TERRA VAC
1651 Alvarado Street, San Leandro, CA 94577-2636
Tel (510) 351-8900 ❑ Fax (510) 351-0221

March 26, 1997

Jennifer Eberle
Alameda County Health Care Services Agency
1131 Harbor Bay Parkway
Alameda, CA 94502-6577

Re: No Further Action Requests- draft addendums/revisions
Former Chevron Stations 9-4587, 9-4516
Oak Street, Oakland, CA
14th Street, Oakland, CA

Dear Ms. Eberle:

Enclosed are: 1) a draft addendum to the November 12, 1996, Final Report on the 609 Oak Street Chevron site, and; 2) a revised draft copy of the Final Report for the 14 th Street Chevron site. We have supplied additional data and attempted to clarify those items you requested and had discussed with Mark Frye. Because groundwater data for the remainder of 1996 is now available, that information has also been utilized to further show the low risk remaining at the sites.

Sincerely,
Terra Vac Corporation

Robert Dahl
Project Manager

cc: Phil Briggs, Chevron
30-0219.20

FINAL REMEDIATION STATUS REPORT AND REQUEST FOR NO FURTHER ACTION FORMER CHEVRON STATION 9-4816 301 14TH STREET OAKLAND, CALIFORNIA

PROJECT 30-0220

FINAL REMEDIATION STATUS REPORT AND REQUEST FOR NO FURTHER ACTION FORMER CHEVRON STATION 9-4816 301 14TH STREET OAKLAND, CALIFORNIA

Prepared For:

Chevron Products Company
6001 Bollinger Canyon Road
P.O. Box 5004
San Ramon, California 94583-0804

Prepared By:

Terra Vac Corporation
1651 Alvarado Road
San Leandro, California 94577

DRAFT

Cliff M. Garratt
Hydrogeologist

DRAFT

Robert A. Dahl
Project Manager

DRAFT

James A. Perkins, R.G.
Division Manager

March 25, 1997

FINAL REMEDIATION STATUS REPORT AND REQUEST FOR NO FURTHER ACTIVE REMEDIATION FORMER CHEVRON STATION 9-4816 301 14th Street OAKLAND, CALIFORNIA

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1.0 INTRODUCTION

At the request of Chevron Products Company (Chevron), Terra Vac Corporation (Terra Vac) is engaged in active remediation of the subject site. Alameda County Health Care Services, Department of Environmental Health (ACHCS) required that this work be performed in order to mitigate the impact of fuel hydrocarbons released during operation of a retail service station. The purpose of this report is to present the results of remediation work completed to date, and to request that the site be placed on a monitoring only status.

This report presents background information on environmental work completed at the site. A review of pre-remediation assessment data is made in order to define site specific environmental problems encountered. Next, implementation of active remediation and an evaluation of its effectiveness is discussed. Finally, current site conditions are evaluated on the basis of associated environmental and human health risks. The conclusion of this report is that no further active remediation is warranted. Additionally, a plan for managing future work at the site is presented.

2.0 BACKGROUND

The following background section provides a summary of work completed at the site. The summary is based on a review of documents provided to Terra Vac by Chevron, which include copies of reports prepared by other consultants and previously submitted to ACHCS. The intent is to develop a timeline of site activities and to list sources of data pertinent to this report. In general, data used in this report are condensed from these sources and may not have been re-tabulated or appended herein.

The site is located at 301 14th Street, on the southwest corner of 14th and Harrison Streets in Oakland, California (Figure 1). This area of Oakland is located on the San Francisco Bay fringe approximately 1/4-mile east of San Francisco Bay. Lake Merritt is located approximately 1/4-mile east of the site. The site is underlain by unconsolidated, Pleistocene age silty and clayey sand of the Lake Merritt Formation. The Lake Merritt Formation is approximately 40 feet thick at this location. The Lake Merritt Formation overlies the Alameda Formation. The upper portion of the Alameda Formation is comprised of a sandy silty clay (*Radbruch, Areal and Engineering Geology of the Oakland West Quadrangle, California, 1957*).

A retail service station and car wash were operated at the site until August 1989. During a tank integrity test conducted in April 1988, the 10,000 gallon Unleaded Supreme underground storage tank was reported to have failed the test. In August of that year a subsurface product line leading to the service islands failed at a joint. The leak was subsequently repaired. In August 1989, the service station was demolished (Figure 2). The site is currently a fenced vacant lot.

In June 1990, GeoStrategies Inc. (GSI) of Hayward, California, drilled eight exploratory soil borings, of which four were completed as groundwater monitoring wells, C-1 through C-4, (Figure 2) in order to assess potential sources of hydrocarbon impact at the site (*GeoStrategies Inc., Soil Boring and Well Installation Report, August 9, 1990*). Boring and well locations are illustrated on Figure 2. Sample results indicated that petroleum hydrocarbons were present in the area of the former USTs and easterly service island. Depth to water was reported as approximately 22 feet below grade with groundwater flow to the southwest.

In October 1990, GSI drilled and installed one additional groundwater monitoring well, C-5, and a groundwater recovery well, CR-1 (Figure 2). The work further delineated the vertical and horizontal extent of hydrocarbon impact west of the former USTs and installed a remediation well at the site (*GeoStrategies Inc., Well Installation Report, December 5, 1990*). Depth to groundwater was again reported to be approximately 22 feet below grade.

During February 1991, R.W. Johnston and Co. Of Oakland removed three USTs (two-10,000 gallon and one-5,000 gallon) and the associated piping. Excavated soil (approximately 800 cubic yards) was stockpiled onsite and aerated to less than 10 parts per million (ppm) of total petroleum hydrocarbons calculated as gasoline (TPH-g). The stockpiled soil was used to backfill the excavations created during the UST removal project.

GSI returned to the site in April 1991 and drilled four additional soil borings that were completed as groundwater monitoring wells, C-6 through C-9 (Figure 2). This investigation further delineated hydrocarbon distributions in soil and groundwater in the apparent up-gradient direction from the site. Depth to groundwater was reported to be approximately 22 feet below grade with groundwater flow to the southwest. (*GeoStrategies Inc., Well Installation Report, June 13, 1991*).

In December 1991, Weiss Associates (Weiss) of Emeryville, California, submitted an application for an air permit to the Bay Area Air Quality Management District (BAAQMD). The permit was for Authority to Construct a soil vapor remediation system at the site (*Weiss Associates, December 6, 1991).*

In February 1992, Weiss developed a remediation work plan for the site. The work plan proposed the installation of a soil vapor extraction system which would utilize an internal combustion engine (ICE) operating on CR-1 and C-5 *(Weiss Associates, Remediation Work plan, February 10, 1992*). The work plan was approved by ACHCS and Weiss completed installation of utilities necessary for the operation of the system. Between March 12 and 16, 1992, Weiss conducted a Source Test for Authority to Construct No. 8272 *(letter to BAAQMD, April 17, 1992).* The VE system apparently was in operation until April 1994.

On June 11, 1992, Groundwater Technology, Inc. Drilled and constructed one offsite groundwater monitoring well, MW-10, and two vapor extraction wells, VEW-1 and VEW-2 (Figure 2) *(Groundwater Technology, Inc., Environmental Assessment Report, August 3, 1992).*

Chevron contracted Weiss to conduct an aquifer test at the site. The work was completed in late January, 1994 *(Weiss Associates, Hydraulic Test Results, February 24, 1994).* Following the aquifer test, Weiss, acting as Chevrons agent, issued a request for bid for the construction of a groundwater extraction system at the site *(Weiss Associates, Request For Bid, Groundwater Extraction System, May 18, 1994).*

Groundwater extraction began in August of 1994. Available data indicates that the groundwater extraction system was in operation until April 1995.

Sierra Environmental Services (SES) was contracted by Chevron to drill two additional wells at the site, MW-11 and MW12 (Figure 2). Well MW-11 was drilled offsite, in the apparent down gradient direction at the time of drilling to further define the extent of hydrocarbon impact to groundwater. Well MW-12 was drilled on site and completed as an additional vapor extraction well *(Sierra Environmental Services, Subsurface Investigation Report, June 23, 1994).*

In March 1995 Terra Vac submitted an addendum to the Weiss work plan. The work plan addendum revised remediation methodology and established active remediation goals for vadose zone soils and guidelines for achieving "no further active remediation" status for the site *(Terra Vac Corporation, Addendum Remediation Work Plan, March 28, 1995)*. Terra Vac proposed the installation of a dual vapor extraction (DVE) system augmented by air sparging to enhance VOC partitioning and bio-activity. Subsequent to negotiations with ACHCS, the addendum to the work plan was approved and system modifications made. Operation of the system began on October 3, 1995. The system was operated until March 1996, during which time a significant mass of hydrocarbons was removed from the subsurface of the site *(Terra Vac Corporation, Remediation Status Report, March, 1996)*.

Drilling and installation of wells to support remediation efforts were conducted during July 1995 (wells (SP-1, SP-2, VEW-4 and VEW-5) and September 1995 (SP-3 and SP-4). As proposed in the addendum work plan for the site, Terra Vac drilled four interim soil borings. These borings were completed as air sparge wells (SP-5 through SP-8) and subsequently incorporated into the sparging system (Figure 2).

3.0 EVALUATION OF PRE-REMEDIATION ASSESSMENT DATA

The following section develops an overall picture of site conditions prior to the start of Terra Vac's remediation work. It defines the nature of the problem confronted at the site, develops a framework for understanding how the remedial action was implemented, and provides a basis for evaluating remedial effectiveness.

3.1 Lithology

Observed site lithology is characterized by laterally discontinuous units of sand, silty sands and clayey sands to approximately 35 feet below grade. However, an area of suspected gravel backfill was encountered in an area bounded by wells VEW-1, SP-1, VEW-5 and SP-3 and extends to a depth of approximately 18.5 feet below grade. The upper permeable zone is underlain by an apparent aquitard consisting of silt, clayey silt and clay units. This aquitard appears to be laterally continuous across the site. Borings drilled at the site have been advanced to depths varying from 25 to 45 feet below grade. Observed lithology beneath the study area appears to be consistent with previous surveys of regional lithology.

3.2 Hydrogeology

Groundwater is currently at a depth of approximately 20.5 feet below grade. Groundwater elevations beneath the site do not appear to vary significantly seasonally. However, groundwater elevations were shown to have rebounded due to the end of a multi-year drought. Groundwater elevations measured

during the first quarter of 1993 are typically 3 to 3.5 feet higher than elevations measured in the fourth quarter of 1992. The potentiometric surface has not been observed to have returned to pre fourth quarter 1992 elevations. For the purpose of this report, soils encountered above 19 feet below grade are considered to be unsaturated vadose zone soils, soils encountered below 20.5 feet below grade are considered to be located within the water bearing zone. A capillary fringe of nominal thickness 1.5 feet is assumed to be present at the interface of the vadose and saturated zones.

The results of a seven hour aquifer test performed at CR-1 produced the following data *(Weiss Associates, Hydraulic Test Results, February 24, 1994)*:

The optimum pumping rate at CR-1 that sustains steady state flow was less than 2.5 gpm but greater than 2 gpm.

The radius of influence from CR-1 appeared to be greater than 70 feet to the east of CR-1, 50 feet to the southwest and 58 feet to the northwest.

Calculated transmissivity values ranged from 730 gallons per day per foot (gpd/ft) using the Theis recovery method to 1,100 gpd/ft using the Cooper/Jacob method.

Calculated conductivity (k) values ranged from 60 gpd/ft^2 (Theis recovery) to 92 gpd/ft^2 (Cooper/Jacob)

The calculated storativity was 0.06, which is indicative of an unconfined or slightly confined aquifer. This is consistent with the observed response of the potentiometric surface during drilling activities.

The maximum drawdown recorded was in well C-5, 58 feet from the pumping well, CR-1.

3.3 Distribution of Hydrocarbons

Prior to system startup in October 1995, 20 on-site exploratory soil borings, of which, 15 were completed as either groundwater monitoring or remediation wells, had been drilled at the site in order to define the vertical and horizontal distribution of fuel hydrocarbons in soil and groundwater. Soil samples were collected from each of the borings, however only 16 samples were analyzed by State-certified laboratories. A review of these data indicates that petroleum hydrocarbons calculated as gasoline were released into the subsurface during the operation of the service station. Evaluation of soil boring sample data has been made relative to active remediation goals established for vadose zone soil in the work plan addendum developed by Terra Vac. For the purpose of this report, samples with concentrations of total petroleum hydrocarbons as gasoline (TPHg) exceeding 100 part per million (ppm), and/or 1 ppm benzene are considered to be impacted. Samples having concentrations below these levels are not considered to be significantly impacted. A summary of soil analytical results is presented in Table 1.

3.3.1 Point of Release

The approximate times and points of releases have been determined. Hydrocarbon releases have been associated with leaking distribution piping. Overfilling of the USTs, or the run-off of fuel spilled during dispensing, may have resulted in additional fuel hydrocarbon impact beneath the site.

3.3.2 Horizontal Distribution in Unsaturated Soil

Borings were advanced to depths ranging from 25 to 46 feet below grade. Twenty soil borings were drilled on site prior to the start of remediation. Sixteen soil samples were collected and submitted for analysis from the unsaturated zone The most shallow soil sample was collected at a depth of approximately 5 feet below grade and the deepest were from a depth of 15.5 feet. The results of laboratory analysis indicate that none of the soil samples were found to exceed the active remediation goals stated in the work plan addendum (Figure 3). As a result, it is assumed that vadose soils are not currently impacted by petroleum hydrocarbons.

3.3.3 Vertical Distribution in Saturated Soil

For an idealized site having a homogeneous lithology and a stable water table, free phase hydrocarbons released into shallow soils will migrate vertically through the vadose zone until they reach the saturated zone. The hydrocarbons will collect at the capillary fringe and migration becomes controlled by diffusion and gravity into the saturated zone. Due to the porous nature of the aquifer media, the highest concentrations of hydrocarbons would be in the capillary fringe and saturated zone. This would lead to high concentrations in dissolved phase hydrocarbons beneath the site. Assuming a depth to ground water of 20.5 feet below grade, samples collected from 19 to 20.5 feet below grade are considered representative of the capillary fringe. In fact, samples having concentrations of fuel hydrocarbons exceeding the clean up goals for soil at the site were present only in the capillary fringe interval (Figure 4). Samples collected from the saturated zone and submitted for analysis can not be considered representative of actual adsorbed hydrocarbons in the soil. Saturated samples collected and analyzed from the capillary fringe and saturated zone are not evaluated in this report.

Historical fluctuation in the potentiometric surface and a rise in the water table due to the end of drought conditions could cause a smear zone as much as 3.5 feet thick. Diffusion of dissolved hydrocarbons in the saturated smear zone appear to account for continued concentrations of dissolved phase hydrocarbons.

3.4 Groundwater Flow Direction and Hydrocarbon Distribution in Groundwater

Seven groundwater monitoring wells were present on-site and six groundwater monitoring wells were off-site prior to the start of remediation in October 1995. Groundwater flow direction has fluctuated over time. Initial groundwater flow was shown to be in the southwesterly direction in 1990. Available illustrations indicate that the flow direction changed in 1992, since then (except during the groundwater extraction phase of remediation) groundwater flow has been to the north, and northeast. Variations in the groundwater flow direction may be the result of changes in the depth to water, water levels above the top of the screen interval and the flat gradient recorded at the site.

During groundwater monitoring, free phase hydrocarbons were present in wells C-1, C-2, C-3, C-5, CR-1 and VEW-3. Approximately 11 gallons of free phase has been removed from the wells. The last measured free phase was recorded on December 27, 1995, in wells C-3, CR-1 and VEW-3.

Groundwater quality data for the third quarter of 1995, just prior to system startup in October 1995, showed detectable concentrations of TPHg ranging from a low of 12,000 parts per billion (ppb) in offsite well C-8 to a high of 280,000 ppb in on-site well C-3. Detectable concentrations of benzene ranged from less than 10 ppb (well C-8) to 27,000 ppb in well C-3. Wells C-4, C-6, C-7, MW-10 and MW-11 have not

contained detectable levels of either TPHg or benzene since November 29, 1994. Well C-9 was not sampled during the third or fourth quarter of 1995, however, petroleum hydrocarbons have not been detected since May 6, 1992 . The groundwater plume has been defined in all but the easterly direction of the site (toward C-8). However, given the historical groundwater flow to the north, northeast, it is assumed that the plume has been defined down gradient of the site (Figure 5).

4.0 ACTIVE REMEDIATION

This section describes active remediation work completed at the site. The goal of active remediation was to remove the residual source of hydrocarbons from beneath the site in a timely and economic manner. A period of passive bioremediation, effected by naturally occurring processes, will be required to completely restore soil and groundwater quality. same

Weiss Associates operated VE system from March 1992 to April 1994 and a groundwater treatment system from August 1994 to April 1995. Approximately 12,600 lbs. of petroleum hydrocarbons were removed utilizing vapor extraction and an addition 109 lbs. were removed via the pump and treat system. VE GT

4.1 Remediation Work Plan

A remediation work plan was developed to outline steps that would be taken to implement active remediation of an estimated 20,000 lbs. of petroleum hydrocarbons in the subsurface at the site. The work plan proposed the use of dual vacuum extraction (DVE) and air sparging as the active remediation technology. At the end of DVE operation, air sparging will be used as a passive remediation technology. DVE is a technology proven to be effective in removing adsorbed and vapor phase hydrocarbons from vadose zone soils and the saturated smear zone. Air sparging is effective in partitioning hydrocarbons and enhancing bioremediation in the vadose and saturated zone. same.

yes. this clarifies things.

Active remediation goals for vadose zone soils were established. The effectiveness of active remediation was to be evaluated using DVE operational data and documented by samples collected from confirmatory soil borings. The work plan predicated that concentrations of hydrocarbons in groundwater would be reduced through naturally occurring processes following the completion of active remediation. The work plan established that "No Further Active Remediation" status, based on existing Category II Non-Attainment Zone criteria, could be awarded following the submittal of a conceptual Management Plan for Residual Hydrocarbons (MPRH). The MPRH was to include a plan for on-going monitoring of the dissolved phase plume and an evaluation of human health risks associated with long term passive bioremediation of the plume.

The work plan was submitted to ACHCS for review in March 28, 1995. ACHCS approved the work plan in a letter dated May 31, 1995. same

4.1.1 Goals for Vadose Zone Soil

The work plan established goals for vadose zone soil active remediation, utilizing DVE. A reduction in vadose zone soil concentrations was to be affected through the operation of the DVE. A reduction in concentration is required to insure that residual hydrocarbons will not leach out of the vadose and act as a continuing source of groundwater impact. The primary goals for soil boring samples were set at 100 ppm TPHg and 1 ppm benzene. A secondary method of validating the effectiveness of the DVE system was

based on the system operational data. The rate at which hydrocarbons are removed from the subsurface tends to decrease over time and may ultimately level off at some point higher than zero pounds per day. When this occurs, the economic viability of operating the system is greatly reduced. Goals for DVE operations were set at an extraction rate below 50 pounds per day and the development of asymptotic extraction rates over time.

4.1.2 Goals for Groundwater

The work plan did not establish numeric remediation goals for groundwater as part of the active remediation goals. ACHCS maintained that groundwater must ultimately be remediated to concentrations below the Maximum Contaminant Levels (MCLs), specifically benzene concentrations must be below one part per billion (ppb). The benefit to groundwater quality achieved during active remediation of source contaminantes in the vadose zone soils will result in regression with no further associated health risks.

4.1.3 Interim and Confirmatory Borings

The work plan called for the installation of interim and confirmatory borings during active remediation of the site. Interim borings are used to enhance the assessment of the site and to evaluate the progress of site active remediation. Interim borings can be completed as extraction wells, expanding the capacity of the treatment system when necessary. Confirmatory borings are installed prior to the completion of active remediation in order to document achievement of active remediation goals. The work plan called for the installation of up to four interim borings after four weeks of active remediation and for two confirmatory borings when remediation appeared to be complete.

