

# BT Associates

Environmental Services

31 Nightowl Court, Richmond, CA 94803  
(Office) 510-222-1541 (Fax) 510-525-2178

ST17 819

## QUARTERLY GROUNDWATER MONITORING WELL SAMPLING REPORT FOR:

3516 ADELINE STREET  
OAKLAND, CA

(February 8, 1995)

RECEIVED

MAY - 9 1995

ENVIRONMENTAL HEALTH SERVICES  
NORTH COUNTY

### SITE DESCRIPTION

3516 Adeline Street is located in the northwest portion of the City of Oakland, which is in Alameda County, California. This address occupies the southeast corner of the intersection of Adeline and 35th Streets, approximately 0.1 mile west from the point at which 35th Street intersects with San Pablo Avenue. The subject site is approximately one (1) mile east of the San Francisco Bay, 60 feet south of State Highway 580 (an elevated structure), and 0.6 mile west of the Highway 580-Highway 980 interchange (Figures 1 and 2). Contiguous properties consist of a mixture of residential and commercial occupancies. The on-site buildings formerly housed the City of Paris Cleaners (a full-service laundry and dry cleaning business), but had been vacant for the past several years. At the time of this report, the facilities were in the process of being cleaned out in preparation for occupancy by a new tenant.

### GEOLOGY AND HYDROGEOLOGY

The subject site is located at an elevation of approximately 30 feet above mean sea level, on an alluvial plain that slopes gently westward toward the San Francisco Bay. Underlying deposits, known as "Bay Mud", are generally composed of unconsolidated olive-gray, blue-gray, brown or black silty clay. This clay varies from soft to stiff and is typically plastic. Permeability is generally low except where lenses of sand occur. The Franciscan Formation, a

complex assemblage of deformed and altered sediments and volcanic rocks commonly forming the bedrock in the San Francisco Bay region, has been documented underlying the sediments in the area.

The geologic materials encountered during excavation and drilling operations conducted in December of 1991 and March of 1992 by Uriah Environmental Services, Inc. (UES) of Modesto consisted predominantly of sandy gravel, clayey sand, and sandy clay. General subsoil conditions encountered during the drilling of the three (3) on-site monitoring wells were noted by UES as being consistent with regional conditions. A brown sandy gravel was encountered to a depth of approximately 12.5 feet below ground surface (bgs). A moist, olive-gray, medium clayey sand of medium density was encountered from 12.5 to 27.5 feet bgs. This clayey sand was, in turn, underlain by a stiff brown sandy clay that exhibited low plasticity (UES Report: "The Installation, Development, and Sampling of Three Groundwater Monitoring Wells at the City of Paris Cleaners site; March 31, 1993).

Groundwater was first encountered during drilling at 19 to 20 feet bgs. The static water level was measured in each well on November 18, 1992, and found to be 13.99 feet in MW-1, 13.18 feet in MW-2, and 13.93 feet in MW-3. On February 8, 1995, the hydraulic gradient was calculated as 0.189 ft./ft., and the direction of groundwater flow was determined to be to the northeast (N13°E).

#### OVERVIEW OF PREVIOUS ENVIRONMENTAL COMPLIANCE ACTIVITIES PERFORMED AT THE SITE

##### Removal of Underground Storage Tanks

On October 4, 1990, one (1) 750-gallon and two (2) 1,000-gallon underground stoddard solvent storage tanks were excavated and removed from this location by the Semco Company of San Mateo (a California-licensed contractor).

Six (6) discrete soil samples acquired attendant to the removal of the tanks were submitted for certified laboratory analysis and found to contain between 1 and 1,000 parts per million (ppm) Total Petroleum Hydrocarbons as Gasoline (TPH-G), and some elevated levels of ethylbenzene and total xylenes. Although reported as TPH-G, the TPH compound(s) detected were believed to have been stoddard solvent. On July 31 and August 1-2, 1991, UES performed a soil vapor survey at the site in an effort to define the approximate boundaries of the area of soil contamination. Although vapors were found to be widely distributed across the site, a discrete soil plume could not be defined due to the presence of buildings, subsurface utilities, and the public roadway.

### **Excavation and Remediation of Hydrocarbon-Contaminated Soil**

On August 30, 1991, employees of W.A. Craig, Inc. (WAC), a California-licensed contractor, overexcavated the eastern portion of the tank pit to a depth of approximately 15 feet. While digging in the southeastern corner of the pit, WAC encountered a 250-gallon underground stoddard solvent storage tank. This tank was subsequently excavated and disposed of in accordance with requirements set forth by Alameda County Health Care Services Agency (ACoHCSA) Inspector Dennis Byrne.

Additional excavation was performed, and 59 cubic yards of contaminated soil was subsequently bioremediated on site and later used to backfill the tank pit. Although soil samples acquired from boundaries of the remedial excavation revealed that some residual contamination remained unexcavated (9.8 to 140 ppm TPH-Stoddard Solvent and 15 to 110 ppm TPH-Diesel), Inspector Byrne advised UES that ACoHCSA would require no additional excavation as the integrity of significant structures (both on site and upon contiguous properties) could be jeopardized if further excavation was attempted.

### **Installation, Development, and Sampling of Monitoring Wells**

On October 29 and 30, 1992, three (3) groundwater monitoring wells were installed at the subject site by Soils Exploration Services (SES) of Vacaville. The wells were placed at locations approved by ACoHCSA (see Figure 4). The borings were advanced with a truck-mounted drill rig equipped with 8-inch outside diameter, continuous flight, hollow-stem augers. Drilling, logging (in accordance with the Unified Soil Classification System), and sampling were performed by/under the direction of a UES staff hydrogeologist.

Discrete soil samples were collected from the borings at five-foot intervals beginning at five (5) feet bgs in a 2-inch inside diameter, split-spoon sampler fitted with clean brass tubes measuring 1.9 inches in diameter by 6.0 inches in length. The sampler was driven 18 inches into undisturbed soil using a standard 30-inch drop of a 140 pound hammer. Upon being retrieved from the sampler, the ends of the lower-most brass tube were covered with teflon sheeting, fitted with plastic caps, and sealed with duct tape. Each tube was then labeled and placed on blue ice for transportation to a California-state certified hazardous waste analytical laboratory under chain-of-custody.

The soil samples acquired from vadose soils (from 5 and 10 feet bgs) were subsequently analyzed for Total Petroleum Hydrocarbons as Stoddard Solvent (TPH-SS), Total Petroleum Hydrocarbons as Diesel (TPH-D), and benzene, toluene, ethylbenzene, and total xylenes (BTEX) as well as for chlorobenzene and dichlorobenzene using EPA Methods 3550/8015-8020 (602).

