

5510 3957



Chevron

May 28, 1999

Chevron Products Company
6001 Bollinger Canyon Road
Building L, Room 1080
PO Box 6004
San Ramon, CA 94583-0904

Mr. Tom Peacock
Alameda County Health Care Services
Department of Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

Philip R. Briggs
Project Manager
Site Assessment & Remediation
Phone 925 842-9136
Fax 925 842-8370

Subject: Notice of Proposed Action Submitted to Alameda County
For: Former Signal Oil Marine Terminal
2301-2337 Blanding Avenue, Alameda, California

Dear Mr. Peacock:

In accordance with section 25297.15(a) of Chapter 6.7 of the Health & Safety Code, Chevron Products Company, certify that we have notified the responsible landowner of the enclosed proposed action. Space is checked for the applicable proposed action:

X Site closure proposal

Sincerely,
CHEVRON PRODUCTS COMPANY

Philip R. Briggs
Site Assessment and Remediation Project Manger

*called
6-4-99*

CC Ms. Julie Beck Ball
Ms. Helen Beck Kleeman
Mr. Peter Reinhold Beck
2720 Broderick Street
San Francisco, CA 94123 Certified-Return Receipt Requested (P238535629)

Mr. Chuck Headlee
RWQCB-San Francisco Bay Region
2101 Webster Street, Suite 500
Oakland, CA 94612

Ms. Bette Owen, Chevron

99 JUN -3 PM 2:53
ENVIRONMENTAL PROTECTION



Chevron

May 28, 1999

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Department of Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

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Philip R. Briggs
Project Manager
Site Assessment & Remediation
Phone 925 842-9136
Fax 925 842-8370

Subject: Certified List of Record Fee Title Owners
For: Former Signal Oil Marine Terminal
2301-2337 Blanding Avenue, Alameda, California

Dear Mr. Peacock:

In accordance with section 25297.15(a) of Chapter 6.7 of the Health & Safety Code, Chevron Products Company, certify that the following is a complete list of current record fee title owners and their mailing addresses for the above site:

Ms. Julie Beck Ball
Ms. Helen Beck Kleeman
Mr. Peter Reinhold Beck
2720 Broderick Street
San Francisco, CA 94123

Sincerely,

CHEVRON PRODUCTS COMPANY

Philip R. Briggs

Site Assessment and Remediation Project Manger

CC Mr. Chuck Headlee
RWQCB-San Francisco Bay Region
2101 Webster Street, Suite 500
Oakland, CA 94612

Ms. Bette Owen, Chevron

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Mr. Tom Peacock
Alameda County Health Care Services
Department of Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

**Re: Former Signal Oil Marine Terminal
2301-2337 Blanding Avenue
Alameda, California**

Dear Mr. Peacock:

Enclosed is a copy of the *Soil and Groundwater Investigation Results* report, dated May 7, 1999, that was prepared by our consultant RRM Engineering Contracting Firm on the above noted site. The purpose of the investigation was to collect data to complete a Risk Based Corrective Action (RBCA) assessment, identify the beneficial use of groundwater beneath the site, determine the background water quality in Alameda Canal and determine if biodegradation is occurring beneath the site.

The results of the investigation indicated that this site should be considered a low risk groundwater case. The results of the RBCA assessment indicate that there does not appear to be a risk to human health based on the volatilization and indoor or outdoor accumulation of hydrocarbons at the site. Based on the information presented, further remedial action or monitoring at this site does not appear to be warranted.

Therefore, Chevron proposes that no further action is warranted and requests that the site be closed.

99 JUN -3 PM 3:27
ENVIRONMENTAL
PROTECTION

May 28, 1999
Mr. Tom Peacock
Former Signal Oil Marine Terminal
Page 2

If you have any questions or comments, please call me at (925) 842-9136.

Sincerely,
CHEVRON PRODUCTS COMPANY



Philip R. Briggs
Site Assessment and Remediation Project Manger

Enclosure

Cc: Ms. Bette Owen, Chevron

Ms. Anne Payne, Chevron

Mr. Chuck Headlee
RWQCB-San Francisco Bay Region
2101 Webster Street, Suite 500
Oakland, CA 94612

Ms. Julie Beck Ball
2720 Broderick Street
San Francisco, CA 94123 (less report-sent under separate cover)

Mr. Monroe J. Wingate
160C Donahue Street #242
Sausalito, CA 94965-1250 (less report-sent under separate cover)



May 7, 1999
Project AA46

Mr. Phil Briggs
Chevron Products Company
6001 Bollinger Canyon Road
San Ramon, California

Re: *Soil and Groundwater Investigation Results*
Former Signal Oil Marine Terminal
2301-2332 Blanding Avenue
Alameda, California

Dear Mr. Briggs:

This report, prepared by RRM, Inc. (RRM) on behalf of Chevron Products Company (Chevron), documents the results of a soil and groundwater investigation performed at the referenced site (Figure 1), and presents the results of a Tier 2 Risk Based Corrective Action (RBCA) assessment. The soil and groundwater investigation was performed on October 28 and 29, 1998. The purpose of the investigation was to: (1) collect site specific data to complete a Tier 2 RBCA assessment; (2) identify the beneficial uses of groundwater beneath the site; (3) determine the background water quality in Alameda Canal; and (4) collect data to determine whether biodegradation of petroleum hydrocarbons is occurring beneath the site. This report includes a site background discussion, scope of work, investigation results, conclusions, and recommendations. Information for the site background was obtained from a document titled "*Soil Investigation and Shallow Groundwater Survey*" by Geomatrix, dated September 1995.

SITE BACKGROUND

The site, totaling approximately 3.5 acres, is located in the City of Alameda, Alameda County, California. The site is bounded to the north by the Alameda Canal, to the south by Blanding Avenue, to the east by Park Street, and to the west by an industrial property.

A Preliminary Site Assessment (PSA) was performed by CET Environmental Services and summarized in a report dated January 13, 1995. The report indicated that a Signal Oil and Gas Company Gasoline Distributing Station operated at the site from at least 1930 until about 1961. Eight above ground storage tanks, concrete secondary containment walls, underground piping, offices and storage buildings, a loading rack, and pumping station were used for petroleum hydrocarbon fuel/lubricant storage and distribution at the site. Storage and distribution

operations were located in the western quarter of the site. Between 1957 and 1963, the buildings at the site were reportedly removed. From 1973 to 1983, the northwestern portion of the site was used as a construction yard and for boat repair services. A restaurant and paved parking area, and a possible automobile sales lot reportedly occupied the southeastern portion of the site during this time. Since 1987, the site has been used as an office center and boat landing. Existing improvements include office buildings, a paved parking lot, walking paths, landscaping, and a concrete seawall and boat slips along the Alameda Canal.

Geomatrix conducted a soil and shallow groundwater investigation at the site, and documented the work in a report dated September 1995. Eight soil borings (SB-1 through SB-8) were advanced for the purpose of soil and groundwater sampling (Figure 2). The report documenting the investigation concluded that petroleum hydrocarbons were present in shallow soil and groundwater beneath the site.

SCOPE OF WORK

Task 1 - Collect Site Specific Data to Complete a Tier 2 RBCA: Borings SB-9 through SB-12 were advanced to depths of approximately 15 to 18 feet below ground surface (bgs) using a Geoprobe®. Boring locations are shown on Figure 2. Soil samples were collected continuously from ground surface to the bottom of each boring for logging purposes, for field analysis utilizing a photo-ionization detector, and for physical and chemical analyses. Additionally, grab groundwater samples were collected from each Geoprobe boring (at 10 to 15 feet bgs) for laboratory analyses. A temporary well casing was installed into each bore, and temporary well points were surveyed to a relative site datum by a licensed surveyor. Field procedures are described in Attachment A. Boring logs, field data sheets, and survey data are presented in Attachment B.

Soil and groundwater samples were analyzed by a California State-Certified Laboratory for the presence of gasoline range total purgeable petroleum hydrocarbons (TPPHg); diesel range total extractable petroleum hydrocarbons (TEPHd); benzene, toluene, ethylbenzene, and xylenes (collectively BTEX); and methyl tertiary butyl ether (MtBE). Additionally, soil samples were analyzed to determine moisture content, total organic carbon (TOC), specific gravity, percent porosity, void ratio, saturation ratio, and dry density. } For RBCA?

Task 2 - Determine Groundwater Flow Direction, Gradient, and Tidal Fluctuations Influencing Groundwater Beneath the Site: In order to evaluate the variables influencing groundwater flow direction and gradient beneath the site, RRM collected time series depth to groundwater data over a period of two days. Data were then compared with water elevation data for the Alameda Canal (collected from the Park Street Bridge), and high and low tide information for Alameda, California.

Task 3 - Identify the Beneficial Uses of Groundwater Beneath the Site: In order to establish applicable beneficial uses of groundwater beneath the site, beneficial uses and associated water quality goals were identified, groundwater samples were collected from each temporary well and

analyzed for total dissolved solids (TDS), and a well survey was conducted for an area within a ¼-mile radius of the site.

Task 4 - Determine the Background Water Quality in Alameda Canal: One grab sample, designated CS-1, was collected from the canal approximately 300 feet north of Geomatrix survey point GWS-9; another grab sample, designated CS-2, was collected from the canal at a location in line with GWS-9; and another grab sample, designated CS-3, was collected from the canal approximately 600 feet southeast of sample GWS-9 (Figure 2). All three grab water samples from the canal were analyzed for the presence of TPPHg, TEPHd, BTEX, MtBE. In addition, the canal grab sample designated CS-2 was analyzed for chlorine and bromine.

Task 5 - Collect Data to Determine Whether Biodegradation of Petroleum Hydrocarbons is Occurring Beneath the Site: Grab groundwater samples were collected from soil borings SB-9 through SB-12 and analyzed by a California State Certified Laboratory for sulfate and nitrate. Dissolved oxygen concentrations were determined in the field using a YSI Model 55 Dissolved Oxygen Meter, and the reduction/oxidation (redox) potential was determined in the field using a Corning ORP-65 redox meter.

What type of microbes?

Task 6 - Perform a Tier 2 RBCA Evaluation: Using data collected by completing Tasks 1 through 3, an evaluation of public health risks posed by residual petroleum hydrocarbons found in soil and groundwater at the site was completed. Software developed by GSI, Inc. was used in determining Site Specific Target Levels (SSTLs) for relevant petroleum hydrocarbon constituents.

INVESTIGATION FINDINGS

Subsurface Soil Conditions: Soils encountered during the investigation consisted of fill material from the ground surface to depths ranging from 3 feet bgs in Boring SB-9 to 6 feet bgs in Boring SB-11. Underlying the fill material, native soil consisted of sandy clay and clayey sand to depths ranging from approximately 13 to 16 feet bgs. Below the sandy clay and clayey sand, poorly graded sand was encountered to the total depths of the borings, which ranged from 15 to 18 feet bgs. The boring logs for Borings SB-9 through SB-12 are presented in Attachment B.

Soil Analytical Data: Petroleum hydrocarbon concentrations were present in soil samples collected from Borings SB-9, SB-10, and SB-11. At Boring SB-9, TPPHg were detected in soil samples from 5 to 6 feet bgs and 13 to 14 feet bgs at concentrations of 130 parts per million (ppm) and 900 ppm, respectively; TPPHg were not detected in the 15 to 16-foot sample. At Boring SB-9, TEPHd were detected at concentrations of 2,200 ppm in the 5 to 6-foot bgs sample and 620 ppm in the 13 to 14-foot bgs sample; TEPHd were not detected in the 15 to 16-foot sample. Benzene was present in soil from Boring SB-9 at 5 to 6 feet bgs, 13 to 14 feet bgs, and 15 to 16 feet bgs at concentrations of 0.36, 3.3, and 0.22 ppm, respectively. At Boring SB-10, only TEPHd were detected (80 ppm at 5.5 to 6.5 feet bgs). At Boring SB-11, the soil sample from 6 to 7 feet bgs contained 140 ppm TPPHg and 27 ppm TEPHd; benzene was not detected in soil from this boring. MtBE was detected only at Boring SB-9 in the 13 to 14-foot sample at a

concentration of 12 ppm. With respect to the detection of MtBE in soil from SB-9, this result is likely a false positive associated with EPA Method 8020. Further, fueling operations ceased at the site (pre-1961), decades before MtBE was used as a fuel additive in California. Soil analytical data are summarized in Table 1, and a soil concentration map is presented as Figure 3. The certified analytical results and chain of custody documentation are presented as Attachment C.

Regarding the detection of TEPHd, soil sample extracts were subjected to silica gel cleanup to remove biogenic compounds from the sample extract. These compounds are the products resulting from biological activity involving the degradation of petroleum products. In all cases, the concentration of TEPHd was reduced by silica gel cleanup. This information indicates that biodegradation of TEPHd is occurring, and that there are other naturally occurring hydrocarbon compounds beneath the site.

Really?

Groundwater Analytical Data: TPPHg were present in groundwater samples from Borings SB-9 and SB-11 at 14,000 parts per billion (ppb) and 310 ppb, respectively. TEPHd were present in groundwater samples from Borings SB-9 and SB-12 at concentrations of 62,000 ppb and 170 ppb, respectively. Only benzene and MtBE were detected in the groundwater samples from Boring SB-9 at concentrations of 1,400 ppb and 260 ppb, respectively. While MtBE was detected using Environmental Protection Agency (EPA) Method 8020, detection was not confirmed using EPA Method 8260. As is the case with soil, this result is likely a false positive associated with EPA Method 8020. Petroleum hydrocarbons and MtBE were not detected in groundwater samples from Borings SB-10 or SB-12. As with soil samples, silica gel cleanup of sample extract reduced TEPHd concentrations. Groundwater analytical data are presented in Table 2, a groundwater concentration map is presented on Figure 4. The certified analytical results and chain of custody documentation are presented as Attachment C.

Do an 8260 to confirm for MtBE.

Physical Soil Parameters: Samples were collected from the vadose and saturated zones at Borings SB-9 through SB-12 and analyzed to provide total organic carbon content, percent porosity, void ratio, percent saturation, percent moisture, natural bulk density, and dry bulk density. Total organic carbon ranged from 120 milligrams per kilogram (mg/kg) at Boring SB-12 to 2,000 mg/kg at Boring SB-10; porosity ranged from 24.8 percent at Boring SB-11 to 42.3 percent at Boring SB-10, and the natural bulk density ranged from 1.80 grams per cubic centimeter (g/cc) to 2.22 g/cc. Physical properties data for soil are presented in Table 3. The certified analytical results and chain of custody documentation are presented as Attachment C.

Groundwater Flow Direction and Gradient: On October 28, 1998, depth to groundwater was measured in Borings SB-9 through SB-12 (Table 4). Soil boring elevations were surveyed to a benchmark (designated CWL-1) measured from a point on the Park Street bridge. An arbitrary elevation of 100 feet was used as the elevation of the benchmark. Based on the measurements, the groundwater flow direction was determined to be northerly across the site toward the Alameda Canal. The approximate groundwater gradient was calculated to be 0.01 (Figure 5).

Tidal Influence: On October 28th and 29th, 1998, depth to water was measured in Borings SB-9 through SB-12 (groundwater) and at CWL-1 (Alameda Canal surface water) on six or more occasions (Table 4). Measurements plotted against time are presented on Figure 6. The measurements indicate that the maximum fluctuation of the water surface below the Park Street Bridge (Alameda Canal surface water) occurred between 8:31 a.m. and 1:04 p.m. The water surface in the canal varied between 81.11 feet and 78.49 feet (total fluctuation of 2.62 feet). Tidal data indicate that on October 29, 1998, a high tide of 5.51 feet relative to mean sea level (msl) occurred at 7:29 a.m. and a low tide of 2.74 feet msl occurred at 1:11 p.m. for a total fluctuation of 2.77 feet. This correlates closely with the measured fluctuation at CWL-1 of 2.62 feet.

Spring tide fluctuation are more extreme.

Groundwater fluctuations in Borings SB-10, SB-11, and SB-12 were minimal. Of these three borings, the maximum groundwater fluctuation was noted in Boring SB-10 at 0.23 feet. At Boring SB-9, a groundwater fluctuation of 0.42 feet was noted with the high level occurring at 11:31 a.m., and low level occurring at 2:08 p.m. Boring SB-9 was located approximately 60 feet from the canal, Borings SB-10, SB-11, and SB-12 were located approximately 120, 260, and 330 feet from the canal, respectively.

Still tidally influenced.

Well Survey: A ½-mile radius well survey was performed for the purpose of identifying the locations of existing wells within close proximity of the site. Nine wells were identified within the specified radius. Of these nine wells, one is a recovery well, one is an irrigation well, five are extraction wells, and two are industrial wells. Specific well data are presented in Table 5, and well locations are presented on Figure 7.

How close to the site are the irrigation & industrial wells?

All far enough away.

Total Dissolved Solids: Total dissolved solid (TDS) concentrations were analyzed at Borings SB-9 through SB-10 and in the Alameda Canal at sample location CS-2 (see Table 6). In the soil borings, TDS ranged from 460 ppm at Boring SB-11 to 1,300 ppm at Boring SB-9. At sample location CS-2, the TDS concentration was 28,000 ppm. The concentrations within the soil borings did not exceed the 3,000 ppm threshold criteria for municipal and domestic supply.

Beneficial Uses of Groundwater: Present and potential beneficial uses of groundwater beneath the site include municipal and domestic supply, agricultural water supply, industrial water supply, industrial process water supply, and freshwater replenishment to surface water. Each of these beneficial uses is discussed below in terms of applicability to groundwater beneath the site.

- **Municipal and Domestic Supply:** California State Water Resources Control Board Resolution 88-63 specifies that all groundwater is suitable for municipal and domestic supply, unless conditions preclude its use. Exceptions precluding the municipal and domestic supply designation include existing high TDS concentrations (greater than 3,000 ppm) and low sustainable yields (less than 200 gallons per day). Since groundwater conditions beneath the site do not preclude its possible use as a municipal and domestic supply, numeric water quality goals associated with this use pertain; however, it is not likely a municipal or domestic well will be installed at or near the site. The placement

of extraction well(s) adjacent to the Alameda Canal for municipal or domestic supply would provide an antecedent condition for the infiltration of saltwater from the canal into the shallow water bearing zone beneath the site. This supposition is supported by information that indicates that within a ½-mile radius of the site, there are no municipal or domestic water supply wells near the site.

↑ but there are industrial & irrig. wells.

- **Industrial Water Supply and Industrial Process Water Supply:** Two industrial water supply wells are located within a ½-mile of the site, suggesting that groundwater in the area is used for industrial supply. Since water treatment can be used to produce the desired water quality, there are no specific water quality goals associated with this beneficial use. It is not likely that shallow occurring groundwater beneath the site would ever be used for industrial supply because of the possibility of salt water infiltration.

← Not necessarily.

- **Agricultural Water Supply:** One irrigation well was identified as being located within a ½-mile of the site, implying that groundwater in the area is used as agricultural water supply. There are no water quality goals for agricultural water supply that pertain to the petroleum hydrocarbon constituents found in groundwater beneath the site. As with industrial supply, it is not likely that shallow occurring groundwater beneath the site would ever be used for irrigation.

← But it does pertain to TDS issues.

- **Freshwater Replenishment to Surface Water:** It is probable that groundwater beneath the site provides freshwater replacement to surface water adjacent to the site. While there are no specific water quality goals for this use, the California Regional Water Quality Control Board - San Francisco Region, Water Quality Control Plan states that groundwater shall not contain concentrations of chemicals in amounts that will adversely affect the beneficial use of the receiving surface water (Alameda Canal). *A Compilation of Water Quality Goals*, by J. Marshack (March 1988), provides the following water quality goals for California Enclosed Bays and Estuaries (30 day average; aquatic organism consumption): 71 ppb benzene; 200,000 ppb toluene, and 29,000 ppb ethylbenzene.

never passed. Not Valid. Need to use SEPZ values.

Background Water Quality in Alameda Canal: Grab water samples CS-1, CS-2, and CS-3 were collected along the Alameda Canal at locations north, southeast, and adjacent to the site. All three grab samples were analyzed for the presence of TPPHg, TEPHd, BTEX, MtBE. None of these analytes were present in the surface water samples. In addition, the canal grab sample designated CS-2 was analyzed for chloride, bromide, and TDS. Chloride was present at a concentration of 10,000 ppm, bromide was present at a concentration of 100 ppm, and TDS was present at a concentration of 28,000 ppm. The certified analytical results and chain of custody documentation are presented as Attachment C, data are provided on Tables 2 and 6.

*General
& Selective
Populations
Microbes capable
of degrading
contaminant.*

Biodegradation Assessment: Dissolved oxygen concentrations were measured the day the borings were installed (approximately 1 to 2.5 hours after installation), and the next day (up to 24 hours after boring installation). In all cases, it was noted that oxygen concentrations decreased over time. Initial dissolved oxygen concentrations ranged from 0.75 ppm in Boring SB-9 to 4.78 ppm in Boring SB-11; final dissolved oxygen results ranged from 0.39 ppm in Boring SB-10 to 0.59 ppm in Boring SB-12.

Redox potential measurements were made the day after the borings were installed; two measurements were made at each boring at approximately 3 hours apart. All measurements for redox potential were negative; the final redox potential ranged from -33 millivolts in Boring SB-10 to -76 millivolts in Boring SB-11.

Nitrate concentrations were all below 1.0 ppm; and sulfate concentrations ranged from 22 ppm at Boring SB-9 to 93 ppm at Boring SB-11. The biodegradation assessment data are presented in Table 6. Certified analytical reports and chain of custody documentation are presented as Attachment C.

RBCA EVALUATION

The Exposure Evaluation Flowchart (RBCA, page 8) was used to characterize primary and secondary sources, transport mechanisms, exposure pathways, and receptors. Given the exposure pathway and receptor scenario, ~~the~~ site specific target levels (SSTLs) were calculated for the constituents of concern. Exposure scenarios were developed using United States Environmental Protection Agency (USEPA) reasonable maximum exposure parameters for adult males. Once SSTLs were calculated, they were compared with site specific concentrations.

The Exposure Evaluation Flowchart was completed as follows:

Primary Sources: Without specific documentation, any one of the following could have been a primary source of petroleum hydrocarbons in the subsurface: general operations, storage tanks, aboveground and/or underground piping, drainage systems, and pumps. The tanks and appurtenances were removed and operations have ceased; therefore, there are no primary sources left at the site.

Secondary Sources: Secondary sources are linked to hydrocarbon residuals left in-place. Secondary sources at the site are dissolved hydrocarbons and hydrocarbon-affected soils. Soil and groundwater impact appears to be localized in two areas. The most significant concentrations were identified at Boring SB-9; hydrocarbons were found in soil samples collected between 5 and 14 feet bgs. There were no separate liquid phase hydrocarbons found at the site.

Transport Mechanisms: Hydrocarbon volatilization and atmospheric dispersion, hydrocarbon volatilization and indoor accumulation, and leaching with groundwater transport were identified as likely transport mechanisms. The primary source of hydrocarbons has been removed and it is likely biodegradation is acting to stabilize the dissolved hydrocarbon plume; consequently,

← Obviously?

further groundwater migration is not probable. It is possible that affected groundwater is entering Alameda Canal; however, dissolved petroleum hydrocarbons were not found in canal surface water samples. As such, hydrocarbon volatilization was considered the most likely transport mechanism.

↑ I don't think so.

How about the shallow water?

Exposure Pathways: Four exposure pathways are listed on the Exposure Evaluation Flowchart; soil ingestion/absorption, inhalation, potable water use, and recreation use/sensitive habitat.

Among these, soil ingestion/absorption and potable water use were not considered relevant exposure pathways because impacted soil is isolated at depth and shallow occurring groundwater in the vicinity of the site is not used, nor likely to be used, as a potable water source.

Also in SB-4, SB-3, SB-6, SB-2, + SB-1.

Concentrations of benzene were only present in soil and groundwater at Boring SB-9, additionally, soil and groundwater samples from Boring SB-9 contained concentrations of toluene, ethylbenzene, and xylenes. Since Boring SB-9 was approximately 100 feet from the nearest building, the volatilization and atmospheric dispersion scenario was utilized for this assessment. Toluene, ethylbenzene, and xylenes were also present in soil and groundwater samples from Boring SB-11. Since Boring SB-11 was drilled adjacent to one of the buildings at the site, volatilization and enclosed space accumulation scenario was used to assess risk at this location.

Not good argument.

The site and area surrounding the site may be considered a sensitive habitat, and there are recreational uses associated with surface water in the area. Recreational use could result in the ingestion of impacted surface water, but this scenario is not likely. Impacted groundwater entering surface water would be significantly diluted (dissolved petroleum hydrocarbons were not detected in canal water), and swimming in the canal is not common because of low water temperature, high boat traffic, and overall poor water quality. Also, recreational use could result in the consumption of tainted aquatic organisms; however, aquatic organisms in the area are exposed to many other more toxic substances (e.g., heavy metals) and, according to public health officials, consumption of aquatic organisms from the area is not recommended. The more probable scenario is the inhalation of vapors emanating from impacted soil and groundwater. To summarize, the most relevant human health exposure pathway related to petroleum hydrocarbon impact at the site is inhalation of vapor.

Not evaluation, most sensitive receptor.

Receptor Characterization: Receptors were characterized with consideration that the site is used for recreation, it is situated in a predominately commercial area, and the water front may serve as a habitat for various forms of marine wildlife.

Site Specific Target Levels

Physical soil parameters, estimated by analyzing soil samples (Table 3), depth to groundwater, and depth to soil impact, were input. Default values were used for other groundwater, air, and building parameters. The more stringent benzene slope factor of 0.01 mandated by California was used to calculate the benzene SSTL, and an exposure risk factor of 1.0×10^{-6} (residential - recreational receptors) was used to provide conservative screening levels. SSTLs for soil and

groundwater are summarized in Table 7. Additionally, Table 7 includes applicable petroleum hydrocarbon concentrations detected in soil and groundwater at Borings SB-9 and SB-11.

really?
SEPT

In reference to Table 7, "none" is entered because the risk level is not exceeded at all possible dissolved levels, or for pure compound present at any concentration. Though the range of compounds characterized as TPPHg were identified in groundwater beneath the site, there are no established numerical goals associated with the remediation of these compounds (taste and odor thresholds are sometimes used). Additionally, the authors of RBCA state that TPPHg should not be used for risk assessment because the general measure of TPPHg provides insufficient information about the individual chemicals of concern.

Data in Table 7 show that site soil and groundwater petroleum hydrocarbon concentrations do not exceed the SSTLs for any of the exposure scenarios examined. Software output associated with calculation of SSTLs is provided as Attachment D.

CONCLUSIONS

Groundwater Flow Direction and Tidal Influence: Groundwater flow direction was consistent with regional topography. Given that groundwater fluctuations were relatively limited in Borings SB-10 through SB-12, RRM asserts that groundwater is tidally influenced to a limited degree in these areas. At Boring SB-9, a groundwater decrease of 0.42 feet was noted over a period of approximately 4.5 hours, while sea levels in the canal decreased 2.37 feet over the same period. This correlation suggests that the groundwater in the area of Boring SB-9 is tidally influenced, and tidal fluctuations would tend to stabilize the dissolved petroleum hydrocarbon plume in the area.

? How?
By pushing
the plume
away from
surface water
By expelling
degradation?
flow?

Beneficial Uses of Groundwater and Water Quality: To quantify the degree of degradation to groundwater quality beneath the site, relevant beneficial uses and associated water quality parameters were compared with site data. As previously stated, the placement of extraction well(s) screened in shallow groundwater adjacent to Alameda Canal for municipal, industrial, or irrigation supply would provide an antecedent condition for the infiltration of water from the canal (which contains TDS concentrations of 28,000 ppm). For this reason, the most applicable beneficial use of groundwater beneath the site is freshwater replenishment to surface water.

