----------parts per million (mg/kg)---------->				
BH-A	6.0	11/03/93	8.56	<1	<0.0025	<0.0025	<0.0025	<0.0025
(MW-1)	10.5	11/03/93		26	0.4	0.12	0.028	0.62
	14.0	11/03/93		24	0.028	0.062	0.02	0.32
	18.0	11/03/93		<1	<0.0025	<0.0025	<0.0025	<0.0025
	22.0	11/03/93		<1	0.0063	0.0097	0.0094	0.057
BH-B	6.0	11/03/93	12.07	<1	<0.0025	<0.0025	<0.0025	<0.0025
(MW-2)	9.0	11/03/93		7.6	0.069	0.044	<0.0025	0.11
	14.0	11/03/93		66	0.07	0.53	0.44	2.6
	18.5	11/03/93		<1	0.032	0.0042	0.012	0.02
	24.0	11/03/93		<1	0.021	0.0037	0.023	0.021
BH-C	6.5	11/04/93	15.27	<1	<0.0025	<0.0025	<0.0025	<0.0025
(MW-3)	11.3	11/04/93		1,700	1.1	33	2.5	44
	16.0	11/04/93		610	3.3	6.9	5.7	33
	22.5	11/04/93		<1	<0.0025	<0.0025	<0.0025	<0.0025

Abbreviations

TPH-G = Total petroleum hydrocarbons as gasoline by modified EPA Method 8015
B = Benzene by EPA Method 8020
E = Ethylbenzene by EPA Method 8020
T = Toluene by EPA Method 8020
X = Xylenes by EPA Method 8020
<n = Not detected above method detection limit of n ppb

Analytical Laboratory:

National Environmental Testing (NET) Pacific, Inc., Santa Rosa, California

Table B-2. Analytic Results for Ground Water, Shell Service Station WIC #204-5510-0600, 4255 MacArthur Blvd., Oakland, California

Well ID	Date Sampled	Depth to Water (ft)	TPH-G	B	E	T	X
			<----------parts per billion (µg/L)---------->				
MW-1	11/17/93	8.59	410	21	7.9	11	47
	01/20/94	8.22	1,200	180	48	19	47
MW-2	11/17/93	12.31	31,000	9,400	1,000	4,600	3,900
	01/20/94	11.48	40,000	6,900	780	5,600	4,100
	01/20/94[dup]	11.48	41,000	7,200	900	6,200	4,800
MW-3	11/17/93	15.40	18,000	5,400	720	660	2,200
	01/20/94	14.61	55,000	13,000	2,200	2,600	6,500
Trip Blank	01/20/94		<50	<0.5	<0.5	<0.5	<0.5
DTSC MCLs			NE	1	680	100[a]	1,750

Abbreviations:

TPH-G = Total petroleum hydrocarbons as gasoline by Modified EPA Method 8015
TPH-D = Total petroleum hydrocarbons as diesel by Modified EPA Method 8015
B = Benzene by EPA Method 8020
E = Ethylbenzene by EPA Method 8020
T = Toluene by EPA Method 8020
X = Xylenes by EPA Method 8020
NE = Not established
DTSC MCLs = California Department of Toxic Substances Control maximum contaminant levels for drinking water
--- = Not analyzed
<n = Not detected at detection limits of n ppb
dup = Duplicate sample

Notes:

a = DTSC recommended action level; MCL not established

ATTACHMENT C

STANDARD FIELD PROCEDURES

STANDARD FIELD PROCEDURES

WA has developed standard procedures for drilling and sampling soil borings and installing, developing and sampling ground water monitoring wells. These procedures comply with Federal, State and local regulatory guidelines. Specific procedures are summarized below.

FIELD WORK PREPARATIONS

Site Safety Plan

WA prepares a site-specific safety plan based upon the site history, previous work and analytic results for soil and water samples previously collected at the site for each phase of work at a particular site. The safety plan will identify potential site hazards and specify procedures to protect site workers and the public.

Utility Lines

Prior to drilling, WA typically visits the site to locate overhead and underground utility lines. WA notifies Underground Service Alert of all scheduled drilling activities and often contracts a private line locator as well. All borings are hand-dug and probed to at least 5 ft depth before drilling.

SOIL BORING AND SAMPLING

Objectives/Supervision

Soil sampling objectives include characterizing subsurface lithology, assessing whether the soils exhibit obvious hydrocarbon or other compound vapor or staining, and collecting samples for analysis at a State-certified laboratory. All borings are logged using the Unified Soil Classification System by a trained geologist working under the supervision of a California Registered Geologist (RG) or a Certified Engineering Geologist (CEG).

Soil Boring and Sampling

Deep soil borings or borings for well installation are typically drilled using hollow-stem augers. Split-barrel samplers lined with steam-cleaned brass or stainless steel tubes are driven through the hollow auger stem into undisturbed sediments at the bottom of the borehole using a 140 pound hammer dropped 30 inches. Soil samples can also be collected without using hollow-stem augers by progressively driving split-barrel soil samplers to depths of up to 30 ft.