The drilling augers and sampling equipment were steam cleaned or thoroughly scrubbed with Alconox solution followed by a distilled water rinse prior to being brought on site and between all samplings. Analytical results for the soil samples collected are presented in Table I, below:

**Table I**  
**Soil Sample Results - Soil Borings for Monitoring Wells**  
**October 29 & 30, 1992 (UES)**

Sample I.D.	TPH-SS (ppm)	TPH-D (ppm)	Benzene (ppb)	Toluene (ppb)	Ethyl- benzene (ppb)	Total Xylenes (ppb)	Chl./Dichl.- benzenes (ppb)
MW1-5'	ND	ND	0.3	12	ND	ND	ND
MW1-10'	210	ND	1.1	21	12	ND	23
MW2-5'	ND	ND	ND	63	130	210	740
MW2-10'	17	ND	ND	120	ND	360	ND
MW3-5'	ND	ND	2.4	120	47	160	410
MW3-10'	30	ND	26	550	ND	ND	230
Method Detection Limits	10	10	5	5	5	5	5
TPH-SS = Total Petroleum Hydrocarbons as Stoddard Solvent					ppm = Parts per million		
TPH-D = Total Petroleum Hydrocarbons as Diesel					ppb = Parts per billion		
ND = Not detected at or above the Method Detection Limit							
Chl./Dichl. = Chlorobenzene; 1,3 Dichlorobenzene; 1,4 Dichlorobenzene; and 1,2 Dichlorobenzene							

Following completion of the drilling, logging, and soil sampling, each boring was converted into a 2-inch inside diameter groundwater monitoring well. The wells were constructed of 2-inch inside diameter, threaded, Schedule 40 PVC risers attached to 0.020-inch slotted PVC well screen. The screened interval extended more than five (5) feet above the water table to account for anticipated fluctuations in the depth to water. The annular space around the well screen was filled with #3 Monterey Silica Sand. The sand was covered by a one foot thick bentonite seal to protect groundwater from surface water infiltration. The wells were finished by covering the bentonite with cement from the top of the seal to 0.5 feet bgs followed by concrete aggregate to grade. Each well was then covered with a locked traffic cover.

Prior to development, the newly installed wells were allowed to equilibrate for a period in excess of 48 hours. Depths to water and total well depths were

measured with an electric water level meter and the volume of water contained in each well casing was computed. The wells were then developed using a vented surge block to release and draw fines (silts, clays, and fine sands) by forcing water in and out of the well screen and adjacent annular pack. The wells were then purged using a clean, disposable polyethylene bailer until the groundwater was free of significant sediment and other grit material and pH, electrical conductivity, and temperature readings stabilized.

A water sample from each developed well was obtained with a clean, disposable, polyethylene bailer lowered into the well to a point immediately below the water surface. The sample was promptly transferred into two (2) amber glass sample bottles and two (2) Volatile Organic Analysis (VOA) vials containing hydrochloric acid preservative. Each container was sealed with a teflon-lined screw cap, labeled, and placed on blue ice for transportation to a California-state certified hazardous waste analytical laboratory under chain-of-custody. Analyses were subsequently performed for TPH-SS, TPH-D, and BTEX using EPA Methods 3510/8015-8020 (602). Analytical results are summarized in Table II (page 6, below and Appendix A).

Cuttings from the boring and rinsate generated from steam cleaning of the augers were each placed in a labeled, covered, 55-gallon DOT drum and stored on site pending receipt of laboratory analyses and development of an appropriate disposal protocol.

Groundwater acquired attendant to the development and initial sampling of all three (3) on-site monitoring wells was found to be free of detectable concentrations of TPH-D and BTEX. TPH-SS was detected in each well, as follows: 1,800 parts per billion (ppb) in MW-1; 630 ppb in MW-2; and 11,000 ppb in MW-3.

Although all soil samples contained detectable concentrations of some target analytes, UES proposed that the only significant presence was that of 210 parts per million (ppm) stoddard solvent at MW1-10. This sample was acquired from slightly moist sandy gravel overlaying less permeable clayey sand. As the soil sample acquired from this area during the course of remedial excavation contained only 14 ppm stoddard solvent, UES believed that the 210 ppm level was either: 1) representative of a small, environmentally insignificant area of residual contamination; or 2) indicative of contamination that had moved as a non-aqueous phase liquid with groundwater during a period when the water table was higher.

In consideration of the data acquired at the site by UES and others, UES proposed that no additional environmental compliance activities be required other than quarterly monitoring of wells MW-1, MW-2, and MW-3 with subsequent laboratory analyses for TPH-SS, TPH-D, and BTEX.

**COMPLIANCE MONITORING/ON-SITE GROUNDWATER MONITORING WELLS**

Groundwater samples were first collected from the on-site monitoring wells by UES on November 18, 1992. In April of 1993, UES ceased business operations. In November of 1993, the sampling and reporting responsibilities for the subject site were assumed by BT Associates.

With the approval of Hazardous Materials Specialist Susan Hugo, BT Associates again collected groundwater samples from the on-site monitoring wells on February 8, 1995. Analytical results for all groundwater samples collected at the subject site have been summarized in Table II, below:

**Table II - Groundwater Sampling Results**

Well #	Date	Depth to Water (ft)	TPH-D (ppb)	TPH-G (ppb)	TPH-SS (ppb)	Benzene (ppb)	Toluene (ppb)	Ethylbenzene (ppb)	Total Xylenes (ppb)
MW-1	11/18/92	13.99	ND	na	1,800	ND	ND	ND	ND
	11/4/93	16.79	ND	ND	2,000	ND	ND	ND	ND
	3/28/94	14.14	ND	na	150	35	40	72	120
	8/2/94	13.18	ND	ND	2,100	ND	ND	ND	ND
	2/8/95	10.92	ND	ND	620	ND	ND	ND	ND
MW-2	11/18/92	13.18	ND	na	630	ND	ND	ND	ND
	11/4/93	14.84	ND	ND	3,200	ND	ND	ND	ND
	3/28/94	11.50	ND	na	45	1.4	2	11	19
	8/2/94	13.14	ND	ND	170	ND	ND	ND	ND
	2/8/95	8.18	ND	ND	570	ND	ND	ND	ND
MW-3	11/18/92	13.93	ND	na	11,000	ND	ND	ND	ND
	11/4/93	15.16	ND	ND	320	ND	ND	ND	ND
	3/28/94	13.43	ND	na	ND	0.8	0.9	5	10
	8/2/94	12.82	ND	ND	ND	ND	ND	ND	ND
	2/8/95	7.62	ND	ND	1000	ND	ND	ND	ND
Method Detection Limits	-	-	50	50	20	0.5	0.5	0.5	0.5
Method of Analysis	-	-	3510/ 8015	5030/ 8015	3510/ 8015	602	602	602	602
TPH-D = Total Petroleum Hydrocarbons as Diesel					ND = Not detected at or above Method Detection Limit				
TPH-G = Total Petroleum Hydrocarbons as Gasoline					na = Not analyzed				
TPH-SS = Total Petroleum Hydrocarbons as Stoddard Solvent					ppb = Parts per billion				

### **Well Sampling Methodology**

Depth to water and total well depth were measured using an electric tape, and the volume of water within the 2-inch inside-diameter casings computed. Each well was then purged using a clean, disposable polyethylene bailer until the groundwater was free of significant sand, silt, and/or other grit material, and pH, conductivity, and temperature readings stabilized. In each case, more than three (3) well volumes were removed from each well. Measurements of pH, conductivity, and temperature were recorded as referenced within Appendix B.

Subsequent to purging the wells, a groundwater sample was collected from each using a clean, disposable polyethylene bailer lowered to a point just below the water surface. Using a Voss VOC Sampler, each groundwater sample was immediately transferred into a one-liter, amber glass bottle and two (2) Volatile Organic Analysis (VOA) vials. Each sample container was promptly sealed with a teflon-lined screw cap, labeled, placed on ice in an insulated container, and then transported under chain-of-custody to a California state-certified hazardous waste analytical laboratory for the following analyses: Total Petroleum Hydrocarbons as Gasoline (TPH-G) and benzene, toluene, ethylbenzene, and total xylenes (BTEX) using EPA Methods 5030/8015-8020 (602); Total Petroleum Hydrocarbons as Diesel (TPH-D) and Total Petroleum Hydrocarbons as Stoddard Solvent (TPH-SS) using EPA Methods 3510/8015.