4.1.4 No Further Active Remediation Status

The work plan allowed for transitioning the site to "No Further Active Remediation." Residual hydrocarbons would remain in the subsurface, but passive bioremediation would continue to remove residual hydrocarbons without posing the threat of further groundwater quality degradation or adverse human health effects. Obtaining "No Further Active Remediation" status was to be based on achievement of the active remediation goals and the development of a MPRH. The MPRH was to include an assessment of post-remediation site conditions, projected passive bioremediation rates, a groundwater quality monitoring plan, a contingency plan in case of adverse changes in site conditions, and an evaluation of human health risks and possible institutional controls on exposures.

4.2 Remediation System

A dual vacuum extraction/air sparge system was installed and operated at the site in order to facilitate active and passive remediation. The basic system design was outlined in the work plan developed for the site by Terra Vac. Following acceptance of the work plan, Terra Vac installed and operated the system under contract to Chevron.

4.2.1 System Design

The vacuum portion of the system consisted of: a regenerative oxidizer bed, an extraction blower, a vapor/liquid separator, two-1,000 lb. activated carbon vessels, associated PVC piping and dual vacuum

extraction wells. The air sparging system consisted of: an air injection blower, associated PVC piping and air sparge wells.

Wells VEW-1 through VEW-5, C-1 through C-3, C-5 and CR-1 were connected to the DVE system. The VEW wells had an effect on vadose zone soils from 9 to 20 feet below grade and the upper two to three feet of the saturated zone. The C-"X" wells had an effect on the vadose zone from 16 to 20 feet below grade and the upper two to three feet of the saturated zone. These intervals roughly correspond with the vertical extent of impacted soil. The air sparge wells were installed such that the screened interval extended from approximately 30 to 32.5 feet below grade.

4.2.2 System Operations

Operation of the DVE system began on October 3, 1995. The system was operated until March 9, 1996 when a total of 134.7 days of operation had been logged. During this time the system removed a calculated 19,481 pounds of petroleum hydrocarbons from the site subsurface. Currently no remedial activities are being conducted at the site.

Extraction flow rates averaged 334 standard cubic feet per minute. The highest observed mass extraction rate was approximately 661 pounds TPH per day, which occurred during the third day of operation. The lowest mass extraction rate of 0.8 pounds/day (lbs./day) occurred after approximately 45 days of operation. Adjustments were made to the system, at which point the mass extraction rate continued to increase to 353 lbs./day at the 80th run day. The mass extraction rate fell to 8.3 lbs./day at approximately 130 day of operation and remained at that level until system shutdown at 134.7 days (Table 1, Operations Summary).

5.0 EVALUATION OF REMEDIATION EFFECTIVENESS

Previous soil remediation activities by Weiss account for the remediation of approximately 13,000 lbs. of contaminant from the subsurface beneath the site. Approximately 19,500 lbs. of TPH have been removed from the subsurface during approximately 134 days of DVE system operation by Terra Vac. While hydrocarbons remain in soil and groundwater beneath the site, a majority of the petroleum hydrocarbons originally impacting the site have been removed and cost effective operation of the DVE system has been completed.

5.1 Operations Data

During operation of the DVE system, the maximum mass extraction rates were observed at the beginning of operations (Chart 1, Removal Rate). As significant amounts of TPH were removed from the subsurface, extracted soil vapor concentrations decreased while soil vapor extraction flow rates remained relatively constant. This caused an overall drop in mass extraction rates over time. Increases in the mass extraction rate occurred after periods of non-operation and/or system adjustments.

Cumulative hydrocarbon mass removed by the DVE has been plotted relative to days of operation (Chart 2, Cumulative Removal Rate). Chart 2 shows that 10,302 pounds TPH, or approximately 51 percent of the extractable mass present, was removed during the first 36 days of operation of the Terra Vac system. After 134 days of operation, 19,581 pounds TPH had been removed. This represents 98 percent of the 20,000 pound TPH estimated by Terra Vac to be present at the start of remediation.

5.2 Results of Interim Soil Boring Installation

Four interim soil borings (SP-5 through SP-8) were drilled on December 20 and 21, 1995. The borings were subsequently completed as air sparging wells. Drilling of the borings occurred after approximately 78 days of system operations when a calculated 12,617 pounds TPH had been removed by the system. The borings were drilled to a depth of approximately 32 feet and samples were collected at five foot intervals. Since vadose zone is not considered to be impacted, soil samples collected form the unsaturated zone were not analyzed from these borings.

5.3 Groundwater Quality Data

Groundwater quality data collected in June 1996 indicates that operation of the DVE has had a significant impact on dissolved phase hydrocarbon concentrations. Wells C-1 through C-3, C-5, C-8, CR-1 and MW-2 shows recorded reductions in TPHg concentrations from 59.2 percent (C-8) to 99.7 percent (C-1). Reductions in benzene concentrations range from 50 percent (C-8) to 99.8 percent (C-1). Wells C-5 and MW-12 did not have detectable concentrations of either TPHg or benzene at the time of the second quarter 1996 sampling event. Figure 6 illustrates TPHg and benzene concentrations reported by Blaine Tech Services for second quarter 1996 sampling event.

6.0 REQUEST FOR NO FURTHER ACTIVE REMEDIATION

To date, work at the site has been guided by the remediation work plan. The work plan is a progressive document that embodies the concepts that the goal of active remediation is to remove a majority hydrocarbon mass in a cost effective manner; that residual hydrocarbons will be present in soil and groundwater at the end of active remediation, and that groundwater quality will ultimately be restored during a period of passive bioremediation effected by naturally occurring processes.

Since the development of the work plan two major changes have occurred within the regulatory frame work governing the site. First, the Lawrence Livermore Report, "Recommendations to Improve the Cleanup Process for California's Leaking Underground Fuel Tanks" was followed by Walt Pettit's December 8, 1996 letter, "Interim Guidance on Required Cleanup at Low-Risk Fuel Sites". The substance of these documents supports the efficacy of the basic concepts developed in the work plan. Second, the "Regional Board Supplemental Instructions to State Water Boards, January 5, 1996" letter developed a six point checklist for assigning low risk status to groundwater impacted sites. The supplemental instructions direct that "Passive bioremediation be the preferred remediation alternative unless there is a compelling reason to do otherwise." The subject site meets the definition of a low risk site and future remediation should be effected by passive bioremediation. The following is an evaluation of site conditions relative to the six points defining a low risk groundwater site.

6.1 On-Going Sources

All USTs and associated piping were removed from the site in February 1991. Cost effective removal of source hydrocarbons from the vadose zone has been completed. Free product has not been observed in groundwater monitoring wells since December 1995 and dissolved phase concentrations of TPHg are significantly below saturation levels.

6.2 Site Characterization

Significant assessment work has been completed at the site. Pre-remediation assessment data defined the source and extent of impacted soil. DVE operations data indicate that soil impact has been significantly reduced. The groundwater flow direction and extent of plume migration has been reasonably defined by off-site assessment.

6.3 Plume Stability

Groundwater quality data has been collected since the early 1990s. With the exception of C-8, perimeter wells have been reported as non detect for TPHg and benzene since their installation. While short-term variations occur over time, dissolved phase hydrocarbon concentrations remained fairly consistent in well C-8 prior to the start of active remediation. The fact that the reduction in dissolved phase hydrocarbons in well C-8 are dissimilar to that observed in the onsite wells suggests that the hydrocarbon source may not originate at the Chevron site. new sentence

6.4 Sensitive Receptors

A 1/2 (2640 foot) mile radius well survey was requested from the County of Alameda Department of Public Works Water Resources Division. Applicable results of the well survey are illustrated on Figure 7. Three possible receptors were identified as a result of the survey. A domestic well located approximately 633 feet southeast of the site. Two irrigation wells were identified, one approximately 2000 feet northeast of the site, the other approximately 2640 feet northeast of the site. An additional receptor is located east of the site, Lake Merritt, at a distance of approximately 2640 feet. Given the historical groundwater flow data, generally north, northeast, only Lake Merritt and the irrigation wells could be considered as potential sensitive receptors.) ok

7.0 RISK BASED CORRECTIVE ACTION EVALUATION

Both active and passive remedial technologies have been used to remediate petroleum impacted soil and groundwater beneath the site. Available data shows that the potential sources have been removed from the site and interim remediation activities have removed high levels of hydrocarbons from the vadose zone soils. However residual hydrocarbons in saturated soil still impact groundwater beneath the site.

The purpose of this section is to develop conservative models of exposures pathways and define the health risks associated with residual hydrocarbon impacted soil and groundwater. And to demonstrate that no significant risk of adverse human health effects would be associated with long term passive bioremediation of the site. Terra Vac evaluated the potential human health risks using the computer software program *ASTM Risk Based Corrective Action* (ASTM/RBCA) produced by Groundwater Services, Inc., of Houston Texas.

"The ASTM/RBCA Spreadsheet System is designed to complete all calculations required for Tier 2 of the RBCA planning process, as defined in ASTM E-1739 "Standard for Risk-Based Corrective Action at Petroleum Release Sites." The RBCA Spreadsheet System consists of a series of linked worksheets in Microsoft® Excel 5.0 which calculate baseline risk levels and/or Site-Specific Target Levels (SSTLs) for soil and groundwater remediation, based upon information provided by the user. Risk assessment procedures employed in the RBCA Spreadsheet System are consistent with current U.S. EPA guidelines."

(*Appendix A, Guidance Manual for Risk-Based Corrective Action,* Groundwater Services, Inc., Houston, Texas). This risk assessment is based on current site conditions and uses. If the site use changes significantly in the future, the health risk assessment should be re-evaluated.

7.1 Constituents of Concern

The ASTM/RBCA evaluation begins with a defined target risk which is deemed to be protective of public health. This risk is the results of a receptors exposure to constituents of concern (COC). The exposure is the result of transport of the COC from its source (impacted soil or groundwater beneath the site) to the receptor via the exposure pathway. The ASTM/RBCA works backwards from the acceptable risk at the receptor to determine an allowable maximum concentration at the source. The calculated maximum concentration is the site specific threshold limit (SSTL) for each COC in soil and groundwater. If existing soil or groundwater concentrations are below the SSTL, no significant health risk is considered to be present.

Benzene has been reported above detectable levels in groundwater within the study area. Benzene is a known carcinogen and was the single COC used to drive the risk assessment. ASTM/RBCA default values for the physical and toxic characteristics of benzene are used in assessing potential health risks.

7.2 Risk Based Assumption

An ASTM/RBCA Tier Two assessment was performed for the site. Site specific data documented in investigation reports were utilized to develop the risk models. See Appendices A and B for summaries of soil and groundwater analytical data. Where site specific data were not available, ASTM/RBCA default values were used in modeling.

The State of California has assigned a maximum contaminant level (MCL) that can be allowed in drinking water of 0.001 mg/l. The California Environmental Protection Agency's toxicity value for benzene is more conservative than the default target risk value (TRV) of 1 occurrence per 1,000,000 population, used by ASTM/RBCA. To reflect this, a factor of 0.29 was applied to the TRV for modeling potential exposures to benzene. The resulting TRV of 1 occurrence in 3.5 million population is used as the default in modeling potential exposures to benzene.

Other key assumptions made in developing the model were related to site use and exposure pathways. The site is currently zoned for commercial use. As a result of the commercial zoning, the OSHA Permissible Exposure Limit (PEL) for benzene is 3.2 mg/m^3 and is applied in addition to the corrected TRV.

Aquifer soil characteristics used in the transport model, such as; organic carbon fraction and effective porosity have been generalized. These data represent average values for each characteristic as found in *Handbook of Hydrology,* Mercer, J.W. and Waddell, R.K, 1993, pages16.2 and 16.22. 7.3

7.3 Exposure Pathways

Exposure pathways evaluated for this report include; direct on-site and off-site dermal exposure to impacted soil and/or groundwater, inhalation of volatilized benzene from vadose zone soils and/or

12-12-96 benzene

1.2	<0.5
1.3	<0.5
100	<0.5
3.0	<0.5
5-8	<0.5
850	<0.5

1013.5 ÷ 6 = 168.91 ppb

X 95% UCL = 160 ppb

groundwater to outdoor and indoor air from sources beneath the site and ingestion pathway of groundwater to off-site receptors.

Given that surface soils (defined as soil to approximately 3 feet below ground surface) have not been reported as containing detectable concentrations of benzene and groundwater is approximately 20.5 feet deep, direct dermal contact pathways have been eliminated as a potential health hazard. The exposure pathways for the volatilization of benzene from either the vadose zone soil and/or groundwater to outdoor and indoor air were evaluated. ok

Available data indicates that vadose zone soils are not a source for the volatilization of benzene to outdoor or indoor air. As a result, only groundwater was evaluated as a potential pathway. Of the two, indoor air exposure to volatiles from groundwater represents the most conservative exposure pathway. ok

As stated above the site is currently a vacant lot. Since the extent of future commercial development at the site is not fully known, as a result default values for an enclosed space assigned by ASTM/RBCA were used to evaluate the potential inhalation pathway. Additionally, data were input into a second model to simulate a basement to a depth of 12 feet below ground surface at the site. This second model is considered to be a conservative representation of the potential health risks associated with the inhalation pathway.

Ingestion pathways to off-site receptors with access to a source of drinking water were evaluated. Three possible receptors were identified as a result of the survey, two irrigation wells, one approximately 2000 feet northeast of the site, the second approximately 2640 feet northeast of the site and Lake Merritt, northeast to east, at a distance of approximately 2640 feet. The assumption is made that water from each these sources could be used as a drinking water and/or dermal contact and to which MCL and TRVs for benzene should be applied. Due to the predominate groundwater flow direction, the domestic well located southeast of the site is not considered as a potential receptor. ok

7.4 Data Set

Benzene concentration data from the fourth quarter 1996 is used to establish a representative benzene concentration for the risk assessment modeling. These data represent the conditions of groundwater after active remediation at the site. For the purposes of arriving at a conservative representative benzene concentration to be used in the model, analytical results shown as less than the reporting limit for benzene on the laboratory report were omitted. The remaining December 12, 1996 groundwater sampling data were input into the model to calculate a representative concentration of benzene in groundwater beneath the site. A 95 percent upper confidence limit of 0.16 mg/l (160 parts per billion (ppb)) benzene was calculated by the model based on the data input. The representative concentration used by the model to calculate the Site Specific Target Levels (SSTL) for the ingestion pathway predicated on both the MCL of 0.001 mg/l (1 ppb) for benzene and TRV of 1 occurrence in 3.5 million at the points of exposure. The SSTL value represents an allowable concentration level of benzene at the source area. At the SSTL concentration, benzene would not be detectable at either the MCL or TRV for benzene at the receptors. These data sets represent a conservative model of current site conditions.

The fate and transport model applies a first order attenuation factor over time and distance to move from the source (the site) to the sensitive receptors (irrigation wells and Lake Merritt) in order to calculate a SSTL. In other words, if groundwater impacted with benzene at the SSTL moves from the site to

receptors (approximately 2000 feet), by the time the benzene impacted groundwater reaches the receptors, natural attenuation will have reduced benzene levels to below the MCL of 0.001 mg/l and would not present a risk to the receptor greater than the TRV of 1 in 3.5 million.

7.5 Model Results

The SSTL from groundwater volatilization to indoor air based on the PEL for benzene was calculated by the model to be greater than the solubility of benzene (Appendix C, Worksheet 9.3A). A SSTL of greater than the solubility of benzene (Appendix C, Worksheet 9.3 B) was also calculated by the model that included a basement to a depth of 12 feet below ground surface.. The modeled SSTL for benzene is significantly greater that the 0.16 mg/l representative concentration of benzene in groundwater beneath the site. The exposure pathway for exposure to volatilized benzene to indoor air does not pose a risk to human health.

The allowable SSTL, based on the MCL, for benzene in groundwater beneath the site was calculated by the model to be 200 mg/l (200,000 ppb). This value represents the maximum allowable benzene concentration in groundwater beneath the site that would insure groundwater reaching the off-site receptors would not contain benzene concentrations above the MCL. The SSTL, based on the TRV, for benzene in groundwater beneath the site is calculated to be 580 mg/l (580,000 ppb). This value represents the maximum allowable benzene concentration in groundwater beneath the site that would insure groundwater reaching the offsite receptors would not pose a risk greater than TRV for benzene. ASTM/RBCA worksheets are presented in Appendix C.

The results of the conservative ASTM/RBCA modeling indicate that the representative benzene concentration of 0.16 mg/l is below the allowable modeled concentration based on the MCL by a factor of approximately 1,250. The representative benzene concentration of 0.16 mg/l is also below the TRV concentration for benzene by a factor of approximately 3,600.

The results of the conservative ASTM/RBCA modeling indicate a significant margin between actual site conditions and conditions which would present a concern for adverse human health effects. This margin allows that site condition may vary somewhat over time but only a radical change in site conditions would raise a concern in the future.

MANAGEMENT PLAN

The DVE system was removed from the site with the approval of ACHCS. However the air sparge system is still remains at the site. Upon approval of this report the remaining system will be removed from the site. Removal of the remaining system components includes the destruction of all remediation and groundwater monitoring wells not utilized during the implementation of the management plan. All wells will be destroyed in accordance with Zone 7 requirements.

In order to monitor and verify that groundwater quality will not pose a risk in the future, the following management plan is proposed for implementation at the site. The management plan is intended to facilitate conservative verification monitoring goals at designated trigger wells (wells C-4 through C-9, MW-10 and MW-11). The management plan will also allow further evaluation of biodegradation in wells C-1 through C-3 and CR-1.

The Management Plan Threshold Limits (MPTL) for each of the trigger wells have been established by applying a multiplier of 10 to the fourth quarter, 1996 benzene concentrations. A magnitude change in benzene concentrations in a trigger well is considered a conservative indicator for re-evaluating plume stability. Table 2 lists the Benzene Concentration Threshold Limits for each of the trigger wells.

The benzene concentrations in each of the biodegradation indicator wells will be plotted against a decay curve to evaluate the biodegradation progress. The decay curve is based on the natural attenuation as a result of the half life of benzene. A decay curve (after equation 16.6.4, page 16.29, Mercer, J.W. and Waddell, R.K., *Handbook of Hydrology*) will be generated for each well ~~using~~ starting with fourth quarter 1996 analytical data:

$$C_t = Ce^{-kt}$$

where :

$^{-k}$ = decay constant based on the half life of benzene, estimated to be 720 days.
^{t} = time interval in days.
C = benzene concentration at time 0 (fourth quarter 1996 data)
C_t = benzene concentration with respect to the time interval.

Over the next three years groundwater wells C-1 through C-3 and CR-1 will be on a semi-annual schedule as shown in Table 2. These wells will be used to evaluate the progress of ~~passive~~ biodegradation. In order to evaluate the progress of biodegradation, groundwater samples from these wells will be analyzed for total petroleum hydrocarbons calculated as gasoline (TPH-g) and benzene, toluene, ethylbenzene and xylenes (BTEX).

Wells C-4 through C-9, MW-10 and MW-11 will be sampled and monitored quarterly for the first year after acceptance of this report. After one year of sampling has been completed, ~~monitoring~~ and sampling will be conducted annually, as shown in Table 2.

If, during the course of continued monitoring, biodegradation is verified by analytical results in groundwater samples from wells C-1 through C-3 and CR-1 and trigger well concentrations have not approached the MPTL, the wells will be destroyed and the site will be closed to further environmental activity. However, if over the next three years a biodegradation trend is not observed in the semi-annual monitoring data in the biodegradation indicator wells or benzene concentrations reach the established benzene concentration threshold limit levels in any one of the trigger wells the following actions will be taken:

- ACHCS will be notified immediately after sample results are known.
- The suspect well will be resampled to confirm the findings of the first sample results.
- If the second sample confirms the first sample results, Chevron will reevaluate site conditions and submit a work plan to ACHCS within 30 days of the second sampling.

All activities that would modify the management plan will be submitted to ACHCS for approval prior to implementation.

This study shows that application of the RBCA model to existing site conditions does not indicate a significant health or environmental threat. The management plan provides continued assessment of site conditions to evaluate the stability of the benzene plume.