Soil samples are collected at least every five ft to characterize the subsurface sediments and for possible chemical analysis. Near the water table and at lithologic changes, the sampling interval may be less than five ft. Ground water sample may be collected from a soil boring by inserting a temporary slotted casing in the boring, purging the boring of as much water as possible with a steam-cleaned bailer and decanting ground water from the bailer into the appropriate sample containers.

Drilling and sampling equipment is steam-cleaned prior to drilling and between borings to prevent cross-contamination. Sampling equipment is washed between samples with trisodium phosphate or an equivalent EPA-approved detergent.

Sample Analysis

After noting the lithology at each end of the sampling tubes, the tube chosen for analysis is immediately trimmed of excess soil and capped with teflon tape and plastic end caps. The sample is labelled, stored at or below 4°C, and transported under chain-of-custody to a State-certified analytic laboratory.

Screening

One of the remaining tubes is partially emptied leaving about one-third of the soil in the tube. The tube is capped with plastic end caps and set aside to allow hydrocarbons to volatilize from the soil. After ten to fifteen minutes, a portable photoionization detector (PID) measures volatile hydrocarbon vapor concentrations in the tube headspace, extracting the vapor through a slit in the cap. PID measurements are used along with the stratigraphy and ground water depth to select soil samples for analysis.

Grouting

If the borings are not completed as wells, the borings are filled to the ground surface with cement grout poured or pumped through a tremie pipe. If wells are completed in the borings, the well installation, development and sampling procedures summarized below are followed.

MONITORING WELL INSTALLATION, DEVELOPMENT AND SAMPLING

Well Construction and Surveying

Wells are installed to monitor ground water quality and determine the ground water elevation, flow direction and gradient. Well depths and screen lengths are based on ground water depth, occurrence of hydrocarbons or other compounds in the borehole, stratigraphy and State and local regulatory guidelines. Well screens typically extend 15 ft below and 5 ft above the static water level at the time of drilling. However, the well screen will generally not extend into or through a clay layer that is at least three ft thick.

Well casing and screen are flush-threaded, Schedule 40 PVC. Screen slot size varies according to the sediments screened, but slots are generally 0.010 or 0.020 inches wide. A rinsed and graded sand occupies the annular space between the boring and the well screen to about one to two ft above the well screen. A two ft thick hydrated bentonite seal separates the sand from the overlying sanitary surface seal composed of cement with 3-5% bentonite.

Well-heads are secured by locking well-caps inside traffic-rated vaults finished flush with the ground surface. A stovepipe may be installed between the well-head and the vault cap for additional security.

The well top-of-casing elevation is surveyed with respect to mean sea level and the well is surveyed for horizontal location with respect to an onsite or nearby offsite landmark by a California-registered land surveyor.

Well Development

After 24 hours, the wells are developed using a combination of ground water surging and extraction. Surging agitates the ground water and dislodges fine sediments from the sand pack. After about ten minutes of surging, ground water is extracted from the well using bailing, pumping

and/or reverse air-lifting through an eductor pipe to remove the sediments from the well. Surging and extraction continue until at least ten well-casing volumes of ground water are extracted and the sediment volume in the ground water is negligible. All equipment is steam-cleaned prior to use and air used for air-lifting is filtered to prevent oil entrained in the compressed air from entering the well. Wells that are developed using air-lift evacuation are not sampled until at least 24 hours after they are developed.

Floating Hydrocarbon Thickness and Water Level Measurements

Prior to sampling, each well is checked for the presence of floating hydrocarbons. If floating hydrocarbons are present, WA will measure the floating hydrocarbon thickness in the well with an oil/water interface probe. The water level in each well is also measured with respect to the top of the PVC casing to the nearest 0.01 ft using an electric sounder. The sounder is thoroughly rinsed with deionized water between measurements to prevent cross-contamination.

Ground Water Sampling

Depending on local regulatory guidelines, three to four well-casing volumes of ground water are purged prior to sampling. Purging continues until ground water pH, conductivity, and temperature have stabilized. Ground water samples are collected using bailers or pumps and are decanted into the appropriate containers supplied by the analytic laboratory. Samples are labelled, placed in protective foam sleeves, stored at 4°C, and transported under chain-of-custody to the laboratory. Laboratory-supplied trip blanks accompany the samples and are analyzed to check for cross-contamination. An equipment blank may be analyzed if non-dedicated sampling equipment is used.

SOIL DISPOSAL

Drill cuttings are temporarily stockpiled on and covered with plastic sheeting or in steel 55-gallon steel at the site. One soil sample is collected for approximately every 12.5 cubic yards of soil. Up to four soil stockpile samples may be composited into one sample for analysis. A certified analytic laboratory generally analyzes the sample(s) for compounds that are suspected to be in the subsurface. Pending the analytic results and acceptance at an appropriate disposal facility, the soil will be transported to the disposal facility by a licensed waste hauler.