# THRIFTY OIL CO.

December 10, 1986

*File UG TANKS*

RECEIVED
DEC 12 1986
ENVIRONMENTAL HEALTH ADMINISTRATION

Alameda County
Environmental Health Services
470 27th Street
Suite 324
Oakland, CA 94612

ATTENTION: Ted Gerow

RE: Thrifty Oil Co. Station #49
3400 San Pablo Avenue
Oakland, CA 94608

Dear Mr. Gerow,

Enclosed please find Woodward-Clyde Consultants subsurface assessment dated December 4, 1986 of the above referenced location.

You will note that the testing results seem to indicate some contamination in the area of the tank pit. We propose to recover all free product from the existing wells and to install two additional wells in the tank backfill (see figure 1). The purpose of the additional wells is to facilitate product removal and to provide a means to add surfactants to flush backfill and remove any residual contamination.

Please review this report and advise if you concur with our proposed well locations. Do not hesitate to contact me if you have any questions or comments.

Yours truly,

Peter D'Amico
Manager
Environmental Affairs

PD/dmt
Enclosure

cc: Peter Johnson, Regional Water Quality Control Board
Mark B. Gilmartin, Straw & Gilmartin (W/out Enclosure)
Marty Cramer, Woodward-Clyde Consultants

90393A COT-1

# SUBSURFACE ASSESSMENT
# SERVICE STATION 49
# OAKLAND, CALIFORNIA

Prepared for

Thrifty Oil Co.
10000 Lakewood Boulevard
Downey, CA 90240

DECEMBER 4, 1986

Woodward-Clyde Consultants
100 Pringle Avenue
Walnut Creek, CA 94596

## INTRODUCTION

In November of 1986, Thrifty Oil Co. retained Woodward-Clyde Consultants to conduct a subsurface site assessment at their Service Station #49 located at 3400 San Pablo Avenue in Oakland, California. This assessment was in response to groundwater contamination discovered during a previous assessment at the site by another firm. The objective was to further delineate the extent of the existing contamination.

The initial site assessment was conducted by Groundwater Technology in August of 1986 and consisted of advancing six borings and installing three 2-inch monitoring wells. Boring and well locations are shown in Figure 1. Soil samples were taken at 5-foot intervals in all borings and field analyzed for volatile organic vapors using a photoionization detector. The samples taken at a depth of 9.0 in Borings SB-1, MW-1 and MW-2 and 4.0 feet in Borings SB-2, SB-3 and MW-3 were submitted to a lab for analysis. Only the samples from SB-1 and MW-3 were found to contain detectable hydrocarbons (67 and 22 ppm respectively). Groundwater samples were also taken from each well and analyzed for hydrocarbons. Total hydrocarbons in MW-1, MW-2 and MW-3 were 85.3, 93.7 and 2.1 ppm, respectively. Respective benzene, ethyl benzene, toluene and xylene (BTEX) levels in the three wells totaled 54.1, 52.4 and 0.75 ppm.

The subsequent site assessment was conducted by Woodward-Clyde and consisted of advancing four 15-foot deep borings and installing four monitoring wells. Soil samples were taken at the approximate location of the water table in all borings except MW-5 where a sample could not be recovered. Only samples from MW-4 and MW-7 exhibited hydrocarbon odors and were submitted to a lab for analysis. Water samples were taken later from each of the four newly-installed wells and also submitted for laboratory analysis. Relative well casing elevations were also established to calculate the local groundwater gradient. In addition, an attempt was made to determine the ambient groundwater quality and existing uses in the area.

# ASSESSMENT ACTIVITIES

## Boring/Well Installation

The installation of the four borings and monitoring wells was conducted on November 14, 1986 using a Mobile B-53 rig with 8-inch hollow stem augers. Locations of the boring/monitoring wells are shown in Figure 1. MW-4 and MW-7 were located to better delineate the groundwater contamination found previously in MW-1 and MW-2, while MW-6 was to serve as a background well. MW-5 was originally to be located in the northwest corner of the site and also to serve as a background well and/or to assess the northerly extent of contamination found in MW-3. However, height restrictions and potential underground utilities created difficulties for drilling at that location. Observations made during the installation of MW-4 and MW-7 and the known contamination in wells MW-1 and MW-2 suggested that the primary area of contamination was centered around the tank pit area. Therefore, MW-5 was relocated to the southeast corner to facilitate some control for potential contaminant migration to the east and provide better delineation of the groundwater and soil contamination found in MW-1 and SB-1, respectively. Both MW-6 and MW-5 were found to be clean with no hydrocarbon odors or vapors detected in The samples or cuttings. The majority of these cuttings were placed in an onsite dumpster for general disposal. Because of the hydrocarbon odors noted in MW-4 and MW-7, a composite sample of the cuttings was taken for analysis. These cuttings were then placed in five drums, sealed, labeled and left onsite pending sample analysis.