This report was prepared in accordance with generally accepted standards of environmental geologic practices in California, at this time. The study is solely for the purpose of applying health risk screening models to existing site conditions. The study was based on a limited number of representative points describing subsurface conditions. Subsurface conditions beyond available data points may potentially have a positive or negative effect on the modeled results.

RBCA SITE ASSESSMENT

Tier 2 Worksheet 9.3

Site Name: Former Chevron Station 9-4816
Site Location: 301 14th Street, Oakland, CA

Completed By: CMG
Date Completed: 3/17/1997

A

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-6
Target Risk (Class C) 1.0E-5
Target Hazard Quotient 2.9E-1

■ MCL exposure limit?
☐ PEL exposure limit?

Calculation Option: 2

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

CONSTITUENTS OF CONCERN		Representative Concentration	X Groundwater Ingestion			X Groundwater Volatilization to Indoor Air		Groundwater Volatilization to Outdoor Air		Applicable SSTL	SSTL Exceeded ?	Required CRF
CAS No.	Name	(mg/L)	Residential: (on-site)	Commercial: 2000 feet	Regulatory(MCL): 2000 feet	Residential: (on-site)	Commercial (on-site)	Residential (on-site)	Commercial (on-site)	(mg/L	"■" If yes	Only if "yes" left
71-43-2	Benzene	1.6E-1	NA	>Sol	2.0E+2	NA	3.7E-1	NA	NA	3.7E-1	☐	<1

• 16 ppm = 160 ppb

• 37 ppm = 370 ppb

• 37 ppm

Software: GSI RBCA Spreadsheet
Version v 1 0

Serial: g-337-yax-542

without PEL
+ using 10-6 + 4th Q 96 gw data. - 10-6 SSTL's

370 ppb

10-5 = 3700 ppb

benzene → 3700 ppb
3.7 ppm

10-5

RBCA SITE ASSESSMENT | **Tier 2 Worksheet 9.3**

Site Name: Former Chevron Station 9-4816
Site Location: 301 14th Street, Oakland, CA

Completed By: CMG
Date Completed: 3/17/1997

B

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-6
Target Risk (Class C) 1.0E-5
Target Hazard Quotient 2.9E-1

■ MCL exposure limit?
☐ PEL exposure limit?

Calculation Option: 2

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

CONSTITUENTS OF CONCERN		Representative Concentration	X Groundwater Ingestion			X Groundwater Volatilization to Indoor Air**		Groundwater Volatilization to Outdoor Air		Applicable SSTL	SSTL Exceeded ?	Required CRF
CAS No.	Name	(mg/L)	Residential (on-site)	Commercial: 2000 feet	Regulatory(MCL): 2000 feet	Residential: (on-site)	Commercial. (on-site)	Residential (on-site)	Commercial: (on-site)	(mg/L	"■" If yes	Only if "yes" left
71-43-2	Benzene	1 6E-1	NA	>Sol	2.0E+2	NA	3 6E-1	NA	NA	3.6E-1 .36ppm	☐	<1

= 160ppb

**For Basement Depth of 12 Feet Below Grade

360ppb

Software: GSI RBCA Spreadsheet
Version. v 1.0

Serial: g-337-yax-542

basement to 12' bgs
4th Q 96 gw data.

RBCA SITE ASSESSMENT

Tier 2 Worksheet 9.3

Site Name Chevron 9-4587
Site Location: Oak Street, Oakland

Completed By: R.A Dahl
Date Completed. 3/20/1997

GROUNDWATER SSTL VALUES

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	X Groundwater Ingestion			X Groundwater Volatilization to Indoor Air		X Groundwater Volatilization to Outdoor Air		Applicable SSTL	SSTL Exceeded ?	Required CRF
CAS No.	Name	(mg/L)	Residential: 1000 feet	Commercial: (on-site)	Regulatory(MCL): 1000 feet	Residential: (on-site)	Commercial: (on-site)	Residential (on-site)	Commercial. (on-site)	(mg/L	"■" If yes	Only if "yes" left
71-43-2	Benzene	3.5E-3	>Sol	NA	>Sol	NA	1.6E-1	NA	1.8E+1	1.6E-1	☐	<1

.0035
3.5ppb

= 16ppm
= 160ppb

Software: GSI RBCA Spreadsheet Serial: G-337-YAX-542
Version: v 1.0

just 1996 gw data for C1, C2 + CR1 without using PEL + using 10-6

rec'd 4-11-97

TABLES

Table 1
Operation Summary
Former Chevron Station 9-4816
301 14th Street
Oakland, CA

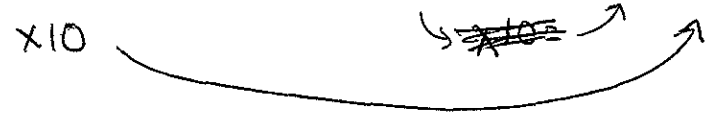
Date	Run Time (days)	Sample	Extracted Flow (scfm)	Extracted Conc. (mg/l)	Extracted Rate (lb/day)	Cumulative Extraction (lb)	Cumulative Water (gal)
10/03/95	0.0	start	558		0.0	0	
10/03/95	0.3	1	558	0.68	34.1	11	0
10/04/95	1.4	3	507	3.44	156.6	110	
10/05/95	2.3	5	596	12.36	661.4	481	4,270
10/05/95	2.3	stop	0		661.4	487	
10/06/95	2.3	start	487		661.4	487	4,412
10/06/95	2.4	7	467	13.30	557.6	545	4,412
10/09/95	5.5	9	306	7.56	207.5	1,760	16,360
10/10/95	6.3	11	358	5.73	183.9	1,915	22,264
10/16/95	12.5	nst	420		183.9	3,047	58,340
10/17/95	13.3	23	420	9.41	354.6	3,273	65,070
10/18/95	14.0	stop	0		354.6	3,508	
10/19/95	14.0	start	417		354.6	3,508	70,645
10/20/95	14.9	nst	401		354.6	3,840	75,215
10/31/95	25.9	nst	328		354.6	7,741	128,849
11/08/95	34.1	26	474	4.34	184.8	9,938	133,522
11/10/95	36.0	nst	402		184.8	10,302	141,028
11/15/95	40.8	38	459	0.20	8.2	10,761	161,110
11/20/95	45.8	50	461	0.02	0.8	10,784	177,738
11/27/95	53.0	nst	451		0.8	10,790	200,421
11/28/95	53.8	nst	302		0.8	10,791	203,113
11/29/95	55.0	54	311	2.00	55.9	10,826	211,866
12/06/95	62.0	nst	313		55.9	11,216	258,585
12/12/95	67.9	65	334	4.60	138.1	11,788	310,266
12/18/95	73.9	stop	0		138.1	12,617	
12/27/95	73.9	start	305		57.0	12,617	414,435
01/01/96	79.0	stop	305		57.0	12,907	
01/03/96	79.0	start	345		277.0	12,907	431,335
01/04/96	79.7	67	333	9.30	277.8	13,115	440,645
01/05/96	80.9	68	328	12.00	353.0	13,477	456,035
01/06/96	81.6	stop	0		353.0	13,727	
01/07/96	81.6	start	328		353.0	13,727	
01/08/96	82.7	69	348	9.30	290.9	14,076	480,784
01/12/96	86.9	70	352	7.90	249.9	15,219	523,918
01/18/96	92.8	nst	311		249.9	16,691	578,996
01/19/96	93.6	71	304	5.20	142.1	16,857	
01/22/96	96.9	72	302	4.40	119.4	17,282	619,317
01/26/96	100.7	73	299	3.60	96.8	17,690	655,448

Table 1
Operation Summary
Former Chevron Station 9-4816
301 14th Street
Oakland, CA

Date	Run Time (days)	Sample	Extracted Flow (scfm)	Extracted Conc. (mg/l)	Extracted Rate (lb/day)	Cumulative Extraction (lb)	Cumulative Water (gal)
02/02/96	107.7	74	275	3.45	85.3	18,326	724,129
02/09/96	114.8	75	289	2.30	59.6	18,842	793,548
02/11/96	116.9	stop	289		59.6	18,969	
02/14/96	116.9	start	287		59.6	18,969	818,038
02/15/96	117.9	86	291	1.11	29.0	19,012	828,787
02/16/96	118.9	87	308	1.67	46.2	19,050	842,387
02/23/96	125.8	stop	308		46.2	19,371	
02/25/96	125.8	start	302		46.2	19,371	911,570
02/26/96	126.7	98	324	0.57	16.6	19,398	920,135
03/01/96	130.7	109	317	0.29	8.3	19,447	958,235
03/02/96	131.6	stop	317		8.3	19,455	
03/05/96	131.6	start	291		8.3	19,455	989,335
03/07/96	133.6	stop	291		8.3	19,472	1,009,835
03/08/96	133.6	start	299		8.3	19,472	1,009,835
03/09/96	134.7	stop	299		8.3	19,481	1,019,529

Table 2
Management Plan Threshold Limits and Sampling Schedule
Former Chevron Station 9-4816
301 14th Street
Oakland, California

Well ID	Benzene Concentration 12/12/96 (ppb)	Average Benzene Concentrations Over The Last Four Qtrs. (ppb)	Benzene Concentration Threshold Limit (ppb)	Monitor & Sample	Sampling Interval
Biodegradation Indicator Wells					
C-1	1.2	2	***	Yes	Semi-Annually
C-2	1.3	2	***	Yes	Semi-Annually
C-3	100	42	***	Yes	Semi-Annually
CR-1	850	475	***	Yes	Semi-Annually
Trigger Wells					
C-4	<0.5	<0.5	5	Yes	Annually
C-5	3.0	1	30	Yes	Annually
C-6	<0.5	<0.5	5	Yes	Annually
C-7	<0.5	<0.5	5	Yes	Annually
C-8	58	28	580	Yes	Annually
C-9	<0.5	<0.5	5	Yes	Annually
MW-10	<0.5	<0.5	5	Yes	Annually
MW-11	<0.5	<0.5	5	Yes	Annually



CHARTS

just Terra Vac data

Chart 1
Removal Rate
Former Chevron Station 9-4816
301 14th Street
Oakland, CA

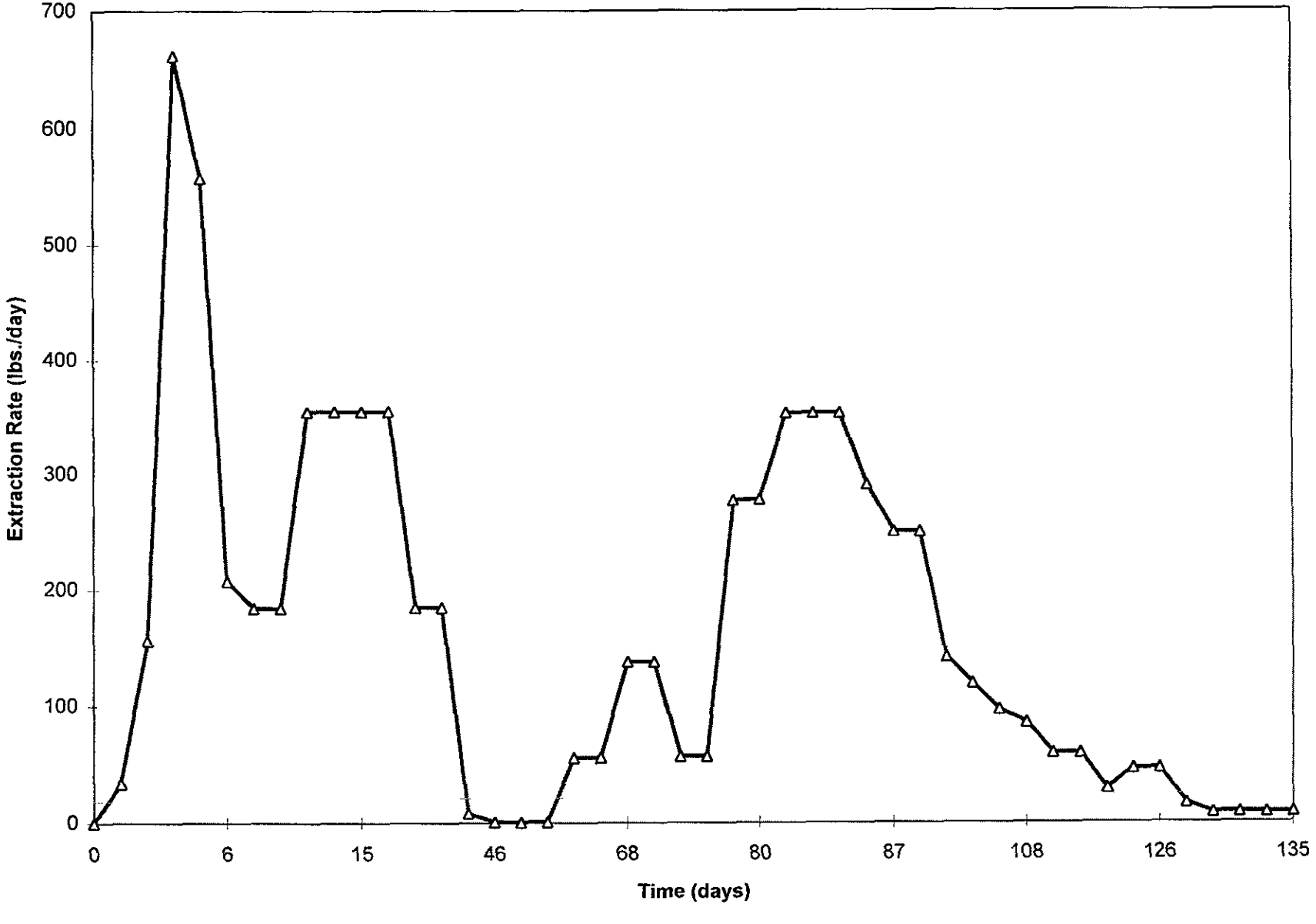
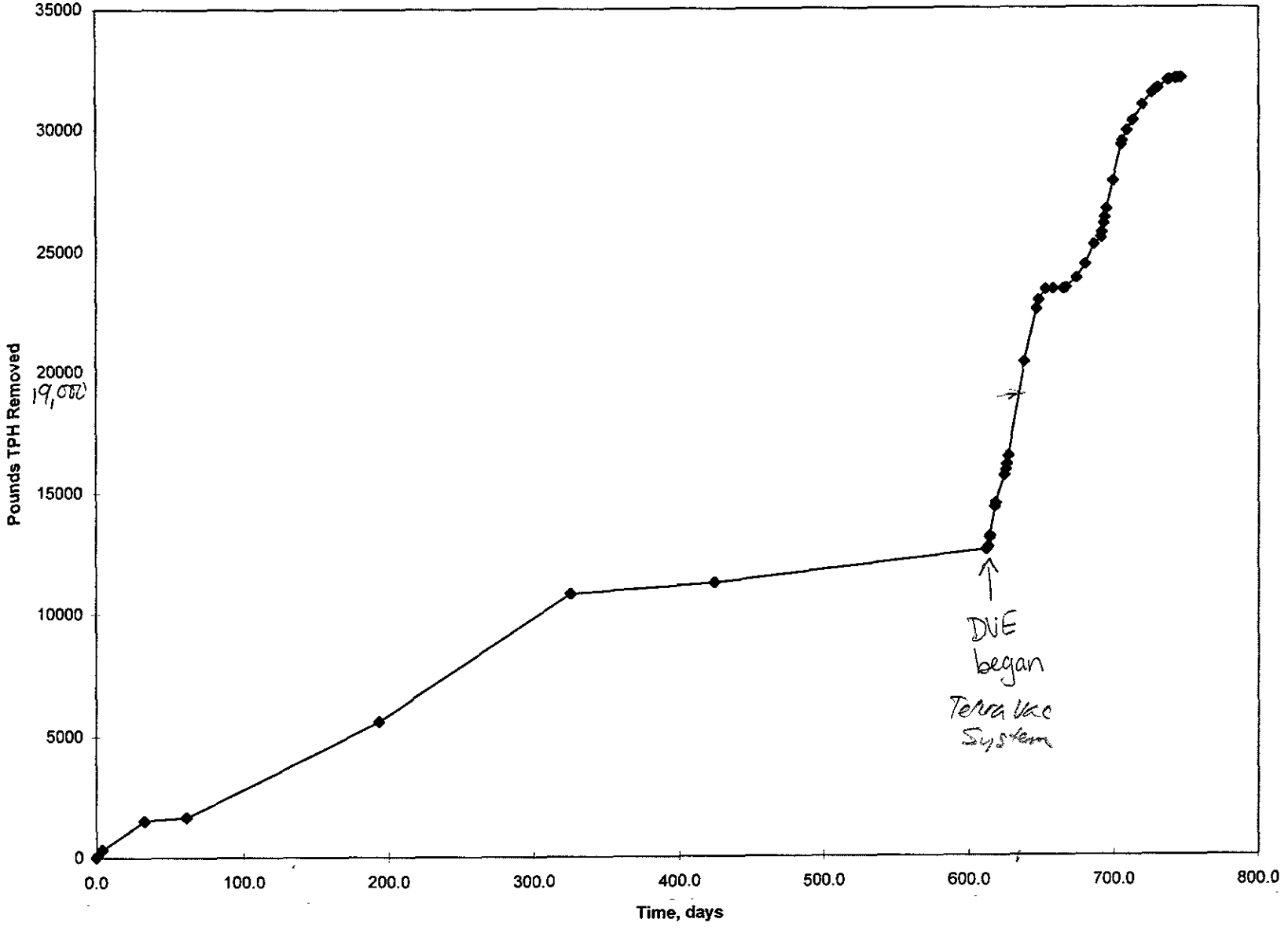


