FREE PRODUCT SUBSURFACE INVESTIGATION MARKETPLACE SITE EMERYVILLE, CALIFORNIA

OCTOBER 19, 1989

McLaren

McLaren

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Mr. Walter Kaczmarek
The Martin Group
6475 Christie Avenue, Suite 500
Emeryville, CA 94608

RESULTS OF THE FREE PRODUCT SUBSURFACE INVESTIGATION CONDUCTED AT THE MARKETPLACE SITE, EMERYVILLE, CALIFORNIA

Dear Mr. Kaczmarek:

Enclosed is the report entitled "Free Product Subsurface Investigation at the Marketplace Site". The purpose of this investigation was to further define the presence of free product and petroleum hydrocarbons at the site. The results of this investigation are:

- Free product has only been detected in upgradient Wells W-5 and W-16;
- Benzene was detected in Well-16, located at the upgradient, eastern boundary at a concentration of 5.5 parts per billion (ppb). The Department of Health Services Maximum Contaminant Level (MCL) for contaminants in drinking water, April 1989, California Code of Regulations, Title 22, is 1 ppb.
- The presence of total petroleum hydrocarbons as diesel (TPH/D) was detected in all of the wells sampled. No regulatory guidelines exist for this type of contamination. No exposure routes exist because there are no drinking water supply wells in the area and the site is paved.
- The free product was determined to be either a heavy gas oil or a heavy crude oil.
- The free product is unrelated to the asphalt-like material which has been detected in soils at the site.
- The upgradient off-site extent of free product has not been determined.

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Previous investigations have determined that the presence of metals and priority pollutants at the site were below applicable regulatory criteria. If you have any questions, please do not hesitate to call.

Sincerely,

Susan Gahry

Susan Gahry
Supervising Engineer

Enclosure

1013LDC2

1. Non Haz. Designation of asphalt
2. Remedial Activity of 7/2/88 needs to be documented by DHS
3. O&M is adequately characterized for purposes of evaluation
4. Any potential for aquifer contamination can be assessed in future by gr. water well monitoring & air well monitoring. Effects on site environment are generally unknown.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1013SMF4

1.0 INTRODUCTION

McLaren conducted an additional subsurface investigation of the Marketplace Site located in Emeryville, California, (Figure 1-1) between September 12 and October 10, 1989 to further characterize the free product identified on-site. Several previous soil and groundwater investigations have been conducted at the site as listed in Table 1-1. Various forms of petroleum derivatives have been identified in these investigations including a free product described as oil in Well W-5 and a solid asphalt-like material in site soils. During the hydrogeological investigation recently completed for the Marketplace/Nielsen Site it was concluded that the free product in Well W-5 and the asphalt-like material found in site soil are most likely different materials and as such unrelated.

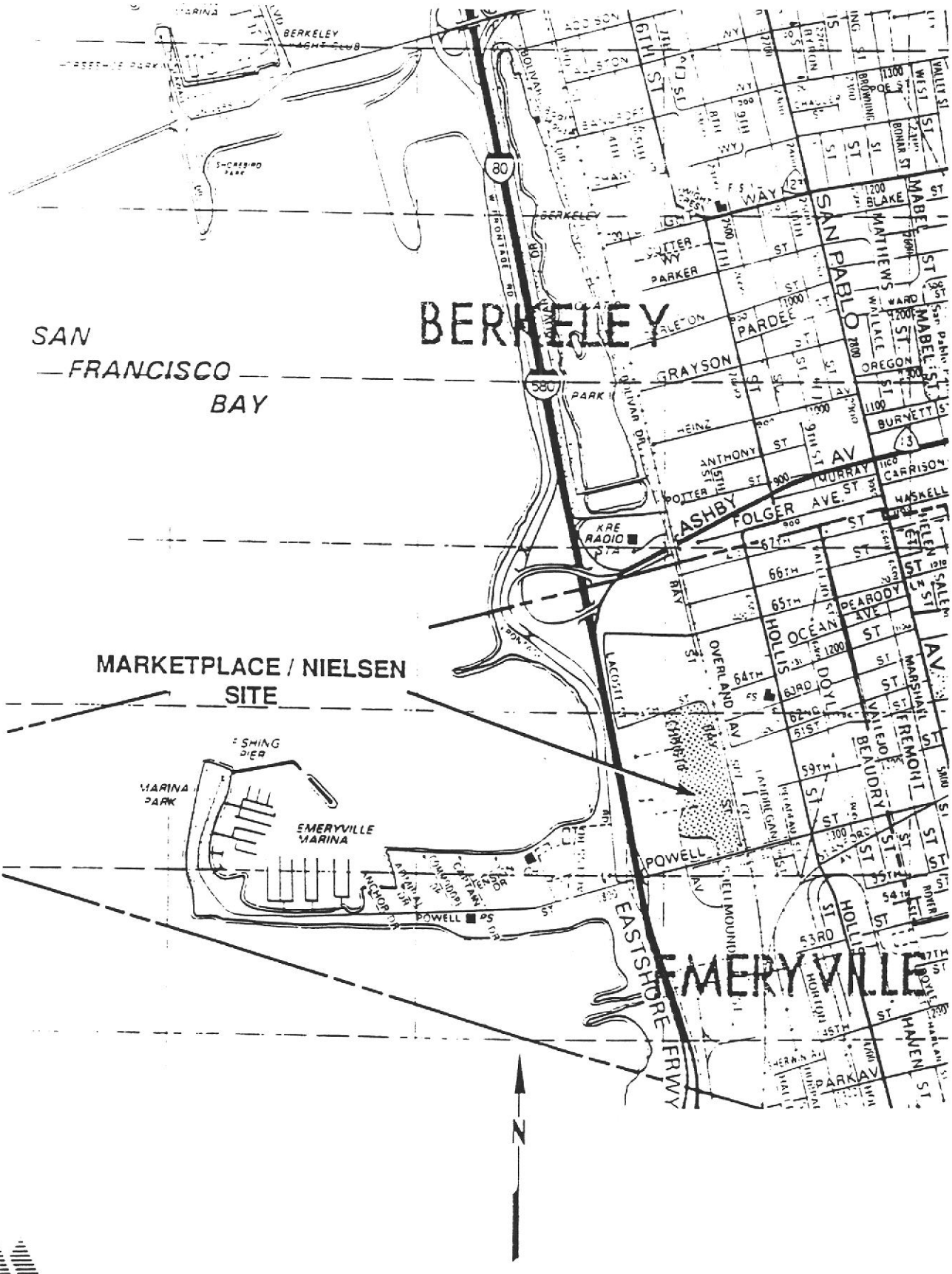
The previous investigation also determined that the concentration of metals and priority pollutants in groundwater are generally below unacceptable levels and do not warrant further investigation. Further, the groundwater at the Marketplace site is not potable and is not extracted for any beneficial use.

The objectives of the current investigation were to:

- Characterize the type and extent of the free product found in Well W-5;
- Further characterize the asphalt-like material; and
- Determine if the groundwater is being adversely impacted by either of these materials.

This project included drilling three soil borings and the construction of three monitoring wells, collection and analysis of groundwater samples from new and selected existing wells, free product sampling and analysis

FIGURE 1-1
SITE LOCATION MAP



McLaren Environmental Engineering

TABLE 1-1

PREVIOUS INVESTIGATIONS AT THE MARKETPLACE AND NIELSEN SITES

Date of Report	Consultant	Title
1982	Woodward Clyde Consultants	Assessment of Subsurface Contaminants Marketplace Property
1987	Woodward Clyde Consultants	Environmental Assessment, Former Nielsen Freight Line Site and Adjacent Parcel
1988	EarthMetrics	Draft Work Plan for Soils Contamination Characterization of the Marketplace Site
1988	Aqua Terra Technologies	Results of the Hydrogeologic Investigation Conducted at the Marketplace/Nielsen Properties
1989	McLaren	Marketplace/Nielsen Hydrogeologic Investigation
Current	McLaren	Marketplace Free Product Subsurface Investigation

1011SMF1.TAB

to determine the type of oil present, and further characterization of the asphalt-like material. In addition, this investigation included a survey of new and existing monitoring well elevations; preparation of a groundwater contour map; sounding of the wells to determine the presence and depth of free product; and removal of any free product on a weekly basis in order to mitigate its occurrence and estimate the rate of free product recharge.

1.1 Marketplace Site Background

Industrial activities on the Marketplace Site were initiated in 1884 by the Paraffine Company which researched and developed bituminous and petroleum based products and may have refined asphalt and kerosene in the production of paint and roofing materials. The asphalt refinery was located in the northeast corner of the site, in which it is believed that crude oil was distilled to produce the various desired hydrocarbon fractions. The refinery was dismantled in 1965 (WCC, 1982). In 1975, the site was graded and construction of the existing Marketplace parking lot was completed.

1.2 Nielsen Site Background

The Nielsen Site located immediately northwest of the Marketplace Site was part of the Marketplace manufacturing operation for roofing products and paint starting in the mid 1930's. The Nielsen Site was developed as a trucking facility in the 1960's. Diesel, gasoline and waste oil were stored in underground tanks and solvents and degreasers were stored above ground.

Further detail on the background of these sites is available in the McLaren report entitled "Results of the Hydrogeologic Investigation Conducted at the Marketplace/Nielsen Properties" dated September 11, 1989.

2.0 FIELD ACTIVITIES

2.1 Soil Boring and Well Installation

Drilling was conducted on September 21 and 22, 1989. A mobile B-61 drill rig using 8-inch hollow stem augers was used to drill the soil borings to depths ranging from 21.5 to 26.5 feet below the ground surface. The soil borings were converted into two-inch diameter groundwater monitoring wells. Saturation was encountered at approximately 25, 20 and 16 feet below the ground surface for monitoring Wells W-16, W-17 and W-18, respectively.

The materials encountered in each boring were logged in accordance with the Unified Soil Classification System by a field geologist who obtained relatively undisturbed samples at five-foot intervals and at the soil-groundwater interface for visual classification and qualitative field analysis for fuel hydrocarbon constituents using an OVM detector. Samples were obtained using a two or two and one-half inch O.D. Modified California Sampler lined with clean brass sleeves. The sampler was driven ahead of the lead auger with a 140-pound hammer free falling 30 inches. Blow counts were taken for each six-inch driving interval.

The depth of saturation encountered during drilling was below that which was expected based on previous investigations in this area. The apparent hydrogeologic reasons for this are discussed later in Section 5.0.

The location of the three new groundwater monitoring wells, designated W-16, W-17 and W-18 are shown later in Figure 3-1. Well construction details are summarized in Table 2-1.

TABLE 2-1

GROUNDWATER MONITORING WELL CONSTRUCTION DETAILS
WATER TABLE DEPTHS AND ELEVATIONS AT THE
MARKETPLACE SITE

Well Description and Date	Depth of Boring (feet)	Borehole Diameter (inches)	Depth of Casing (feet)	Screened Interval (feet)	Top of Casing (feet)	Approximate Water Surface Elevations (feet)	Depth to Groundwater (feet)	Thickness of Free Product (feet)
W-1[a] (4/13/87)	13.0	8	13.0	3 - 13	11.47	5.84	5.63	---
W-4 (8/4/81)	12.5	6	12.5	3 - 18.5	9.96	6.09[c]	3.87[c]	---
W-5 (7/30/81)	14.0	6	14.0	3 - 14	11.41	6.98[c]	4.43[c]	0.71[c]
W-7[a] (4/16/87)	12.5	8	12.5	2 - 12	9.05	5.97[c]	3.08[c]	---
W-8 (4/17/87)	13.0	8	13.0	3 - 13	10.43	6.84[b]	3.59[b]	---
W-10 (8/4/81)	12.0	6	12.0	2 - 12	7.14	3.47[c]	3.67[c]	---
W-13 (8/9/89)	11.0	8	10.0	5 - 10	8.15	3.55[c]	4.60[c]	---
W-14 (8/9/89)	11.0	8	10.0	5 - 10	7.97	2.95[b]	5.02[b]	---
W-15 (8/9 - 10/89)	23.0	8	20.0	10 - 20	11.53	7.27[c]	4.26[c]	---
W-16 (9/21/89)	26.5	8	26.0	14 - 26	10.94	6.13[c]	4.81[c]	0.07[c]
W-17 (9/21/89)	26.5	8	25.0	8 - 25	12.14	3.02[c,d]	9.12[c,d]	0.0[c]
W-18 (9/22/89)	21.5	8	20.0	4 - 20	11.34	5.82[c]	5.52[c]	0.0[c]

a. Nielsen Property
b. Sounded August 20, 1989 soundings could not be obtained on October 11, 1989 due to cars parked on top of well.
c. October 11, 1989
d. Inconsistent value was resounded but top of casing needs to be verified.
e. Discrepancies in boring log and well description (WCC, 1982), depths are based on well installation descriptions.

1011SMF1.TAB

The groundwater monitoring wells were constructed in accordance with Section 2647 of the California Administrative Code (CAC, 1985) and the Department of Resources' Bulletin 74-81 (DWR, 1981). Each monitoring well was constructed of two inch I.D., flush threaded, schedule 40 PVC blank casing with 0.020 inch machine slotted screen. The screens were set with at least 5 feet of screen above the first water level measured in the borehole. The screen extended to the total well depth. The annular space between the well screen and borehole was packed with clean graded (8 x 20 mesh) sand from the bottom of the borehole to one foot above the screened casing. A one foot bentonite seal was placed above the sand pack and the remainder filled with a neat cement and bentonite (5%) slurry. A watertight locking cap was installed on the well and the wellhead was protected by installing an at-grade, traffic rated road box. Each well was developed with a centrifugal pump until approximately ten casing volumes were removed. A small amount of free product was found on the water surface in monitoring wells W-16 and W-17 prior to development. Soil drilling logs are included as Appendix A.

2.2 Groundwater Sampling

Groundwater samples were collected from the new wells (W-16, W-17 and W-18) as well as selected existing wells (W-5, W-7, W-8 and W-15) for which previous investigations indicated that petroleum hydrocarbons may have been present. Attempts were made to sample well W-10, but the volume in the well was insufficient to obtain a sample. Although this well was previously reported to contain free product, no indication of free product was detected during this sampling event.

Prior to sampling, three well casing volumes were removed. In wells W-5 and W-16 which contained free product, the free product was removed from

the well prior to sampling the groundwater. The water generated through well development and purging was stored on-site in approved 55-gallon drums pending laboratory analysis to determine a proper disposal method.