The four wells were completed to a depth of 15 feet and constructed of 2- or 4-inch I.D. PVC casing. Four-inch I.D. casing was used for MW-4 and MW-7 to allow them to be utilized for extraction wells if required. Two-inch I.D. casing was used for MW-5 and MW-6, as they were to be used primarily as background wells. The wells were originally to be completed to a depth of 20 feet, but high water-table conditions necessitated screening the wells to within 4 feet of The surface. Craig Mayfield of the Alameda County Flood Control and Water Conservation District Zone 7 then requested that the wells be limited to a depth of 15 feet due to the resulting shallow well seal (3 feet). The boring/well construction logs are included in Appendix A. Permitting and installation of the monitoring wells were conducted in accordance with the Zone 7 guidelines.

Soil Sampling

Based on the findings of the previous investigation, soil contamination was not considered to be a problem and, as such, no soil sampling was proposed. However, because moderate hydrocarbon odors were detected in the cuttings in the first boring (MW-4), a sample was taken at the approximate location of the water table in that and each subsequent boring. At the time of drilling, the water table was about 6 feet below grade as measured in MW-2. Samples were obtained using a modified California sampler containing three brass tubes measuring 2.5 inches in diameter by 6 inches long. The sampler was driven ahead of the augers by a 140-pound drop hammer. After each sample drive, one tube was extruded into a plastic bag in the field, and a headspace analysis was performed using a flame-ionization organic vapor analyzer. Samples from both MW-4 and MW-7 resulted in headspace readings of >1,000 ppm while the MW-6 sample contained only 20 ppm in the headspace. No soil was recovered in the MW-5 sample after three attempts. Due to the high headspace readings, one of the adjacent tubes from the MW-4 and MW-7 samples was sealed at each end with aluminum foil, PVC end caps and tape and submitted to Brown and Caldwell Laboratories in Emeryville for analysis.

Well Monitoring, Development and Sampling

On November 24, 1986, fluid level measurements were taken in each of the new wells which were then developed by bailing to remove silts and sand and to improve well performance. Due to the clayey nature of the substrate, groundwater recharge to the wells was very slow. After bailing each well dry, they were allowed to recover to at least 80 percent of their original water level before sampling per the Regional Water Quality Control Board guidelines. Bailing and sampling were conducted with Teflon bailers which were decontaminated between wells. Samples were collected in two sterilized VOA vials and also submitted to Brown and Caldwell Laboratories for analysis. The bailed water was placed in two drums which were secured, labeled and left onsite pending results of the sample analyses.

The relative well casing elevations were surveyed to enable calculation of the local groundwater gradient. Calculations indicated that the gradient was to the east northeast. A closer analysis of the data revealed a mound or ridge in the water table near the tank pit area and more specifically between wells MW-7 and MW-4. Although the reason for the mounding is uncertain, it is not unusual in urbanized areas where pavement or buildings cover most of the ground surface and open areas available for groundwater recharge are sporadic. In addition, the region is known to contain old buried stream channels and subsurface faults which will influence local gradients. Other contributing factors could be leaking water, sewer or storm drain piping. There is a storm drain inlet adjacent to MW-4 which could be a source of recharge if it contains water and is leaking. It would not, however, be expected to influence water levels in MW-7 due to the distance from the source.

The presence of the mound has resulted in the groundwater gradient below the site sloping in two separate directions. Gradient calculations using wells to the north of the mound indicate that it slopes to the west northwest whereas the use of wells to the south of the mound results in the gradient sloping to the south southeast. Free product measuring 0.3 feet was discovered in MW-1, which is to the south of the storage tank area. All measurements are listed in Table 1.

