R. William Rudolph, Jr., PE
Thomas E. Cundey, PE
Jeriann N. Alexander, PE

November 6, 1995
SCI 447.055

STID 469

Ms. Susan Hugo
Senior Hazardous Materials Specialist
Alameda County Health Care Services Agency
Harbor Bay Parkway
Alameda, California

Transmittal
Corrective Action Work Plan
3093 Broadway
Oakland, California

Dear Ms. Hugo:

Enclosed please find a Corrective Action Work Plan and associated cost breakdown for implementation of remedial actions at the referenced site. The plan addresses issues presented in your October 16, 1995 letter.

The responsible parties will be submitting this package to the California Underground Storage Tank Cleanup Fund (FUND) to obtain preapproval for the work outlined. The FUND has indicated that a signed written letter of approval is required from the oversight agency prior to obtaining preapproval. Hence, your prompt favorable response would be greatly appreciated. A copy of the FUND preapproval request application is enclosed. If you have any questions, please call.

Yours very truly,

Subsurface Consultants, Inc.

Jeriann N. Alexander, P.E.
Project Manager

Enclosed: Corrective Action Work Plan
Estimated Fee Breakdown
FUND Preapproval Letter

Subsurface Consultants, Inc.
171 12th Street • Suite 201 • Oakland, California 94607 • Telephone 510-268-0461 • FAX 510-268-0137

R. William Rudolph, Jr., PE
Thomas E. Cundey, PE
Jeriann N. Alexander, PE

November 6, 1995
SCI 447.055

Mr. Jonathan Redding
Fitzgerald, Abbott & Beardsley
1221 Broadway, 21st Floor
Oakland, California 94612-1837

Corrective Action Work Plan
3093 Broadway
Oakland, California

Dear Mr. Redding:

This letter transmits a Corrective Action Work Plan prepared by Subsurface Consultants, Inc. (SCI) in general accordance with the guidelines of Title 23, Article 11 of the California Code of Regulations. SCI has provided environmental engineering services related to petroleum releases at the site since 1989. Hence, this work plan is based on SCI's extensive experience with site conditions and constraints.

ASSESSMENT of IMPACTS

A. Hydrogeologic Characterization

The site is situated on the south side of Hawthorne Avenue, between Broadway and Webster Street. The site contains a high one-story building with a slab-on-grade floor. Asphalt and concrete-paved accesses extend along the west and south sides of the building; sidewalks extend along the north and east sides. Three former tanks were located beneath the sidewalk adjacent to the north side of the site, as shown on Plate 1.

The site was developed by cutting into the eastern flank of a minor structural uplift on the Oakland alluvial plain commonly known as "Pill Hill". The ground surface in the area slopes moderately down toward the east and southeast across Broadway and toward Glen Echo Creek, which drains in a southerly direction to Lake Merritt.

Hydrogeologic assessment of the site has confirmed geologic mapping by Radbruch (1957). In general, the site is underlain by the Temescal formation, an extensive Quaternary-age alluvial fan deposit composed of interbedded lenses of silt, sand, clay and gravel. Because of the random nature of alluvial fan deposition, the heterogeneous layers of the Temescal formation are irregular in thickness and

laterally discontinuous. As encountered during past investigations, soils underlying the site range from silty clays to sandy gravels. The sand and gravel deposits typically occur as lenses interfingered with the more prevalent silts and clays. Significant lateral stratigraphic discontinuities, localized perched groundwater zones, and preferential groundwater flow paths exist within the underlying formation.

Groundwater levels have been measured periodically in the on-site wells beginning in 1990. The direction of groundwater flow is generally towards the east. Where coarse-grained soil deposits are coincident with the groundwater level, pathways of preferential groundwater flow are developed due to the higher hydraulic conductivity of these soils. The effect may account for the variable nature of the direction and gradient across the site. Historic water level readings are summarized in Table 1. Our interpretation of the flow direction and gradient for the August 1995 event are presented on Plate 2.

Pumping test results indicated that preferential flow exists within coarse-grained deposits. The effect of pumping from well MW-10, which has a well-graded sandy gravel present at the groundwater surface, was observed up to 200 feet away in well MW-2 in which coarse-grained soils were also present at the groundwater surface. However, well MW-6, situated about 90 feet away from well MW-10, which also has coarse-grained soils at the groundwater surface was unaffected by pumping. Pumping from well MW-8, which penetrates predominately fine grained soils, did not effect water levels in adjacent wells.

B. Characteristics of the Contaminants

On December 18, 1989, three underground fuel storage tanks which previously contained gasoline, diesel and waste oil were removed from the site. Studies to date indicate that soil and groundwater have been impacted predominately by releases of gasoline. Gasoline impacted soils have been identified near the former tank area and within the zone of groundwater fluctuation downgradient of the tank area. Free product is floating on the groundwater surface in areas up to 200 feet downgradient of the tank area. The free and dissolved product plumes appear to be coincident with each other. The distribution of the gasoline plume has remained essentially unchanged since the study began in 1989.

Contaminants of primary concern which have been identified to date include the volatile constituents of gasoline including benzene, toluene, ethylbenzene, and total xylenes (BTEX), and 1,2-Dichloroethane (DCA, a.k.a. Ethylene Dichloride, EDC), and polycyclic aromatics including naphthalene, and 2-methylnaphthalene. During the most recent monitoring event (August 1995) very low levels of oil and grease and semi-volatile organic compounds have also been detected locally near the former waste oil tank. Historic analytical data is summarized in Tables 2 and 3.

C. Surface Water

The nearest surface water body is Glen Echo Creek situated 600 feet southeast of the downgradient edge of the dissolved product plume. The creek is a fresh water tributary which drains southerly to Lake Merritt. The water within the creek potentially could accommodate most of the designated beneficial uses outlined in the San Francisco Bay Regional Basin Plan (December 1986).

Lake Merritt is an estuarine water body situated 3700 feet south of the plume. A tidal canal connects the lake to San Francisco Bay. The mode of plume migration to the lake would be through interception by Glen Echo Creek. The beneficial uses of the lake include water contact and non-contact water recreation, wildlife habitat, and fish spawning.

D. Groundwater

The depth to first encountered groundwater currently varies from 18 to 28 feet below adjacent groundsurface elevations. Groundwater has been shown to flow in a southeasterly direction along preferential pathways which exist within permeable soil zones. The permeable zones exist as laterally discontinuous layers.

Groundwater beneath the site is within the East Bay Plain Subarea of the San Francisco Bay Basin. Potential beneficial uses include municipal industrial and agricultural supply. However, it has been locally recognized that the first encountered groundwater zone has limited use due to low yield and numerous impacts associated with the historic urban development of the area.

E. Potential Effects of Residual Contamination on Water

The first encountered groundwater layer beneath the site has been adversely impacted by previous petroleum releases. A free gasoline product plume has been identified floating on the groundwater surface at distances up to 200 feet from the former tank area. The free product plume has not been found in wells at the property limits. A dissolved plume characterized by gasoline and diesel range hydrocarbons, BTEX and 1,2-DCA also exists. The dissolved plume appears to be localized to the site and adjacent streets.

The free product plume has not migrated to previously unimpacted wells during the past 6 years of monitoring. The free product is perched within permeable soils which exist within discontinuous layers. Free product mobilization appears to occur coincident with groundwater level changes. During the last 6 years the groundwater level changes have resulted in varying thickness' of free product plume in the impacted wells. Given the monitoring data, it does not appear that the free product plume has the potential to impact Glen Echo Creek or Lake Merritt.