Chart 2

Cumulative Removal Rate

Former Chevron Station 9-4816

301 14th Street, Oakland CA



← Weiss' work →

VE since 3-92

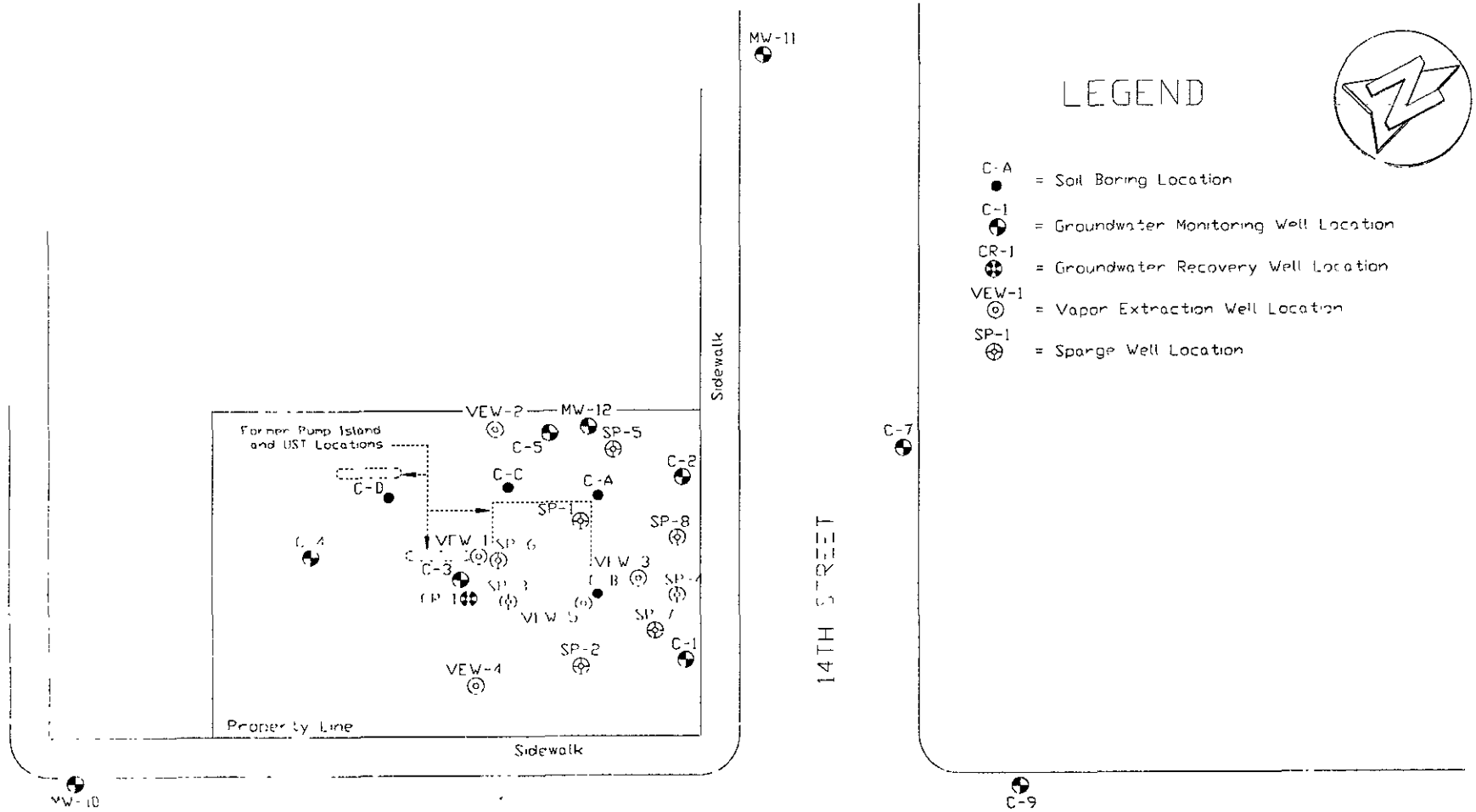
FIGURES

VICINITY MAP
Former Chevron Station 9-4816
301 14th Street
Oakland, California

Project	30-0220	Drawn	CMC
Date	10/8/96	Revision	
Scale	N.T.S	Checked	

TERRA VAC
1651 Alvarado Street
San Leandro, CA 94577
(510) 351-8900 Fax: -0221

Figure 1



LEGEND

C-A = Soil Boring Location

C-1 = Groundwater Monitoring Well Location

CR-1 = Groundwater Recovery Well Location

VEW-1 = Vapor Extraction Well Location

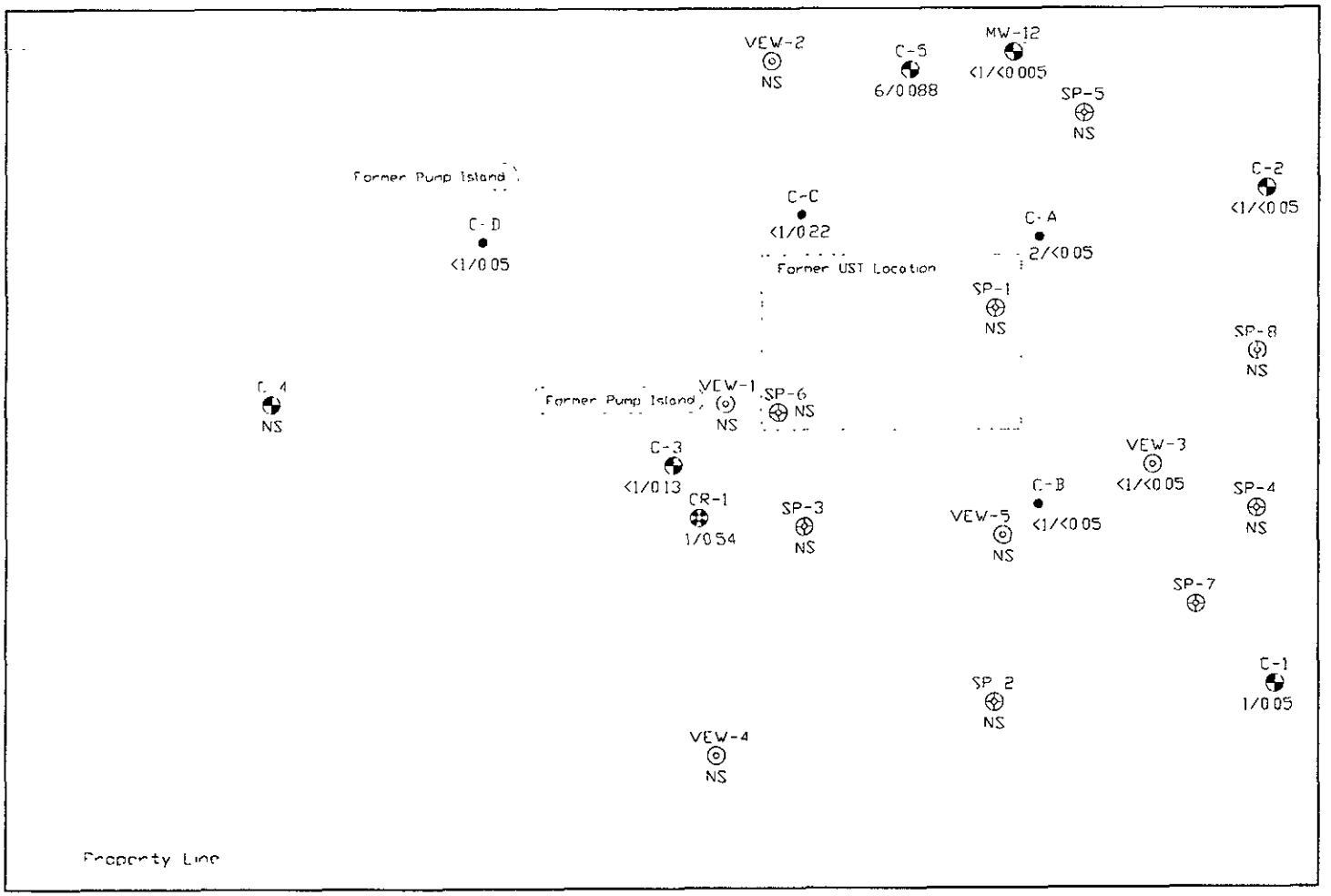
SP-1 = Sparge Well Location

SITE PLAN
FORMER CHEVRON STATION 9-4816
301 14TH STREET
OAKLAND, CALIFORNIA

Project	30-0220	Drawn	CMG
Date	8/28/96	Revision	
Scale	1"= 50'	Checked	

TERRA VAC
1651 Alvarado Street
San Leandro, CA 94577
(510) 351-8900 Fax: -0221

Figure 2



LEGEND

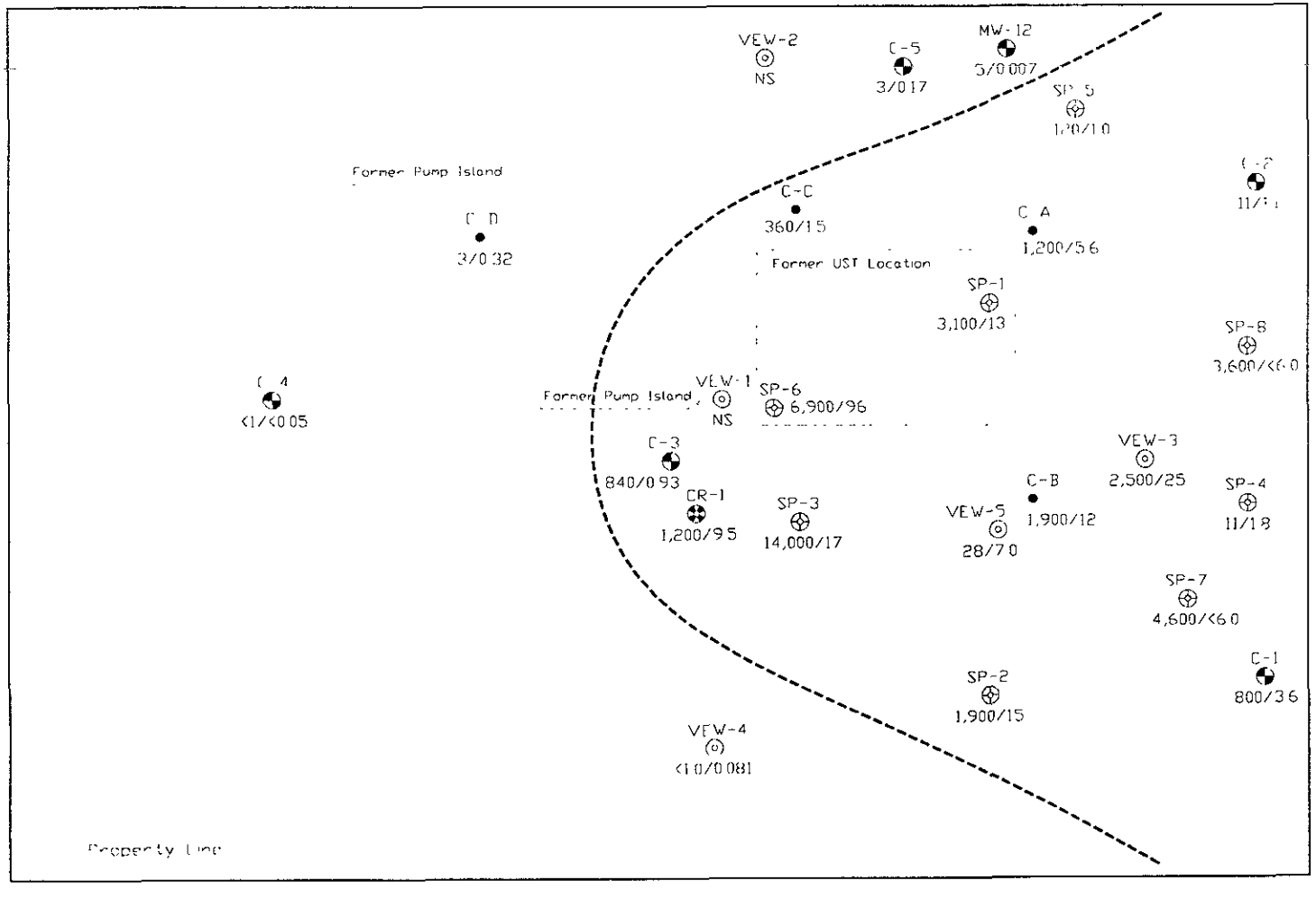
- C-A ● = Soil boring location
- C-1 ⊕ = Groundwater monitoring well location
- CR-1 ⊕ = Groundwater recovery well location
- VEW-1 ⊙ = Vapor extraction well location
- SP-1 ⊕ = Sparge Well Location
- 1,100/14 = Concentration of TPHg/Benzene in Soil, mg/kg Sample depths less than 20 feet
- NS = Not Samples

TPHg/Benzene in Vadose Zone Soil
FORMER CHEVRON STATION 9-4816
301 14TH STREET
OAKLAND, CALIFORNIA

Project	30-0220	Drawn	CMG
Date	8/29/96	Revision	
Scale	1"= 20'	Checked	

TERRA VAC
1651 Alvarado Street
San Leandro, CA 94577
(510) 351-8900 Fax: -0221

Figure 3



LEGEND

- C-A = Soil boring location
- C-C = Groundwater monitoring well location
- SP-1 = Groundwater recovery well location
- VEW-1 = Vapor extraction well location
- SP-1 = Sparge Well Location

1,200/56 = Concentration of TPHg/Benzene in Soil, mg/kg
Sample depths greater than or equal to 20 feet

NS = Not Samples

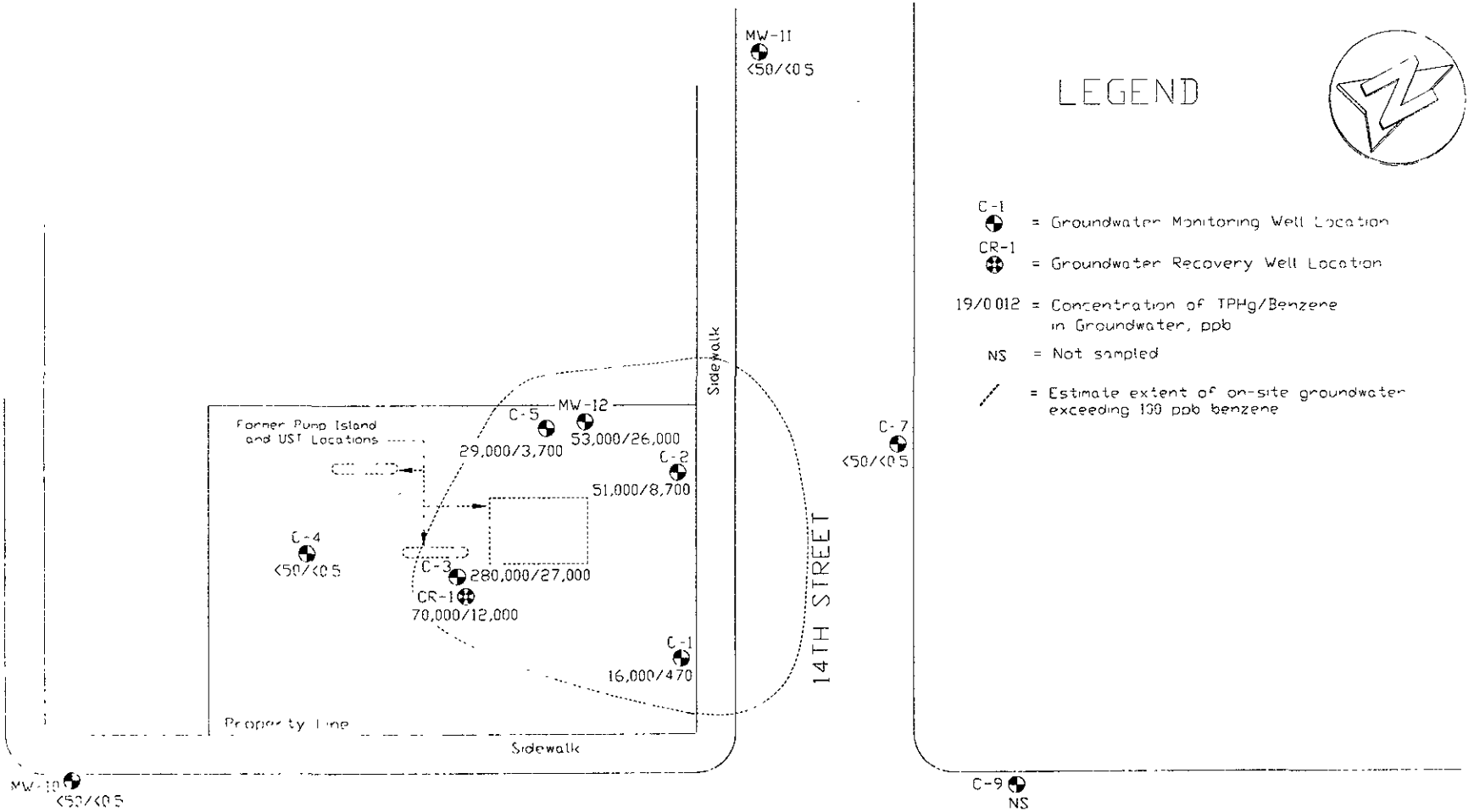
= Estimated extent of soil concentrations exceeding 100 mg/kg TPHg or 1 mg/kg benzene

TPHg/Benzene in Saturated Soil
FORMER CHEVRON STATION 9-4816
301 14TH STREET
OAKLAND, CALIFORNIA