The groundwater samples were submitted to McLaren Analytical Laboratory for analysis of total petroleum hydrocarbons as diesel (TPH/D) by the California, State Water Resource Control Board LUFT Manual Method and for benzene, toluene, xylene and ethylbenzene (BTXE) by modified EPA Method 602. These analyses were selected based on Regional Water Quality Control Board guidelines for diesel and heavier petroleum components.

2.3 Oil-Water Sounding

All of the existing monitoring wells were sounded with an oil-water interface probe to determine the presence and amount of free product, if any, in the wells on September 15, 1989. The new wells (W-16, W-17, and W-18) were sounded on September 22, 1989. Free product was detected only in monitoring Wells W-5 and W-16. The depth of the free product in Well W-5 was sounded on four occasions and ranged from 0.51 to 1.02 feet in depth, with an average depth of 0.74 feet. Well W-16 was reported to contain free product at the time is was constructed. However, the depth of free product measured in the well during September and October of 1989 amounted to a trace on September 27, and a depth of 0.07 feet on October 11, 1989.

2.4 Removal of the Free Product

Free product was removed from monitoring Well W-5 on a weekly basis using a peristaltic pump. This was done in order to mitigate its occurrence and to estimate the rate of recharge to the well. Based on the well sounding data for Well W-5 the recharge rate for the free product is approximately

0.019 gallons per day. During this one month sampling period approximately 0.5 gallons of free product have been removed from Well W-5. A measurable depth of free product was accumulated in Well W-16 on only one occasion, and therefore, a recharge rate was not calculated.

At this time the downgradient extent of the free product is relatively well defined and the free product is not migrating off-site as it has not been detected in downgradient well W-18. However, at this time the upgradient extent of the free product is not adequately defined as will be discussed further in Section 6.0

Lowell Miller of the Alameda County Environmental Health Department visited the Marketplace site on September 21, 1989. He sampled the oil from Well W-5 and drill cuttings from the construction of Well W-16.

3.0 RESULTS OF GROUNDWATER ANALYSES

3.1 BTXE

The results of the groundwater analyses are presented in Table 3-1. Analytical data sheets and chain of custody records are included in Appendix B. Detectable levels of benzene (5.5 ppb) and xylene (1.3 ppb) were measured in the groundwater of monitoring wells W-16 and W-15, respectively. None of the other wells sampled contained detectable levels of volatile organic compounds. The California Department of Health Services (DHS) Maximum Contaminant Levels (MCLs) for drinking water are 1.0 ppb benzene, 100 ppb toluene, 680 ppb ethylbenzene, and 1750 ppb xylenes. Therefore, the only well which exceeded an MCL was Well W-16 for benzene. Monitoring Wells W-15 and W-16 are located in close vicinity to the eastern, upgradient property boundary.

3.2 Total Petroleum Hydrocarbons/ Diesel

All of the wells sampled contained measurable levels of TPH/D ranging from 700 to 20,000 ppb as shown on Figure 3-1. Monitoring Well W-5, which contains free product, had the maximum TPH/D concentration. Monitoring Well W-5 is located near the upgradient property boundary and appears to be the center of the free product plume.

TABLE 3-1

CHEMICAL CONCENTRATIONS, ppb

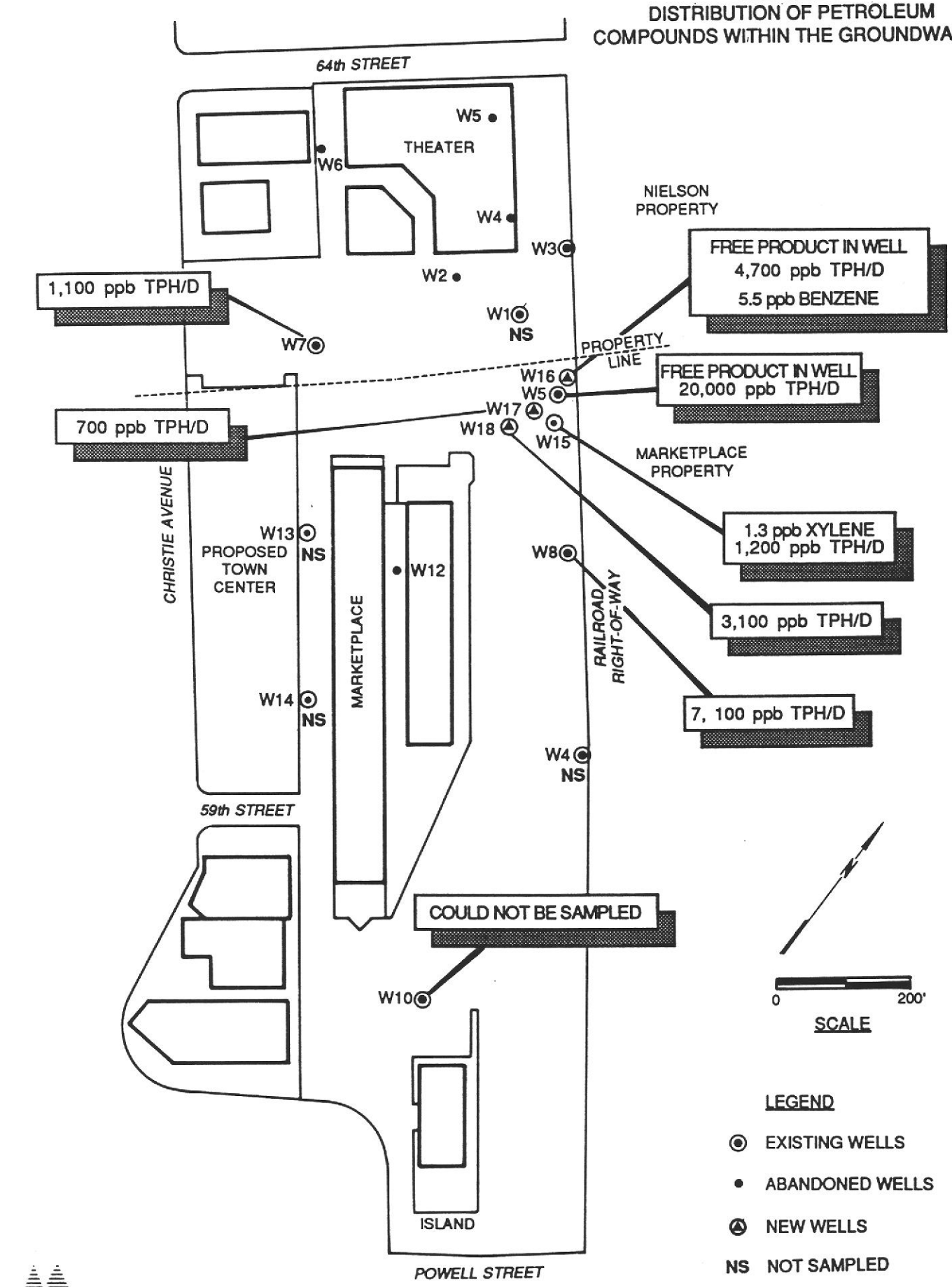
MARKETPLACE SITE
EMERYVILLE, CALIFORNIA

	Chemicals				
Well Number	Benzene	Toluene	Xylene	Ethylbenzene	TPH/D
W-8	ND	ND	ND	ND	7,100
W-10	NA	NA	NA	NA	NA
W-15	ND	ND	1.3	ND	1,200
W-16	5.5	ND	ND	ND	4,700*
W-17	ND	ND	ND	ND	700
W-18	ND	ND	ND	ND	3,100
W-5	ND	ND	ND	ND	20,000*
W-7	ND	ND	ND	ND	1,100

ND = Not Detected.
NA = Not analyzed since an adequate amount of sample could not be obtained.
TPH/D = Total Petroleum Hydrocarbons as Diesel.
* = Free Product Detected in Well.

1011SMF1.TAB

FIGURE 3-1
DISTRIBUTION OF PETROLEUM
COMPOUNDS WITHIN THE GROUNDWATER



4.0 CHARACTERIZATION OF FREE PRODUCT AND ASPHALT-LIKE SUBSTANCE

4.1 Characterization of Free Product

The free product found in monitoring Well W-5 during previous groundwater investigations has been described as a "black floating fluid" (WCC, 1982) and simply as a free product (McLaren 1989). Further characterization of this material was undertaken in order to determine its nature. The free product in Well W-5 was sampled and sent to Saybolt Laboratories for analysis by American Standard Testing Methods (ASTM) routinely used in the oil industry. The analyses requested included:

- API Gravity by ASTM Method D287,
- Viscosity by ASTM Method D445,
- Distillation to determine the boiling range of the product by either ASTM Method D1160 (heavy products) or ASTM Method D86 (light products).

The initial sample of free product submitted for analysis was collected from Well W-5 on August 31, 1989. During refrigerative storage of the sample, the oil separated from the groundwater such that the sample contained only approximately 25% oil. Thus, this sample could not be analyzed due to the insufficient volume of oil. Another sample of the oil, which was collected directly from the barrel used to store the free product, was obtained on September 19, 1989. This sample also showed signs of oil-water separation, although, not as substantial as the first sample. Therefore, a Sediment and Water analysis was undertaken to determine the percentage of sediment and water in the oil sample. Water constituted 34% of the oil sample and therefore the distillation analysis was not possible.

The API Gravity and the Viscosity tests were conducted on the second sample and were determined to be 20.6 and 21.5 centistokes at 122 °F, respectively. Analytical data sheets have not as yet been received from the laboratory.

Charts published for the purposes of characterizing petroleum products (Hougen et al., 1943) were used to estimate the properties of the free product. These charts are included as Figures 4-1 and 4-2. It was determined that the average boiling temperature for the free product was approximately 750° F and that the molecular weight falls within a range of 220 to 260.

Petroleum products in this boiling and molecular weight range are classified as heavy gas oil as shown in Table 4-1. However, a heavy crude oil, such as one used to manufacture asphalt, could also exhibit this average boiling point and molecular weight range. The distillation test would have determined if the petroleum was a heavy gas oil or a crude oil. A heavy gas oil would be expected to have a relatively narrow boiling point range of 500°F - 1000°F whereas a crude oil would be expected to have a wider boiling point range of 100°F - 1000°F.

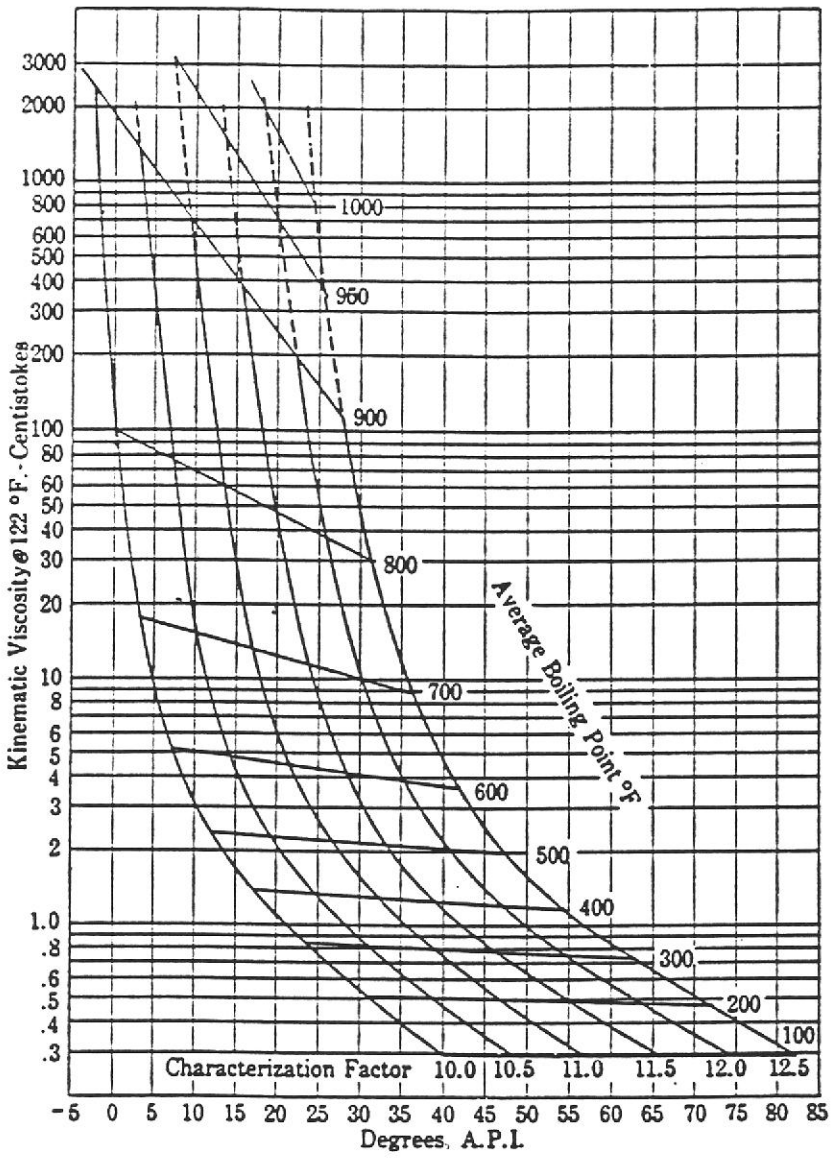
4.2 Characterization of the Asphalt-like Substance

A sample of the asphalt-like substance was collected on September 19, 1989 from a pile of excavated soil. A portion of the sample was sent to Accurex Laboratories for analysis using the EPA Toxicity Characterization Leaching Procedure (TCLP) test to evaluate leaching under "worst-case" test conditions. The sample was frozen and smashed to obtain the particle size required by the test; the particle size of the material could not be reduced by grinding. The extract from this procedure was