Monitoring data is inconclusive regarding the potential for significant migration of the dissolved plume. Contaminant concentrations appear to be influenced by seasonal rainfall and naturally occurring biodegration at the plume boundary. Given the current plume boundary and the distance to Glen Echo Creek and Lake Merritt, it is unlikely that the dissolved plume would reach these water bodies. Additional study and monitoring is required to assess this potential.

PROPOSED CORRECTIVE ACTION

As discussed at the Pre-Enforcement Review Panel meeting on September 27, 1995, the Alameda County Health Care Services Agency (ACHCSA) is requiring that the following actions be performed at the site:

- Interim remedial measures consisting of free product recovery
- Groundwater monitoring
- Preparation of a Final Corrective Action Plan (CAP) including feasibility studies for alternatives which may have long term application
- Development of site specific cleanup levels

Details regarding these actions are described herein.

A. Interim Remedial Measures/Free Product Source Reduction

Free product recovery using skimmer pumps and bailers have removed 89 gallons of free gasoline product from the three impacted wells MW-1, MW-4 and MW-6. Product removal data is summarized in Table 5. Product removal will continue using these methods until a long term solution is identified.

Product thickness' measured in well MW-6 in 1995 are greater than those measured during previous events. During site studies between 1991 and 1994, the average thickness of free product in well MW-6 was about 2 to 3 feet. In August 1995, about 7.9 feet of floating product was measured in well MW-6. The product was removed and two weeks later was measured to be [illegible] thick. It is our opinion that the increase is related to the downgradient redistribution of product along preferential flow paths. Free product appears to be perched within non-contiguous permeable zones. When these zones are intercepted by groundwater levels, the free product is mobilized and migrates. As water levels fluctuate so will the availability of the free product.

While bailing/skimming has been shown to be an effective means of product removal, SCI proposes a more aggressive approach using vapor extraction technologies (VES) to continuously remove free product, thereby increasing the rate of free product removal. VES is a proven technology for the removal of free product and vadose zone soil contamination and has the added benefit of thermally destroying the contaminants and eliminating the need for storage and disposal of a contaminated water and fuel mixture.

In general, a portable soil vapor extraction system (VES) will be utilized to remove product from well MW-6, a well in which the thickest free product measurements have been recorded to date. A vacuum will be applied to well MW-6 which will be sufficient to volatilize the product. The recovered vapors will be passed through a trailer mounted internal combustion engine to thermally destroy the hydrocarbons. The treated air will then be released under permit to the atmosphere.

Prior to operating the system, appropriate permits will be obtained from the City of Oakland Fire Department and the Bay Area Air Quality Management District (BAAQMD). In accordance with the BAAQMD permit, samples of the treated effluent will be collected daily for the first 7 days of operation, weekly for the subsequent 2 week period, and then on a monthly basis. The effluent samples will be analyzed for TVH and BTEX on a rapid turnaround basis to document that hydrocarbon destruction is continuing to occur. In addition, vapor influent samples will be obtained monthly and analyzed for TVH, BTEX and 1,2-DCA on a rapid turnaround basis to evaluate the appropriateness of the system settings.

It is proposed to operate the VES in well MW-6 for a 6 month period. The data generated during the 6 month period, along with the concurrent feasibility studies, will be used to evaluate the use of VES as a long term source reduction alternative.

B. Groundwater Monitoring

Groundwater level measurements will be performed on a quarterly basis in all the wells. The wells will then be checked for the presence of free floating product. Free product which is detected will be removed as an interim remedial measure, and the wells will not be sampled. Wells which do not contain measurable free product will be purged and sampled. As discussed in the meeting, the sampling frequency and analytes to be tested for are summarized in the following table.

add MTBE

Well	Location	Impact related to USTs	Analytes	Sampling Frequency
FP 1	Source Area	Yes	TVH/BTEX, O&G TEH, DCA, SVOC	SA
2	Upgradient/Side Gradient	No YES	TVH/BTEX, TEH, DCA	A
3	Side Gradient	No	TVH/BTEX, TEH, DCA	A
FP 4	Mid Plume	Yes	TVH/BTEX, TEH, DCA	SA
5	Side Gradient	No	TVH/BTEX, TEH, DCA	A
FP 6	Mid Plume	Yes	TVH/BTEX, TEH, DCA	SA
7	Side/Down Gradient	No	TVH/BTEX, TEH, DCA	Q
8	Down Gradient	Yes	TVH/BTEX, TEH, DCA	Q
9	Mid Plume	Yes	TVH/BTEX, TEH, DCA	SA
10	Mid Plume	Yes	TVH/BTEX, TEH, DCA	A
11	Upgradient	No YES	TVH/BTEX, TEH, DCA	A
12	Not a Well			
13	Down Gradient	Yes	TVH/BTEX, TEH, DCA	Q

A - Annually
SA - Semi Annually
Q - Quarterly

Quarterly reports will be prepared which include isoconcentration maps for soil and groundwater, groundwater contour maps and historic tabulated water level elevations, free product thickness' and analytical data.. The next event is scheduled to be performed in November 1995. During that event a product sample from well MW-6 and water samples from wells MW-1 and MW-9 will be analyzed for ~~typical gasoline~~ additives including MTBE. If MTBE is identified, then MTBE will be added to the testing program.

C. Feasibility Studies

Feasibility studies will be performed to evaluate the cost effectiveness of using VES for free product removal and in situ bioremediation for dissolved contaminant reduction.

1. Vapor Extraction

A one day vapor extraction pilot test will be performed to further evaluate the long term application of VES at the site. The pilot test will be performed during operation of the portable VES in well MW-6. (Please refer to pages 4 and 5 for a discussion of why vapor extraction is suitable for use at the site and the Estimated Fee Breakdown for Corrective Action for a detailed breakdown of system components.)

Initially, 4 vapor monitoring probes will be installed to the groundwater surface (25 feet deep) in the vicinity of well MW-6. The probes will consist of one-inch diameter stainless steel slotted casing. Vacuum measurements will be made at well MW-6, the probes and at several other wells nearby during a 12-hour period. Vapor samples will be obtained from well MW-6 at the beginning and end of the test. The vapor samples will be analyzed for TVH, BTEX and 1,2-DCA. Based on the results of the test the potential radius of influence, vapor flow rates, and hydrocarbon removal rates will be determined.

2. Insitu Bioremediation

Preliminary feasibility studies involving groundwater pump tests have been performed to evaluate groundwater extraction. For a comparison of benefits achieved, in-situ bioremediation will also be evaluated. Groundwater samples will be obtained from several of the existing wells and analyzed to evaluate the biotreatability of the dissolved plume constituents. The samples will be analyzed for the following:

1. Ammonia Nitrate
2. Nitrate Nitrogen
3. Ortho-Phosphate
4. pH
5. Dissolved Oxygen, and
6. Bacterial Plate Count.

D. Cleanup Levels

Target cleanup levels will be developed for BTEX and 1,2-DCA, the primary indicator compounds for the plume which exists at the site. The cleanup levels will be developed using the Risk-Based Corrective Action analysis process presented in ASTM ES 38-94.

E. Corrective Action Plan

Based on our extensive experience in the Bay Area and our knowledge of the unique site hydrogeology, we expect that vapor extraction technologies will provide the most cost effective long term solution to mitigate free product and impacted soil. The extent to which other remedial measures are proposed and/or whether the portable VES will be recommended for use in other site wells will be determined after careful analysis of the systems operation in well MW-6 and the results of other feasibilty studies.

Following agency review of the results of the feasibility studies, a final corrective action plan (CAP) will be prepared. The CAP will present the results of the various feasibility studies and an evaluation of the costs and potential benefits associated with each alternative. A recommendation for further remediation, as may be required will also be presented.