Extracted groundwater, in excess of that acquired for laboratory analysis, was placed into a covered DOT drum and stored on site pending the receipt of the report of laboratory analysis and the development of an appropriate disposal protocol.

### **Results of Certified Laboratory Analyses**

TPH-D, TPH-G, and BTEX were non-detectable (ND) in all groundwater samples collected on February 8, 1995. TPH-SS was detected in all three (3) wells, as follows: MW-1 - 620 parts per billion (ppb); MW-2 - 570 ppb; and MW-3 - 1,000 ppb. Analytical results for the groundwater samples collected have been summarized in Table II (page 6, above, and Appendix A). Copies of all laboratory results as received from the certified hazardous waste analytical laboratory are enclosed within Appendix B.

## CONCLUSIONS AND RECOMMENDATIONS

The levels of Total Petroleum Hydrocarbons as Diesel (TPH-D), Total Petroleum Hydrocarbons as Gasoline (TPH-G), and benzene, toluene, ethylbenzene, and total xylenes (BTEX) were found to be below the limits of laboratory detection (ND) in all groundwater samples collected on February 8, 1995.

Total Petroleum Hydrocarbons as Stoddard Solvent (TPH-SS) was detected in samples from all three (3) wells, as follows: MW-1 - 620 parts per billion (ppb); MW-2 - 570 ppb; and MW-3 - 1,000 ppb. In the previous round of sampling, TPH-SS levels in samples from these wells were 2,100 ppb, 170 ppb, and ND, respectively. TPH-SS has been detected in MW-1 and MW-2 at various levels in all sampling events (total of five [5] conducted). TPH-SS had been ND in MW-3 in the two (2) previous rounds.

Based on the above, it is recommended that quarterly groundwater monitoring at the subject site be continued.

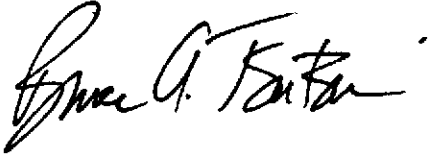
In addition, BT Associates recommends performing a pilot study using a small Pump and Treat system (as noted in the previous report and as discussed on-site with the client and ACoHCSA on February 8, 1995). The purpose of this study is to ascertain if the extraction and treatment of small to moderate volumes of water from the upper portion of first encountered groundwater will significantly reduce the levels of stoddard solvent contamination. The system is intended to extract free product (if present) and hydrocarbons dissolved in groundwater from the existing, on-site wells and introduce these contaminants into an above grade, fluidized-bed aerobic bioreactor system (Figure 6). The non-pathogenic, aerobic bacteria present within the reactor vessel are known to be capable of the complete biological detoxification of fuel hydrocarbons to form the non-toxic end products of carbon dioxide, minerals, and water. Details pertaining to the proposed program have been enclosed in Appendix C.

If approved by ACoHCSA, the pilot study will begin shortly before the next groundwater sampling event for this site (which is scheduled to take place in May of 1995).


Should you have any questions, or if we may otherwise be of assistance, please feel free to contact either of the undersigned at 510-222-1541.



Sincerely,



Bruce A. Tsutsui  
President, BT Associates  
Registered Environmental Health Specialist (#4522)



Marvin D. Kirkeby  
President, Kirkeby Engineering  
Registered Civil Engineer (#14001)



