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SITE CLOSURE REPORT
UST SITES MF25 & MF26
ECONOMY PARKING LOT
OAKLAND INTERNATIONAL AIRPORT

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OAKLAND INTERNATIONAL

AIRPORT

Prepared by Port of Oakland
Environmental Health & Safety Compliance
May 4, 2001

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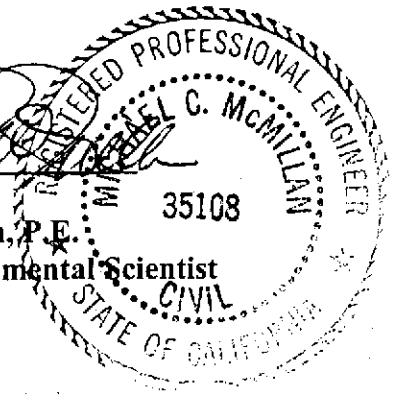

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Introduction

The Port of Oakland is pleased to submit this Underground Storage Tank (UST) Closure Report and Request for Closure to Alameda County, Health Care Services Agency (ACHCSA). This report and request for closure is for Former UST Sites MF25 & MF26 at the Economy Parking Lot Site, South Field, Oakland International Airport (OIA). This document has been prepared in accordance with applicable regulatory guidelines, specifically the *Corrective Action Regulations (Title 23, California Code of Regulations), and the Tri-Regional Board Staff Recommendations for Preliminary Evaluation and Investigation of Underground Tank Sites*, dated August 10, 1990.

In October 1995, Lawrence Livermore National Laboratory (LLNL) issued its "Recommendations to Improve the Cleanup Process for California's Leaking Underground Fuel Tanks". The report concluded that for sites that pose a low-risk to human health and the environment, source removal and natural attenuation may adequately remediate the contamination. Based on the LLNL report, the San Francisco Bay RWQCB issued an Interim Guidance Technical Memorandum on 6 January 1996 which outlines the criteria for determining if an UST site may be classified as a low-risk soil or groundwater case.

The Interim Guidance Technical Memorandum issued by the San Francisco Bay RWQCB states that an UST site may be considered a low-risk soil case only if "little or no groundwater impact currently exists and no contaminants are found at levels above established Maximum Contaminant Levels (MCLs) or other applicable water quality objectives". The Interim Guidance Technical Memorandum established six criteria for determining if a site can be classified as a low-risk groundwater case. The six criteria are listed below:

1) The leak has been stopped and ongoing sources, including free product, removed or remediated
2) The site has been adequately characterized
3) The dissolved hydrocarbon plume is not migrating
4) No water wells, deeper drinking water aquifers, surface water, or other sensitive receptors are likely to be impacted
5) The site presents no significant risk to human health
6) The site presents no significant risk to the environment

Site Chronology

1978	Tanks were installed
October 1988	Phase 1 soil investigation performed
December 1988	Phase II soil sampling performed
March 1992	Tanks removed, initial soil and groundwater sampling performed
May 1992	Groundwater monitoring well MW-1 installed
April 1995	Groundwater monitoring wells MW-2 and MW-3 installed
May 1998	Groundwater monitoring wells MW-4 through MW-8 installed
December 1998	First oxygen-releasing compound (ORC) injection
June 2000	Second ORC injection

Background

The site is located in the economy parking lot at the Oakland International Airport, 1100 Airport Drive, Oakland (Figures 1 and 2). The site is owned by the Port of Oakland (Port) and lies adjacent to Building M-110, which is currently occupied by United Airlines (UAL) and is used as an aircraft maintenance facility. The underground storage tanks MF25 and MF26 were reportedly installed around 1978 by R. J. Miller Company, and at the time of their removal both were found to contain waste solvents, and possibly waste oil. Analytical results for the sample collected from UST MF26 reported elevated concentrations of 1,1,2,2-tetrachloroethane, tetrachloroethene, toluene, ethyl benzene, methylene chloride, 1,1-dichlorethane, 1,1,1-trichloroethane, and benzene.

Prior to removal of the USTs, a Phase I soil investigation of the site was conducted in October 1988 by Baseline Engineering (BASELINE). One soil sample (UHWS-1) collected north of the waste oil tank (Figure 3) was analyzed for total petroleum hydrocarbons (TPH), oil and grease, and volatile organic compounds (VOCs). Analytical results detected elevated concentrations of TPH as jet fuel (11,000 mg/kg), oil and grease (9,000 mg/kg), 1,1,1-trichloroethane (900 ug/kg), ethyl benzene (7,200 ug/kg), tetrachloroethene (1,700 ug/kg), toluene (8,600 ug/kg) and total xylenes (19,000 ug/kg).

The analytical results of the site assessment concluded that the soil contamination near the tanks indicated that they had leaked. An Unauthorized Release Report Form was prepared and submitted to Alameda County Health Care Services Agency (ACHCSA).

To determine the potential extent of soil contamination near the former USTs, additional sampling was conducted as part of a BASELINE Phase II investigation in December 1988. A total of 14 soil samples (UW-1 through UW-14) were collected from 14 soil boring locations at distances ranging from 12 to 110 feet from the waste oil/safety solvent tanks (Figure 4). Analytical results of the Phase II site characterization sampling are summarized in Table 1.

Description of Removal Activities

Prior to removal of the underground storage tanks (USTs) MF25 and MF26, the contents of both tanks were sampled for characterization and disposal purposes. On March 19, 1992, 4,343-gallons and 1,400-gallons were removed from tanks MF25 and MF26 and disposed of at Romic Chemical in East Palo Alto, California, under hazardous waste manifest numbers 89887269 and 90648024, respectively. In addition, on March 24, 1992, 1,800-gallons of tank rinsate was disposed of at Romic Chemical under hazardous waste manifest number 91718153.

In March 1992, the Port of Oakland removed two underground storage tanks (USTs) from the Economy Parking Lot Site, at the Oakland International Airport (OIA). One 3,000-gallon underground storage tank (MF-25), one 1,000-gallon underground storage tank (MF-26), and the associated piping were removed on March 19, 1992 by Tank Protect Engineering of Union City, California (Figure 5). The two USTs were transported by Trident Truck Line, Inc. under uniform hazardous waste manifest #91488949 and disposed of at Erickson, Inc. in Richmond,

California. The tank removal activities were described in the Uribe & Associates document entitled "Report of Removal of Inactive Tanks MF-25 and MF-26, 1100 Airport Drive, Oakland", dated May 1992.

Soil samples were collected from the tank excavation and stockpiled soils in accordance with requirements established by Alameda County Health Care Services Agency (ACHCSA) and the San Francisco Bay Regional Water Quality Control Board (RWQCB). The samples were analyzed for the presence of gasoline, diesel, oil volatile and semi-volatile organic compounds, and metals (nickel, cadmium, chromium, zinc, and lead). After removal of the tank and sample collection, the excavation was back-filled with pea gravel, a geomembrane liner, and aggregate base rock. Approximately 940 cubic yards of soil were excavated during the tank removal activities.

The approximately 940 cubic yards of excavated soil was stockpiled and treated at the Port of Oakland Bioremediation Site, located directly northwest of Langley Street at the Oakland International Airport. The Bioremediation Site was operated according to the Operations Manual (Revised by Uribe & Associates-1994) which was approved by the Alameda County Department of Environmental Health (1994).

Of the approximately 940 cubic yards of soil, 590 cubic yards were disposed of off-site at a Class II landfill (Browning-Ferris Inc, BFI-Livermore). The remaining 350 cubic yards of bioremediated soils were used as fill at the Bioremediation Site.

Initial Soil and Water Sampling Activities

After the tanks were removed, four soil samples (E-1 through E-4) were collected (one at each end of the two tanks) from the excavation sidewalls (Figure 6). The samples were analyzed for total oil and grease (Method 5520D&F), total petroleum hydrocarbons (TPH) as gasoline and diesel (Method 8015-modified), and volatile and semi-volatile ~~hydrocarbons~~ compounds (Method 8240 and 8270, respectively).

On March 24 and 25, 1992, approximately 700 cubic yards of soil in the former tank areas were excavated. The excavated soils consisted of sandy fill material to a depth of 13 feet below ground surface (bgs), where the sand fill was underlain by clay. A noticeable hydrocarbon odor was emitted during the excavation work. No visibly discolored soils were observed during the excavation activities. The approximate dimensions of the excavation were 50 feet by 50 feet, to a maximum depth of 13 feet.

On April 25, 1995, water samples were collected from groundwater monitoring wells MW-1, MW-2 and MW-3. The groundwater elevation data indicate an approximate gradient of 0.005 foot per foot in a west-southwesterly direction across the site.

After the installation of groundwater monitoring wells MW-2 and MW-3, Alameda County Health Care Services Agency (ACHCSA) requested that the three monitoring wells be routinely sampled on a quarterly basis. The groundwater samples collected from the three monitoring wells were analyzed for TPHd, TPHg, TPHmo, BTEX, and purgeable halocarbons. Free

product was reported in groundwater monitoring wells MW-2 and MW-3 from August 1995 (MW-3) and June 1996 (MW-2) through the 4/25/97 sampling event.

Upon completion of the excavation, eight (8) additional soil samples were collected, six of the samples were collected from approximately 6 feet bgs around the perimeter of the excavation. The remaining two samples were collected at approximately 11 feet bgs to determine whether the contamination varied with depth. The samples were analyzed for total petroleum hydrocarbons (TPH) as gasoline and diesel (Method 8015-modified), and volatile hydrocarbons (Method 8240). The analytical results of the soil sampling are summarized in Tables 2, 3, and 4 and shown in Figure 6.

Field and Laboratory Data Discussion

Maximum concentrations of oil and grease (19,000 mg/kg), total petroleum hydrocarbons as gasoline (11,000 mg/kg), total petroleum hydrocarbons as diesel (1,000 mg/kg), and 700 mg/kg total xylenes were detected in soil sample E-1. All four soil samples had detectable levels of chlorinated hydrocarbons as measured by EPA Methods 8240 and 8270. Most of the compounds detected by EPA Method 8270 are found in asphalt and tar, and may have originated from the tanks tar wrap coating.

Laboratory analyses of soil samples collected from the tank and subsequent soil excavation area indicate low concentrations of residual petroleum hydrocarbons, indicating an unauthorized release of hydrocarbons had occurred from the two USTs.

Soil and Groundwater Investigations

In May 1992, one groundwater monitoring well (MW-1-3, referred to as MW-1) was installed at the site during a preliminary site investigation (Figure 7). Analysis of initial groundwater samples collected from well MW-1 detected ~~TPHd,~~ TPHg, and ~~TPHj~~ at concentrations of ~~5,200~~ ug/L, ~~70~~ ug/L, and ~~800~~ ug/L, respectively.

ND NA

On April 19, 1995, two (2) exploratory soil borings were advanced to approximately 11.5 feet below grade, and completed as groundwater monitoring wells MW-2 and MW-3 (Figure 8). During drilling, groundwater was observed at approximately 2.5 feet bgs. During sampling, groundwater was measured to be between 2.20 and 2.78 feet below the top of the casing in wells MW-1, MW-2, and MW-3. Free product was observed in groundwater monitoring wells MW-2 and MW-3 in 1996 and 1997. Analytical results of soil samples collected during the installation of groundwater monitoring wells MW-2 and MW-3 are summarized in Table 5.