SCHEDULE

SCI proposes the following tentative schedule through year-end 1996 assuming no significant delays due to ACHCSA, City of Oakland Fire Department, UST Fund, and BAAQMD requirements and approval.

November 1995	Submit corrective action work plan. Conduct semi-annual/quarterly groundwater monitoring Interim product removal. Obtain water samples for biotreatability testing.
December 1995	Design enhanced VES for well MW-6. Submit November groundwater monitoring report.
January 1996	Start enhanced VES product recovery. Interim product removal in MW1 and 4. Conduct concurrent VES pilot test.
February 1996	Conduct quarterly groundwater monitoring. Interim product removal.
March 1996	Submit February groundwater monitoring report. Interim product removal.
April 1996	Interim product removal.
May 1996	Conduct annual /semi-annual/quarterly groundwater monitoring. Submit May groundwater monitoring report. Interim product removal.
June 1996	Interim product removal.
July 1996	Interim product removal. Decide whether or not to continue enhanced VES in well MW-6 and/or other wells.
August 1996	Conduct quarterly groundwater monitoring. Interim product removal.
September 1996	Submit Feasibility Study Results/Corrective Action Plan. Design long term remedial action. Submit August groundwater monitoring report. Interim product removal.
October 1996	Interim product removal.
November 1996	Receive comments on Feasibility Study/Corrective Action Plan. Conduct semi-annual/quarterly groundwater monitoring. Interim product removal.
December 1996	Submit final CAP. Interim product removal. Submit November groundwater monitoring letter.

If you have any questions, please call.

Yours very truly,

Subsurface Consultants, Inc.

R. William Rudolph
Geotechnical Engineer 741 (expires 12/31/96)

Jeriann N. Alexander
Civil Engineer 40469 (expires 3/31/99)

JNA:RWR:sld

Attachments:

Table 1 - Groundwater and Free Product Elevation Data
Table 2 - Summary of Contaminant Concentrations in Groundwater from Monitoring Wells
Table 3 - Summary of Contaminant Concentrations - Grab Groundwater Samples from Boring and CPT Holes
Table 4 - Free Product Removal
Plate 1 - Site Plan
Plate 2 - Groundwater Surface Elevation Contours, 8/29-30/95

15 copies submitted

Table 1
GROUNDWATER AND FREE PRODUCT ELEVATION DATA

Well	TOC Elevation (feet)	Date	Groundwater Depth (feet)	Groundwater Elevation (feet)	Product Thickness (feet)	Product Elevation (feet)
MW-1	94.48	10/3/90	26.40	68.08		
		3/5/91	27.46	67.02		
		3/18/91	26.88	67.60		
		4/12/91	25.49	68.99		
		12/23/91	26.86	67.62	1.15	68.77
		12/26/91	26.08	68.40	0.22	68.63
		1/13/92	26.53	67.95	0.66	68.61
		2/28/92	27.75	66.73	0.42	67.15
		5/18/92	24.75	69.73		
		6/29/92	25.09	69.39	0.04	69.43
		7/29/92	25.46	69.02	0.15	69.17
		8/28/92	25.56	68.92	0.29	69.21
		10/28/92	26.44	68.04		
		11/24/92	26.63	67.85		
		12/22/92	26.37	68.11		
		4/5/93	23.77	70.71		
		7/20/93	24.51	69.97	0.60	70.57
		11/9/93	26.06	68.42	1.17	69.59
		8/30/95	21.73	72.75	0.23	72.98
		9/15/95	21.88	72.61	0.15	72.75
		10/2/95	22.42	72.06	0.42	72.48
MW-2	94.81	3/5/91	27.86	66.95		
		3/18/91	27.46	67.35		
		4/12/91	26.98	67.83		
		5/18/92	26.50	68.31		
		6/29/92	26.80	68.01		
		7/29/92	27.08	67.73		
		8/28/92	27.33	67.48		
		10/28/92	27.65	67.16		
		11/24/92	27.91	66.90		
		12/22/92	27.74	67.07		
		4/5/93	25.95	68.86		
		7/20/93	25.59	69.22		
		11/9/93	26.72	68.09		
		8/30/95	25.75	69.06		
		10/2/95	25.10	69.71		

Table 1
GROUNDWATER AND FREE PRODUCT ELEVATION DATA

Well	TOC Elevation (feet)	Date	Groundwater Depth (feet)	Groundwater Elevation (feet)	Product Thickness (feet)	Product Elevation (feet)
MW-3	90.08	3/6/91	23.17	66.91		
		3/18/91	22.76	67.32		
		4/12/91	22.51	67.57		
		5/12/92	23.17	66.91		
		6/29/92	22.90	67.18		
		7/29/92	22.17	67.91		
		8/28/92	22.28	67.80		
		10/28/92	22.67	67.41		
		11/24/92	23.01	67.07		
		12/22/92	22.91	67.17		
		4/5/93	22.11	67.97		
		7/20/93	23.93	66.15		
		11/9/93	23.14	66.94		
		8/29/95	20.61	69.47		
		10/2/95	21.18	68.90		
MW-4	88.84	3/5/91	23.79	65.05		
		3/18/91	22.30	66.54		
		4/12/91	21.85	66.99		
		12/23/91	22.63	66.22	0.98	67.19
		12/26/91	22.52	66.32	0.96	67.28
		1/10/92	22.74	66.10	0.99	67.09
		2/28/92	22.00	66.84	0.67	67.51
		3/11/92	21.71	67.13	0.55	67.68
		3/13/92	21.56	67.28	0.49	67.77
		3/17/92	25.46	63.38	0.44	63.82
		3/18/92	21.38	67.47	0.44	67.90
		3/19/92	21.33	67.51	0.48	67.99
		3/23/92	21.29	67.55	0.42	67.97
		3/24/92	21.31	67.53	0.38	67.90
		3/25/92	21.17	67.67	0.36	68.04
		3/26/92	21.08	67.76	0.35	68.11
		3/27/92	20.92	67.92	0.26	68.18
		3/31/92	21.15	67.69	0.44	68.13
		4/1/92	20.90	67.94	0.24	68.18
		4/2/92	20.90	67.94	0.17	68.11
		4/10/92	20.91	67.93	0.33	68.26
		4/13/92	21.04	67.80	0.42	68.22

Table 1
GROUNDWATER AND FREE PRODUCT ELEVATION DATA

Well	TOC Elevation (feet)	Date	Groundwater Depth (feet)	Groundwater Elevation (feet)	Product Thickness (feet)	Product Elevation (feet)
MW-4	88.84	4/20/92	20.74	68.10	0.19	68.29
		5/4/92	20.83	68.01	0.33	68.34
		5/18/92	21.33	67.51	0.23	67.74
		5/26/92	20.83	68.01	0.17	68.18
		6/1/92	20.85	67.99	0.19	68.17
		6/29/92	21.38	67.46	0.53	67.99
		7/29/92	21.69	67.15	0.56	67.71
		8/28/92	21.35	67.49	0.63	68.12
		10/28/92	22.48	66.36		
		11/24/92	22.60	66.24		
		12/22/92	22.47	66.37		
		4/3/93	20.11	68.73		
		7/20/93	20.48	68.36	0.52	68.88
		11/9/93	21.71	67.13	0.63	67.76
		8/30/95	19.90	68.94	2.20	71.14
		9/15/95	18.76	70.08	0.57	70.65
		10/2/95	19.17	69.67	0.65	70.32
MW-5	84.84	3/18/91	26.31	58.53		
		3/12/91	26.41	58.43		
		5/18/92	26.75	58.09		
		6/29/92	26.73	58.11		
		7/29/92	26.66	58.18		
		8/28/92	26.90	57.94		
		10/28/92	26.39	58.45		
		11/24/92	26.83	58.01		
		12/22/92	27.33	57.51		
		4/3/93	26.62	58.22		
		7/20/93	26.60	58.24		
		11/9/93	27.24	57.60		
		8/30/95	27.46	57.38		
		10/2/95	26.85	57.99		
MW-6	85.62	3/18/91	25.82	59.80		
		4/12/91	27.23	58.39		
		12/23/91	28.40	57.22	3.21	60.44
		12/26/91	27.25	58.37	1.67	60.04
		1/10/92	27.23	58.39	0.90	59.29
		2/4/92	27.71	57.91	2.04	59.95