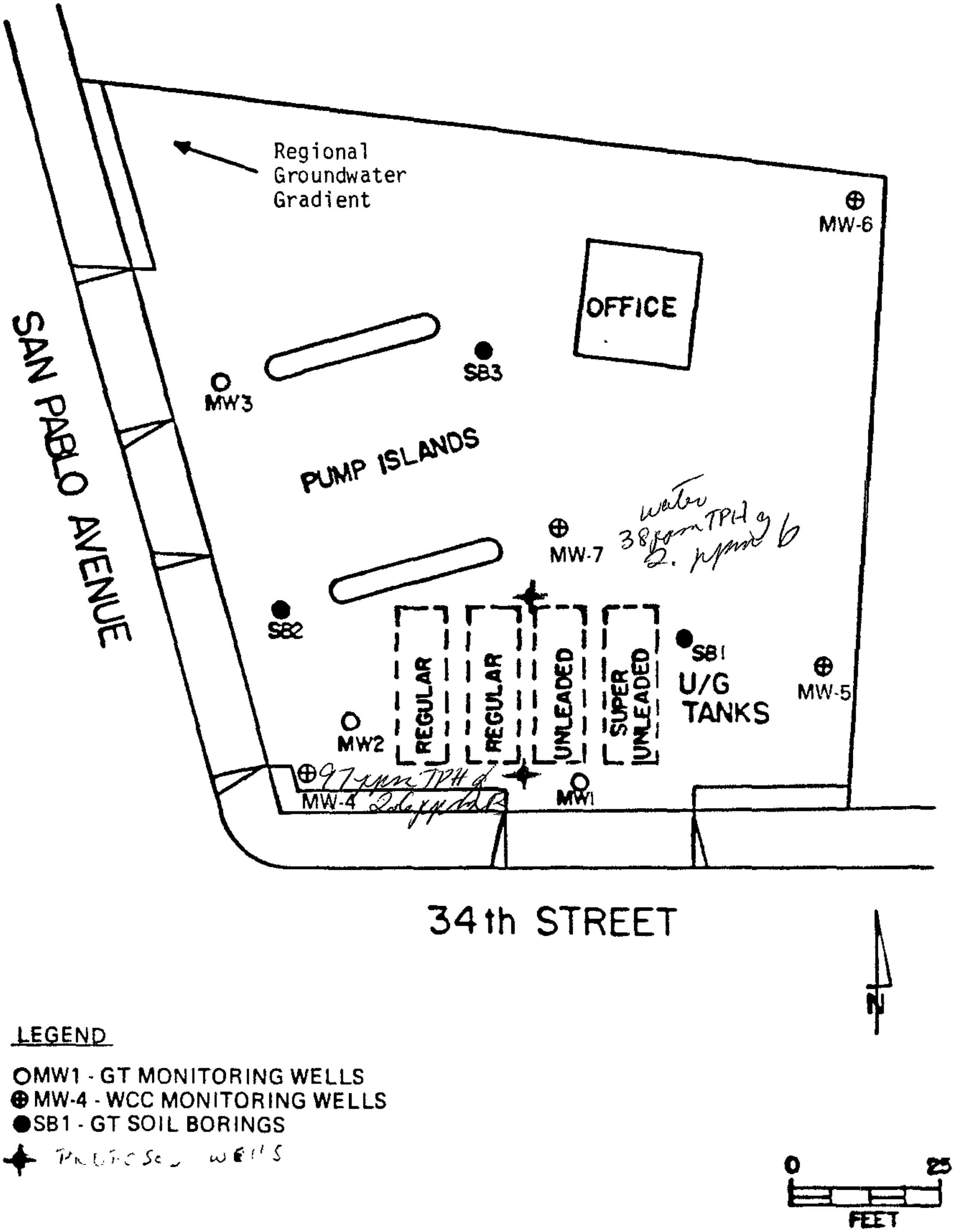


Figure 1. MONITORING WELL AND BORING LOCATIONS

TABLE 1. WELL MEASUREMENT DATA

| Well Number | Relative Casing Elevation | 11-24-86 | | | 12-2-86 | | | 12-3-86 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Depth to Water | Elev. of Water | Product Thick. | Depth to Water | Elev. of Water | Product Thick. | Depth to Water | Elev. of Water | Product Thick. |
| MW-1 | 98.03 | -- | | | -- | | | 7.45 | 90.58 | 0.3 |
| MW-2 | 97.44 | -- | | | -- | | | 6.60 | 90.84 | 0 |
| MW-3 | 97.69 | -- | | | -- | | | 7.77 | 89.92 | 0 |
| MW-4 | 97.33 | 5.94 | 91.39 | 0 | 6.21 | 91.12 | 0 | 6.28 | 91.05 | 0 |
| MW-5 | 98.85 | 7.93 | 90.92 | 0 | 8.04 | 90.81 | 0 | 8.10 | 90.75 | 0 |
| MW-6 | 99.67 | 9.08 | 90.59 | 0 | 9.04 | 90.63 | 0 | 9.00 | 90.67 | 0 |
| MW-7 | 99.02 | 7.92 | 90.10 | 0 | 7.98 | 91.04 | 0 | 8.04 | 90.98 | 0 |

*All measurements given in feet

The regional gradient is to the west northwest, and if wells MW-4, MW-2 and MW-7 were excluded from the calculations, the local gradient would also be to the west northwest. The well locations and respective contaminant levels would indicate that migration is occurring to the west northwest along the regional gradient. The mounding could, therefore, be a recent or temporary phenomenon that occurs seasonally or in response to unknown parameters. The recent appearance of product in MW-1 would tend to support this premise.