Project	30-0220	Drawn	CVS
Date	8/29/96	Revision	
Scale	1" = 20'	Checked	

TERRA VAC
1651 Alvarado Street
San Leandro, CA 94577
(510) 351-8900 Fax: -0221

Figure 4



LEGEND

C-1 = Groundwater Monitoring Well Location

CR-1 = Groundwater Recovery Well Location

19/0.012 = Concentration of TPHg/Benzene in Groundwater, ppb

NS = Not sampled

/ = Estimate extent of on-site groundwater exceeding 100 ppb benzene

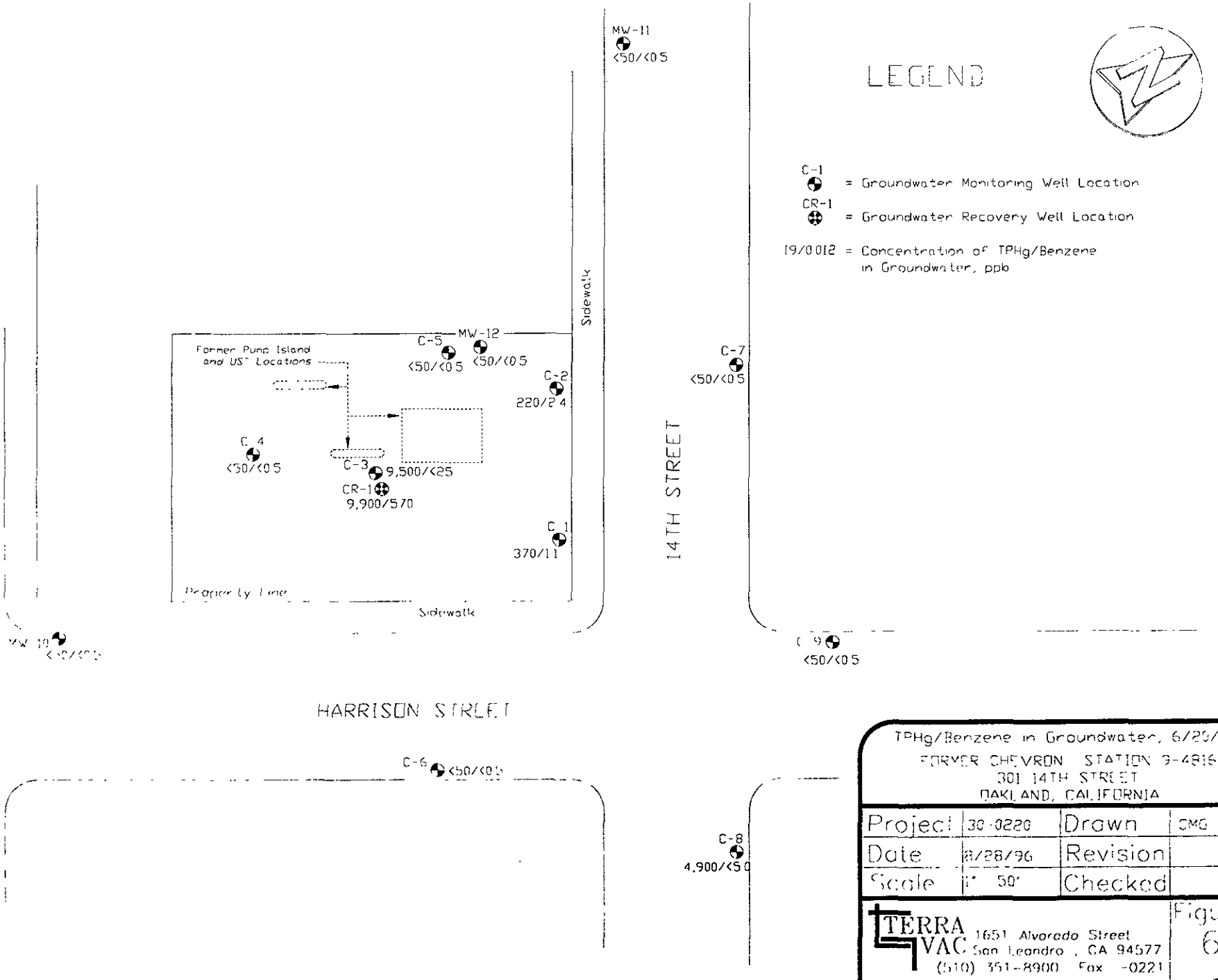
TPHg/Benzene in Groundwater, 8/28/96

FORMER CHEVRON STATION # 4816
301 14TH STREET
OAKLAND, CALIFORNIA

Project	130-0220	Drawn	DVS
Date	8/28/96	Revision	
Scale	1" = 50'	Checked	

TERRA VAC
1651 Alvarado Street
San Leandro, CA 94577
(510) 351-8900 Fax -0221

Figure 5



LEGEND

C-1 = Groundwater Monitoring Well Location

CR-1 = Groundwater Recovery Well Location

19/0.012 = Concentration of TPHg/Benzene in Groundwater, ppb

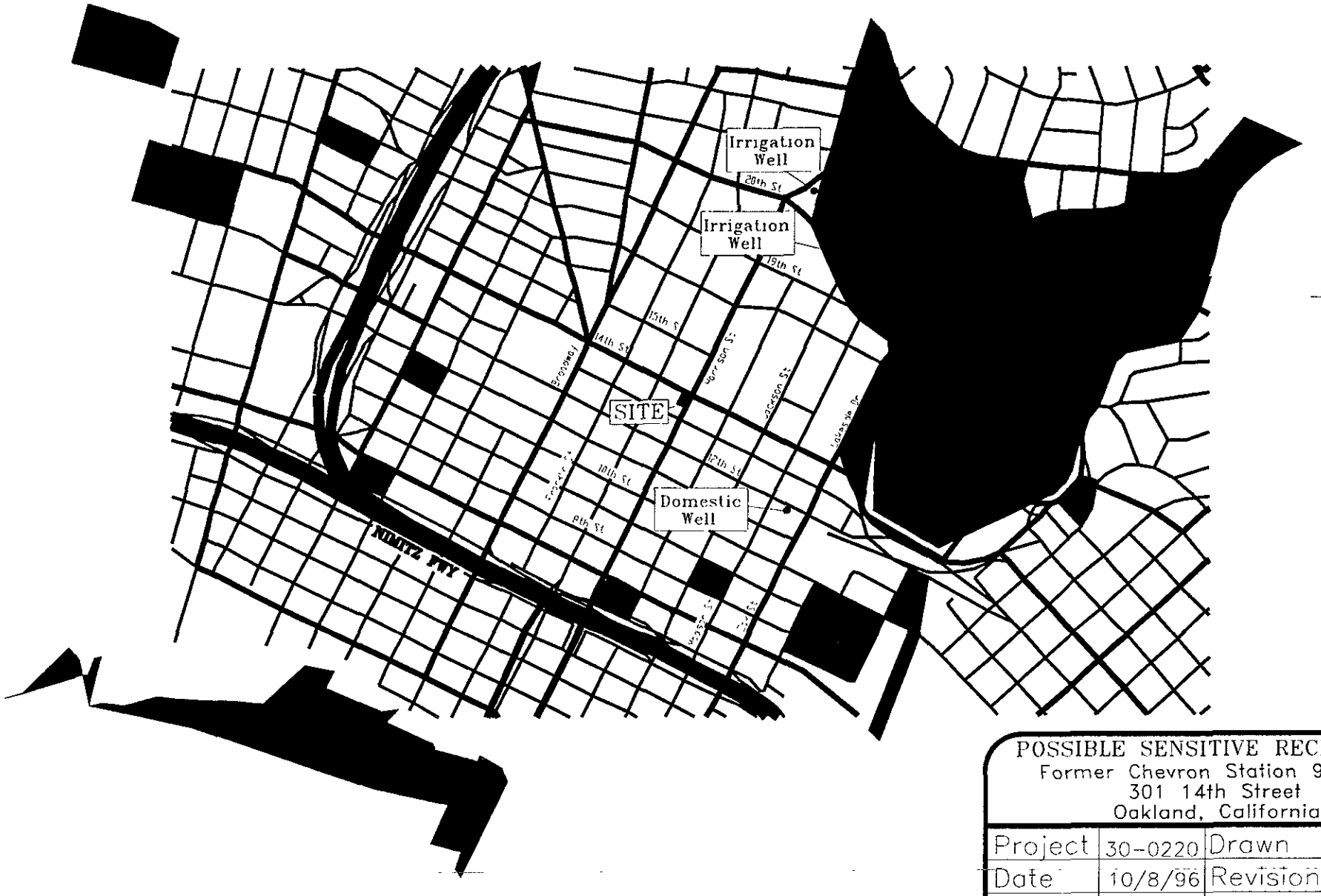
TPHg/Benzene in Groundwater, 6/20/96

FORMER CHEVRON STATION 9-4816
301 14TH STREET
OAKLAND, CALIFORNIA

Project	30-0220	Drawn	CMG
Date	8/28/96	Revision	
Scale	1" = 50'	Checked	

TERRA VAC
1651 Alvarado Street
San Leandro, CA 94577
(510) 351-8900 Fax -0221

Figure 6



POSSIBLE SENSITIVE RECEPTORS
Former Chevron Station 9-4816
301 14th Street
Oakland, California

Project	30-0220	Drawn	CMG
Date	10/8/96	Revision	
Scale	N.T.S.	Checked	

TERRA VAC
1651 Alvarado Street
San Leandro, CA 94577
(510) 351-8900 Fax -0221

Figure 7

APPENDIX A

TABLE 1
Summary of Soil Analytical Results
301 14th Street Oakland, CA

Sample #	Depth (feet)	Date	TPH-g (ppm)	Benzene (ppm)	Toluene (ppm)	Ethylbenzene (ppm)	Xylenes (ppm)
C-1	15	Jun-90	1	<0.05	<0.05	<0.05	0.05
	20		800	3.6	32	13	77
	25		<1	<0.05	<0.05	<0.05	<0.05
C-2	10		<1	<0.05	<0.05	<0.05	<0.05
	15		<1	<0.05	<0.05	<0.05	<0.05
	22		11	1.1	1.7	0.15	0.87
C-3	5		<1	<0.05	<0.05	<0.05	<0.05
	10		<1	0.13	<0.05	<0.05	<0.05
	15		<1	<0.05	<0.05	<0.05	<0.05
	20		840	0.93	15	9.0	63
	25		3	0.07	0.05	<0.05	0.19
C-4	20		<1	<0.05	<0.05	<0.05	<0.05
	25		<1	<0.05	<0.05	<0.05	<0.05
CA	10		<1	<0.05	0.05	0.05	0.05
	15		2	<0.05	0.05	0.05	0.10
	20		1200	5.6	43	18	120
	25		2	0.10	0.06	<0.05	0.09
CB	10		<1	<0.05	<0.05	<0.05	<0.05
	15		<1	<0.05	<0.05	<0.05	<0.05
	20		1900	12	80	26	150
	25		9	1.3	0.83	0.05	0.31
CC	10		<1	<0.05	<0.05	<0.05	<0.05
	15		<1	0.22	<0.05	<0.05	<0.05
	20		360	0.75	9.9	4.8	30
	25		290	1.5	8.0	3.1	19
CD	5		<1	<0.05	<0.05	<0.05	<0.05
	10		<1	<0.05	<0.05	<0.05	<0.05
	15		<1	<0.05	<0.05	<0.05	<0.05
	20		3	0.32	0.32	<0.05	0.15
	25		<1	<0.05	<0.05	<0.05	<0.05

TABLE 1
Summary of Soil Analytical Results
301 14th Street Oakland, CA

Sample #	Depth (feet)	Date	TPH-g (ppm)	Benzene (ppm)	Toluene (ppm)	Ethylbenzene (ppm)	Xylenes (ppm)
C-5	15.5	Oct-90	6	0.088	0.30	0.094	0.56
	20.5		3	0.17	0.49	0.071	0.51
CR-1	15.5		1	0.54	0.17	0.059	0.11
	20.5		1200	9.5	56	18	110
C-6	15.5	Apr-91	<1	<0.005	<0.005	<0.005	<0.005
	22.5		<1	<0.005	<0.005	<0.005	<0.005
	25.5		<1	<0.005	<0.005	<0.005	<0.005
C-7	15.5		<1	<0.005	<0.005	<0.005	<0.005
	20.5		<1	<0.005	<0.005	<0.005	<0.005
	24.5		<1	<0.005	<0.005	<0.005	<0.005
C-8	15.5		<1	<0.005	<0.005	<0.005	<0.005
	22.5		<1	<0.005	<0.005	<0.005	<0.005
	25.5		10	<0.005	0.04	0.03	0.1
C-9	15.5		<1	<0.005	<0.005	<0.005	<0.005
	20.5		<1	<0.005	<0.005	<0.005	<0.005
	23.5		<1	<0.005	<0.005	<0.005	<0.005
MW-10	15.5	Jun-92	<1	<0.005	<0.005	<0.005	<0.005
	20.5		<1	<0.005	<0.005	<0.005	<0.005
VEW-1	19		1100	14	56	18	91
VEW-3	10	Mar-93	<1	<0.005	<0.005	<0.005	<0.005
	20		2500	25	120	23	460
MW-11	20	Apr-94	<1	<0.005	<0.005	<0.005	<0.005
MW-12	15		<1	<0.005	<0.005	<0.005	<0.005
	20		5	0.007	0.016	0.011	0.84
SP-1	20.2	Jul-95	3100	13	47	39	28
SP-2	20		1900	15	72	34	220
VEW-4	20.2		<1.0	0.81	0.0078	0.019	0.095
VEW-5	23.7		28	7.0	7.6	0.52	2.4
SP-3	20.2	Sep-95	14000	17	940	270	1800
	35.5		<1.0	0.044	0.065	0.011	0.071

TABLE 1
Summary of Soil Analytical Results
301 14th Street Oakland, CA

Sample #	Depth (feet)	Date	TPH-g (ppm)	Benzene (ppm)	Toluene (ppm)	Ethylbenzene (ppm)	Xylenes (ppm)
SP-4	25.3	Sep-95	9.5	1.8	0.79	0.23	1.0
	30.3		11	0.46	2.0	0.29	2.3
SP-5	19.3		120	<0.25	0.25	0.25	2.0
	24.3		9.9	1.0	1.8	0.16	1.1
SP-6	20.3	Dec-95	6900	96	560	150	940
	25.3		10	1.6	0.75	0.20	1.1
SP-7	20.3		4600	<6.0	120	82	760
	25.3		3.8	<0.005	0.15	0.046	0.86
SP-8	20.7		3600	<6.0	<6.0	<6.0	210
	25.7		<1.0	0.038	0.015	0.0056	0.1
	30.7		<1.0	0.0066	0.029	<0.005	0.034

ppm ≅ mg/kg
< Value = Below detection limit, none detected

APPENDIX B

Cumulative Table of Well Data and Analytical Results

Vertical Measurements are in feet. Volumetric Measurements are in gallons. Analytical results are in parts per billion (ppb)

DATE	Well Head Elev.	Ground Water Elev.	Depth To Water	SPH Thickness	SPH Removed	Total SPH Removed	Notes	TPH-Gasoline	Benzene	Toluene	Ethyl-Benzene	Xylene	MTBE
C-1													
06/13/90	30.82	8.85	21.97	--	--	--	--	26,000	2800	5100	400	2600	--
10/30/90	30.82	9.10	21.72	--	--	--	--	67,000	6700	8700	900	5000	--
01/04/91	30.82	8.98	21.84	--	--	--	--	--	--	--	--	--	--
01/07/91	30.82	8.87	21.95	--	--	--	--	100,000	12,000	20,000	1600	11,000	--
01/11/91	30.82	8.83	21.99	--	--	--	--	--	--	--	--	--	--
02/15/91	30.82	8.70	22.12	--	--	--	--	--	--	--	--	--	--
05/02/91	30.82	8.76	22.06	--	--	--	--	59,000	5600	7700	700	5200	--
05/30/91	30.82	8.78	22.04	--	--	--	--	--	--	--	--	--	--
06/13/91	30.82	9.02	21.80	--	--	--	--	--	--	--	--	--	--
07/12/91	30.82	8.81	22.01	--	--	--	--	--	--	--	--	--	--
08/07/91	30.82	--	--	--	--	--	--	7900	2000	150	240	330	--
09/24/91	30.82	--	--	--	--	--	--	--	--	--	--	--	--
10/18/91	30.87	8.45	22.42	--	--	--	--	--	--	--	--	--	--
11/05/91	30.87	8.51	22.36	--	--	--	--	8700	1500	1200	150	580	--
01/06/92	30.87	8.53	22.34	--	--	--	--	--	--	--	--	--	--
01/16/92	30.87	8.61	22.26	0.03	--	--	--	--	--	--	--	--	--
01/22/92	30.87	8.51	22.43	0.09	--	--	--	--	--	--	--	--	--
01/28/92	30.87	8.61	22.26	0.02	--	--	--	--	--	--	--	--	--
02/04/92	30.87	8.64	22.24	0.01	--	--	--	--	--	--	--	--	--
02/14/92	30.87	8.71	22.16	--	--	--	Sheen	--	--	--	--	--	--
02/21/92	30.87	8.80	22.07	--	--	--	Sheen	--	--	--	--	--	--
02/25/92	30.87	8.92	21.95	--	--	--	Sheen	--	--	--	--	--	--
03/06/92	30.87	9.02	21.85	--	--	--	--	--	--	--	--	--	--
03/19/92	30.87	10.33	20.54	--	--	--	--	--	--	--	--	--	--
05/06/92	30.87	9.48	21.39	--	--	--	Sheen	--	--	--	--	--	--
08/31/92	30.87	9.36	21.51	--	--	--	Sheen	--	--	--	--	--	--
12/01/92	30.87	8.99	21.88	--	--	--	Sheen	--	--	--	--	--	--
03/15/93	32.81	11.91	20.90	--	--	--	--	130,000	8900	13,000	1800	11,000	--
06/08/93	32.81	13.35	19.46	--	--	--	--	23,000	2300	2900	540	3300	--
09/07/93	32.81	12.98	19.83	--	--	--	--	14,000	1300	2100	340	2800	--
03/09/94	32.81	12.71	20.10	--	--	--	--	37,000	2700	3400	930	5900	--
06/17/94	32.81	12.79	20.02	--	--	--	--	24,000	2200	2300	520	3600	--
09/13/94	32.81	11.78	21.03	--	--	--	--	15,000	710	550	330	2000	--
09/26/94	32.81	11.84	20.97	--	--	--	--	--	--	--	--	--	--
11/29/94	32.81	12.39	20.42	--	--	--	--	50,000	3100	5400	1300	7000	--

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Cumulative Table of Well Data and Analytical Results

Vertical Measurements are in feet. Volumetric Measurements are in gallons. Analytical results are in parts per billion (ppb)

DATE	Well Head Elev.	Ground Water Elev.	Depth To Water	SPH Thickness	SPH Removed	Total SPH Removed	Notes	TPH-Gasoline	Benzene	Toluene	Ethyl-Benzene	Xylene	MTBE
C-1 (CONT'D)													
03/29/95	32.81	13.91	18.90	--	--	--	--	43,000	2100	3300	880	5200	--
06/19/95	32.81	14.45	18.36	--	--	--	--	26,000	2000	2000	800	2600	--
09/28/95	32.81	13.79	19.02	--	--	--	--	16,000	470	460	330	1300	--
12/27/95	32.81	12.53	20.28	--	--	--	--	8600	28	39	91	1400	<125
03/26/96	32.81	11.56	21.25	--	--	--	--	960	<2.5	<2.5	<2.5	84	<12
06/20/96	32.81	12.53	20.28	--	--	--	--	370	1.1	<1.0	<1.0	8.2	<5.0
09/30/96	32.81	13.37	19.44	--	--	--	--	340	1.7	<0.5	1.2	1.7	<2.5
12/12/96	32.81	11.56	21.25	--	--	--	--	330	1.2	<0.5	0.68	2.6	<2.5

Cumulative Table of Well Data and Analytical Results

Vertical Measurements are in feet. Volumetric Measurements are in gallons. Analytical results are in parts per billion (ppb)

DATE	Well Head Elev.	Ground Water Elev.	Depth To Water	SPH Thickness	SPH Removed	Total SPH Removed	Notes	TPH-Gasoline	Benzene	Toluene	Ethyl-Benzene	Xylene	MTBE
C-2													
06/13/90	30.91	8.83	22.08	--	--	--	--	15,000	1100	1900	260	1700	--
10/30/90	30.91	9.10	21.81	--	--	--	--	13,000	2800	1900	240	1000	--
01/04/91	30.91	9.01	21.90	--	--	--	--	--	--	--	--	--	--
01/07/91	30.91	8.88	22.03	--	--	--	--	15,000	3400	2500	340	1400	--
01/11/91	30.91	8.78	22.13	--	--	--	--	--	--	--	--	--	--
02/15/91	30.91	8.55	22.36	--	--	--	--	--	--	--	--	--	--
05/02/91	30.91	8.47	22.44	--	--	--	--	19,000	4500	3200	660	2900	--
05/02/91	30.91	8.47	22.44	--	--	--	--	21,000	3200	2200	410	2000	--
05/30/91	30.91	8.47	22.44	--	--	--	--	--	--	--	--	--	--
06/13/91	30.91	--	--	--	--	--	--	--	--	--	--	--	--
07/12/91	30.91	8.35	22.57	0.01	--	--	--	--	--	--	--	--	--
08/07/91	30.91	--	--	0.11	--	--	--	--	--	--	--	--	--
09/24/91	30.91	--	--	--	--	--	--	--	--	--	--	--	--
10/18/91	30.72	8.44	22.34	0.07	--	--	--	--	--	--	--	--	--
11/05/91	30.72	8.49	22.26	0.04	--	--	--	--	--	--	--	--	--
01/06/92	30.72	8.47	22.25	--	--	--	--	--	--	--	--	--	--
01/16/92	30.72	8.57	22.16	0.01	--	--	--	--	--	--	--	--	--
01/22/92	30.72	8.49	22.25	0.02	--	--	--	--	--	--	--	--	--
01/28/92	30.72	8.55	22.18	0.01	--	--	--	--	--	--	--	--	--
02/04/92	30.72	8.58	22.15	0.01	--	--	--	--	--	--	--	--	--
02/14/92	30.72	8.63	22.09	--	--	--	--	--	--	--	--	--	--
02/21/92	30.72	8.66	22.06	--	--	--	Sheen	--	--	--	--	--	--
02/25/92	30.72	8.76	21.96	--	--	--	--	--	--	--	--	--	--
03/06/92	30.72	8.92	21.80	--	--	--	--	--	--	--	--	--	--
03/19/92	30.72	9.60	21.12	--	--	--	--	--	--	--	--	--	--
05/06/92	30.72	9.42	21.30	--	--	--	Sheen	--	--	--	--	--	--
08/31/92	30.72	9.29	21.43	--	--	--	Sheen	--	--	--	--	--	--
12/01/92	30.72	8.98	21.74	--	--	--	Sheen	--	--	--	--	--	--
03/15/93	33.27	12.35	20.92	--	--	--	--	66,000	2200	3900	1300	7300	--
06/08/93	33.27	13.22	20.05	--	--	--	--	23,000	1400	2300	680	4000	--
09/07/93	33.27	12.90	20.37	--	--	--	--	22,000	1900	2000	620	4000	--

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Cumulative Table of Well Data and Analytical Results

Vertical Measurements are in feet. Volumetric Measurements are in gallons. Analytical results are in parts per billion (ppb)

DATE	Well Head Elev.	Ground Water Elev.	Depth To Water	SPH Thickness	SPH Removed	Total SPH Removed	Notes	TPH-Gasoline	Benzene	Toluene	Ethyl-Benzene	Xylene	MTBE
C-2 (CONT'D)													
03/09/94	33.27	12.55	20.72	--	--	--	--	25,000	4100	1100	670	3100	--
06/17/94	33.27	12.66	20.61	--	--	--	--	43,000	13,000	2600	1300	5200	--
09/13/94	33.27	11.58	21.69	--	--	--	--	36,000	7700	2500	1100	4800	--
09/26/94	33.27	11.65	21.62	--	--	--	--	--	--	--	--	--	--
11/29/94	33.27	12.15	21.12	--	--	--	--	39,000	6600	3400	880	5000	--
03/29/95	33.27	13.69	19.58	--	--	--	--	77,000	12,000	4100	2000	13,000	--
06/19/95	33.27	14.29	18.98	--	--	--	--	51,000	7900	560	1200	4100	--
09/28/95	33.27	13.73	19.54	--	--	--	--	51,000	8700	990	1500	3700	--
12/27/95	33.27	12.47	20.80	--	--	--	--	5100	130	64	50	380	<50
03/26/96	33.27	12.12	21.15	--	--	--	--	380	2.6	1.5	<1.0	22	<5.0
06/20/96	33.27	12.87	20.40	--	--	--	--	220	2.4	<0.5	<0.5	2.9	<2.5
09/30/96	33.27	13.40	19.87	--	--	--	--	75	0.51	<0.5	<0.5	0.91	<2.5
12/12/96	33.27	12.05	21.22	--	--	--	--	120	1.3	<0.5	0.56	1.7	<2.5