TPHg or TPHd
S.T. In the
Studies

For the constituents of concern in groundwater at the site, only benzene (1,400 ppb at Boring SB-9) exceeds the surface water quality goals (71 ppb benzene) for California enclosed bays and estuaries, when considering the human health 30-day average for aquatic organism consumption. Although the benzene level in groundwater exceeds this surface water quality goal, other site conditions suggest that shallow groundwater from beneath the site is not affecting surface water. It should be noted that: (1) samples CS-1, CS-2, and CS-3, collected from Alameda Canal, did not contain petroleum hydrocarbon concentrations; (2) two concrete sea-walls separate shallow groundwater beneath the site from the canal water, as evidenced by limited tidal influence; (3) tidal influence, coupled with the relatively low permeability of soil beneath the site, limit the

not passed.

more info
on this
sea wall

but it is still
tidally influenced

← How is that?

← Not a definite. Insufficient info.

mobility of dissolved petroleum hydrocarbons found beneath the site; and (4) natural attenuation and biodegradation are reducing benzene concentrations beneath the site.

Biodegradation Assessment: Depleted dissolved oxygen concentrations at each boring location provide evidence that biotic and abiotic reactions are occurring. RRM suspects that when each bore was first opened to atmosphere and mixing occurred, dissolved oxygen concentrations were increased. Subsequently over time, biotic and abiotic processes proceeded, dissolved oxygen was utilized, and dissolved oxygen concentrations decreased.

Evidence of petroleum hydrocarbon biodegradation can be seen in cases where dissolved oxygen concentrations decreased at a higher rate in wells with higher concentrations of TPPHg and TEPHd. At Boring SB-9, the location of the maximum petroleum hydrocarbon concentrations, the dissolved oxygen concentration never rose above 0.75 ppm. At Boring SB-11, the location of the second highest petroleum hydrocarbon concentrations (several orders of magnitude less than at Boring SB-9), the dissolved oxygen concentration fell from 4.78 ppm to 0.43 ppm over a 24-hour period. At Boring SB-12, a location where no petroleum hydrocarbons were detected, the dissolved oxygen concentration fell from 2.82 ppm to 1.13 ppm over a 19-hour period. The final dissolved oxygen concentrations at each boring indicate that biotic and abiotic utilization of oxygen is vigorous, and that anaerobic processes probably dominate the biodegradation of petroleum hydrocarbons at the site. This is supported by the redox potential measurements which show that subsurface conditions are reducing.

Evidence of anaerobic biodegradation is provided by sulfate concentration data. The lowest sulfate concentration was associated with Boring SB-9, which contained the highest concentrations of petroleum hydrocarbons in soil and groundwater. This further supports the supposition that anaerobic processes probably dominate the biodegradation of petroleum hydrocarbons at the site

In summary, there is evidence that petroleum hydrocarbons are being degraded both by aerobic and anaerobic microorganisms beneath the site. However, it appears that anaerobic processes dominate.

Tier 2 RBCA Evaluation: The SSTLs were not exceeded by site specific concentrations in soil or groundwater.

RECOMMENDATIONS

RRM recommends that this site be managed as a low risk groundwater case. In order to determine the current site status with respect to the low risk groundwater case criteria, site specific data were evaluated against criteria defined in the *Interim Guidance on Required Cleanup at Low Risk Fuel Sites* by the Regional Water Quality Control Board - San Francisco Bay Region. This evaluation is presented below.

1. **The leak has been stopped and ongoing sources, including free product, have been removed or remediated.**

All of the USTs formerly located on the property have been removed. There are no ongoing sources of petroleum hydrocarbons at the site. Free product has not been detected in groundwater.

2. **The site has been adequately characterized.** *More G-W. Monitoring req.*
Adequate characterization of petroleum hydrocarbon plume has been completed to the extent possible. Soil and groundwater concentrations have been defined to the north, south, and east. A sea wall abuts the site to the west and provides a barrier between the site and the Alameda Canal.
3. **Dissolved petroleum hydrocarbons are not migrating.** *→ This is not certain.*
Tidal fluctuations and the existence of a sea wall tend to stabilize the dissolved petroleum hydrocarbon plume. Additionally, biodegradation contributes to plume stabilization. Based on surface water sample analytical data collected from the Alameda Canal downgradient of the site, it appears that petroleum hydrocarbons are not migrating from the site.
- ✓ 4. **No water wells, deeper drinking water aquifers, surface water, or other sensitive receptors are likely to be impacted.**
A sea wall provides a barrier between the site and Alameda Canal. Shallow soils are relatively impermeable and impede the vertical and horizontal migration of petroleum hydrocarbons. Based on soil boring analytical results, it appears that petroleum hydrocarbon concentrations attenuate rapidly with depth and distance from the source area. There were no petroleum hydrocarbons detected in canal surface water. The results of a well survey performed by RRM during 1998 indicated that the nearest wells are located a minimum 300 feet southwest (upgradient) relative to the site. These wells are located at 2307 Clement Avenue in Oakland, California and are reportedly used for industrial purposes. There are no water supply wells near the site where receptors may be exposed.
5. **The site presents no significant risk to human health.**
It was determined that the applicable SSTLs are not exceeded. There appears to be no risk to human health due to the volatilization of dissolved hydrocarbons in soil or groundwater.
6. **The site presents no significant risk to the environment.** *Look at SEPE values.*
There are no surface water wetlands adjacent to the site, a sea wall provides a barrier between the site and Alameda Canal, and no petroleum hydrocarbons detected in canal surface water. It appears the site presents no significant risk to the environment.

RRM submits that the foregoing criteria have been met and that the site should be categorized as a Low Risk Groundwater Case. The results of the Tier 2 RBCA assessment indicate that there

does not appear to be a risk to human health based on the volatilization and indoor or outdoor accumulation of hydrocarbons at the site. Based on the information presented herein, further remedial action or monitoring at this site does not appear to be warranted.

If you have any questions regarding the contents of this report, please contact RRM at (831) 475-8141.

Sincerely,


RRM, Inc.



Robert Giattino
Chemical Engineer, PE



Dave Reinsma
Project Manager/Geologist



Joseph Muzzio
Project Geologist
CEG 1672



- Attachments:
- Table 1 - Soil Analytical Data
 - Table 2 - Groundwater Analytical Data
 - Table 3 - Physical Properties of Soils
 - Table 4 - Groundwater and Surface Water Elevation Data
 - Table 5 - Well Survey Data
 - Table 6 - Biodegradation Assessment Data
 - Table 7 - Comparison of Site Specific Target Levels with Applicable Petroleum Hydrocarbon Concentrations for Soil and Groundwater
 - Figure 1 - Site Location Map
 - Figure 2 - Soil Boring Location Map
 - Figure 3 - Soil Concentration Map
 - Figure 4 - Groundwater Concentration Map
 - Figure 5 - Groundwater Elevation Contour Map
 - Figure 6 - Soil Boring and Benchmark Hydrograph for October 29, 1998
 - Figure 7 - Well Survey Map
 - Attachment A - Field and Laboratory Procedures
 - Attachment B - Exploratory Boring Logs, Field Data Sheets, and Survey Data
 - Attachment C - Certified Analytical Reports and Chain-of-Custody Documentation
 - Attachment D - SSTL Calculation Output

Table 1
Soil Analytical Data
(Petroleum Hydrocarbons)

Former Signal Oil Marine Terminal
2301-2337 Blanding Avenue
Alameda, California

Sample ID	Date Sampled	Sample Depth (feet)	TPPHg (ppm)	TEPHd (ppm)	TEPHd		Benzene (ppm)	Toluene (ppm)	Ethyl-benzene (ppm)	Xylenes (ppm)	MtBE 8020 (ppm)
					Silica Gel Cleanup First Round (ppm)	Silica Gel Cleanup Second Round (ppm)					
SB-9	10/28/98	5-6	130	3,300	2,900	2,200	0.36	<0.12	<0.12	0.28	<0.62
	10/28/98	13-14	900	1,300	940	620	3.3	<1.2	2.1	2.0	12
	10/28/98	15-16	<1.0	1.2	<1.0	--	0.22	<0.0050	<0.0050	<0.0050	<0.025
SB-10	10/28/98	5.5-6.5	<1.0	130	95	80	<0.0050	<0.0050	<0.0050	<0.0050	< 0.025
SB-11	10/28/98	6-7	140	60	38	27	<0.10	0.12	0.24	0.49	<0.50
SB-12	10/28/98	5-6	<1.0	<1.0	--	--	<0.0050	<0.0050	<0.0050	<0.0050	< 0.025
	10/28/98	7-8	<1.0	<1.0	--	--	<0.0050	<0.0050	<0.0050	<0.0050	< 0.025
	10/28/98	14-15	<1.0	<1.0	--	--	<0.0050	<0.0050	<0.0050	<0.0050	< 0.025

Notes :

- TPPHg = Gasoline range total purgeable petroleum hydrocarbons
- TEPHd = Diesel range total extractable petroleum hydrocarbons
- MtBE = Methyl tertiary butyl ether
- 8020 = EPA Method 8020
- ppm = Parts per million
- = Not analyzed
- < = Not detected at or above the specified detection limit

Table 2
Groundwater Analytical Data
(Petroleum Hydrocarbons)

Former Signal Oil Marine Terminal
2301-2337 Blanding Avenue
Alameda, California

Sample ID	Date Sampled	TPPHg (ppb)	TEPHd (ppb)	TEPHd		Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylenes (ppb)	MtBE 8020 (ppb)	MtBE 8260* (ppb)
				Silica Gel Cleanup First Round (ppb)	Silica Gel Cleanup Second Round (ppb)						
SB-9	10/28/98	14,000	--	83,000	62,000	1,400	58	490	630	260	<10
SB-10	10/28/98	<50	--	97	<50	<0.50	<0.50	<0.50	<0.50	<2.5	--
SB-11	10/28/98	310	--	270	170	<0.50	0.69	1.6	2.4	<2.5	--
SB-12	10/28/98	<50	--	<50	--	<0.50	<0.50	<0.50	<0.50	<2.5	--
CS-1	10/28/98	<50	--	<50	--	<0.50	<0.50	<0.50	<0.50	<2.5	--
CS-2	10/28/98	<50	--	<50	--	<0.50	<0.50	<0.50	<0.50	<2.5	--
CS-3	10/28/98	<50	--	<50	--	<0.50	<0.50	<0.50	<0.50	<2.5	--

Notes :

TPPHg = Gasoline range total purgeable petroleum hydrocarbons
TEPHd = Diesel range total extractable petroleum hydrocarbons
MtBE = Methyl tertiary butyl ether
8020 = EPA Method 8020
8060 = EPA Method 8060
ppb = Parts per billion
-- = Not analyzed
< = Not detected at or above the specified detection limit
* = 8260 analyzed beyond recommended holding time

**Table 3
Physical Properties of Soils**

Former Signal Oil Marine Terminal
2301-2337 Blanding Avenue
Alameda, California

Sample ID	Date Sampled	Sample Depth (feet)	Soil Type	Total Organic Carbon (mg/kg)	Percent Porosity	Void Ratio	Percent Saturation	Percent Moisture	Natural Bulk Density (g/cc)	Dry Bulk Density (g/cc)
SB-9	10/28/98	4-5	Gray, silty sand with gravel	1,800	30.9	0.45	91.6	18.1	1.85	1.57
	10/28/98	9.5-10.5	Gray, sandy clayey silt	590	30.2	0.43	99.7	16.1	2.18	1.88
SB-10	10/28/98	3-4	Gray, slightly silty sand	900	30.6	0.44	56.2	9.3	2.03	1.86
	10/28/98	6.5-7	Gray, sandy clayey silt with slight gravel	2,000	42.3	0.73	99.9	30.6	1.80	1.38
SB-11	10/28/98	2.5-3.5	Gray, silty sand with gravel	1,200	30.0	0.43	99.8	16.1	2.16	1.86
	10/28/98	7-8	Gray, silty sand with slight clay	240	24.8	0.33	64.6	8.0	2.16	2.00
SB-12	10/28/98	2-3	Gray, silty sand with gravel	1,200	26.5	0.36	97.4	13.2	2.22	1.96
	10/28/98	6-7	Gray, sandy clayey silt	120	29.9	0.43	99.7	16.0	2.16	1.86

Notes:

mg/kg = Milligrams per kilogram

g/cc = Grams per cubic centimeter

Methods: Porosity, Water Saturation and Density performed using API RP-40; Moisture Content performed by ASTM D-2216

**Table 4
Groundwater and Surface Water Elevation Data**

Former Signal Oil Marine Terminal
2301-2337 Blanding Avenue
Alameda, California

Sample ID	Date Guaged	Time (24 hour)	Sample Point Elevation (feet)	Depth to Water (feet)	Groundwater & Surface Water Elevation (feet)
CWL-1	10/28/98	0652	100.00	18.92	81.08
		0815		19.52	80.48
		1121		21.00	79.00
		1314		20.82	79.18
		1440		19.90	80.10
		1545		19.60	80.40
	10/29/98	0831		18.89	81.11
		1003		20.10	79.90
		1108		20.81	79.19
		1158		21.25	78.75
		1304		21.51	78.49
		1353		21.26	78.74
SB-9	10/28/98	1422	87.43	6.61	80.82
	10/29/98	0936		5.98	81.45
		1030		5.94	81.49
		1131		5.98	81.45
		1244		6.38	81.05
		1408		6.40	81.03
SB-10	10/28/98	1510	88.10	7.92	80.18
	10/29/98	0924		6.50	81.60
		1029		6.41	81.69
		1126		6.49	81.61
		1232		6.63	81.47
		1312		6.62	81.48
		1406		6.64	81.46
SB-11	10/28/98	1129	87.21	5.65	81.56
	10/29/98	0906		4.60	82.61
		1017		4.45	82.76
		1122		4.43	82.78
		1223		4.48	82.73
		1309		4.47	82.74
		1404		4.47	82.74

Table 4
(continued)
Groundwater and Surface Water Elevation Data

Former Signal Oil Marine Terminal
2301-2337 Blanding Avenue
Alameda, California

Sample ID	Date Guaged	Time (24 hour)	Sample Point Elevation (feet)	Depth to Water (feet)	Groundwater & Surface Water Elevation (feet)
SB-12	10/28/98	1315	87.88	4.77	83.11
	10/29/98	0845		4.57	83.31
		1014		4.58	83.30
		1119		4.50	83.38
		1214		4.55	83.33
		1308		4.55	83.33
		1402		4.64	83.24

Notes:

An arbitrary elevation of 100.00 feet was used as a benchmark measured from a point on the Park Street Bridge (CWL-1)
MSL = Mean sea level

Tide	Date	Time (24Hr)	MSL
High Tide	10/28/98	0638	5.25
Low Tide	10/28/98	1211	3.24
High Tide	10/28/98	1733	5.45
Low Tide	10/29/98	0016	0.58
High Tide	10/29/98	0729	5.51
Low Tide	10/29/98	1311	2.74
High Tide	10/29/98	1842	5.45

Table 5
Well Survey Data

Former Signal Oil Marine Terminal
2301-2332 Blanding Avenue
Alameda, California

Well ID Number	Address	Distance from Site	Owner	Well Type	Well Dia./ Total Depth (inches/feet)	Water Depth (feet)	Date Drilled
02S03W/7F14	Corner of Kennedy and 23rd Ave, Oakland	900' NE	Chevron/Lonestar	Recovery	12"/26'	9	Apr-88
02S03W/7L2	1819 Everett Street, Alameda	950' SSE	A.T. Ghillier	Irrigation	4"/?	5	1906
02S03W/7L15	1725 Park Street, Alameda	1050' SSW	Exxon-USA	Extraction	4"/40'	7	Dec-91
02S03W/7L16	1725 Park Street, Alameda	1050' SSW	Exxon-USA	Extraction	4"/40'	7	Dec-91
02S03W/7L17	1725 Park Street, Alameda	1050' SSW	Exxon-USA	Extraction	4"/41'	7	Dec-91
02S03W/7L18	1725 Park Street, Alameda	1050' SSW	Exxon-USA	Extraction	4"/41'	7	Dec-91
02S03W/7L19	1725 Park Street, Alameda	1050' SSW	Exxon-USA	Extraction	4"/40'	7	Dec-91
02S03W/7M1	2307 Clement Ave, Oakland	300' SW	Bob Tennant	Industrial	6"/72'	Unknown	Apr-77
02S03W/7M2	2307 Clement Ave, Oakland	300' SW	Bob Tennant	Industrial	6"/82'	6	Apr-77

**Table 6
Biodegradation Assessment Data**

Former Signal Oil Marine Terminal
2301-2337 Blanding Avenue
Alameda, California

Sample ID	Sample Date	Time (24 hour)	Dissolved Oxygen (ppm)	Re-Dox Potential (mV)	Chloride (ppm)	Bromide (ppm)	Nitrate (ppm)	Sulfate (ppm)	TDS (ppm)
SB-9	10/28/98	1440	0.75	--	210	7.4	<1.0	22	1,300
	10/29/98	0931	0.42	-034	--	--	--	--	--
	10/29/98	1238	0.52	-056	--	--	--	--	--
SB-10	10/28/98	1530	1.10	--	72	6.7	<1.0	68	740
	10/29/98	0916	0.23	-029	--	--	--	--	--
	10/29/98	1229	0.39	-033	--	--	--	--	--
SB-11	10/28/98	1155	4.78	--	63	<1.0	<1.0	93	460
	10/29/98	0903	0.68	-084	--	--	--	--	--
	10/29/98	1220	0.43	-076	--	--	--	--	--
SB-12	10/28/98	1330	2.82	--	18	7.1	<1.0	86	520
	10/29/98	0836	1.13	-063	--	--	--	--	--
	10/29/98	1205	0.59	-065	--	--	--	--	--
CS-2	10/28/98	1505	--	--	10,000	100	--	--	28,000

Notes:

ppm = Parts per million mV = Millivolts Re Dox = Oxidation reduction potential TDS = Total dissolved solids -- = Not analyzed

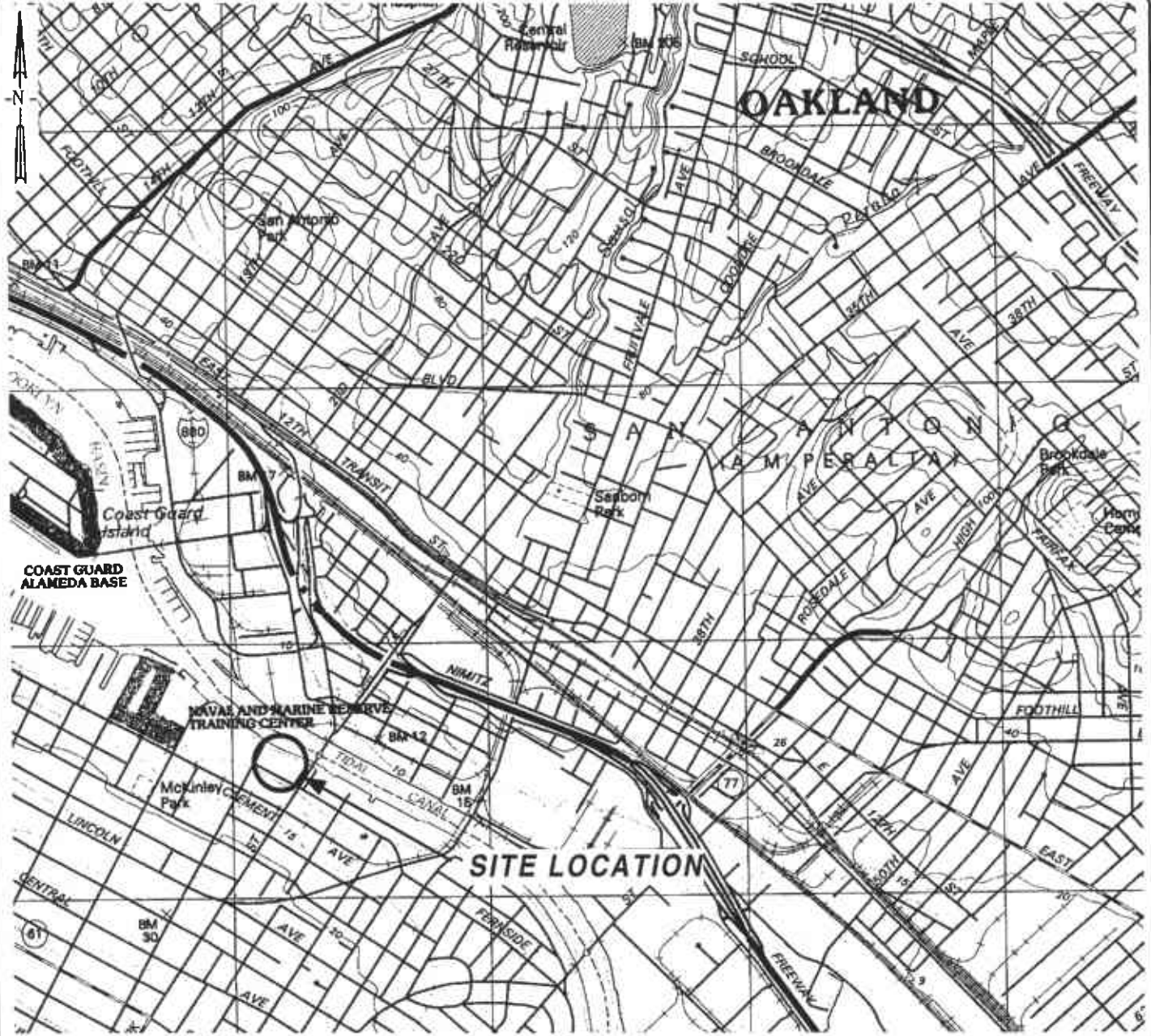
Table 7
Comparison of Site Specific Target Levels with Applicable
Petroleum Hydrocarbon Concentrations for Soil and Groundwater

Former Signal Oil Marine Terminal
 2301-2337 Blanding Avenue
 Alameda, California

Exposure Scenario	Benzene (ppm)	Toluene (ppm)	Ethylbenzene (ppm)	Xylenes (ppm)
Groundwater/Inhalation/Outdoors	170	none	none	none
Applicable Concentration (SB-9)	1.4	0.058	0.49	0.63
Groundwater/Inhalation/Indoors	0.41	none	none	none
Applicable Concentration (SB-11)	<0.0005	0.00069	0.0016	0.0024
Soil/Inhalation/Outdoors	11	none	none	none
Applicable Concentration (SB-9)	3.3	<1.2	2.1	2.0
Soil/Inhalation/Indoors	0.026	none	none	none
Applicable Concentration (SB-11)	<0.10	0.12	0.24	0.49

Notes:

ppm = Parts per million none = Risk level is not exceeded at all possible dissolved levels or for pure compound at any concentration



QUADRANGLE
LOCATION

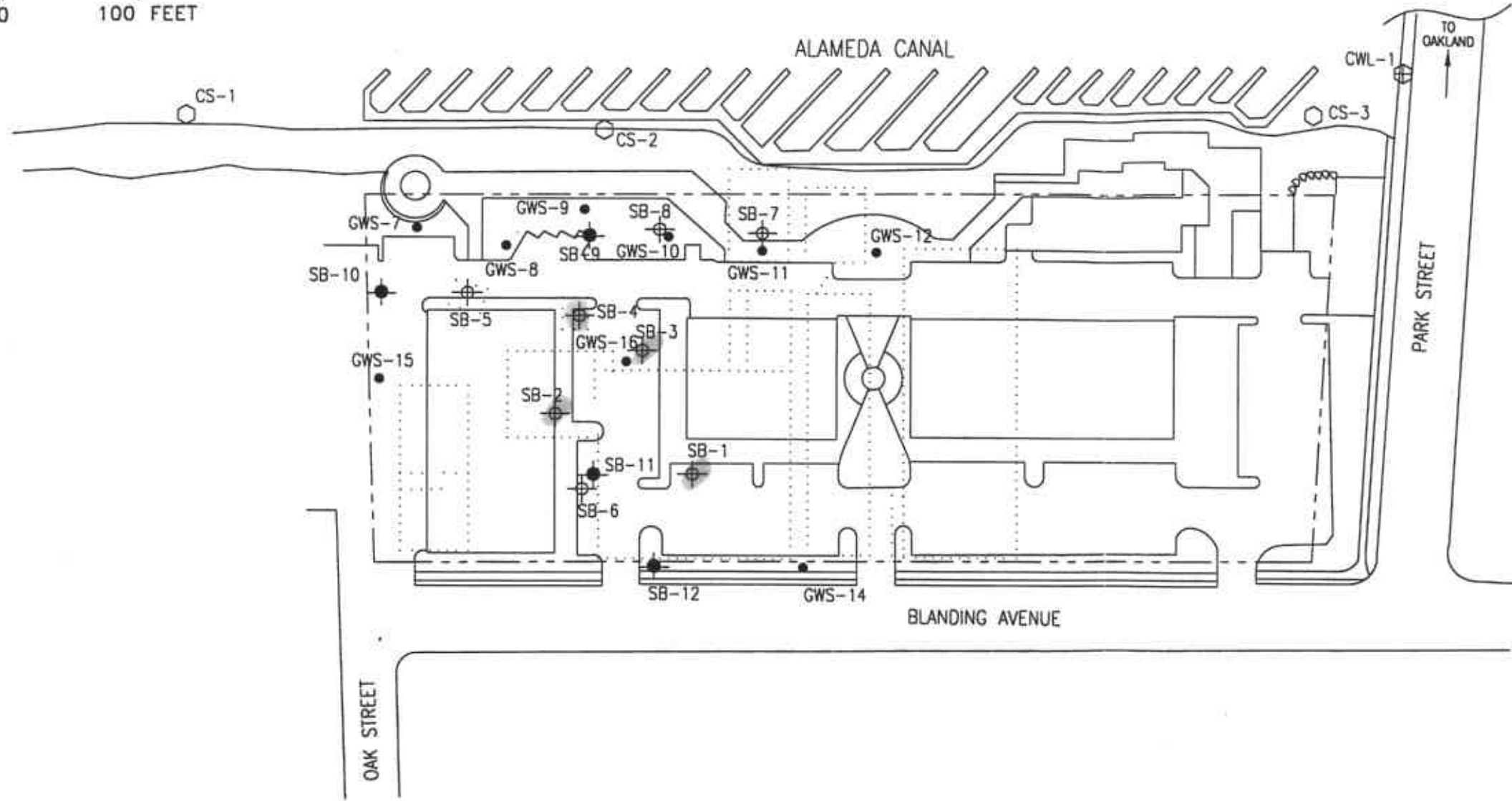
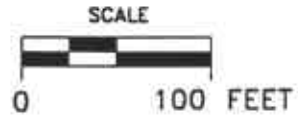
Reference:
USGS 7.5 MIN. TOPOGRAPHIC MAP
TITLED: OAKLAND EAST, CALIFORNIA
REVISED: 1997



SCALE:
0 FEET 2000
DRAWN BY:
DATE:
April 23, 1999

SITE LOCATION MAP
FORMER SIGNAL OIL MARINE TERMINAL
2301-2332 Blanding Avenue
Alameda, California