This procedure is for those wastes which can still be land disposed

FIGURE 4-1

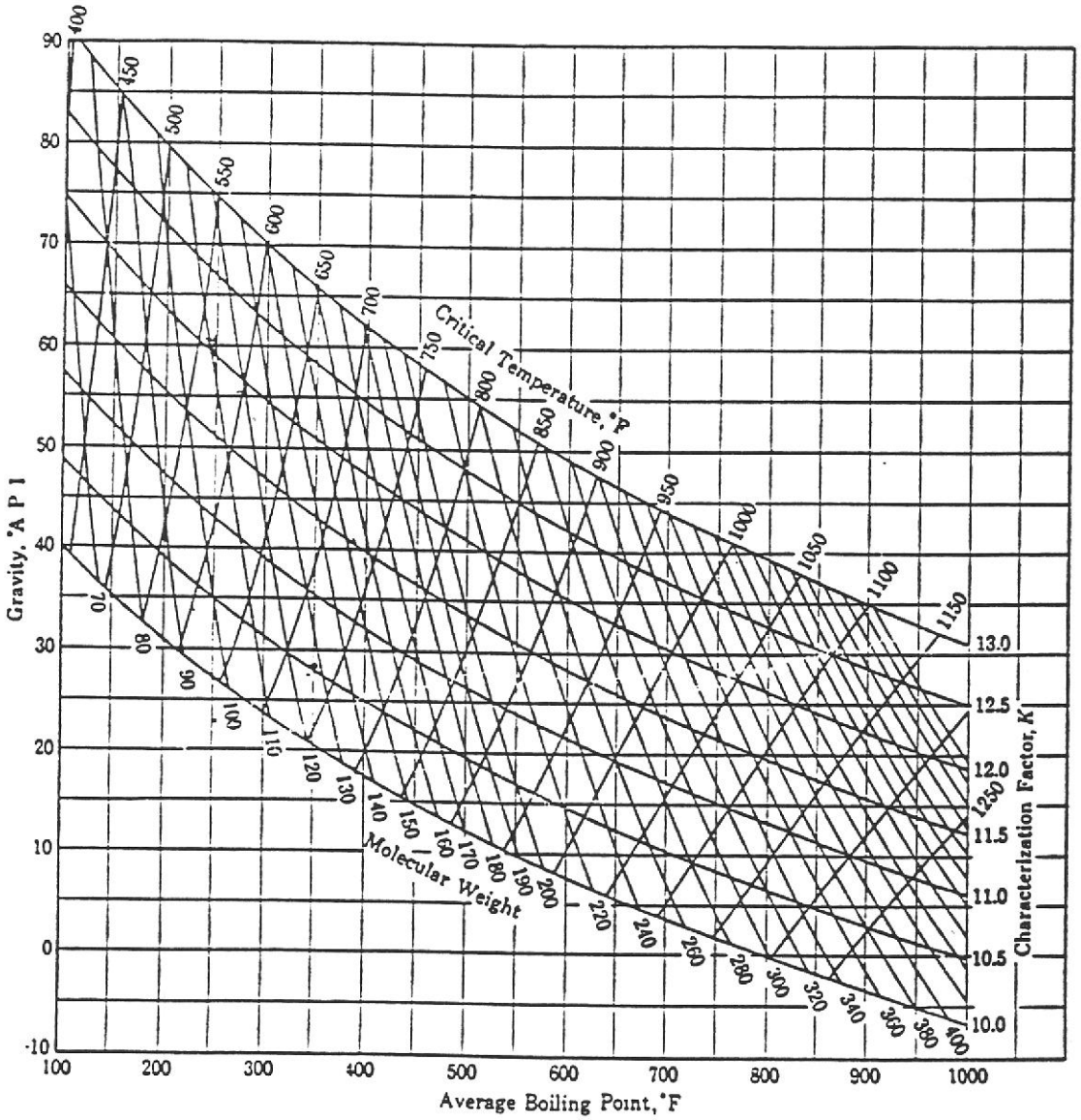
CHARACTERIZATION FACTOR FROM
VISCOSITY AT 122°F



Source: Hougen et al., 1943

FIGURE 4-2

MOLECULAR WEIGHTS, CRITICAL TEMPERATURES, AND CHARACTERIZATION FACTORS OF PETROLEUM FRACTIONS



Source: Haugen et al., 1943

TABLE 4-1

BOILING RANGE FOR VARIOUS
FRACTIONS OF CRUDE OIL

Crude Oil Fractions	Boiling Range °F
Gases	Below 80
Light Naphtha	50 - 220
Heavy Naphtha	190 - 520
Light gas oil (Diesel)	400 - 650
Heavy gas oil (Fuel Oil)	610 - 800
Residues	above 800

Source: 1980 Refining Process Handbook Hydrocarbon Processing

1011SMF1.TAB

analyzed for BTXE by EPA Method 602; for higher boiling petroleum hydrocarbons (TPH/D) by the DHS LUFT manual method; and for semivolatile organics (polynuclear aromatic compounds) by EPA Method 8270. The results of the TCLP analysis are included in Appendix B.

Another portion of the asphalt-like substance sample was sent to Saybolt Laboratories for characterization by ASTM D1160 Distillation, viscosity, and gravity. However, due to the solid nature of the material, it was not possible to conduct these tests.

The TCLP is a relatively new procedure developed by the EPA in order to assess the potential leachability of toxicants from liquid, solid and multiphasic wastes under test conditions conducive to leaching. The method involves grinding the solid material and using an acid extract solution. The TCLP procedure is applicable to wastes that may inappropriately be deposited in a sanitary landfill. To date this procedure has not gained full acceptance in the environmental community and has been subject to criticism in two areas:

- The use of an acidic extractant is significantly more severe than may be encountered in the environment; and
- Milling of the sample prior to extraction may not be representative of subsurface conditions.

The use of a moderately acidic extractant is designed to simulate conditions that might occur in a sanitary landfill if a manufacturing waste was deposited in an inappropriate facility. Milling is designed to simulate breakage which could occur due to digging or backhoe operation and weathering.

Milling of the samples prior to conducting the TCLP has been criticized as many materials are monolithic and are not subject to milling under

subsurface conditions. The EPA has suggested that modifications to the procedure may include elimination of the milling process except where the analysis of volatile organic chemicals is involved (USEPA, 1986). This is due to the use of a zero-headspace extractor (ZHE) which does not allow the use of the proposed alternative to grinding. In addition numerous problems have been encountered in the use of the ZHE with regards to the precision of the TCLP.

The results of the TCLP extraction test are summarized in Table 4-2. Concentrations of 130 ppb benzene, 100 ppb toluene, 140 ppb xylenes, and 8.5 ppb ethylbenzene were leached from the sample. Published regulatory levels for toluene, xylene and ethylbenzene in the TCLP extract are 330 µg/L and 150 µg/L and 53 µg/L (ppb), respectively (CFR 40, 1988). No regulatory standards exist for benzene in the TCLP extract. The leachate from the TCLP test also showed 330 ppb of TPH/D, 53 ppb of 2,4-dimethylphenol, and 70 ppb of naphthalene. No regulatory limits have been set for these compounds by TCLP protocol.

These data suggest that under worst-case laboratory conditions BTXE and other organic chemicals may be extracted from this material at very low levels. However, none of the established regulatory standards were exceeded under the TCLP protocol.

However, the test results appear to be anomalous since the groundwater at the site does not contain concentrations of BTXE except for low levels at the eastern site boundary which appears to be related to the presence of free product rather than to the asphalt-like material. Further, under the conditions found at the Marketplace site it is unlikely that milling or acidic conditions would occur.

TABLE 4-2

RESULTS OF THE ASPHALT LEACHIBILITY TEST (TCLP)

Purgeable Aromatics (EPA 602)	Extracted µg/l (ppb)	Waste Extract[a] Standards µg/L (ppb)
Benzene	130.0	---
Toluene	180.0	330
Ethylbenzene	8.5	53
Total Xylenes	140.0	150
TPH/D	330.0	---
Semivolatile Organic Compounds (EPA 8270)		
2,4 - Dimethylphenol	53.0	---
Naphthalene	70.0	---

a) Source: CFR 40, Part 268, Subpart D pp. 721.

1011SMF1.TAB

Therefore, although the TCLP suggests a leaching potential, groundwater data from the site indicates that no significant leaching of BTXE compounds has occurred.

4.3 Comparison of Free Product and Asphalt-like Substances

Two of the primary objectives of this investigation were 1) to determine the nature of the free product and asphalt-like substance and, 2) determine if these materials are related. Based on the results of this investigation and previous investigations it is concluded that the free product and the asphalt-like substance are different materials and unrelated.

The physical characterization of the two materials was incomplete as described above. However, the available information suggests that these material are physically and chemically different.

- The D1160 Distillation was not completed for either material since the asphalt-like substance was too dense and could not be distilled; and the free product contained too much water.
- The asphalt-like solid substance was too dense (solid) to determine API gravity or viscosity.
- API gravity and viscosity measurements for the free product indicate the estimated boiling range is 650° to 850°F, which indicates the product is a heavy gas-oil, or heavy crude oil. Hydrocarbons in this boiling range were not leached to an appreciable degree from the asphalt-like substance even under the severe leaching conditions of the TCLP.
- The free product is found in Well W-5 floating on top of the water-table.

- The asphalt-like substance occurs in massive aggregated veins to depths of seven feet below grade and is interdispersed in the soil.

The locations of the asphalt-like substance and the free product on the site also suggest that these materials are not directly related. The free product appears to be isolated to an area surrounding Well W-5. Trace amounts of free product were found in Well W-16 along the eastern border of the site. These wells are adjacent to a transfer manifold pipeworks located on the Santa Fe Railroad property, which may have historically been used for product off-loading. The asphalt-like material has been found at several locations throughout the eastern and central position of the site. The central portion of the site is downgradient from Well W-5 and at this time no free product has been detected in any other downgradient wells. It is logical to assume that if the free product is the result of the asphalt-like material, then the free product should most likely be found at other locations where the asphalt-like substance is located. This is not evident. It is concluded from this comparison that the asphalt-like substance and the free product in Well-5 are different hydrocarbon materials and as such are unrelated.

The chemical characterizations of the asphalt-like substance and the free product (sampled from Well W-5) were addressed under the self-classification of these materials for hazardous waste characteristics as prescribed in Title 22 of the CCR section 66680 et seg. (Aqua Terra Technologies, 1988) and the substance was determined to be non-hazardous (ATT, 1988; McLaren, 1988b).

not by DHS!

Based on the non-hazardous characterization of the asphalt-like material (Aqua Terra Technologies 1988, McLaren 1989) and the correspondence from ChemRisk to the California Department of Health Services (dated August 29, 1989) and the Alameda County Environmental Health Department (dated

August 29, 1989) the asphalt-like substance is not a human health or environmental hazard. It is contained in the subsurface soil and is not mobile. There is no evidence that it has adversely affected groundwater quality. No potential for human exposure to this material exists under current or possible future site conditions.

In contrast, the free product in the area surrounding Well W-5 may be an issue which the RWQCB may regard as requiring further action. This will be further addressed in Section 6.0.

5.0 Site Hydrogeology

5.1 Groundwater Depth Survey

A level and depth survey was conducted to estimate groundwater gradient and flow direction. The survey was conducted on October 11, 1989. To estimate the gradient and flow direction, depths to groundwater were measured relative to a bench mark located on the steps of a brick building located southeast of the Marketplace site. Well casing, ground surface elevations, and depth and elevation of groundwater are summarized in Table 2-1.

5.2 Hydrogeology

Cross-sections developed during the hydrogeologic investigation of the Marketplace/Nielsen Site (McLaren, 1989) show that the site is underlain by, in order of increasing depth below grade, artificial fill, the "New Bay Mud", and "Older Alluvium". "Old Bay Mud", known to be relatively impermeable, exists below the "Older Alluvium" at depths greater than thirty feet below grade at the adjacent Westinghouse site (WCC, 1985) and likely exists at this depth beneath the Marketplace site. Because the maximum depth penetrated by the wells at the Marketplace site is 26.5 feet, the "Old Bay Mud" has not been observed. Groundwater elevations determined on August 20 and October 11, 1989 indicate that groundwater occurs between 3 to 6 feet below grade. In some locations groundwater first occurs within the artificial fill; in other locations (Wells W-16, W-17 and W-18) groundwater was first encountered below the artificial fill, between 16 and 25 feet below grade.

The artificial fill is unconsolidated, relatively uncompacted material comprised of gravels, sands, silts, and clays, sometimes containing wood,

brick, metal, plastic, glass and tar paper construction debris. The fill material is thickest (approximately 15 feet) in the northeastern portion of the site near monitoring Well W-8 and thinnest (approximately 3 feet) in the southeastern portion of the site near Well W-10.

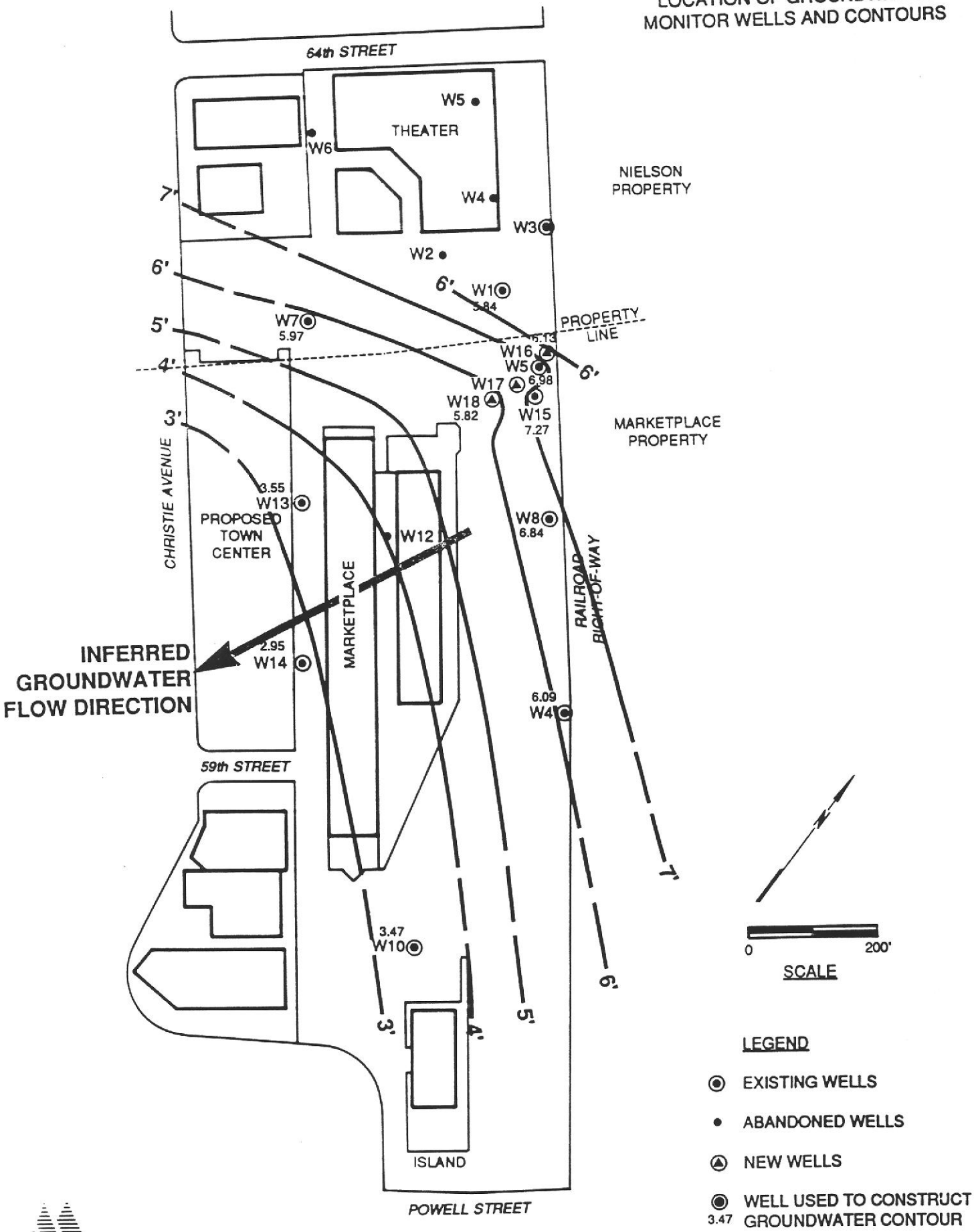
Underlying the artificial fill under most of the site is the "New Bay Mud" and silt and clay. Where it occurs, "New Bay Mud" is approximately 2 to 5 feet thick. The "New Bay Mud" is absent in areas where tidal channels or tidal pools once existed (Wells W-1, W-13, W-16, and W-17).