As part of subsequent discussions for closure of this site and the adjoining taxiway site with Alameda County Health Care Services Agency (ACHCSA), additional characterization of the site was requested, along with the recovery of any free product. In response, recommendations were presented to ACHCSA in the ITSI report entitled *"Findings and Recommendations, Tanks MF25 and MF26"*, dated April 25, 1997. Activities performed included the redevelopment of the existing three monitoring wells at the site, collection of free-product samples from wells

TABLE 1
Phase I/II Site Investigation Sampling Results-October/December 1988
Tanks MF-25 and MF-26
(in mg/kg)

Sample #	TPHd	TPHg	TPHk	Toluene	Ethyl benzene	Total Xylenes	1,1,1-TCA	TCE	Naph	Ba	Cr	Co	Cu	Ni	V	Zn
UW-1	<10	<10	<10	NA	NA	NA	NA	NA	<0.33	NA	NA	NA	NA	NA	NA	NA
UW-2	<10	<10	<10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
UW-3	<10	<10	<10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
UW-4	<10	<10	<10	NA	NA	NA	NA	NA	<0.33	NA	NA	NA	NA	NA	NA	NA
UW-5	<10	**2,800**	**9,500**	**11.0**	**20.0**	**44.0**	<0.5	<0.5	**15**	**25**	**19**	**3.5**	**5.9**	**20**	**14**	**13**
UW-6	<10	<10	<10	<0.025	<0.025	<0.025	<0.025	<0.025	NA	NA	NA	NA	NA	NA	NA	NA
UW-7	<10	<10	<10	<0.025	<0.025	<0.025	<0.025	<0.025	NA	NA	NA	NA	NA	NA	NA	NA
UW-8	<10	<10	<10	<0.025	<0.025	<0.025	<0.025	<0.025	NA	NA	NA	NA	NA	NA	NA	NA
UW-9	<10	**2,300**	**8,100**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
UW-10	<10	<10	**18**	<0.025	<0.025	<0.025	<0.025	<0.025	NA	**120**	**20**	**3.4**	**13**	**18**	**14**	**16**
UW-11	<10	<10	<10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
UW-12	<10	<10	<10	<0.025	<0.025	<0.025	<0.025	<0.025	<0.33	NA	NA	NA	NA	NA	NA	NA
UW-13	<10	<10	<10	<0.025	<0.025	<0.025	<0.025	<0.025	<0.33	NA	NA	NA	NA	NA	NA	NA
UW-14	<10	<10	<10	<0.025	<0.025	<0.025	<0.025	<0.025	NA	NA	NA	NA	NA	NA	NA	NA
UHWS-1*	<10	<10	<10	**8.6**	**7.2**	**19.0**	**0.90**	**1.7**	NA	NA	NA	NA	NA	NA	NA	NA

NA = Not analyzed

* Sample UHWS (collected during Phase I investigation) was reported to contain 11,000 mg/kg of total petroleum hydrocarbons as jet fuel, and 9,600 mg/kg oil and grease.

MW-2 and MW-3 for fuel-fingerprint analysis, and completion of the July 1997 quarterly groundwater monitoring event.

After redevelopment of the existing monitoring wells, free product was not observed in wells MW-2 and MW-3. Laboratory analysis of the free-product samples reported that the chromatograms were consistent with the laboratory's Jet A standard. Also, the gas chromatograms contained peaks attributed to heavier petroleum hydrocarbons (approximately C26 to C30) which did not match any of the laboratory's fuel standards.

As part of ITSI's December 16, 1997 *"Workplan for Additional Site Investigation"*, five additional groundwater monitoring wells were proposed, three in the "inferred" downgradient location (MW-5, MW-6 and MW-7), one in the "inferred" upgradient location (MW-8), and one "remediation" well (MW-4) located within the former UST excavation backfill.

The remediation well would be constructed with 4-inch-diameter PVC pipe, and was intended for the removal of free product. The remediation well could also be used for the introduction of oxygen-releasing compounds (ORCs) for stimulating aerobic degradation of recalcitrant petroleum hydrocarbons detected in the shallow groundwater aquifer.

On May 5, 1998, Innovative Technical Solutions, Inc. (ITSI) advanced five (5) soil borings to a maximum depth of approximately 10 feet bgs, and completed them as groundwater monitoring wells MW-4 through MW-8 (Figure 9). Soil samples were collected from the five soil borings at depths of approximately 1.5 to 2.0 feet bgs. The soil samples were analyzed for TPHd, TPHg, TPHmo, BTEX, and purgeable halocarbons. Analytical results for the soil samples collected during the installation of the groundwater monitoring wells MW-4 through MW-8 are summarized in Table 6 and shown in Figure 10.

On May 13, 1998, groundwater samples were collected from monitoring wells MW-2 and MW-4 through MW-8. A hydrocarbon sheen was noted on the groundwater collected from wells MW-2 and MW-4. The water samples collected from the six groundwater monitoring wells were analyzed for TPHd, TPHg, TPHmo, BTEX, and purgeable halocarbons. Analytical results for the water samples collected after the installation of the groundwater monitoring wells are shown in Figures 11 and 12.

Geology and Hydrology

The site is in the Coast Range Geomorphic Province, on the eastern side of San Francisco Bay, approximately seven (7) miles west of the Hayward Fault. The uppermost geologic member consists primarily of Quaternary alluvial deposits. The Quaternary alluvium is composed of unconsolidated to semi-consolidated bay mud, silt, sand, and gravel. The site is approximately

TABLE 2
Summary of TPH and Metal Analytical Results – Soil Excavation March 1992
Tanks MF-25 and MF-26 (in mg/kg)

Sample I.D.	Depth (feet)	TPHd	TPHg	Oil & Grease	Benzene	Toluene	Total Xylenes	Ethyl Benzene	Metals				
									Cadm	Chro	Nick	Lead	Zinc
Excavation Interior													
E-1	6	**1,000**	**11,000**	**19,000**	**190**	**580**	**700**	**150**	<0.2	**21**	**20**	**2.6**	**14**
E-2	6	**500**	**6,000**	**4,500**	**170**	**530**	**630**	**130**	<0.2	**25**	**23**	**2.9**	**16**
E-3	6	**1**	**2,800**	**2,100**	**100**	**340**	**420**	**100**	<0.2	**21**	**19**	**2.1**	**13**
E-4	6	**500**	**10,000**	**3,600**	**40**	**170**	**20**	**50**	<0.2	**31**	**29**	**3.7**	**20**
Shallow Excavation Periphery													
E-5	6	NA	<0.3	<50	<0.005	<0.005	NA	<0.005	NA				
E-6	6	**7**	**0.3**	<50	NA	NA	NA	NA	NA				
E-7	6	NA	NA	<50	**0.02**	**0.04**	NA	<0.02	NA				
E-8	6	**3**	NA	<50	NA	NA	NA	NA	NA				
E-10	6	NA	<0.3	<50	<0.005	<0.005	NA	<0.005	NA				
E-12	6	NA	<0.3	<50	<0.005	<0.005	NA	<0.005	NA				
Deep Excavation Periphery													
E-9	11	NA	NA	<50	NA	NA	NA	NA	NA				
E-11	11	<1	<0.3	<50	<0.005	<0.005	NA	<0.005	NA				

NA=Not analyzed
cadm=cadmium, chro=chromium, nick=nickel

TABLE 3
Summary of VOC Analytical Results – Soil Excavation
Tanks MF-25 and MF-26
(in mg/kg)

Sample I.D.	Depth (feet)	1,1,1-TCA	1,1-DCA	MeCl	TCE
Excavation Interior					
E-1	6	**140**	**30**	**450**	**100**
E-2	6	**140**	**30**	**380**	**80**
E-3	6	**80**	<20	<20	**60**
E-4	6	**30**	<20	<20	**30**
Shallow Excavation Periphery					
E-5	6	<0.005	<0.005	<0.005	<0.005
E-6	6	NA	NA	NA	NA
E-7	6	<0.02	<0.02	<0.05	<0.02
E-8	6	NA	NA	NA	NA
E-10	6	<0.005	<0.005	<0.005	<0.005
E-12	6	<0.005	<0.005	<0.005	<0.005
Deep Excavation Periphery					
E-9	11	NA	NA	NA	NA
E-11	11	<0.005	<0.005	<0.005	<0.005

NA = Not analyzed

TABLE 4
Summary of SVOC Analytical Results – Soil Excavation
Tanks MF-25 and MF-26 (in mg/kg)

Constituent	E-1	E-2	E-3	E-4
2-Methylnaphthalene	**53**	**6.9**	**7.6**	**35**
Acenaphthene	**1.7**	<2	<0.4	**2.8**
Benzo(a)anthracene	<1	<1	<0.2	**4.9**
Benzo(a)pyrene	<1	<1	<0.2	**2**
Chrysene	<1	<1	<0.2	**4.3**
Dibenzofuran	<1	<1	<0.2	**107**
Fluoranthene	<1	<1	<0.2	**13**
Fluorene	**1.6**	<1	<0.2	**2.2**
Naphthalene	**34**	**2.7**	**3.2**	**14**
Phenanthrene	**1**	<2	**0.24**	**16**
Phenol	<2	<2	**9.2**	<2
Pyrene	<1	<1	**0.19**	**14**
Bis(2-ethylhexyl)phthalate	**3.9**	**5.5**	<0.4	<2
C7-C35 Hydrocarbon matrix	**40,000**	**500**	**5,000**	**20,000**

Note: The SVOCs detected in the UST removal confirmation samples are commonly found in coal tar and/or asphalt-containing materials. The USTs were reportedly covered with a tar paper wrap that was degraded near the fill pipe ends of the tanks.

four (4) feet above mean sea level. The topography for the vicinity is generally flat, gradually sloping to the west, toward San Francisco Bay (Page, Ben M., 1966).[1]

The South Field at the Oakland International Airport was constructed on shallow bay sediments by hydraulically-dredged sand and silt from the surrounding San Francisco Bay. During the late 1950's and early 1960's, a perimeter dike was constructed out into San Francisco Bay, and dredged sediments were used to fill the interior of the diked area. The shallow subsurface geology consists of bay sediments and sand fill. This sand fill comprises the uppermost geologic unit, extending from the surface to a depth of approximately 13 feet. There is a confining clay layer consisting of "Young Bay Mud" below a depth of approximately 13 feet.

Summary of Recent Groundwater Investigations and Conclusions

In an effort to bring the site towards case closure, Harding Lawson Associates (HLA) installed the first batch of oxygen-releasing compound (ORC) on December 23, 1998 along the up-gradient edge of the former UST excavation at 11 locations. After checking that no free product was present in the groundwater monitoring wells, HLAs subcontractor used a direct-push rig to inject a total of 780 pounds of time-release ORC mixed with 60 gallons of water through 2-inch diameter rods to a depth of 4 to 8 feet below ground surface.

HLA installed a second batch treatment of ORC on January 7, 2000 in three areas: 250 pounds of ORC in the vicinity of MW-3; 250 pounds of ORC adjacent to MW-4; and 500 pounds of ORC focused in the vicinity of MW-2. A total of approximately 1,000-pounds of ORC were injected under pressure at nine (9) drill locations.

TPH groundwater concentrations have stabilized and/or decreased significantly since the wells were first sampled in 5/15/92 (MW-1). Tables 7 & 8 summarize the maximum concentrations of chemical constituents compared to the current levels detected in the eight (8) groundwater monitoring wells.

The presence and distribution of halogenated VOCs above MCLs in the groundwater beneath the site may indicate the presence of another potential source other than the former USTs at the site. For example, 1,2-DCA and vinyl chloride were only detected in up-gradient monitoring well MW-8, and the reported concentrations of 1,1-DCE and 1,1-DCA were significantly higher in MW-8.

The historical concentrations of petroleum hydrocarbons and halogenated VOCs detected in the eight (8) groundwater monitoring wells are summarized in Tables 9 & 10, respectively.