**APPENDIX A**

**FIGURES AND TABLES**

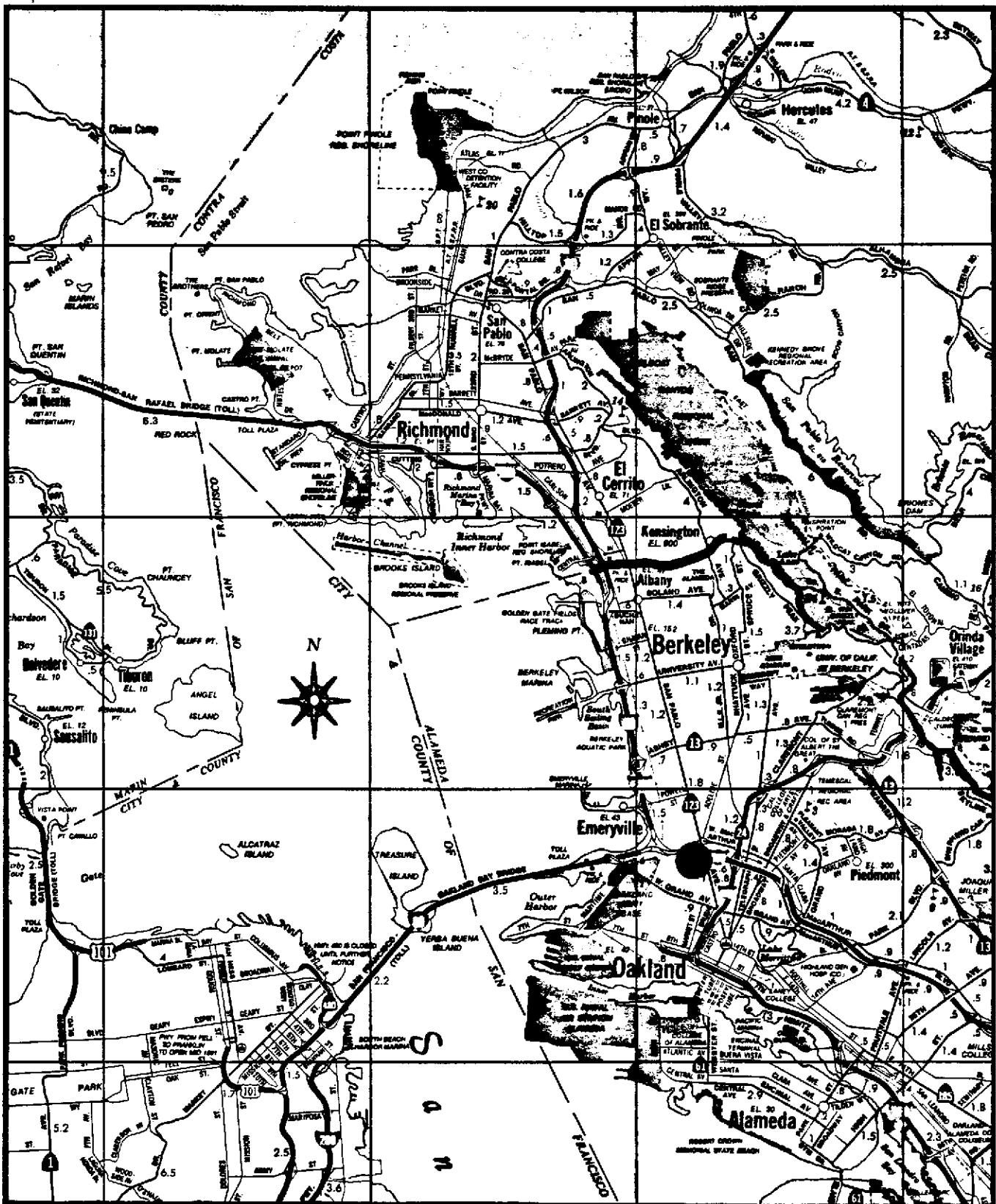
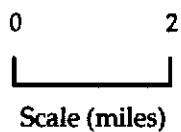
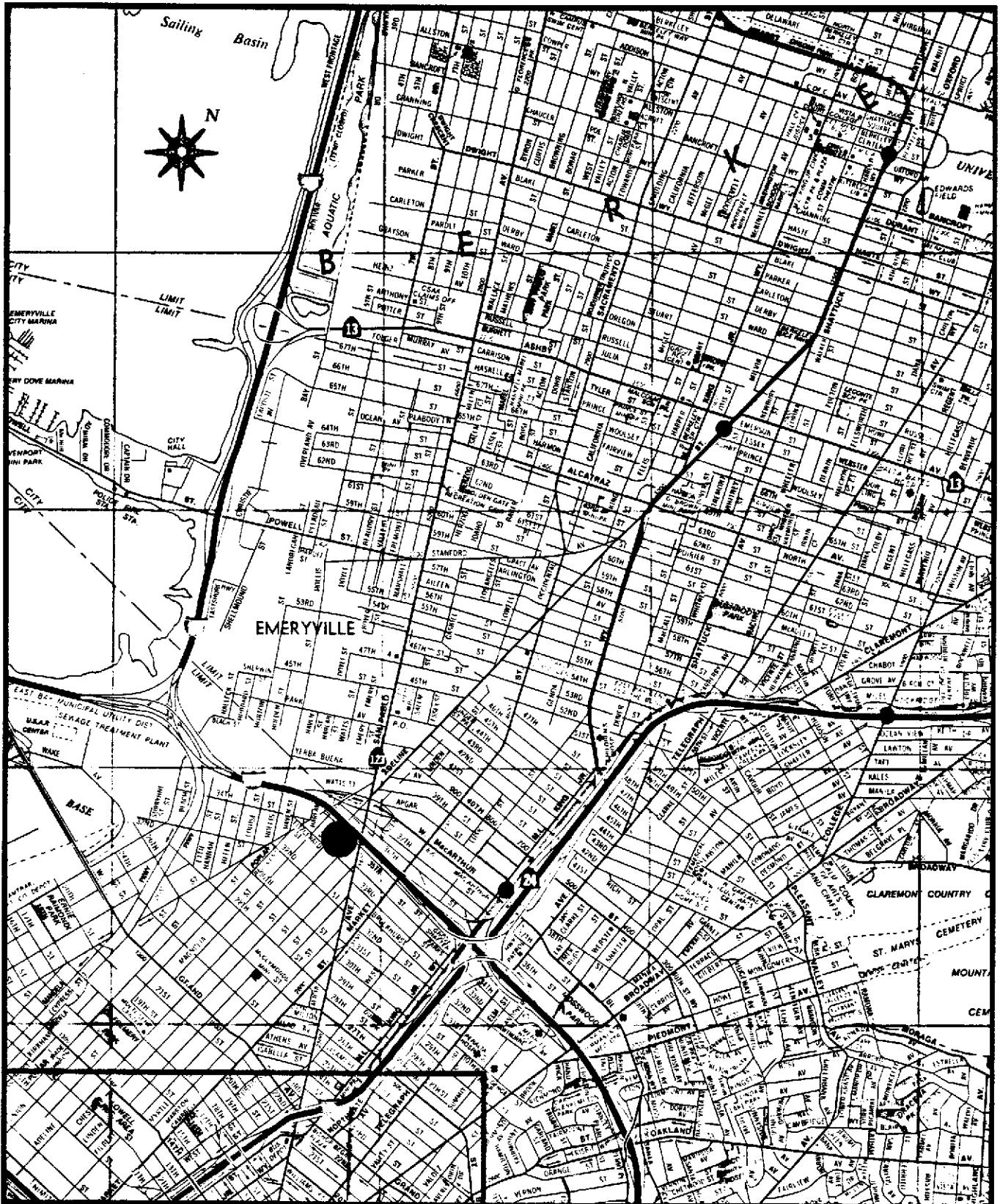


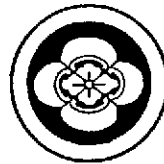
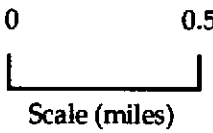
Figure 1 - Regional Map  
 Colored circle denotes location of  
 3516 Adeline Street,  
 Oakland, CA



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 31 Nightowl Court, Richmond, CA 94803



**Figure 2 - Locality Map**  
 Colored circle denotes location of  
 3516 Adeline Street,  
 Oakland, CA

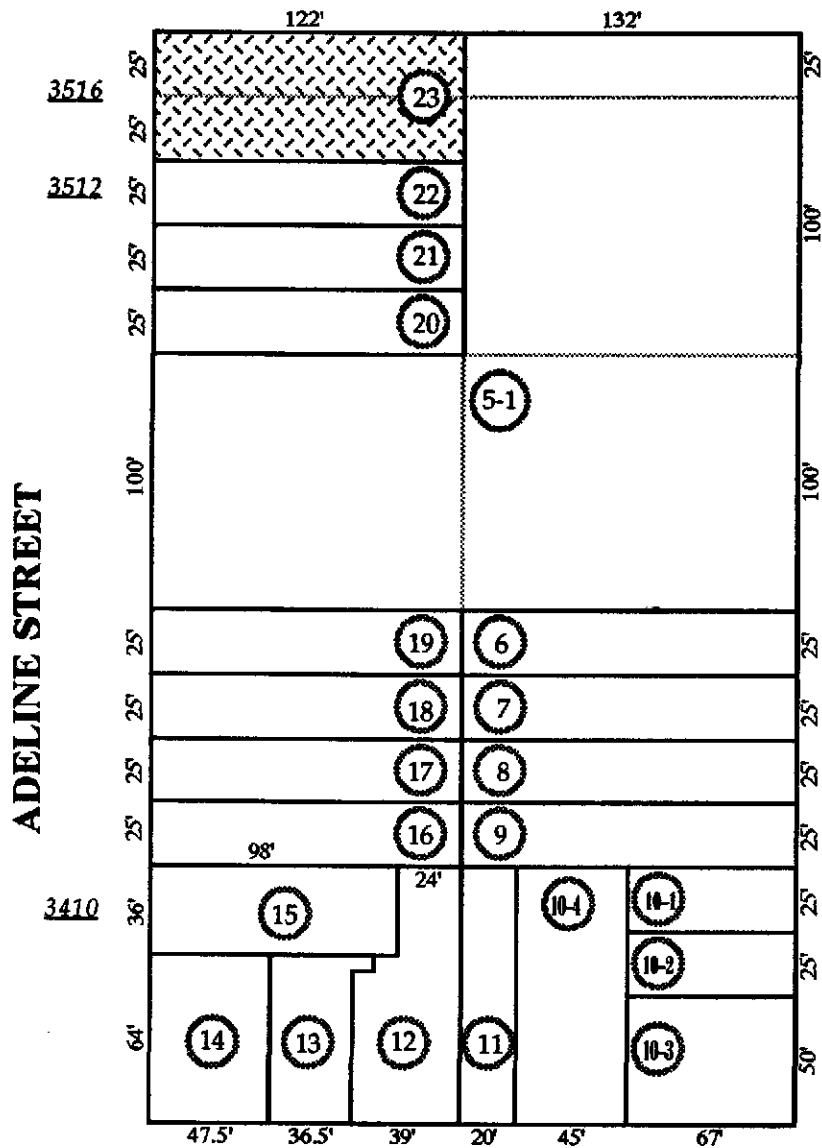


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 31 Nightowl Court, Richmond, CA 94803