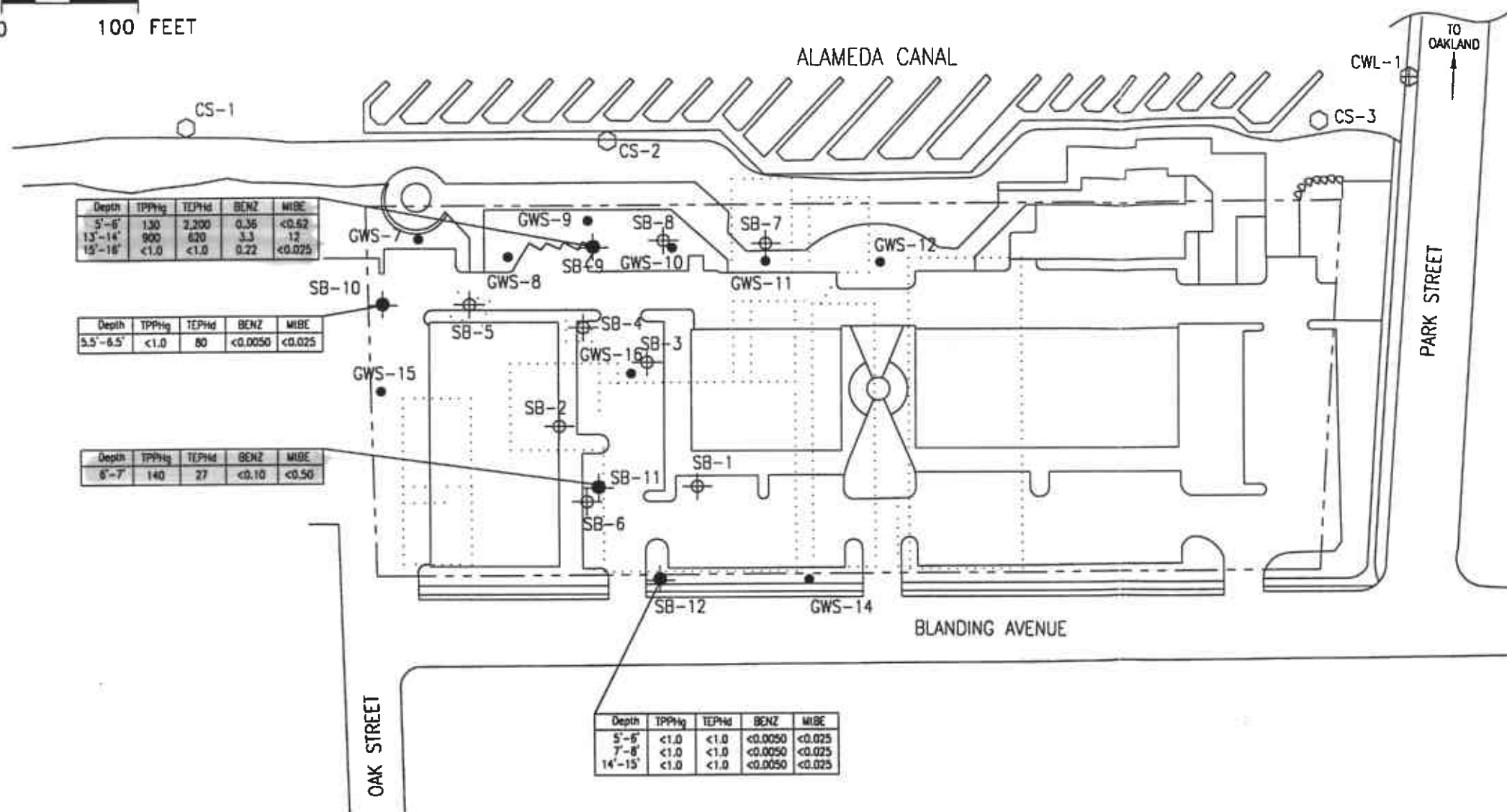
FIGURE
1
PROJECT
AA46



- EXPLANATION**
- SOIL BORING (RRM, OCT. 1998)
 - ⊕ SOIL BORING (Pre-OCT. 1998)
 - SHALLOW GROUNDWATER SURVEY POINT (GEOMATRIX, APRIL 1995)
 - CANAL GRAB SURFACE WATER SAMPLE (RRM, OCT. 1998)
 - ⊕ CANAL WATER LEVEL GAUGING STATION FROM PARK STREET BRIDGE (RRM, OCT. 1998)
 - ⋯ SITE FEATURES NOTED ON A 1932 SANBORN FIRE INSURANCE MAP

Ref. AA46/Slamp100.dwg
 Basemap from Geomatrix

PREPARED BY RRM engineering contracting firm	FORMER SIGNAL OIL MARINE TERMINAL 2301-2332 Blanding Avenue Alameda, California	FIGURE: 2
	SOIL BORING LOCATION MAP	PROJECT: AA46



Depth	TPPHg	TEPHd	BENZ	MIBE
5'-6'	130	2,200	0.36	<0.52
13'-14'	900	620	3.3	12
15'-16'	<1.0	<1.0	0.22	<0.025

Depth	TPPHg	TEPHd	BENZ	MIBE
5.5'-6.5'	<1.0	80	<0.0050	<0.025

Depth	TPPHg	TEPHd	BENZ	MIBE
6'-7'	140	27	<0.10	<0.50

Depth	TPPHg	TEPHd	BENZ	MIBE
5'-6'	<1.0	<1.0	<0.0050	<0.025
7'-8'	<1.0	<1.0	<0.0050	<0.025
14'-15'	<1.0	<1.0	<0.0050	<0.025

EXPLANATION

- SOIL BORING (RRM, OCT. 1998)
- ⊕ SOIL BORING (Pre-OCT. 1998)
- SHALLOW GROUNDWATER SURVEY POINT (GEOMATRIX, APRIL 1995)
- CANAL GRAB SURFACE WATER SAMPLE (RRM, OCT. 1998)
- ⊕ CANAL WATER LEVEL GAUGING STATION FROM PARK STREET BRIDGE (RRM, OCT. 1998)
- ⋯ SITE FEATURES NOTED ON A 1932 SANBORN FIRE INSURANCE MAP
- TPPHg TOTAL PETROLEUM HYDROCARBON CALCULATED AS GASOLINE IN PARTS PER MILLION (ppm)
- TEPHd TOTAL PETROLEUM HYDROCARBON CALCULATED AS DIESEL IN ppm
- BENZ BENZENE, ppm
- MIBE METHYL-TERT-BUTYL-ETHER, ppm
- < NOT DETECTED AT OR ABOVE LABORATORY REPORTING LIMIT SHOWN

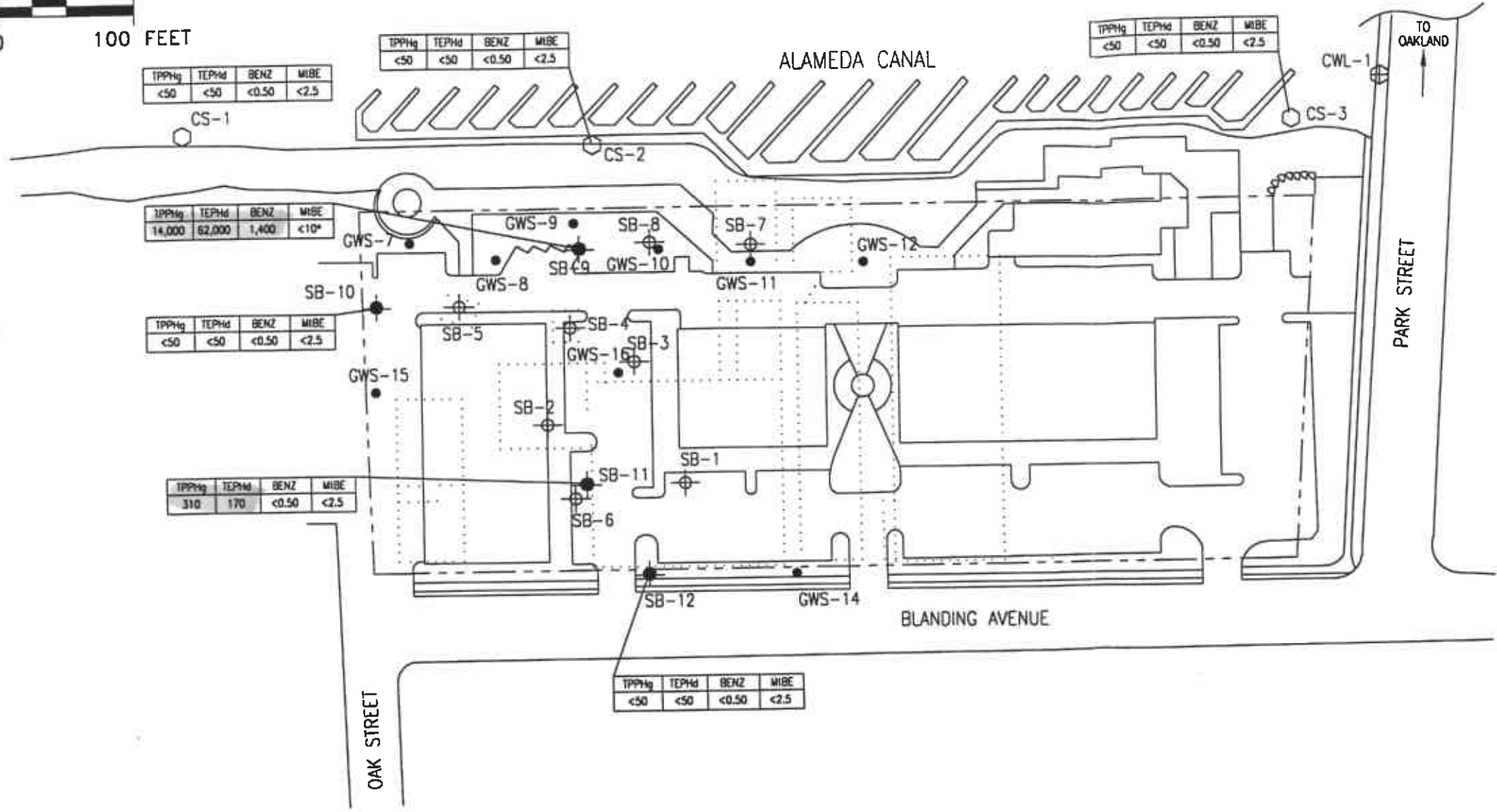
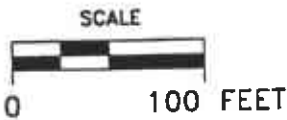
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FORMER SIGNAL OIL MARINE TERMINAL
2301-2332 Blanding Avenue
Alameda, California

SOIL CONCENTRATION MAP,
OCTOBER 28, 1998

FIGURE:
3
PROJECT:
AA46



EXPLANATION

- SOIL BORING (RRM, OCT. 1998)
- ⊕ SOIL BORING (Pre-OCT. 1998)
- SHALLOW GROUNDWATER SURVEY POINT (GEOMATRIX, APRIL 1995)
- CANAL GRAB SURFACE WATER SAMPLE (RRM, OCT. 1998)
- ⊕ CANAL WATER LEVEL GAUGING STATION FROM PARK STREET BRIDGE (RRM, OCT. 1998)
- ⋯ SITE FEATURES NOTED ON A 1932 SANBORN FIRE INSURANCE MAP
- TPPHg TOTAL PETROLEUM HYDROCARBON CALCULATED AS GASOLINE IN PARTS PER BILLION (ppb)
- TPHd TOTAL PETROLEUM HYDROCARBON CALCULATED AS DIESEL IN ppb
- BENZ BENZENE, ppb
- MIBE METHYL-TERT-BUTYL-ETHER, ppb
- MIBE BY 8260
- < NOT DETECTED AT OR ABOVE LABORATORY REPORTING LIMIT SHOWN

Ref. AA46/Slamp100.dwg
Base map from Geomatrix

PREPARED BY

RRM

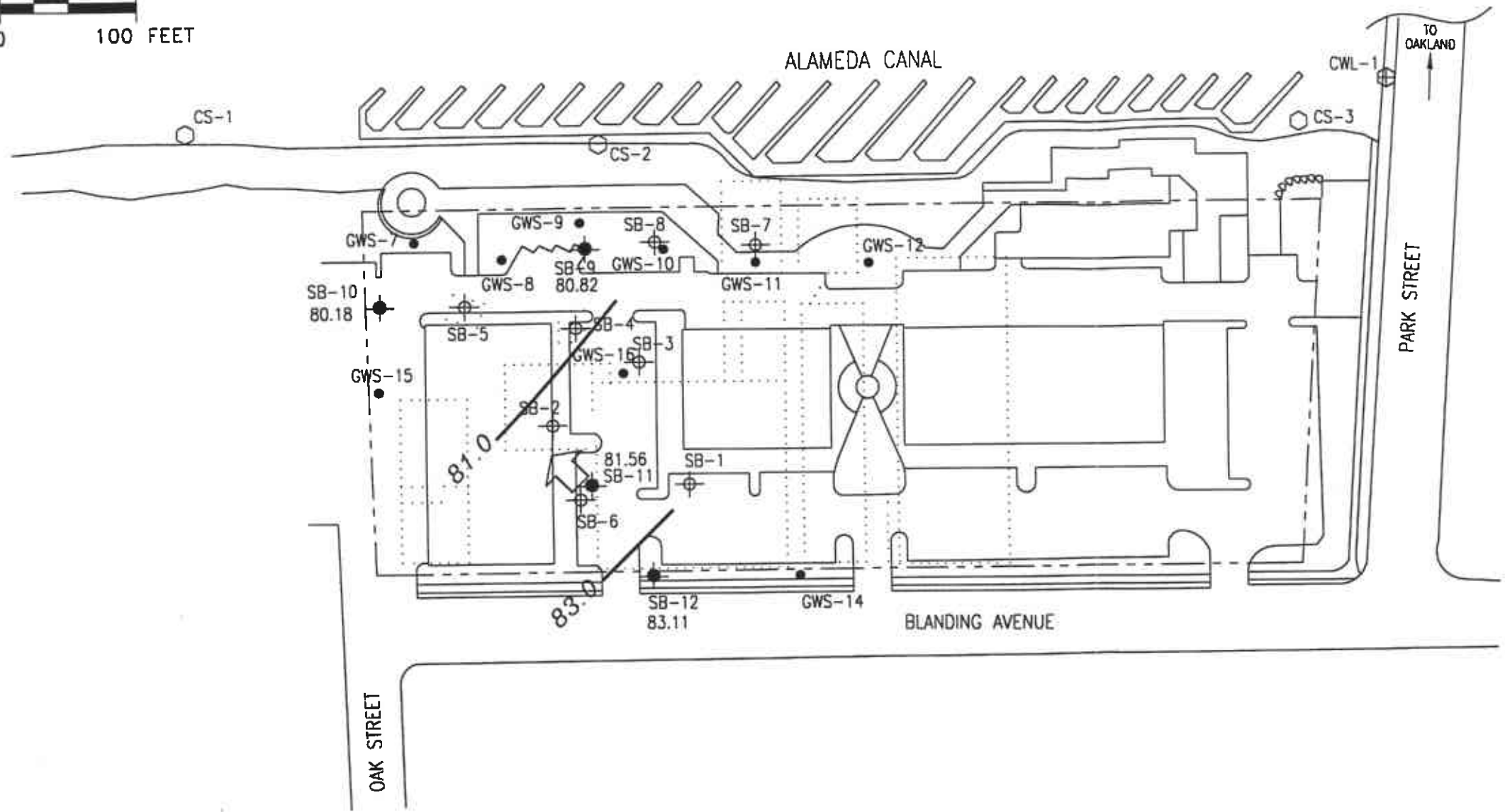
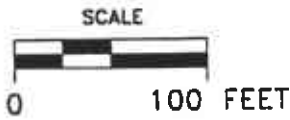
engineering contracting firm

FORMER SIGNAL OIL MARINE TERMINAL
2301-2332 Blanding Avenue
Alameda, California

GROUNDWATER CONCENTRATION MAP,
OCTOBER 28, 1998

FIGURE:
4

PROJECT:
AA46



- EXPLANATION**
- SOIL BORING (RRM, OCT. 1998)
 - ⊕ SOIL BORING (Pre-OCT. 1998)
 - SHALLOW GROUNDWATER SURVEY POINT (GEOMATRIX, APRIL 1995)
 - CANAL GRAB SURFACE WATER SAMPLE (RRM, OCT. 1998)
 - ⊕ CANAL WATER LEVEL GAUGING STATION FROM PARK STREET BRIDGE (RRM, OCT. 1998)
 - ⋯ SITE FEATURES NOTED ON A 1932 SANBORN FIRE INSURANCE MAP
 - 83.11 GROUNDWATER ELEVATION (FT. RELATIVE DATUM)
 - 83.0 — GROUNDWATER ELEVATION CONTOUR (FT. RELATIVE DATUM)
 - ↘ APPROXIMATE GROUNDWATER FLOW DIRECTION; APPROXIMATE GRADIENT = 0.01

PREPARED BY
RRM
 engineering contracting firm

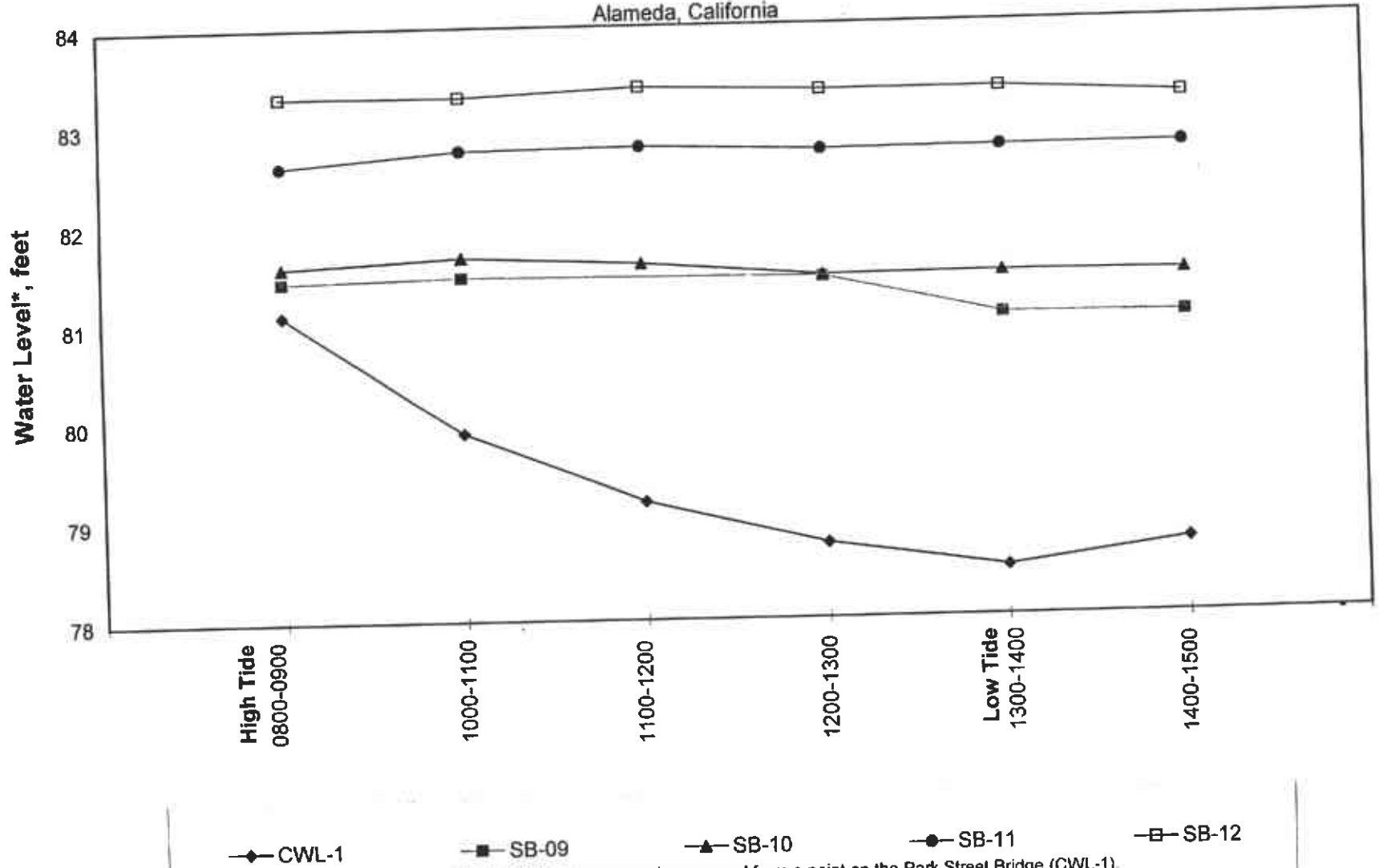
FORMER SIGNAL OIL MARINE TERMINAL
 2301-2332 Blanding Avenue
 Alameda, California
 GROUNDWATER ELEVATION CONTOUR MAP,
 OCTOBER 28, 1998

FIGURE:
5
 PROJECT:
 AA46

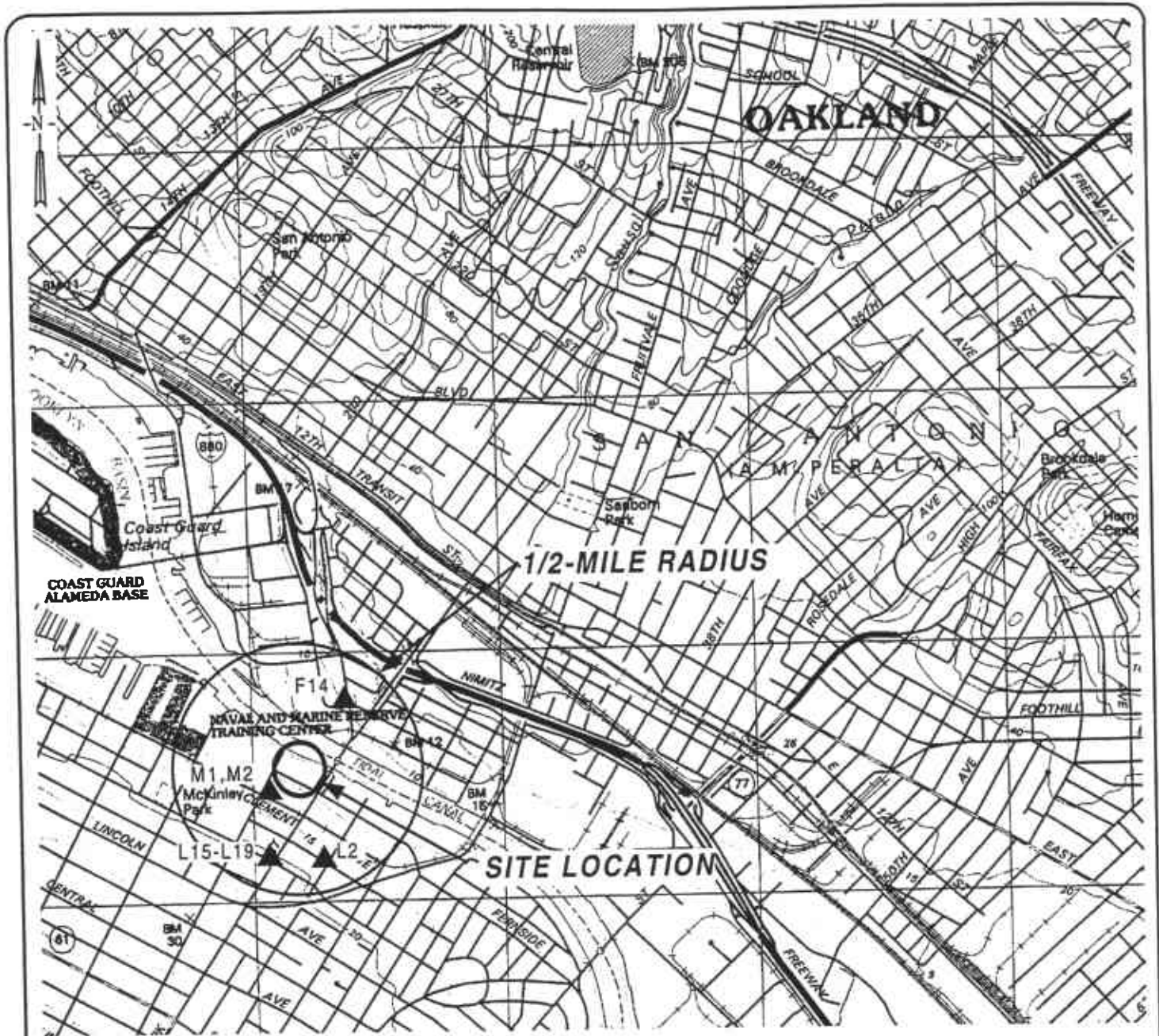
Figure 6

Soil Boring and Benchmark Hydrograph for October 29, 1998

Former Signal Oil Marine Terminal
2301-2332 Blanding Avenue
Alameda, California



* An arbitrary elevation of 100.0 feet was used as a benchmark measured from a point on the Park Street Bridge (CWL-1).



QUADRANGLE
LOCATION

<u>WELL I.D.</u>	<u>WELL TYPE</u>
F14	Groundwater extraction
L15 thru L19	Irrigation
L2	Industrial
M1, M2	Groundwater extraction

Reference:
USGS 7.5 MIN. TOPOGRAPHIC MAP
TITLED: OAKLAND EAST, CALIFORNIA
REVISED: 1997

RRM
engineering contracting firm

SCALE:
0 FEET 2000
DRAWN BY:
DATE:
April 23, 1999

WELL SURVEY MAP
FORMER SIGNAL OIL MARINE TERMINAL
2301-2332 Blanding Avenue
Alameda, California

FIGURE
7
PROJECT
AA46

ATTACHMENT A
FIELD AND LABORATORY PROCEDURES

ATTACHMENT A

FIELD AND LABORATORY PROCEDURES

Soil and Groundwater Sampling Procedures

Soil borings were permitted and installed in accordance with state and local guidelines using a subcontracted state licensed driller. The soil borings were drilled using a 2-inch diameter pneumatically driven GeoProbe® drilling. The GeoProbe® drilling system was used for the assessment of soil and groundwater. During drilling, the borings were logged for lithologic description by an RRM, Inc. geologist using the Unified Soil Classification System and standard geologic techniques. Descriptive information denoted on the boring logs includes soil, groundwater, and contaminant data.

The GeoProbe® drilling system collects soil samples for lithologic description and chemical analysis at 4-foot depth intervals by advancing a 2-inch diameter core sampler with acetate liners into undisturbed soil during drilling. The sampler was driven continuously. The acetate liner containing the deepest 6 inches of soil from each sample interval was retained for possible chemical analyses and capped with Teflon® tape squares and plastic end caps, and then placed in a sealable plastic bag.

Temporary wells were installed by placing a 1-inch diameter, slotted PVC casing to the total depth of the boring. A stainless-steel bailer was then used to sample the groundwater and pour it into appropriate, labeled sample containers. All samples were then placed on ice for transport to a California State-Certified laboratory, accompanied by chain-of-custody documentation. Drilling and sampling equipment was steam-cleaned or cleaned with tri-sodium phosphate prior to and between uses. Upon completion of groundwater and monitoring sampling activities, the borings were backfilled with cement grout through tremie pipe from the bottom of each boring to the ground surface.

Dissolved oxygen concentrations were determined in the field using a YSI Model 55 Dissolved Oxygen Meter, and the reduction/oxidation (redox) potential was determined in the field using a Corning ORP-65 redox meter. Depth to groundwater measurements were collected from the temporary wells and canal gauging stations at approximately 1-hour intervals for tidal influence evaluation. Temporary well points were surveyed to a relative site datum by a licensed surveyor.

Field Hydrocarbon Screening Procedures

Field hydrocarbon screening procedures consisted of measuring organic vapor concentrations using a photo-ionization detector (PID). The procedure consisted of getting approximately

30 grams of soil and testing the sample with a pre-calibrated photo-ionization detector using a 100 ppm isobutylene standard (in air).

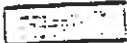


Laboratory Program



Soil and groundwater samples were analyzed by a California State Certified Laboratory for the presence of total purgeable petroleum hydrocarbons as gasoline (TPPHg) and total extractable petroleum hydrocarbons as diesel (TEPHd) by EPA Method 8015M; benzene, toluene, ethylbenzene, and xylenes (collectively BTEX) and methyl tertiary butyl ether (MTBE) by EPA Method 8020. Select soil samples were analyzed by a Geotechnical lab to determine moisture content by ASTM Method D-2216, total organic carbon (TOC) by EPA Method 415.1, percent porosity, void ratio, saturation ratio, and density by Method API RP-40. The methods of analyses for the soil and groundwater samples are further documented on the certified analytical reports presented as Attachment C.