[1] Geology of the Coast Ranges of California, Bulletin 190, Geology of Northern California, Ben M. Page, 1966

TABLE 5
RESULTS OF SOIL SAMPLING FOR MONITORING WELL INSTALLATIONS
MW-2 and MW-3
(mg/kg)

Sample ID	Sample Depth (feet)	Sampling Date	TPHd	TPHg	TPHj	TPHmo	Benzene	Toluene	Ethyl benzene	Total xylenes	VOCs	SVOCs
MW-2	2.0 to 2.5	4/19/95	**13**	**4.9**	<1	<4	<0.5	<0.5	<0.5	<0.5	ND	NA
MW-2	7.0 to 7.5	4/19/95	NA	NA	NA	NA	<0.005	<0.005	<0.005	<0.005	ND	ND
MW-3	2.0 to 2.5	4/19/95	<5,000	**6,300**	**11,000**	**1,600**	<5	**61**	**22**	**135**	ND	NA
MW-3	10.0 to 10.5	4/19/95	NA	NA	NA	NA	<0.005	<0.005	<0.005	<0.005	ND	ND

NA = Not Analyzed
Note: Bold values indicate detected concentrations

TABLE 6
RESULTS OF SOIL SAMPLING FOR MONITORING WELL INSTALLATIONS
MW-4 through MW-8
(mg/kg)

	Sample Depth (feet)	Sampling Date	TPHd	TPHg	TPHj	TPHmo	Benzene	Toluene	Ethyl benzene	Total Xylenes
MW-4	2	5/5/98	**3.5(1,2)**	<1	<1	**46 (1,2)**	<0.005	<0.005	<0.005	<0.01
MW-5	2	5/5/98	<1	<1	<1	<5	<0.005	<0.005	<0.005	<0.01
MW-6	2	5/5/98	<1	<1	<1	<5	<0.005	<0.005	<0.005	<0.01
MW-7	1.5	5/5/98	<1	<1	<1	<5	<0.005	<0.005	<0.005	<0.01
MW-8	2	5/5/98	<1	<1	<1	<5	<0.005	<0.005	<0.005	<0.01

Note: Bold values indicate detected concentrations
1 Hydrocarbons present do not match profile of laboratory standard
2 Hydrocarbons are heavier than indicated standard

TABLE 7
Maximum and Current Groundwater Analytical Results
Petroleum Hydrocarbons

Monitoring Well	Benzene (ug/L)	Toluene (ug/L)	Ethyl Benzene (ug/L)	Total Xylenes (ug/L)	MTBE (ug/L)	TPHd (ug/L)	TPHg (ug/L)	TPHj (ug/L)	TPHmo (ug/L)
MW-1									
Maximum	3.3	0.52	2.7	1.3	3.2	11,000	120	800	1,800
Current	3.0	<0.5	<0.5	<0.5	<2.5	440	63	170	290
MW-2									
Maximum	340	680	110	580	---	21,000	17,000	36,000	26,000
Current	45	34	72	130	---	**21,000**	2,700	18,000	6,700
MW-3									
Maximum	150	600	100	580	---	79,000	8,000	110,000	31,000
Current	2.3	1.1	1.7	5.7	---	7,200	2,400	4,000	2,300
MW-4									
Maximum	24	23	13	79	5.5	3,300	1,900	41,000	9,400
Current	15	<2.5	3.3	4.5	<13	**3,300**	860	2,700	1,400
MW-5									
Maximum	---	---	---	---	---	140	---	---	530
Current	---	---	---	---	---	80	---	---	300
MW-6									
Maximum	---	---	---	---	---	120	---	---	280
Current	---	---	---	---	---	<50	---	---	<250
MW-7									
Maximum	---	0.6	---	---	---	52	---	---	---
Current	---	<0.5	---	---	---	<50	---	---	---
MW-8									
Maximum	4.1	1.3	---	---	3.2	450	77	200	530
Current	1.4	<0.5	---	---	<2.5	90	<50	<50	<250

NA = Not analyzed
Note: Data was listed only when constituent was detected, otherwise maximum and current values were non-detect (---)

TABLE 8
MAXIMUM AND CURRENT GROUNDWATER ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS (VOCs)

Monitoring Well	Chloro-form (ug/L)	1,1-DCA (ug/L)	1,2-DCE (ug/L)	1,1,1-TCA (ug/L)	TCE (ug/L)	PCE (ug/L)	Chloro-ethane (ug/L)	1,2-DCA (ug/L)	1,1-DCE (ug/L)	Vinyl chloride (ug/L)
MW-1										
Maximum	<5	32	19	2.9	2.5	5.5	<1.0	<2.0	3.1	1.2
Current	<1.0	**32**	11	<1.0	<1.0	<1.0	<1.0	<1.6	2.4	<1.0
MW-2										
Maximum	5.0	95	[redacted]	20	6.7	9.0	5.5	<2.5	0.82	<5.0
Current	<1.0	43	[redacted]	<1.0	<2.0	<0.6	3.4	<1.6	<1.0	<1.0
MW-3										
Maximum	2.1	30	<30	2.4	<2.0	0.62	1.8	<2.0	3.1	<1.0
Current	<1.0	<1.6	<1.0	<1.0	<2.0	<0.6	<1.2	<1.6	**3.1**	<1.0
MW-4										
Maximum	<2.5	53	42.1	3.9	5.5	2.8	13	<5.0	2.8	<2.5
Current	<1.0	42	25	<1.0	<2.0	<0.5	13	<1.6	2.8	<1.0
MW-5										
Maximum	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<2.0	<2.0	<1.0	<2.0
Current	<1.0	<1.0	<1.0	<1.0	<2.0	<0.5	<1.0	<1.6	<1.0	<1.0
MW-6										
Maximum	<1.0	<1.0	<1.0	<0.5	<2.0	<1.0	<2.0	<2.0	<1.0	<2.0
Current	<1.0	<1.0	<1.0	<1.0	<2.0	<0.6	<1.0	<1.6	<1.0	<1.0
MW-7										
Maximum	<1.0	26	1.9	<1.0	<2.0	1.8	<2.0	<2.0	9.8	<2.0
Current	<1.0	18	<1.0	<1.0	<2.0	1.5	<1.0	<1.6	7.7	<1.0
MW-8										
Maximum	<10	[redacted]	1.9	<10	<20	<10	<10	11	[redacted]	10
Current	<10	[redacted]	<10	<10	<20	<6.0	<10	<16	[redacted]	<10

TABLE 9 - GROUNDWATER MONITORING WELL ANALYTICAL RESULTS
PETROLEUM HYDROCARBONS - ECONOMY PARKING LOT (in ug/L)

Monitoring Well ID#	Date	Benzene	Toluene	Ethyl benzene	Total Xylenes	MTBE	TPHd	TPHg	TPHj	TPHmo	Unidentified hydrocarbons
MW-1	05/15/92	<0.4	<0.3	<0.3	<0.4	NA	NA	<50	NA	NA	TOG=<5000
	08/06/92	<0.4	<0.3	<0.3	<0.4	NA	NA	<50	**800(13)**	NA	TOG=<5000
	11/24/92	<0.4	<0.3	<0.3	<0.4	NA	NA	<50	<50	NA	NA
	02/12/93	<0.4	<0.3	<0.3	<0.4	NA	NA	<50	NA	NA	NA
	05/17/93	<0.4	<0.3	<0.3	<0.4	NA	NA	<50	NA	NA	NA
	08/03/93	<0.5	<0.5	<0.5	<0.5	NA	**5,200**	<50	NA	NA	NA
	11/25/93	<0.5	<0.5	<0.5	**0.6**	NA	NA	**70**	NA	NA	NA
	05/09/94	<0.5	<0.5	<0.5	<0.5	NA	NA	<50	NA	NA	NA
	08/29/94	<0.5	<0.5	**2.7**	<0.5	NA	NA	<50	NA	NA	NA
	04/25/95	<5	<5	<5	<5	NA	**1,400**	<50	<50	**610**	NA
	08/11/95	<0.4	<0.3	<0.3	<0.4	NA	**1,900**	<50	<50	**1,200**	NA
	11/03/95	**0.4**	**0.4**	<0.3	<0.4	NA	**4,200**	<50	<50	**1,800**	NA
	06/19/96	**0.99**	<0.5	**1.1**	<1.0	NA	**11,000**	<50	<500	**820**	NA
	10/24/96	**1.9**	<0.5	<0.5	**1.3**	NA	<250	**57**	<500	<250	NA
	01/22/97	<0.5	<0.5	<0.5	<1.0	NA	**220**	<50	<500	<250	NA
	04/25/97	**1.2**	<0.5	**1.0**	**1.3**	NA	<50	**110**	<500	<250	NA
	08/06/97	**2.1**	<0.5	<0.5	<1.0	NA	**340**	**100**	<500	<250	NA
	12/23/97	**0.7**	<0.5	<0.5	**1.2**	NA	<50	<50	<50	<300	NA
	03/26/98	<0.5	<0.5	<0.5	<1.0	NA	<48	<50	<48	<290	NA
	12/16/98	**1.8**	<0.5	<0.5	<1.0	<2.5	**640**	**120**	<50	<250	**340**
	02/26/99	**0.96**	<0.5	<0.5	<1.0	**2.6**	**670(2)**	**69**	<50	**350**	<50
	05/20/99	**1.7**	<0.5	<0.5	<0.5	<2.5	**380**	**85**	<50	<250	<50
	08/17/99	**2.6**	**0.52**	<0.5	<0.5	<2.5	**530**	**54**	<50	<500	NA
	11/11/99	**2.5**	<0.5	<0.5	<0.5	<2.5	**1,100**	**96**	<50	<250	NA
	03/23/00	**1.7**	<0.5	<0.5	<0.5	**3.2**	**1,100**	---(6)	<50	**1,100**	NA
	04/25/00	NA	NA	NA	NA	NA	NA	**60(6)**	NA	NA	NA
	05/24/00	**2.5**	<0.5	<0.5	<0.5	<2.5	**670**	**76**	**410**	<250	NA
	08/31/00	**3.3**	<0.5	<0.5	**0.89**	<2.5	**600**	**84**	**320**	**430**	NA
	01/11/01	**3.0**	<0.5	<0.5	<0.5	<2.5	**440**	**63**	**170(9)**	**290(10)**	NA

TABLE 9 - GROUNDWATER MONITORING WELL RESULTS - PETROLEUM HYDROCARBONS (in ug/L)

Monitoring Well ID#	Date	Benzene	Toluene	Ethyl benzene	Total Xylenes	MTBE	TPHd	TPHG	TPHj	TPHmo	Unidentified hydrocarbons
MW-2	04/25/95	**340**	**570**	**110**	**580**	NA	<10,000	**5,200**	**13,000**	**19,000**	NA
	08/11/95	**320**	**680**	**110**	**510**	NA	<8,000	**5,500**	**7,900**	**20,000**	NA
	11/03/95	**200**	**400**	**27**	**360**	NA	**3,800**	<11,000	**11,000**	**4,200**	NA
	06/19/96	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)
	10/24/96	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)
	01/22/97	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)
	04/25/97	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)
	08/06/97	**170**	**270**	**92**	**410**	NA	**12,000**	**9,900**	<1,000	**2,300**	NA
	12/23/97	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	03/26/98	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	05/13/98	**150**	**270**	**94**	**440**	NA	**2,600(1,2)**	**4,000**	**3,400**	<290	NA
	12/16/98	**130**	**180**	**71**	**330**	<50	<1,000	**4,600**	**31,000**	**8,200**	<1,000
	02/26/99	**86**	**210**	**64**	**350**	<100	<1,000	**4,700**	**18,000**	**7,800**	<1,000
	05/20/99	**120**	**280**	**76**	**360**	<2.5	<50	**4,700**	**15,000**	**5,800**	<50
	08/17/99	**55**	**44**	**57**	**200**	<2.5	<1,000	**17,000**	**22,000**	**<10,000**	NA
	11/11/99	**60**	**37**	**78**	**190**	<2.5	<500	**3,800**	**10,000**	<2,500	NA
	03/23/00	**92**	**180**	**97**	**310**	<25	<500	---(6)	**36,000**	**26,000**	NA
	04/25/00	NA	NA	NA	NA	NA	NA	**7,600(6)**	NA	NA	NA
	05/24/00	**100**	**180**	**96**	**310**	<50	**8,000**	**3,200**	**8,100**	**4,200**	NA
	08/31/00	**50**	**18**	**77**	**160**	<50	**4,900**	**3,200**	**4,000**	**1,800**	NA
	01/11/01	**45**	**34**	**72**	**130**	<130	**21,000(11)**	**2,700**	**18,000**	**6,700(10)**	NA
MW-3	04/25/95	**150**	**600**	**100**	**580**	NA	<40,000	**7,200**	**38,000**	**31,000**	NA
	08/11/95	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)
	11/03/95	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)
	06/19/96	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)
	10/24/96	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)
	01/22/97	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)
	04/25/97	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)
	08/06/97	**4**	**16**	**14**	**90**	NA	**1,400**	**4,200**	<500	<250	NA
	12/23/97	**13**	**16**	**9**	**116**	NA	**79,000**	**2,200**	**110,000**	**8,200**	NA