MacArthur Freeway (above)



### 35TH STREET



477

ADELINE STREET

CHESTNUT STREET

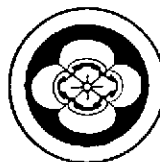
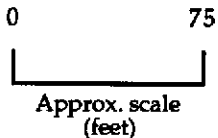
479

### 34TH STREET

Re-drawn from Alameda County Assessor's Map 5-478-23 (12/20/82)

#### Figure 3 - Detail Map

Location and shape of subject site at 3516 Adeline Street, Oakland, CA



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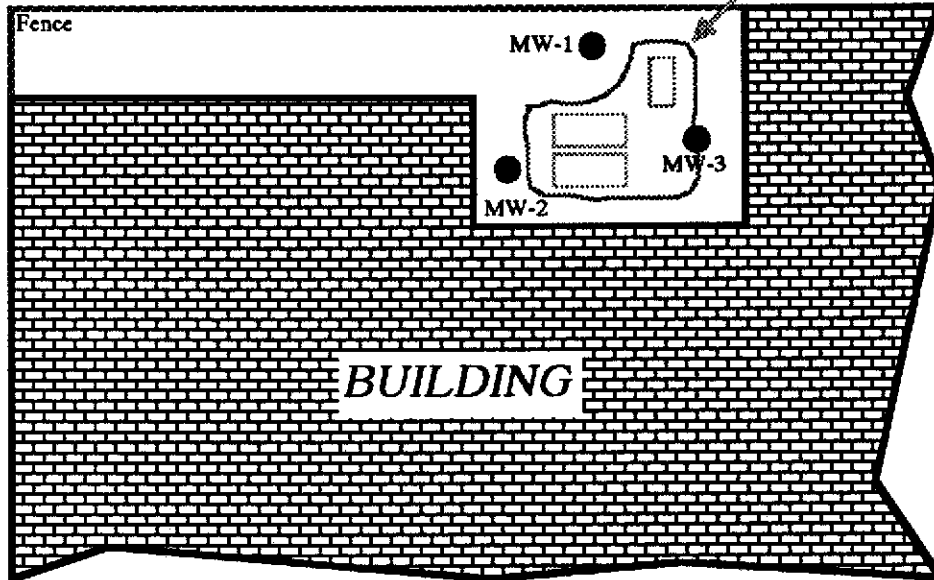
**35TH STREET**

**FORMER  
TANK PIT**

**ADELINE STREET**

Sidewalk

Sidewalk

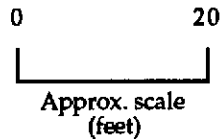


**BUILDING**

Location of former underground storage tanks and excavated area re-drawn from "Groundwater Monitoring Well Installation Report" (Uriah Environmental Services, Inc., March 31, 1993)

**Figure 4 - Detail Map**

Location and shape of subject site at  
3516 Adeline Street,  
Oakland, CA



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**35TH STREET**

**ADELINE STREET**

Sidewalk

Fence

MW-1

MW-3

MW-2

*BUILDING*

Sidewalk

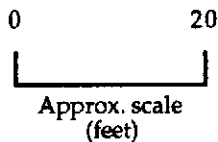
*Groundwater Flow Direction (02/08/95)*

Date	Gradient	Direction
11/04/93	0.127 ft/ft	N45°E
03/28/94	0.149 ft/ft	N50°E
08/02/94	0.023 ft/ft	N44°W
02/08/95	0.189 ft/ft	N13°E

Location of former underground storage tanks and excavated area re-drawn from "Groundwater Monitoring Well Installation Report" (Uriah Environmental Services, Inc., March 31, 1993)

**Figure 5 - Detail Map**

Direction of groundwater flow at  
3516 Adeline Street,  
Oakland, CA



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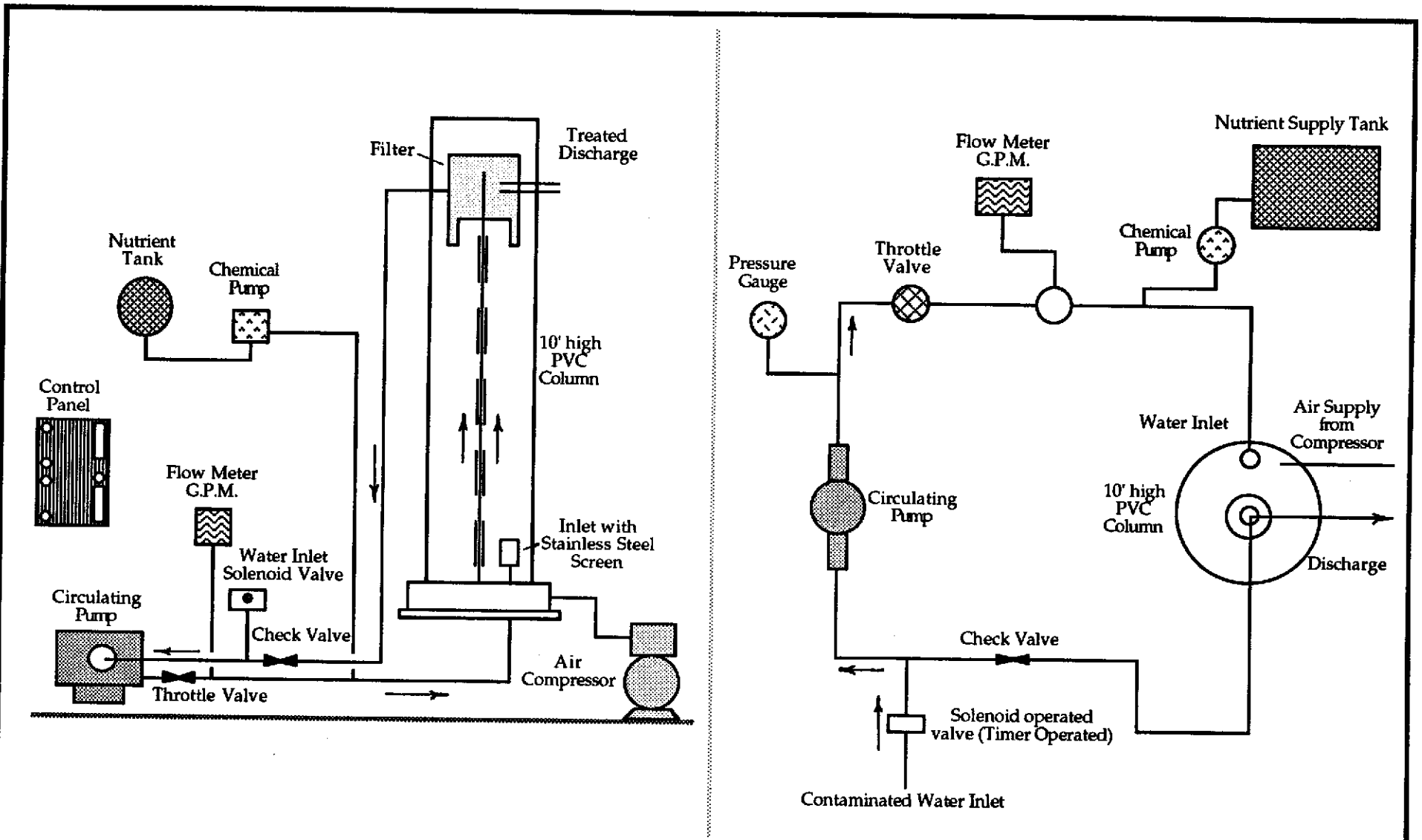
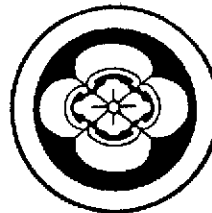