Laboratory Analyses

All samples were analyzed by gas chromatography using various EPA methods. Total fuel hydrocarbons in both soils and water were analyzed by method 8015 while soil BTX was analyzed by method 8020. The BTEX in the water samples was analyzed by method 602. The lead concentration in the MW-7 soil sample was analyzed by method 7420/7421. The MW-7 sample was chosen for lead analysis because the field observations and headspace readings of the adjacent tube suggested that it was the most heavily contaminated of the two samples submitted for analysis. The results of these analyses are listed in Table 2, and a discussion is provided below in the Conclusions section. Copies of the lab reports are appended.

Local Groundwater Use

The Regional Water Quality Control Board (RWQCB) and the Alameda County Flood Control and Water Conservation District (ACFC&WCD) were contacted to assess the ambient quality and identify existing and potential uses of the groundwater in the vicinity of the site. The ACFC&WCD maintains records, to the extent possible, of all wells in the district and does periodic water quality testing in selected wells. Unfortunately, they are primarily concerned with salt water intrusion and do not test any of the wells within several miles of the site. They did indicate that salt water intrusion was not a problem in the vicinity of the site.

TABLE 2. ANALYTICAL RESULTS*

| Sample Type and Number | Depth Taken | Total Fuel HC | Benzene | Ethyl Benzene | Toluene | Xylene | Total BTEX | Lead |
|---|---|---|---|---|---|---|---|---|
| Soil | | | | | | | | |
| 7-1-2 | 6.50 ft | <10 | <0.5 | N.T. | <0.5 | <0.5 | <0.5 | <10 |
| 4-1-3 | 6.75 ft | 1200 | 12 | N.T. | 53 | 42 | 107 | N.T. |
| C-1 (Cuttings Composite) | N/A | 140 | N.T. | N.T. | N.T. | N.T. | N.T. | N.T. |
| Water | | | | | | | | |
| MW-4 | N/A | 97 | 2.6 | 2.7 | 2.5 | 11 | 18.8 | N.T. |
| MW-5 | N/A | >1 | >0.002 | >0.002 | >0.002 | >0.002 | >0.002 | N.T. |
| MW-6 | N/A | >1 | >0.002 | >0.002 | >0.002 | >0.002 | >0.002 | N.T. |
| MW-7 | N/A | 38 | 2.0 | 1.6 | 1.6 | 8.7 | 13.9 | N.T. |

N/A - Not Applicable
N.T. - Not Tested
* - Results are given in ppm

90386A-T2 COT

The records on active wells in the area appear to be complete but outdated, and very little data is available on well construction. The records indicate that approximately five wells exist within a 1-mile radius of the site. This information, however, is rarely updated unless the well owner contacts the ACFC&WCD which means the wells may or may not currently be in operation. Four of the wells in the area are, or were, used for industrial purposes with the other being an irrigation well. No municipal or domestic wells were identified anywhere near the site. The closest well is an industrial well located approximately 1/2 mile to the south. The locations of the wells are shown in Figure 2.

According to the ACFC&WCD personnel contacted, there were several industrial and domestic wells installed in the early-to-mid 1900's, but since the East Bay Municipal Utility District began supplying water, the majority of these wells were either abandoned or inactivated. The low permeability of the sediments inhibits water production in the wells, which further deters the use of groundwater wells for water supply. The ACFC&WCD personnel did not know of any potential future uses of the groundwater in the area other than the few existing industrial and irrigation wells.

## CONCLUSIONS

The laboratory results and observations made during drilling and sampling indicate that subsurface contamination does exist in both the soil and groundwater at the site, although it does not appear to be extensive. The product storage tanks and pipelines were reported to have been tested and found to be tight, which suggests that the contamination is the result of occasional tank overfills. The location of the existing groundwater contamination does appear to be centered around the tank pit area and is generally migrating to the west or northwest. It is probable that some free product is present within the tank backfill but has been relatively well contained by the surrounding silty clay substrate.