TABLE 9 - GROUNDWATER MONITORING WELL RESULTS – PETROLEUM HYDROCARBONS (in ug/L)

Monitoring Well ID#	Date	Benzene	Toluene	Ethyl benzene	Total Xylenes	MTBE	TPHd	TPHG	TPHj	TPHmo	Unidentified hydrocarbons
MW-3	03/26/98	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	---(3)	NA
	12/16/98	<10	**12**	<10	**43**	<50	---(5)	**2,300**	---(5)	---(5)	NA
	02/26/99	**16**	**16**	**10**	**40**	<100	---(5)	**5,700**	---(5)	---(5)	NA
	05/20/99	**20**	**25**	**7.8**	**37**	<2.5	---(5)	**2,700**	---(5)	---(5)	NA
	08/17/99	**14**	<0.5	<0.5	**15**	<2.5	---(5)	**2,100**	---(5)	---(5)	NA
	11/11/99	**7.8**	<0.5	<0.5	**17**	<2.5	---(5)	**3,300**	---(5)	---(5)	NA
	03/23/00	**13**	**20**	**16**	**48**	<50	NA	---(6)	NA	NA	NA
	04/25/00	NA	NA	NA	NA	NA	**6,200**	**8,000(6)**	**7,100**	**4,600**	NA
	05/24/00	**4.6**	**6.4**	**6.3**	**23**	<13	**6,200**	**6,300**	**7,100**	**4,600**	NA
	08/31/00	<25	<25	<25	<25	<130	**6,600**	**2,800**	**6,300**	**2,100**	NA
	01/11/01	**2.3(12)**	**1.1(12)**	**1.7(12)**	**5.7(12)**	<5(12)	**7,200**	**2,400(12)**	**4,000(9)**	**2,300**	NA
MW-4	05/13/98	**9.8**	**23**	**13**	**79**	NA	**2,000(1,2)**	**1,400**	**2,300**	<310	NA
	12/16/98	<10	<10	<10	**58**	<50	<1,000	**1,900**	**40,000**	**8,800**	<1,000
Duplicate	12/16/98	<10	<10	<10	**51**	<50	<1,000	**1,700**	**41,000**	**9,400**	<1,000
	02/26/99	**13**	<10	<10	**22**	<50	<500	**1,200**	**5,500**	<2,500	<500
Duplicate	02/26/99	**16**	<2.5	**6.2**	**20**	<10	<500	**1,200**	**5,200**	<2,500	<500
	05/20/99	**16**	**0.83**	**3..0**	**10**	**5.5**	<50	**670**	**1,900**	**560**	<50
Duplicate	05/20/99	**15**	**0.78**	**3.0**	**11**	**5.4**	<50	**1,100**	**1,200**	**290**	<50
	08/17/99	**22**	<0.5	<0.5	<0.5	<2.5	<50	**1,000**	**2,000**	<500	<50
Duplicate	08/17/99	**24**	**3.1**	**3.2**	**16**	<2.5	<50	**690**	**1,700**	<500	NA
	11/11/99	**11**	<0.5	<0.5	**12**	<2.5	<50	**1,600**	**2,400**	<50	NA
Duplicate	11/11/99	**11**	**1.4**	**2.7**	**16**	<2.5	<50	**1,300**	**1,800**	<50	NA
	03/23/00	**10**	**0.95**	**2.0**	**12**	<2.5	**2,800**	---(6)	<50	**2,200**	NA
Duplicate	03/23/00	**10**	**0.81**	**2.0**	**12**	<2.5	**2,800**	---(6)	<50	**2,100**	NA
	04/25/00	NA	NA	NA	NA	NA	NA	**1,200(6)**	NA	NA	NA
Duplicate	04/25/00	NA	NA	NA	NA	NA	NA	**630(6)**	NA	NA	NA
	05/24/00	**14**	<1.0	**2.3**	**13**	<5.0	**2,500**	**690**	**2,100**	**1,800**	NA
Duplicate	05/24/00	**13**	<1.0	**2.8**	**15**	<5.0	**3,100**	**560**	**2,600**	**2,200**	NA
	08/31/00	**22**	<1.3	**3.1**	**13**	<6.3	**2,300**	**700**	**1,800**	**1,000**	NA
Duplicate	08/31/00	**21**	<1.3	**2.8**	**13**	**11(8)**	**2,500**	**550**	**2,000**	**1,000**	NA

TABLE 9 - GROUNDWATER MONITORING WELL RESULTS – PETROLEUM HYDROCARBONS (in ug/L)

Monitoring Well ID#	Date	Benzene	Toluene	Ethyl benzene	Total Xylenes	MTBE	TPHd	TPHG	TPHj	TPHmo	Unidentified hydrocarbons
MW-4	01/11/01	**15**	<2.5	**3.3**	**4.5**	<13	**3,300**	**860**	**2,700(9)**	**1,400(10)**	NA
											NA
MW-5	05/13/98	<0.5	<0.5	<0.5	<1.0	NA	<50	<50	<50	<300	NA
	12/16/98	<0.5	<0.5	<0.5	<0.5	<2.5	<50	<50	<50	<250	**260**
	02/26/99	<0.5	<0.5	<0.5	<0.5	<2.5	**69**	<50	<50	<250	<50
	05/20/99	<0.5	<0.5	<0.5	<0.5	<2.5	<50	<50	<50	<250	<50
	08/17/99	<0.5	<0.5	<0.5	<0.5	<2.5	**79**	<50	<50	<500	NA
	11/11/99	<0.5	<0.5	<0.5	<0.5	<2.5	**93**	<50	<50	<250	NA
	03/23/00	<0.5	<0.5	<0.5	<0.5	<2.5	**140**	---(6)	<50	**530**	NA
	04/25/00	NA	NA	NA	NA	NA	NA	<50(6)	NA	NA	NA
	05/24/00	<0.5	<0.5	<0.5	<0.5	<2.5	**73**	<50	<50	**400**	NA
	08/31/00	<0.5	<0.5	<0.5	<0.5	<2.5	<50	<50	<50	<250	NA
	01/11/01	<0.5	<0.5	<0.5	<0.5	<2.5	**80**	<50	<50	**300**	NA
MW-6	05/13/98	<0.5	<0.5	<0.5	<1.0	NA	<48	<50	<48	<290	NA
	12/16/98	<0.5	<0.5	<0.5	<0.5	<2.5	<50	<50	<50	<250	<50
	02/26/99	<0.5	<0.5	<0.5	<0.5	<2.5	**83**	<50	<50	<250	<50
	05/20/99	<0.5	<0.5	<0.5	<0.5	<2.5	<50	<50	<50	<250	<50
	08/17/99	<0.5	<0.5	<0.5	<0.5	<2.5	**72**	<50	<50	<500	NA
	11/11/99	<0.5	<0.5	<0.5	<0.5	<2.5	**93**	<50	<50	<250	NA
	03/23/00	<0.5	<0.5	<0.5	<0.5	<2.5	**120**	---(6)	<50	**280**	NA
	04/25/00	NA	NA	NA	NA	NA	NA	<50(6)	NA	NA	NA
	05/24/00	<0.5	<0.5	<0.5	<0.5	<2.5	<50	<50	<50	<250	NA
	08/31/00	<0.5	<0.5	<0.5	<0.5	<2.5	<50	<50	<50	<250	NA
	01/11/01	<0.5	<0.5	<0.5	<0.5	<2.5	<50	<50	<50	<250	NA
MW-7	05/13/98	<0.5	**0.6**	<0.5	<1.0	NA	<51	<50	<51	<310	NA
	12/16/98	<0.5	<0.5	<0.5	<0.5	<2.5	<50	<50	<50	<250	<50
	02/26/99	<0.5	<0.5	<0.5	<0.5	<2.5	<50	<50	<50	<250	<50
	05/20/99	<0.5	<0.5	<0.5	<0.5	<2.5	<50	<50	<50	<250	<50

TABLE 9 - GROUNDWATER MONITORING WELL RESULTS – PETROLEUM HYDROCARBONS (in ug/L)

Monitoring Well ID#	Date	Benzene	Toluene	Ethyl benzene	Total Xylenes	MTBE	TPHd	TPHG	TPHj	TPHmo	Unidentified hydrocarbons
MW-7	08/17/99	<0.5	<0.5	<0.5	<0.5	<2.5	**52**	<50	<50	<500	NA
	11/11/99	<0.5	<0.5	<0.5	<0.5	<2.5	<50	<50	<50	<250	NA
	03/23/00	<0.5	<0.5	<0.5	<0.5	<2.5	<50	---(6)	<50	<250	NA
	04/25/00	NA	NA	NA	NA	NA	NA	<50(6)	NA	NA	NA
	05/24/00	<0.5	<0.5	<0.5	<0.5	<2.5	<50	<50	<50	<250	NA
	08/31/00	<0.5	<0.5	<0.5	<0.5	<2.5	<50	<50	<50	<250	NA
	01/11/01	<0.5	<0.5	<0.5	<0.5	<2.5	<50	<50	<50	<250	NA
MW-8	05/13/98	**2**	<0.5	<0.5	<1.0	NA	<47	<50	<47	<280	NA
	12/16/98	**4.1**	<0.5	<0.5	<0.5	**2.9(4)**	<50	**53**	**200**	<250	<50
	02/26/99	**3.5**	<0.5	<0.5	<0.5	**2.7(4)**	<50	<50	<50	<250	<50
	05/20/99	**2.8**	<0.5	<0.5	<0.5	<2.5	**150**	<50	<50	<250	<50
	08/17/99	**3.5**	<0.5	<0.5	<0.5	**2.9**	**190**	**51**	<50	<250	NA
	11/11/99	**3.0**	<0.5	<0.5	<0.5	**3.2**	**310**	<50	<50	<250	NA
	03/23/00	<0.5	<0.5	<0.5	<0.5	<2.5	**450**	---(6)	<50	**530**	NA
	04/25/00	NA	NA	NA	NA	NA	NA	**77(6)**	NA	NA	NA
	05/24/00	**2.0**	**1.3**	<0.5	<0.5	<2.5	**130**	**53**	<50	<250	NA
	08/31/00	**1.9**	<0.5	<0.5	<0.5	**2.9**	**120**	<50	**71(9)**	<250	NA
	01/11/01	**1.4**	<0.5	<0.5	<0.5	<2.5	**82**	<50	<50	<250	NA
Duplicate	01/11/01	**1.4**	<0.5	<0.5	<0.5	<2.5	**90**	<50	<50	<250	NA