Figure 6  
 Fluidized - Bed  
 Bioreactor System



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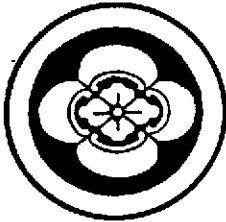


**Table I**  
**Soil Sample Results - Soil Borings for Monitoring Wells**  
**October 29 & 30, 1992 (UES)**

Sample I.D.	TPH-SS (ppm)	TPH-D (ppm)	Benzene (ppb)	Toluene (ppb)	Ethyl- benzene (ppb)	Total Xylenes (ppb)	Chl./Dichl.- benzenes (ppb)
MW1-5'	ND	ND	0.3	12	ND	ND	ND
MW1-10'	210	ND	1.1	21	12	ND	23
MW2-5'	ND	ND	ND	63	130	210	740
MW2-10'	17	ND	ND	120	ND	360	ND
MW3-5'	ND	ND	2.4	120	47	160	410
MW3-10'	30	ND	26	550	ND	ND	230
<b>Method Detection Limits</b>	10	10	5	5	5	5	5
TPH-SS = Total Petroleum Hydrocarbons as Stoddard Solvent				ppm = Parts per million			
TPH-D = Total Petroleum Hydrocarbons as Diesel				ppb = Parts per billion			
ND = Not detected at or above the Method Detection Limit							
Chl./Dichl. = Chlorobenzene; 1,3 Dichlorobenzene; 1,4 Dichlorobenzene; and 1,2 Dichlorobenzene							

**Table II  
Groundwater Sampling Results**

Well #	Date	Depth to Water (ft)	TPH-D (ppb)	TPH-G (ppb)	TPH-SS (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl- benzene (ppb)	Total Xylenes (ppb)
MW-1	11/18/92	13.99	ND	na	1,800	ND	ND	ND	ND
	11/4/93	16.79	ND	ND	2,000	ND	ND	ND	ND
	3/28/94	14.14	ND	na	150	35	40	72	120
	8/2/94	13.18	ND	ND	2,100	ND	ND	ND	ND
	2/8/95	10.92	ND	ND	620	ND	ND	ND	ND
MW-2	11/18/92	13.18	ND	na	630	ND	ND	ND	ND
	11/4/93	14.84	ND	ND	3,200	ND	ND	ND	ND
	3/28/94	11.50	ND	na	45	1.4	2	11	19
	8/2/94	13.14	ND	ND	170	ND	ND	ND	ND
	2/8/95	8.18	ND	ND	570	ND	ND	ND	ND
MW-3	11/18/92	13.93	ND	na	11,000	ND	ND	ND	ND
	11/4/93	15.16	ND	ND	320	ND	ND	ND	ND
	3/28/94	13.43	ND	na	ND	0.8	0.9	5	10
	8/2/94	12.82	ND	ND	ND	ND	ND	ND	ND
	2/8/95	7.62	ND	ND	1000	ND	ND	ND	ND
Method Detection Limits	-	-	50	50	20	0.5	0.5	0.5	0.5
Method of Analysis	-	-	3510/ 8015	5030/ 8015	3510/ 8015	602	602	602	602
TPH-D = Total Petroleum Hydrocarbons as Diesel					ND = Not detected at or above Method Detection Limit				
TPH-G = Total Petroleum Hydrocarbons as Gasoline					na = Not analyzed				
TPH-SS = Total Petroleum Hydrocarbons as Stoddard Solvent					ppb = Parts per billion				



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## WELL MONITORING FORM

CLIENT: City of Paris/Champion Family Estate

DATE: February 8, 1995

SITE ADDRESS: 3516 Adeline Street

COUNTY REPRESENTATIVE: Ms. Susan Hugo

Oakland, CA

COUNTY REPRESENTATIVE CONTACTED PRIOR TO SAMPLING? Yes

Note 1: TOTAL WELL DEPTH & DEPTH TO WATER measurements are read to an accuracy of .01' from a straight edge placed in a north-south orientation on top of the christy box.

Note 2: The 0.17 figure used below to convert WATER COLUMN HEIGHT to gallons has units of gallons/linear foot, and is for a 2" diameter, Schedule 40 PVC pipe with an inside diameter of 2.067". Similarly, use a conversion factor of 0.66 for a 4" pipe, which has a 4.026" I.D.

TOTAL WELL DEPTH 30.08' MONITORING WELL # MW-1

- DEPTH TO WATER 10.92' PURGE METHOD: Disposable Polyethylene Bailer

= WATER COLUMN HEIGHT 19.16' x 0.17 = 3.26 Gallons (1 well volume)

Multiply 1 well volume by 3 to obtain the minimum number of gallons of water to be purged from monitoring well prior to taking samples.

3 x 3.26 = 9.78 Gallons (3 Well Volumes)

TIME	GALLONS	TEMPERATURE (°F)	pH	CONDUCTIVITY $\mu$ mhos/cm
1618	0	57.4	5.83	1436
1632	4	58.7	5.86	1430
1646	8	59.1	5.85	1446
1700	12	59.3	5.85	1443

CONTAMINANT ODOR? No

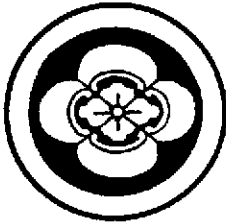
TIME OF SAMPLE COLLECTION: 1615

TURBIDITY LEVEL: Moderate

WITNESSED BY: No Witness

SHEEN ON WATER? No

SAMPLER'S SIGNATURE:   
(Bruce Tsutsui)



# BT Associates

## Environmental Services

31 Nightowl Court, Richmond, CA 94803

(Office)  
510-222-1541

(Fax)  
510-525-2178

### WELL MONITORING FORM

CLIENT: City of Paris/Champion Family Estate

DATE: February 8, 1995

SITE ADDRESS: 3516 Adeline Street

COUNTY REPRESENTATIVE: Ms. Susan Hugo

Oakland, CA

COUNTY REPRESENTATIVE CONTACTED PRIOR TO SAMPLING? Yes

Note 1: TOTAL WELL DEPTH & DEPTH TO WATER measurements are read to an accuracy of .01' from a straight edge placed in a north-south orientation on top of the christy box.

Note 2: The 0.17 figure used below to convert WATER COLUMN HEIGHT to gallons has units of gallons/linear foot, and is for a 2" diameter, Schedule 40 PVC pipe with an inside diameter of 2.067". Similarly, use a conversion factor of 0.66 for a 4" pipe, which has a 4.026" I.D.