Cumulative Table of Well Data and Analytical Results

Vertical Measurements are in feet. Volumetric Measurements are in gallons. Analytical results are in parts per billion (ppb)

DATE	Well Head Elev.	Ground Water Elev.	Depth To Water	SPH Thickness	SPH Removed	Total SPH Removed	Notes	TPH-Gasoline	Benzene	Toluene	Ethyl-Benzene	Xylene	MTBE
C-3													
06/13/90	--	--	24.75	3.00	--	--	--	--	--	--	--	--	--
10/30/90	--	--	23.81	2.50	--	--	--	--	--	--	--	--	--
01/04/91	--	--	24.15	2.70	--	--	--	--	--	--	--	--	--
01/07/91	--	--	24.13	2.50	--	--	--	--	--	--	--	--	--
01/11/91	--	--	24.35	2.66	--	--	--	--	--	--	--	--	--
02/15/91	--	--	24.70	2.93	--	--	--	--	--	--	--	--	--
05/02/91	--	--	--	--	--	--	--	--	--	--	--	--	--
05/30/91	--	--	24.08	2.49	--	--	--	--	--	--	--	--	--
06/13/91	--	--	--	--	--	--	--	--	--	--	--	--	--
07/12/91	--	--	--	--	--	--	--	--	--	--	--	--	--
08/07/91	--	--	--	2.64	--	--	--	--	--	--	--	--	--
09/24/91	--	--	--	--	--	--	--	--	--	--	--	--	--
10/18/91	30.79	6.35	24.44	2.50	--	--	--	--	--	--	--	--	--
11/05/91	30.79	--	24.31	2.46	--	--	--	--	--	--	--	--	--
01/06/92	30.79	--	24.25	2.39	--	--	--	--	--	--	--	--	--
01/16/92	30.79	--	24.02	2.39	--	--	--	--	--	--	--	--	--
01/22/92	30.79	--	24.10	2.28	--	--	--	--	--	--	--	--	--
01/28/92	30.79	--	24.06	2.29	--	--	--	--	--	--	--	--	--
02/04/92	30.79	--	24.04	2.31	--	--	--	--	--	--	--	--	--
02/14/92	30.79	--	23.93	2.31	--	--	--	--	--	--	--	--	--
02/21/92	30.79	--	24.61	3.05	--	--	--	--	--	--	--	--	--
02/25/92	30.79	--	23.69	2.23	--	--	--	--	--	--	--	--	--
03/06/92	30.79	--	23.69	2.23	--	--	--	--	--	--	--	--	--
03/19/92	30.79	--	22.98	2.26	--	--	--	--	--	--	--	--	--
05/06/92	30.79	--	22.74	1.93	--	--	--	--	--	--	--	--	--
08/31/92	30.79	--	21.77	1.93	--	--	--	--	--	--	--	--	--
12/01/92	30.79	--	22.63	1.32	--	--	--	--	--	--	--	--	--
03/15/93	33.28	12.52	20.76	--	--	--	--	530,000	69,000	58,000	6000	32,000	--
06/08/93	33.28	13.31	19.97	--	--	--	--	310,000	56,000	58,000	7000	41,000	--
09/07/93	33.28	13.00	20.28	--	--	--	--	160,000	46,000	43,000	3300	24,000	--
09/26/94	33.28	11.66	22.25	0.79	--	--	--	--	--	--	--	--	--
11/29/94	33.28	11.93	22.10	0.94	0.264	0.264	--	--	--	--	--	--	--
12/20/94	33.28	12.48	21.20	0.50	0.300	0.564	--	--	--	--	--	--	--

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Cumulative Table of Well Data and Analytical Results

Vertical Measurements are in feet. Volumetric Measurements are in gallons. Analytical results are in parts per billion (ppb)

DATE	Well Head Elev.	Ground Water Elev.	Depth To Water	SPH Thickness	SPH Removed	Total SPH Removed	Notes	TPH-Gasoline	Benzene	Toluene	Ethyl-Benzene	Xylene	MTBE
C-3 (CONT'D)													
12/28/94	33.28	12.57	20.95	0.30	0.300	0.564	--	--	--	--	--	--	--
01/03/95	33.28	12.63	20.65	--	--	0.564	--	--	--	--	--	--	--
01/10/95	33.28	12.91	20.50	0.16	0.100	0.664	--	--	--	--	--	--	--
01/17/95	33.28	13.14	20.20	0.07	--	0.664	--	--	--	--	--	--	--
01/23/95	33.28	13.28	20.00	--	--	0.664	--	--	--	--	--	--	--
02/07/95	33.28	13.55	19.73	--	--	0.664	--	--	--	--	--	--	--
02/22/95	33.28	13.78	19.50	--	--	0.664	--	--	--	--	--	--	--
03/07/95	33.28	13.78	19.50	--	--	0.664	--	--	--	--	--	--	--
03/29/95	33.28	12.63	22.46	2.26	0.132	0.796	--	--	--	--	--	--	--
03/30/95	33.28	12.24	21.05	0.01	--	0.796	--	--	--	--	--	--	--
04/10/95	33.28	13.95	19.33	--	--	0.796	--	--	--	--	--	--	--
05/07/95	33.28	14.39	18.91	0.02	0.026	0.822	--	--	--	--	--	--	--
05/09/95	33.28	14.34	18.94	--	--	0.822	--	--	--	--	--	--	--
05/12/95	33.28	14.45	18.83	--	--	0.822	--	--	--	--	--	--	--
05/18/95	33.28	14.70	18.68	0.12	0.158	0.980	--	--	--	--	--	--	--
05/26/95	33.28	13.43	19.85	--	--	0.980	--	--	--	--	--	--	--
06/08/95	33.28	13.46	19.82	--	--	0.980	--	--	--	--	--	--	--
06/16/95	33.28	14.46	18.86	0.05	0.026	1.006	--	--	--	--	--	--	--
06/19/95	33.28	14.48	18.82	0.02	0.010	1.016	--	--	--	--	--	--	--
06/29/95	33.28	14.50	18.78	--	--	1.016	--	--	--	--	--	--	--
07/06/95	33.28	14.71	18.57	--	--	1.016	--	--	--	--	--	--	--
07/12/95	33.28	14.69	18.59	--	--	1.016	--	--	--	--	--	--	--
07/22/95	33.28	14.19	19.09	--	--	1.016	--	--	--	--	--	--	--
07/27/95	33.28	14.14	19.14	--	--	1.016	--	--	--	--	--	--	--
08/02/95	33.28	13.37	19.92	0.01	0.010	1.026	--	--	--	--	--	--	--
09/28/95	33.28	13.81	19.47	--	--	1.026	--	280,000	27,000	36,000	3400	30,000	--
12/27/95	33.28	12.65	20.66	0.04	--	1.026	--	--	--	--	--	--	--
03/26/96	33.28	--	--	--	--	--	Inaccessible	--	--	--	--	--	--
04/01/96	33.28	12.42	20.86	--	--	1.026	--	15,000	28	150	35	1500	<125
06/20/96	33.28	12.42	18.48	--	--	1.026	--	9500	<25	<25	<25	620	<125
09/30/96	33.28	13.48	19.80	--	--	1.026	--	3600	14	39	17	330	27
12/12/96	33.28	12.83	20.45	--	--	1.026	--	15,000	100	160	71	1500	<250

Cumulative Table of Well Data and Analytical Results

Vertical Measurements are in feet. Volumetric Measurements are in gallons. Analytical results are in parts per billion (ppb)

DATE	Well Head Elev.	Ground Water Elev.	Depth To Water	SPH Thickness	SPH Removed	Total SPH Removed	Notes	TPH-Gasoline	Benzene	Toluene	Ethyl-Benzene	Xylene	MTBE
C-4													
06/13/90	31.42	8.69	22.73	--	--	--	--	440	47	47	3.0	61	--
10/30/90	31.42	8.94	22.48	--	--	--	--	210	72	13	1.0	11	--
01/04/91	31.42	8.78	22.64	--	--	--	--	--	--	--	--	--	--
01/07/91	31.42	8.68	22.74	--	--	--	--	690	100	130	15	88	--
01/11/91	31.42	8.61	22.81	--	--	--	--	--	--	--	--	--	--
02/15/91	31.42	8.87	22.55	--	--	--	--	--	--	--	--	--	--
05/02/91	31.42	8.88	22.54	--	--	--	--	330	140	11	2.0	9.0	--
05/30/91	31.42	8.87	22.55	--	--	--	--	--	--	--	--	--	--
06/13/91	31.42	--	--	--	--	--	--	--	--	--	--	--	--
07/12/91	31.42	--	--	--	--	--	--	--	--	--	--	--	--
08/07/91	31.42	--	--	--	--	--	--	1500	400	79	13	61	--
09/24/91	31.42	--	--	--	--	--	--	--	--	--	--	--	--
10/16/91	31.20	8.23	22.97	--	--	--	--	--	--	--	--	--	--
11/05/91	31.20	8.30	22.90	--	--	--	--	310	130	11	2.6	6.8	--
01/06/92	31.20	8.36	22.84	--	--	--	--	--	--	--	--	--	--
01/16/92	31.20	8.45	22.75	--	--	--	--	--	--	--	--	--	--
01/22/92	31.20	8.39	22.81	--	--	--	--	--	--	--	--	--	--
01/28/92	31.20	8.43	22.77	--	--	--	--	--	--	--	--	--	--
02/04/92	31.20	8.48	22.72	--	--	--	--	300	100	26	2.4	14	--
02/14/92	31.20	8.62	22.58	--	--	--	--	--	--	--	--	--	--
02/21/92	31.20	8.60	22.60	--	--	--	--	--	--	--	--	--	--
02/25/92	31.20	8.70	22.50	--	--	--	--	--	--	--	--	--	--
03/06/92	31.20	--	--	--	--	--	--	--	--	--	--	--	--
03/19/92	31.20	9.45	21.75	--	--	--	--	--	--	--	--	--	--
05/06/92	31.20	9.38	21.82	--	--	--	--	200	26	<0.5	1.2	1.4	--
08/31/92	31.20	9.32	21.88	--	--	--	--	190	20	1.2	1.7	1.7	--
12/01/92	31.20	8.97	22.23	--	--	--	--	72	5.0	0.5	<0.5	1.3	--
03/15/93	33.85	12.47	33.85	--	--	--	--	84	2.1	0.9	<0.5	<1.5	--
06/08/93	33.85	13.30	20.55	--	--	--	--	74	1.0	<0.5	<0.5	0.5	--
09/07/93	33.85	13.00	20.85	--	--	--	--	<50	1.0	<0.5	<0.5	<0.5	--
03/09/94	33.85	12.69	21.16	--	--	--	--	<50	5.0	4.0	<0.5	4.0	--
06/17/94	33.85	12.77	21.08	--	--	--	--	120	4.3	18	2.8	43	--
09/13/94	33.85	11.95	21.90	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
09/26/94	33.85	11.94	21.91	--	--	--	--	--	--	--	--	--	--
11/29/94	33.85	12.25	21.60	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--

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Cumulative Table of Well Data and Analytical Results

Vertical Measurements are in feet. Volumetric Measurements are in gallons. Analytical results are in parts per billion (ppb)

DATE	Well Head Elev.	Ground Water Elev.	Depth To Water	SPH Thickness	SPH Removed	Total SPH Removed	Notes	TPH-Gasoline	Benzene	Toluene	Ethyl-Benzene	Xylene	MTBE
C-4 (CONT'D)													
03/29/95	33.85	13.47	20.38	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
06/19/95	33.85	14.47	19.38	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
09/28/95	33.85	13.88	19.97	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
12/27/95	33.85	12.71	21.14	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	<2.5
03/26/96	33.85	13.27	20.58	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	<2.5
06/20/96	33.85	14.25	19.60	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	<2.5
09/30/96	33.85	13.65	20.20	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	<2.5
12/12/96	33.85	13.34	20.51	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	<2.5

Cumulative Table of Well Data and Analytical Results

Vertical Measurements are in feet. Volumetric Measurements are in gallons. Analytical results are in parts per billion (ppb)

DATE	Well Head Elev.	Ground Water Elev.	Depth To Water	SPH Thickness	SPH Removed	Total SPH Removed	Notes	TPH-Gasoline	Benzene	Toluene	Ethyl-Benzene	Xylene	MTBE
C-5													
10/30/90	31.25	9.14	22.11	--	--	--	--	20,000	2500	3300	320	2200	--
01/04/91	31.25	--	22.55	0.31	--	--	--	--	--	--	--	--	--
01/07/91	31.25	9.26	22.36	0.04	--	--	--	--	--	--	--	--	--
01/11/91	31.25	--	23.08	0.73	--	--	--	--	--	--	--	--	--
02/15/91	31.25	--	24.70	2.74	--	--	--	--	--	--	--	--	--
05/02/91	31.25	--	22.02	2.00	--	--	--	--	--	--	--	--	--
05/30/91	31.25	--	24.78	2.70	--	--	--	--	--	--	--	--	--
06/13/91	31.25	--	24.70	2.77	--	--	--	--	--	--	--	--	--
07/12/91	31.25	--	25.10	2.72	--	--	--	--	--	--	--	--	--
08/07/91	31.25	--	--	2.69	--	--	--	--	--	--	--	--	--
09/24/91	31.25	--	--	--	--	--	--	--	--	--	--	--	--
10/18/91	30.16	--	24.71	2.51	--	--	--	--	--	--	--	--	--
11/05/91	30.16	--	24.47	2.29	--	--	--	--	--	--	--	--	--
01/06/92	30.16	--	24.68	--	--	--	--	--	--	--	--	--	--
01/16/92	30.16	--	24.03	1.82	--	--	--	--	--	--	--	--	--
01/22/92	30.16	--	24.01	1.67	--	--	--	--	--	--	--	--	--
01/28/92	30.16	--	23.79	1.46	--	--	--	--	--	--	--	--	--
02/04/92	30.16	--	23.81	1.54	--	--	--	--	--	--	--	--	--
02/14/92	30.16	--	22.79	1.59	--	--	--	--	--	--	--	--	--
02/21/92	30.16	--	24.40	2.22	--	--	--	--	--	--	--	--	--
02/25/92	30.16	--	23.25	1.03	--	--	--	--	--	--	--	--	--
03/06/92	30.16	--	23.20	1.19	--	--	--	--	--	--	--	--	--
03/19/92	30.16	--	--	--	--	--	--	--	--	--	--	--	--
05/06/92	30.16	--	--	--	--	--	--	--	--	--	--	--	--
08/31/92	30.16	--	21.86	--	--	--	Sheen	--	--	--	--	--	--
12/01/92	30.16	--	22.24	--	--	--	Sheen	--	--	--	--	--	--
03/15/93	33.85	20.96	20.96	--	--	--	--	--	--	--	--	--	--
06/08/93	33.85	13.20	20.65	--	--	--	--	90,000	26,000	11,000	2000	16,000	--
09/07/93	33.85	--	--	--	--	--	--	--	--	--	--	--	--
03/09/94	33.85	12.53	21.32	--	--	--	--	170,000	35,000	11,000	2400	13,000	--
06/17/94	33.85	12.74	21.11	--	--	--	--	100,000	57,000	13,000	1800	5,100	--
~~09/13/94~~	~~33.85~~	~~11.37~~	~~22.48~~	--	--	--	--	~~120,000~~	~~1500~~	~~5400~~	~~1700~~	~~19,000~~	--
09/26/94	33.85	11.41	22.44	--	--	--	--	--	--	--	--	--	--
11/29/94	33.85	12.00	21.85	--	--	--	--	31,000	29	220	290	3600	--

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Cumulative Table of Well Data and Analytical Results

Vertical Measurements are in feet. Volumetric Measurements are in gallons. Analytical results are in parts per billion (ppb)

DATE	Well Head Elev.	Ground Water Elev.	Depth To Water	SPH Thickness	SPH Removed	Total SPH Removed	Notes	TPH-Gasoline	Benzene	Toluene	Ethyl-Benzene	Xylene	MTBE
C-5 (CONT'D)													
03/29/95	33.85	13.47	20.38	--	--	--	--	9300	730	420	68	1000	--
06/19/95	33.85	14.35	19.50	--	--	--	--	17,000	900	510	88	1500	--
09/28/95	33.85	13.72	20.13	--	--	--	--	29,000	3700	1600	180	2300	--
12/27/95	33.85	12.48	21.37	--	--	--	--	1200	20	37	13	160	62
03/26/96	33.85	13.16	20.69	--	--	--	--	650	1.2	0.51	<0.5	19	<2.5
06/20/96	33.85	12.50	21.35	--	--	--	--	<50	<0.5	<0.5	<0.5	1.9	<2.5
09/30/96	33.85	13.35	20.50	--	--	--	--	<50	<0.5	<0.5	<0.5	1.0	<2.5
12/12/96	33.85	11.83	22.02	--	--	--	--	90	3.0	<0.5	<0.5	1.7	<2.5

Cumulative Table of Well Data and Analytical Results

Vertical Measurements are in feet. Volumetric Measurements are in gallons. Analytical results are in parts per billion (ppb)

DATE	Well Head Elev.	Ground Water Elev.	Depth To Water	SPH Thickness	SPH Removed	Total SPH Removed	Notes	TPH-Gasoline	Benzene	Toluene	Ethyl-Benzene	Xylene	MTBE
C-6													
05/02/91	30.41	8.57	21.84	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
05/30/91	30.41	--	--	--	--	--	--	--	--	--	--	--	--
07/12/91	30.41	7.55	22.86	--	--	--	--	--	--	--	--	--	--
08/07/91	30.41	--	--	--	--	--	--	--	--	--	--	--	--
09/24/91	30.41	8.53	21.88	--	--	--	--	--	--	--	--	--	--
10/18/91	30.41	8.23	22.18	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
11/05/91	30.41	8.27	22.14	--	--	--	--	--	--	--	--	--	--
01/06/92	30.41	8.32	22.09	--	--	--	--	--	--	--	--	--	--
01/16/92	30.41	8.37	22.04	--	--	--	--	--	--	--	--	--	--
01/22/92	30.41	8.37	22.04	--	--	--	--	--	--	--	--	--	--
01/28/92	30.41	8.42	21.99	--	--	--	--	<50	<0.5	<0.5	<0.5	0.6	--
02/04/92	30.41	8.47	21.94	--	--	--	--	--	--	--	--	--	--
02/14/92	30.41	8.54	21.87	--	--	--	--	--	--	--	--	--	--
02/21/92	30.41	8.58	21.83	--	--	--	--	--	--	--	--	--	--
02/25/92	30.41	8.70	21.71	--	--	--	--	--	--	--	--	--	--
03/06/92	30.41	8.88	21.53	--	--	--	--	--	--	--	--	--	--
03/19/92	30.41	9.49	20.92	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
05/06/92	30.41	9.39	21.02	--	--	--	--	80	<0.5	<0.5	<0.5	2.4	--
08/31/92	30.41	9.27	21.14	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
01/21/93	30.41	9.50	20.91	--	--	--	--	<50	<0.5	<0.5	<0.5	<1.5	--
03/15/93	33.09	13.09	20.00	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
06/08/93	33.09	13.37	19.72	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
09/07/93	33.09	13.34	19.75	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
03/09/94	33.09	12.79	20.30	--	--	--	--	<50	1.1	<0.5	<0.5	0.6	--
06/17/94	33.09	12.88	20.21	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
09/13/94	33.09	12.20	20.89	--	--	--	--	--	--	--	--	--	--
09/26/94	33.09	12.15	20.94	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
11/29/94	33.09	12.61	20.48	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
03/29/95	33.09	13.97	19.12	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
06/19/95	33.09	14.55	18.54	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	<2.5
09/28/95	33.09	14.03	19.06	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	<2.5
12/27/95	33.09	12.89	20.20	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	<2.5
03/26/96	33.09	13.32	19.77	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	<2.5
06/20/96	33.09	14.19	18.90	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	<2.5
09/30/96	33.09	13.62	19.47	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	<2.5
12/12/96	33.09	13.37	19.72	--	--	--	--						