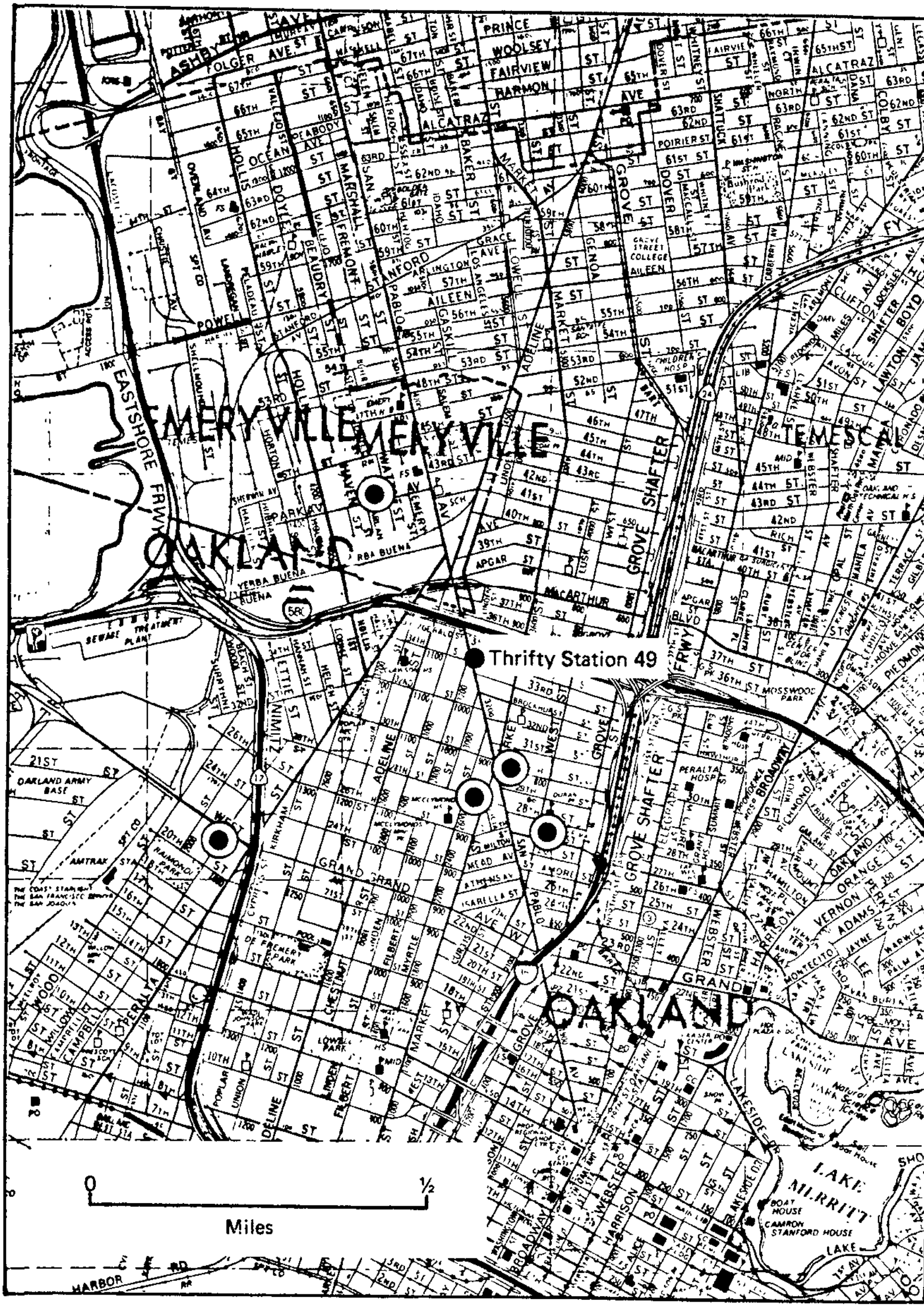


Figure 2. LOCATIONS OF INDUSTRIAL AND IRRIGATION WELLS

The soil contamination at the site does not seem to be extensive although there are some inconsistencies in the data. In the previous assessment, samples were taken either a few feet above or below the water table, while the current samples were taken at the water table. Further difficulties resulted from high headspace readings being found in samples from both MW-4 and MW-7 while lab analysis of the adjacent sample tubes found a significant level of hydrocarbons in MW-4 (1200 mg/kg), and non-detectable in MW-7. Observations made in the initial assessment also detected moderate hydrocarbon odors in several of the borings, while the corresponding sample analyses were below the detection limit. It is possible that the samples taken in the previous assessment and from MW-7 could have been just above or below the zone of actual contamination or that the contamination is somewhat discontinuous.

Past WCC spill experience in clayey, low permeability materials such as these suggest that free product may typically migrate slowly downgradient along the water table and be distributed vertically through the substrate from seasonal water table fluctuations. The high retention capacity of the fine-grained materials rapidly immobilizes the free product prior to migrating any great distance. The relatively high hydrocarbon contamination in the soil in MW-4 and the absence of free product in the well would appear to support this.

The presence of free product in MW-1 endorses a previous assumption that some free product may still be present in the tank backfill. Apparently, the presence of product in this well is a recent occurrence, as none was detected in the initial assessment, and it is our understanding that Thrifty has been monitoring the original wells periodically. The sudden appearance of free product in MW-1 could be related to the aforementioned water table mound and the resulting gradient towards MW-1. Also, the water table has been receding recently which tends to stimulate downgradient migration of free product. The low permeability nature of the clayey substrate surrounding the tank pit area would tend to contain, within the backfill, any free product that may have accumulated from occasional overfills or historical leaks. The product would, however, eventually migrate into the surrounding clays. Because MW-1 is closest to the tank backfill, it would be expected to accumulate product first.