ATTACHMENT B
EXPLORATORY BORING LOGS, FIELD DATA SHEETS, AND
SURVEY DATA

WELL / BORING LOG KEY TO ABBREVIATIONS

WELL / BORING COMPLETION



-  Annular seal; cement grout
-  Slotted well screen section
-  Solid well section

-  Bentonite seal
-  Annular sand pack

MOISTURE CONTENT

- D - Dry
- DP - Damp
- M - Moist
- S - Saturated (Silt and Clays)
- W - Wet (Sands and Gravels)

GROUNDWATER

-  First encountered groundwater
-  Stabilized groundwater level

DENSITY (blows/foot - Say Mac Sampler)

-Sands and Gravels-	-Silt and Clays-
0-5 -Very loose	0-3 -Very soft
5-13 -Loose	2-4 -Soft
13-38 -Medium dense	4-9 -Firm
38-63 -Dense	9-17 -Stiff
OVER 63 -Very dense	17-37 -Very stiff
	37-72 -Hard
	OVER 72 -Very hard

FIELD TEST

- PIG - Photo-ionization detector
- FID - Flame-ionization detector

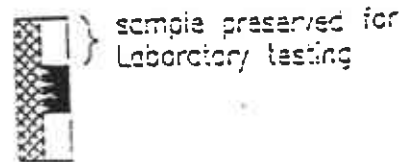
SOIL SAMPLE NUMBER

- B-1-8 B-Samples - Depth in feet for borings
- WW-1-8 WW-Samples - Depth in feet for wells

RECOVERY / SAMPLE INTERVAL

- SAMPLE INTERVAL - Attempted sample interval
- RECOVERY - Sample retained within sample interval
- NO RECOVERY - Sample not retained within sample interval

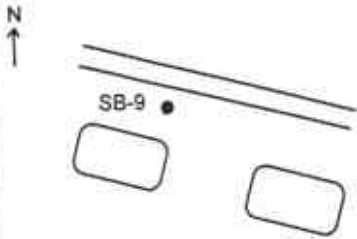
GRAPHIC



EXPLANATION AND ABBREVIATIONS

- USCS SYMBO = Unified Soil Classification System
- MSL = mean sea level
- 2.5YR 6/2 = Munsell Color Chart Designation

WELL/BORING LOCATION MAP



REMEDIATION RISK MANAGEMENT, INC.

WELL/BORING: SB-9

DATE: 10/28/98

DRILLING METHOD: GEOPROBE

PROJECT: AA46

SAMPLING METHOD: CONTINUOUS CORE

CLIENT: CHEVRON

BORING DIAMETER: 2"

LOCATION: BLANDING AVE.

BORING DEPTH: 16'

CITY: ALAMEDA

WELL CASING: Temporary 1" sch 40 PVC

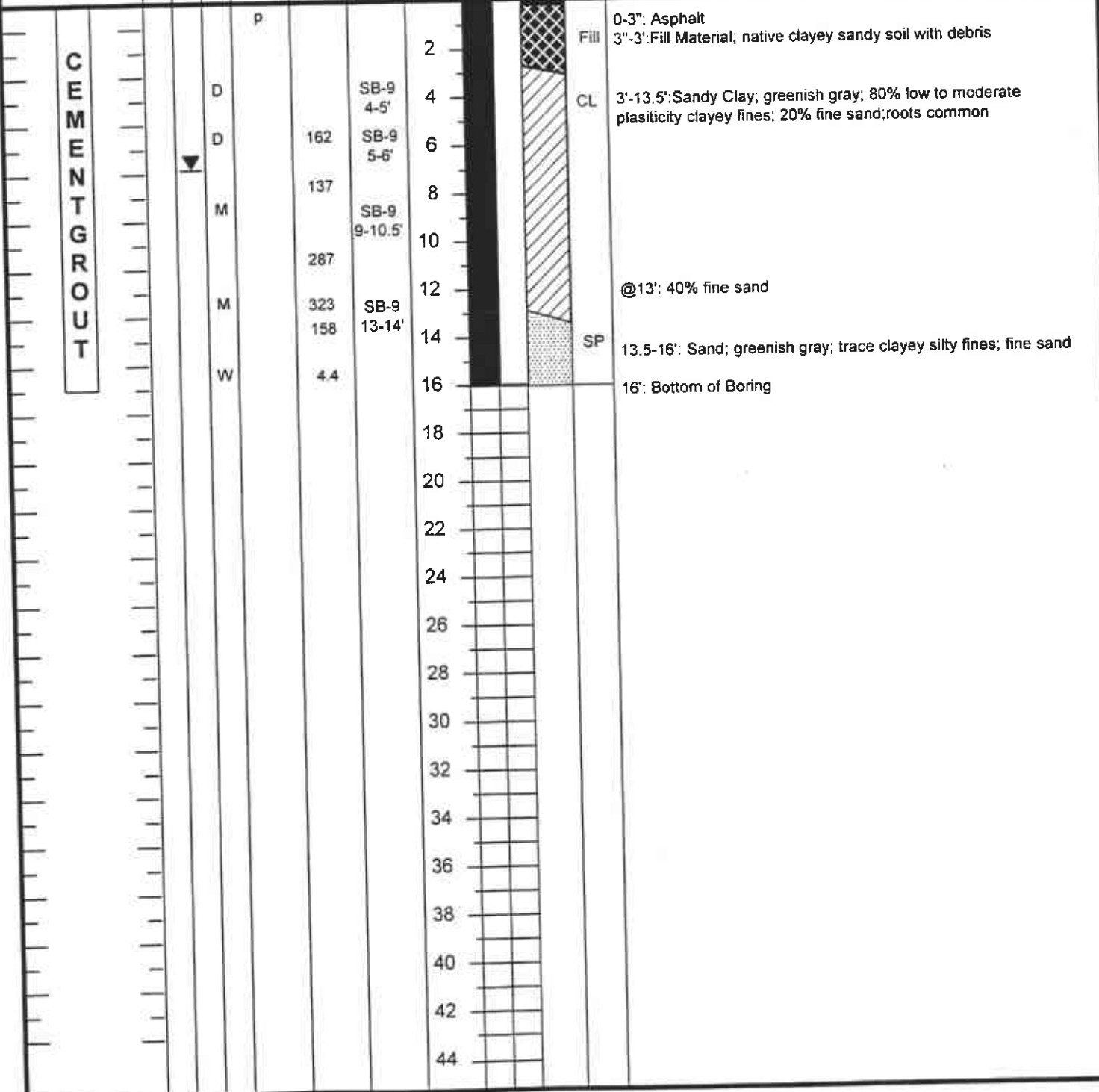
CO./STATE: ALAMEDA

WELL SCREEN:

DRILLER: ECA

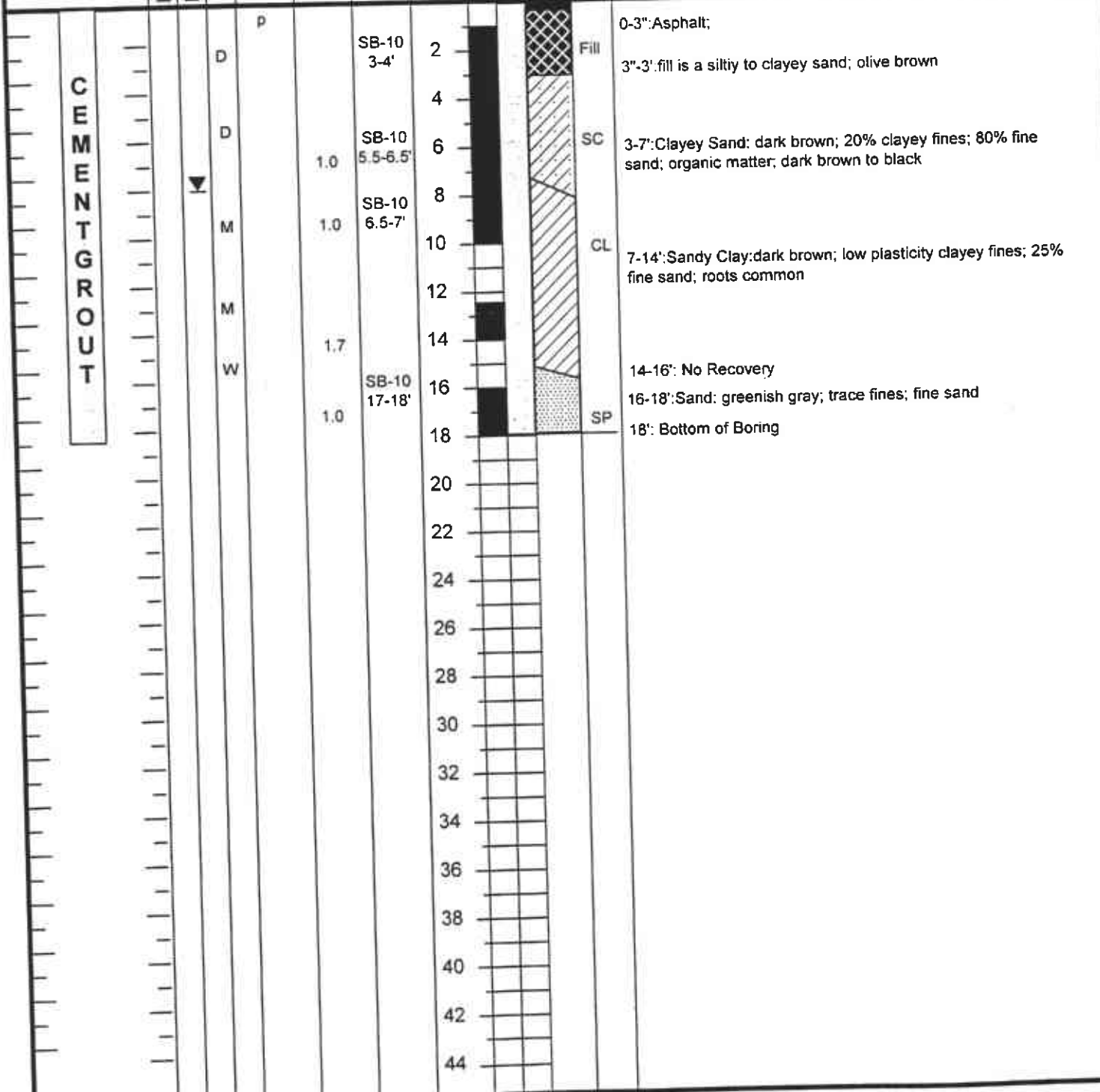
SAND PACK:

WELL/BORING COMPLETION	FIRST	STABILIZED	MOISTURE	DENSITY BLOWS / ft.	FIELD TEST HNU	SAMPLE NUMBER	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	GRAPHIC	USCS SYMBOL	WATER LEVEL:	6.59	6.60'
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>										TIME:	13:55	14:10
												DATE:	10/28/98	10/28/98
DESCRIPTION/LOGGED BY: DR														



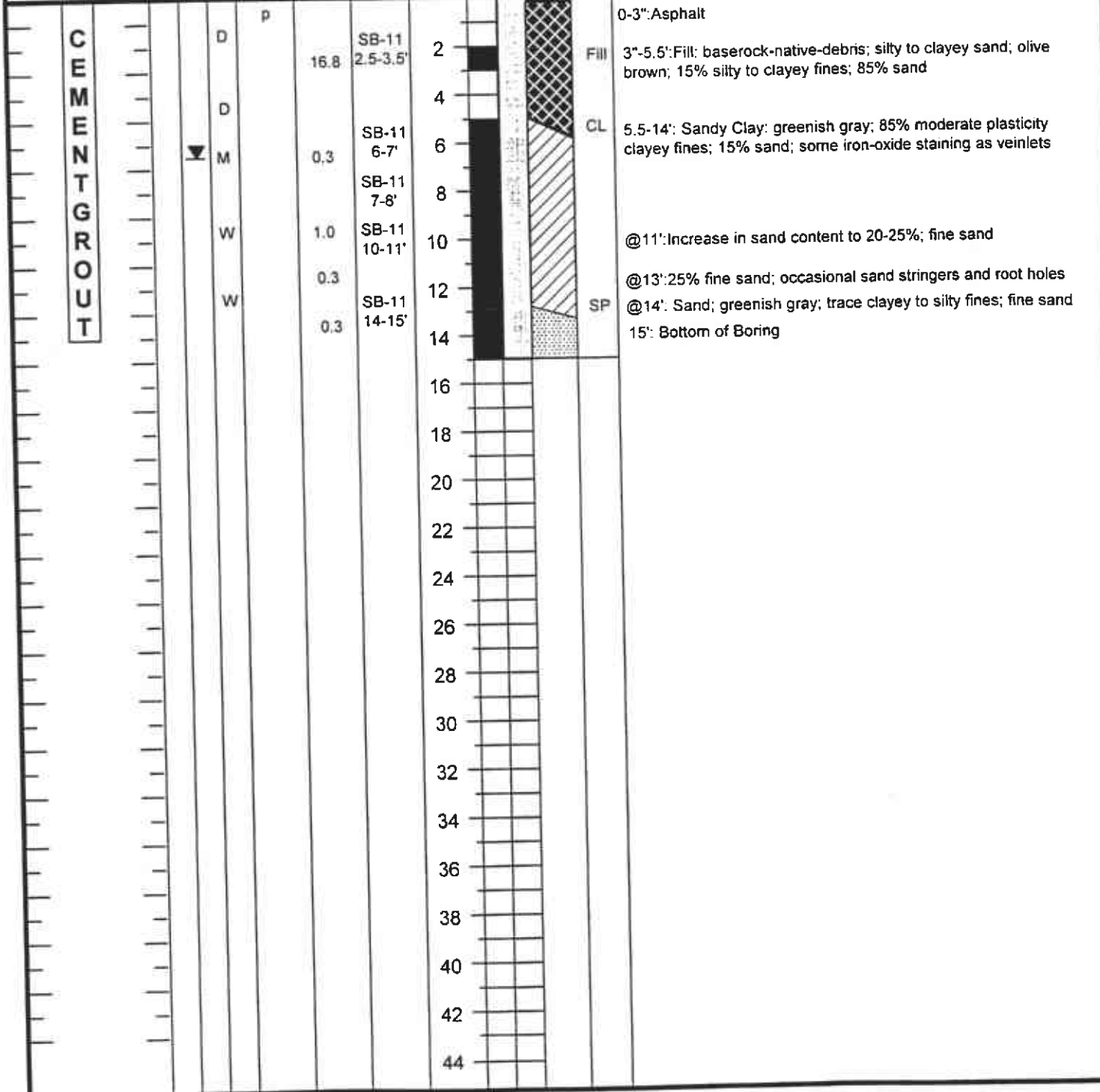
WELL/BORING LOCATION MAP 	REMEDIATION RISK MANAGEMENT, INC.		WELL/BORING: SB-10
	DATE: 10/28/98	DRILLING METHOD: GEOPROBE	
	PROJECT: AA46	SAMPLING METHOD: CONTINUOUS CORE	
	CLIENT: CHEVRON	BORING DIAMETER: 2"	
	LOCATION: BLANDING AVE.	BORING DEPTH: 18'	
	CITY: ALAMEDA	WELL CASING: Temporary 1" sch 40 PVC	
	CO./STATE: ALAMEDA	WELL SCREEN:	
	DRILLER: ECA	SAND PACK:	

WELL/BORING COMPLETION	FIRST <input checked="" type="checkbox"/>	STABILIZED <input checked="" type="checkbox"/>	MOISTURE	DENSITY BLOWS / ft.	FIELD TEST HNU	SAMPLE NUMBER	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	GRAPHIC	USCS SYMBOL	WATER LEVEL:	9.60'		
												TIME:	14:05		
												DATE:	10/28/98		
												DESCRIPTION/LOGGED BY: DR			



WELL/BORING LOCATION MAP 	REMEDIATION RISK MANAGEMENT, INC.		WELL/BORING:SB-11
	DATE:10/28/98	DRILLING METHOD:GEOPROBE	
	PROJECT:AA46	SAMPLING METHOD:CONTINUOUS CORE	
	CLIENT:CHEVRON	BORING DIAMETER:2"	
	LOCATION:BLANDING AVE	BORING DEPTH:~15'	
	CITY:ALAMEDA	WELL CASING:Temporary 1" sch 40 PVC	
	CO./STATE:ALAMEDA	WELL SCREEN:	
DRILLER:ECA	SAND PACK:		

WELL/BORING COMPLETION	FIRST	STABILIZED	MOISTURE	DENSITY BLOWS / ft.	FIELD TEST HNU	SAMPLE NUMBER	DEPTH (FEET)	RECOVERY SAMPLE INTERVAL	GRAPHIC	USCS SYMBOL	WATER LEVEL:	8.19'	7.57'	6.50'
											TIME:	09:30	09:47	10:10
											DATE:	10/28/98	10/28/98	10/28/98
											DESCRIPTION/LOGGED BY:DR			



WELL/BORING LOCATION MAP 	REMEDIATION RISK MANAGEMENT, INC.		WELL/BORING: SB-12	
	DATE: 10/28/98		DRILLING METHOD: GEOPROBE	
	PROJECT: AA46		SAMPLING METHOD: CONTINUOUS CORE	
	CLIENT: CHEVRON		BORING DIAMETER: 2"	
	LOCATION: BLANDING AVE.		BORING DEPTH: ~15'	
	CITY: ALAMEDA		WELL CASING: Temporary 1" sch 40 PVC	
	CO./STATE: ALAMEDA		WELL SCREEN:	
	DRILLER: CA		SAND PACK:	

WELL/BORING COMPLETION	FIRST	STABILIZED	MOISTURE	DENSITY BLOWS / ft.	FIELD TEST HNU	SAMPLE NUMBER	DEPTH (FEET)	RECOVERY	SAMPLE INTERVAL	GRAPHIC	USCS SYMBOL	DESCRIPTION/LOGGED BY: DR	
CEMENT GROUT 						SB-12 2-3'	2				Fill	Planter Fill Top Soil; silty to clayey sand; olive brown	
						SB-12 6-7'	4				CL	4-12.5': Sandy Clay: dark grayish brown; low plasticity 80% fines; 20% fine sand	
						SB-12 7-8'	6	1.0					@9': Sandy Clay: olive yellow;; low plasticity 80% fines; 25% fine sand
							8	1.0					@11': Sandy Clay: greenish gray; low plasticity 80% fines; 20% fine sand
						SB-12 14-15'	10	1.0				SC	12.5-14.5': Clayey Sand; greenish gray; 25% fines; 75% sand
	12					SP	14.5-15': Sand; greenish gray; trace fines						
	14							15': Bottom of Boring					
	16												
	18												
	20												
	22												
	24												
	26												
	28												
	30												
	32												
	34												
	36												
	38												
	40												
	42												
	44												

FIELD DATA

DEPTH TO GROUNDWATER/SEPARATE-PHASE HYDROCARBON REMOVAL FORM


DATE: 10/29/98 SITE ADDRESS: Blanding
 STATION/PROJECT NO.: AA46 CITY/COUNTY/STATE: Alameda FIELD TECH: [Signature]

PROBE TYPE

Oil/Water Interface Probe
 Other: H₂O Levels

Dtw Ord.	Well ID	Time (2400 hr)	Total Depth (feet)	First Depth to Water (feet)	Second Depth to Water (feet)	DTW SPT Thickness (feet)	SEPARATE-PHASE HYDROCARBON (SPH) QUALITATIVE DESCRIPTION										Well Integrity Notes	
							Clear	Light	Dark	Other	Light	Medium	Heavy	SPH	Water	LIQUID REMOVED		
																		COLOR
	CWL-1	0831		18.89	58.9	5.98												
	SB-12	0845		4.57	CWL-1	1158	21.25											
	SB-11	0906		4.60	SB-12	1214	4.55											
	SB-10	0924		6.50	SB-11	1223	4.48											
	SB-9	0936		5.98	SB-10	1232	6.63											
	CWL-1	1003		20.10	SB-9	1244	6.38											
	SB-12	1014		4.58	CWL-1	1304	21.51											
	SB-11	1017		4.45	SB-12	1308	4.55											
	SB-10	1029		6.41	SB-11	1309	4.47											
	SB-9	1030		5.94	SB-10	1312	6.62											
	CWL-1	1108		20.81	CWL-1	1353	21.26											
	SB-12	1119		4.50	SB-12	1402	4.64											
	SB-11	1122		4.43	SB-11	1404	4.47											
	SB-10	1126		6.49	SB-10 SB-9	1406 1408	6.64 6.40											

Comments/Notes: CWL-1 ds from top of walkway marked ~~at~~ by a hacksaw cut 6" from the second railing post.



cement walk B. id. 10. 11. 12.

SIGNATURE: [Signature]

FIELD DATA

DEPTH TO GROUNDWATER/SEPARATE-PHASE HYDROCARBON REMOVAL FORM

DATE: 10/20/98 SITE ADDRESS: Blanching
 STATION/PROJECT NO.: AA46 CITY/COUNTY/STATE: Alameda FIELD TECH.: JR/OR

PROBE TYPE	
<input type="checkbox"/> Oil/Water Interface Probe	
<input checked="" type="checkbox"/> Other: <u>Water Table</u>	

Dtw Ord.	Well ID	Time (2400 hr)	Total Depth (feet)	First Depth to Water (feet)	Second Depth to Water (feet)	SPH Depth (feet)	SPH Thickness (feet)	SEPARATE-PHASE HYDROCARBON (SPH) QUALITATIVE DESCRIPTION								Well Integrity Notes
								COLOR				VISCOSITY		LIQUID REMOVED		
								Clear	Light	Dark	Other	Light	Medium	Heavy	SPH	
	<u>CWL-1</u> <u>Bridge</u>	<u>0652</u>		<u>18.92</u> <u>TOP/OC</u>												
	<u>CWL-1</u>	<u>0815</u>		<u>19.52</u>												
	<u>CWL-1</u>	<u>1121</u>		<u>21.00</u>												
	<u>SB-11</u>	<u>1129</u>		<u>5.65</u>												
	<u>SB-12</u>	<u>1315</u>		<u>4.77</u>												
	<u>CWL-1</u>	<u>1314</u>		<u>20.82</u>												
	<u>SB-9</u>	<u>1422</u>		<u>6.61</u>												
	<u>CWL-1</u>	<u>14:40</u>		<u>19.90</u>												
	<u>SB-10</u>	<u>1510</u>		<u>7.92</u>												
	<u>CWL-1</u>	<u>15:45</u>		<u>19.00</u>												

Comments/Notes: * ← in flake on walkway along the post-st. Bridge

SIGNATURE: [Signature]

FIELD DATA

GROUNDWATER SAMPLING FORM

DATE: 10/28/98 SITE ADDRESS: Blanding Ave WELL ID #: SB-9
 STATION/PROJECT NO.: AA46 CITY/COUNTY/STATE: Alameda FIELD TECH.: JD

PROBE TYPE Oil/Water Interface Probe
 Electronic Indicator
 Other

CASING DIAMETER	GAL/ LINEAR FT.
<input type="checkbox"/> 2	<input type="checkbox"/> 0.17
<input type="checkbox"/> 3	<input type="checkbox"/> 0.38
<input type="checkbox"/> 4	<input type="checkbox"/> 0.66
<input type="checkbox"/> 4.5	<input type="checkbox"/> 0.83
<input type="checkbox"/> 5	<input type="checkbox"/> 1.02
<input type="checkbox"/> 6	<input type="checkbox"/> 1.5
<input type="checkbox"/> 7	<input type="checkbox"/> 2.0
<input type="checkbox"/> 8	<input type="checkbox"/> 2.6

SAMPLE TYPE
 Groundwater
 Duplicate
 Extraction Well
 Trip Blank
 Field Blank
 Equipment Blank
 Other _____

WELL INFORMATION
 Depth to Liquid: _____ TOB
 Depth to Liquid: _____ TOC
 Depth to Water: _____ TOB
 Depth to Water: _____ TOC
 Total Depth: _____ (Feet)

TD _____ - Dtw _____ = _____ Gal/Linear X-Foot _____ = _____ Number of X Casings _____ = _____ Calculated Purge

PURGE INFORMATION

DATE PURGED: _____ START: _____ END (2400 hr): _____ PURGED BY: _____
 DATE SAMPLED: _____ START: _____ END (2400 hr): _____ SAMPLED BY: _____

TIME (2400 hr)	VOLUME (gallons)	pH (units)	E.C. (μ mhos/cm @ 25 ° C)	TEMPERATURE (° F)	COLOR	TURBIDITY (NTU 0-200)	ODOR
<u>1436</u>		<u>5.29</u>	<u>1309</u>	<u>65.3</u>	<u>Cloudy</u>	<u>mod</u>	<u>mod</u>

Total Purge Volume: _____ Well Pumped Dry: Yes/No
 Clear _____ Heavy _____ Strong _____
 Cloudy _____ Moderate _____ Moderate _____
 Yellow _____ Light _____ Faint _____
 Brown _____ Trace _____ None _____

PURGING EQUIPMENT/NOTES

SAMPLING EQUIPMENT/NOTES

Bailer: disposable Airlift Pump: _____
 Centrifugal Pump: _____ Dedicated: _____
 Other: _____ Other: _____

GROUNDWATER SAMPLING INFORMATION

SAMP. ID#	DATE	TIME (2400 hr)	CONTAINER	SIZE	No. of Cont.	PRESERVE	ANALYTICAL PARAMETER
<u>SB-9</u>	<u>10/28/98</u>		<u>Via amber plastic</u>	<u>8</u>	<u>4</u>	<u>HCL</u>	<u>anal/BTEX TPH TDS/Chl./Pcr.</u>

REMARKS: DO = 0.75 Oily Sheen on surface

SIGNATURE: [Signature]

FIELD DATA

GROUNDWATER SAMPLING FORM

DATE: 10/28/98 SITE ADDRESS: Blanding Ave. WELL ID #: SB-10
 STATION/PROJECT NO.: AA46 CITY/COUNTY/STATE: Alameda FIELD TECH.: JD

PROBE TYPE Oil/Water Interface Probe
 Electronic Indicator
 Other

	CASING DIAMETER		GAL/ LINEAR FT.
<input type="checkbox"/>	2		0.17
<input type="checkbox"/>	3		0.38
<input type="checkbox"/>	4		0.66
<input type="checkbox"/>	4.5		0.83
<input type="checkbox"/>	5		1.02
<input type="checkbox"/>	6		1.5
<input type="checkbox"/>	7		2.0
<input type="checkbox"/>	8		2.6

SAMPLE TYPE

Groundwater
 Duplicate
 Extraction Well
 Trip Blank
 Field Blank
 Equipment Blank
 Other _____

WELL INFORMATION

Depth to Liquid: _____ TOB
 Depth to Liquid: _____ TOC
 Depth to Water: _____ TOB
 Depth to Water: _____ TOC
 Total Depth: _____ (Feet)

TD _____ - Dtw _____ = _____ Gal/Linear x Foot _____ Number of x Casings _____ Calculated Purge _____

PURGE INFORMATION

DATE PURGED: _____ START: _____ END (2400 hr): _____ PURGED BY: _____
 DATE SAMPLED: _____ START: _____ END (2400 hr): _____ SAMPLED BY: _____

TIME (2400 hr)	VOLUME (gallons)	pH (units)	E.C. (umhos/cm @ 25 °C)	TEMPERATURE (°F)	COLOR	TURBIDITY (NTU 0-200)	ODOR
1571		6.10	896	65.4	cloudy	mod	None

Total Purge Volume: _____ Well Pumped Dry: Yes / No _____

Clear
 Cloudy
 Yellow
 Brown
 Heavy Moderate
 Light Trace
 Strong Moderate
 Faint None

PURGING EQUIPMENT/NOTES

SAMPLING EQUIPMENT/NOTES

Bailer: disposable Airlift Pump: _____ Bailer: disposable
 Centrifugal Pump: _____ Dedicated: _____ Dedicated: _____
 Other: _____ Other: _____

GROUNDWATER SAMPLING INFORMATION

SAMP. ID #	DATE	TIME (2400 hr)	CONTAINER	SIZE	No. of Cont.	PRESERVE	ANALYTICAL PARAMETER
SB-10	10/28/98		V00		4	HCL	As/Br/Fe TOHid TDS/Con/Br
			water		2		
			plastic		2		

REMARKS: DO = 1.10

SIGNATURE: [Signature]

FIELD DATA

GROUNDWATER SAMPLING FORM

DATE: 10/28/98 SITE ADDRESS: Blanding ave WELL ID #: SB-11
 STATION/PROJECT NO.: AA46 CITY/COUNTY/STATE: Alameda FIELD TECH: JL

PROBE TYPE: Oil/Water Interface Probe
 Electronic Indicator
 Other

CASING DIAMETER	GAL/LINEAR FT.
<input type="checkbox"/> 2	<input type="checkbox"/> 0.17
<input type="checkbox"/> 3	<input type="checkbox"/> 0.38
<input type="checkbox"/> 4	<input type="checkbox"/> 0.66
<input type="checkbox"/> 4.5	<input type="checkbox"/> 0.83
<input type="checkbox"/> 5	<input type="checkbox"/> 1.02
<input type="checkbox"/> 6	<input type="checkbox"/> 1.5
<input type="checkbox"/> 7	<input type="checkbox"/> 2.0
<input type="checkbox"/> 8	<input type="checkbox"/> 2.6

SAMPLE TYPE:
 Groundwater
 Duplicate
 Extraction Well
 Trip Blank
 Field Blank
 Equipment Blank
 Other _____

WELL INFORMATION
 Depth to Liquid: _____ TOB
 Depth to Liquid: _____ TOC
 Depth to Water: _____ TOB
 Depth to Water: _____ TOC
 Total Depth: _____ (Feet)

ED _____ Dwg _____ Gal/Linear X Foot _____ Number of X Casings _____ Calculated Purge _____

PURGE INFORMATION

DATE PURGED: _____ START: _____ END (2400 hr): _____ PURGED BY: _____
 DATE SAMPLED: _____ START: _____ END (2400 hr): _____ SAMPLED BY: _____

TIME (2400 hr)	VOLUME (gallons)	pH (units)	E.C. (umhos/cm @ 25 ° C)	TEMPERATURE (° F)	COLOR	TURBIDITY (NTU 0-200)	ODOR
<u>11:37</u>	<u>NA</u>	<u>6.28</u>	<u>788</u>	<u>68.8</u>	<u>Cloudy</u>	<u>Light</u>	<u>None</u>

Total Purge Volume: _____ Well Pumped Dry: Yes / No
 Clear Cloudy Yellow Brown Heavy Moderate Light Trace Strong Moderate Faint None

PURGING EQUIPMENT/NOTES: Bailer: diags: S.S. Air-lift Pump: _____
 Centrifugal Pump: _____ Dedicated: _____
 Other: _____
 SAMPLING EQUIPMENT/NOTES: Bailer: diags S.S.
 Dedicated: _____
 Other: _____

GROUNDWATER SAMPLING INFORMATION

SAMP. ID #	DATE	TIME (2400 hr)	CONTAINER	SIZE	No. of Cont.	PRESERVE	ANALYTICAL PARAMETER
<u>SB-11</u>	<u>10/28/98</u>		<u>VDA</u>		<u>4</u>	<u>HCL</u>	<u>met/3TEX</u>
<u>↓</u>	<u>↓</u>		<u>Amber</u>		<u>2</u>		<u>TOB</u>
			<u>Plastic</u>		<u>2</u>		<u>TOC / Cu / Cr</u>

REMARKS: D.C. = 4.78 mg/L

SIGNATURE: Jeff Remediation Risk Management, Inc.