The "Older Alluvium" is beneath the "New Bay Mud" and tidal channel/pool deposits. This unit is unconsolidated and is comprised of materials that were deposited by streams. This unit is highly variable in composition, and consists of gravels, sands, silts, and clays of varying thickness.

Figure 5-1 is a groundwater elevation contour map. This map indicates the groundwater flow directions across the site. The predominant direction of groundwater flow is towards the southwest. The slope of the water table, and the hence the groundwater flow direction, roughly corresponds to the topography throughout the site. The hydraulic gradient is variable (0.008 to 0.011) throughout the site, most likely due to the presence of a former tidal channel.

The groundwater flow direction shown near Well W-5 and W-15 may be anomalous. The presence of free product in Well W-5 may be affecting the groundwater table in this area. The sounding data from Well W-17 was not used in the preparation of the contours since it appeared to be in error because it was approximately two feet lower than nearby wells. The reported top of casing for Wells W-17 and W-18 are suspect and will be verified. An upward vertical gradient may exist between the wells completed in the "older alluvium" and the artificial fill.

FIGURE 5-1
LOCATION OF GROUNDWATER MONITOR WELLS AND CONTOURS



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6.0 CONCLUSION

Past site activities have likely contributed to the presence of free product on site. In addition, a review of off-site groundwater contamination investigations conducted previously (McLaren, 1989) listed two sites immediately upgradient of the Marketplace that had reported concentrations of oil and diesel in the groundwater. Groundwater contamination at these sites may potentially influence the groundwater quality underlying the Marketplace Site.

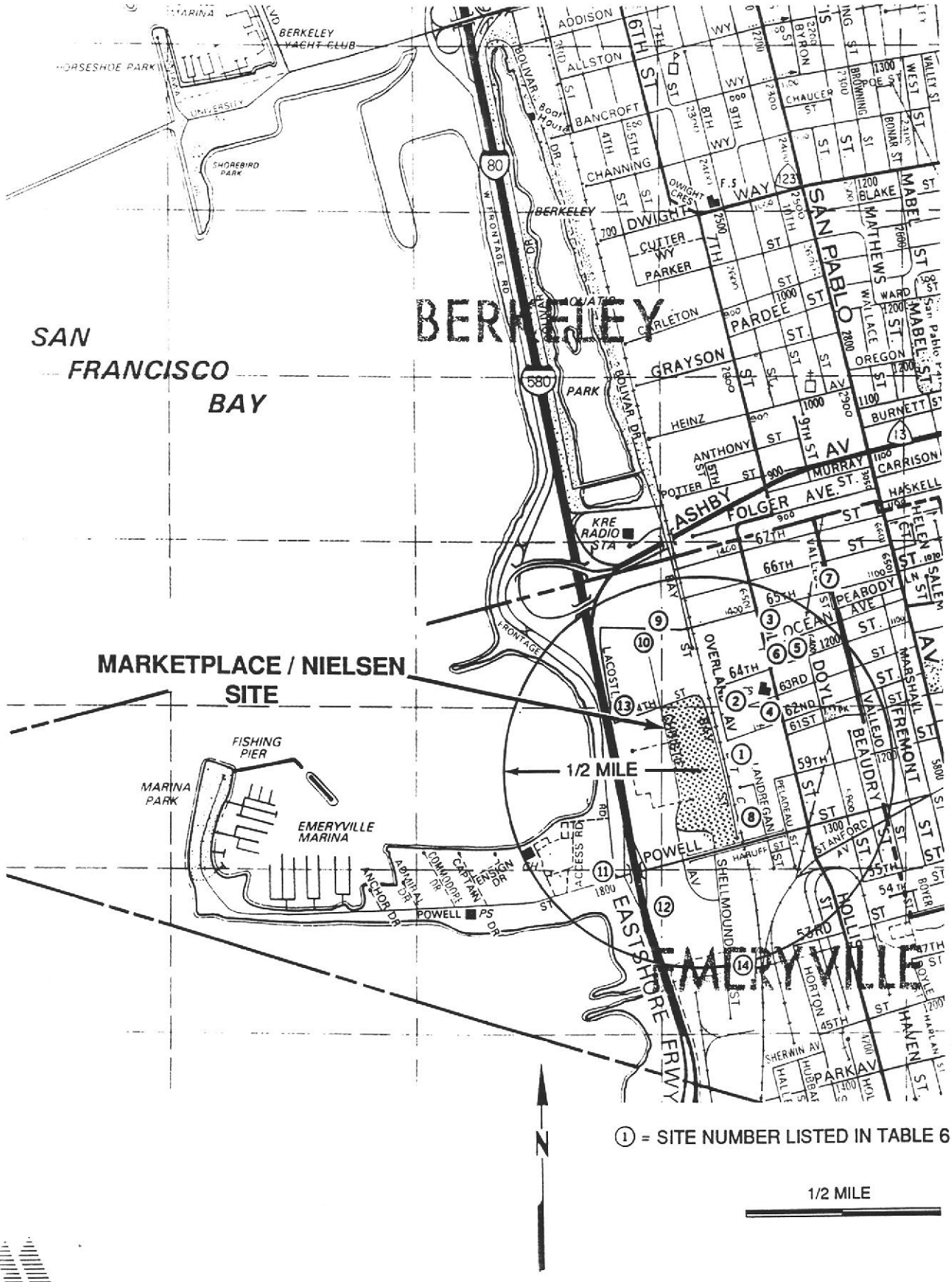
6.1 Westinghouse Electric Company, 5899 Peladeau Street (#1 on Figure 6-1)

This site is being handled by the RWQCB as a Toxics Case. The western boundary of the site is located approximately 200 yards east of the subject property in an upgradient direction. Soil and groundwater at the site contain oil, some of which was identified as transformer oil containing polychlorinated biphenyls (PCB's).

A subsurface cutoff wall (slurry wall) made of a bentonite-soil slurry was constructed on only part of the northern portion of the Westinghouse site, east of the center of the Westinghouse site in 1985. The purpose of the slurry wall was to fully encapsulate the area where PCB's occur in soil and prevent chemicals from moving off-site. The slurry wall extends to the relatively impermeable old bay mud at a depth of 35 feet and should prevent the movement of shallow groundwater in the artificial fill material from moving to the Marketplace site.

Boring logs from drilling activities at the Westinghouse site indicate the presence of "oil sheens" and "strong petroleum odor". Benzene, toluene,

FIGURE 6-1
OTHER SITES WITH REPORTED
SOIL OR GROUNDWATER
CONTAMINATION



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and ethylbenzene have also been detected in groundwater wells at the Westinghouse site. The most recent data (December, 1987) for the downgradient monitoring well at the Westinghouse site, located immediately upgradient from the Marketplace site indicate that PCB's are not present. This would suggest that the slurry wall has been effective. However, the groundwater sampling data do not report analysis for other contaminants such as TPH. It may be possible that oil contaminated groundwater migrated beyond the end of the slurry wall. This may warrant further investigation.

6.2 Peterson Manufacturing Company, 1600 63rd Street (#2 on Figure 6-1)

This site is being handled by the RWQCB as an Underground Fuel Leak Case. It is located less than 1/8 of a mile north of the Marketplace site and is now occupied by a Federal Express Terminal. The soils and groundwater at the site contain diesel fuel and gasoline. TPH/D was detected at a concentration of 17,000 ppm in a groundwater sample taken during March, 1988 from an on-site industrial well.

Groundwater samples collected at the Nielsen site in 1987 and analyzed for a variety of petroleum hydrocarbons (McLaren, 1989) indicated that groundwater from the Peterson site had not impacted the Nielsen site at that time. However, the most recent groundwater results for TPH/D at the Marketplace site suggest otherwise. Further investigation of groundwater TPH/D contamination upgradient from the Marketplace site may be warranted.

The following conclusions regarding the presence of free product are drawn:

- The free product appears isolated to the immediate area of Well W-5;

- The presence of the free product on the groundwater is likely related to historical site uses and may be related to the transfer manifold located adjacent to Well W-16 and the Santa Fe Railroad Line;

- The free product (heavy gas-oil or heavy crude oil) may have been in the soil in excess of 30 years and has shown little if no subsurface movement, indicating that this material is unlikely to migrate to off-site locations;

- The upgradient, off-site extent of free product has not been determined;

- Under the RWQCB "Tri-Regional Staff Recommendations" dated June 2, 1988 groundwater monitoring may need to be initiated and the ongoing removal of the free product may be required;

Based on the characterization of the asphalt-like substance, the following conclusions are drawn:

- Under "worst-case" conditions simulated by the TCLP, only small amounts of BTXE (<200 ppb), TPH/D (<400 ppb) and two semivolatile compounds were leached. Under the conditions expected to occur at the Marketplace site, significant leaching of the asphalt-like material is not expected to occur.

- Most importantly, BTXE has been detected at low concentrations in only two wells (W-15, and W-16) located on the eastern, upgradient boundary of the site. This indicates that volatile aromatics have not leached into the groundwater over the extensive period the material has been in the soil.

- As determined in a previous investigation the asphalt-like material is self-classified under Title 22 as non-hazardous.

Although petroleum based compounds have been detected in soil and groundwater beneath the site, only one well, W-16, located on the upgradient site boundary, showed a concentration which exceeded an established regulatory water concentration level. Benzene was detected in Well W-16 at a concentration of 5.5 ppb whereas the MCL concentration

is 1 ppb. Based on current groundwater flow data and the analytical results, the compounds in groundwater are contained within the downgradient site boundaries.

7.0 REFERENCES

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Hydrocarbon Processing, (1980). 1980 Refining Process Handbook Hydrocarbon Processing, September, 1980. pp 96.

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USEPA, (1986). Hazardous Waste Management System, Proposed Rule. Federal Register. Vol. 51(114) June 13, 1986. pp 21652.

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1011SMF

APPENDIX A

ANALYTICAL DATA SHEETS

McLaren Environmental Engineering

Date: October 2, 1989
LP #: 2264

Susan Gahry
McLaren
Suite 100
980 Atlantic Avenue
Alameda CA 94501

Dear Ms. Gahry:

Enclosed are the laboratory results for the sample(s) submitted by you to the McLaren Analytical Laboratory on September 27, 1989, for the project Market Place.

The analyses you requested are:

TPH/D
BTEX

The report consists of the following sections:

1. A copy of the chain of custody
2. Sample description (chain of custody summary form)
3. Quality Control Report
4. Analysis results

Thank you for choosing McLaren Analytical Laboratory. We are looking forward to serving you in the future. Should you have any questions concerning this analytical report or the analytical methods employed, please do not hesitate to call.

Sincerely,

Jon M. Bartell
Laboratory Director

Shakoora Azimi-Galloway
Quality Assurance Officer

McLaren Analytical Laboratory
11101 White Rock Road
Rancho Cordova, CA 95670
(916) 638-3696

Client: Susan Gahry
McLaren
Alameda, Ca. 94501

L.P. #:	2264	Project Name:	Market Place
Date Rec'd:	9/27/89	Project #:	59801-002
Date Due:	9/29/89	Contact:	Julie Menack
Section:	GC	Phone:	415-521-5200

Analysis: 4 sample(s) received under Chain of Custody 000592 and 000582 in voa vials to be analyzed for BTEX EPA Modified 602. 4 sample(s) in 1 liter ambers, to be analyzed for Total Petroleum Hydrocarbons/Diesel. Sample(s) received 9/27/89 @ 10:15. Chain of Custody agrees with sample container(s).

Correction(s) made: None

McLaren

QUALITY CONTROL REPORT

METHOD BLANK RESULTS: A method blank (MB) is a laboratory generated sample free of any contamination. The method blank assesses the degree to which the laboratory operations and procedures cause false-positive analytical results for your samples. The method blank results associated with your samples are attached.

LABORATORY CONTROL SPIKES

The LCS Program:

The laboratory control spike is a well characterized matrix (organic pure type II for water samples and contamination free sand for soil samples) which is spiked with certain target parameters and analyzed in duplicate at approximately 10% of the sample load in order to assure the accuracy and precision of the analytical method. The results of the laboratory control spike associated with your samples are attached.

Accuracy is measured using percent recovery, i.e.:

$$\text{Percent Recovery} = \frac{\text{(measured concentration)}}{\text{(actual concentration)}} \times 100$$

Precision is measured using the relative percent difference (RPD) from duplicate tests, i.e.:

$$\text{RPD} = \frac{\%\ \text{Recovery of Spike}_{(1)} - \%\ \text{Recovery of Spike}_{(2)}}{(\%\ \text{Recovery of Spike}_{(1)} + \%\ \text{Recovery of Spike}_{(2)})/2} \times 100$$

Control limits for accuracy and precision are different for different methods. They may also vary with the different sample matrices. They are based on laboratory average historical data and EPA limits which are approved by the Quality Assurance Department. McLaren Analytical Laboratory reanalyzes samples if the precision or accuracy is out of acceptance control limits.