Table 1
GROUNDWATER AND FREE PRODUCT ELEVATION DATA

Well	TOC Elevation (feet)	Date	Groundwater Depth (feet)	Groundwater Elevation (feet)	Product Thickness (feet)	Product Elevation (feet)
MW-6	85.62	2/28/92	27.92	57.70	3.00	60.70
		3/10/92	27.16	58.46	2.06	60.53
		3/12/92	25.96	59.66	0.52	60.18
		3/13/92	25.70	59.92	0.21	60.13
		3/23/92	26.34	59.28	1.09	60.37
		3/30/92	25.73	59.89	0.35	60.25
		4/10/92	25.29	60.33	0.05	60.38
		4/13/92	25.52	60.10	0.21	60.31
		4/20/92	25.38	60.25	0.10	60.35
		5/4/92	25.40	60.22		
		5/18/92	25.50	60.12	0.17	60.29
		5/26/92	25.46	60.16	0.13	60.29
		6/1/92	25.46	60.16	0.09	60.26
		6/29/92	25.59	60.03	0.14	60.17
		7/29/92	26.90	58.72	1.71	60.43
		8/28/92	25.09	60.53	2.62	63.15
		10/28/92	25.02	60.60		
		11/24/92	28.87	56.75		
		7/20/93	26.17	59.45		
		11/9/93	27.51	58.11	3.06	61.17
		8/30/95	28.00	57.62	7.96	65.58
		9/15/95	28.24	57.38	6.14	63.52
		10/2/95	28.39	57.23	6.13	63.36
MW-7	85.41	3/18/91	21.63	63.78		
		4/12/91	22.13	63.28		
		5/18/92	21.67	63.74		
		6/29/92	20.75	64.66		
		7/29/92	21.07	64.34		
		8/28/92	21.35	64.06		
		10/28/92	21.81	63.60		
		11/24/92	21.52	63.89		
		12/22/92	obstructed	-		
		4/3/93	20.08	65.33		
		7/20/93	19.59	65.82		
		11/9/93	20.65	64.76		
		8/30/95	18.78	66.63		
		10/2/95	18.73	66.68		

Table 1

GROUNDWATER AND FREE PRODUCT ELEVATION DATA

Well	TOC Elevation (feet)	Date	Groundwater Depth (feet)	Groundwater Elevation (feet)	Product Thickness (feet)	Product Elevation (feet)
MW-8	85.50	10/28/92	27.70	57.80		
		11/24/92	27.62	57.88		
		12/22/92	27.40	58.10		
		4/3/93	26.64	58.86		
		7/20/93	26.60	58.90		
		11/9/93	27.18	58.32		
		8/30/95	26.35	59.15		
		10/2/95	26.60	58.90		
MW-9	90.37	10/28/92	23.37	67.00		
		11/24/92	23.51	66.86		
		12/22/92	23.31	67.06		
		4/3/93	21.14	69.23		
		7/20/93	21.54	68.83		
		11/9/93	27.53	62.84		
		8/30/95	19.59	70.78		
		10/2/95	20.05	70.32		
MW-10	88.60	10/28/92	21.55	67.05		
		11/24/92	21.86	66.74		
		12/22/92	21.68	66.92		
		4/3/93	19.14	69.46		
		7/20/93	19.79	68.81		
		11/9/93	20.83	67.77		
		8/30/95	17.99	70.61		
		10/2/95	18.42	70.18		
MW-11	102.06	11/24/92	33.65	68.41		
		12/22/92	33.37	68.69		
		4/5/93	31.03	71.03		
		7/20/93	31.90	70.16		
		11/9/93	32.60	69.46		
		8/29/95	28.92	73.14		
		10/2/95	29.48	72.58		

Table 1

GROUNDWATER AND FREE PRODUCT ELEVATION DATA

Well	TOC Elevation (feet)	Date	Groundwater Depth (feet)	Groundwater Elevation (feet)	Product Thickness (feet)	Product Elevation (feet)
MW-13	84.06	11/24/92	26.05	58.01		
		12/22/92	25.08	58.98		
		4/5/93	24.64	59.42		
		7/20/93	24.29	59.77		
		11/9/93	24.23	59.83		
		8/29/95	23.30	60.76		
		10/2/95	23.78	60.28		

Reference datum: arbitrary benchmark established by Levine Fricke.

TOC = Top of casing

Groundwater depths are measured below TOC.

Table 2
SUMMARY OF CONTAMINANT CONCENTRATIONS IN GROUNDWATER FROM MONITORING WELLS

Well	Event Date	TVH ug/l	TEH ug/l	B ug/l	T ug/l	E ug/l	X ug/l	1,2-DCA ug/l	Other Purgeable Halocarbons ug/l	Oil & Grease mg/l	Semi-volatile Compounds ug/l
MW-1	Oct-90	620,000	<500	33,000	50,000	7,900	41,000	2,900	ND	--	--
	Oct-92	490,000	--	51,000	59,000	5,000	27,000	1,300	--	--	--
	Nov-92	320,000	4,600	35,000	43,000	4,200	22,000	1,600	ND	--	--
	Apr-93	270,000	25,000	50,000	58,000	4,600	25,000	1,800	ND	--	--
	Jul-93	FP	--	--	--	--	--	--	--	--	--
	Nov-93	FP	--	--	--	--	--	--	--	--	--
	Aug-95	FP	--	--	--	--	--	--	--	10	2,4-dichlorophenol (1,700) naphthalene (1,200) 2-methylnaphthalene (630) bis (2-ethylhexyl) phthalate (240)
MW-2	Mar-91	<50	<50	<0.5	<0.5	<0.5	<0.5	ND	ND	--	--
	Nov-92	<50	<50	<0.5	1.1	<0.5	1.5	<1	ND	--	--
	Apr-93	<50	870	<0.5	<0.5	<0.5	<0.5	<1	ND	--	--
	Jul-93	<50	<50	<0.5	<0.5	<0.5	<0.5	<1	ND	--	--
	Nov-93	<50	240	<0.5	<0.5	<0.5	<0.5	<1	ND	--	--
	Aug-95	<50	150*	<0.5	<0.5	<0.5	<0.5	<1	--	--	--