NA=Not analyzed

1 Hydrocarbons for TPHd do not match profile for laboratory standard.
2 Hydrocarbons for TPHd are lighter than indicated standard.
3 Not analyzed due to presence of free product.
4 MTBE detected by GC methods at slightly over reporting limit has not been confirmed by 8260 GC/MS.
5 MW-3 has slow recovery so not enough water could be collected for all analyses.
6 Due to an oversight TPHg was not analyzed for in the March sampling event, the wells were resampled in April.
7 The surrogate recovery for this sample can not be accurately quantified due to interferences from coeluting organic compounds.
8 The laboratory reported that continuing calibration indicated that the quantitative result for MTBE includes a greater than 15% degree of uncertainty.
9 TPHj chromatogram pattern is unidentified hydrocarbons C9-C24.
10 The motor oil chromatogram pattern is unidentified hydrocarbons greater than C16.
11 The diesel chromatogram pattern is unidentified hydrocarbons C9-C24.
12 TPHg, BTEX and TBE analyzed one day past holding time.
13 TPHj was reported as not matching standard

TABLE 10 – GROUNDWATER MONITORING WELL ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS (VOCs)
UNITED AIRLINES ECONOMY PARKING LOT (in ug/L)

Monitoring well ID#	Date	Acetone	2-Butan-one	Chloro-form	1,1-DCA	1,2-DCE	4-Methyl-2-pentanone	1,1,1-TCA	TCE	PCE	Chloro-ethane	1,2-DCA	1,1-DCE	Vinyl chloride
MW-1	05/15/92	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	08/06/92	<20	<20	<5	<5	<5	<20	<5	<5	<5	<5	<5	<5	<5
	11/24/92	<20	<20	<5	<5	<5	<20	<5	<5	<5	<5	<5	<5	<5
	02/12/93	<20	<20	<5	<5	<5	<20	<5	<5	<5	<5	<5	<5	<5
	05/17/93	<20	<20	<5	<5	<5	<20	<5	<5	<5	<5	<5	<5	<5
	08/03/93	<20	<20	<5	<5	<5	<20	<5	<5	<5	<5	<5	<5	<5
	11/25/93	<20	<20	<5	<5	**6.0**	<20	<5	<5	<5	<5	<5	<5	<5
	05/09/94	<20	<20	<5	<5	<5	<20	<5	<5	**5.5**	<5	<5	<5	<5
	09/27/94	<20	<20	<5	<5	<5	<20	<5	<5	<5	<5	<5	<5	<5
	01/25/95	<20	<20	<5	<5	<5	<20	<5	<5	<5	<5	<5	<5	<5
	08/11/95	NA	NA	<0.5	**4.3**	**13**	NA	**2.0**	**1.8**	**0.6**	<0.5	<0.3	<0.2	<0.5
	11/03/95	NA	NA	<0.5	**1.3**	**3.7**	**NA**	**0.6**	**0.5**	<0.5	<0.5	<0.3	<0.2	<0.5
	06/19/96	NA	NA	<0.5	**5.4**	<0.5	**NA**	<0.5	**1.2**	<0.5	<0.5	<0.3	<0.2	<0.5
	10/24/96	NA	NA	<0.5	**12**	<1.0	**NA**	<0.5	**1.4**	<0.5	<5.2	<0.5	<1.3	<1.8
	01/22/97	NA	NA	<0.5	**3.9**	**8.4**	NA	<0.5	**1.7**	<0.5	<5.2	<0.5	<1.3	<1.8
	04/25/97	NA	NA	<0.5	**6.2**	**10**	NA	<0.5	**1.2**	**0.62**	<5.2	<0.5	<1.3	<1.8
	08/06/97	NA	NA	<0.5	**14**	**19**	NA	<0.5	**2.5**	**0.54**	<5.2	<0.5	<1.3	<1.8
	12/23/97	NA	NA	<1.0	**6.6**	**9.3**	NA	<1.0	<1.0	<1.0	<5.2	<0.5	<1.3	<1.8
	03/26/98	NA	NA	<1.0	**5.3**	**8.1**	NA	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0
	12/16/98	NA	NA	<0.5	**20**	**18**	NA	<0.5	<0.5	<0.5	<1.0	<0.5	**1.5**	<1.0
	02/26/99	NA	NA	<0.5	**15**	**9.8**	NA	**2.9**	<0.5	<0.5	<1.0	<0.5	**0.79**	<1.0
	05/20/99	NA	NA	<0.5	**22**	**17**	NA	<0.5	<0.5	<0.5	<1.0	<0.5	**1.5**	**1.2**
	08/17/99	NA	NA	<0.5	**23**	**15**	NA	<0.5	<0.5	<0.5	<1.0	<0.5	**2.1**	<1.0
	11/11/99	NA	NA	<0.5	**21**	**19**	NA	<0.5	<0.5	<0.5	<1.0	<0.5	**1.5**	<1.0
	03/23/00	NA	NA	<1.0	**24**	**11**	NA	<1.0	<1.0	<1.0	<1.0	<2.0	**1.3**	<1.0
	05/24/00	NA	NA	<1.0	**24**	**11**	NA	<1.0	<1.0	<1.0	<1.0	<2.0	**1.3**	<1.0
	07/10/00	NA	NA	<1.0	**30**	**16**	NA	<1.0	<1.0	<1.0	<1.0	<2.0	**2.2**	<1.0
	08/31/00	NA	NA	<1.0	**30**	**18**	NA	<1.0	<1.0	<1.0	<1.0	<2.0	**3.1**	<1.0
	01/11/01	NA	NA	<1.0	**32**	**11**	NA	<1.0	<1.0	<1.0	<1.0	<1.6	**2.4**	<1.0

TABLE 10 – GROUNDWATER MONITORING WELL ANALYTICAL RESULTS – VOCs (in ug/L)

Monitoring well ID#	Date	Acetone	2-Butan-one	Chloro-form	1,1-DCA	1,2-DCE	4-Methyl-2-pentanone	1,1,1-TCA	TCE	PCE	Chloro-ethane	1,2-DCA	1,1-DCE	Vinyl chloride
MW-2	04/25/95	<200	<200	<50	**50**	**<50**	<200	NA	NA	**<50**	NA	NA	NA	NA
	08/11/95	NA	NA	**5.0**	**79**	**26**	NA	**20**	**4.0**	**9.0**	<5	<3	<2	<5
	11/03/95	NA	NA	<0.5	**73**	**24**	NA	**4.8**	**6.7**	**6.8**	<5	<3	<2	<5
	06/19/96	NA	NA	---(1)	---(1)	---(1)	NA	---(1)	---(1)	---(1)	---(1)	---(1)	---(1)	---(1)
	10/24/96	NA	NA	---(1)	---(1)	---(1)	NA	---(1)	---(1)	---(1)	---(1)	---(1)	---(1)	---(1)
	01/22/97	NA	NA	---(1)	---(1)	---(1)	NA	---(1)	---(1)	---(1)	---(1)	---(1)	---(1)	---(1)
	04/25/97	NA	NA	---(1)	---(1)	---(1)	NA	---(1)	---(1)	---(1)	---(1)	---(1)	---(1)	---(1)
	08/06/97	NA	NA	<5	**69**	**160**	NA	<5	<12	<5	<52	<5	<13	<18
	12/23/97	NA	NA	---(1)	---(1)	---(1)	NA	---(1)	---(1)	---(1)	---(1)	---(1)	---(1)	---(1)
	03/26/98	NA	NA	---(1)	---(1)	---(1)	NA	---(1)	---(1)	---(1)	---(1)	---(1)	---(1)	---(1)
	05/13/98	NA	NA	NA	**51**	**140**	NA	<1.0	<1.0	<1.0	**3.4**	<1.0	<1.0	<2.0
	12/16/98	NA	NA	<5	**58**	**220**	NA	<2.5	<2.5	<2.5	<1.0	<2.5	<2.5	<5.0
	02/26/99	NA	NA	<1.3	**19**	**57**	NA	**2.9**	<1.3	<1.3	<1.3	<1.3	<1.3	<2.5
	05/20/99	NA	NA	<0.5	**63**	**191.5**	NA	**5.8**	**1.1**	**1.5**	**4.4**	<0.5	**0.82**	<1.0
	08/17/99	NA	NA	<2.5	**70**	**140**	NA	<2.5	<2.5	<2.5	<5.0	<2.5	<2.5	<5.0
	11/11/99	NA	NA	<2.5	**48**	**180**	NA	<2.5	<2.5	<2.5	<5.0	<2.5	<2.5	<5.0
	03/23/00	NA	NA	<5.0	**55**	**160**	NA	<5.0	<5.0	<5.0	<5.0	<10	<5.0	<5.0
	05/24/00	NA	NA	<5.0	**55**	**160**	NA	<5.0	<5.0	<5.0	<5.0	<10	<5.0	<5.0
	07/10/00	NA	NA	<5.0	**95**	**240**	NA	<5.0	<5.0	<5.0	**5.5**	<10	<5.0	<5.0
	08/31/00	NA	NA	<1.0	**70**	**150**	NA	<1.0	<1.0	<1.0	**5.0**	<2.0	<1.0	<1.0
	01/11/01	NA	NA	<1.0	**43**	**80**	NA	<1.0	<2.0	<0.6	**3.4**	<1.6	<1.0	<1.0
MW-3	04/25/95	300	300	NA	**30**	<30	**200**	NA	NA	<30	NA	NA	NA	NA
	08/11/95	NA	NA	---(1)	---(1)	---(1)	NA	---(1)	---(1)	---(1)	---(1)	---(1)	---(1)	---(1)
	11/03/95	NA	NA	---(1)	---(1)	---(1)	NA	---(1)	---(1)	---(1)	---(1)	---(1)	---(1)	---(1)
	06/19/96	NA	NA	---(1)	---(1)	---(1)	NA	---(1)	---(1)	---(1)	---(1)	---(1)	---(1)	---(1)
	10/24/96	NA	NA	---(1)	---(1)	---(1)	NA	---(1)	---(1)	---(1)	---(1)	---(1)	---(1)	---(1)
	01/22/97	NA	NA	---(1)	---(1)	---(1)	NA	---(1)	---(1)	---(1)	---(1)	---(1)	---(1)	---(1)
	04/25/97	NA	NA	---(1)	---(1)	---(1)	NA	---(1)	---(1)	---(1)	---(1)	---(1)	---(1)	---(1)

TABLE 10 – GROUNDWATER MONITORING WELL ANALYTICAL RESULTS-VOCs (in ug/L)