McLaren

QUALITY CONTROL REPORT

METHOD BLANK

Method: 602 (BTEX)
Units: ug/L (ppb)

COMPOUNDS	MDL	RESULTS OF THE MB
Benzene	0.5	BRL
Toluene	0.5	BRL
Ethyl Benzene	0.5	BRL
p-Xylene	0.5	BRL
m-Xylene	0.5	BRL
o-Xylene	0.5	BRL

LABORATORY CONTROL SPIKE

Method: 602 (BTEX)
Units: ug/L (ppb)

COMPOUNDS	CONCENTRATION SPIKED	CONCENTRATION MEASURED	ACCURACY % RECOVERY	PRECISION RPD
Benzene	20.	18.	90	0
Chlorobenzene	20.	17.	85	6
Ethyl Benzene	20.	23.	115	4

McLaren

(CN2264)

QUALITY CONTROL REPORT

METHOD BLANK

Method: TPH-D by LUFT
Units: ug/ml (ppm)

COMPOUNDS	MDL	RESULTS OF THE MB
Total Petroleum Hydrocarbons Diesel	0.5	BRL

LABORATORY CONTROL SPIKE

Method: TPH-D by LUFT
Units: ug/ml (ppm)

COMPOUNDS	CONCENTRATION SPIKED	CONCENTRATION MEASURED	ACCURACY % RECOVERY	PRECISION RPD
Diesel Range	3.4	3.7	85	24

McLaren

ANALYSIS RESULTS

Test methods may include minor modifications of published EPA methods (e.g., reporting limits or parameter lists). Reporting limits are adjusted to reflect dilution of the sample when appropriate. Solids and waste are analyzed with no correction made for moisture content. Results are corrected for concentrations of analytes which may be found in the blanks.

ABBREVIATIONS USED IN THIS REPORT:

BRL	Below reporting limit
MB	Method Blank
MS	Matrix Spike
MSD	Matrix Spike Duplicate
LCS	Laboratory Control Spike
LCSD	Laboratory Control Spike Duplicate
RPD	Relative Percent Difference

Results are on the attached data sheets.

COMMENTS

VOLATILE AROMATIC COMPOUNDS
MODIFIED EPA METHOD 602 (BTEX)

Project: Market Place 59801-002

Lab Project Number: 2264

Sample Location: W-18

Lab ID Number: 31232

Sample Number: 129316-19

Date Received: 09/27/89

Date Sampled: 09/26/89

Date Analyzed: 09/28/89

COMPOUND	ANALYTE CONCENTRATION ug/L (ppb)	REPORTING LIMIT ug/L (ppb)
Benzene	BRL	0.5
Toluene	BRL	0.5
Ethylbenzene	BRL	0.5
p-Xylene	BRL	0.5
m-Xylene	BRL	0.5
o-Xylene	BRL	0.5
Surrogate recovery (percent): a,a,a-Trifluorotoluene	127*	

Comments: * High surrogate recovery due to heavy matrix interference.

Approved By: _____ Date: 09/29/89
A. Putnam

McLaren

VOLATILE AROMATIC COMPOUNDS
MODIFIED EPA METHOD 602 (BTEX)

Project: Market Place 59801-002

Lab Project Number: 2264

Sample Location: W-8

Lab ID Number: 31234

Sample Number: 129322-25

Date Received: 09/27/89

Date Sampled: 09/26/89

Date Analyzed: 09/29/89

COMPOUND	ANALYTE CONCENTRATION ug/L (ppb)	REPORTING LIMIT ug/L (ppb)
Benzene	BRL	1.
Toluene	BRL	1.
Ethylbenzene	BRL	1.
p-Xylene	BRL	1.
m-Xylene	BRL	1.
o-Xylene	BRL	1.
Surrogate recovery (percent): a,a,a-Trifluorotoluene	114*	

Comments: 1:2 dilution used in analysis due to heavy matrix interference.
* Surrogate recovery from a different detector.

Approved By: A. Putnam Date: 10/02/89

McLaren

VOLATILE AROMATIC COMPOUNDS
MODIFIED EPA METHOD 602 (BTEX)

Project: Market Place 59801-002

Lab Project Number: 2264

Sample Location: W-17

Lab ID Number: 31229

Sample Number: 129307-129309, 129310-129313

Date Received: 09/27/89

Date Sampled: 09/25/89

Date Analyzed: 09/29/89

COMPOUND	ANALYTE CONCENTRATION ug/L (ppb)	REPORTING LIMIT ug/L (ppb)
Benzene	BRL	0.5
Toluene	BRL	0.5
Ethylbenzene	BRL	0.5
p-Xylene	BRL	0.5
m-Xylene	BRL	0.5
o-Xylene	BRL	0.5
Surrogate recovery (percent): a,a,a-Trifluorotoluene	127*	

Comments: * High surrogate recovery due to matrix interference.

Approved By: _____ Date: 10/02/89
A. Putnam

McLaren

VOLATILE AROMATIC COMPOUNDS
MODIFIED EPA METHOD 602 (BTEX)

Project: Market Place 59801-002

Lab Project Number: 2264

Sample Location: W-15

Lab ID Number: 31310

Sample Number: 129301-04

Date Received: 09/27/89

Date Sampled: 09/25/89

Date Analyzed: 09/28/89

COMPOUND	ANALYTE CONCENTRATION ug/L (ppb)	REPORTING LIMIT ug/L (ppb)
Benzene	BRL	1.
Toluene	BRL	1.
Ethylbenzene	BRL	1.
p-Xylene	BRL	1.
m-Xylene	BRL	1.
o-Xylene	1.3	1.

Surrogate recovery (percent):
a,a,a-Trifluorotoluene 93

Comments: 1:2 dilution used in analysis due to heavy matrix interference.

Approved By: _____ Date: 09/29/89
A. Putnam

McLaren

TOTAL PETROLEUM HYDROCARBONS
DIESEL (by LUFT Method)

Project: Market Place 59801-002

Lab Project Number: 2264

Sample Location: W-17

Lab ID Number: 31230

Sample Number: 129311-12

Date Received: 09/27/89

Date Sampled: 09/25/89

Date Analyzed: 09/29/89

PETROLEUM HYDROCARBONS	CONCENTRATION ug/ml (ppm)	REPORTING LIMIT ug/ml (ppm)
Diesel Range	0.7	0.5

Comments:

Approved By: J. M. Hoch Date: 10/02/89

McLaren

VOLATILE AROMATIC COMPOUNDS
MODIFIED EPA METHOD 602 (BTEX)

Project: Market Place 59801-002

Lab Project Number: 2264

Sample Location: W-18

Lab ID Number: 31232

Sample Number: 129316-19

Date Received: 09/27/89

Date Sampled: 09/26/89

Date Analyzed: 09/28/89

COMPOUND	ANALYTE CONCENTRATION ug/L (ppb)	REPORTING LIMIT ug/L (ppb)
Benzene	BRL	0.5
Toluene	BRL	0.5
Ethylbenzene	BRL	0.5
p-Xylene	BRL	0.5
m-Xylene	BRL	0.5
o-Xylene	BRL	0.5
Surrogate recovery (percent): a,a,a-Trifluorotoluene	127*	

Comments: * High surrogate recovery due to heavy matrix interference.

Approved By: _____ Date: 09/29/89
A. Putnam

McLaren

VOLATILE AROMATIC COMPOUNDS
MODIFIED EPA METHOD 602 (BTEX)

Project: Market Place 59801-002

Lab Project Number: 2264

Sample Location: W-8

Lab ID Number: 31234

Sample Number: 129322-25

Date Received: 09/27/89

Date Sampled: 09/26/89

Date Analyzed: 09/29/89

COMPOUND	ANALYTE CONCENTRATION ug/L (ppb)	REPORTING LIMIT ug/L (ppb)
Benzene	BRL	1.
Toluene	BRL	1.
Ethylbenzene	BRL	1.
p-Xylene	BRL	1.
m-Xylene	BRL	1.
o-Xylene	BRL	1.
Surrogate recovery (percent): a,a,a-Trifluorotoluene	114*	

Comments: 1:2 dilution used in analysis due to heavy matrix interference.
* Surrogate recovery from a different detector.

Approved By: amp
A. Putnam

Date: 10/02/89

McLaren

VOLATILE AROMATIC COMPOUNDS
MODIFIED EPA METHOD 602 (BTEX)

Project: Market Place 59801-002

Lab Project Number: 2264

Sample Location: W-17

Lab ID Number: 31229

Sample Number: 129307-129309, 129310-129313

Date Received: 09/27/89

Date Sampled: 09/25/89

Date Analyzed: 09/29/89

COMPOUND	ANALYTE CONCENTRATION ug/L (ppb)	REPORTING LIMIT ug/L (ppb)
Benzene	BRL	0.5
Toluene	BRL	0.5
Ethylbenzene	BRL	0.5
p-Xylene	BRL	0.5
m-Xylene	BRL	0.5
o-Xylene	BRL	0.5
Surrogate recovery (percent): a,a,a-Trifluorotoluene	127*	

Comments: * High surrogate recovery due to matrix interference.

Approved By: A. Putnam Date: 10/02/89

McLaren

VOLATILE AROMATIC COMPOUNDS
MODIFIED EPA METHOD 602 (BTEX)

Project: Market Place 59801-002

Lab Project Number: 2264

Sample Location: W-15

Lab ID Number: 31310

Sample Number: 129301-04

Date Received: 09/27/89

Date Sampled: 09/25/89

Date Analyzed: 09/28/89

COMPOUND	ANALYTE CONCENTRATION ug/L (ppb)	REPORTING LIMIT ug/L (ppb)
Benzene	BRL	1.
Toluene	BRL	1.
Ethylbenzene	BRL	1.
p-Xylene	BRL	1.
m-Xylene	BRL	1.
o-Xylene	1.3	1.
Surrogate recovery (percent): a,a,a-Trifluorotoluene	93	

Comments: 1:2 dilution used in analysis due to heavy matrix interference.

Approved By: _____ Date: 09/29/89
A. Putnam

McLaren

TOTAL PETROLEUM HYDROCARBONS
DIESEL (by LUFT Method)

Project: Market Place 59801-002

Lab Project Number: 2264

Sample Location: W-17

Lab ID Number: 31230

Sample Number: 129311-12

Date Received: 09/27/89

Date Sampled: 09/25/89

Date Analyzed: 09/29/89

PETROLEUM HYDROCARBONS	CONCENTRATION ug/ml (ppm)	REPORTING LIMIT ug/ml (ppm)
Diesel Range	0.7	0.5

Comments:

Approved By: J. M. Hoch Date: 10/02/89

McLaren

TOTAL PETROLEUM HYDROCARBONS
DIESEL (by LUFT Method)

Project: Market Place 59801-002

Lab Project Number: 2264

Sample Location: W-18

Lab ID Number: 31231

Sample Number: 129314-15

Date Received: 09/27/89

Date Sampled: 09/26/89

Date Analyzed: 09/29/89

PETROLEUM HYDROCARBONS	CONCENTRATION ug/ml (ppm)	REPORTING LIMIT ug/ml (ppm)
Diesel Range	3.1	0.5

Comments:

Approved By: J. M. Hoch Date: 10/02/89

McLaren

TOTAL PETROLEUM HYDROCARBONS
DIESEL (by LUFT Method)

Project: Market Place 59801-002

Lab Project Number: 2264

Sample Location: W-8

Lab ID Number: 31233

Sample Number: 129320-21

Date Received: 09/27/89

Date Sampled: 09/26/89

Date Analyzed: 09/29/89

PETROLEUM HYDROCARBONS	CONCENTRATION ug/ml (ppm)	REPORTING LIMIT ug/ml (ppm)
Diesel Range	7.1	0.5

Comments:

Approved By: J. M. Hoch Date: 10/02/89

McLaren

TOTAL PETROLEUM HYDROCARBONS
DIESEL (by LUFT Method)

Project: Market Place 59801-002

Lab Project Number: 2264

Sample Location: W-15

Lab ID Number: 31311

Sample Number: 129305-06

Date Received: 09/27/89

Date Sampled: 09/25/89

Date Analyzed: 10/01/89

PETROLEUM HYDROCARBONS	CONCENTRATION ug/ml (ppm)	REPORTING LIMIT ug/ml (ppm)
Diesel Range	1.2	0.5

Comments:

Approved By: J. M. Hoch Date: 10/02/89

McLaren

McLaren Environmental Engineering

Date: October 3, 1989
LP #: 2271

Susan Gahry
McLaren
Suite 100
980 Atlantic Avenue
Alameda CA 94501

Dear Ms. Gahry:

Enclosed are the laboratory results for the sample(s) submitted by you to the McLaren Analytical Laboratory on September 28, 1989, for the project Market Place.

The analyses you requested are:

TPH/D
BTEX

The report consists of the following sections:

1. A copy of the chain of custody
2. Sample description (chain of custody summary form)
3. Quality Control Report
4. Analysis results

Thank you for choosing McLaren Analytical Laboratory. We are looking forward to serving you in the future. Should you have any questions concerning this analytical report or the analytical methods employed, please do not hesitate to call.

Sincerely,

Jon M. Bartell
Laboratory Director

Shakoora Azimi-Galloway
Quality Assurance ~~Officer~~

McLaren Analytical Laboratory
11101 White Rock Road
Rancho Cordova, CA 95670
(916) 638-3696

Client: Susan Gahry
McLaren
Alameda, Ca. 94501

L.P. #:	2271	Project Name:	Market Place
Date Rec'd:	9/28/89	Project #:	59801-002
Date Due:	10/2/89	Contact:	Susan Gahry
Section:	GC	Phone:	415-521-5200

Analysis: 3 sample(s) received under Chain of Custody 000588 and 000590 in 1 liter ambers to be analyzed for Total Petroleum Hydrocarbons/Diesel. 3 sample(s) in voa vials, to be analyzed for BTEX EPA Modified 602. Sample(s) received 9/28/89 @ 10:15. Chain of Custody agrees with sample container(s).

Correction(s) made: None

McLaren

QUALITY CONTROL REPORT

METHOD BLANK RESULTS: A method blank (MB) is a laboratory generated sample free of any contamination. The method blank assesses the degree to which the laboratory operations and procedures cause false-positive analytical results for your samples. The method blank results associated with your samples are attached.

LABORATORY CONTROL SPIKES

The LCS Program:

The laboratory control spike is a well characterized matrix (organic pure type II for water samples and contamination free sand for soil samples) which is spiked with certain target parameters and analyzed in duplicate at approximately 10% of the sample load in order to assure the accuracy and precision of the analytical method. The results of the laboratory control spike associated with your samples are attached.