Table 2
SUMMARY OF CONTAMINANT CONCENTRATIONS IN GROUNDWATER FROM MONITORING WELLS

Well	Event Date	TVH ug/l	TEH ug/l	B ug/l	T ug/l	E ug/l	X ug/l	1,2-DCA ug/l	Other Purgeable Halocarbons ug/l	Oil & Grease mg/l	Semi-volatile Compounds ug/l
MW-3	Mar-91	<50	<50	<50	0.6	<0.5	<0.5	ND	ND	--	--
	Nov-92	50	160	<0.5	0.9	<0.5	2	<1	ND	--	--
	Apr-93	<50	<50	<0.5	<0.5	<0.5	<0.5	<1	ND	--	--
	Jul-93	<50	<50	<0.5	<0.5	<0.5	<0.5	<1	ND	--	--
	Nov-93	<50	<50	<0.5	<0.5	<0.5	<0.5	<1	ND	--	--
	Aug-95	<50	<50	<0.5	<0.5	<0.5	<0.5	<1	--	--	--
MW-4	Mar-91	150,000	<500	20,000	38,000	2,800	14,000	610	ND	--	--
	Oct-92	230,000	--	15,000	32,000	2,500	14,000	430	--	--	--
	Nov-92	210,000	1,600	14,000	31,000	2,500	14,000	500	ND	--	--
	Apr-93	FP	--	--	--	--	--	--	--	--	--
	Jul-93	FP	--	--	--	--	--	--	--	--	--
	Nov-93	FP	--	--	--	--	--	--	--	--	--
	Aug-95	FP	--	--	--	--	--	--	--	--	--
MW-5	Mar-91	<50	<50	<0.5	<0.5	<0.5	<0.5	ND	ND	--	--
	Nov-92	<50	50	<0.5	<0.5	<0.5	<0.5	<1	ND	--	--
	Apr-93	<50	<50	<0.5	<0.5	<0.5	<0.5	<1	ND	--	--
	Jul-93	<50	190	<0.5	<0.5	<0.5	<0.5	<1	ND	--	--
	Nov-93	<50	170	<0.5	<0.5	<0.5	<0.5	<1	ND	--	--
	Aug-95	<50	180*	<0.5	<0.5	<0.5	<0.5	<1	--	--	--

Table 2
SUMMARY OF CONTAMINANT CONCENTRATIONS IN GROUNDWATER FROM MONITORING WELLS

Well	Event Date	TVH ug/l	TEH ug/l	B ug/l	T ug/l	E ug/l	X ug/l	1,2-DCA ug/l	Other Purgeable Halocarbons ug/l	Oil & Grease mg/l	Semi-volatile Compounds ug/l
MW-6	Mar-91	80,000	<50	12,000	13,000	1,100	5,400	1,400	Dibromochloro-methane (160)	--	--
	Oct-92	19,000	--	3,200	1,400	200	560	840	--	--	--
	Dec-92	FP	--	--	--	--	--	--	--	--	--
	Apr-93	FP	--	--	--	--	--	--	--	--	--
	Jul-93	FP	--	--	--	--	--	--	--	--	--
	Nov-93	FP	--	--	--	--	--	--	--	--	--
MW-7	Mar-91	<50	<50	<0.5	<0.5	<0.5	<0.5	ND	ND	--	--
	Nov-92	<50	<50	<0.5	<0.5	<0.5	<0.5	<1	ND	--	--
	Apr-93	<50	<50	<0.5	<0.5	<0.5	<0.5	<1	ND	--	--
	Jul-93	<50	150	<0.5	<0.5	<0.5	<0.5	<1	ND	--	--
	Nov-93	<50	200	<0.5	1	<0.5	1.7	<1	ND	--	--
	Aug-95	<50	170*	<0.5	<0.5	<0.5	<0.5	<1	--	--	--
MW-8	Oct-92	70	--	20	1	1	3	210	--	--	--
	Nov-92	<50	170	<0.5	<0.5	<0.5	<0.5	200	ND	--	--
	Apr-93	490	100	15	45	5.1	73	210	ND	--	--
	Jul-93	180	90	2.5	3	<0.5	1.9	350	ND	--	--
	Nov-93	310	170	23	<0.5	<0.5	<0.5	240	ND	--	--
	Aug-95	660	240*	360	6.8	13	2.8	130	--	--	--

Table 2
SUMMARY OF CONTAMINANT CONCENTRATIONS IN GROUNDWATER FROM MONITORING WELLS

Well	Event Date	TVH ug/l	TEH ug/l	B ug/l	T ug/l	E ug/l	X ug/l	1,2-DCA ug/l	Other Purgeable Halocarbons ug/l	Oil & Grease mg/l	Semi-volatile Compounds ug/l
MW-9	Nov-92	19,000	320	180	590	23	2000	340	Chloroform (15)	--	--
	Apr-93	2,300	920	48	4	0.6	13	600	Chloroform (2)	--	--
	Jul-93	2,300	450	170	8.1	15	<0.5	1100	ND	--	--
	Nov-93	4,400	450	69	7.3	21	9.7	900	ND	--	--
	Aug-95	3,200	680	3,900	49	80	22.8	960	--	--	--
MW-10	Oct-92	28,000	--	2,700	3,800	210	1,300	150	--	--	--
	Nov-92	130,000	1,300	9,700	19,000	1,400	8,400	370	ND	--	--
	Apr-93	63,000	5,000	6,300	14,000	1,100	7,500	70	ND	--	--
	Jul-93	140,000	20,000	16,000	31,000	2,200	13,000	700	ND	--	--
	Aug-95	92,000	5,900	13,000	24,000	1,800	9,100	300	--	--	--
MW-11	Nov-92	<50	220	<0.5	<0.5	<0.5	<0.5	<1	ND	--	--
	Dec-92	<50	140	<0.1	<0.1	<0.1	<0.1	--	--	--	--
	Dec-92	<50	120	<0.5	<0.5	<0.5	<0.5	--	--	--	--
	Apr-93	<50	<50	<0.5	<0.5	<0.5	<0.5	<1	ND	--	--
	Jul-93	160	150	<0.5	1.8	<0.5	<0.5	<1	ND	--	--
	Nov-93	80	60	<0.5	<0.5	<0.5	<0.5	<1	ND	--	--
	Aug-95	<50	240*	<0.5	<0.5	<0.5	<0.5	<1	--	--	--

Table 2
SUMMARY OF CONTAMINANT CONCENTRATIONS IN GROUNDWATER FROM MONITORING WELLS

Well	Event Date	TVH ug/l	TEH ug/l	B ug/l	T ug/l	E ug/l	X ug/l	1,2-DCA ug/l	Other Purgeable Halocarbons ug/l	Oil & Grease mg/l	Semi-volatile Compounds ug/l
MW-13	Nov-92	<50	3,600	<0.5	<0.5	<0.5	<0.5	<1	ND	--	--
	Dec-92	<50	210	<0.1	<0.1	<0.1	<0.1	--	--	--	--
	Dec-92	<50	100	<0.5	<0.5	<0.5	<0.5	--	--	--	--
	Apr-93	<50	<50	<0.5	0.9	<0.5	<0.5	<1	ND	--	--
	Jul-93	<50	<50	<0.5	<0.5	<0.5	<0.5	<1	ND	--	--
	Nov-93	<50	160	<0.5	<0.5	<0.5	<0.5	<1	ND	--	--
	Aug-95	<50	<50	49	<0.5	<0.5	<0.5	3.6	--	--	--

ug/l = micrograms per liter = parts per billion = ppb
MW-1 was initially referred to as Sample 5
ND = None detected, chemicals not present at concentrations above detection limits reported on laboratory test reports
TVH = Total Volatile Hydrocarbons
TEH = Total Extractable Hydrocarbons
BTEX = Benzene, Toulene, Ethylbenzene, Xylenes
* = Suspect laboratory contamination contributing to test result.
1,2-DCA = 1,2-Dichloroethane
<0.5 = Chemical not present at a concentration in excess of detection limit shown
-- = Test not requested
FP = Free product encountered in well