Monitoring well ID#	Date	Acetone	2-Butan-one	Chloro-form	1,1-DCA	1,2-DCE	4-Methyl-2-pentanone	1,1,1-TCA	TCE	PCE	Chloro-ethane	1,2-DCA	1,1-DCE	Vinyl chloride
MW-3	08/06/97	NA	NA	**2.1**	**3.8**	<0.5	NA	<0.5	<1.2	**0.62**	<5.2	<0.5	<1.3	<1.8
	12/23/97	NA	NA	<1.0	**4.2**	<1.0	NA	<1.0	<1.0	<1.0	<5.2	<0.5	<1.3	<1.8
	03/26/98	NA	NA	---(1)	---(1)	---(1)	NA	---(1)	---(1)	---(1)	---(1)	---(1)	---(1)	---(1)
	12/16/98	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	02/26/99	NA	NA	<0.5	**4.4**	<0.5	NA	**1.6**	**<0.5**	<0.5	<1.0	<0.5	<0.5	<1.0
	05/20/99	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	08/17/99	NA	NA	<0.5	**3.6**	<0.5	NA	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5	<1.0
	11/11/99	NA	NA	<0.5	**3.2**	<0.5	NA	**2.4**	<0.5	<0.5	<1.0	<0.5	<0.5	<1.0
	03/23/00	NA	NA	<1.0	**4.8**	<1.0	NA	<1.0	<1.0	<1.0	**1.8**	<2.0	<1.0	<1.0
	05/24/00	NA	NA	<1.0	**4.8**	<1.0	NA	<1.0	<1.0	<1.0	**1.8**	<2.0	<1.0	<1.0
	07/10/00	NA	NA	<1.0	**9.8**	<1.0	NA	<1.0	<1.0	<1.0	**1.1**	<2.0	<1.0	<1.0
	08/31/00	NA	NA	<1.0	**9**	<1.0	NA	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0
	01/11/01	NA	NA	<1.0	<1.6	<1.0	NA	<1.0	<2.0	<0.6	<1.2	<1.6	**3.1**	<1.0
MW-4	05/13/98	NA	NA	NA	**31**	**9.9**	NA	NA	NA	**2.8**	**2.8**	<1.0	<2.0	<2.0
	12/16/98	NA	NA	<0.5	**53**	**17**	NA	<5.0	<0.5	**0.94**	**6.8**	<0.5	**1.6**	<1.0
Duplicate	12/16/98	NA	NA	<0.5	**52**	**14**	NA	<5.0	<0.5	**0.88**	**4.4**	<0.5	**1.2**	<1.0
	02/26/99	NA	NA	<0.5	**39**	**28**	NA	**1.4**	<0.5	**0.97**	**6.5**	<0.5	<0.5	<1.0
Duplicate	02/26/99	NA	NA	<0.5	**43**	**36**	NA	**1.7**	<0.5	**1.3**	**8.3**	<0.5	**2.8**	<1.0
	05/20/99	NA	NA	<0.5	**45**	**42.1**	NA	<0.5	**0.54**	**1.7**	**8.9**	<0.5	**2.8**	<1.0
Duplicate	05/20/99	NA	NA	<0.5	**48**	**39.4**	NA	**3.9**	**0.59**	**1.9**	**8.6**	<0.5	**2.5**	<1.0
	08/17/99	NA	NA	<0.5	**37**	**22**	NA	<0.5	**0.7**	**1.8**	**4.3**	<0.5	**2**	<1.0
Duplicate	08/17/99	NA	NA	<0.5	**45**	**0.77**	NA	<0.5	**5.5**	**2**	**13**	<0.5	**2.8**	<1.0
	11/11/99	NA	NA	<0.5	**34**	**22**	NA	<0.5	<0.5	**0.76**	**6.9**	<0.5	**1.1**	<1.0
Duplicate	11/11/99	NA	NA	<0.5	**38**	**23**	NA	<0.5	<0.5	**0.85**	**7.9**	<0.5	**1.1**	<1.0
	03/23/00	NA	NA	<1.0	**24**	**13**	NA	<1.0	<1.0	<1.0	**4.1**	<2.0	<1.0	<1.0
Duplicate	03/23/00	NA	NA	<1.0	**26**	**14**	NA	<1.0	<1.0	**1.1**	**5.5**	<2.0	**1.1**	<1.0
	05/24/00	NA	NA	<1.0	**24**	**13**	NA	<1.0	<1.0	<1.0	**4.1**	<2.0	<1.0	<1.0
Duplicate	05/24/00	NA	NA	<1.0	**26**	**14**	NA	<1.0	<1.0	**1.1**	**5.5**	<2.0	**1.1**	<1.0

TABLE 10 – GROUNDWATER MONITORING WELL ANALYTICAL RESULTS-VOCs (in ug/L)

Monitoring well ID#	Date	Acetone	2-Butan-one	Chloro-form	1,1-DCA	1,2-DCE	4-Methyl-2-pentanone	1,1,1-TCA	TCE	PCE	Chloro-ethane	1,2-DCA	1,1-DCE	Vinyl chloride
MW-4	07/10/00	NA	NA	<2.5	**48**	**25**	NA	<2.5	<2.5	<2.5	**10**	<5.0	<2.5	<2.5
Duplicate	07/10/00	NA	NA	<2.5	**35**	**16**	NA	<2.5	<2.5	<2.5	**7.3**	<5.0	<2.5	<2.5
	08/31/00	NA	NA	<1.0	**50**	**32**	NA	<1.0	<1.0	<1.0	**12**	<2.0	**1.9**	<1.0
Duplicate	08/31/00	NA	NA	<1.0	**43**	**27**	NA	<1.0	<1.0	<1.0	**9.9**	<2.0	**1.6**	<1.0
	01/11/00	NA	NA	<1.0	**42**	**25**	NA	<1.0	<2.0	<0.5	**13**	<1.6	**2.8**	<1.0
MW-5	05/13/98	NA	NA	NA	<1.0	<1.0	NA	NA	NA	<1.0	<2.0	<1.0	<1.0	<2.0
	12/16/98	NA	NA	<0.5	<0.5	<0.5	NA	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5	<1.0
	02/26/99	NA	NA	<0.5	<0.5	<0.5	NA	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5	<1.0
	05/20/99	NA	NA	<0.5	<0.5	<0.5	NA	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5	<1.0
	08/17/99	NA	NA	<0.5	<0.5	<0.5	NA	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5	<1.0
	11/11/99	NA	NA	<0.5	<0.5	<0.5	NA	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5	<1.0
	03/23/00	NA	NA	<1.0	<1.0	<1.0	NA	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0
	05/24/00	NA	NA	<1.0	<1.0	<1.0	NA	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0
	07/10/00	NA	NA	<1.0	<1.0	<1.0	NA	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0
	08/31/00	NA	NA	<1.0	<1.0	<1.0	NA	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0
	01/11/01	NA	NA	<1.0	<1.0	<1.0	NA	<1.0	<2.0	<0.5	<1.0	<1.6	<1.0	<1.0
MW-6	05/13/98	NA	NA	NA	<1.0	<1.0	NA	NA	NA	<1.0	<2.0	<1.0	<1.0	<2.0
	12/16/98	NA	NA	<0.5	<0.5	<0.5	NA	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5	<1.0
	02/26/99	NA	NA	<0.5	<0.5	<0.5	NA	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5	<1.0
	05/20/99	NA	NA	<0.5	<0.5	<0.5	NA	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5	<1.0
	08/17/99	NA	NA	<0.5	<0.5	<0.5	NA	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5	<1.0
	11/11/99	NA	NA	<0.5	<0.5	<0.5	NA	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5	<1.0
	03/23/00	NA	NA	<1.0	<1.0	<1.0	NA	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0
	05/24/00	NA	NA	<1.0	<1.0	<1.0	NA	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0
	07/10/00	NA	NA	<1.0	<1.0	<1.0	NA	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0
	08/31/00	NA	NA	<1.0	<1.0	<1.0	NA	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0
	01/11/01	NA	NA	<1.0	<1.0	<1.0	NA	<1.0	<2.0	<0.5	<1.0	<1.6	<1.0	<1.0

TABLE 10 – GROUNDWATER MONITORING WELL ANALYTICAL RESULTS-VOCs

Monitoring well ID#	Date	Acetone	2-Butan-one	Chloro-form	1,1-DCA	1,2-DCE	4-Methyl-2-pentanone	1,1,1-TCA	TCE	PCE	Chloro-ethane	1,2-DCA	1,1-DCE	Vinyl chloride
MW-7	05/13/98	NA	NA	NA	**8**	<1.0	NA	NA	NA	<1.0	<2.0	<1.0	**3.4**	<2.0
	12/16/98	NA	NA	<0.5	**12**	<0.5	NA	<0.5	<0.5	<0.5	<1.0	<0.5	**5.0**	<1.0
	02/26/99	NA	NA	<0.5	**15**	<0.5	NA	<0.5	<0.5	<0.5	<1.0	<0.5	**6.8**	<1.0
	05/20/99	NA	NA	<0.5	**19**	**0.74**	NA	<0.5	<0.5	<0.5	<1.0	<0.5	**7.3**	<1.0
	08/17/99	NA	NA	<0.5	**22**	**0.59**	NA	<0.5	<0.5	**0.52**	<1.0	<0.5	**9.6**	<1.0
	11/11/99	NA	NA	<0.5	**17**	<0.5	NA	<0.5	<0.5	<0.5	<1.0	<0.5	**6.8**	<1.0
	03/23/00	NA	NA	<1.0	**16**	<1.0	NA	<1.0	<1.0	<1.0	<1.0	<2.0	**5.6**	<1.0
	05/24/00	NA	NA	<1.0	**16**	<1.0	NA	<1.0	<1.0	<1.0	<1.0	<2.0	**5.6**	<1.0
	07/10/00	NA	NA	<1.0	**26**	**1.1**	NA	<1.0	<1.0	**1.8**	<1.0	<2.0	**9.8**	<1.0
	08/31/00	NA	NA	<1.0	**22**	**1.2**	NA	<1.0	<1.0	**1.1**	<1.0	<2.0	**9.5**	<1.0
	01/11/01	NA	NA	<1.0	**18**	<1.0	NA	<1.0	<2.0	**1.5**	<1.0	<1.6	**7.7**	<1.0
MW-8	05/13/98	NA	NA	NA	**180**	**1.9**	NA	NA	NA	<1.0	<2.0	**2.7**	**180**	**6.0**
	12/16/98	NA	NA	<0.5	**440**	**1.2**	NA	<0.5	<0.5	<0.5	<1.0	**10**	**520**	**6.6**
	02/26/99	NA	NA	<2.5	**390**	<2.5	NA	<2.5	<2.5	<2.5	<5.0	**6.9**	**490**	**10**
	05/20/99	NA	NA	<0.5	**410**	**1.2**	NA	<0.5	<0.5	<0.5	<1.0	**8.3**	**480**	**3.9**
	08/17/99	NA	NA	<2.5	**500**	<2.5	NA	<2.5	<2.5	<2.5	<5.0	**11**	**700**	<5.0
	11/11/99	NA	NA	<5.0	**300**	<5.0	NA	<5.0	<5.0	<5.0	<10	**7.5**	**340**	<10
	03/23/00	NA	NA	<10	**240**	<10	NA	<10	<10	<10	<10	<20	**230**	<10
	05/24/00	NA	NA	<10	**240**	<10	NA	<10	<10	<10	<10	<20	**230**	<10
	07/10/00	NA	NA	<10	**380**	<10	NA	<10	<10	<10	<10	<20	**420**	<10
	08/31/00	NA	NA	<10	**310**	<10	NA	<10	<10	<10	<10	<20	**380**	<10
	01/11/01	NA	NA	<10	**260**	<10	NA	<10	<20	<6.0	<10	<16	**300**	<10
Duplicate	01/11/01	NA	NA	<10	**250**	<10	NA	<10	<20	<6.0	<10	<16	**290**	<10

---(1) = Not sampled due to free product in well

NA = Not analyzed

RECOMMENDATIONS FOR SITE CLOSURE AS A "LOW RISK GROUNDWATER CASE"

1) ***The leak has been stopped and ongoing sources, including free product, has been removed or remediated;***

- USTs MF25 and MF26 were removed in March 1992.

- On March 24 and 25, 1992, approximately 700 cubic yards of soil in the former tanks area was excavated. The excavated soils consisted of sandy fill material to a depth of 13 feet below ground surface (bgs), where the sand fill was underlain by clay. A noticeable hydrocarbon odor was emitted during the excavation work. No visibly discolored soils were observed during the excavation activities. The approximate dimensions of the excavation were 50 feet by 50 feet, to a maximum depth of 13 feet.