Cumulative Table of Well Data and Analytical Results

Vertical Measurements are in feet. Volumetric Measurements are in gallons. Analytical results are in parts per billion (ppb)

DATE	Well Head Elev.	Ground Water Elev.	Depth To Water	SPH Thickness	SPH Removed	Total SPH Removed	Notes	TPH-Gasoline	Benzene	Toluene	Ethyl-Benzene	Xylene	MTBE
C-7													
05/02/91	30.56	8.75	21.81	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
05/30/91	30.56	--	--	--	--	--	--	--	--	--	--	--	--
07/12/91	30.56	8.41	22.15	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
08/07/91	30.56	--	--	--	--	--	--	--	--	--	--	--	--
09/24/91	30.56	9.03	21.53	--	--	--	--	--	--	--	--	--	--
10/18/91	30.56	8.49	22.07	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
11/05/91	30.56	8.55	22.01	--	--	--	--	--	--	--	--	--	--
01/06/92	30.56	8.53	22.03	--	--	--	--	--	--	--	--	--	--
01/16/92	30.56	8.58	21.98	--	--	--	--	--	--	--	--	--	--
01/22/92	30.56	8.51	22.05	--	--	--	--	--	--	--	--	--	--
01/28/92	30.56	8.55	22.01	--	--	--	--	--	--	--	--	--	--
02/14/92	30.56	8.62	21.94	--	--	--	--	--	--	--	--	--	--
02/21/92	30.56	8.62	21.94	--	--	--	--	--	--	--	--	--	--
02/25/92	30.56	8.74	21.82	--	--	--	--	--	--	--	--	--	--
03/06/92	30.56	8.91	21.65	--	--	--	--	--	--	--	--	--	--
03/19/92	30.56	9.64	20.92	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
05/06/92	30.56	9.35	21.21	--	--	--	--	<50	<0.5	0.7	<0.5	0.9	--
08/31/92	30.56	9.17	21.39	--	--	--	--	<50	<0.5	<0.5	<0.5	0.9	--
12/01/92	30.56	8.77	21.79	--	--	--	--	<50	<0.5	<0.5	<0.5	<1.5	--
03/15/93	33.06	12.12	20.94	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
06/08/93	33.06	13.07	19.99	--	--	--	--	2800	63	36	41	40	--
09/07/93	33.06	13.06	20.00	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
03/09/94	33.06	12.36	20.70	--	--	--	--	<50	<0.5	<0.5	<0.5	0.6	--
06/17/94	33.06	12.47	20.59	--	--	--	--	65	<0.5	<0.5	<0.5	<0.5	--
09/13/94	33.06	11.83	21.23	--	--	--	--	--	--	--	--	--	--
09/26/94	33.06	11.84	21.22	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
11/29/94	33.06	13.28	19.78	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
03/29/95	33.06	13.67	19.39	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
06/19/95	33.06	14.13	18.93	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
09/28/95	33.06	13.54	19.52	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	<2.5
12/27/95	33.06	10.38	22.68	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	<2.5
03/26/96	33.06	12.81	20.25	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	<2.5
06/20/96	33.06	13.71	19.35	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	<2.5
09/30/96	33.06	13.20	19.86	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	<2.5
12/12/96	33.06	12.75	20.31	--	--	--	--						

Cumulative Table of Well Data and Analytical Results

Vertical Measurements are in feet. Volumetric Measurements are in gallons. Analytical results are in parts per billion (ppb)

DATE	Well Head Elev.	Ground Water Elev.	Depth To Water	SPH Thickness	SPH Removed	Total SPH Removed	Notes	TPH-Gasoline	Benzene	Toluene	Ethyl-Benzene	Xylenes	MTBE
C-8													
05/02/91	30.12	8.88	21.24	--	--	--	--	5000	<0.5	17	140	470	--
05/30/91	30.12	--	--	--	--	--	--	--	--	--	--	--	--
07/12/91	30.12	--	--	--	--	--	--	--	--	--	--	--	--
08/07/91	30.12	--	--	--	--	--	--	6300	<0.5	28	100	120	--
09/24/91	30.12	8.79	21.33	--	--	--	--	--	--	--	--	--	--
10/18/91	30.12	8.36	21.76	--	--	--	--	--	--	--	--	--	--
11/05/91	30.12	8.42	21.70	--	--	--	--	5100	<0.5	20	92	74	--
01/06/92	30.12	8.39	21.73	--	--	--	--	--	--	--	--	--	--
01/16/92	30.12	8.49	21.63	--	--	--	--	--	--	--	--	--	--
01/22/92	30.12	8.42	21.70	--	--	--	--	--	--	--	--	--	--
01/28/92	30.12	8.47	21.65	--	--	--	--	--	--	--	--	--	--
02/04/92	30.12	8.50	21.62	--	--	--	--	5300	<2.5	2.5	97	61	--
02/14/92	30.12	8.59	21.53	--	--	--	--	--	--	--	--	--	--
02/21/92	30.12	8.61	21.51	--	--	--	--	--	--	--	--	--	--
02/25/92	30.12	8.73	21.39	--	--	--	--	--	--	--	--	--	--
03/06/92	30.12	8.91	21.21	--	--	--	--	--	--	--	--	--	--
03/19/92	30.12	9.55	20.57	--	--	--	--	--	--	--	--	--	--
05/06/92	30.12	9.35	20.77	--	--	--	--	3700	<0.5	29	110	130	--
08/31/92	30.12	9.21	20.91	--	--	--	--	1100	1.3	2.0	31	48	--
12/01/92	30.12	8.95	21.17	--	--	--	--	3400	<0.5	19	140	290	--
03/15/93	32.77	13.01	19.76	--	--	--	--	4200	<0.5	20	54	33	--
06/08/93	32.77	13.39	19.38	--	--	--	--	3700	53	6.0	74	120	--
09/07/93	32.77	13.39	19.38	--	--	--	--	2900	70	46	39	55	--
03/09/94	32.77	12.65	20.12	--	--	--	--	3400	<0.5	6.0	46	66	--
06/17/94	32.77	12.75	20.02	--	--	--	--	4200	1.0	39	75	86	--
09/13/94	32.77	12.18	20.59	--	--	--	--	3800	<0.5	10	63	79	--
09/26/94	32.77	12.17	20.60	--	--	--	--	--	--	--	--	--	--
11/29/94	32.77	12.61	20.16	--	--	--	--	5300	<10	40	37	39	--
03/29/95	32.77	14.18	18.59	--	--	--	--	7300	<5.0	<5.0	38	67	--
06/19/95	32.77	13.42	19.35	--	--	--	--	5700	37	<10	<10	<10	--
09/28/95	32.77	13.75	19.02	--	--	--	--	12,000	<10	<10	<10	85	--
12/27/95	32.77	12.77	20.00	--	--	--	--	8200	<50	<50	<50	92	390
03/26/96	32.77	13.19	19.58	--	--	--	--	4500	<10	<10	10	<10	<50
06/20/96	32.77	13.97	18.80	--	--	--	--	4900	<5.0	7.8	6.6	<5.0	<25
09/30/96	32.77	13.43	19.34	--	--	--	--	3900	39	6.5	<5.0	5.9	<25
12/12/96	32.77	13.07	19.70	--	--	--	--	3500	58	51	22	48	<50

Cumulative Table of Well Data and Analytical Results

Vertical Measurements are in feet. Volumetric Measurements are in gallons. Analytical results are in parts per billion (ppb)

DATE	Well Head Elev.	Ground Water Elev.	Depth To Water	SPH Thickness	SPH Removed	Total SPH Removed	Notes	TPH-Gasoline	Benzene	Toluene	Ethyl-Benzene	Xylene	MTBE
C-9													
05/02/91	30.15	8.88	21.27	--	--	--	--	<50	<0.5	<0.5	<0.5	0.8	--
05/30/91	30.15	--	--	--	--	--	--	--	--	--	--	--	--
07/12/91	30.15	8.58	21.57	--	--	--	--	--	--	--	--	--	--
08/07/91	30.15	--	--	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
08/07/91	30.15	--	--	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
09/24/91	30.15	9.05	21.10	--	--	--	--	--	--	--	--	--	--
10/18/91	30.15	8.48	21.67	--	--	--	--	--	--	--	--	--	--
11/05/91	30.15	8.50	21.65	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
11/05/91	30.15	8.50	21.65	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
01/06/92	30.15	8.50	21.65	--	--	--	--	--	--	--	--	--	--
01/16/92	30.15	8.57	21.58	--	--	--	--	--	--	--	--	--	--
01/22/92	30.15	8.50	21.65	--	--	--	--	--	--	--	--	--	--
01/28/92	30.15	8.52	21.63	--	--	--	--	--	--	--	--	--	--
02/04/92	30.15	8.57	21.58	--	--	--	--	<50	<0.5	0.7	<0.5	0.7	--
02/04/92	30.15	8.57	21.58	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
02/14/92	30.15	8.61	21.54	--	--	--	--	--	--	--	--	--	--
02/21/92	30.15	8.63	21.52	--	--	--	--	--	--	--	--	--	--
02/25/92	30.15	8.76	21.39	--	--	--	--	--	--	--	--	--	--
03/06/92	30.15	8.94	21.21	--	--	--	--	--	--	--	--	--	--
03/19/92	30.15	9.68	20.47	--	--	--	--	--	--	--	--	<0.5	--
05/06/92	30.15	9.34	20.81	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
08/31/92	30.15	9.18	20.97	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
12/01/92	30.15	8.88	21.27	--	--	--	--	<50	<0.5	<0.5	<0.5	<1.5	--
03/15/93	32.70	12.28	20.42	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
06/08/93	32.70	13.27	19.43	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
09/07/93	32.70	13.30	19.40	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
03/09/94	32.70	12.46	20.24	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
06/17/94	32.70	12.57	20.13	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
09/13/94	32.70	12.02	20.68	--	--	--	--	--	--	--	--	--	--
09/26/94	32.70	12.03	20.67	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
11/29/94	32.70	12.46	20.24	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
03/29/95	32.70	14.00	18.70	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
06/19/95	32.70	14.22	18.48	--	--	--	--	--	--	--	--	--	--
09/28/95	32.70	--	--	--	--	--	--	--	--	--	--	--	--
12/27/95	32.70	--	--	--	--	--	--	--	--	--	--	--	--

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Cumulative Table of Well Data and Analytical Results

Vertical Measurements are in feet. Volumetric Measurements are in gallons. Analytical results are in parts per billion (ppb)

DATE	Well Head Elev.	Ground Water Elev.	Depth To Water	SPH Thickness	SPH Removed	Total SPH Removed	Notes	TPH-Gasoline	Benzene	Toluene	Ethyl-Benzene	Xylenes	MTBE
C-9 (CONT'D)													
03/26/96	32.70	12.97	19.73	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	<2.5
06/20/96	32.70	13.75	18.95	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	<2.5
09/30/96	32.70	13.22	19.48	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	<2.5
12/12/96	32.70	12.85	19.85	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	<2.5

Cumulative Table of Well Data and Analytical Results

Vertical Measurements are in feet. Volumetric Measurements are in gallons. Analytical results are in parts per billion (ppb)

DATE	Well Head Elev.	Ground Water Elev.	Depth To Water	SPH Thickness	SPH Removed	Total SPH Removed	Notes	TPH-Gasoline	Benzene	Toluene	Ethyl-Benzene	Xylene	MTBE
CR-1 (CONT'D)													
12/20/94	33.40	12.49	21.62	0.89	2.000	2.264	--	--	--	--	--	--	--
12/28/94	33.40	12.58	21.29	0.59	0.500	2.764	--	--	--	--	--	--	--
01/03/95	33.40	12.62	21.12	0.42	0.800	3.564	--	--	--	--	--	--	--
01/10/95	33.40	12.96	20.74	0.38	0.500	4.064	--	--	--	--	--	--	--
01/17/95	33.40	13.02	20.45	0.09	--	4.064	--	--	--	--	--	--	--
01/23/95	33.40	14.00	19.40	--	--	4.064	--	--	--	--	--	--	--
02/07/95	33.40	13.53	19.91	0.05	0.300	4.364	--	--	--	--	--	--	--
02/22/95	33.40	13.78	19.62	--	--	4.364	--	--	--	--	--	--	--
03/07/95	33.40	13.68	19.72	--	--	4.364	--	--	--	--	--	--	--
03/29/95	33.40	10.22	23.32	0.17	0.026	4.390	--	--	--	--	--	--	--
03/30/95	33.40	7.39	26.01	--	--	4.390	--	--	--	--	--	--	--
04/10/95	33.40	14.01	19.39	--	--	4.390	--	--	--	--	--	--	--
05/07/95	33.40	14.37	19.03	--	--	4.390	--	--	--	--	--	--	--
05/09/95	33.40	14.25	19.15	--	--	4.390	--	--	--	--	--	--	--
05/12/95	33.40	14.28	19.12	--	--	4.390	--	--	--	--	--	--	--
05/18/95	33.40	14.41	19.03	0.05	0.264	4.654	--	--	--	--	--	--	--
05/26/95	33.40	14.35	19.05	--	--	4.654	--	--	--	--	--	--	--
06/08/95	33.40	14.24	19.16	--	--	4.654	--	--	--	--	--	--	--
06/16/95	33.40	14.48	18.94	0.02	0.021	4.675	--	--	--	--	--	--	--
06/19/95	33.40	14.46	18.95	0.01	0.010	4.685	--	--	--	--	--	--	--
06/29/95	33.40	14.50	18.90	--	--	4.685	--	--	--	--	--	--	--
07/06/95	33.40	14.72	18.68	--	--	4.685	--	--	--	--	--	--	--
07/12/95	33.40	14.69	18.71	--	--	4.685	--	--	--	--	--	--	--
07/22/95	33.40	13.85	19.56	0.01	0.010	4.695	--	--	--	--	--	--	--
07/27/95	33.40	14.17	19.23	--	--	4.695	--	--	--	--	--	--	--
08/02/95	33.40	13.42	20.00	0.02	0.010	4.705	--	70,000	12,000	10,000	910	5300	--
09/28/95	33.40	13.64	19.76	--	--	4.705	--	--	--	--	--	--	--
12/27/95	33.40	12.63	20.79	0.02	--	4.705	--	15,000	280	650	130	1700	<125
03/26/96	33.40	12.05	21.35	--	--	4.705	--	9900	570	1000	230	2300	60
06/20/96	33.40	12.98	20.42	--	--	4.705	--	3600	200	180	52	480	<50
09/30/96	33.40	12.46	20.94	--	--	4.705	--	21,000	850	1400	500	4200	<125
12/12/96	33.40	12.79	20.61	--	--	4.705	--						

Cumulative Table of Well Data and Analytical Results

Vertical Measurements are in feet. Volumetric Measurements are in gallons. Analytical results are in parts per billion (ppb)

DATE	Well Head Elev.	Ground Water Elev.	Depth To Water	SPH Thickness	SPH Removed	Total SPH Removed	Notes	TPH-Gasoline	Benzene	Toluene	Ethyl-Benzene	Xylene	MTBE
CR-1								--	--	--	--	--	--
10/30/90	30.17	--	23.81	2.50	--	--	--	--	--	--	--	--	--
01/04/91	30.17	--	24.08	2.70	--	--	--	--	--	--	--	--	--
01/07/91	30.17	--	23.30	3.00	--	--	--	--	--	--	--	--	--
01/11/91	30.17	--	24.24	2.64	--	--	--	--	--	--	--	--	--
02/15/91	30.17	--	24.72	2.92	--	--	--	--	--	--	--	--	--
05/02/91	30.17	--	--	--	--	--	--	--	--	--	--	--	--
05/30/91	30.17	--	23.07	2.42	--	--	--	--	--	--	--	--	--
06/13/91	30.17	--	--	--	--	--	--	--	--	--	--	--	--
07/12/91	30.17	--	--	--	--	--	--	--	--	--	--	--	--
08/07/91	30.17	--	--	2.69	--	--	--	--	--	--	--	--	--
09/24/91	30.17	--	--	--	--	--	--	--	--	--	--	--	--
10/16/91	30.17	--	23.75	2.50	--	--	--	--	--	--	--	--	--
11/05/91	30.17	--	23.64	2.43	--	--	--	--	--	--	--	--	--
01/06/92	30.17	--	23.57	--	--	--	--	--	--	--	--	--	--
01/16/92	30.17	--	23.41	2.30	--	--	--	--	--	--	--	--	--
01/22/92	30.17	--	23.44	2.24	--	--	--	--	--	--	--	--	--
01/28/92	30.17	--	23.40	2.29	--	--	--	--	--	--	--	--	--
02/14/92	30.17	--	23.31	2.34	--	--	--	--	--	--	--	--	--
02/21/92	30.17	--	24.10	3.19	--	--	--	--	--	--	--	--	--
02/25/92	30.17	--	23.15	1.03	--	--	--	--	--	--	--	--	--
03/06/92	30.17	--	--	--	--	--	--	--	--	--	--	--	--
03/19/92	30.17	--	--	--	--	--	--	--	--	--	--	--	--
05/06/92	30.17	--	--	--	--	--	--	--	--	--	--	--	--
08/31/92	30.17	--	21.84	0.41	--	--	--	--	--	--	--	--	--
12/01/92	30.17	--	22.06	0.21	--	--	--	410,000	28,000	42,000	5200	37,000	--
03/15/93	33.40	--	20.34	--	--	--	--	85,000	10,000	21,000	3200	20,000	--
06/08/93	33.40	13.33	20.07	--	--	--	--	180,000	50,000	48,000	5100	33,000	--
09/07/93	33.40	13.33	20.07	--	--	--	--	94,000	18,000	20,000	2500	19,000	--
03/09/94	33.40	12.73	20.67	--	--	--	--	26,000	2400	3600	480	6100	--
06/17/94	33.40	13.75	19.65	--	--	--	--	--	--	--	--	--	--
09/13/94	33.40	--	--	--	--	--	Inaccessible	--	--	--	--	--	--
09/26/94	33.40	--	--	--	--	--	--	--	--	--	--	--	--
11/29/94	33.40	8.56	24.90	0.08	0.264	0.264	--	--	--	--	--	--	--

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Cumulative Table of Well Data and Analytical Results

Vertical Measurements are in feet. Volumetric Measurements are in gallons. Analytical results are in parts per billion (ppb)

DATE	Well Head Elev.	Ground Water Elev.	Depth To Water	SPH Thickness	SPH Removed	Total SPH Removed	Notes	TPH-Gasoline	Benzene	Toluene	Ethyl-Benzene	Xylene	MTBE
MW-10													
01/21/93	31.59	10.32	21.27	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
03/15/93	31.59	12.18	21.10	--	--	--	--	<50	<0.5	<0.5	<0.5	<1.5	--
06/08/93	33.28	13.33	19.95	--	--	--	--	<50	<0.5	<0.5	<0.5	1.0	--
09/07/93	33.28	13.35	19.93	--	--	--	--	<250	<2.5	<2.5	<2.5	<2.5	--
03/09/94	33.28	12.77	20.51	--	--	--	--	<50	1.0	0.5	<0.5	0.9	--
06/17/94	33.28	12.86	20.42	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
09/13/94	33.28	12.19	21.09	--	--	--	--	<50	2.1	0.7	<0.5	1.1	--
09/26/94	33.28	12.18	21.10	--	--	--	--	--	--	--	--	--	--
11/29/94	33.28	12.54	20.74	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
03/29/95	33.28	13.88	19.40	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
06/19/95	33.28	14.56	18.72	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
09/28/95	33.28	14.00	19.28	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
12/27/95	33.28	13.03	20.25	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	<2.5
03/26/96	33.28	13.52	19.76	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	<2.5
06/20/96	33.28	14.30	18.98	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	<2.5
09/30/96	33.28	13.73	19.55	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	<2.5
12/12/96	33.28	13.46	19.82	--	--	--	--						

Cumulative Table of Well Data and Analytical Results

Vertical Measurements are in feet. Volumetric Measurements are in gallons. Analytical results are in parts per billion (ppb)