Table 3
SUMMARY OF CONTAMINANT CONCENTRATIONS
GRAB GROUNDWATER SAMPLES FROM BORING AND CPT HOLES
OCTOBER 1992

	TVH ug/l	TEH ug/l	B ug/l	T ug/l	E ug/l	X ug/l	1,2-DCA ug/l	Other Purgeable Halocarbons ug/l
B-12 (CPT17)	<50	<50	<0.5	<0.5	<0.5	<0.5	<1	ND
CPT 1	490	-	20	60	10	60	1	-
CPT 3	50	-	<0.4	<0.4	3	3	<4	-
CPT 4	1,100	-	60	50	80	15	110	-
CPT 5	600,000	-	2,300	53,000	8,000	43,000	730	-
CPT 7	1,700,000	-	40,000	120,000	25,000	120,000	2,900	-
CPT 9	2,100,000	-	49,000	140,000	28,000	145,000	620	-
CPT 10	190,000	-	13,000	16,000	3,900	18,000	1,400	-
CPT 11	2,000	-	200	50	30	70	11	-
CPT 12	130,000	-	4,100	10,000	2,600	10,000	9	-
CPT 13 (MW-10)	28,000	-	2,700	3,800	210	1,300	150	-

ug/l = micrograms per liter = parts per billion = ppb
ND = None detected, chemicals not present at concentrations above detection limits reported on laboratory test reports
TVH = Total Volatile Hydrocarbons
TEH = Total Extractable Hydrocarbons
BTEX = Benzene, Toluene, Ethylbenzene, Xylenes
1,2-DCA = 1,2-Dichloroethane
<50 = Chemical not present at a concentration in excess of detection limit shown
- = Test not requested
Note: CPT 2, 6, 8, 14, 15 and 16 were not sampled

Table 4
FREE PRODUCT THICKNESS AND RECOVERY DATA

Well	Date of Removal	Product Thickness (feet)	Product Removed (gallons)	Cumulative Product Removed (gallons)
MW-1	12/23/91	1.15	2.0	2.0
	12/26/91	0.22	0.5	2.5
	1/13/92	0.66	1.0	3.5
	2/28/92	0.42	2.0	5.5
	6/29/92	0.04	0.0	5.5
	7/29/92	0.15	0.0	5.5
	8/28/92	0.29	0.5	6.0
	7/20/93	0.60	0.0	6.0
	11/9/93	1.17	0.5	6.5
	8/30/95	0.23	0.0	6.5
	9/15/95	0.15	0.0	6.5
MW-4	12/23/91	0.98	2.5	2.5
	12/26/91	0.96	6.0	8.5
	1/10/92	0.99	5.0	13.5
	2/28/92	0.67	4.0	17.5
	3/11/92	0.55	3.5	21.0
	3/13/92	0.49	3.5	24.5
	3/17/92	0.44	2.25	26.75
	3/18/92	0.44	2.5	29.25
	3/19/92	0.48	1.5	30.75
	3/23/92	0.42	4.0	34.75
	3/24/92	0.38	1.5	36.25
	3/25/92	0.36	1.0	37.25
	3/26/92	0.35	1.0	38.25
	3/27/92	0.26	0.5	38.75
	3/31/92	0.44	0.5	39.25
	4/1/92	0.24	0.25	39.50
	4/2/92	0.17	0.13	39.76
	4/6/92	0.41	0.13	39.89
	4/10/92	0.33	0.25	40.14
	4/13/92	0.42	0.25	40.26
	4/20/92	0.19	0.13	40.39
	5/4/92	0.33	0.25	40.52
	5/18/92	0.23	0.13	40.65
	5/26/92	0.17	0.13	40.78
	6/1/92	0.19	0.06	40.84
	6/29/92	0.53	0.25	41.09
	7/29/92	0.56	1.11	42.20

Table 4
FREE PRODUCT THICKNESS AND RECOVERY DATA

Well	Date of Removal	Product Thickness (feet)	Product Removed (gallons)	Cumulative Product Removed (gallons)
	8/28/92	0.63	1.68	43.88
	4/3/93	0.52	0.13	44.01
	7/20/93	NA	0.0	44.01
	11/9/93	0.63	0.03	44.04
	8/30/95	2.20	1.75	45.79
	9/15/95	0.57	0.0	45.79
	10/2/95	0.65	0.5	46.29
MW-6	12/23/91	3.21	7.5	7.5
	12/26/91	1.67	2.0	9.5
	1/10/92	0.90	1.0	10.5
	2/4/92	2.04	2.0	12.5
	2/28/92	3.00	3.0	15.5
	3/10/92	2.06	2.75	18.25
	3/12/92	0.52	2.0	20.25
	3/13/92	0.21	0.0	20.25
	3/23/92	1.09	1.0	21.25
	3/30/92	0.35	0.5	21.75
	4/10/92	0.05	0.25	22.00
	4/13/92	0.21	0.13	22.13
	4/20/92	0.10	0.13	22.26
	5/4/92	0.08	0.13	22.39
	5/18/92	0.17	0.06	22.45
	5/26/92	0.13	0.13	22.58
	6/1/92	0.09	0.06	22.64
	6/29/92	0.14	0.19	22.83
	7/29/92	1.71	0.6	23.43
	8/28/92	2.62	2.4	25.83
	4/3/93	NA	1.75	27.58
	11/9/93	3.06	0.83	28.41
	8/30/95	7.96	4.5	32.91
	9/15/95	6.14	0.0	32.91
	10/2/95	6.13	4.0	36.91

HAWTHORNE AVENUE

LF2

LF3

LF4

SIDEWALK

3093 BROADWAY

SIDEWALK

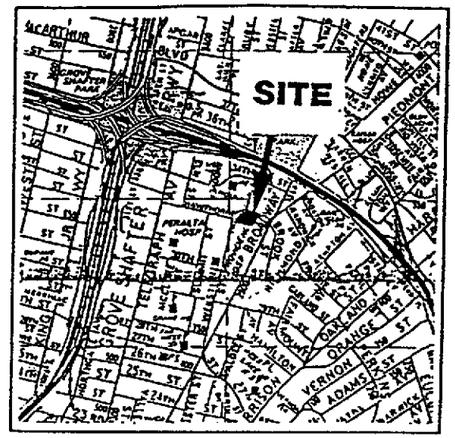
WEBSTER STREET

SIDEWALK

BROOK STREET

BROADWAY

SIDEWALK



VICINITY MAP

- SCI TEST BORING
- SCI MONITORING WELL
- EXTRACTION WELL
- LEVINE FRICKE MONITORING WELL
- CONE PENETRATION TEST (CPT)
- FENCE
- RETAINING WALL
- GROUNDWATER CONTOUR
- FORMER TANK LOCATION

APPROXIMATE SCALE (feet)