FIELD DATA

GROUNDWATER SAMPLING FORM

DATE: 10/28/98 SITE ADDRESS: Blending Ave WELL ID #: SB-12
 STATION/PROJECT NO.: AA46 CITY/COUNTY/STATE: Alameda FIELD TECH.: JGD

PROBE TYPE Oil/Water Interface Probe
 Electronic Indicator
 Other

CASING DIAMETER	GAL. LINEAR FT.
<input type="checkbox"/> 2	<input type="checkbox"/> 0.17
<input type="checkbox"/> 3	<input type="checkbox"/> 0.38
<input type="checkbox"/> 4	<input type="checkbox"/> 0.66
<input type="checkbox"/> 4.5	<input type="checkbox"/> 0.83
<input type="checkbox"/> 5	<input type="checkbox"/> 1.02
<input type="checkbox"/> 6	<input type="checkbox"/> 1.5
<input type="checkbox"/> 7	<input type="checkbox"/> 2.0
<input type="checkbox"/> 8	<input type="checkbox"/> 2.6

SAMPLE TYPE
 Groundwater
 Duplicate
 Extraction Well
 Trip Blank
 Field Blank
 Equipment Blank
 Other _____

WELL INFORMATION
 Depth to Liquid: _____ TOB
 Depth to Liquid: _____ TOC
 Depth to Water: _____ TOB
 Depth to Water: _____ TOC
 Total Depth: _____ (Feet)

TD _____ - Dtw _____ = _____ Gal/Linear x Foot = _____ Number of X Casings = _____ Calculated Purge

PURGE INFORMATION

DATE PURGED: _____ START: _____ END (2400 hr): _____ PURGED BY: _____
 DATE SAMPLED: _____ START: _____ END (2400 hr): _____ SAMPLED BY: _____

TIME (2400 hr)	VOLUME (gallons)	pH (units)	E.C. (umhos/cm @ 25 ° C)	TEMPERATURE (° F)	COLOR	TURBIDITY (NTU 0-200)	ODOR
<u>1318</u>		<u>6.18</u>	<u>590</u>	<u>66-1</u>	<u>Cloudy</u>	<u>mod & lig</u>	<u>None</u>

Total Purge Volume: _____ Well Pumped Dry: Yes/No
 Legend: Clear, Cloudy, Yellow, Brown, Heavy, Moderate, Light, Trace, Strong, Moderate, Faint, None

PURGING EQUIPMENT/NOTES **SAMPLING EQUIPMENT/NOTES**
 Bailer: disp S.S. Airlift Pump: _____ Bailer: disp S.S.
 Centrifugal Pump: _____ Dedicated: _____ Dedicated: _____
 Other: _____ Other: _____

GROUNDWATER SAMPLING INFORMATION

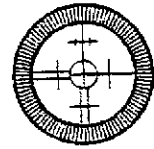
SAMP. ID #	DATE	TIME (2400 hr)	CONTAINER	SIZE	No. of Cont.	PRESERVE	ANALYTICAL PARAMETER
<u>SB-12</u>	<u>10/28/98</u>		<u>VCA</u>		<u>4</u>	<u>HLL</u>	<u>ars/BTEX</u>
			<u>Amber</u>		<u>2</u>		<u>Trials</u>
			<u>plastic</u>		<u>2</u>		<u>TDS/Chl/Br</u>

REMARKS: D.O. = 2.82

SIGNATURE: [Signature] Remediation Risk Management, Inc.



LANGFORD LAND SURVEYING



Ms. Coco Tatay, Geologist.
RRM, Inc.
3912 Portola Drive, Suite 8
Santa Cruz, CA 95062
831.475.8141 (fax) 831.475.8249

October 30, 1998

Project Site: 2301-2337 Blanding Avenue, Alameda, CA

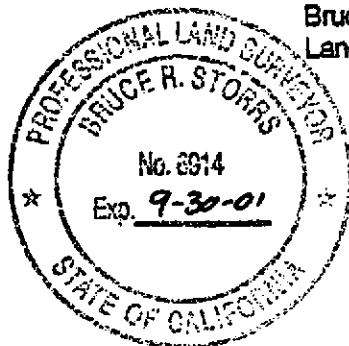
Ms. Tatay

On October 29, 1998 we conducted a Vertical Survey on the above referenced site. Assuming an elevation of 100.00 feet at the mark, which RRM, INC. set on the "Park Street Bridge". We brought elevations to the 4 monitoring, wells upon the site (SB9, SB10, SB11 and SB12). The elevations for these points are summarized as follows:

WELL NO.	ELEVATION
SB9	87.43 FEET
SB10	88.10 FEET
SB11	87.21 FEET
SB12	87.68 FEET

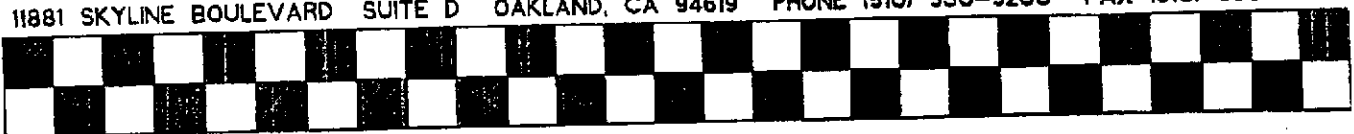
Bruce Storrs

Bruce R. Storrs, P.L.S.
Langford Land Surveying



RRM.DOC

11881 SKYLINE BOULEVARD SUITE D OAKLAND, CA 94619 PHONE (510) 530-5200 FAX (510) 530-0825



ATTACHMENT C
CERTIFIED ANALYTICAL REPORTS AND CHAIN-OF-CUSTODY
DOCUMENTATION



RRM, Inc. 3912 Portola Dr., #8 Santa Cruz, CA 95062	Client Proj. ID: Chevron AA46/Frmr. Signal Oil Lab Proj. ID: 9810K35	Sampled: 10/28/98 Received: 10/29/98 Analyzed: see below Reported: 11/17/98
Attention: Dave Reinsma		

LABORATORY ANALYSIS

Analyte	Units	Date Analyzed	Detection Limit	Sample Results
Lab No: 9810K35-01 Sample Desc: SOLID,SB-9,4-5'				
Bulk Density	-			Attached
Moisture, Percent	%	11/04/98	1.0	20
Organic Carbon : Total	mg/Kg	11/10/98	50	1800
Porosity	-			Attached
Subout	-			Attached
Lab No: 9810K35-02 Sample Desc: SOLID,SB-9,9.5-10.5'				
Bulk Density	-			Attached
Moisture, Percent	%	11/04/98	1.0	13
Organic Carbon : Total	mg/Kg	11/10/98	50	590
Porosity	-			Attached
Subout	-			Attached
Lab No: 9810K35-03 Sample Desc: SOLID,SB-10,3-4'				
Bulk Density	-			Attached
Moisture, Percent	%	11/04/98	1.0	11
Organic Carbon : Total	mg/Kg	11/10/98	50	900
Porosity	-			Attached
Subout	-			Attached
Lab No: 9810K35-04 Sample Desc: SOLID,SB-10,6.5-7'				
Bulk Density	-			Attached
Moisture, Percent	%	11/04/98	1.0	20
Organic Carbon : Total	mg/Kg	11/10/98	50	2000
Porosity	-			Attached
Subout	-			Attached

Analytes reported as N.D. were not present above the stated limit of detection.

w = 5 to 20%
TOC = 120 to 2000 mg/kg

SEQUOIA ANALYTICAL - ELAP #1210

Mike Gregory
Project Manager






RRM, Inc. 3912 Portola Dr., #8 Santa Cruz, CA 95062	Client Proj. ID: Chevron AA46/Frmr. Signal Oil Lab Proj. ID: 9810K35	Sampled: 10/28/98 Received: 10/29/98 Analyzed: see below Reported: 11/17/98
Attention: Dave Reinsma		

LABORATORY ANALYSIS

Analyte	Units	Date Analyzed	Detection Limit	Sample Results
Lab No: 9810K35-05 Sample Desc : SOLID,SB-11,2.5-3.5'				
Bulk Density	-			Attached
Moisture, Percent	%	11/04/98	1.0	5.0
Organic Carbon : Total	mg/Kg	11/10/98	50	1200
Porosity	-			Attached
Subout	-			Attached
Lab No: 9810K35-06 Sample Desc : SOLID,SB-11,7-8'				
Bulk Density	-			Attached
Moisture, Percent	%	11/04/98	1.0	13
Organic Carbon : Total	mg/Kg	11/10/98	50	240
Porosity	-			Attached
Subout	-			Attached
Lab No: 9810K35-07 Sample Desc : SOLID,SB-12,2-3'				
Bulk Density	-			Attached
Moisture, Percent	%	11/04/98	1.0	12
Organic Carbon : Total	mg/Kg	11/10/98	50	1200
Porosity	-			Attached
Subout	-			Attached
Lab No: 9810K35-08 Sample Desc : SOLID,SB-12,6-7'				
Bulk Density	-			Attached
Moisture, Percent	%	11/04/98	1.0	14
Organic Carbon : Total	mg/Kg	11/10/98	50	120
Porosity	-			Attached
Subout	-			Attached

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210


Mike Gregory
Project Manager





Sequoia
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(707) 792-1865

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FAX (925) 988-9673
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FAX (707) 792-0342

RRM, Inc.
3912 Portola Dr., #8
Santa Cruz, CA 95062
Attention: Dave Reinsma

Client Proj. ID: Chevron AA46/Frmr. Signal Oil
Lab Proj. ID: 9810K35

Received: 10/29/98
Reported: 11/17/98

LABORATORY NARRATIVE

In order to properly interpret this report, it must be reproduced in its entirety. This report contains a total of 1 pages including the laboratory narrative, sample results, quality control, and related documents as required (cover page, COC, raw data, etc.).

SEQUOIA ANALYTICAL


Mike Gregory
Project Manager





**Sequoia
Analytical**

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FAX (707) 792-0342

RRM, Inc.
3912 Portola Dr., #8
Santa Cruz, CA 95062
Attention: Dave Reinsma

Client Project ID: Chevron 1146/Frmr. Signal Oil

QC Sample Group: 9810K35-01-08

Reported: Nov 17, 1998

QUALITY CONTROL DATA REPORT

Matrix: Solid
Method: EPA 415.1
Analyst: S. Flynn

ANALYTE Total Organic Carbon

QC Batch #: IN1110984151TCA

Sample No.: 9810K35-06
Date Prepared: 11/10/98
Date Analyzed: 11/10/98

Sample Conc., mg/Kg: 240
Conc. Spiked, mg/Kg: 2000

Matrix Spike, mg/Kg: 2400
% Recovery: 108

Matrix
Spike Duplicate, mg/Kg: 2400
% Recovery: 108

Relative % Difference: 0.0

RPD Control Limits: 0-20

LCS Batch#: LCS111098A

Date Prepared: 11/10/98
Date Analyzed: 11/10/98

Conc. Spiked, mg/L: 2000

LCS Recovery, mg/L: 2000
LCS % Recovery: 100

Percent Recovery Control Limits:

MS/MSD 75-125
LCS 80-120

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

SEQUOIA ANALYTICAL

Mike Gregory
Project Manager

Please Note:

The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.





PETROLEUM SERVICES

Mr. Mike Gregory
Sequoia Analytical
680 Chesapeake Dr.
Redwood City, CA 94063

November 17, 1998

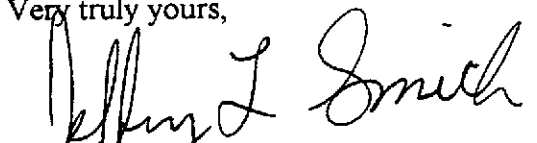
Subject : Transmittal of Geotechnical Analysis Data
SA Work order # 9810K35
Core Lab File No. 57111-98300

Dear Mr. Gregory:

Soil samples were submitted to our Bakersfield laboratory for geotechnical analysis. Determinations of bulk density, total porosity, water saturation and moisture content were requested. Grain and pore volumes were determined by Boyles Law double-cell methods utilizing an extended range helium porosimeter. The bulk densities, water saturations and total porosity measurements and calculations were performed as described in API RP-40, API Recommended Practice for Core-Analysis Procedure, 1960. Moisture Content was determined by standard ASTM D-2216 method. Accompanying this letter please find the results of this study.

We appreciate this opportunity to be of service to you and to Sequoia Analytical. Should you have any questions, or if we may be of further help in the future, please do not hesitate to contact us.

Very truly yours,



Jeffrey L. Smith
Laboratory Supervisor - Rock Properties

JLS:nw

1 original report, 1 cc report: Addressee



Sequoia Analytical

Core Lab File #: 57111-98300

(Redwood City)

S.A. Project RRM

Work Order # 9810K35

$$\frac{V_w}{V_s} \quad \frac{V_w}{V} \quad \frac{W_w}{W_s} \quad SR = \frac{V_w}{V_v} \rho_d = \frac{M_s}{V_s} = \frac{\rho}{1+w} \quad \rho = \frac{M}{V}$$

Sample ID		Void Ratio	Porosity (Total) %	Moisture Content		Water Saturation %	Density			Description
Frac.	Desc.			Ratio	D-2216 %		Dry Bulk g/cc	Natural Bulk g/cc	Grain g/cc	
01	SB-9, 4.0-5.0'	0.45	30.9	0.18	18.1	91.6	1.57	1.85	2.27	Gray vf-vcgr silty sand w/gravel
02	SB-9, 9.5-10.5'	0.43	30.2	0.16	16.1	99.7	1.88	2.18	2.69	Gray vf-fgr sandy clayey silt
03	SB-10, 3.0-4.0'	0.44	30.6	0.09	9.3	56.2	1.86	2.03	2.67	Gray vf-fgr sl silty sand
04	SB-10, 6.5-7.0'	0.73	42.3	0.31	30.6	99.9	1.38	1.80	2.39	Gray vf-fgr sandy clayey silt w/sl gravel
05	SB-11, 2.5-3.5'	0.43	30.0	0.16	16.1	99.8	1.86	2.16	2.66	Gray vf-vcgr silty sand w/gravel
06	SB-11, 7.0-8.0'	0.33	24.8	0.08	8.0	64.6	2.00	2.16	2.66	Gray vf-fgr silty sand w/sl clay
07	SB-12, 2.0-3.0'	0.36	26.5	0.13	13.2	97.4	1.96	2.22	2.67	Gray vf-vcgr silty sand w/gravel
08	SB-12, 6.0-7.0'	0.43	29.9	0.16	16.0	99.7	1.86	2.16	2.66	Gray vf-fgr sandy clayey silt

- Void Ratio = Pore Volume / Grain Volume
- Porosity = (Pore Volume / Bulk Volume) X 100
- Moisture Ratio = Water Mass / Dry Matrix Mass
- D-2216 Moisture = (Water Mass / Dry Matrix Mass) X 100
- Water Saturation = (Water Volume / Pore Volume) X 100
- Dry Bulk Density = Dry Matrix Mass / Bulk Volume
- Natural Bulk Density = Fresh Sample Mass / Bulk Volume
- Grain Density = Dry Matrix Mass / Grain Volume

Methods : API RP-40 - Porosity, Water Saturation, Density; ASTM D-2216 - Moisture Content

Fax copy of Lab Report and COC to Chevron Contact: Yes No

Chain-of-Custody-Record

Chevron U.S.A. Inc.
P.O. BOX 5004
San Ramon, CA 94583
FAX (415)842-9591

Chevron Facility Number FORMER BAYVIEW OIL MARINE TERM
Facility Address 2301-2337 BAYVIEW AVE
Consultant Project Number A1746
Consultant Name KRM, INC.
Address 3912 PORTLAND DR. SUITE G SANTA CRUZ
Project Contact (Name) DAVE REINSMA
(Phone) 831 475-8141 (Fax Number) 475-8249

Chevron Contact (Name) PITIL BERNARDIS
(Phone) 925 842-9130
Laboratory Name SEQUOIA
Laboratory Release Number 9105023
Samples Collected by (Name) PAUL PRINSON
Collection Date 10-28-98
Signature [Signature]

Sample Number	Lab Sample Number	Number of Containers	Matrix S = Soil W = Water A = Air C = Charcoal	Type G = Grab C = Composite D = Discrete	Time	Sample Preservation	Lead (Yes or No)	Analyses To Be Performed												Remarks			
								BTEX + TPH GAS (8020 + 8015)	TPH Diesel (8015)	Oil and Grease (5520)	Purgeable Hydrocarbons (8010)	Purgeable Aromatics (8020)	Purgeable Organics (8240)	Extractable Organics (8270)	Metals Cd, Cr, Pb, Zn, Ni (ICAP or AA)	MOISTURE CONTENT	TOTAL DEMAND CARBON DC	SPECIFIC GRAVITY SATURATION RATIO	DENSITY CORRECTION		VOID RATIO		
SB-9, 4-5'	7	1	S	D	13:23	NO	Y											X	X	X	X	X	01
SB-9, 9.5-10.5' R		1	S	D	13:30	NO	Y											X	X	X	X	X	02
SB-10, 3-4'	8	1	S	D	10:43	NO	Y											X	X	X	X	X	03
SB-10, 6.5-7'	8	1	S	D	10:45	NO	Y											X	X	X	X	X	04
SB-11, 2.5-3.5'	8	1	S	D	09:00	NO	Y											X	X	X	X	X	05
SB-11, 7-8'	7	1	S	D	09:05	NO	Y											X	X	X	X	X	06
SB-12, 2-3'	8	1	S	D	09:51	NO	Y											X	X	X	X	X	07 29 5 2
SB-12, 6-7'	8	1	S	D	09:57	NO	Y											X	X	X	X	X	08

9810K35

Relinquished By (Signature) <u>[Signature]</u>	Organization <u>KRM</u>	Date/Time <u>10/29/98</u>	Received By (Signature) <u>[Signature]</u>	Organization <u>Sequoia</u>	Date/Time <u>10/29 15:12</u>
Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
Relinquished By (Signature)	Organization	Date/Time	Received For Laboratory By (Signature) <u>[Signature]</u>		Date/Time <u>10/29/98 7:22</u>

Turn Around Time (Circle Choice)

24 Hrs.
48 Hrs.
5 Days
10 Days
As Contracted

COC-10/29/98



RRM, Inc. 3912 Portola Dr., #8 Santa Cruz, CA 95062 Attention: Dave Reinsma	Client Proj. ID: Chevron AA46/Frmr.Signal Oil Sample Descript: SB-9,5-6' Matrix: SOLID Analysis Method: 8015Mod/8020 Lab Number: 9810H02-01	Sampled: 10/28/98 Received: 10/29/98 Extracted: 11/09/98 Analyzed: 11/09/98 Reported: 11/16/98
--	---	--

QC Batch Number: GC110998BTEXEXB
Instrument ID: GCHP22

Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX and MTBE

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TPPH as Gas	25	130
Methyl t-Butyl Ether	0.62	N.D.
Benzene	0.12	0.36
Toluene	0.12	N.D.
Ethyl Benzene	0.12	N.D.
Xylenes (Total)	0.12	0.28
Chromatogram Pattern: Gas & Unidentified HC		C8-C13
	Control Limits %	% Recovery
Surrogates	70	130
Trifluorotoluene	60	140
4-Bromofluorobenzene		5 Q

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210

Mike Gregory
Project Manager





RRM, Inc. 3912 Portola Dr., #8 Santa Cruz, CA 95062	Client Proj. ID: Chevron AA46/Frmr Signal Oil Sample Descript: SB-9 Matrix: LIQUID Analysis Method: EPA 8260 Lab Number: 9811B06-01	Sampled: 10/28/98 Received: 10/29/98 Analyzed: 11/29/98 Reported: 12/02/98
---	---	---

QC Batch Number: MS112998MTBEF2A
Instrument ID: F2

Methyl t-Butyl Ether (MTBE)

Analyte	Detection Limit ug/L	Sample Results ug/L
Methyl t-Butyl Ether	10	N.D.
Surrogates	Control Limits %	% Recovery
1,2-Dichloroethane-d4	76 114	108

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210



Mike Gregory
Project Manager





**Sequoia
Analytical**

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(707) 792-1865

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FAX (925) 988-9673
FAX (916) 921-0100
FAX (707) 792-0342

RRM, Inc.
3912 Portola Dr., #8
Santa Cruz, CA 95062
Attention: Dave Reinsma

Client Project ID: Chevron AA46/Frmr Signal Oil
Matrix: Liquid

Work Order #: 9811B06 -01

Reported: Dec 4, 1998

QUALITY CONTROL DATA REPORT

Analyte: MTBE

QC Batch#: MS112998MTBEF2A
Analy. Method: EPA 8260
Prep. Method: N.A.

Analyst: L. Zhu
MS/MSD #: 9811F8901
Sample Conc.: N.D.
Prepared Date: 11/29/98
Analyzed Date: 11/29/98
Instrument I.D.#: F2
Conc. Spiked: 50 µg/L

Result: 45
MS % Recovery: 90

Dup. Result: 47
MSD % Recov.: 94

RPD: 4.3
RPD Limit: 0-25

LCS #: LCS112998

Prepared Date: 11/29/98
Analyzed Date: 11/29/98
Instrument I.D.#: F2
Conc. Spiked: 50 µg/L

LCS Result: 44
LCS % Recov.: 88

MS/MSD 60-140
LCS 70-130
Control Limits

SEQUOIA ANALYTICAL

Mike Gregory
Project Manager

Please Note:

The LCS is a control sample of known, interferent-free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

** MS = Matrix Spike, MSD = MS Duplicate, RPD = Relative % Difference

9811B06.RRR <1>





Sequoia
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FAX (707) 792-0342

RRM, Inc.
3912 Portola Dr., #8
Santa Cruz, CA 95062
Attention: Dave Reinsma

Client Proj. ID: Chevron AA46/Frmr Signal Oil

Received: 10/29/98

Lab Proj. ID: 9811B06

Reported: 12/02/98

LABORATORY NARRATIVE

In order to properly interpret this report, it must be reproduced in its entirety. This report contains a total of 4 pages including the laboratory narrative, sample results, quality control, and related documents as required (cover page, COC, raw data, etc.).

MTBE (8260):

Sample 9811B06-01 was diluted 5-fold.