The dissolved hydrocarbon levels found in the wells adjacent to the storage tanks suggest the nearby presence of free product possibly in the tank backfill. The substantial decrease in hydrocarbon concentrations between MW-2 and MW-3 would suggest that the dissolved contaminant plume does not extend very far offsite. The significant decrease in BTX levels between MW-2 and MW-4 would tend to agree with this, although the wells were sampled at different times and the samples analyzed by different labs.

Disposition of the drummed soil cuttings and well development water will have to be coordinated with the Regional Water Quality Control Board due to the hydrocarbon levels found in the sample analyses. Soil containing between 100 and 1000 mg/kg hydrocarbons generally requires disposal in a Class II-1 landfill. There are five drums of soil and one drum of water. It may be possible to aerate the soil onsite to avoid transportation and disposal costs at a regulated landfill.

The discussions, conclusions, and recommendations contained herein are based on the results of the field exploration and laboratory test program and the assumption that the site subsurface conditions do not deviate substantially from those disclosed in the borings and monitoring wells. If subsequent events indicate deviations from the conditions disclosed by our investigation, Woodward-Clyde Consultants should be contacted for further recommendations.

APPENDIX A

BORING LOGS

Project No.: 90386A

Date: 11-14-86

Elevation.

| DEPTH IN FEET | SAMPLE NUMBER | LOG & SAMPLE | PENE. RESIS. / FT. | DESCRIPTION |
|---|---|---|---|---|
| | | | | Existing Ground Surface |
| 0–1 | | | | AC Pavement and Base |
| 1–2 | | | | Black Silty Clayey Fill - Dry - No Odor |
| 2–3.5 | | | | Light Brown Silty Clay - Moist - No Odor |
| 3.5–5.5 | | | | Light Brown to Light Green Silty Clay - Moist No Odor |
| 5.5–7 | 6-1 | | 26 | Olive Silty Clay - Moist - No Odor |
| 7–10.5 | | | | Light Brown Gravelly Silty Clay - Moist - No Odor |
| 10.5–15 | | | | Brown Gravelly Silty Clay, Less Gravel w/ Depth - Very Moist - No Odor |
| 15 | | | | Bottom of Boring at 15 ft. |

WELL DESIGN

#3 SAND

2"ID-0.02 SLOT

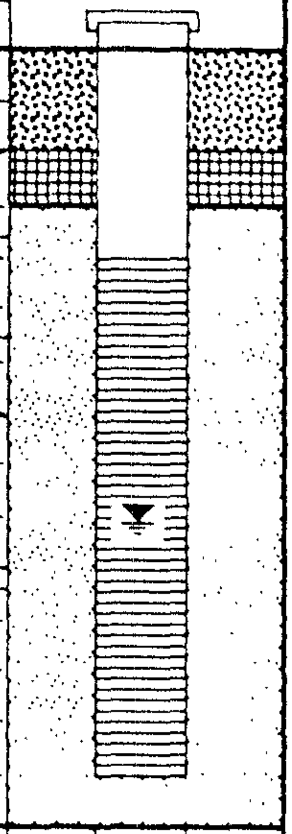

Figure 4 - Test Boring Log No. B-3

- Monitoring Well No. MW-6

Woodward-Clyde Consultants

Project No.: 90386A

Date: 11-14-86

Elevation.

| DEPTH IN FEET | SAMPLE NUMBER | LOG & SAMPLE | PENE. RESIS. / FT. | DESCRIPTION |
|---|---|---|---|---|
| | | | | Existing Ground Surface |
| | | | | AC Pavement and Base |
| | | | | Black Silty Clayey Fill - Dry - No Odor |
| | | | | Olive Silty Clay - Moist - Possible HC Odor |
| | | | | Light Blue/Green Silty Clay - Moist - No Odor |
| | 7-1 | | 20 | Lt. Green/Brown Silty Clay-Slight HC Odor |
| | | | | Light Brown Silty Clay - Moist - Slight HC Odor - Some Gravel |
| | | | | Brown Silty Clay w/ Less Gravel and Some Sand - Moist - No Odor |
| | | | | Bottom of Boring at 15 ft. |

WELL DESIGN

#3 SAND

4"ID-0.02SLOT

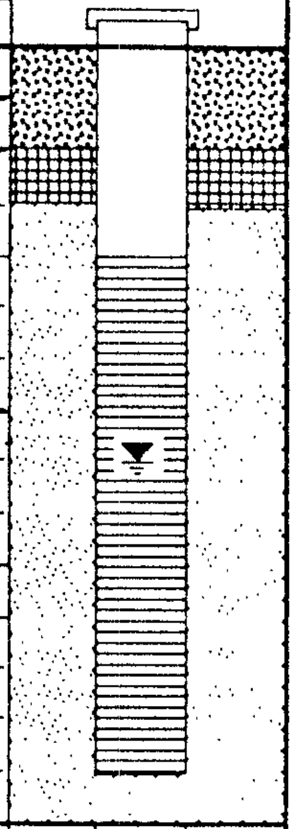

Figure 5 - Test Boring Log No. B-7
- Monitoring Well No. MW-7

Woodward-Clyde Consultants

Project No.: 90386A

Date: 11-14-86

Elevation.