0 60 120

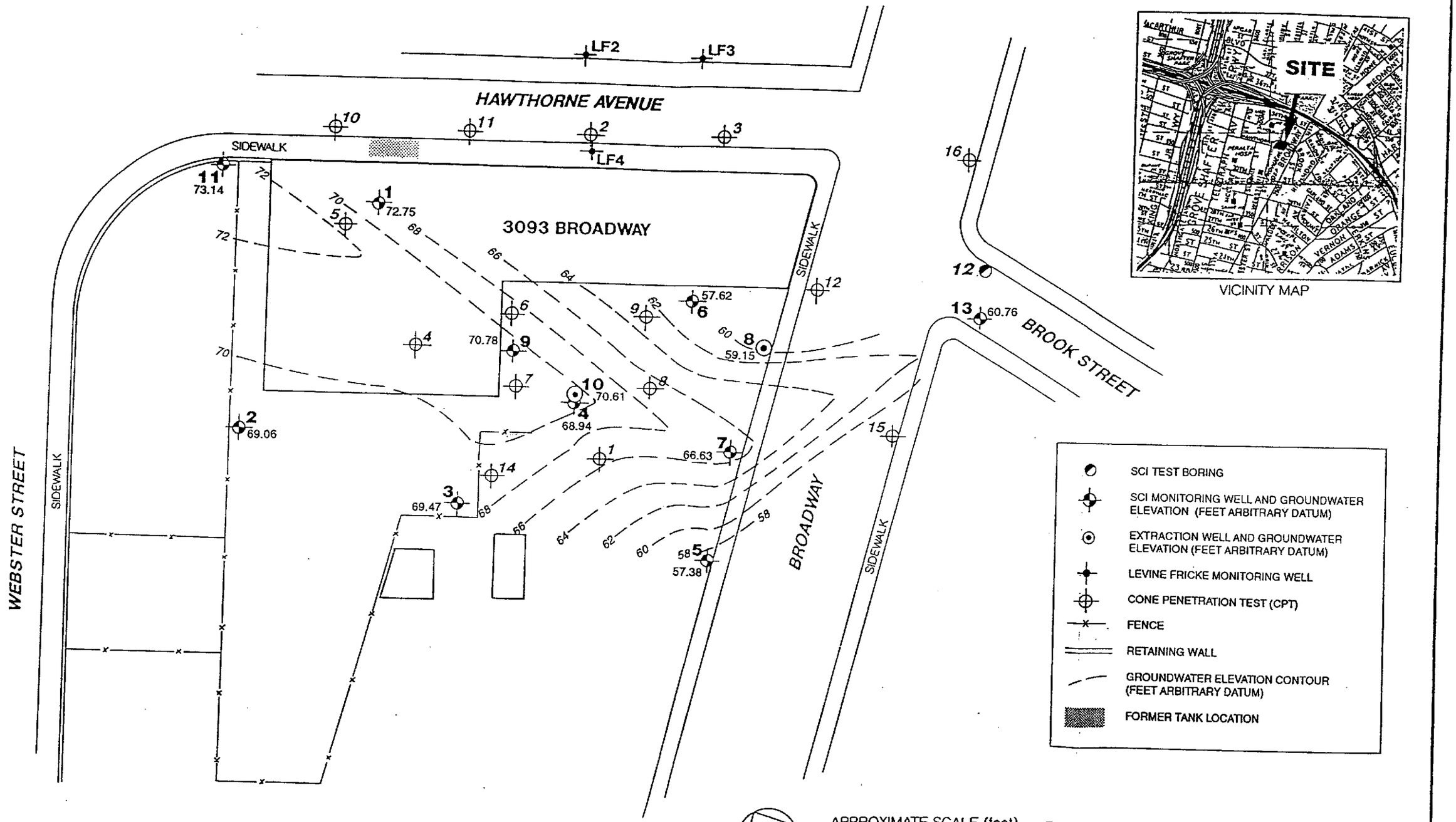
SITE PLAN

Subsurface Consultants

CONNELL OLDSMOBILE – OAKLAND, CA

JOB NUMBER	DATE	APPROVED
447.055	9/14/95	

PLATE 1



VICINITY MAP

- SCI TEST BORING
- SCI MONITORING WELL AND GROUNDWATER ELEVATION (FEET ARBITRARY DATUM)
- EXTRACTION WELL AND GROUNDWATER ELEVATION (FEET ARBITRARY DATUM)
- LEVINE FRICKE MONITORING WELL
- CONE PENETRATION TEST (CPT)
- FENCE
- RETAINING WALL
- GROUNDWATER ELEVATION CONTOUR (FEET ARBITRARY DATUM)
- FORMER TANK LOCATION

NOTE: GROUNDWATER DATA ELEVATIONS FOR MW-1, MW-4 ANDMW-6 WERE NOT USED IN ESTIMATING GROUNDWATER SURFACE DUE TO THE PRESENCE OF FLOATING PRODUCT IN THE WELLS.

N

APPROXIMATE SCALE (feet)

0 60 120

GROUNDWATER SURFACE ELEVATION CONTOURS AUGUST 29-30, 1995

Subsurface Consultants

CONNELL OLDSMOBILE – OAKLAND, CA

JOB NUMBER	DATE	APPROVED	PLATE
447.055	9/14/95		2

CALIFORNIA UNDERGROUND STORAGE TANK CLEANUP FUND
COST PRE-APPROVAL REQUEST
(Complete form, enclose required items, sign, date & return)

TO: _____ Fax: (916) 227-4530
UST Cleanup Fund, 2014 T Street, Sacramento, CA 95814

I. CLAIM INFORMATION

A. CLAIM NO. _____ B. CLAIMANT _____

C. CLAIM STATUS (complete appropriate section)

LOC ISSUED FOR $_____

ON PRIORITY LIST ____YES ____NO IF YES, PRIORITY CLASS ☐ A ☐ B ☐ C ☐ D

NOT YET FILED, EXPECTED FILE DATE: _____

CONTACT PERSON: _____ PHONE: _____
ADDRESS: _____ FAX: _____
_____
_____

II. TYPE OF REQUEST (check appropriate boxes)

☐ PRE-APPROVAL ☐ 3-BID REVIEW

THE FOLLOWING DOCUMENTS ARE REQUIRED FOR THE SPECIFIED REQUEST. ALL DOCUMENTS REQUESTED MUST BE SUBMITTED IN THEIR ENTIRETY OR THE REQUEST(S) WILL BE RETURNED UNPROCESSED.

A. REQUEST FOR PRE-APPROVAL OF PROPOSED COSTS - The following items are required before review and determination will be made by Fund staff.

1. ___A complete signed copy of the proposed Investigation Workplan (IP) or Corrective Action Plan (CAP) (as defined and required by Article 11, Chapter 16, California Underground Storage Tank Regulations). Corrective Action Plans must include the required feasibility study and chosen cost-effective alternative.

✳ 2. ___A signed copy of the oversight agency approval letter for the IP/CAP.

3. ___A complete copy of the Request For Bids, including all attachments. A list of all firms requested to bid must be included.

4. ___Complete copies of all bids and other correspondence submitted in response to the Request For bids.

5. ___A time schedule, if not part of bid documents, anticipated for project initiation and duration.

6. ___A detailed project budget, which includes breakdowns of staff/task/hour with associated estimated totals.

B. THREE-BID REVIEW/EVALUATION/DETERMINATION - Fund staff will assist any claimant requesting an evaluation of bids upon request. The following information must be submitted - 1, 2, 3 AND 4 as described in Item A above.

III. CERTIFICATION

I certify under penalty of perjury that all information submitted with this request is complete and accurate and in accordance with all applicable laws and regulations.

Signed _____

Dated _____

R. William Rudolph, Jr., PE
Thomas E. Cundey, PE
Jeriann N. Alexander, PE

ESTIMATED FEE BREAKDOWN FOR CORRECTIVE ACTIONS TO RESPOND TO ACHCSA LETTER OF OCTOBER 16, 1995

Subsurface Consultants, Inc. (SCI) has prepared a Corrective Action Work Plan and this associated cost breakdown to assist the claimants in obtaining preapproval from the Fund for corrective actions required at 3093 Broadway, in Oakland, California. The work plan responds to requirements of the Alameda Health Care Services Agency (ACHCSA) as contained in their letter dated October 16, 1995, a copy of which is attached. Work plan elements have been discussed with the ACHCSA and hence, prompt approval of the plan by the ACHCSA is expected. A brief synopsis of the required elements is presented below.