SEQUOIA ANALYTICAL


Mike Gregory
Project Manager





RRM, Inc. 3912 Portola Dr., #8 Santa Cruz, CA 95062	Client Proj. ID: Chevron AA46/Frmr.Signal Oil Sample Descript: SB-9.5-6' Matrix: SOLID Analysis Method: EPA 8015 Mod Lab Number: 9810H02-01	Sampled: 10/28/98 Received: 10/29/98 Extracted: 11/05/98 Analyzed: 11/12/98 Reported: 11/16/98
Attention: Dave Reinsma		

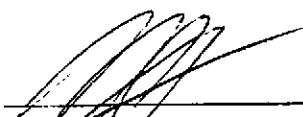
QC Batch Number: GC1105980HBPEXD
Instrument ID: GCHP4B

Total Extractable Petroleum Hydrocarbons (TEPH) with Silica Gel Cleanup

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TEPH as Diesel Chromatogram Pattern: Note 1	100 C9-C24+ C18-C24	2900 W-Diesel Unid-HC
Surrogates n-Pentacosane (C25)	Control Limits % 50 150	% Recovery Q

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210



Mike Gregory
Project Manager





RRM, Inc. 3912 Portola Dr., #8 Santa Cruz, CA 95062	Client Proj. ID: Chevron AA46/Frmr.Signal Oil Sample Descript: SB-9,5-6' Matrix: SOLID Analysis Method: EPA 8015 Mod Lab Number: 9810H02-01	Sampled: 10/28/98 Received: 10/29/98 Extracted: 11/05/98 Analyzed: 11/10/98 Reported: 11/16/98
Attention: Dave Reinsma		


QC Batch Number: GC1105980HBPEXD
Instrument ID: GCHP5B

Total Extractable Petroleum Hydrocarbons (TEPH)

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TEPH as Diesel Chromatogram Pattern:	100 C9-C24+C1	3300 W-Diesel
Surrogates n-Pentacosane (C25)	Control Limits % 50 150	% Recovery Q

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210



Mike Gregory
Project Manager





RRM, Inc. 3912 Portola Dr., #8 Santa Cruz, CA 95062	Client Proj. ID: Chevron AA46/Frmr.Signal Oil Sample Descript: SB-9,13-14' Matrix: SOLID Analysis Method: 8015Mod/8020 Lab Number: 9810H02-02	Sampled: 10/28/98 Received: 10/29/98 Extracted: 11/09/98 Analyzed: 11/09/98 Reported: 11/16/98
Attention: Dave Reinsma		

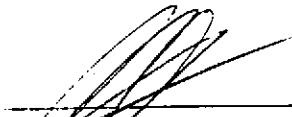
QC Batch Number: GC110998BTEXEXB
Instrument ID: GCHP22

Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX and MTBE

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TPPH as Gas	250	900
Methyl t-Butyl Ether	6.2	12
Benzene	1.2	3.3
Toluene	1.2	N.D.
Ethyl Benzene	1.2	2.1
Xylenes (Total)	1.2	2.0
Chromatogram Pattern: Gas & Unidentified HC		C8-C13
Surrogates	Control Limits %	% Recovery
Trifluorotoluene	70	130
4-Bromofluorobenzene	60	140

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210



Mike Gregory
Project Manager





RRM, Inc. 3912 Portola Dr., #8 Santa Cruz, CA 95062	Client Proj. ID: Chevron AA46/Frmr.Signal Oil Sample Descript: SB-9,13-14' Matrix: SOLID Analysis Method: EPA 8015 Mod Lab Number: 9810H02-02	Sampled: 10/28/98 Received: 10/29/98 Extracted: 11/05/98 Analyzed: 11/12/98 Reported: 11/16/98
Attention: Dave Reinsma		


QC Batch Number: GC1105980HBPEXD
Instrument ID: GCHP4B

Total Extractable Petroleum Hydrocarbons (TEPH) with Silica Gel Cleanup

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TEPH as Diesel Chromatogram Pattern: Note 1	100 C9-C24+ C9-C24	940 W-Diesel Unid-HC
Surrogates n-Pentacosane (C25)	Control Limits % 50 150	% Recovery Q

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210



Mike Gregory
Project Manager





RRM, Inc.
3912 Portola Dr., #8
Santa Cruz, CA 95062

Attention: Dave Reinsma

Client Proj. ID: Chevron AA46/Frmr.Signal Oil
Sample Descript: SB-9,13-14'
Matrix: SOLID
Analysis Method: EPA 8015 Mod
Lab Number: 9810H02-02

Sampled: 10/28/98
Received: 10/29/98
Extracted: 11/05/98
Analyzed: 11/11/98
Reported: 11/16/98

QC Batch Number: GC1105980HBPEXD
Instrument ID: GCHP5B

Total Extractable Petroleum Hydrocarbons (TEPH)

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TEPH as Diesel Chromatogram Pattern:	100 C9-C24+C9	1300 W-diesel
Surrogates n-Pentacosane (C25)	Control Limits % 50 150	% Recovery Q

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210

Mike Gregory
Project Manager





RRM, Inc.
3912 Portola Dr., #8
Santa Cruz, CA 95062

Client Proj. ID: Chevron AA46/Fmr.Signal Oil
Sample Descript: SB-9,15-16'
Matrix: SOLID
Analysis Method: 8015Mod/8020
Lab Number: 9810H02-03

Sampled: 10/28/98
Received: 10/29/98
Extracted: 11/09/98
Analyzed: 11/10/98
Reported: 11/16/98


QC Batch Number: GC110998BTEXEXB
Instrument ID: GCHP7

Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX and MTBE

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TPPH as Gas	1.0	N.D.
Methyl t-Butyl Ether	0.025	N.D.
Benzene	0.0050	0.22
Toluene	0.0050	N.D.
Ethyl Benzene	0.0050	N.D.
Xylenes (Total)	0.0050	N.D.
Chromatogram Pattern:		
Surrogates	Control Limits %	% Recovery
Trifluorotoluene	70	130
4-Bromofluorobenzene	60	140

Analyses reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210



Mike Gregory
Project Manager





RRM, Inc. 3912 Portola Dr., #8 Santa Cruz, CA 95062 Attention: Dave Reinsma	Client Proj. ID: Chevron AA46/Frmr.Signal Oil Sample Descript: SB-9,15-16' Matrix: SOLID Analysis Method: EPA 8015 Mod Lab Number: 9810H02-03	Sampled: 10/28/98 Received: 10/29/98 Extracted: 11/05/98 Analyzed: 11/12/98 Reported: 11/16/98
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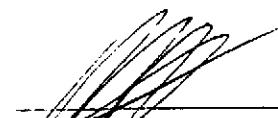
QC Batch Number: GC1105980HBPEXD
Instrument ID: GCHP4B

Total Extractable Petroleum Hydrocarbons (TEPH) with Silica Gel Cleanup

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TEPH as Diesel Chromatogram Pattern:	1.0	N.D.
Surrogates	Control Limits %	% Recovery
n-Pentacosane (C25)	50 150	64

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210



Mike Gregory
Project Manager





RRM, Inc. 3912 Portola Dr., #8 Santa Cruz, CA 95062	Client Proj. ID: Chevron AA46/Frmr.Signal Oil Sample Descript: SB-9.15-16' Matrix: SOLID Analysis Method: EPA 8015 Mod Lab Number: 9810H02-03	Sampled: 10/28/98 Received: 10/29/98 Extracted: 11/05/98 Analyzed: 11/10/98 Reported: 11/16/98
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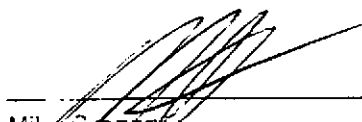
QC Batch Number: GC1105980HBPEXD
Instrument ID: GCHP4B

Total Extractable Petroleum Hydrocarbons (TEPH)

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TEPH as Diesel Chromatogram Pattern:	1.0 C9-C24	1.2 Unid.-HC
Surrogates	Control Limits %	% Recovery
n-Pentacosane (C25)	50 150	72

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210



Mike Gregory
Project Manager





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FAX (707) 792-0342

RRM, Inc. 3912 Portola Dr., #8 Santa Cruz, CA 95062	Client Proj. ID: Chevron AA46/Frmr.Signal Oil Sample Descript: SB-10.5.5-6.5' Matrix: SOLID Analysis Method: 8015Mod/8020 Lab Number: 9810H02-04	Sampled: 10/28/98 Received: 10/29/98 Extracted: 11/09/98 Analyzed: 11/09/98 Reported: 11/16/98
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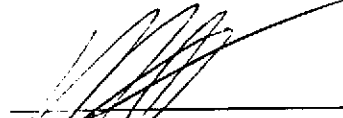
Attention: Dave Reinsma
QC Batch Number: GC110998BTEXEXB
Instrument ID: GCHP31

Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX and MTBE

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TPPH as Gas	1.0	N.D.
Methyl t-Butyl Ether	0.025	N.D.
Benzene	0.0050	N.D.
Toluene	0.0050	N.D.
Ethyl Benzene	0.0050	N.D.
Xylenes (Total)	0.0050	N.D.
Chromatogram Pattern:		
Surrogates	Control Limits %	% Recovery
Trifluorotoluene	70 130	85
4-Bromofluorobenzene	60 140	82

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210



Mike Gregory
Project Manager





FRM, Inc. 3912 Portola Dr., #8 Santa Cruz, CA 95062	Client Proj. ID: Chevron AA46/Frmr.Signal Oil Sample Descript: SB-10,5.5-6.5' Matrix: SOLID Analysis Method: EPA 8015 Mod Lab Number: 9810H02-04	Sampled: 10/28/98 Received: 10/29/98 Extracted: 11/05/98 Analyzed: 11/12/98 Reported: 11/16/98
Attention: Dave Reinsma		

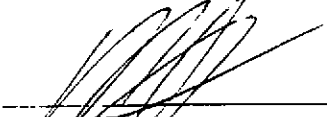
QC Batch Number: GC1105980HBPEXD
Instrument ID: GCHP4B

Total Extractable Petroleum Hydrocarbons (TEPH) with Silica Gel Cleanup

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TEPH as Diesel Chromatogram Pattern:	10 C9-C24	95 Unid-HC
Surrogates n-Pentacosane (C25)	Control Limits % 50 150	% Recovery 283 Q

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210



Mike Gregory
Project Manager





RRM, Inc. 3912 Portola Dr., #8 Santa Cruz, CA 95062	Client Proj. ID: Chevron AA46/Frmr.Signal Oil Sample Descript: SB-10,5.5-6.5' Matrix: SOLID Analysis Method: EPA 8015 Mod Lab Number: 9810H02-04	Sampled: 10/28/98 Received: 10/29/98 Extracted: 11/05/98 Analyzed: 11/10/98 Reported: 11/16/98
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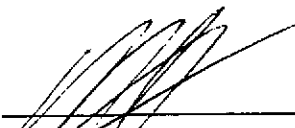
QC Batch Number: GC1105980HBPEXD
Instrument ID: GCHP4B

Total Extractable Petroleum Hydrocarbons (TEPH)

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TEPH as Diesel Chromatogram Pattern:	10 C9-C24	130 Unid.-HC
Surrogates n Pentacosane (C25)	Control Limits % 50 150	% Recovery 382 Q

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210



Mike Gregory
Project Manager





RRM, Inc. 3912 Portola Dr., #8 Santa Cruz, CA 95062	Client Proj. ID: Chevron AA46/Fmr.Signal Oil Sample Descript: SB-11,6-7' Matrix: SOLID Analysis Method: 8015Mod/8020 Lab Number: 9810H02-05	Sampled: 10/28/98 Received: 10/29/98 Extracted: 11/09/98 Analyzed: 11/09/98 Reported: 11/16/98
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QC Batch Number: GC110998BTEXEXB
Instrument ID: GCHP31

Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX and MTBE

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TPPH as Gas	20	140
Methyl t-Butyl Ether	0.50	N.D.
Benzene	0.10	N.D.
Toluene	0.10	0.12
Ethyl Benzene	0.10	0.24
Xylenes (Total)	0.10	0.49
Chromatogram Pattern: Gas & Unidentified HC		C8-C13
Surrogates	Control Limits %	% Recovery
Trifluorotoluene	70	130
4-Bromofluorobenzene	60	140

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210


Mike Gregory
Project Manager





RRM, Inc. 3912 Portola Dr., #8 Santa Cruz, CA 95062 Attention: Dave Reinsma	Client Proj. ID: Chevron AA46/Frmr.Signal Oil Sample Descript: SB-11,6-7' Matrix: SOLID Analysis Method: EPA 8015 Mod Lab Number: 9810H02-05	Sampled: 10/28/98 Received: 10/29/98 Extracted: 11/05/98 Analyzed: 11/12/98 Reported: 11/16/98
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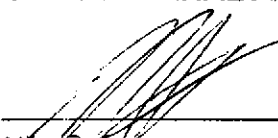
QC Batch Number: GC1105980HBPEXD
Instrument ID: GCHP4B

Total Extractable Petroleum Hydrocarbons (TEPH) with Silica Gel Cleanup

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TEPH as Diesel Chromatogram Pattern:	4.0 C9-C24	38 Unid-HC
Surrogates n-Pentacosane (C25)	Control Limits % 50 150	% Recovery 145

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210



 Mike Gregory
 Project Manager





RRM, Inc. 3912 Portola Dr., #8 Santa Cruz, CA 95062 Attention: Dave Reinsma	Client Proj. ID: Chevron AA46/Frmr.Signal Oil Sample Descript: SB-11,6-7 Matrix: SOLID Analysis Method: EPA 8015 Mod Lab Number: 9810H02-05	Sampled: 10/28/98 Received: 10/29/98 Extracted: 11/05/98 Analyzed: 11/10/98 Reported: 11/16/98
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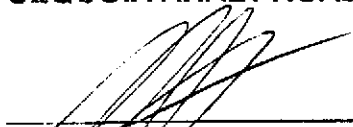
QC Batch Number: GC1105980HBPEXD
Instrument ID: GCHP4B

Total Extractable Petroleum Hydrocarbons (TEPH)

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TEPH as Diesel Chromatogram Pattern:	4.0 C9-C24	60 Unid.-HC
Surrogates n-Pentacosane (C25)	Control Limits % 50 150	% Recovery 173 Q

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210



Mike Gregory
Project Manager





RPM, Inc.
3912 Portola Dr., #8
Santa Cruz, CA 95062

Client Proj. ID: Chevron AA46/Frmr.Signal Oil
Sample Descript: SB-12,5-6'
Matrix: SOLID
Analysis Method: 8015Mod/8020
Lab Number: 9810H02-06

Sampled: 10/28/98
Received: 10/29/98
Extracted: 11/09/98
Analyzed: 11/09/98
Reported: 11/16/98


QC Batch Number: GC110998BTEXEXB
Instrument ID: GCHP31

Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX and MTBE

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TPPH as Gas	1.0	N.D.
Methyl t-Butyl Ether	0.025	N.D.
Benzene	0.0050	N.D.
Toluene	0.0050	N.D.
Ethyl Benzene	0.0050	N.D.
Xylenes (Total)	0.0050	N.D.
Chromatogram Pattern:		
Surrogates	Control Limits %	% Recovery
Trifluorotoluene	70 130	90
4-Bromofluorobenzene	60 140	86

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210


Mike Gregory
Project Manager





PRM, Inc. 3912 Portola Dr., #8 Santa Cruz, CA 95062	Client Proj. ID: Chevron AA46/Frmr.Signal Oil Sample Descript: SB-12,5-6' Matrix: SOLID Analysis Method: EPA 8015 Mod Lab Number: 9810H02-06	Sampled: 10/28/98 Received: 10/29/98 Extracted: 11/05/98 Analyzed: 11/10/98 Reported: 11/16/98
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QC Batch Number: GC1105980HBPEXD
Instrument ID: GCHP4B

Total Extractable Petroleum Hydrocarbons (TEPH)

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TEPH as Diesel Chromatogram Pattern:	1.0	N.D.
Surrogates	Control Limits %	% Recovery
n-Pentacosane (C25)	50 150	94

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210

Mike Gregory
Project Manager





RPM, Inc. 3912 Portola Dr., #8 Santa Cruz, CA 95062	Client Proj. ID: Chevron AA46/Frmr.Signal Oil Sample Descript: SB-12,7-8' Matrix: SOLID Analysis Method: 8015Mod/8020 Lab Number: 9810H02-07	Sampled: 10/28/98 Received: 10/29/98 Extracted: 11/09/98 Analyzed: 11/09/98 Reported: 11/16/98
Attention: Dave Reinsma		

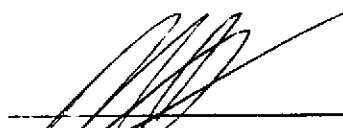
GC Batch Number: GC110998BTEXEXB
Instrument ID: GCHP31

Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX and MTBE

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TPPH as Gas	1.0	N.D.
Methyl t-Butyl Ether	0.025	N.D.
Benzene	0.0050	N.D.
Toluene	0.0050	N.D.
Ethyl Benzene	0.0050	N.D.
Xylenes (Total)	0.0050	N.D.
Chromatogram Pattern:		
Surrogates	Control Limits %	% Recovery
Trifluorotoluene	70 130	88
4-Bromofluorobenzene	60 140	83

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210



Mike Gregory
Project Manager





RRM, Inc. 2912 Portola Dr., #8 Santa Cruz, CA 95062 Attention: Dave Reinsma	Client Proj. ID: Chevron AA46/Frmr.Signal Oil Sample Descript: SB-12.7-8' Matrix: SOLID Analysis Method: EPA 8015 Mod Lab Number: 9810H02-07	Sampled: 10/28/98 Received: 10/29/98 Extracted: 11/05/98 Analyzed: 11/10/98 Reported: 11/16/98
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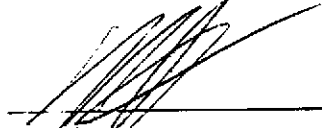
GC Batch Number: GC1105980HBPEXD
Instrument ID: GCHP4B

Total Extractable Petroleum Hydrocarbons (TEPH)

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TEPH as Diesel Chromatogram Pattern:	1.0	N.D.
Surrogates	Control Limits %	% Recovery
n-Pentacosane (C25)	50 150	74

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210



Mike Gregory
Project Manager





RRM, Inc. 3912 Portola Dr., #8 Santa Cruz, CA 95062	Client Proj. ID: Chevron AA46/Frmr.Signal Oil Sample Descript: SB-12,14-15' Matrix: SOLID Analysis Method: 8015Mod/8020 Lab Number: 9810H02-08	Sampled: 10/28/98 Received: 10/29/98 Extracted: 11/09/98 Analyzed: 11/09/98 Reported: 11/16/98
Attention: Dave Reinsma		

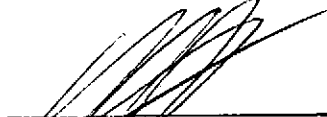
QC Batch Number: GC110998BTEXEXB
Instrument ID: GCHP18

Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX and MTBE

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TPPH as Gas	1.0	N.D.
Methyl t-Butyl Ether	0.025	N.D.
Benzene	0.0050	N.D.
Toluene	0.0050	N.D.
Ethyl Benzene	0.0050	N.D.
Xylenes (Total)	0.0050	N.D.
Chromatogram Pattern:		
Surrogates	Control Limits %	% Recovery
Trifluorotoluene	70 130	94
4-Bromofluorobenzene	60 140	75

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210



Mike Gregory
Project Manager





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RFM, Inc. 3912 Portola Dr., #8 Santa Cruz, CA 95062 Attention: Dave Reinsma	Client Proj. ID: Chevron AA46/Frmr.Signal Oil Sample Descript: SB-12,14-15' Matrix: SOLID Analysis Method: EPA 8015 Mod Lab Number: 9810H02-08	Sampled: 10/28/98 Received: 10/29/98 Extracted: 11/05/98 Analyzed: 11/10/98 Reported: 11/16/98
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QC Batch Number: GC1105980HBPEXD
Instrument ID: GCHP4B

Total Extractable Petroleum Hydrocarbons (TEPH)

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TEPH as Diesel Chromatogram Pattern:	1.0	N.D.
Surrogates	Control Limits %	% Recovery
n-Pentacosane (C25)	50 150	97

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210



Mike Cafegery
Project Manager





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RRM, Inc. 3912 Portola Dr., #8 Santa Cruz, CA 95062	Client Proj. ID: Chevron AA46/Frmr.Signal Oil Sample Descript: SG#2, SB-9, 5-6' Matrix: SOLID Analysis Method: EPA 8015 Mod Lab Number: 9810H02-09	Sampled: 10/28/98 Received: 10/29/98 Extracted: 11/05/98 Analyzed: 11/13/98 Reported: 11/16/98
Attention: Dave Reinsma		

GC Batch Number: GC1105980HBPEXD
Instrument ID: GCHP4A

Total Extractable Petroleum Hydrocarbons (TEPH) with Silica Gel Cleanup

Anaiyte	Detection Limit mg/Kg	Sample Results mg/Kg
TEPH as Diesel	100	2200
Chromatogram Pattern:	C9-C24	W-Diesel+
Note 1	C18-C24	Unid-HC
Surrogates	Control Limits %	% Recovery
n-Pentacosane (C25)	50 150	Q

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210



Mike Gregory
Project Manager





RRM, Inc.
3912 Portola Dr., #8
Santa Cruz, CA 95062

Client Proj. ID: Chevron AA46/Fmr.Signal Oil
Sample Descript: SG#2, SB-9, 13-14'
Matrix: SOLID
Analysis Method: EPA 8015 Mod
Lab Number: 9810H02-10

Sampled: 10/28/98
Received: 10/29/98
Extracted: 11/05/98
Analyzed: 11/13/98
Reported: 11/16/98

Attention: Dave Reinsma

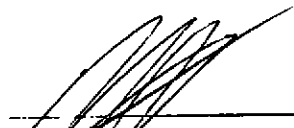
GC Batch Number: GC1105980HBPEXD
Instrument ID: GCHP4A

Total Extractable Petroleum Hydrocarbons (TEPH) with Silica Gel Cleanup

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TEPH as Diesel Chromatogram Pattern: Note 1	50 C9-C24 C9-C24	620 W-Diesel+ Unid-HC
Surrogates n-Pentacosane (C25)	Control Limits % 50 150	% Recovery Q

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210



Mike Gregory
Project Manager





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RRM, inc. 3912 Portola Dr., #8 Santa Cruz, CA 95062	Client Proj. ID: Chevron AA46/Frmr.Signal Oil Sample Descript: SG#2, SB-10, 5.5-6.5' Matrix: SOLID Analysis Method: EPA 8015 Mod Lab Number: 9810H02-12	Sampled: 10/28/98 Received: 10/29/98 Extracted: 11/05/98 Analyzed: 11/13/98 Reported: 11/16/98
Attention: Dave Reinsma		

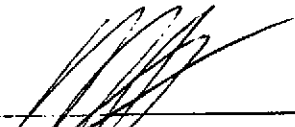
QC Batch Number: GC1105980HBPEXD
Instrument ID: GCHP4A

Total Extractable Petroleum Hydrocarbons (TEPH) with Silica Gel Cleanup

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TEPH as Diesel Chromatogram Pattern:	5.0 C9-C24	80 Unid-HC
Surrogates n-Pentacosane (C25)	Control Limits % 50 150	% Recovery 366 Q

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210



Mike Gregory
Project Manager





RRM, Inc.
3912 Portola Dr., #8
Santa Cruz, CA 95062

Client Proj. ID: Chevron AA46/Frmr.Signal Oil
Sample Descript: SG#2, SB- 11, 6-7'
Matrix: SOLID
Analysis Method: EPA 8015 Mod
Lab Number: 9810H02-13

Sampled: 10/28/98
Received: 10/29/98
Extracted: 11/05/98
Analyzed: 11/13/98
Reported: 11/16/98

Attention: Dave Reinsma


GC Batch Number: GC1105980HBPEXD
Instrument ID: GCHP4A

Total Extractable Petroleum Hydrocarbons (TEPH) with Silica Gel Cleanup

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TEPH as Diesel Chromatogram Pattern:	2.0 C9-C24	27 Unid-HC
Surrogates	Control Limits %	% Recovery
n-Pentacosane (C25)	50 150	114

Analyses reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210



Mike Gregory
Project Manager





**Sequoia
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3912 Portola Dr., #8
Santa Cruz, CA 95062
Attention: Dave Reinsma

Client Proj. ID: Chevron AA46/Frmr.Signal Oil
Lab Proj. ID: 9810H02

Received: 10/29/98
Reported: 11/16/98

LABORATORY NARRATIVE

In order to properly interpret this report, it must be reproduced in its entirety. This report contains a total of _____ pages including the laboratory narrative, sample results, quality control, and related documents as required (cover page, COC, raw data, etc.).

TPH-GAS/BTEX:

Sample 9810H02-01 was diluted 25-fold.
Sample 9810H02-02 was diluted 250-fold.
Sample 9810H02-05 was diluted 20-fold.

TPH-Diesel:

Sample 9810H02-01 was diluted 100-fold.
Sample 9810H02-02 was diluted 100-fold.
Sample 9810H02-04 was diluted 10-fold.
Sample 9810H02-05 was diluted 4-fold.

Q - Surrogate diluted out.
*Q - Surrogate coelution was confirmed.

SEQUOCIA ANALYTICAL


Mike Gregory
Project Manager



Fax copy of Lab Report and COC to Chevron Contact: Yes No

Chain-of-Custody-Record

Chevron U.S.A. Inc.
P.O. BOX 5004
San Ramon, CA 94583
FAX (415)842-9591

98-10-H02

Chevron Facility Number FORMER BURNAL OIL MARINE TERM.
Facility Address 2301-2337 BLANDING AVE.
Consultant Project Number A1746
Consultant Name KRM, INC.
Address 3912 PORTOLA DR. SUITE 9, SANTARUZ
Project Contact (Name) DAVE REINEMA
(Phone) 831 475-8141 (Fax Number) 475-8249

Chevron Contact (Name) DHIL BRIDGEMAN
(Phone) 925 842-9130
Laboratory Name SEQUOIA
Laboratory Release Number 9106023
Samples Collected by (Name) DAVE REINEMA
Collection Date 10-23-98
Signature [Signature]

Sample Number	Lab Sample Number	Number of Containers	Matrix S = Soil W = Water C = Charcoal	Type G = Grab C = Composite D = Discrete	Time	Sample Preservation	Iced (Yes or No)	Analysis To Be Performed											Remarks			
								BTEX + TPH GAS (8020 + 8015) (M/15)	TPH Diesel (8015)	Oil and Grease (5520)	Purgeable Halocarbons (8010)	Purgeable Aromatics (8020)	Purgeable Organics (8240)	Extractable Organics (8270)	Metals Cd, Cr, Pb, Zn, Ni (ICAP or AA)	Multiple SWICS (EPA 8210.1)						
✓ SB-9, 5-10'		1	S	D	13:25	NO	Y	X	X													HOLD SB-9
✓ SB-9, 13-14'		1	S	D	13:30	NO	Y	X	X													SAMPLES FOR
✓ SB-9, 15-16'		1	S	D	13:35	NO	Y	X	X													POSSIBLE TSLP FRESH ANOML-
✓ SB-10, 55-65'		1	S	D	10:46	NO	Y	X	X													YSIS.
✓ SB-11, 6-7'		1	S	D	9:05	NO	Y	X	X													
✓ SB-12, 5-6'		1	S	D	07:55 10:00	NO	Y	X	X													
✓ SB-12, 7-8'		1	S	D	10:00	NO	Y	X	X													20.5?
✓ SB-12, 14-15'		1	S	D	10:10	NO	Y	X	X													

COC-3.DWG/03 91/ACH

Relinquished By (Signature) <u>[Signature]</u>	Organization <u>KRM</u>	Date/Time <u>10/29/98</u>	Received By (Signature) <u>[Signature]</u>	Organization <u>Sequoia</u>	Date/Time <u>10/29 15:10</u>	Turn Around Time (Circle Choice) 24 Hrs. 48 Hrs. 5 Days 10 Days <u>As Contracted</u>
Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time	
Relinquished By (Signature)	Organization	Date/Time	Received For Laboratory By (Signature) <u>[Signature]</u>		Date/Time <u>10/29/98 17:22</u>	



**Sequoia
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FAX (707) 792-0342

RRM, Inc.
3912 Portola Dr., #8
Santa Cruz, CA 95062
Attention: Dave Reinsma

Client Project ID: Chevron AA46/Frmr. Signal Oil

QC Sample Group: 9810H02-01-08

Reported: Nov 16, 1998

QUALITY CONTROL DATA REPORT

Matrix: Solid
Method: EPA 8015
Analyst: R.GECKLER

ANALYTE Gasoline

QC Batch #: GC110998BTEXEXB

Sample No.: 9811420-12
Date Prepared: 11/9/98
Date Analyzed: 11/10/98
Instrument I.D.#: GCHP7

Sample Conc., mg/Kg: N.D.
Conc. Spiked, mg/Kg: 5.0

Matrix Spike, mg/Kg: 4.4
% Recovery: 88

Matrix
Spike Duplicate, mg/Kg: 4.3
% Recovery: 86

Relative % Difference: 2.3

RPD Control Limits: 0-25

LCS Batch#: GC110998BTEXEXB

Date Prepared: 11/9/98
Date Analyzed: 11/10/98
Instrument I.D.#: GCHP7

Conc. Spiked, mg/Kg: 5.0

Recovery, mg/Kg: 4.9
LCS % Recovery: 98

Percent Recovery Control Limits:

MS/MSD	60-140
LCS	70-130

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

Please Note:

The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

SEQUOIA ANALYTICAL

Mike Gregory
Project Manager





**Sequoia
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RRM, Inc.
3912 Portola Dr., #8
Santa Cruz, CA 95062
Attention: Dave Reinsma

Client Project ID: Chevron AA46/Frmr. Signal Oil

QC Sample Group: 9810H02-01-08

Reported: Nov 16, 1998

QUALITY CONTROL DATA REPORT

Matrix: Solid
Method: EPA 8015A
Analyst: A. PORTER

ANALYTE Diesel

QC Batch #: GC1105980HBPEXD

LCS ID: BLK110598DS/DSD

Date Prepared: 11/5/98
Date Analyzed: 11/9/98
Instrument I.D.#: GCHP4B

Conc. Spiked, mg/Kg: 17

Blank Spike, mg/Kg: 13
% Recovery: 76

Blank
Spike Duplicate, mg/Kg: 13
% Recovery: 76

Relative % Difference: 0.0

% Recovery
Control Limits: 50-150

RPD Control Limits: 0-50

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

SEQUOIA ANALYTICAL

Mike Gregory
Project Manager

Please Note:

The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.





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RRM, Inc.
3912 Portola Dr., #8
Santa Cruz, CA 95062
Attention: Dave Reinsma

Client Project ID: Chevron AA46/ Frm. Signal Oil
Matrix: Solid

Work Order #: 9810H02 -01-05

Reported: Nov 19, 1998

QUALITY CONTROL DATA REPORT

Analyte: Diesel

QC Batch#: GC1105980HBPEXD SG
Analy. Method: EPA 8015A
Prep. Method: N.A.