2) ***The site has been adequately characterized;***

- Prior to removal of the USTs, a Phase I soil investigation of the site was conducted in 1988 by Baseline Engineering (BASELINE). One soil sample (UHWS-1) collected north of the waste oil tank (Figure 3) was analyzed for total petroleum hydrocarbons (TPH), oil and grease, and volatile organic compounds (VOCs). Analytical results detected elevated concentrations of TPH as jet fuel (11,000 mg/kg), oil and grease (9,000 mg/kg), 1,1,1-trichloroethane (900 ug/kg), ethyl benzene (7,200 ug/kg), tetrachloroethene (1,700 ug/kg), toluene (8,600 ug/kg) and total xylenes (19,000 ug/kg).

- To determine the potential extent of soil contamination near the former USTs, additional sampling was conducted as part of a BASELINE Phase II investigation. A total of 14 soil samples were collected from 14 soil boring locations at distances ranging from 12 to 110 feet from the waste oil/safety solvent tanks.

- After USTs MF25/26 were removed, four soil samples (E-1 through E-4) were collected (one at each end of the two tanks) from the excavation sidewalls. The samples were analyzed for total oil and grease (Method 5520D&F), total petroleum hydrocarbons (TPH) as gasoline and diesel (Method 8015-modified), and volatile and semi-volatile hydrocarbons (Method 8240 and 8270, respectively).

- After the removal of 700 cubic yards of soil during the over-excavation of the UST pit, eight (8) additional soil samples were collected, six of the samples were collected from approximately 6 feet bgs around the perimeter of the excavation. The remaining two samples were collected at approximately 11 feet bgs to determine whether the contamination varied with depth. The samples were analyzed for total petroleum hydrocarbons (TPH) as gasoline and diesel (Method 8015-modified), and volatile hydrocarbons (Method 8240). The analytical results of the soil sampling are summarized in Tables 2, 3, and 4.

- In May 1992, one groundwater monitoring well (MW-1) was installed at the site during a preliminary site investigation (Figure 8). Analysis of initial groundwater samples collected from well MW-1 detected TPHd, TPHg, and TPHj at concentrations of 5,200 ug/L, 70 ug/L, and 800 ug/L, respectively.

- On April 19, 1995, two (2) exploratory soil borings were advanced to approximately 11.5 feet below grade, and completed as groundwater monitoring wells MW-2 and MW-3. During

drilling, groundwater was observed at approximately 2.5 feet bgs. During sampling, groundwater was measured to be between 2.20 and 2.78 feet below the top of the casing in wells MW-1, MW-2, and MW-3. Free product was observed in groundwater monitoring wells MW-2 and MW-3 in 1996 and 1997.

- On May 5, 1998, Innovative Technical Solutions, Inc. (ITSI) advanced five (5) soil borings to a maximum depth of approximately 10 feet bgs, and completed them as groundwater monitoring wells MW-4 through MW-8. Soil samples were collected from the five soil borings at depths of approximately 1.5 to 2.0 feet bgs. The soil samples were analyzed for TPHd, TPHg, TPHmo, BTEX, and purgeable halocarbons. A hydrocarbon sheen was noted on the groundwater collected from wells MW-2 and MW-4.

- In December 1998 and January 2000, Harding Lawson Associates (HLA) injected approximately 1,800 pounds of oxygen-releasing compound (ORC) in the vicinity of the former UST locations. The ORC was used to stimulate aerobic degradation of petroleum hydrocarbons in the shallow aquifer.

3) ***The dissolved hydrocarbon plume is not migrating;***

- Detected concentrations of total petroleum hydrocarbons have stabilized and/or decreased significantly since the wells were first sampled in 5/15/92 (MW-1).

- Groundwater monitoring well MW-1 has been sampled on a quarterly basis since April 1992. Groundwater monitoring wells MW-2 through MW-3 have been sampled on a quarterly basis since April 1995. Groundwater monitoring wells MW-4 through MW-8 have been sampled on a quarterly basis since May 1998.

  Analytical results from the eight (8) groundwater monitoring wells are summarized in Table 9. These groundwater monitoring results indicate that the lateral extent of dissolved TPH in the groundwater has generally decreased over time. The analytical data suggests that the dissolved hydrocarbon plume is stable, and is mostly concentrated in the former UST excavation area.

4) ***No water wells, deeper drinking water aquifers, surface water, of other sensitive receptors are likely to be impacted;***

- There are no water supply wells located on the Oakland International Airport (OIA) property.

  The San Francisco Bay Regional Water Quality Control Board "East Bay Plain Groundwater Basin Beneficial Use Evaluation Report, Alameda and Contra Costa Counties, CA", identifies seven irrigation wells on Bay Farm Island located over 2 miles north and west of the OIA property. One irrigation well is installed between 0-100 feet below ground surface (bgs), and six irrigation wells are installed deeper than 100 feet bgs.

  The OIA is located within the East Bay Plain's Groundwater Management Zone A, which the RWQCB has concurred that the quality and nature of the groundwater beneath OIA is such that the deeper aquifers are a significant source of drinking water. The RWQCB has concluded that the shallow groundwater is unlikely to be used for drinking water, due to the high total dissolved solid (TDS) content.

The RWQCB concluded that within the East Bay Plain, there are groundwater plumes that may warrant less aggressive remediation on a case-by-case basis. These plumes are shallow, concentrations of contaminants are declining and no beneficial uses of the groundwater are threatened. The RWQCB should consider the following criteria for the less aggressive remediation approach:

1) The pollution is pre-existing and has not occurred subsequent to this policy;
2) Pollutants are reasonably characterized both laterally and vertically;
3) The source is reasonably removed or remediated;
4) Pollutant concentrations are stable or declining, and the requisite concentration levels will be attained within a reasonably defined time periods;
5) The shallow aquifer is separated from the deeper aquifer by a continuous confining layer (Bay Mud)
6) Potential vertical conduits are properly destroyed;
7) Existing groundwater and surface water beneficial uses are not impacted by the pollutants;
8) The proposal is consistent with any local groundwater management plans and well head protection areas (current or future).

- The Oakland International Airport property consists of shallow fill material (5-10 feet) underlain by young Bay Mud of an average thickness of 10-20 feet. The young Bay Mud is directly underlain by the Merritt Sand Formation which is again underlain by the old Bay Mud. The Merritt Sand Formation is considered brackish and would not be considered a drinking water aquifer. The old Bay Mud is underlain by the Alameda Formation consisting of inter-bedded sand and clay layers down to bedrock (Franciscan Formation). The young Bay Mud is an effective barrier for the vertical migration of petroleum hydrocarbons, and any deeper drinking water aquifers (i.e. Alameda Formation) are not likely to be impacted.

- The results of the groundwater investigations indicate that the horizontal extent of the hydrocarbon-impacted groundwater is limited to approximately 100 feet from the source area in any one direction.

5) The site presents no significant risk to human health; and

The soil and groundwater monitoring well BTEX, SVOC, VOC, and TPH maximum concentrations were compared to the San Francisco International Airport (SFIA) Human Health Protection Zone Tier 1 standards and the California Regional Water Quality Control Board, Tier 1 standards for the "Application of Risk-Based Screening Levels (RBSLs) and Decision Making to Sites With Impacted Soil and Groundwater".

Note: Analytical results of excavation interior samples E-1 through E-4, and soil sample UHWS-1 were not used in the human health risk assessment analysis. The over-excavation of the UST pit removed the soil characterized by soil samples E-1 through E-4 and UHWS-1.

- Benzene was detected at a maximum concentration of 0.02 mg/kg in shallow excavation periphery soil sample E-7, collected at a depth of six (6) feet below ground surface (bgs). The benzene concentration of 0.02 mg/kg is approximately 300 times less than the San Francisco International Airport (SFIA) Tier 1 Human Health Protection Zone (HHPZ) soil standards of 7.5/6.5 mg/kg for Outdoor Maintenance Worker/Construction Worker Risk scenarios.

TABLE 11 – HUMAN HEALTH RISK ASSESSMENT SUMMARY

Chemical of Concern (COC)	MF25/26 Maximum reported concentrations*		SFIA Tier 1 Human Health Protection Zone - Outdoor/Maintenance Worker Risk Scenario (Construction Worker Risk Scenario)		Tier 1 Risk-Based Screening Levels (RBSLs) - Application of RBSLs and Decision Making to Sites With Impacted Soil and Groundwater
	Groundwater (ug/L)	Soil (mg/kg)	Groundwater (ug/L)	Soil (mg/kg)	Direct-Exposure Screening Levels for Construction/Trench Worker Exposure Scenario (mg/kg)
Acenaphthene (nc-PAH)	---	---	---	---	26000
Acetone	300	---	---	---	12000
Benzene	340	0.02	13000 (11000)	7.5 (6.5)	16
Benzo(a)anthracene	---	---	---	---	12
Benzo(a)pyrene	---	---	0.20 (0.32)	1.6 (2.6)	1.2
Bis(2-ethylhexyl)phthalate	---	---	---	---	1200
2-Butanone	300	---	---	---	---
Chloroethane	5.5	---	5700000 (5700000)	2300 (2300)	290
Chloroform	5.0	---	22000 (19000)	9.2 (8.1)	3.2
Chrysene	---	---	---	---	120
Dibenzofuran	---	---	---	---	---
1,1-Dichloroethane (1,1-DCA)	95	<0.02	300000 (270000)	110 (99)	300
1,1-Dichloroethene (1,1-DCE)	700	---	2700 (2400)	1.9 (1.7)	4.6
1,2-Dichloroethane (1,2-DCA)	11	---	49000 (44000)	11 (10)	40
1,2-Dichloroethene (1,2-DCE)	240	---	710000 (99000)	280 (39)	Cis-340/Trans-510
Ethyl benzene	110	20.0	170000 (170000)	510 (510)	230
Fluoranthene	---	---	---	---	12000
Fluorene	---	---	---	---	18000
Methylene chloride (dichloroethane)	---	<0.05	880000 (780000)	170 (150)	360
2-Methylnaphthalene	---	---	1800 (260)	120 (18)	18000
4-Methyl-2-pentanone	200	---	---	---	---
Methyl tert-butyl ether	5.5	---	26000000 (4600000)	4700 (830)	4900
Naphthalene	---	15.0	3800 (530)	61 (8.6)	450
Oil & Grease		<50	---	18000 (7900)	---
Phenanthrene	---	---			18000

TABLE 11 – HUMAN HEALTH RISK ASSESSMENT SUMMARY

Chemical of Concern (COC)	MF25/26 Maximum reported concentrations*		SFIA Tier 1 Human Health Protection Zone – Outdoor/Maintenance Worker Risk Scenario (Construction Worker Risk Scenario)		Tier 1 Risk-Based Screening Levels (RBSLs)
	Groundwater (ug/L)	Soil (mg/kg)	Groundwater (ug/L)	Soil (mg/kg)	Direct-Exposure Screening Levels for Construction/Trench Worker Exposure Scenario (mg/kg)
Phenol	---	---	83000000 (83000000)	26000 (26000)	190000
Pyrene (nc-PAH)	---	---	820 (820)	92 (92)	16000
Tetrachloroethylene (PCE)	9.0	<0.02	150000 (150000)	220 (210)	82
Toluene	680	11.0	530000 (420000)	830 (670)	520
Total petroleum hydrocarbons as diesel	**79000**	7	640	17000 (7900)	16000
Total petroleum hydrocarbons as gasoline	**17000**	2800.0	500	15000 (8500)	16000
Total petroleum hydrocarbons as jet fuel	**110000**	9500.0	17000 (9600)	---	16000
Total petroleum hydrocarbons as motor oil	31000	1600	---	---	16000
Total xylenes	580	44.0	180000 (180000)	360 (360)	210
1,1,1-Trichloroethane (1,1,1-TCA)	20	<0.02	1300000 (740000)	1,400 (780)	1400
Trichloroethylene (TCE)	6.7	100	150000 (150000)	220 (210)	150
Vinyl chloride	10	---	1800 (1600)	0.66(0.59)	2.4

* Groundwater monitoring well concentrations only, screening-level concentrations were not considered to be representative of actual groundwater conditions

NOTE: Tier 1 RBSLs for surface soil and groundwater where GROUNDWATER IS **NOT** A CURRENT OF POTENTIAL SOURCE OF DRINKING WATER

Values in brackets applicable if vadose zone soils are predominantly fine-grained, silty, clayey loams (<20% sand-size (0.075mm) or larger material – i.e. > or = to 80% of soil material will pass through 200 mesh sieve). Bolded values exceed one or more standard/RBSL.

nc-PAH = non-carcinogenic poly-aromatic hydrocarbon

The benzene concentration of 0.02 mg/kg is approximately three (3) orders of magnitude less than the RWQCB Tier 1 Construction/Trench Worker Risk-Based Screening Level (RBSL) of 16 mg/kg.