- Interim remedial measures consisting of free product recovery by bailing/skimming will be performed on a monthly basis in three wells in which the product level is at a depth of about 25 feet. In one well where the free product thickness is greater than 6 feet, a vapor extraction system (VES) will be installed and operated. VES was selected since it has been proven to be a very efficient and cost effective method at removing free product. Presently, free product removal is considered an interim measure and as such, a portable VES will be used so that it can be moved to other wells during the study to evaluate VES as a long term remedial measure.

- A groundwater monitoring program will be implemented consisting of 4 quarterly events. Of the 12 wells which exist, two wells have 8-inch diameter well casings and the remaining have 2-inch diameter casings. Groundwater is situated at a depth of about 27 feet in the wells which average 40 feet deep. The groundwater level has fluctuated from 20 to 27 feet below the groundsurface during site studies. The program will be as presented in the work plan.

- Feasibility studies for alternatives which may have long term application including vapor extraction, groundwater extraction, and insitu biodegradation will be performed. The cost effectiveness of the alternatives will be evaluated.

- Site specific cleanup levels will be developed for the various contaminants using the Risk-Based Corrective Action analysis process presented in ASTM ES 38-94.

- A Corrective Action Plan will be prepared. The plan will present the results of the feasibility studies, costs and potential benefits of the alternatives, a recommendation for long term solutions and the cleanup levels for the site.

A detailed cost breakdown for the required elements is attached.

Subsurface Consultants, Inc.
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ESTIMATED FEE BREAKDOWN
CORRECTIVE ACTIONS
3093 BROADWAY
OAKLAND, CALIFORNIA
November 1995

Interim Free Product Removal

VES Design/Permitting

Principal Engineer	2 hours @	$130 \hr	$260
Associate Engineer	10 hours @	$100 \hr	$1,000
Engineer	20 hours @	$70 \hr	$1,400
Permits			$2,000
		Subtotal	**$4,660**

VES Setup/Operation/Maintenance for 6 Months

Setup/Startup			
Contractor Delivery, Installation, Pickup			$1,000
SCI Coordination			
Associate Engineer	4 hours @	$100 \hr	$400
Engineer	8 hours @	$70 \hr	$560
Equipment Rental	6 months @	$3,000 \mo	$18,000
Equipment Maintenance	6 months @	$1,200 \mo	$7,200
Propane Tank Permit			$230
Propane Tank Rental	6 months @	$120 \mo	$720
Propane Usage	6 months @	$100 \mo	$600
Temporary Fence			$1,200
System Monitoring			
Principal Engineer	2 hours @	$130 \hr	$260
Associate Engineer	4 hours @	$10 \hr	$40
Engineer	10 hours @	$70 \hr	$700
Technician	24 hours @	$60 \hr	$1,440
Analysis			
TVH/BTEX	12 tests @	$85 \ea	$1,020
DCA	12 tests @	$100 \ea	$1,200
		Subtotal	**$34,570**

Free Product Removal by Skimming (Monthly)

Associate Engineer	0.5 hour @	$100 \hr	$50
Engineer	1 hour @	$70 \hr	$70
Technician	4 hours @	$60 \hr	$240
Materials			$50
		Subtotal/month	$410
		Subtotal/year	**$4,920**

Groundwater Monitoring (November '95 - November '96)

Measure Water Levels/Check for Free Product

Technician	2 hours @	$60 \hr	$120
Materials			$50
		Subtotal	$170
		4 Events/year	**$680**

Free Product Characterization

Analytical Testing			
Product Sample	1 scans @	$250 \ea	$250
Water Sample	2 scans @	$250 \ea	$500
			$750

3-Well Event

Technician	8 hours @	$60 \hr	$480
Materials			$50
Analytical Testing			
TVH/BTEX	3 tests @	$85 \ea	$255
TEH	3 tests @	$75 \ea	$225
DCA	3 tests @	$100 \ea	$300
		Subtotal/event	$1,310
		2 events/year	**$2,620**

7-Well Event

Technician	16 hours @	$60 \hr	$960
Materials			$100
Analytical Testing			
TVH/BTEX	7 tests @	$85 \ea	$595
TEH	7 tests @	$75 \ea	$525
DCA	7 tests @	$100 \ea	$700
		Subtotal/event	**$2,880**

12-Well Event

Technician	24 hours @	$60 \hr	$1,440
Materials			$150
Analytical Testing			
TVH/BTEX	12 tests @	$85 \ea	$1,020
TEH	12 tests @	$75 \ea	$900
DCA	12 tests @	$100 \ea	$1,200
		Subtotal/event	**$4,710**

Quarterly Reports

Principal Engineer	0.5 hour @	$130 \hr	$65
Associate Engineer	2 hours @	$100 \hr	$200
Engineer	16 hours @	$70 \hr	$1,120
Drafting	4 hours @	$40 \hr	$160
Clerical	4 hours @	$35 \hr	$140
		Subtotal	$1,685
		4 Events/year	**$6,740**

VES Pilot Test

Field Effort

Drill Rig to Install Probes			$1,500
Materials & Supplies (probes, gages, flow meters)			$500
Principal Engineer	0.5 hour @	$130 \hr	$65
Associate Engineer	2 hours @	$100 \hr	$200
Engineer	10 hours @	$70 \hr	$700
Technician	20 hours @	$60 \hr	$1,200

Analytical

TVH/BTEX	2 tests @	$85 \ea	$170
DCA	2 tests @	$100 \ea	$200

Data Evaluation

Principal Engineer	4 hours @	$130 \hr	$520
Associate Engineer	12 hours @	$100 \hr	$1,200
Engineer	30 hours @	$60 \hr	$1,800

Subtotal **$8,055**

Biotreatability

Analytical Testing

Ammonia Nitrogen	4 tests @	$30 \ea	$120
Nitrate Nitrogen	4 tests @	$35 \ea	$140
Ortho-Phosphate	4 tests @	$35 \ea	$140
pH	4 tests @	$20 \ea	$80
Dissolved Oxygen	4 tests @	$20 \ea	$80
Plate Count	4 tests @	$70 \ea	$280
Cytoculture Evaluation			$500
Principal Engineer	2 hours @	$130 \hr	$260
Associate Engineer	8 hours @	$100 \hr	$800
Engineer	16 hours @	$60 \hr	$960

Subtotal **$3,360**

Development of Risk-Based Cleanup Levels per ASTM ES 38-94, RBCA Tier 1

Principal Engineer	2 hours @	$130 \hr	$260
Associate Engineer	12 hours @	$100 \hr	$1,200
Engineer	24 hours @	$70 \hr	$1,680
		Subtotal	**$3,140**

Feasibility Study Report

Principal Engineer	2 hours @	$130 \hr	$260
Associate Engineer	10 hours @	$100 \hr	$1,000
Engineer	20 hours @	$70 \hr	$1,400
Drafting	10 hours @	$40 \hr	$400
Clerical	10 hours @	$35 \hr	$350
		Subtotal	**$3,410**

Discussions with Client and Local Oversight Program re. Feasibilty Study Results and

Principal Engineer	4 hours @	$130 \hr	$520
Associate Engineer	8 hours @	$100 \hr	$800
		Subtotal	**$1,320**

Finalize Corrective Action Plan

Principal Engineer	2 hours @	$130 \hr	$260
Associate Engineer	10 hours @	$100 \hr	$1,000
Drafting	10 hours @	$40 \hr	$400
Clerical	10 hours @	$35 \hr	$350
		Subtotal	**$2,010**

TOTAL **$83,825**