Analyst: A. Porter
MS/MSD #: BLK110598
Sample Conc.: N.D.
Prepared Date: 11/5/98
Analyzed Date: 11/11/98
Instrument I.D.#: GCHP4
Conc. Spiked: 17 mg/Kg

Result: 10
MS % Recovery: 59

Dup. Result: 11
MSD % Recov.: 65

RPD: 9.5
RPD Limit: 0-50

LCS #:

Prepared Date:
Analyzed Date:
Instrument I.D.#:
Conc. Spiked:

LCS Result:
LCS % Recov.:

**MS/MSD
LCS
Control Limits** 40-140

SEQUOIA ANALYTICAL

Mike Gregory
Project Manager

Please Note:

The LCS is a control sample of known, interferent-free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

** MS = Matrix Spike, MSD = MS Duplicate, RPD = Relative % Difference

9810H02.RRR < 1 >





**Sequoia
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RRM, Inc.
3912 Portola Dr., #8
Santa Cruz, CA 95062
Attention: Dave Reinsma

Client Project ID: Chevron AA46/ Frmr. Signal Oil
Matrix: Solid

Work Order #: 9810H02-09, 10, 12, 13

Reported: Nov 19, 1998

QUALITY CONTROL DATA REPORT

Analyte: Diesel

QC Batch#: GC1105980HBPEXD SG2

Analy. Method: EPA 8015M

Prep. Method: N.A.

Analyst: A. Porter

MS/MSD #:

Sample Conc.:

Prepared Date:

Analyzed Date:

Instrument I.D.#:

Conc. Spiked:

Result:

MS % Recovery:

Dup. Result:

MSD % Recov.:

RPD:

RPD Limit:

LCS #: BLK110598 SG2

Prepared Date: 11/5/98

Analyzed Date: 11/13/98

Instrument I.D.#: GCHP4

Conc. Spiked: 17 mg/Kg

LCS Result: 8.4

LCS % Recov.: 49

MS/MSD 40-140

LCS 40-140

Control Limits

Please Note:

The LCS is a control sample of known, interferent-free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

SEQUOIA ANALYTICAL

Mike Gregory
Project Manager

** MS = Matrix Spike, MSD = MS Duplicate, RPD = Relative % Difference

9810H02.RRR <2>





RRM, Inc. 3912 Portola Dr., #8 Santa Cruz, CA 95062	Client Proj. ID: Chevron AA46/2301-2337 Bland Lab Proj. ID: 9810K69	Sampled: 10/28/98 Received: 10/29/98 Analyzed: see below Reported: 11/16/98
Attention: Dave Reinsma		

LABORATORY ANALYSIS

Analyte	Units	Date Analyzed	Detection Limit	Sample Results
Lab No: 9810K69-01 Sample Desc: LIQUID,SB-9				
Bromide	mg/L	10/29/98	1.0	7.4
Chloride	mg/L	10/29/98	1.0	210
Nitrate as Nitrate	mg/L	10/29/98	1.0	N.D.
Sulfate	mg/L	10/29/98	1.0	22
Total Dissolved Solids	mg/L	11/04/98	50	1300

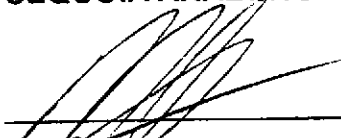
Lab No: 9810K69-02 Sample Desc: LIQUID,SB-10				
Bromide	mg/L	10/29/98	1.0	6.7
Chloride	mg/L	10/29/98	1.0	72
Nitrate as Nitrate	mg/L	10/29/98	1.0	N.D.
Sulfate	mg/L	10/29/98	1.0	68
Total Dissolved Solids	mg/L	11/04/98	100	740

Lab No: 9810K69-03 Sample Desc: LIQUID,SB-11				
Bromide	mg/L	10/29/98	1.0	N.D.
Chloride	mg/L	10/29/98	1.0	63
Nitrate as Nitrate	mg/L	10/29/98	1.0	N.D.
Sulfate	mg/L	10/29/98	1.0	93
Total Dissolved Solids	mg/L	11/04/98	100	460

Lab No: 9810K69-04 Sample Desc: LIQUID,SB-12				
Bromide	mg/L	10/29/98	1.0	7.1
Chloride	mg/L	10/29/98	1.0	18
Nitrate as Nitrate	mg/L	10/29/98	1.0	N.D.
Sulfate	mg/L	10/29/98	1.0	86
Total Dissolved Solids	mg/L	11/04/98	100	520

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210


Mike Gregory
Project Manager





**Sequoia
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FAX (707) 792-0342

RRM, Inc.
3912 Portola Dr., #8
Santa Cruz, CA 95062

Client Proj. ID: Chevron AA46/2301-2337 Bland
Lab Proj. ID: 9810K69

Sampled: 10/28/98
Received: 10/29/98
Analyzed: see below

Attention: Dave Reinsma

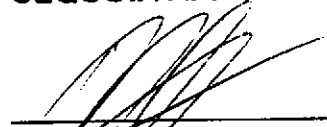
Reported: 11/16/98

LABORATORY ANALYSIS

Analyte	Units	Date Analyzed	Detection Limit	Sample Results
Lab No:	9810K69-06			
Sample Desc :	LIQUID,CW-2			
Bromide	mg/L	10/30/98	10	100
Chloride	mg/L	10/30/98	100	10000
Total Dissolved Solids	mg/L	11/04/98	20	28000

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210



Mike Gregory
Project Manager





RRM, Inc. 3912 Portola Dr., #8 Santa Cruz, CA 95062	Client Proj. ID: Chevron AA46/2301-2337 Bland Sample Descript: SB-9 Matrix: LIQUID Analysis Method: EPA 8015 Mod Lab Number: 9810K69-01	Sampled: 10/28/98 Received: 10/29/98 Extracted: 11/03/98 Analyzed: 11/05/98 Reported: 11/16/98
Attention: Dave Reinsma		

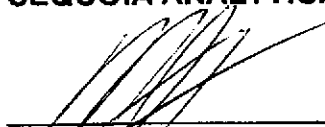
QC Batch Number: GC1103980HBPEXB
Instrument ID: GCHP4A

Total Extractable Petroleum Hydrocarbons (TEPH) with Silica Gel Cleanup

Analyte	Detection Limit ug/L	Sample Results ug/L
TEPH as Diesel Chromatogram Pattern:	5000 C9-C24	83000 W-diesel
Surrogates	Control Limits %	% Recovery
n-Pentacosane (C25)	50 150	Q

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210



Mike Gregory
Project Manager





RRM, Inc. 3912 Portola Dr., #8 Santa Cruz, CA 95062	Client Proj. ID: Chevron AA46/2301-2337 Bland Sample Descript: SB-9 Matrix: LIQUID Analysis Method: 8015Mod/8020 Lab Number: 9810K69-01	Sampled: 10/28/98 Received: 10/29/98 Analyzed: 11/08/98 Reported: 11/16/98
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QC Batch Number: GC110898BTEX30A
Instrument ID: GCHP30

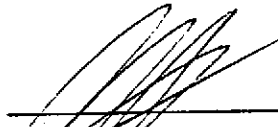
Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX and MTBE

Analyte	Detection Limit ug/L	Sample Results ug/L
TPPH as Gas	1000	14000
Methyl t-Butyl Ether	50	260
Benzene	10	1400
Toluene	10	58
Ethyl Benzene	10	490
Xylenes (Total)	10	630
Chromatogram Pattern:		GAS

Surrogates	Control Limits %	% Recovery
Trifluorotoluene	70 130	150 Q

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210



Mike Gregory
Project Manager





RRM, Inc.
3912 Portola Dr., #8
Santa Cruz, CA 95062

Attention: Dave Reinsma

Client Proj. ID: Chevron AA46/2301-2337 Bland
Sample Descript: SB-10
Matrix: LIQUID
Analysis Method: EPA 8015 Mod
Lab Number: 9810K69-02

Sampled: 10/28/98
Received: 10/29/98
Extracted: 11/03/98
Analyzed: 11/05/98
Reported: 11/16/98


QC Batch Number: GC1103980HBPEXB
Instrument ID: GCHP4B

Total Extractable Petroleum Hydrocarbons (TEPH) with Silica Gel Cleanup

Analyte	Detection Limit ug/L	Sample Results ug/L
TEPH as Diesel Chromatogram Pattern:	50 C9-C24	97 Unid.-HC
Surrogates	Control Limits %	% Recovery
n-Pentacosane (C25)	50 150	90

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210



Mike Gregory
Project Manager





RRM, Inc. 3912 Portola Dr., #8 Santa Cruz, CA 95062	Client Proj. ID: Chevron AA46/2301-2337 Bland Sample Descript: SB-10 Matrix: LIQUID Analysis Method: 8015Mod/8020 Lab Number: 9810K69-02	Sampled: 10/28/98 Received: 10/29/98 Analyzed: 11/09/98 Reported: 11/16/98
Attention: Dave Reinsma		

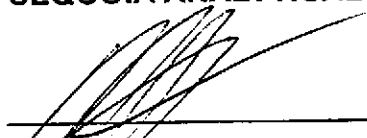
QC Batch Number: GC110998BTEX02A
Instrument ID: GCHP02

Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX and MTBE

Analyte	Detection Limit ug/L	Sample Results ug/L
TPPH as Gas	50	N.D.
Methyl t-Butyl Ether	2.5	N.D.
Benzene	0.50	N.D.
Toluene	0.50	N.D.
Ethyl Benzene	0.50	N.D.
Xylenes (Total)	0.50	N.D.
Chromatogram Pattern:		
Surrogates	Control Limits %	% Recovery
Trifluorotoluene	70 130	116

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210



Mike Gregory
Project Manager





**Sequoia
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FAX (707) 792-0342

RRM, Inc.
3912 Portola Dr., #8
Santa Cruz, CA 95062

Client Proj. ID: Chevron AA46/2301-2337 Bland
Sample Descript: SB-11
Matrix: LIQUID
Analysis Method: EPA 8015 Mod
Lab Number: 9810K69-03

Sampled: 10/28/98
Received: 10/29/98
Extracted: 11/05/98
Analyzed: 11/10/98
Reported: 11/16/98

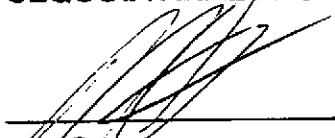
QC Batch Number: GC1105980HBPEXB
Instrument ID: GCHP5A

Total Extractable Petroleum Hydrocarbons (TEPH) with Silica Gel Cleanup

Analyte	Detection Limit ug/L	Sample Results ug/L
TEPH as Diesel Chromatogram Pattern:	50 C9-C24	270 Unid.-HC
Surrogates n-Pentacosane (C25)	Control Limits % 50 150	% Recovery 92

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210



Mike Gregory
Project Manager





RRM, Inc.
3912 Portola Dr., #8
Santa Cruz, CA 95062

Attention: Dave Reinsma

Client Proj. ID: Chevron AA46/2301-2337 Bland
Sample Descript: SB-11
Matrix: LIQUID
Analysis Method: 8015Mod/8020
Lab Number: 9810K69-03

Sampled: 10/28/98
Received: 10/29/98

Analyzed: 11/08/98
Reported: 11/16/98

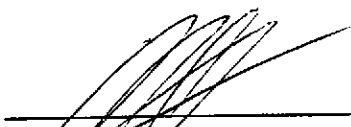
QC Batch Number: GC110898BTEX30A
instrument ID: GCHP30

Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX and MTBE

Analyte	Detection Limit ug/L	Sample Results ug/L
TPPH as Gas	50	310
Methyl t-Butyl Ether	2.5	N.D.
Benzene	0.50	N.D.
Toluene	0.50	0.69
Ethyl Benzene	0.50	1.6
Xylenes (Total)	0.50	2.4
Chromatogram Pattern: Unidentified HC		C6-C12
Surrogates	Control Limits %	% Recovery
Trifluorotoluene	70 130	119

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210



Mike Gregory
Project Manager





RRM, Inc. 3912 Portola Dr., #8 Santa Cruz, CA 95062	Client Proj. ID: Chevron AA46/2301-2337 Bland Sample Descript: SB-12 Matrix: LIQUID Analysis Method: EPA 8015 Mod Lab Number: 9810K69-04	Sampled: 10/28/98 Received: 10/29/98 Extracted: 11/05/98 Analyzed: 11/10/98 Reported: 11/16/98
Attention: Dave Reinsma		

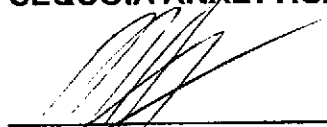
QC Batch Number: GC1105980HBPEXB
instrument ID: GCHP5A

Total Extractable Petroleum Hydrocarbons (TEPH) with Silica Gel Cleanup

Analyte	Detection Limit ug/L	Sample Results ug/L
TEPH as Diesel Chromatogram Pattern:	50	N.D.
Surrogates	Control Limits %	% Recovery
n-Pentacosane (C25)	50 150	83

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210



Mike Gregory
Project Manager





RRM, Inc. 3912 Portola Dr., #8 Santa Cruz, CA 95062	Client Proj. ID: Chevron AA46/2301-2337 Bland Sample Descript: SB-12 Matrix: LIQUID Analysis Method: 8015Mod/8020 Lab Number: 9810K69-04	Sampled: 10/28/98 Received: 10/29/98 Analyzed: 11/08/98 Reported: 11/16/98
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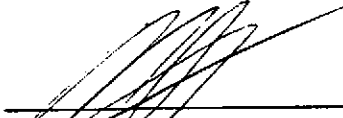
QC Batch Number: GC110898BTEX30A
Instrument ID: GCHP30

Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX and MTBE

Analyte	Detection Limit ug/L	Sample Results ug/L
TPPH as Gas	50	N.D.
Methyl t-Butyl Ether	2.5	N.D.
Benzene	0.50	N.D.
Toluene	0.50	N.D.
Ethyl Benzene	0.50	N.D.
Xylenes (Total)	0.50	N.D.
Chromatogram Pattern:		
Surrogates	Control Limits %	% Recovery
Trifluorotoluene	70 130	107

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210



Mike Gregory
Project Manager





RFM, Inc.
3912 Portola Dr., #8
Santa Cruz, CA 95062

Client Proj. ID: Chevron AA46/2301-2337 Bland
Sample Descript: CW-1
Matrix: LIQUID
Analysis Method: EPA 8015 Mod
Lab Number: 9810K69-05

Sampled: 10/28/98
Received: 10/29/98
Extracted: 11/05/98
Analyzed: 11/10/98
Reported: 11/16/98

Attention: Dave Reinsma

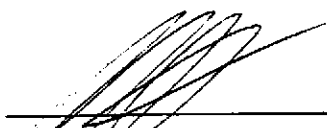
QC Batch Number: GC1105980HBPEXB
Instrument ID: GCHP5A

Total Extractable Petroleum Hydrocarbons (TEPH) with Silica Gel Cleanup

Analyte	Detection Limit ug/L	Sample Results ug/L
TEPH as Diesel Chromatogram Pattern:	50	N.D.
Surrogates	Control Limits %	% Recovery
n-Pentacosane (C25)	50 150	67

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210



Mike Gregory
Project Manager





**Sequoia
Analytical**

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FAX (916) 921-0100
FAX (707) 792-0342

RRM, Inc. 3912 Portola Dr., #8 Santa Cruz, CA 95062	Client Proj. ID: Chevron AA46/2301-2337 Bland Sample Descript: CW-1 Matrix: LIQUID Analysis Method: 8015Mod/8020 Lab Number: 9810K69-05	Sampled: 10/28/98 Received: 10/29/98 Analyzed: 11/08/98 Reported: 11/16/98
Attention: Dave Reinsma		

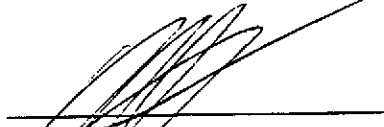
QC Batch Number: GC110898BTEX30A
Instrument ID: GCHP30

Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX and MTBE

Analyte	Detection Limit ug/L	Sample Results ug/L
TPPH as Gas	50	N.D.
Methyl t-Butyl Ether	2.5	N.D.
Benzene	0.50	N.D.
Toluene	0.50	N.D.
Ethyl Benzene	0.50	N.D.
Xylenes (Total)	0.50	N.D.
Chromatogram Pattern:		
Surrogates	Control Limits %	% Recovery
Trifluorotoluene	70 130	96

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210



Mike Gregory
Project Manager





RRM, Inc. 3912 Portola Dr., #8 Santa Cruz, CA 95062	Client Proj. ID: Chevron AA46/2301-2337 Bland Sample Descript: CW-2 Matrix: LIQUID Analysis Method: EPA 8015 Mod Lab Number: 9810K69-06	Sampled: 10/28/98 Received: 10/29/98 Extracted: 11/05/98 Analyzed: 11/10/98 Reported: 11/16/98
Attention: Dave Reinsma		

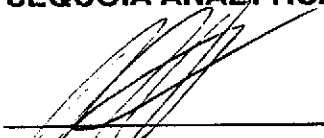
QC Batch Number: GC1105980HBPEXB
instrument ID: GCHP5A

Total Extractable Petroleum Hydrocarbons (TEPH) with Silica Gel Cleanup

Analyte	Detection Limit ug/L	Sample Results ug/L
TEPH as Diesel Chromatogram Pattern:	50	N.D.
Surrogates	Control Limits %	% Recovery
n-Pentacosane (C25)	50 150	75

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210



Mike Gregory
Project Manager





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RRM, Inc.
3912 Portola Dr., #8
Santa Cruz, CA 95062

Client Proj. ID: Chevron AA46/2301-2337 Bland
Sample Descript: CW-2
Matrix: LIQUID
Analysis Method: 8015Mod/8020
Lab Number: 9810K69-06

Sampled: 10/28/98
Received: 10/29/98
Analyzed: 11/08/98
Reported: 11/16/98

Attention: Dave Reinsma

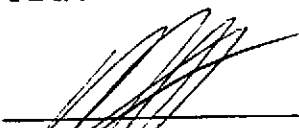
QC Batch Number: GC110898BTEX30A
Instrument ID: GCHP30

Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX and MTBE

Analyte	Detection Limit ug/L	Sample Results ug/L
TPPH as Gas	50	N.D.
Methyl t-Butyl Ether	2.5	N.D.
Benzene	0.50	N.D.
Toluene	0.50	N.D.
Ethyl Benzene	0.50	N.D.
Xylenes (Total)	0.50	N.D.
Chromatogram Pattern:		
Surrogates	Control Limits %	% Recovery
Trifluorotoluene	70 130	103

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210



Mike Gregory
Project Manager





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RRM, Inc.
3912 Portola Dr., #8
Santa Cruz, CA 95062

Client Proj. ID: Chevron AA46/2301-2337 Bland
Sample Descript: CW-3
Matrix: LIQUID
Analysis Method: EPA 8015 Mod
Lab Number: 9810K69-07

Sampled: 10/28/98
Received: 10/29/98
Extracted: 11/05/98
Analyzed: 11/10/98
Reported: 11/16/98


QC Batch Number: GC1105980HBPEXB
Instrument ID: GCHP5A

Total Extractable Petroleum Hydrocarbons (TEPH) with Silica Gel Cleanup

Analyte	Detection Limit ug/L	Sample Results ug/L
TEPH as Diesel Chromatogram Pattern:	50	N.D.
Surrogates	Control Limits %	% Recovery
n-Pentacosane (C25)	50 150	83

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210



Mike Gregory
Project Manager





RRM, Inc.
3912 Portola Dr., #8
Santa Cruz, CA 95062

Client Proj. ID: Chevron AA46/2301-2337 Bland
Sample Descript: CW-3
Matrix: LIQUID
Analysis Method: 8015Mod/8020
Lab Number: 9810K69-07

Sampled: 10/28/98
Received: 10/29/98
Analyzed: 11/08/98
Reported: 11/16/98

Attention: Dave Reinsma

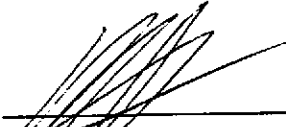
QC Batch Number: GC110898BTEX30A
Instrument ID: GCHP30

Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX and MTBE

Analyte	Detection Limit ug/L	Sample Results ug/L
TPPH as Gas	50	N.D.
Methyl t-Butyl Ether	2.5	N.D.
Benzene	0.50	N.D.
Toluene	0.50	N.D.
Ethyl Benzene	0.50	N.D.
Xylenes (Total)	0.50	N.D.
Chromatogram Pattern:		
Surrogates	Control Limits %	% Recovery
Trifluorotoluene	70 130	99

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210



Mike Gregory
Project Manager





RRM, Inc. 3912 Portola Dr., #8 Santa Cruz, CA 95062	Client Proj. ID: Chevron AA46/2301-2337 Bland Sample Descript: SG#2,SB-9 Matrix: LIQUID Analysis Method: EPA 8015 Mod Lab Number: 9810K69-09	Sampled: 10/28/98 Received: 10/29/98 Extracted: 11/03/98 Analyzed: 11/13/98 Reported: 11/16/98
Attention: Dave Reinsma		


QC Batch Number: GC1103980HBPEXB
Instrument ID: GCHP4A

Total Extractable Petroleum Hydrocarbons (TEPH) with Silica Gel Cleanup

Analyte	Detection Limit ug/L	Sample Results ug/L
TEPH as Diesel	5000	62000
Chromatogram Pattern: Unidentified HC		C9-C24+
Weathered Diesel		C9-C24
Surrogates	Control Limits %	% Recovery
n-Pentacosane (C25)	50 150	Q

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210



Mike Gregory
Project Manager





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RRM, Inc. 3912 Portola Dr., #8 Santa Cruz, CA 95062 Attention: Dave Reinsma	Client Proj. ID: Chevron AA46/2301-2337 Bland Sample Descript: SG#2,SB-10 Matrix: LIQUID Analysis Method: EPA 8015 Mod Lab Number: 9810K69-10	Sampled: 10/28/98 Received: 10/29/98 Extracted: 11/03/98 Analyzed: 11/13/98 Reported: 11/16/98
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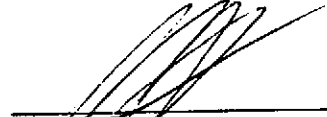
QC Batch Number: GC1103980HBPEXB
Instrument ID: GCHP4A

Total Extractable Petroleum Hydrocarbons (TEPH) with Silica Gel Cleanup

Analyte	Detection Limit ug/L	Sample Results ug/L
TEPH as Diesel Chromatogram Pattern:	50	N.D.
Surrogates	Control Limits %	% Recovery
n-Pentacosane (C25)	50 150	55

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210



Mike Gregory
Project Manager





RRM, Inc.
3912 Portola Dr., #8
Santa Cruz, CA 95062

Attention: Dave Reinsma

Client Proj. ID: Chevron AA46/2301-2337 Bland
Sample Descript: SG#2,SB-11
Matrix: LIQUID
Analysis Method: EPA 8015 Mod
Lab Number: 9810K69-11

Sampled: 10/28/98
Received: 10/29/98
Extracted: 11/05/98
Analyzed: 11/13/98
Reported: 11/16/98

QC Batch Number: GC1105980HBPEXB
Instrument ID: GCHP4A

Total Extractable Petroleum Hydrocarbons (TEPH) with Silica Gel Cleanup

Analyte	Detection Limit ug/L	Sample Results ug/L
TEPH as Diesel	50	170
Chromatogram Pattern: Unidentified HC		C9-C24
Surrogates	Control Limits %	% Recovery
n-Pentacosane (C25)	50 150	79

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210


Mike Gregory
Project Manager





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RRM, Inc.
3912 Portola Dr., #8
Santa Cruz, CA 95062
Attention: Dave Reinsma

Client Proj. ID: Chevron AA46/2301-2337 Bland

Received: 10/29/98

Lab Proj. ID: 9810K69

Reported: 11/16/98

LABORATORY NARRATIVE

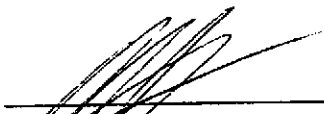
In order to properly interpret this report, it must be reproduced in its entirety. This report contains a total of 30 pages including the laboratory narrative, sample results, quality control, and related documents as required (cover page, COC, raw data, etc.).

#Q - Surrogate coelution was confirmed.
Q - Surrogate diluted out.

TPH-Diesel:
Sample 9810K69-01 was diluted 100-fold.

TPH-GAS/BTEX:
Sample 9810K69-01 was diluted 20-fold.

SEQUOIA ANALYTICAL



Mike Gregory
Project Manager



Fax copy of Lab Report and COC to Chevron Contact: Yes No

Chain-of-Custody-Record

Chevron U.S.A. Inc.
P.O. BOX 5004
San Ramon, CA 94583
FAX (415)842-9591

Chevron Facility Number FORMER SOUTHWEST OIL MARINE TRM.
Facility Address 2301-2337 BROADWAY AVE.
Consultant Project Number A1746
Consultant Name RRM, INC.
Address 3912 PORTOLA DR. SUITE 9 SANTA CRUZ
Project Contact (Name) DAVE BRINEMA
(Phone) 831 475-8141 (Fax Number) 475-8249

Chevron Contact (Name) PHIL BRIGGS
(Phone) 925 342-9150
Laboratory Name SEQUOIA
Laboratory Release Number 916 5023
Samples Collected by (Name) DAVE BRINEMA
Collection Date 10-28-98
Signature Phil Briggs

Sample Number	Lab Sample Number	Number of Containers	Matrix S = Soil W = Water A = Air C = Charcoal	Type G = Grab C = Composite D = Discrete	Time	Sample Preservation	Iced (Yes or No)	Analytes To Be Performed														Remarks			
								BTEX + TPH GAS (8020 + 8015) M/TBE	TPH Diesel (8015)	Oil and Grease (5520)	Purgeable Halocarbons (8010)	Purgeable Aromatics (8020)	Purgeable Organics (8240)	Extractable Organics (8270)	Metals Cd, Cr, Pb, Zn, Ni (ICAP or AA)	IDS	Nitrate/Sulfate	Chlorine	Bromine	Multiple Sulfur	Cell Cleanup				
✓ SB-9	01	7	W	G	14:40	HCL/NO	Y	X	X									X	X	X	X	X	X	X	ONE VOA for SB-9 BROKE AND the contents used TRANSFERRED to A NEW VOA. (DR)
✓ SB-10	02	7	W	G	15:30	HCL/NO	Y	X	X									X	X	X	X	X	X	X	
✓ SB-11	03	8	W	G	11:55	HCL/NO	Y	X	X									X	X	X	X	X	X	X	
✓ SB-12	04	8	W	G	13:30	HCL/NO	Y	X	X									X	X	X	X	X	X	X	
✓ CW-1	05	4	W	G	15:17	HCL/NO	Y	X	X									X	X	X	X	X	X	X	
✓ CW-2	04	6	W	G	15:05	HCL/NO	Y	X	X									X	X	X	X	X	X	X	* Samples collected on 10/29/98
✓ CW-3	01	4	W	G	14:50	HCL/NO	Y	X	X									X	X	X	X	X	X	X	to ensure enough sample for analyses.
✓ SB-9*	08	3	W	G	11:40	HCL	Y																		

9810375
9810K69

Relinquished By (Signature) Phil Briggs Organization RRM Date/Time 10-29-98
 Received By (Signature) Charles Armstrong Organization Sequoia Date/Time 10/29 15:10
 Relinquished By (Signature) _____ Organization _____ Date/Time _____
 Received By (Signature) _____ Organization _____ Date/Time _____
 Relinquished By (Signature) _____ Organization _____ Date/Time _____
 Received For Laboratory By (Signature) Phil Briggs Date/Time 10/29/98

Turn Around Time (Circle Choice)
 24 Hrs.
 48 Hrs.
 6 Days
 10 Days
 As Contracted

COC-3.DWG/AS 91/HCH



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RRM, Inc.
3912 Portola Dr., #8
Santa Cruz, CA 95062
Attention: Dave Reinsma

Client Project ID: Chevron AA46/2301-2337 Bland

QC Sample Group: 9810K69-03-07

Reported: Nov 12, 1998

QUALITY CONTROL DATA REPORT

Matrix: Liquid
Method: EPA 8015A
Analyst: A. PORTER

ANALYTE Diesel

QC Batch #: GC1105980HBPEXB SG

LCS ID: BLK110598BS/BSD

Date Prepared: 11/5/98
Date Analyzed: 11/10/98
Instrument I.D.#: GCHP5A

Conc. Spiked, ug/L: 1000

Blank Spike, ug/L: 730
% Recovery: 73

Blank
Spike Duplicate, ug/L: 630
% Recovery: 63

Relative % Difference: 15

% Recovery
Control Limits: 40-140

RPD Control Limits: 0-50

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

SEQUOIA ANALYTICAL


Mike Gregory
Project Manager

Please Note:

The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.