Accuracy is measured using percent recovery, i.e.:

$$\text{Percent Recovery} = \frac{\text{(measured concentration)}}{\text{(actual concentration)}} \times 100$$

Precision is measured using the relative percent difference (RPD) from duplicate tests, i.e.:

$$\text{RPD} = \frac{\%\ \text{Recovery of Spike}_{(1)} - \%\ \text{Recovery of Spike}_{(2)}}{(\%\ \text{Recovery of Spike}_{(1)} + \%\ \text{Recovery of Spike}_{(2)})/2} \times 100$$

Control limits for accuracy and precision are different for different methods. They may also vary with the different sample matrices. They are based on laboratory average historical data and EPA limits which are approved by the Quality Assurance Department. McLaren Analytical Laboratory reanalyzes samples if the precision or accuracy is out of acceptance control limits.

McLaren

QUALITY CONTROL REPORT

METHOD BLANK

Method: 602 (BTEX)
Units: ug/L (ppb)

COMPOUNDS	MDL	RESULTS OF THE MB
Benzene	0.5	BRL
Toluene	0.5	BRL
Ethyl Benzene	0.5	BRL
p-Xylene	0.5	BRL
m-Xylene	0.5	BRL
o-Xylene	0.5	BRL

LABORATORY CONTROL SPIKE

Method: 602 (BTEX)
Units: ug/L (ppb)

COMPOUNDS	CONCENTRATION SPIKED	CONCENTRATION MEASURED	ACCURACY % RECOVERY	PRECISION RPD
Benzene	20.	17.	85	6
Chlorobenzene	20.	16.	80	6
Ethyl Benzene	20.	21.	105	9

McLaren

(CN2271)

QUALITY CONTROL REPORT

METHOD BLANK

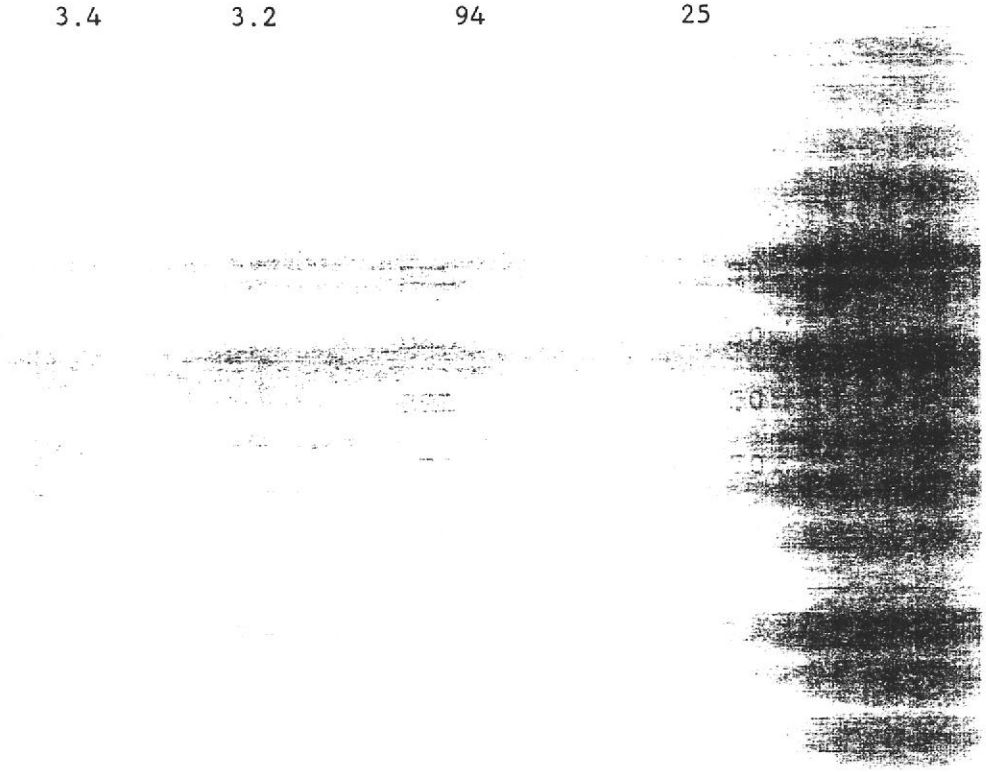
Method: TPH-D by LUFT
Units: ug/ml (ppm)

COMPOUNDS	MDL	RESULTS OF THE MB
Total Petroleum Hydrocarbons Diesel	0.5	BRL

LABORATORY CONTROL SPIKE

Method: TPH-D by LUFT
Units: ug/ml (ppm)

COMPOUNDS	CONCENTRATION SPIKED	CONCENTRATION MEASURED	ACCURACY % RECOVERY	PRECISION RPD
Diesel Range	3.4	3.2	94	25



McLaren

(CN2271)

ANALYSIS RESULTS

Test methods may include minor modifications of published EPA methods (e.g., reporting limits or parameter lists). Reporting limits are adjusted to reflect dilution of the sample when appropriate. Solids and waste are analyzed with no correction made for moisture content. Results are corrected for concentrations of analytes which may be found in the blanks.

ABBREVIATIONS USED IN THIS REPORT:

BRL	Below reporting limit
MB	Method Blank
MS	Matrix Spike
MSD	Matrix Spike Duplicate
LCS	Laboratory Control Spike
LCSD	Laboratory Control Spike Duplicate
RPD	Relative Percent Difference

Results are on the attached data sheets.

COMMENTS

VOLATILE AROMATIC COMPOUNDS
MODIFIED EPA METHOD 602 (BTEX)

Project: Marketplace 59801-002

Lab Project Number: 2271

Sample Location: W-7

Lab ID Number: 31323

Sample Number: 12928-31

Date Received: 09/28/89

Date Sampled: 09/26/89

Date Analyzed: 10/02/89

COMPOUND	ANALYTE CONCENTRATION ug/L (ppb)	REPORTING LIMIT ug/L (ppb)
Benzene	BRL	3.
Toluene	BRL	3.
Ethylbenzene	BRL	3.
p-Xylene	BRL	3.
m-Xylene	BRL	3.
o-Xylene	BRL	3.
Surrogate recovery (percent): a,a,a-Trifluorotoluene	99	

Comments: 1:5 dilution used in analysis due to foaming.

Approved By: A. Putnam Date: 10/03/89

McLaren

VOLATILE AROMATIC COMPOUNDS
MODIFIED EPA METHOD 602 (BTEX)

Project: Marketplace 59801-002

Lab Project Number: 2271

Sample Location: W-16

Lab ID Number: 31325

Sample Number: 129334-37

Date Received: 09/28/89

Date Sampled: 09/27/89

Date Analyzed: 09/29/89

COMPOUND	ANALYTE CONCENTRATION ug/L (ppb)	REPORTING LIMIT ug/L (ppb)
Benzene	BRL	3.
Toluene	BRL	3.
Ethylbenzene	BRL	3.
p-Xylene	BRL	3.
m-Xylene	BRL	3.
o-Xylene	BRL	3.
Surrogate recovery (percent): a,a,a-Trifluorotoluene	116	

Comments: 1:5 dilution used in analysis due to foaming.

Approved By: A. Putnam Date: 10/03/89

McLaren

VOLATILE AROMATIC COMPOUNDS
MODIFIED EPA METHOD 602 (BTEX)

Project: Marketplace 59801-002

Lab Project Number: 2271

Sample Location: W-5

Lab ID Number: 31327

Sample Number: 129340-43

Date Received: 09/28/89

Date Sampled: 09/27/89

Date Analyzed: 09/29/89

COMPOUND	ANALYTE CONCENTRATION ug/L (ppb)	REPORTING LIMIT ug/L (ppb)
Benzene	BRL	50.
Toluene	BRL	50.
Ethylbenzene	BRL	50.
p-Xylene	BRL	50.
m-Xylene	BRL	50.
o-Xylene	BRL	50.

Surrogate recovery (percent):
a,a,a-Trifluorotoluene 96

Comments: 1:100 dilution used in analysis due to foaming.

Approved By: A. Putnam Date: 10/03/89

McLaren

TOTAL PETROLEUM HYDROCARBONS
DIESEL (by LUFT Method)

Project: Marketplace 59801-002

Lab Project Number: 2271

Sample Location: W-7

Lab ID Number: 31322

Sample Number: 129326-27

Date Received: 09/28/89

Date Sampled: 09/26/89

Date Analyzed: 10/01/89

PETROLEUM HYDROCARBONS	CONCENTRATION ug/ml (ppm)	REPORTING LIMIT ug/ml (ppm)
Diesel Range	1.1	0.5

Comments:

Approved By: J. M. Hoch Date: 10/02/89

McLaren

TOTAL PETROLEUM HYDROCARBONS
DIESEL (by LUFT Method)

Project: Marketplace 59801-002

Lab Project Number: 2271

Sample Location: W-16

Lab ID Number: 31324

Sample Number: 129332-33

Date Received: 09/28/89

Date Sampled: 09/27/89

Date Analyzed: 10/01/89

PETROLEUM HYDROCARBONS	CONCENTRATION ug/ml (ppm)	REPORTING LIMIT ug/ml (ppm)
Diesel Range	4.7	0.5

Comments:

Approved By: J. M. Hoch Date: 10/02/89

McLaren

TOTAL PETROLEUM HYDROCARBONS
DIESEL (by LUFT Method)

Project: Marketplace 59801-002

Lab Project Number: 2271

Sample Location: W-5

Lab ID Number: 31326

Sample Number: 129338-39

Date Received: 09/28/89

Date Sampled: 09/27/89

Date Analyzed: 10/01/89

PETROLEUM HYDROCARBONS	CONCENTRATION ug/ml (ppm)	REPORTING LIMIT ug/ml (ppm)
Diesel Range	20.	5.

Comments: 1:10 dilution used in analysis.

Approved By: _____ Date: 10/02/89
J. M. Hoch

McLaren

ACUREX Corporation

Environmental Systems Division

McLaren Environmental Eng.
930 Atlantic Ave., Suite 100
Alameda, CA 94501

October 4, 1989
Acurex ID: 8909062
Client PO: 59802-02

Attention: Susan Gahry

Subject: Analysis of 1 Asphalt Sample, Received 9/21/89.

One asphalt sample was prepared according to EPA Method 1312, the Toxicity Characteristic Leaching Procedure (TCLP). A weighed aliquot of sample was ground to a particle size of <9.5mm and leached for 18 hours with twenty times its weight of an aqueous, pH 5, buffered extraction fluid in a zero headspace extractor (ZHE). Afterwards, the leachate was separated from the solid particulate by pressure filtration through a glass fiber filter. The TCLP extract was then stored at 4°C for subsequent analysis by SW-846 methods.

The sample was analyzed for purgeable aromatic compounds according to U.S. EPA Method 602 (Federal Register, Volume 49 No. 209, Oct. 26, 1984; Page 40). Results are presented in Table 1. The method can be summarized as follows:

> Helium is bubbled through a 5-mL water sample contained in a specially designed purging chamber at ambient temperature. The purgeable aromatic organic compounds are efficiently transferred from the aqueous phase to the vapor phase. The vapor is swept through a sorbent column where the purgeables are trapped. After purging is completed, the sorbent column is heated and back flushed with helium to desorb the purgeables onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the purgeables which are then detected with a PID detector.

The sample was analyzed for higher boiling petroleum hydrocarbons using guidelines established in the Regional Water Quality Control Board (RWQCB) Leaking Underground Fuel Tank (LUFT) manual. This method is also known as the modified 8015 protocol. Results are summarized in Table 2. The method can be summarized as follows:

> Higher boiling petroleum hydrocarbons such as diesel, kerosene and motor oil are extracted into organic solvent and analyzed using a gas chromatograph equipped with an FID.

485 Clyde Avenue, P.O. Box 7044, Mountain View, CA 94039 (415) 961-5700 Telex: 325961 FAX: (415) 964-5145

Samples were analyzed for semivolatile organic compounds according to U.S. EPA Method 8270 (Test Methods for Evaluating Solid Waste - SW846, 3rd Ed.,1986). Results are presented in Table 3. The method can be summarized as follows:

> A weighed aliquot of sample is extracted with methylene chloride/acetone (1:1) at neutral pH. The extract is dried using sodium sulfate and concentrated to 1 mL. Just prior to injection into a Gas Chromatograph/Mass Spectrometer (GC/MS), internal standards are added. The GC/MS is equipped with a fused silica capillary column and is set up for the analysis of semivolatile priority pollutants.

Qualitative identification of the priority pollutants is performed initially using the relative retention times and the relative abundance of three unique ions. The entire mass spectrum is checked before any final identifications are recorded. Quantitative analysis is performed by the internal standard method using a single characteristic ion and response factors obtained from a daily calibration standard. In the tables, an entry such as "<5" means that the compound was not found at a level above the laboratory's reporting limit. The reporting limit, which is based on EPA reporting levels, has been corrected for any sample dilution.

Prior to analysis, every sample is spiked with surrogate compounds as part of Acurex's Quality Control Program. These compounds simulate the behavior of compounds of interest and confirm that acceptable recoveries are being achieved on every sample. The results of surrogate recoveries are reported with the sample results.

Identification and quantitation of other semivolatile compounds is presented in Table 4.

If you should have any technical questions, please contact the undersigned at (415)964-0844.