| DEPTH IN FEET | SAMPLE NUMBER | LOG & SAMPLE | PENE. RESIS. / FT. | DESCRIPTION |
|---|---|---|---|---|
| 0 | | | | Existing Ground Surface |
| 0–1 | | | | Concrete Slab and Base |
| 1–2 | | | | Black Silty Clayey Fill - Dry - No Odor |
| 2–4.5 | | | | Olive Silty Clay - Moist - No Odor |
| 4.5–6.5 | 4-1 | | 14 | Light Green Silty Clay w/ Brown Mottling - Moist - Moderate HC Odor |
| 6.5–10.5 | | | | Olive Silty Sandy Clay - Very Moist - Slight to Moderate HC Odor |
| 10.5–15 | | | | Light Brown Silty Sandy Clay - Very Moist - No Odor |
| 15 | | | | Bottom of Boring at 15 ft. |

WELL DESIGN

#3 SAND

4"ID-0.02SLOT

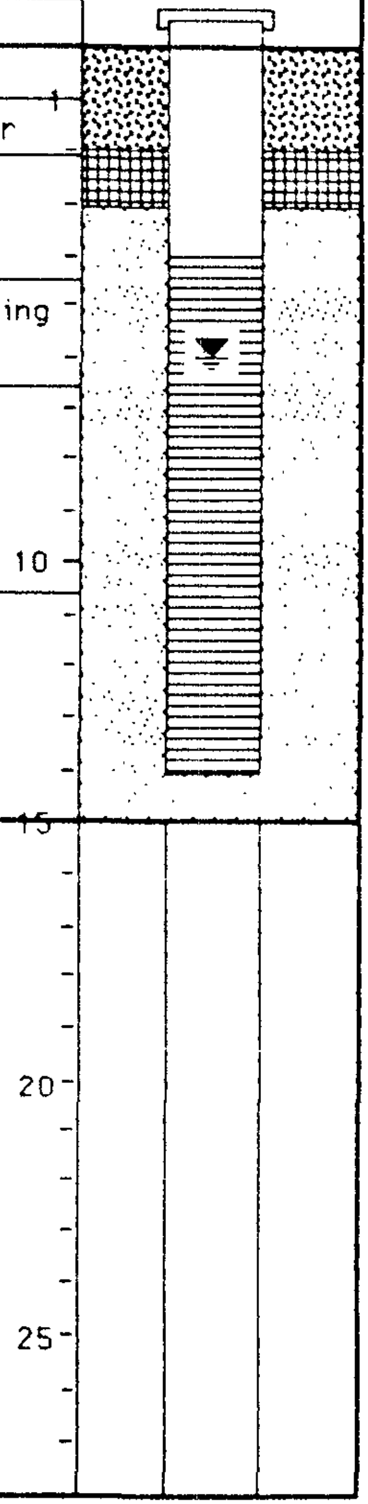


Figure 2 - Test Boring Log No. B-1

- Monitoring Well No. MW-4

Woodward-Clyde Consultants

Project No.: 90386A

Date: 11-14-86

Elevation.

| DEPTH IN FEET | SAMPLE NUMBER | LOG & SAMPLE | PENE. RESIS / FT | DESCRIPTION |
|---|---|---|---|---|
| | | | | Existing Ground Surface |
| 0 | | | | AC Pavement and Base |
| 1–2 | | | | Black Silty Clay Fill |
| 2–4 | | | | Brown Silty Loam - Dry - No Odor |
| 4–6 | | | 50 | Light Green Silty Clay w/ Some Sand - Moist - No Odor |
| 6–8 | 5-1 | | | Same as Above Except More Moisture - No Odor - No Recovery From Sample |
| 8–11 | | | | Brown Silty Gravelly Clay - Moist - No Odor |
| 11–15 | | | | Same as Above Except No Gravel |
| 15 | | | | Bottom of Boring at 15 ft. |