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RRM, Inc.
3912 Portola Dr., #8
Santa Cruz, CA 95062
Attention: Dave Reinsma

Client Project ID: Chevron AA46/2301-2337 Bland

QC Sample Group: 9810K69-01,02

Reported: Nov 12, 1998

QUALITY CONTROL DATA REPORT

Matrix: Liquid
Method: EPA 8015A
Analyst: A. PORTER

ANALYTE Diesel

QC Batch #: GC1103980HBPEXB SG

Sample No.: 9810K69-1 SG

Date Prepared: 11/3/98
Date Analyzed: 11/5/98
Instrument I.D.#: GCHP4A

Sample Conc., ug/L: 83000
Conc. Spiked, ug/L: 1000

THE SAMPLE, MS AND MSD WERE
ALL RUN AT A 100X DILUTION.,

Matrix Spike, ug/L: 77000
% Recovery: -600

Matrix
Spike Duplicate, ug/L: 72000
% Recovery: -1100

Relative % Difference: 59

RPD Control Limits: 0-50

LCS Batch#: BLK110398BS SG

Date Prepared: 11/3/98
Date Analyzed: 11/5/98
Instrument I.D.#: GCHP4A

Conc. Spiked, ug/L: 1000

Recovery, ug/L: 880
LCS % Recovery: 88

Percent Recovery Control Limits:

MS/MSD 50-150
LCS 60-140

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

SEQUOIA ANALYTICAL

Mike Gregory
Project Manager

Please Note:

The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.





RRM, Inc. 3912 Portola Dr., #8 Santa Cruz, CA 95062 Attention: Dave Reinsma	Client Project ID: Chevron AA46/2301-2337 Bland QC Sample Group: 9810K69-01,03-07	Reported: Nov 12, 1998
--	--	------------------------

QUALITY CONTROL DATA REPORT

Matrix:	Liquid			
Method:	EPA 8020			
Analyst:	AM			
ANALYTE	Benzene	Toluene	Ethylbenzene	Xylenes

QC Batch #: GC110898BTEX30A

Sample No.:	GW9811L33-01			
Date Prepared:	11/7/98	11/7/98	11/7/98	11/7/98
Date Analyzed:	11/7/98	11/7/98	11/7/98	11/7/98
Instrument I.D.#:	GCHP30	GCHP30	GCHP30	GCHP30
Sample Conc., ug/L:	N.D.	N.D.	N.D.	N.D.
Conc. Spiked, ug/L:	10	10	10	30
Matrix Spike, ug/L:	12	13	13	38
% Recovery:	120	130	130	127
Matrix Spike Duplicate, ug/L:	11	12	12	35
% Recovery:	110	120	120	117
Relative % Difference:	8.7	8.0	8.0	8.2
RPD Control Limits:	0-25	0-25	0-25	0-25

LCS Batch#: GC110898BTEX30A

Date Prepared:	11/8/98	11/8/98	11/8/98	11/8/98
Date Analyzed:	11/8/98	11/8/98	11/8/98	11/8/98
Instrument I.D.#:	GCHP30	GCHP30	GCHP30	GCHP30
Conc. Spiked, ug/L:	10	10	10	30
LCS Recovery, ug/L:	13	13	13	39
LCS % Recovery:	130	130	130	130

Percent Recovery Control Limits:

MS/MSD	60-140	60-140	60-140	60-140
LCS	70-130	70-130	70-130	70-130

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

Please Note:

The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

SEQUOIA ANALYTICAL

Mike Gregory
Project Manager





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FAX (707) 792-0342

RRM, Inc.
3912 Portola Dr., #8
Santa Cruz, CA 95062
Attention: Dave Reinsma

Client Project ID: Chevron AA46/2301-2337 Bland

QC Sample Group: 9810K69-01-06

Reported: Nov 12, 1998

QUALITY CONTROL DATA REPORT

Matrix: Liquid
Method: EPA 300.0
Analyst: G. Fish

ANALYTE	Fluoride	Chloride	Nitrite	Bromide	Nitrate	Phosphate	Sulfate
---------	----------	----------	---------	---------	---------	-----------	---------

QC Batch #: 1030983000ACC

Sample No.:	9810J99-7						
Date Prepared:	10/30/98	10/30/98	10/30/98	10/30/98	10/30/98	10/30/98	10/30/98
Date Analyzed:	10/30/98	10/30/98	10/30/98	10/30/98	10/30/98	10/30/98	10/30/98
Instrument I.D.#:	INAC1	INAC1	INAC1	INAC1	INAC1	INAC1	INAC1
Sample Conc., mg/L:	N.D.	360	N.D.	N.D.	N.D.	N.D.	130
Conc. Spiked, mg/L:	1000	1000	1000	1000	1000	1000	1000
Matrix Spike, mg/L:	1000	1300	940	890	880	840	970
% Recovery:	100	94	94	89	88	84	84
Matrix Spike Duplicate, mg/L:	1000	1300	940	880	880	830	930
% Recovery:	100	94	94	88	88	83	80
Relative % Difference:	0.0	0.0	0.0	1.1	0.0	1.2	4.9
RPD Control Limits:							

LCS Batch#: LCS1030983000ACC

Date Prepared:	10/30/98	10/30/98	10/30/98	10/30/98	10/30/98	10/30/98	10/30/98
Date Analyzed:	10/30/98	10/30/98	10/30/98	10/30/98	10/30/98	10/30/98	10/30/98
Instrument I.D.#:	INAC1	INAC1	INAC1	INAC1	INAC1	INAC1	INAC1
Conc. Spiked, mg/L:	10	10	10	10	10	10	10
LCS Recovery, mg/L:	10	9.1	9.8	9.2	9.4	9.1	9.1
LCS % Recovery:	104	91	98	92	94	91	91

Percent Recovery Control Limits:

MS/MSD	75-125	75-125	75-125	75-125	75-125	75-125	75-125
LCS	90-110	90-110	90-110	90-110	90-110	90-110	90-110

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

Please Note:

The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

SEQUOIA ANALYTICAL

Mike Gregory
Project Manager





**Sequoia
Analytical**

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RRM, Inc.
3912 Portola Dr., #8
Santa Cruz, CA 95062
Attention: Dave Reinsma

Client Project ID: Chevron AA46/2301-2337 Bland

QC Sample Group: 9810K69-01-04,06

Reported: Nov 12, 1998

QUALITY CONTROL DATA REPORT

Matrix: Liquid
Method: EPA 160.1
Analyst: MAIVU

ANALYTE Total Dissolved Solids

QC Batch #: IN110498160100A

Sample No.: 9810J78-01A
Date Prepared: 11/4/98
Date Analyzed: 11/5/98

Sample Conc., mg/L: 480
Conc. Spiked, mg/L: 500

Matrix Spike, mg/L: 1000
% Recovery: 110

Matrix
Spike Duplicate, mg/L: 1100
% Recovery: 115

Relative % Difference: 4.4

RPD Control Limits: 0-20

LCS Batch#: LCS110498

Date Prepared: 11/4/98
Date Analyzed: 11/5/98

Conc. Spiked, mg/L: 500

LCS Recovery, mg/L: 480
LCS % Recovery: 96

Percent Recovery Control Limits:

MS/MSD 75-125
LCS 80-120

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

Please Note:

The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

SEQUOIA ANALYTICAL

Mike Gregory
Project Manager





RRM, Inc.
3912 Portola Dr., #8
Santa Cruz, CA 95062
Attention: Dave Reinsma

Client Project ID: Chevron AA46/2301-2337 Bland

QC Sample Group: 9810K69-01-04

Reported: Nov 12, 1998

QUALITY CONTROL DATA REPORT

Matrix: Liquid
Method: EPA 300.0
Analyst: G. Fish

ANALYTE	Fluoride	Chloride	Nitrite	Bromide	Nitrate	Phosphate	Sulfate
---------	----------	----------	---------	---------	---------	-----------	---------

QC Batch #: 1029983000ACB

Sample No.:	9810J98-1						
Date Prepared:	10/29/98	10/29/98	10/29/98	10/29/98	10/29/98	10/29/98	10/29/98
Date Analyzed:	10/29/98	10/29/98	10/29/98	10/29/98	10/29/98	10/29/98	10/29/98
Instrument I.D.#:	INAC1	INAC1	INAC1	INAC1	INAC1	INAC1	INAC1
Sample Conc., mg/L:	N.D.	17	N.D.	N.D.	N.D.	N.D.	30
Conc. Spiked, mg/L:	100	100	100	100	100	100	100
Matrix Spike, mg/L:	100	110	91	90	94	81	110
% Recovery:	100	93	91	90	94	81	80
Matrix Spike Duplicate, mg/L:	100	110	91	90	94	82	110
% Recovery:	100	93	91	90	94	82	80
Relative % Difference:	0.0	0.0	0.0	0.0	0.0	1.2	0.0

RPD Control Limits:

LCS Batch#: LCS1029983000ACB

Date Prepared:	10/29/98	10/29/98	10/29/98	10/29/98	10/29/98	10/29/98	10/29/98
Date Analyzed:	10/29/98	10/29/98	10/29/98	10/29/98	10/29/98	10/29/98	10/29/98
Instrument I.D.#:	INAC1	INAC1	INAC1	INAC1	INAC1	INAC1	INAC1
Conc. Spiked, mg/L:	10	10	10	10	10	10	10
LCS Recovery, mg/L:	10	9.2	9.9	9.2	9.3	9.2	9.4
LCS % Recovery:	105	92	99	92	93	92	94

Percent Recovery Control Limits:

MS/MSD	75-125	75-125	75-125	75-125	75-125	75-125	75-125
LCS	90-110	90-110	90-110	90-110	90-110	90-110	90-110

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

SEQUOIA ANALYTICAL

Mike Gregory
Project Manager

Please Note:

The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.





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RRM, Inc.
3912 Portola Dr., #8
Santa Cruz, CA 95062
Attention: Dave Reinsma

Client Project ID: Chevron AA46/2301-2337 Bland

QC Sample Group: 9810K69-02

Reported: Nov 12, 1998

QUALITY CONTROL DATA REPORT

Matrix: Liquid
Method: EPA 8015
Analyst: TLP

ANALYTE Gasoline

QC Batch #: GC110998BTEX02A

Sample No.: GEW9810140-11

Date Prepared: 11/9/98

Date Analyzed: 11/9/98

Instrument I.D.#: GCHPO2

Sample Conc., ug/L: N.D.

Conc. Spiked, ug/L: 250

Matrix Spike, ug/L: 280

% Recovery: 112

Matrix

Spike Duplicate, ug/L: 280

% Recovery: 112

Relative % Difference: 0.0

RPD Control Limits: 0-25

LCS Batch#: GC110998BTEX02A

Date Prepared: 11/9/98

Date Analyzed: 11/9/98

Instrument I.D.#: GCHPO2

Conc. Spiked, ug/L: 250

LCS Recovery, ug/L: 300

LCS % Recovery: 120

Percent Recovery Control Limits:

MS/MSD 80-140

LCS 70-130

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

SEQUOIA ANALYTICAL

Mike Gregory
Project Manager

Please Note:

The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.





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RRM, Inc.
3912 Portola Dr., #8
Santa Cruz, CA 95062
Attention: Dave Reinsma

Client Project ID: Chevron AA46/2301-2337 Bland
Matrix: Liquid

Work Order #: 9810K69 -09, 10

Reported: Nov 19, 1998

QUALITY CONTROL DATA REPORT

Analyte: Diesel

QC Batch#: GC1105980HBPEXB SG2

Analy. Method: EPA 8015A

Prep. Method: N.A.

Analyst: A. Porter

MS/MSD #:

Sample Conc.:

Prepared Date:

Analyzed Date:

Instrument I.D.#:

Conc. Spiked:

Result:

MS % Recovery:

Dup. Result:

MSD % Recov.:

RPD:

RPD Limit:

LCS #: LCS110598BS SG2

Prepared Date: 11/5/98

Analyzed Date: 11/13/98

Instrument I.D.#: GCHP4

Conc. Spiked: 1000 µg/L

LCS Result: 650

LCS % Recov.: 65

MS/MSD 40-140

LCS 40-140

Control Limits

Please Note:

The LCS is a control sample of known, interferent-free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

SEQUOIA ANALYTICAL

Mike Gregory
Project Manager

** MS= Matrix Spike, MSD= MS Duplicate, RPD= Relative % Difference

9810K69.RRR <1>





RRM, Inc.
3912 Portola Dr., #8
Santa Cruz, CA 95062
Attention: Dave Reinsma

Client Project ID: Chevron AA46/2301-2337 Bland
Matrix: Liquid

Work Order #: 9810K69-11

Reported: Nov 19, 1998

QUALITY CONTROL DATA REPORT

Analyte: Diesel

QC Batch#: GC1103980HBPEXB SG2

Analy. Method: EPA 8015A

Prep. Method: N.A.

Analyst: A. Porter

MS/MSD #:

Sample Conc.:

Prepared Date:

Analyzed Date:

Instrument I.D.#:

Conc. Spiked:

Result:

MS % Recovery:

Dup. Result:

MSD % Recov.:

RPD:

RPD Limit:

LCS #: LCS110398BS SG2

Prepared Date: 11/3/98

Analyzed Date: 11/13/98

Instrument I.D.#: GCHP4

Conc. Spiked: 1000 µg/L

LCS Result: 450

LCS % Recov.: 45

MS/MSD 40-140

LCS 40-140

Control Limits

Please Note:

The LCS is a control sample of known, interferent-free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

SEQUOIA ANALYTICAL

Mike Gregory
Project Manager

** MS= Matrix Spike, MSD= MS Duplicate, RPD= Relative % Difference

9810K69.RRR <2>



ATTACHMENT D
SSTL CALCULATION OUTPUT

RBCA SITE ASSESSMENT

Tier 2 Worksheet 9.3

Site Name: Former Signal Oil Marine Terminal
 Site Location: Oakland, California

Completed By: rrm-enviroener
 Date Completed: 4/20/1999

1 OF 1

Calculation Option: 2

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-6 MCL exposure limit?
 Target Risk (Class C) 1.0E-5 PEL exposure limit?
 Target Hazard Quotient 1.0E+0

SSTL Results For Complete Exposure Pathways ("x" If Complete)

CONSTITUENTS OF CONCERN		Representative Concentration (mg/L)	Groundwater Ingestion			Groundwater Volatilization to Indoor Air		Groundwater Volatilization to Outdoor Air		Applicable SSTL (mg/L)	SSTL Exceeded? <input checked="" type="checkbox"/> If yes	Required CRF Only if "yes" left
			Residential (on-site)	Commercial (on-site)	Regulatory(MCL) (on-site)	Residential (on-site)	Commercial (on-site)	Residential (on-site)	Commercial (on-site)			
0-00-0	benzene.cal	0.0E+0	NA	NA	NA	NA	4.1E-1	NA	1.7E+2	4.1E-1	<input type="checkbox"/>	<1
100-41-4	Ethylbenzene	0.0E+0	NA	NA	NA	NA	>Sol	NA	>Sol	>Sol	<input type="checkbox"/>	<1
108-88-3	Toluene	0.0E+0	NA	NA	NA	NA	>Sol	NA	>Sol	>Sol	<input type="checkbox"/>	<1
1330-20-7	Xylene (mixed isomers)	0.0E+0	NA	NA	NA	NA	>Sol	NA	>Sol	>Sol	<input type="checkbox"/>	<1

>Sol indicates risk-based target concentration greater than constituent solubility

Software: GSI RBCA Spreadsheet
 Version: 1.0.1

Serial: g-545-qhx-510

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Where are concentrations?

*STET
 Why is it checked as being exceeded?*

RBCA SITE ASSESSMENT

Tier 2 Worksheet 9.2

Site Name: Former Signal Oil Marine Terminal
 Site Location: Oakland, California

Completed By: rrm-enviroener
 Date Completed: 4/20/1999

1 OF 1

**SUBSURFACE SOIL SSTL VALUES
 (> 3.3 FT BGS)**

Target Risk (Class A & B) 1.0E-6
 Target Risk (Class C) 1.0E-5
 Target Hazard Quotient 1.0E+0

MCL exposure limit?
 PEL exposure limit?

Calculation Option: 2

SSTL Results For Complete Exposure Pathways ("x" if Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	Soil Leaching to Groundwater			Soil Volatilization to Indoor Air		Soil Volatilization to Outdoor Air		Applicable SSTL (mg/kg)	SSTL Exceeded? <input type="checkbox"/> "If yes"	Required CRF
			Residential: (on-site)	Commercial: (on-site)	Regulatory(MCL): (on-site)	Residential: (on-site)	Commercial: (on-site)	Residential: (on-site)	Commercial: (on-site)			
CAS No.	Name	(mg/kg)										
0-00-0	benzene cal	0.0E+0	NA	NA	NA	NA	2.6E-2	NA	1.1E+1	2.6E-2	<input type="checkbox"/>	<1
100-41-4	Ethylbenzene	0.0E+0	NA	NA	NA	NA	>Res	NA	>Res	>Res	<input type="checkbox"/>	<1
108-88-3	Toluene	0.0E+0	NA	NA	NA	NA	>Res	NA	>Res	>Res	<input type="checkbox"/>	<1
1330-20-7	Xylene (mixed isomers)	0.0E+0	NA	NA	NA	NA	>Res	NA	>Res	>Res	<input type="checkbox"/>	<1

>Res Indicates risk-based target concentration greater than constituent residual saturation value

Software: GSI RBCA Spreadsheet
 Version: 1.0.1

Serial: g-545-qhx-510

RBCA TIER 1/TIER 2 EVALUATION

Output Table 1

Site Name: Former Signal Oil Marine Terminal Identification: aa46
 Site Location: Oakland, California Date Completed: 4/20/99
 Completed By: rm-envroneer

Software: GSI RBCA Spreadsheet
 Version: 1.0.1

NOTE: values which differ from Tier 1 default values are shown in bold italics and underlined.

Exposure Parameter	Definition (Units)	Residential			Commercial/Industrial	
		Adult	(1-6yrs)	(1-16 yrs)	Chronic	Constrctn
ATc	Averaging time for carcinogens (yr)	70			25	1
ATn	Averaging time for non-carcinogens (yr)	30	6	16	70	
BW	Body Weight (kg)	70	15	35	70	
ED	Exposure Duration (yr)	30	6	16	25	1
t	Averaging time for vapor flux (yr)	30			250	180
EF	Exposure Frequency (days/yr)	350			250	
EF_Derm	Exposure Frequency for dermal exposure	350			250	
IRgw	Ingestion Rate of Water (L/day)	2			1	100
IRs	Ingestion Rate of Soil (mg/day)	100	200		50	
IRadj	Adjusted soil ing. rate (mg-yr/kg-d)	1.1E+02			9.4E+01	
IRa.in	Inhalation rate indoor (m ³ /day)	15			20	10
IRa.out	Inhalation rate outdoor (m ³ /day)	20			20	5.8E+03
SA	Skin surface area (dermal) (cm ²)	5.8E+03		2.0E+03	5.8E+03	5.8E+03
SAadj	Adjusted dermal area (cm ² -yr/kg)	2.1E+03			1.7E+03	
M	Soil to Skin adherence factor	1				
AAFb	Age adjustment on soil ingestion	FALSE			FALSE	
AAFd	Age adjustment on skin surface area	FALSE			FALSE	
tox	Use EPA tox data for air (or PEL based)?	TRUE				
gwMCL?	Use MCL as exposure limit in groundwater?	FALSE				

Matrix of Exposed Persons to Complete Exposure Pathways	Residential		Commercial/Industrial	
	Chronic	Constrctn	Chronic	Constrctn
Outdoor Air Pathways:				
SS.v	Volatiles and Particulates from Surface Soils	FALSE	FALSE	FALSE
S.v	Volatilization from Subsurface Soils	FALSE	TRUE	TRUE
GW.v	Volatilization from Groundwater	FALSE	TRUE	TRUE
Indoor Air Pathways:				
S.b	Vapors from Subsurface Soils	FALSE	TRUE	TRUE
GW.b	Vapors from Groundwater	FALSE	TRUE	TRUE
Soil Pathways:				
SS.d	Direct Ingestion and Dermal Contact	FALSE	FALSE	FALSE
Groundwater Pathways:				
GW.i	Groundwater Ingestion	FALSE	FALSE	FALSE
S.l	Leaching to Groundwater from all Soils	FALSE	FALSE	FALSE

Matrix of Receptor Distance and Location On- or Off-Site	Residential		Commercial/Industrial	
	Distance	On-Site	Distance	On-Site
GW	Groundwater receptor (cm)	FALSE	FALSE	TRUE
S	Inhalation receptor (cm)	FALSE	FALSE	TRUE

Matrix of Target Risks	Individual	Cumulative
	TRab	Target Risk (class A&B carcinogens)
TRc	Target Risk (class C carcinogens)	1.0E-05
THQ	Target Hazard Quotient	1.0E+00
Opt	Calculation Option (1, 2, or 3)	2
Tier	RBCA Tier	2

Surface Parameters	Definition (Units)	Residential	Constrctn
		Value	Value
A	Contaminated soil area (cm ²)	2.2E+06	1.0E+06
W	Length of affect. soil parallel to wind (cm)	1.5E+03	1.0E+03
W.gw	Length of affect. soil parallel to groundwater (cm)	1.5E+03	
Uair	Ambient air velocity in mixing zone (cm/s)	2.3E+02	
delta	Air mixing zone height (cm)	2.0E+02	
Lss	Thickness of affected surface soils (cm)	1.0E+02	
Pe	Particulate areal emission rate (g/cm ² /s)	6.9E-14	

Groundwater Definition (Units)	Definition (Units)	Residential	Commercial	foundation
		Value	Value	Value
della.gw	Groundwater mixing zone depth (cm)	2.0E+02		
I	Groundwater infiltration rate (cm/yr)	3.0E+01		
Igw	Groundwater Darcy velocity (cm/yr)	2.5E+03		
Ugw	Groundwater seepage velocity (cm/yr)	6.6E+03		
Ks	Saturated hydraulic conductivity (cm/s)			
grad	Groundwater gradient (cm/cm)			
Sw	Width of groundwater source zone (cm)			
Sd	Depth of groundwater source zone (cm)			
phi.eff	Effective porosity in water-bearing unit	3.8E-01		
loc.sat	Fraction organic carbon in water-bearing unit	1.0E-03		
BIO?	Is bioattenuation considered?	TRUE		
BC	Biodegradation Capacity (mg/L)			

Soil	Definition (Units)	Residential	Commercial	foundation
		Value	Value	Value
hc	Capillary zone thickness (cm)	5.0E+00		
hv	Vadose zone thickness (cm)	3.0E+02		
rho	Soil density (g/cm ³)	2.08 ✓		
loc	Fraction of organic carbon in vadose zone	0.001275 ✓		
phi	Soil porosity in vadose zone	0.32 ✓		
Igw	Depth to groundwater (cm)	3.0E+02		
Ls	Depth to top of affected subsurface soil (cm)	1.0E+02		
Lsubs	Thickness of affected subsurface soils (cm)	2.0E+02		
pH	Soil/groundwater pH	6.5		
phi.w	Volumetric water content	0.291	0.276	0.12
phi.a	Volumetric air content	0.029	0.044	0.26

Building	Definition (Units)	Residential	Commercial
		Value	Value
Lb	Building volume/area ratio (cm)	2.0E+02	3.0E+02
ER	Building air exchange rate (s ⁻¹)	1.4E-04	2.3E-04
Lcrk	Foundation crack thickness (cm)	1.5E+01	
eta	Foundation crack fraction	0.01	

Transport Parameters	Definition (Units)	Residential	Commercial
		Value	Value
Groundwater			
ax	Longitudinal dispersivity (cm)		
ay	Transverse dispersivity (cm)		
az	Vertical dispersivity (cm)		
Vapor			
dcy	Transverse dispersion coefficient (cm)		
dcz	Vertical dispersion coefficient (cm)		

RBCA CHEMICAL DATABASE

Physical Property Data

CAS Number	Constituent	type	Molecular Weight (g/mole)		Diffusion Coefficients			log (Koc) or log(Kd) (@ 20 - 25 C)		Henry's Law Constant (@ 20 - 25 C)			Vapor Pressure (@ 20 - 25 C) (mm Hg)		Solubility (@ 20 - 25 C) (mg/L)		acid	base	ref
			MW	ref	in air (cm2/s)	ref	in water (cm2/s)	ref	log(l/kg)	ref	mol	(unitless)	ref	ref	pKa	pKb			
0-00-0	benzene.cal	O	78.1		9.30E-02		1.10E-05		1.58		5.29E-03	2.20E-01		9.52E+01		1.75E+03			
100-41-4	Ethylbenzene	A	106.2	5	7.60E-02	A	8.50E-06	A	1.98	A	7.69E-03	3.20E-01	A	1.00E+01	4	1.52E+02	5		
108-88-3	Toluene	A	92.4	5	8.50E-02	A	9.40E-06	A	2.13	A	6.25E-03	2.60E-01	A	3.00E+01	4	5.15E+02	29		
1330-20-7	Xylene (mixed isomers)	A	106.2	5	7.20E-02	A	8.50E-06	A	2.38	A	6.97E-03	2.90E-01	A	7.00E+00	4	1.98E+02	5		

Site Name: Former Signal Oil Marine Terminal Site Location: Oakland, California Completed By: rrm-enviroener Date Completed: 4/20/1999

Software version: 1.0.1

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RBCA CHEMICAL DATABASE

Toxicity Data

CAS Number	Constituent	Reference Dose (mg/kg/day)				Slope Factors 1/(mg/kg/day)				EPA Weight of Evidence	Is Constituent Carcinogenic ?
		Oral RfD_oral	ref	Inhalation RfD_Inhal	ref	Oral SF_oral	ref	Inhalation SF_Inhal	ref		
0-00-0	benzene.cal			1.70E-03		1.00E-01		1.00E-01		A	TRUE
100-41-4	Ethylbenzene	1.00E-01	A	2.86E-01	A	-		-		D	FALSE
108-88-3	Toluene	2.00E-01	A,R	1.14E-01	A,R	-		-		D	FALSE
1330-20-7	Xylene (mixed isomers)	2.00E+00	A,R	2.00E+00	A	-		-		D	FALSE

Site Name: Former Signal Oil Marine TeSite Location: Oakland, California Completed By: rrm-environeer Date Completed: 4/20/1999

Software version: 1.0.1

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RBCA CHEMICAL DATABASE

Miscellaneous Chemical Data

CAS Number	Constituent	Maximum Contaminant Level		Permissible Exposure Limit PEL/TLV (mg/m3)	ref	Relative Absorption Factors		Detection Limits (mg/L)		Soil (mg/kg)		Half Life (First-Order Decay) (days)		ref
		MCL (mg/L)	reference			Oral	Dermal	ref	ref	Saturated	Unsaturated			
0-00-0	benzene.cal	5.00E-03		3.20E+00		1	0.5	0.002		0.005		720	720	
100-41-4	Ethylbenzene	7.00E-01	56 FR 3526 (30 Jan 91)	4.34E+02	ACGIH	1	0.5	0.002	C	0.005	S	228	228	H
108-88-3	Toluene	1.00E+00	56 FR 3526 (30 Jan 91)	1.47E+02	ACGIH	1	0.5	0.002	C	0.005	S	28	28	H
1330-20-7	Xylene (mixed isomers)	1.00E+01	56 FR 3526 (30 Jan 91)	4.34E+02	ACGIH	1	0.5	0.005	C	0.005	S	360	360	H

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