Approved by: M. Claire Ferguson
M. Claire Ferguson
Client Services Manager

Table 1. Purgeable Aromatic Results

	McLaren Sample ID				
602 Compounds	027474 Leachate ug/L	Dup 027474 Leachate ug/L	Purge Blank ug/L	Storage Blank ug/L	Spike % Recov
Benzene	130	120	<0.5	<0.5	106
Toluene	180	170	<1.0	<1.0	119
Chlorobenzene	<2.5	<2.5	<0.5	<0.5	98
Ethylbenzene	8.5	8.0	<0.5	<0.5	NS
1,3-Dichlorobenzene	<2.5	<2.5	<0.5	<0.5	NS
1,4-Dichlorobenzene	<2.5	<2.5	<0.5	<0.5	NS
1,2-Dichlorobenzene	<2.5	<2.5	<0.5	<0.5	92
Total xylenes	140	136	<0.5	<0.5	NS
Date Analyzed:	10/2/89	10/4/89	10/2/89	10/2/89	10/2/89
Surrogate	Percent Recoveries (%)				
Bromofluorobenzene:	99	96	96	96	100

NS - Not spiked

Table 1. Purgeable Aromatic Results

McLaren Sample ID

602 Compounds	Dup Spike % Recov
Benzene	96
Toluene	83
Chlorobenzene	101
Ethylbenzene	NS
1,3-Dichlorobenzene	NS
1,4-Dichlorobenzene	NS
1,2-Dichlorobenzene	97
Total xylenes	NS

Date Analyzed: 10/2/89

Surrogate	Percent Recoveries (%)
Bromofluorobenzene:	98

NS - Not spiked

Table 2. Petroleum Hydrocarbon Results

	McLaren Sample ID		
	027474 Leachate	Method Blank	Spike
8015 Compounds	mg/L	mg/L	% Recov
Diesel	0.33	<0.05	107.4
Date Analyzed:	10/4/89	10/4/89	10/4/89

Table 3. Semivolatile Organic Results

McLaren Sample ID

8270 Compounds	027474 Leachate ug/L	Method Blank ug/L	Spike % Recov	Dup Spike % Recov
Phenol	<10	<10	50	47
Bis(2-chloroethyl)ether	<10	<10	NS	NS
2-Chlorophenol	<10	<10	54	46
1,3-Dichlorobenzene	<10	<10	NS	NS
1,4-Dichlorobenzene	<10	<10	42	46
1,2-Dichlorobenzene	<10	<10	NS	NS
Bis(2-chloroisopropyl)ether	<10	<10	NS	NS
N-Nitroso-di-n-propylamine	<10	<10	58	64
Hexachloroethane	<10	<10	NS	NS
Nitrobenzene	<10	<10	NS	NS
Isophorone	<10	<10	NS	NS
2-Nitrophenol	<10	<10	NS	NS
2,4-Dimethylphenol	53	<10	NS	NS
Bis(2-chloroethoxy)methane	<10	<10	NS	NS
2,4-Dichlorophenol	<10	<10	NS	NS
1,2,4-Trichlorobenzene	<10	<10	48	52
Naphthalene	70	<10	NS	NS
Hexachlorobutadiene	<10	<10	NS	NS
4-Chloro-3-methylphenol	<10	<10	60	55
Hexachlorocyclopentadiene	<10	<10	NS	NS
2,4,6-Trichlorophenol	<10	<10	NS	NS
2-Chloronaphthalene	<10	<10	NS	NS
Dimethyl phthalate	<10	<10	NS	NS
Acenaphthylene	<10	<10	NS	NS
Acenaphthene	<10	<10	58	62
2,4-Dinitrophenol	<100	<100	NS	NS
4-Nitrophenol	<100	<100	41	9
2,4-Dinitrotoluene	<10	<10	58	60
2,6-Dinitrotoluene	<10	<10	NS	NS
Diethyl phthalate	<10	<10	NS	NS
4-Chlorophenyl phenylether	<10	<10	NS	NS
Fluorene	<10	<10	NS	NS
4,6-Dinitro-2-methylphenol	<100	<100	NS	NS
N-Nitrosodiphenylamine	<10	<10	NS	NS
4-Bromophenyl phenylether	<10	<10	NS	NS
Hexachlorobenzene	<10	<10	NS	NS
Pentachlorophenol	<100	<100	55	22
Phenanthrene	<10	<10	NS	NS
Anthracene	<10	<10	NS	NS
Di-n-Butyl phthalate	<10	<10	NS	NS

Table 3. Semivolatile Organic Results (Continued)

	McLaren Sample ID			
8270 Compounds	027474 Leachate ug/L	Method Blank ug/L	Spike % Recov	Dup Spike % Recov
Fluoranthene	<10	<10	NS	NS
Pyrene	<10	<10	64	68
Butyl benzyl phthalate	<10	<10	NS	NS
3,3'-Dichlorobenzidine	<40	<40	NS	NS
Benzo(a)anthracene	<10	<10	NS	NS
Bis(2-ethylhexyl)phthalate	<10	<10	NS	NS
Chrysene	<10	<10	NS	NS
Di-n-octyl phthalate	<10	<10	NS	NS
Benzo(b)fluoranthene	<10	<10	NS	NS
Benzo(k)fluoranthene	<10	<10	NS	NS
Benzo(a)pyrene	<10	<10	NS	NS
Indeno(1,2,3-cd)pyrene	<10	<10	NS	NS
Dibenzo(a,h)anthracene	<10	<10	NS	NS
Benzo(g,h,i)perylene	<10	<10	NS	NS
alpha-BHC	<10	<10	NS	NS
beta-BHC	<10	<10	NS	NS
gamma-BHC	<10	<10	NS	NS
delta-BHC	<10	<10	NS	NS
Heptachlor	<10	<10	NS	NS
Aldrin	<10	<10	NS	NS
Heptachlor epoxide	<10	<10	NS	NS
Endosulfan I	<10	<10	NS	NS
Dieldrin	<10	<10	NS	NS
4,4'-DDE	<10	<10	NS	NS
Endrin	<10	<10	NS	NS
Endosulfan II	<10	<10	NS	NS
4,4'-DDD	<10	<10	NS	NS
Endrin aldehyde	<10	<10	NS	NS
Endosulfan sulfate	<10	<10	NS	NS
4,4'-DDT	<10	<10	NS	NS
Date Analyzed	10/3/89	10/3/89	10/3/89	10/3/89
Date Extracted	9/28/89	9/28/89	9/28/89	9/28/89
Surrogates	Percent Recovery (%)			
2-Fluorophenol	51	67	52	43
Phenol-d5	57	61	47	44
Nitrobenzene-d5	57	87	58	58
2-Fluorobiphenyl	63	108	58	62
2,4,6-Tribromophenol	57	57	58	35
p-Terphenyl-d14	57	82	60	62

NS - Not spiked

Table 4. Tentatively Identified Compounds

	McLaren Sample ID	
	027474 Leachate	Method Blank
8270 Compounds	ug/L	ug/L
2-Methylphenol	ND	ND
4-Methylphenol	17	ND
2-Methylnaphthalene	10	ND
C3 Substituted benzene	170	ND
C4 Substituted benzene	11	ND
Tetrahydronaphthalene	10	ND
Trimethylphenol	13	ND

ND - Not detected among the major peaks examined, detection limit unknown.

The above compounds (idents) are reported at the client's request. They were identified and quantitated by the following procedure:

After identification and quantitation of the target compounds, the 20 most intense peaks remaining in the chromatogram are selected for examination. The spectra for these peaks are compared by computer with a National Bureau of Standards library containing 42,000 entries. A chemist trained in mass spectral interpretation then examines the results. Since at the outset these peaks are unknown, no standards are usually analyzed to obtain retention time or response factor data. Quantitation is based on a comparison of the area of the reconstructed ion chromatogram from the unknown peak and the nearest internal standard. This follows the EPA CLP protocol.

000515

CHAIN OF CUSTODY RECORD

Sampler: Ken Lyle Date Shipped: 9/20/89 Carrier: Federal Express

Telephone: _____ Airbill Number: _____ Cooler: _____

SHIP TO:
~~McLaren Analytical Laboratory~~
~~11101 White Rock Road~~
~~Rancho Cordova, CA 95670~~
~~(916) 638-3696~~
E. W. Saybolt
115 N. Avalon Ave.
Wilmington, CA
90744

SEND RESULTS TO:
Client Name: Susan Gorby
Company: McLaren
Address: 980 Atlantic Ave, Ste #100
Phone: 415-521-5200 / Alameda CA 94501

PROJECT NAME: Mathetplace PROJECT #: 59802-07

LABORATORY PROJECT (LP) #: _____ P.O. #: _____

Relinquished by: (Signature) Ken D. Lyle	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received at lab by: (Signature)	Date:	Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Date/Time	Analysis Requested	T.A.T.	Type of Container	Number of Containers	Lab ID
100226	W-5	8/31/89 1610	D86 OR D1160		1 LIT Amber Bottle	1	
100227	W-5	1615	D287		40ml Vile	1	
100228	W-5	1620	D97		40ml vile	1	
100229	W-5	1625	↓		500 ml plastic bottle	1	
10030	W-5	1630	↓		↓	1	
10031	W-5	1635	↓		1 Liter ~~Amber~~ bottle	1	
100224	W-5	1600	↓		125 ml plastic bottle	1	
100225	~~SOLID~~ W-5	1605	↓		125 ml plastic bottle	1	
	SOLID	9-14-89 10:30A	D1160, D287, D97		plastic Bag	1	

Special Instructions/Comments:

Sample Condition Upon Receipt:

Expected Analytical Turn-Around Times:

1 = Immediate Attention:	2 = Rush:	3 = Standard:	4 = Standard:
24 hours	48 hours	1 week	2 weeks

Laboratory Disposition:
Storage Refrigerator ID _____
Storage Freezer ID _____

Secured:
Yes ___
No ___

000513

CHAIN OF CUSTODY RECORD

Sampler: Ken Lyle Date Shipped: 9/ /89 Carrier: Federal Express

Telephone: _____ Airbill Number: _____ Cooler: _____

SHIP TO:

McLaren Analytical Laboratory
11101 White Rock Road
Rancho Cordova, CA 95670
(916) 638-3696

Acurex
405 Clyde Ave.
Mountain View, CA
94039

SEND RESULTS TO:

Client Name: Susan Gahry
Company: McLaren
Address: 980 Atlantic Ave, Suite 100 Alameda, CA 945
Phone: 5215200

PROJECT NAME: Marketplace PROJECT #: 5980Z-07

LABORATORY PROJECT (LP) #: _____ P.O. #: _____

Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received at lab by: (Signature)	Date:	Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Date/Time	Analysis Requested	T.A.T.	Type of Container	Number of Containers	Lab ID
	~~SOIL~~	9-14-89 1030	TCLP → BTXE, TPH/D, PNAs		Plastic Bag	1	

Special Instructions/Comments:

Sample Condition Upon Receipt:

Expected Analytical Turn-Around Times:

1 = Immediate Attention: 24 hours
2 = Rush: 48 hours
3 = ~~Standard:~~ 1 week
4 = Standard: 2 weeks

Laboratory Disposition:
Storage Refrigerator ID _____
Storage Freezer ID _____

Secured:
Yes ___
No ___

8909-062 000513

CHAIN OF CUSTODY RECORD

Sampler: Ken Lyle Date Shipped: 9/ /89 Carrier: Federal Express

Telephone: Airbill Number: Cooler:

SHIP TO:
McLaren Analytical Laboratory
11101 White Rock Road
Rancho Cordova, CA 95670
(916) 638-3696

Acurex
405 Clyde Ave.
Mountain View, CA
94039

SEND RESULTS TO:
Client Name: Susan Gahry
Company: McLaren
Address: 980 Atlantic Ave, Suite 100 Alameda, CA 94
Phone: 521 5200

PROJECT NAME: Marketplace PROJECT #: 5980Z-07

LABORATORY PROJECT (LP) #: P.O. #:

Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received at lab by: (Signature)	Date:	Time:
	Diane C Martin	Sept 21	9:45

ANALYSIS REQUEST

Sample ID Number	Sample Description	Date/Time	Analysis Requested	T.A.T.	Type of Container	Number of Containers	Lab ID
027474	~~SOIL~~	9-14-89 1030	TCLP → BTXE, TPH/D, PNAs		Plastic Bag	1	

Special Instructions/Comments:

Marsha Depin Acurex
9/21/89 9:45 AM

Sample Condition Upon Receipt:

Expected Analytical Turn-Around Times:

1 = Immediate Attention: 24 hours
2 = Rush: 48 hours
3 = ~~Standard~~: 1 week
4 = Standard: 2 weeks

Laboratory Disposition:
Storage Refrigerator ID
Storage Freezer ID

Secured:
Yes
No

000592

CHAIN OF CUSTODY RECORD

Sampler: Lonie Malik Date Shipped: 9/26/89 Carrier: Fed Ex

Telephone: _____ Airbill Number: _____ Cooler: _____

SHIP TO:
McLaren Analytical Laboratory
11101 White Rock Road
Rancho Cordova, CA 95670
(916) 638-3696

SEND RESULTS TO:
Client Name: Julie Kramek
Company: McLaren
Address: Alameda
Phone: _____

PROJECT NAME: Market Place **PROJECT #:** 59801-002

LABORATORY PROJECT (LP) #: 2264 **P.O. #:** _____

Relinquished by: (Signature) Lonie Malik Received by: (Signature) Date: 9/26/89 Time: 0900

Relinquished by: (Signature) Received by: (Signature) Date: Time:

Relinquished by: (Signature) Received at lab by: (Signature) Michael A. Abernathy Date: 9/27/89 Time: 1015

ANALYSIS REQUEST

Sample ID Number	Sample Description	Date/Time	Analysis Requested	T.A.T.	Type of Container	Number of Containers	Lab ID
129301 129302	W-15	9/25/89 1340	BXTE	2	VOA	2	31300 ~~31227~~
129303 129304	W-15	9/25/89 1340	BXTE	2	VOA	2	
129305 129306	W-15	9/25/89 1340	TPH/D	2	1 lt Amber	2	31311 ~~31228~~
129307 129309	W-17	9/25/89 1450	BXTE	2	VOA	2	31229
129310 129313	W-17	9/25/89 1450	BXTE	2	VOA	2	
129311 129312	W-17	9/25/89 1450	TPH/D	2	1 lt Amber	2	31230 ~~31230~~

Special Instructions/Comments:
Ice → Fed → Lab

Sample Condition Upon Receipt:

Expected Analytical Turn-Around Times:

1 = Immediate Attention: 24 hours 2 = Rush: 48 hours 3 = Standard: 1 week 4 = Standard: 2 weeks

Laboratory Disposition:
Storage Refrigerator ID _____
Storage Freezer ID _____

Secured:
Yes ___
No ___

000582

CHAIN OF CUSTODY RECORD

Sampler: Louie Malixi | Date Shipped: | Carrier: Fed Ex

Telephone: 521-5202 | Airbill Number: | Cooler:

SHIP TO:
McLaren Analytical Laboratory
11101 White Rock Road
Rancho Cordova, CA 95670
(916) 638-3696

SEND RESULTS TO:
Client Name: Julie Menack
Company: Mclaren
Address: Alameda
Phone:

PROJECT NAME: Market Place | PROJECT #: 59801-002

LABORATORY PROJECT (LP) #: 2264 | P.O. #:

Relinquished by: (Signature) Louie Malixi	Received by: (Signature)	Date: 9/26/89	Time: 1350
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received at lab by: (Signature) Michael A. Newberry	Date: 9/27/89	Time: 10:15

ANALYSIS REQUEST

Sample ID Number	Sample Description	Date/Time	Analysis Requested	T.A.T.	Type of Container	Number of Containers	Lab ID
129314 129315	W-18	9/26/89	TPH/D	2	1 lt Amber	2	~~31331~~ 31235
129316 / 129318 129317 / 129319	W-18	9/26/89	BTXE	2	VOA	4	~~31332~~ 31236
129320 / 129321	W-8	9/26/89	TPH/D	2	1 lt Amber	2	~~31333~~ 31237
129322 / 129324 129323 / 129325	W-8	9/26/89	BTXE	2	VOA	4	~~31334~~ 31238

Special Instructions/Comments:

Ref → Fed → Lab

Sample Condition Upon Receipt:

Expected Analytical Turn-Around Times:

1 = Immediate Attention:	2 = Rush:	3 = Standard:	4 = Standard:
24 hours	48 hours	1 week	2 weeks

Laboratory Disposition:
Storage Refrigerator ID _____
Storage Freezer ID _____

Secured:
Yes ___
No ___

000590

CHAIN OF CUSTODY RECORD

Sampler: Lorie Malixi | Date Shipped: 9/27/89 | Carrier: Fed.