DATE	Well Head Elev.	Ground Water Elev.	Depth To Water	SPH Thickness	SPH Removed	Total SPH Removed	Notes	TPH-Gasoline	Benzene	Toluene	Ethyl-Benzene	Xylene	MTBE
MW-11													
05/06/94	33.02	--	--	--	--	--	--	<50	1.4	<0.5	<0.5	0.6	--
05/16/94	33.02	12.44	20.58	--	--	--	--	--	--	--	--	--	--
09/13/94	33.02	--	--	--	--	--	--	--	--	--	--	--	--
09/26/94	33.02	11.93	21.09	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
11/29/94	33.02	12.20	20.82	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
03/29/95	33.02	13.62	19.40	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
06/19/95	33.02	14.10	18.92	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
09/28/95	33.02	13.55	19.47	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
12/27/95	33.02	12.52	20.50	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	<2.5
03/26/96	33.02	12.84	20.18	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	<2.5
06/20/96	33.02	13.76	19.26	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	<2.5
09/30/96	33.02	13.54	19.48	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	<2.5
12/12/96	33.02	12.78	20.24	--	--	--	--						
MW-12													
05/06/94	33.90	--	--	--	--	--	--	160,000	69,000	16,000	1900	7600	--
05/16/94	33.90	12.63	21.27	--	--	--	--	--	--	--	--	--	--
09/13/94	33.90	--	--	--	--	--	--	--	--	--	--	--	--
09/26/94	33.90	--	--	--	--	--	--	--	--	--	--	--	--
11/29/94	33.90	12.80	21.10	--	--	--	--	41,000	9100	3500	520	1500	--
03/29/95	33.90	14.30	19.60	--	--	--	--	16,000	4000	1000	230	840	--
06/19/95	33.90	15.07	18.83	--	--	--	--	76,000	26,000	4200	1300	3400	--
09/28/95	33.90	14.11	19.79	--	--	--	--	53,000	26,000	720	820	590	--
12/27/95	33.90	13.25	20.65	--	--	--	--	4800	150	130	29	910	<25
03/26/96	33.90	13.89	20.01	--	--	--	--	89	0.86	<0.5	<0.5	9.3	<2.5
06/20/96	33.90	14.12	19.78	--	--	--	--	<50	<0.5	<0.5	<0.5	0.86	<2.5
09/30/96	33.90	13.63	20.27	--	--	--	--	<50	0.52	<0.5	<0.5	<0.5	<2.5
12/12/96	33.90	13.40	20.50	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	<2.5

Cumulative Table of Well Data and Analytical Results

Vertical Measurements are in feet. Volumetric Measurements are in gallons. Analytical results are in parts per billion (ppb)

DATE	Well Head Elev.	Ground Water Elev.	Depth To Water	SPH Thickness	SPH Removed	Total SPH Removed	Notes	TPH-Gasoline	Benzene	Toluene	Ethyl-Benzene	Xylene	MTBE
VEW-3													
12/20/94	--	--	20.43	--	--	--	--	--	--	--	--	--	--
12/28/94	--	--	21.73	1.32	2.000	2.000	--	--	--	--	--	--	--
01/03/95	--	--	21.07	0.50	1.500	3.500	--	--	--	--	--	--	--
01/10/95	--	--	20.55	0.27	0.300	3.800	--	--	--	--	--	--	--
01/17/95	--	--	20.21	0.26	0.300	4.100	--	--	--	--	--	--	--
01/23/95	--	--	20.10	--	--	--	--	--	--	--	--	--	--
02/07/95	--	--	19.92	0.23	0.300	4.400	--	--	--	--	--	--	--
02/22/95	--	--	19.59	0.16	0.100	4.500	--	--	--	--	--	--	--
03/07/95	--	--	19.47	0.12	0.100	4.600	--	--	--	--	--	--	--
03/30/95	--	--	19.85	--	--	--	--	--	--	--	--	--	--
04/10/95	--	--	19.31	0.07	0.100	4.700	--	--	--	--	--	--	--
05/07/95	--	--	19.00	0.07	0.317	5.017	--	--	--	--	--	--	--
05/09/95	--	--	19.04	0.04	0.005	5.022	--	--	--	--	--	--	--
05/12/95	--	--	18.80	0.04	0.008	5.030	--	--	--	--	--	--	--
05/18/95	--	--	19.27	0.04	0.264	5.294	--	--	--	--	--	--	--
05/26/95	--	--	19.02	0.02	0.005	5.299	--	--	--	--	--	--	--
06/08/95	--	--	18.94	0.05	0.040	5.339	--	--	--	--	--	--	--
06/16/95	--	--	19.00	0.04	0.021	5.360	--	--	--	--	--	--	--
06/19/95	--	--	19.00	0.02	0.010	5.370	--	--	--	--	--	--	--
06/29/95	--	--	19.03	--	--	5.370	--	--	--	--	--	--	--
07/06/95	--	--	18.81	--	--	5.370	--	--	--	--	--	--	--
07/12/95	--	--	19.12	0.01	0.026	5.396	--	--	--	--	--	--	--
07/22/95	--	--	19.09	--	--	5.396	--	--	--	--	--	--	--
07/27/95	--	--	19.10	--	--	5.396	--	--	--	--	--	--	--
08/02/95	--	--	19.99	0.02	0.020	5.416	--	--	--	--	--	--	--
09/28/95	--	--	19.38	--	--	5.416	--	--	--	--	--	--	--
12/27/95	--	--	20.74	0.02	--	5.416	--	--	--	--	--	--	--
03/26/96	--	--	21.04	--	--	5.416	--	--	--	--	--	--	--
06/20/96	--	--	20.32	--	--	5.416	--	--	--	--	--	--	--
09/30/96	--	--	20.87	--	--	5.416	--	--	--	--	--	--	--
12/12/96	--	--	20.18	--	--	5.416	--	--	--	--	--	--	--

Cumulative Table of Well Data and Analytical Results

Vertical Measurements are in feet. Volumetric Measurements are in gallons. Analytical results are in parts per billion (ppb)

DATE	Well Head Elev.	Ground Water Elev.	Depth To Water	SPH Thickness	SPH Removed	Total SPH Removed	Notes	TPH-Gasoline	Benzene	Toluene	Ethyl-Benzene	Xylene	MTBE
TRIP BLANK													
05/02/91	--	--	--	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
08/07/91	--	--	--	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
11/05/91	--	--	--	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
02/04/92	--	--	--	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
05/06/92	--	--	--	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
08/31/92	--	--	--	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
12/01/92	--	--	--	--	--	--	--	<50	<0.5	<0.5	<0.5	<1.5	--
03/15/93	--	--	--	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
06/08/93	--	--	--	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
09/07/93	--	--	--	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
03/09/94	--	--	--	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
06/17/94	--	--	--	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
09/13/94	--	--	--	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
09/26/94	--	--	--	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
11/29/94	--	--	--	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
03/29/95	--	--	--	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
06/19/95	--	--	--	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--
09/28/95	--	--	--	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	<2.5
12/27/95	--	--	--	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	<2.5
03/26/96	--	--	--	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	<2.5
06/20/96	--	--	--	--	---	---	--	<50	<0.5	<0.5	<0.5	<0.5	--
09/30/96	--	--	--	--	---	---	--	<50	<0.5	<0.5	<0.5	<0.5	<2.5
12/12/96	--	--	--	--	---	---	--						

Note: Blaine Tech Services, Inc. began routine monitoring of the groundwater wells at this site on November 1, 1994.
Earlier field data and analytical results are drawn from the September 27, 1994 Groundwater Technology, Inc. report.

ABBREVIATIONS:
TPH = Total Petroleum Hydrocarbons
SPH = Separate Phase Hydrocarbons
MTBE = Methyl t-butyl ether

APPENDIX C

RBCA TIER 1/TIER 2 EVALUATION

Output Table 1

Site Name: Former Chevron Station 9-4811 — Site Identification: 30-0220
Site Location: 301 14th Street, Oakland, CA — Date Completed: 8/28/96
Completed By: CMG

Software: GSI RBCA Spreadsheet
Version: v 1 0

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

DEFAULT PARAMETERS

Exposure Parameter	Definition (Units)	Residential Adult	Residential (1-6yrs)	Residential (1-16 yrs)	Commercial/Industrial Chronic	Commercial/Industrial Constrctn
ATc	Averaging time for carcinogens (yr)	70				
ATn	Averaging time for non-carcinogens (yr)	30	6	16	25	1
BW	Body Weight (kg)	70	15	35	70	
ED	Exposure Duration (yr)	30	6	16	25	1
EF	Exposure Frequency (days/yr)	350			250	180
EF Derm	Exposure Frequency for dermal exposure	350			250	
IRgw	Ingestion Rate of Water (l/day)	2			1	
IRs	Ingestion Rate of Soil (mg/day)	100	200		50	100
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	
IRa out	Inhalation rate outdoor (m^3/day)	20			20	10
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				
AAFs	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)	***FALSE***				
gwMCL?	Use MCL as exposure limit in groundwater?	TRUE				

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

Matrix of Receptor Distance and Location on- or off-site		Residential Distance	Residential On-Site	Commercial/Industrial Distance	Commercial/Industrial On-Site
GW	Groundwater receptor (cm)	6 1E+04	FALSE	6.1E+04	FALSE
S	Inhalation receptor (cm)		FALSE		FALSE

Matrix of Target Risks		Individual	Cumulative
TRab	Target Risk (class A&B carcinogens)	***2.9E-07***	
TRc	Target Risk (class C carcinogens)	1 0E-05	
THQ	Target Hazard Quotient	***2.9E-01***	
Opt	Calculation Option (1, 2, or 3)	2	
Tier	RBCA Tier	2	

Surface Parameters	Definition (Units)	Residential	Commercial/Industrial Chronic	Commercial/Industrial Construction
t	Exposure duration (yr)	30	25	1
A	Contaminated soil area (cm^2)			
W	Length of affected soil parallel to wind (cm)			
W gw	Length of affected soil parallel to groundwater (c			
Uair	Ambient air velocity in mixing zone (cm/s)	2.3E+02		
delta	Air mixing zone height (cm)	2 0E+02		
Lss	Definition of surficial soils (cm)			
Pe	Particulate areal emission rate (g/cm^2/s)	2 2E-10		

Groundwater	Definition (Units)	Value
delta gw	Groundwater mixing zone depth (cm)	2.0E+02
I	Groundwater infiltration rate (cm/yr)	3.0E+01
Ugw	Groundwater Darcy velocity (cm/yr)	***1.8E+03***
Ugw.tr	Groundwater Transport velocity (cm/yr)	***4.7E+03***
Ks	Saturated Hydraulic Conductivity(cm/s)	2.8E-03
grad	Groundwater Gradient (cm/cm)	2.0E-02
Sw	Width of groundwater source zone (cm)	9.1E+02
Sd	Depth of groundwater source zone (cm)	1.5E+02
BC	Biodegradation Capacity (mg/L)	
BIO?	Is Bioattenuation Considered	TRUE
phi eff	Effective Porosity in Water-Bearing Unit	3.8E-01
foc sat	Fraction organic carbon in water-bearing unit	1.0E-03

Soil	Definition (Units)	Value	vadose	foundation
hc	Capillary zone thickness (cm)	***4.6E+01***		
hv	Vadose zone thickness (cm)	***5.8E+02***		
rho	Soil density (g/cm^3)	1.7		
foc	Fraction of organic carbon in vadose zone	0.01		
phi	Soil porosity in vadose zone	0 38		
Lgw	Depth to groundwater (cm)	***6.2E+02***		
Ls	Depth to top of affected soil (cm)			
Lsubs	Thickness of affected subsurface soils (cm)			
pH	Soil/groundwater pH	6.5		
		capillary	vadose	foundation
phi.w	Volumetric water content	0 342	0 12	0.12
phi a	Volumetric air content	0 038	0.26	0.26

Building	Definition (Units)	Residential	Commercial
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	

Dispersive Transport Parameters	Definition (Units)	Residential	Commercial
Groundwater			
ax	Longitudinal dispersion coefficient (cm)		6 1E+03
ay	Transverse dispersion coefficient (cm)		2.0E+03
az	Vertical dispersion coefficient (cm)		3.0E+02
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) MW	ref	Diffusion Coefficients in air (cm2/s) Dair	re	in water (cm2/s) Dwat	re	log (Koc) or log(Kd) (@ 20 - 25 C) (l/kg) Koc	ref	Henry's Law Constant (@ 20 - 25 C) (atm-m3/mol)	(unitless)	re	Vapor Pressure (@ 20 - 25 C) (mm Hg) Pure Component	ref	Solubility (@ 20 - 25 C) (mg/l) Pure Component	ref	acid pKa	base pKb	ref
71-43-2	Benzene	A	78.1	5	9.30E-02	A	1.10E-05	A	1.58	A	5.29E-03	2.20E-01	A	9.52E+01	4	1.75E+03	A			

Site Name: Former Chevron Sta Site Location: 301 14th Street, Oa Completed By: CMG Date Completed: 3/17/1997

Software version: v 1.0

RBCA CHEMICAL DATABASE

Toxicity Data

CAS Number	Constituent	Reference Dose (mg/kg/day) Oral RfD_oral	ref	Inhalation RfD_inhal	re	Slope Factors 1/(mg/kg/day) Oral SF_oral	ref	Inhalation SF_inhal	ref	EPA Weight of Evidence	Is Constituent Carcinogenic ?
71-43-2	Benzene	-	R	1.70E-03	R	2.90E-02	A	2.90E-02	A	A	TRUE

Site Name: Former Chevr Site Location: 301 14th Street, Oakla Completed By: CMG Date Completed: 3/17/1997

Software version: v 1.0

RBCA CHEMICAL DATABASE

Miscellaneous Chemical Data

CAS Number	Constituent	Maximum Contaminant Level MCL (mg/L)	reference	Permissible Exposure Limit PEL/TLV (mg/m3)	ref	Relative Absorption Factors Oral	Dermal	Detection Limits Groundwater (mg/L)	ref	Soil (mg/kg)	re	Half Life (First-Order Decay) (days) Saturated	Unsaturated	ref
71-43-2	Benzene	1.00E-03	52 FR 25690	3.20E+00	OSHA	1	0.5	0.002	C	0.005	S	720	720	H

Site Name: Former Chevr Site Location: 301 14th Street, Oakland, CA Completed By: CMG Date Completed: 3/17/1997

Software version: v 1.0

RBCA SITE ASSESSMENT — Tier 2 Worksheet 9.3

Site Name: Former Chevron Station 9-4816
Site Location: 301 14th Street, Oakland, CA
Completed By: CMG
Date Completed: 3/17/1997

A

GROUNDWATER SSTL VALUES

Target Risk (Class A & B): 2.9E-7
Target Risk (Class C): 1.0E-5
Target Hazard Quotient: 2.9E-1

■ MCL exposure limit?
■ PEL exposure limit?

Calculation Option: 2

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

CONSTITUENTS OF CONCERN		Representative Concentration	X Groundwater Ingestion			X Groundwater Volatilization to Indoor Air		Groundwater Volatilization to Outdoor Air		Applicable SSTL	SSTL Exceeded ?	Required CRF
CAS No.	Name	(mg/L)	Residential: (on-site)	Commercial: 2000 feet	Regulatory(MCL): 2000 feet	Residential: (on-site)	Commercial: (on-site) (PEL)	Residential (on-site)	Commercial: (on-site) (PEL)	(mg/L	"■" If yes	Only if "yes" left
71-43-2	Benzene	1.6E-1	NA	5.8E+2	2.0E+2	NA	>Sol	NA	NA	2.0E+2	☐	<1

.16 ppm

200ppm

Software: GSI RBCA Spreadsheet
Version: v 1.0

Serial: g-337-yax-542

using PEL
4th Q 96 gw data only
~~compare applicable SSTL to min~~ choose lowest pathway SSTL
+ makes it the applicable SSTL

200ppm GW - at the site - MCL - receptors

PEL { Basement - 12ft → greater than solubility - indoor
Without Basement → greater than solubility

RBCA SITE ASSESSMENT | **Tier 2 Worksheet 9.3**

Site Name: Former Chevron Station 9-4816
Site Location: 301 14th Street, Oakland, CA

Completed By: CMG
Date Completed: 3/17/1997

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 2.9E-7
Target Risk (Class C) 1.0E-5
Target Hazard Quotient 2.9E-1

■ MCL exposure limit?
■ PEL exposure limit?

Calculation Option: 2

B

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

CONSTITUENTS OF CONCERN		Representative Concentration	X Groundwater Ingestion			X Groundwater Volatilization to Indoor Air**		Groundwater Volatilization to Outdoor Air		Applicable SSTL	SSTL Exceeded ?	Required CRF
CAS No.	Name	(mg/L)	Residential: (on-site)	Commercial: 2000 feet	Regulatory(MCL): 2000 feet	Residential: (on-site)	Commercial: (on-site) (PEL)	Residential (on-site)	Commercial: (on-site) (PEL)	(mg/L	"■" If yes	Only if "yes" left
71-43-2	Benzene	1.6E-1	NA	5.8E+2	2.0E+2	NA	>Sol	NA	NA	2.0E+2	☐	<1

**For Basement Depth of 12 Feet Below Grade

Software: GSI RBCA Spreadsheet
Version: v 1.0

Serial: g-337-yax-542

Site Name: Former Chevron Station 9-4816 | Site Location: 301 14th Street, Oakland, C | Completed By: CMG | Date Completed: 8/28/1996 | 3 OF 3

TIER 2 PATHWAY RISK CALCULATION

GROUNDWATER EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAYS ARE ACTIVE)

	CARCINOGENIC RISK						TOXIC EFFECTS		
Constituents of Concern	(1) EPA Carcinogenic Classification	(2) Total Carcinogenic Intake Rate (mg/kg/day) Off-Site	(2) Total Carcinogenic Intake Rate (mg/kg/day) Commercial	(3) Oral Slope Factor (mg/kg-day)^-1	(4) Individual COC Risk (2) x (3) Off-Site	(4) Individual COC Risk (2) x (3) Commercial	(5) Total Toxicant Intake Rate (mg/kg/day) Off-Site	(5) Total Toxicant Intake Rate (mg/kg/day) Commercial	(6) Oral Reference Dose (mg/kg-day)	(7) Individual COC Hazard Quotient (5) / (6) Off-Site	(7) Individual COC Hazard Quotient (5) / (6) Commercial
Benzene	A		2.7E-9	2.9E-2		7.8E-11					

Total Pathway Carcinogenic Risk = **0.0E+0** **7.8E-11**

Total Pathway Hazard Index = **0.0E+0** **0.0E+0**

Site Name: Former Chevron Station 9-4816 | Site Location: 301 14th Street, Oakland, CA | Completed By: CMG | Date Completed: 8/28/1996 | 6 OF 6

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

GROUNDWATER: INGESTION

Constituents of Concern	Exposure Concentration: 1) Source Medium — Groundwater Concentration (mg/L)	2) NAF Value (dim) — Receptor: Off-Site Commercial	3) Exposure Medium — Groundwater: POE Conc. (mg/L) (1)/(2): Off-Site Commercial	4) Exposure Multiplier (IRxEFxED)/(BWxAT) (L/kg-day): Off-Site Commercial	5) Average Daily Intake Rate (mg/kg-day): Off-Site Commercial	MAX. PATHWAY INTAKE (mg/kg-day) (Maximum intake of active pathways soil leaching & groundwater routes.): Off-Site Commercial
Benzene	1.6E-1	2.0E+5	7.7E-7	3.5E-3	2.7E-9	2.7E-9

NOTE: AT = Averaging time (days) | BW = Body Weight (kg) | CF = Units conversion factor | ED = Exp. duration (yrs) | EF = Exposure frequencey (days/yr) | IR = Intake rate (L/day or mg/day) | POE = Point of exposure

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cc. Ms. Bette Owen, Chevron

Mr. J. N. Robbins, Chevron

Ms. Beth D. Castleberry
Gray, Cary, Ware & Freidenrich
400 Hamilton Avenue
Palo Alto, CA 94301-1825