TOTAL WELL DEPTH 30.08' MONITORING WELL # MW-2  
 - DEPTH TO WATER 8.18' PURGE METHOD: Disposable Polyethylene Bailer  
 = WATER COLUMN HEIGHT 21.90' x 0.17 = 3.72 Gallons (1 well volume)

Multiply 1 well volume by 3 to obtain the minimum number of gallons of water to be purged from monitoring well prior to taking samples.

3 x 3.72 = 11.16 Gallons (3 Well Volumes)

TIME	GALLONS	TEMPERATURE (°F)	pH	CONDUCTIVITY $\mu$ mhos/cm
1430	0	60.6	7.58	1343
1442	3.8	60.7	7.12	1368
1505	7.6	61.2	6.56	1508
1518	11.4	60.8	6.43	1527
1525	12.4	60.7	6.42	1528

\* intermittent flecks of iridescent floating material

CONTAMINANT ODOR? No

TIME OF SAMPLE COLLECTION: 1530

TURBIDITY LEVEL: Moderate

WITNESSED BY: No Witness

SHEEN ON WATER? Slight

SAMPLER'S SIGNATURE:   
(Bruce Tsuboi)



# BT Associates

Environmental Services

31 Nightowl Court, Richmond, CA 94803

(Office)  
510-222-1541

(Fax)  
510-525-2178

## WELL MONITORING FORM

CLIENT: City of Paris/Champion Family Estate

DATE: February 8, 1995

SITE ADDRESS: 3516 Adeline Street

COUNTY REPRESENTATIVE: Ms. Susan Hugo

Oakland, CA

COUNTY REPRESENTATIVE CONTACTED PRIOR TO SAMPLING? Yes

Note 1: TOTAL WELL DEPTH & DEPTH TO WATER measurements are read to an accuracy of .01' from a straight edge placed in a north-south orientation on top of the christy box.

Note 2: The 0.17 figure used below to convert WATER COLUMN HEIGHT to gallons has units of gallons/linear foot, and is for a 2" diameter, Schedule 40 PVC pipe with an inside diameter of 2.067". Similarly, use a conversion factor of 0.66 for a 4" pipe, which has a 4.026" I.D.

TOTAL WELL DEPTH 30.18' MONITORING WELL # MW-3  
 - DEPTH TO WATER 7.62' PURGE METHOD: Disposable Polyethylene Bailer  
 = WATER COLUMN HEIGHT 22.56' x 0.17 = 3.84 Gallons (1 well volume)

Multiply 1 well volume by 3 to obtain the minimum number of gallons of water to be purged from monitoring well prior to taking samples.

3 x 3.84 = 11.52 Gallons (3 Well Volumes)

TIME	GALLONS	TEMPERATURE (°F)	pH	CONDUCTIVITY $\mu$ mhos/cm
1538	0	59.9	5.98	1695
1548	3.3	60.4	5.94	1719
1600	6.6	60.6	5.91	1696
1610	9.9	61.3	5.97	1706

\* dark gray color >1/2 gal.; intermittent flecks of iridescent floating material as in MW-2

CONTAMINANT ODOR? No

TIME OF SAMPLE COLLECTION: 1705

TURBIDITY LEVEL: Moderate

WITNESSED BY: No Witness

SHEEN ON WATER? Slight

SAMPLER'S SIGNATURE: Bruce Tsutsui  
(Bruce Tsutsui)

**APPENDIX B**

**REPORTS OF CERTIFIED LABORATORY ANALYSES  
CHAIN-OF-CUSTODY AND QA/QC DOCUMENTS  
WELL MONITORING FORMS**



# PRIORITY ENVIRONMENTAL LABS

Precision Environmental Analytical Laboratory

February 11, 1995

PEL # 9502029

BT ASSOCIATES

Attn: Bruce Tsutsui

Re: Three water samples for Gasoline/BTEX and Diesel analyses.

Project name: Champion Estate

Project location: 3516 Adeline St., - Oakland

Date sampled: Feb 08, 1995

Date submitted: Feb 09, 1995

Date extracted: Feb 09-10, 1995

Date analyzed: Feb 09-10, 1995

## RESULTS:

SAMPLE I.D.	Gasoline (ug/L)	Diesel (ug/L)	Benzene (ug/L)	Toluene (ug/L)	Ethyl Benzene (ug/L)	Total Xylenes (ug/L)	Stoddard Solvent (ug/L)
MW-1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	620
MW-2	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	570
MW-3	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	1000
Blank	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Spiked Recovery	99.8%	101.2%	100.4%	80.3%	99.2%	100.4%	---
Detection limit	50	50	0.5	0.5	0.5	0.5	50
Method of Analysis	5030 / 8015	3510 / 8015	602	602	602	602	3510 / 8015

David Duong  
Laboratory Director



**BT Associates**  
Environmental Services

31 Nightowl Court  
Richmond, CA 94  
(Office) 510-222-1541 (Fax

# CHAIN OF CUSTODY

B.9.1995 Page 1 of 1

PEL # 9502029

INV # 25656

PROJECT I.D. CHAMPION ESTATE  
ADDRESS 3516 ADELIN STREET, OAKLAND  
SAMPLER'S NAME BRUCE TEUEU  
SIGNATURE [Signature]  
TELEPHONE NUMBER 510-222-1541

SAMPLE I.D.	DATE	TIME	MATRIX	T P H G	T P H D	T P H G & B T E X	B T E X	O & G	M E T A L S  Cd,Cr Pb,Zn Ni	P H A R L G O A C A L R B O N S	V O R G A N I C L E A D	O R G A N I C L E A D	T O T A L L E A D	S O L U B L E L E A D	T P H - S O L V E N T				# O F C O N T A I N E R S	
MW-1	2-8-95	1615	Soil <u>(Water)</u>		X	X									X					3
MW-2	2-8-95	1530	Soil <u>(Water)</u>		X	X									X					3
MW-3	2-8-95	1705	Soil <u>(Water)</u>		X	X									X					3
			Soil Water																	
			Soil Water																	
			Soil Water																	

LABORATORY INSTRUCTIONS / COMMENTS:  
Turn-around Time (Circle One)  
Same Day 24 Hrs. 48 Hrs. 72 Hrs. (Normal)  
2 VOL% 1 AMBER LITER PER SAMPLE;  
SAMPLES HELD UNDER REFRIGERATION  
AT LFC 2/8/95 - 2/9/95

ANALYTICAL LABORATORY PRIORITY ENV. LABS  
CITY MILPITAS

RELINQUISHED BY:  
BRUCE TEUEU  
Printed Name  
BT ASSOCIATES  
Company  
[Signature]  
Signature  
Time 150 Date 2-9-95

RECEIVED BY:  
VICTOR DUNN  
Printed Name  
[Signature]  
Company  
PEL  
Signature  
Time 1520 Date 2-9-95

RELINQUISHED BY:  
Printed Name  
Company  
Signature  
Time \_\_\_\_\_ Date \_\_\_\_\_

RECEIVED BY:  
Printed Name  
Company  
Signature  
Time \_\_\_\_\_ Date \_\_\_\_\_

RELINQUISHED BY:  
Printed Name  
Company  
Signature  
Time \_\_\_\_\_ Date \_\_\_\_\_

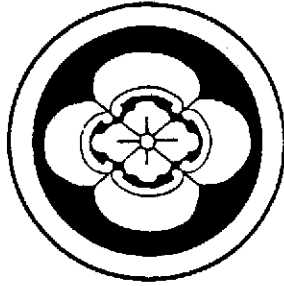
RECEIVED BY:  
Printed Name  
Company  
Signature  
Time \_\_\_\_\_ Date \_\_\_\_\_



**APPENDIX C**

(PILOT STUDY)

**PUMP AND TREAT SYSTEM**



# **BT Associates**

**Environmental Services**

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31 Nightowl Court, Richmond, CA 94803  
(Office) 510-222-1541 (Fax) 510-525-2178

**PROPOSED PROGRAM  
FOR  
GROUNDWATER EXTRACTION  
AND INTERIM REMEDIATION**

**3516 ADELINE STREET  
OAKLAND, CA**

BT Associates (BTA) has recommended performing a pilot study at the subject site using a small Pump and Treat system. The purpose of this study is to ascertain if the extraction and treatment of small to moderate volumes of water from the upper portion of first encountered groundwater will significantly reduce the levels of stoddard solvent contamination.