Telephone: 521-5200 | Airbill Number: | Cooler:

SHIP TO:
McLaren Analytical Laboratory
11101 White Rock Road
Rancho Cordova, CA 95670
(916) 638-3696

SEND RESULTS TO:
Client Name: Judie Monack
Company: McLaren
Address: Alameda
Phone:

PROJECT NAME: Market Place | PROJECT #: 59801-002

LABORATORY PROJECT (LP) #: 2271 | P.O. #:

Relinquished by: (Signature)	Received by: (Signature)	Date: 9/27/89	Time: 1700
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received at lab by: (Signature) Michael A. Flaventury	Date: 9/28/89	Time: 10:15

ANALYSIS REQUEST

Sample ID Number	Sample Description	Date/Time	Analysis Requested	T.A.T.	Type of Container	Number of Containers	Lab ID
129326 / 129327	W-7	9/26/89 1600	TPH/D	2	lt. Amber	2	30322
129328 / 129329 / 129330 / 129331	W-7	9/26/89 1600	BTXE	2	VOA	4	30323
129332 / 129333	W-16	9/27/89 1600	TPH/D	2	lt. Amber	2	30324
129334 / 129335 / 129336 / 129337	W-16	9/27/89 1600	BTXE	2	VOA	4	30325

Special Instructions/Comments:
Del → Fed → lab

Sample Condition Upon Receipt:

Expected Analytical Turn-Around Times:

1 = Immediate Attention: 24 hours | 2 = Rush: 48 hours | 3 = Standard: 1 week | 4 = Standard: 2 weeks

Laboratory Disposition: 3
Storage Refrigerator ID
Storage Freezer ID 3

Secured: Yes ✓ No

000588

CHAIN OF CUSTODY RECORD

Sampler: LX Date Shipped: 9/27/89 Carrier: FedEX

Telephone: 521-5200 Airbill Number: _____ Cooler: _____

SHIP TO:

McLaren Analytical Laboratory
11101 White Rock Road
Rancho Cordova, CA 95670
(916) 638-3696

SEND RESULTS TO:

Client Name: Julie Manack
Company: McLaren
Address: Alameda
Phone: _____

PROJECT NAME: Market Place PROJECT #: 59501-002

LABORATORY PROJECT (LP) #: 2271 P.O. #: _____

Relinquished by: (Signature) [signature] Received by: (Signature) _____ Date: 9/27/89 Time: 1435

Relinquished by: (Signature) _____ Received by: (Signature) _____ Date: _____ Time: _____

Relinquished by: (Signature) _____ Received at lab by: (Signature) Michael McNeeley Date: 9/28/89 Time: 1015

ANALYSIS REQUEST

Sample ID Number	Sample Description	Date/Time	Analysis Requested	T.A.T.	Type of Container	Number of Containers	Lab ID
129338							
129339	W-5	9/27/89	TPH/D	2	1 L Amb; 2	2	30326
129340							
129341	W-5	9/27/89	BTXE	2	VOA	2	30327
129342							
129343	W-5	9/27/89	BTXE	2	VOA	2	~~30328~~ Void Mw. ~~30329~~ Mw.

Special Instructions/Comments:

Ref → Fed → lab

Sample Condition Upon Receipt:

Expected Analytical Turn-Around Times:

1 = Immediate Attention: 24 hours 2 = Rush: 48 hours 3 = Standard: 1 week 4 = Standard: 2 weeks

Laboratory Disposition:
Storage Refrigerator ID 3
Storage Freezer ID _____

Secured: Yes ✓ No ___

SOIL DRILLING LOG

McLAREN

SB/MW # : MW-18
D- 4393
Page 1 of 1
Sampler: H. HIRSCHFELD

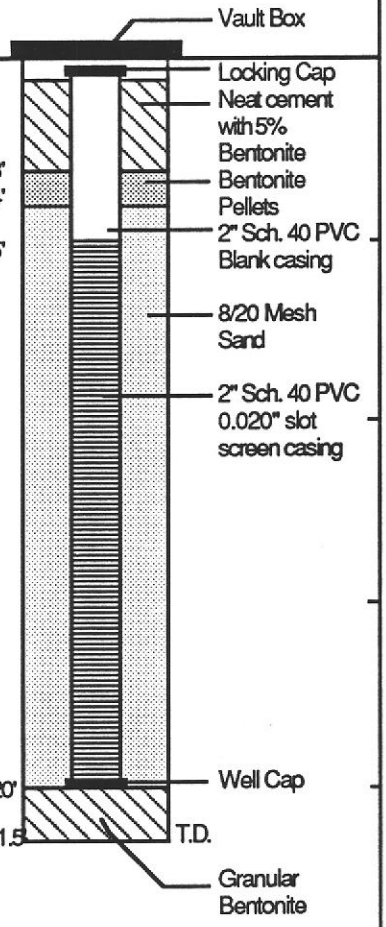
PROJECT MARKETPLACE LOCATION 40' SW OF MW-17
ELEVATION MONITORING DEVICE 580A OVM
SAMPLING DATE(S) 9-22-89 START 0930 FINISH 1330
SAMPLING METHO 8" HOLLOW STEM AUGER SUBCONTRACTOR & EQUIPMENT ENVIRONMENTAL EXPLORATION, CME-55
MEMO

Depth Below Surface(ft.)	Penetration Results: Blows 6"-6"-6"	Penetration Results: BPF	Sampler Depth Interval (ft.)	Sample ID #	OVM reading (ppm)	Soil Description Color, Texture, Moisture, Etc.	Unified Classification	Graphic Log	Sampled Depth
5'	2-4-4	8	5.0-6.5	–	52	Asphalt (4") Yellowish brown (10YR 5/4) sand and gravel fill material; medium and coarse sand; gravel to 3.0 cm; dry to slightly moist.	RB		
						Greenish gray (5G 5/1) clay; very stiff; highly plastic; streaks and pockets of grease and oil; strong petroleum odor; moist.	CH		
10'	9-13-10	23	10.0-11.5	–	133	Black (10YR 2/1) clayey sand; moderately plastic; moist; grading to yellowish brown (10YR 5/4) silty sand; medium and coarse sand; oil product; strong odor; moist.	SC/SM		
15'	8-8-7	15	15.0-16.5	–	3.4	Yellowish brown (10YR 5/4) gravelly clayey sand; coarse sand; gravel to 3.0 cm; saturated; grading to clayey sand; fine sand; moderately stiff and plastic; very moist.	SC		
20'	4-4-7	11	20.0-21.5	–	6.3	Brown (10YR 5/3) sandy clay; stiff; very plastic; fine sand; moist.	CL		
25'									
30'									

final water 10/11/89

first water

Borehole Abandonment/ Well Construction Details



SIGNATURE OF FIELD SUPERVISOR
ASSOCIATE SOIL SCIENTIST
TITLE

Julie S. Mena dc, RG #4440
SIGNATURE OF REVIEWER
SUPERVISING GEOLOGIST
TITLE

SOIL DRILLING LOG

McLAREN

SB/MW # : MW-17
D- 4392
Page 1 of 1
Sampler: H. HIRSCHFELD

PROJECT MARKETPLACE LOCATION 40' SW OF MW-15A
ELEVATION ____ MONITORING DEVICE 580A OVM
SAMPLING DATE(S) 9-21-89 START 1130 FINISH 1530
SAMPLING METHO 8" HOLLOW STEM AUGER SUBCONTRACTOR & EQUIPMENT ENVIRONMENTAL EXPLORATION, CME-55
MEMO ____

Depth Below Surface(ft.)	Penetration Results: Blows 6"-6"-6"	Penetration Results: BPF	Sampler Depth Interval (ft.)	Sample ID #	OVM reading (ppm)	Soil Description Color, Texture, Moisture, Etc.	Unified Classification
						Asphalt (6")	AC
						Sand and gravel fill material.	RB
5'	4-7-12	19	5.0-6.5	–	11	Black (10YR 2/1) clayey sand; moderately plastic; moderately stiff; medium grained sand; slightly moist to moist;oil and grease product; slight to moderate petroleum odor.	SC
10'	14-25-22	47	10.0-11.5	–	185	Olive (5Y 5/3) and yellowish brown (10YR 5/4) gravelly clayey sand; medium and coarse sand; gravel to 2.0 cm; moist; pockets of oil; strong odor.	SC
15'	5-8-10	18	15.0-16.5	–	18	Yellowish brown (10YR 5/6) clayey sand; fine sand; slightly plastic; slightly moist to moist.	SC/SM
20'	5-7-10	17	20.0-21.5	–	5.6	Yellowish brown (10YR 5/4) clayey sand; moderately stiff; moderately plastic; medium sand; saturated to very moist.	SC
25'	7-8-9	17	25.0-26.5	--	3.6	Brown (10YR 5/3) silty clay with gray (10YR 5/1) mottles; very stiff; highly plastic; moist.	CL
30'							

final water 10/11/89

first water

Graphic Log / Sampled Depth: 7' 8' 9'

Borehole Abandonment/ Well Construction Details

- Vault Box
- Locking Cap
- Neat cement with 5% Bentonite
- 2" Sch. 40 PVC Blank casing
- Bentonite Pellets
- 8/20 Mesh Sand
- 2" Sch. 40 PVC 0.020" slot screen casing
- Well Cap
- 26.5 T.D.
- Granular Bentonite

SIGNATURE OF FIELD SUPERVISOR
ASSOCIATE SOIL SCIENTIST
TITLE

Julie S. Nicoll, RG 4440
SIGNATURE OF REVIEWER
SUPERVISING GEOLOGIST
TITLE

SOIL DRILLING LOG

McLAREN

SB/MW # : MW-16
D- 4391
Page 1 of 1
Sampler: H. HIRSCHFELD

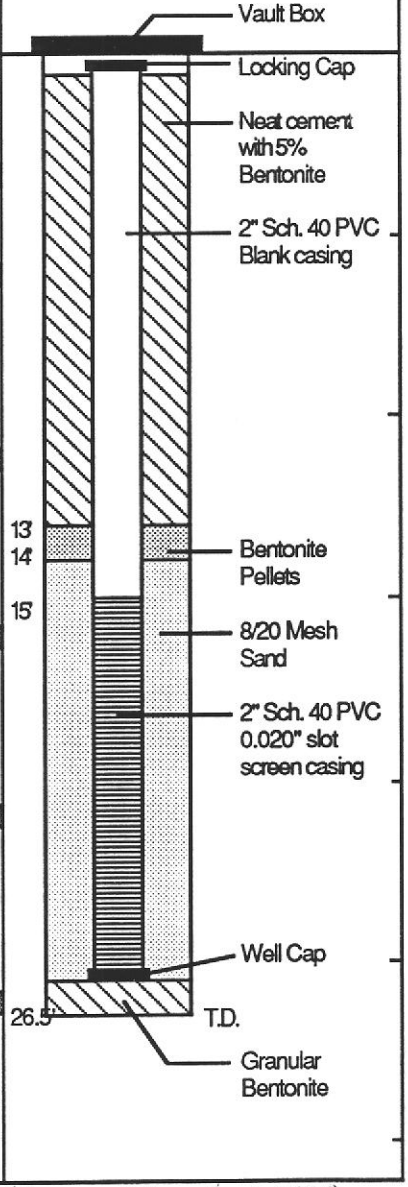
PROJECT MARKETPLACE LOCATION 40' NE OF MW-15A; 5' W OF FENCE
ELEVATION ____ MONITORING DEVICE 580A OVM
SAMPLING DATE(S) 9-21-89 START 0830 FINISH 1130
SAMPLING METHO 8" HOLLOW STEM AUGER SUBCONTRACTOR & EQUIPMENT ENVIRONMENTAL EXPLORATION, CME-55
MEMO ____

Depth Below Surface(ft.)	Penetration Results: Blows 6"-6"-6"	Penetration Results: BPF	Sampler Depth Interval (ft.)	Sample ID #	OVM reading (ppm)	Soil Description Color, Texture, Moisture, Etc.	Unified Classification	Graphic Log	Sampled Depth
			3.0-3.5	--	35	Brown (10YR 4/3) gravelly sand; fine sand to medium pebble gravel; loose; common brick; moist.	RB		
5'	2-3-4	7	5.0-6.5	--	83	Black (10YR 2/1) extremely gravelly sand; gravel to 1.5 cm in diameter; oil and grease common; moist; strong petroleum odor.	GM		
						Dark gray (5Y 4/1) clayey sand; moderately plastic; slightly sticky; medium sand; very moist; strong petroleum odor; streaks of oil and grease.	SC		
10'	8-8-8	16	10.0-11.5	--	80	Dark gray (5Y 3/1) grading to greenish gray (5G 6/1) clayey sand grading to brown (10YR 5/3) clay; very plastic; stiff to very stiff; very moist to slightly moist.	SC/CL		
15'	4-7-12	19	15.0-16.5	--	76	Olive gray (5Y 4/2) silty sand; well sorted medium sand; slightly plastic; very moist; slight petroleum odor.	SC/SM		
20'	4-6-11	17	20.0-21.5	--	157	Greenish gray (5GY 5/1) clayey sand; slightly plastic; very moist; grading to olive (5Y 3/3) sandy clay; highly plastic; very stiff; moist; oil product; strong odor.	SC/CL		
25'	4-4-8	12	25.0-26.5	--	88	Greenish gray (5GY 5/1) silty sand; medium sand to fine pebble gravel; saturated; grading to brown (10YR 5/3) clayey sand; slightly stiff; slightly plastic; moist.	SM / SC		
30'									

final water 10/11/89

first water

Borehole Abandonment/ Well Construction Details



SIGNATURE OF FIELD SUPERVISOR
ASSOCIATE SOIL SCIENTIST
TITLE

Julie S. Meacock RG-#-1440
SIGNATURE OF REVIEWER
SUPERVISING GEOLOGIST
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