WELL DESIGN

#3 SAND

2"ID-0.02 SLOT

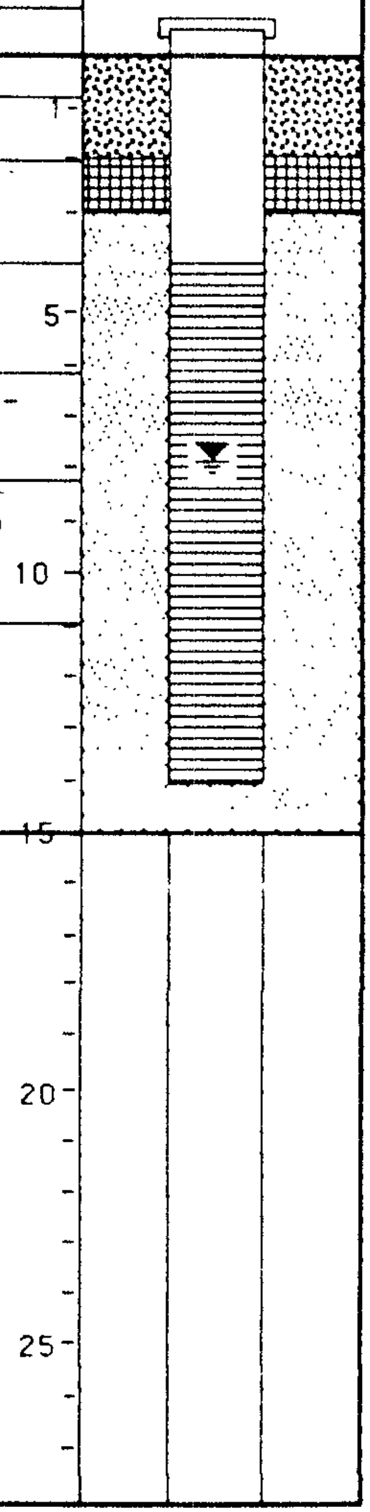


Figure 3 - Test Boring Log No. B-2
- Monitoring Well No. MW-5

Woodward-Clyde Consultants

# APPENDIX B
# LABORATORY REPORTS

BROWN AND CALDWELL

ANALYTICAL LABORATORIES

LOG NO: E86-11-467

Received: 24 NOV 86
Reported: 01 DEC 86

Mr. Marty Cramer
Woodward-Clyde Consultants
100 Pringle Avenue
Walnut Creek, California 94596

Project: 90386A

REPORT OF ANALYTICAL RESULTS



| LOG NO | SAMPLE DESCRIPTION, WATER SAMPLES | DATE SAMPLED |
|---|---|---|
| 11-467-1 | MW-4 | 24 NOV 86 |
| 11-467-2 | MW-5 | 24 NOV 86 |
| 11-467-3 | MW-6 | 24 NOV 86 |
| 11-467-4 | MW-7 | 24 NOV 86 |

| PARAMETER | 11-467-1 | 11-467-2 | 11-467-3 | 11-467-4 |
|---|---|---|---|---|
| Total Fuel Hydrocarbons, mg/L | 97 | <1 | <1 | <1 |
| EPA Method 602 | | | | |
| Date Extracted | 11.26.86 | 11.26.86 | 11.26.86 | 11.26.86 |
| 1,2-Dichlorobenzene, ug/L | <2.0 | <2.0 | <2.0 | <2.0 |
| 1,3-Dichlorobenzene, ug/L | <2.0 | <2.0 | <2.0 | <2.0 |
| 1,4-Dichlorobenzene, ug/L | <2.0 | <2.0 | <2.0 | <2.0 |
| Benzene, ug/L | 2600 | <2.0 | <2.0 | 2000 |
| Chlorobenzene, ug/L | <2.0 | <2.0 | <2.0 | <2.0 |
| Ethylbenzene, ug/L | 2700 | <2.0 | <2.0 | 1600 |
| Toluene, ug/L | 2500 | <2.0 | <2.0 | 1600 |
| Total Xylene Isomers, ug/L | <2.0 | <2.0 | <2.0 | 8700 |

D. A. McLean, Laboratory Director

BROWN AND CALDWELL

ANALYTICAL LABORATORIES

LOG NO: E86-11-282

Received: 14 NOV 86
Reported: 26 NOV 86

Mr. Martin Cramer
Woodward-Clyde Consultants
100 Pringle Avenue
Walnut Creek, California 94596

Project: TO-49

REPORT OF ANALYTICAL RESULTS

Page 1

| LOG NO | SAMPLE DESCRIPTION, SOIL SAMPLES | DATE SAMPLED |
|---|---|---|
| 11-282-1 | C-1 | 14 NOV 86 |
| 11-282-2 | 7-1-2 | 14 NOV 86 |
| 11-282-3 | 4-1-3 | 14 NOV 86 |

| PARAMETER | 11-282-1 | 11-282-2 | 11-282-3 |
|---|---|---|---|
| Lead, mg/kg | --- | 10 | --- |
| Nitric Acid Digestion, Date | --- | 11.17.86 | --- |
| Benzene,Toluene,Xylene Isomers | | | |
| Benzene, mg/kg | --- | <0.5 | 12 |
| Toluene, mg/kg | --- | <0.5 | 53 |
| Total Xylene Isomers, mg/kg | --- | <0.5 | 42 |
| Total Fuel Hydrocarbons, mg/kg | 140 | <10 | 1200 |

D. A. McLean, Laboratory Director