The system is intended to extract free product (if present) and hydrocarbons dissolved in groundwater from the existing, on-site wells and introduce these contaminants into an above grade, fluidized-bed aerobic bioreactor system (Figure 6, Appendix A). The non-pathogenic, aerobic bacteria present within the reactor vessel are known to be capable of the complete biological detoxification of fuel hydrocarbons to form the non-toxic end products of carbon dioxide, minerals, and water.

The science upon which biological detoxification is based is itself founded upon knowledge of the chemical and physical changes that occur in compounds that have entered the environment as pollutants. While changes in the composition of polluting hydrocarbon mixtures are both chemically and biologically induced in nature, biological (microbial) degradation plays a major role in this process (which is often referred to as weathering). Although the complete breakdown of hydrocarbon materials into carbon dioxide, water, and minerals is theoretically possible under virtually all circumstances, petroleum hydrocarbons are very complex mixtures containing large numbers of alicyclic, aromatic, and other compounds. Gasoline, for instance, may contain hundreds of such compounds

and crude oil many thousands. As each of these compounds possess distinct physical and chemical characteristics, they differ in their capacity to serve as microbial substrates (i.e. be utilized by microorganisms as sources of carbon and energy) within a given environment. In addition, the physical state of the pollutants, environmental temperature, availability of oxygen and nutrients (particularly nitrogen, phosphorous, potassium, and/or micro nutrients) significantly impact the rate of pollutant degradation. By employing a fluidized-bed bioreactor system to treat contaminated water, these factors can be carefully monitored and controlled, thus ensuring rapid and complete destruction of contaminants.

### HYDRAULIC CONDUCTIVITY

The flow rate of the water ( $v$ ) in a saturated, porous medium is defined by Darcy's Law. This law states that, under saturated conditions, the volume of water ( $V$ ) flowing per unit area ( $A$ ) per unit of time ( $T$ ) is directly proportional to the product of hydraulic gradient ( $h/L$ ) and soil hydraulic conductivity ( $K_s$ ):

$$v/AT = v = h/L (K_s)$$

BTA proposes to perform measurements of hydraulic conductivity at the site. The contaminant present, stoddard solvent, is a lighter-than-water, non-aqueous phase liquid petroleum hydrocarbon (LNAPL). As such, it will have a horizontal flow rate equal to the product of the hydraulic gradient and the hydraulic conductivity values exhibited by the soils near the top of the water table, whether or not groundwater below this depth moves at a higher rate.

### BIOMASS

The surface area available for microbial "attack" has a marked influence on the fate of the petroleum contaminant(s). Contaminants may be present as a thin surface film, a stable hydrocarbon-water emulsion, be entrained within sediments, or associated with suspended particles. Hydrocarbon-utilizing organisms typically position themselves at the hydrocarbon-water interface, a location that assures maximum access to both the hydrocarbon substrate and water soluble mineral nutrients. Many such microbes also produce surface active agents that emulsify oil, thereby increasing surface area. This increased surface area provides additional sites for microbial development and contaminant utilization. In order to develop and maintain high biomass, BTA will use granular activated carbon to support microbial growth with its reactor vessel.

## TEMPERATURE

As with other microbial activities, the rate at which petroleum products are degraded is strongly temperature dependent. Mesophilic bacteria (those thriving at moderate temperatures) are generally considered to be the most prolific degraders. As a result, water temperature within the BTA reactor vessel will be controlled.

## OXYGEN

In their initial attack on petroleum compounds and other hydrocarbons, bacteria commonly employ chemical compounds that catalyze the transfer of oxygen (oxygenase enzymes). This transfer process requires the presence of molecular oxygen and its availability must be considered as an important limiting factor for petroleum degradation. When low to moderate concentrations of petroleum hydrocarbons are thoroughly dispersed in aerobic water, it is unlikely that a lack of oxygen is a limiting factor. However, in cases where pools of hydrocarbons accumulate, in regions of intense decomposition, and in some groundwater, the development of anoxic conditions can severely limit the rate of (bio)degradation. To preclude this, BTA proposes to utilize bottled oxygen to supply its reactor.

## NUTRIENTS

Petroleum is rich in carbon and energy, but deficient in those mineral nutrients necessary for microbial growth (primarily nitrogen, phosphorous, and potassium). Consequently, petroleum degrading microorganisms must obtain these essential materials elsewhere. To preclude nutrient deficiencies, macro- and micro-nutrients will be carefully monitored and supplied appropriately via a metering pump system.

In addition to the above, two (2) processes can, and probably most often do, occur in the degradation of petroleum hydrocarbons. These are sparing and co-oxidation. Acetate, an intermediate product in hydrocarbon biodegradation, has been found to reduce the utilization of hexadecane. The basis for this sparing effect is not well defined, but it certainly occurs for other hydrocarbons, as well. Co-oxidation is a process in which compounds that otherwise would not be degraded can be attacked by enzymes due to the abilities of the individual microorganisms producing the enzymes to utilize other hydrocarbons within the petroleum mixture. The complexities of petroleum compounds provide an excellent chemical environment in which co-oxidation can occur, and many complex branched and cyclic hydrocarbons are degraded as a result. It has been

found, for instance, that the degradation of hydrocarbons within a gasoline mixture occur at a rate different from the degradation of individual compounds comprising the mixture. Phenomena such as these do not alter the metabolic pathways of degradation, but determine whether the enzymes necessary for metabolic attack on a particular hydrocarbon are active, or even produced. Metabolic rates of system biomass will be monitored, as necessary, to ensure the system is sufficiently active to remediate contaminants in a timely manner.

### SAMPLING AND DISPOSAL

Initially, BTA proposes to extract groundwater from the on-site monitoring wells on a weekly basis (specific volume/frequency to be determined after performing measurements of hydraulic conductivity). Samples of the treated water will be acquired (number of samples and frequency dependent upon the volume of water being treated) and submitted for certified analyses under chain-of-custody.

Following treatment, remediated water will be discharged to the sanitary sewer under the authority of a permit issued for this purpose. Fuel hydrocarbons sorbed onto soil particles in the saturated zone will also be remediated using this technology through the dynamics of equilibrium stoichiometry. As noted above, a schematic of the bioreactor system proposed for the site has been enclosed as Figure 6 (Appendix A).

\* \* \* \* \*

With the approval of the client and the Alameda County Health Care Services Agency (ACoHCSA), BT Associates will begin the referenced work at the time of the next groundwater sampling event for this site (scheduled to take place in May of 1995).