Benzene was detected at a maximum concentration of 340 ug/L in the groundwater sample collected from monitoring well MW-2 (on 4/25/95). The benzene concentration of 340 ug/L is approximately thirty (30) times less than the San Francisco International Airport (SFIA) Tier 1 Human Health Protection Zone (HHPZ) groundwater standards of 13,000/11,000 ug/L for Outdoor Maintenance Worker/Construction Worker Risk scenarios.

- Toluene, ethyl benzene, and total xylene isomers (TEX) were detected at maximum soil concentrations of 11.0 mg/kg, 20 mg/kg and 44.0 mg/kg, respectively (sample UW-5).

The toluene soil concentrations of 11.0 mg/kg is approximately seventy (70) times less than the SFIA Outdoor/Maintenance Worker and Construction Work Tier 1 standards of 830 mg/kg, and 670 mg/kg, respectively.

The toluene soil concentration of 11.0 mg/kg is approximately fifty (50) times less than the RWQCB Tier 1 Construction/Trench Worker RBSL of 520 mg/kg.

Toluene was detected at a maximum concentration of 680 ug/L in the groundwater sample collected from monitoring well MW-2 (on 8/11/95). The toluene concentration of 680 ug/L is approximately three (3) orders of magnitude less than the SFIA HHPZ Outdoor/Maintenance Worker and Construction Work Tier 1 standards of 530,000 ug/L, and 420,000 ug/L, respectively.

- The ethyl benzene soil concentration of 20 mg/kg is approximately twenty-five (25) times less than the SFIA HHPZ Outdoor/Maintenance and Construction Worker Tier 1 standards of 510 mg/kg.

The ethyl benzene soil concentration of 20 mg/kg is approximately ten (10) times less than the RWQCB Tier 1 RBSL Construction/Trench Worker exposure scenario standard of 230 mg/kg.

Ethyl benzene was detected at a maximum concentration 110 ug/L in the groundwater sample collected from monitoring well MW-2 (on 4/25/95 and 8/1/95). This value is approximately three (3) orders of magnitude less than the SFIA HHPZ Outdoor/Maintenance Worker and Construction Work Tier 1 standards of 170,000 ug/L.

- The total xylene isomers soil concentration of 44.0 mg/kg is approximately eight (8) times less than the SFIA HHPZ Outdoor/Maintenance and Construction Worker Tier 1 standards of 360 mg/kg.

The total xylenes concentration of 44.0 mg/kg is approximately five (5) times less than the RWQCB Tier 1 RBSL Construction/Trench Worker exposure scenario standard of 210 mg/kg.

Total xylene isomers were detected at a maximum concentration of 580 ug/L in the groundwater sample collected from monitoring well MW-2 (on 4/25/95). The total xylenes groundwater concentration of 580 ug/L is approximately three hundred (300) times less than the SFIA HHPZ Outdoor/Maintenance Worker and Construction Work Tier 1 standards of 180,000 ug/L.

- The maximum detected TPHd soil concentration of 7.0 mg/kg (shallow excavation periphery sample E-6) is approximately two-thousand (2,000) times less than the SFIA HHPZ Outdoor/Maintenance Worker Tier 1 standard of 15,000 mg/kg, and approximately one-thousand (1,000) times less than the Construction Worker Tier 1 standard of 8,500 mg/kg.

  The TPHd soil concentration of 7.0 mg/kg is approximately two-thousand (2,000) times less than the RWQCB Tier 1 Construction/Trench Worker exposure scenario standard of 16,000 mg/kg.

  The maximum detected TPHd monitoring well groundwater concentration of 79,000 ug/L (MW-3 on 12/23/97) is approximately two (2) orders of magnitude greater than the SFIA HHPZ Outdoor/Maintenance Worker and Construction Worker Tier 1 standards of 640 ug/L. However, a thick sheen was reported in monitoring well MW-3 during the 12/23/97 sampling of well MW-3. The elevated TPHd concentration probably resulted from trace free product being present in the monitoring well MW-3 water sample.

- The maximum detected TPHg soil concentration of 2,800 mg/kg (sample UW-5 collected on 12/28/88) is approximately five times less than the SFIA HHPZ Outdoor/Maintenance Worker Tier 1 standard of 15,000 mg/kg, and approximately three (3) times less than the Construction Worker Tier 1 standard of 8,500 mg/kg.

  The TPHg concentration of 2,800 mg/kg is approximately six (6) times less than the RWQCB Tier 1 Construction/Trench Worker exposure scenario standard of 16,000 mg/kg.

  The maximum detected TPHg groundwater monitoring well concentration of 17,000 ug/L (MW-2 on 8/17/99) is approximately thirty (30) times greater than the SFIA HHPZ Outdoor/Maintenance Worker and Construction Worker Tier 1 standard of 500 ug/L. However, fuel odor and a slight sheen was reported in monitoring well MW-2 during the 8/17/99 sampling of well MW-2. The elevated TPHg concentration probably resulted from trace free product being present in the monitoring well MW-4 water sample.

- The maximum detected TPHj soil concentration of 9,500 mg/kg (sample UW-5 collected on 12/28/88) is approximately two (2) times less than the RWQCB Construction/Trench Worker Tier 1 standard of 16,000 mg/kg.

  The maximum detected TPHj groundwater monitoring well concentration of 110,000 ug/L (MW-3 on 12/23/97) is approximately two-hundred (200) times greater than the SFIA HHPZ Outdoor/Maintenance Worker and Construction Worker Tier 1 standard of 500 ug/L. However, a thick sheen was reported in monitoring well MW-3 during the sampling of monitoring well MW-3 on 12/23/97. The elevated TPHj concentration probably resulted from trace free product being present in the monitoring well MW-3 water sample.

- No VOCs or SVOCs were detected at concentrations which exceeded the SFIA HHPZ or RWQCB Risk-Based Screening Level standards for soil and groundwater.

- The Economy Parking Lot site is used for the parking of vehicles at the Oakland International Airport, and no buildings will be built in the area of the petroleum-hydrocarbon plume. Therefore, the volatilization of petroleum hydrocarbons from either soil or groundwater to indoor air does not represent a complete exposure pathway.

- The Economy Parking Lot site is capped with a sufficient thickness of asphaltic-concrete. Therefore, the volatilization of petroleum hydrocarbons from either soil or groundwater to outdoor air does not represent a complete exposure pathway.

- The Economy Parking Lot site will not be excavated to a depth where either impacted soil and/or groundwater will likely be encountered. If contaminated soil and/or groundwater conditions are encountered during any future site redevelopment, the Port of Oakland will immediately implement procedures which limit any exposure to construction workers. These procedures include the removal and disposal of any contaminated materials by hazardous material contractors properly trained as required by State and Federal (OSHA) regulations.

- Consideration of groundwater RBSLs listed under the category of "Elevated Threat to Surface Water Habitats" will not generally be necessary at sites with small, isolated plumes of impacted groundwater located some distance from a body of surface water. This is the case for the Economy Parking Lot Site. These screening levels are intended to address potential bioaccumulation of chemicals in aquatic organisms and subsequent human consumption of these organisms. Although these plumes could conceivably migrate offsite and discharge into a body of surface water in the distant future, impacts are likely to be short-lived and the plumes are likely to become significantly diluted as they mix with surface water.

*6) **The site presents no significant risk to the environment***

- The soil and groundwater monitoring well BTEX, SVOC, VOC, and TPH maximum concentrations were compared to the San Francisco International Airport (SFIA) Saltwater Ecological Protection Zone (SEPZ) Tier 1 standards and the California Regional Water Quality Control Board Tier 1 standards for the "Application of Risk-Based Screening Levels (RBSLs) and Decision Making to Sites With Impacted Soil and Groundwater".

Note: Analytical results of excavation interior samples E-1 through E-4, and soil sample UHWS-1 were not used in the ecological risk assessment analysis. The over-excavation of the UST pit removed the soil characterized by soil samples E-1 through E-4 and UHWS-1.

- Benzene was detected at a maximum concentration of 0.02 mg/kg in shallow excavation periphery soil sample E-7, collected at a depth of six (6) feet below ground surface (bgs). The benzene concentration of 0.02 mg/kg is approximately two (2) orders of magnitude less than the SFIA SEPZ Tier 1 soil standard of 2.73 mg/kg, and the RWQCB Soil Leaching standard of 2.1 mg/kg.

  The maximum benzene concentration detected in water samples collected from the groundwater monitoring wells (340 ug/L – MW-2 on 4/25/95) is approximately five (5) times greater than the SFIA SEPZ standard (71 ug/L). However, since the Economy Parking Lot Site is approximately 2,400 feet from San Francisco Bay, a dilution attenuation factor (DAF) needs to be applied to the SEPZ standard to calculate the site-specific or Horizontal Migration Management Zone (HMMZ) standard. This results in a DAF of 24 (1 for each 100 feet distance from the Bay), resulting in a HMMZ standard of 1.66 mg/L (estimated from benzene chart).

  In addition, the Lawrence Livermore National Laboratory (LLNL) study concluded that the benzene plume should not extend more than 250 feet from the hydrocarbon source area. Therefore, it is very unlikely that the benzene plume at the Economy Parking Lot Site would discharge into San Francisco Bay at concentrations exceeding the 71 ug/L standard.

TABLE 12 – ECOLOGICAL RISK ASSESSMENT SUMMARY

Chemical of Concern (COC)	MF25/26 Maximum reported concentrations*		SF1A Tier 1 Ecological Protection Zone Standards		Tier 1 Risk-Based Screening Levels (RBSLs) - Application of RBSLs and Decision Making to Sites With Impacted Soil and Groundwater	
	Groundwater (ug/L)	Soil (mg/kg)	Groundwater (ug/L)	Soil (mg/kg)	Chronic and Acute Surface Water Criteria (ug/L) Table F-4c	Commercial/Industrial Groundwater Protection Soil Leaching (mg/kg) Table G
Acenaphthene (nc-PAH)	---	---	15	19	23 (freshwater)	16
Acetone	300	---	---	---	1500 (freshwater)	0.51
Benzene	**340**	0.02	71	2.73	46 (freshwater)	2.1
Benzo(a)anthracene	---	---	---	---	0.027 (freshwater)	12
Benzo(a)pyrene	---	---	0.031	0.064	0.014 (freshwater)	130
Bis(2-ethylhexyl)phthalate	---	---	---	---	32 (freshwater)	530
2-Butanone (methyl ethyl ketone)	300	---	---	---	14000	13
Chloroethane	5.5	---	99	2.3	---	2.1 (7.1)
Chloroform	5.0	---	470	19	28 (freshwater)	0.88
Chrysene	---	---	---	---	0.70 (freshwater)	4.7
Dibenzofuran	---	---	---	---	---	---
1,1-Dichloroethane (1,1-DCA)	95	<0.02	99	2.5	47 (freshwater)	2.1
1,1-Dichloroethene (1,1-DCE)	**700**	---	3.2	2.5	25 (freshwater)	1.7 (4.3)
1,2-Dichloroethane (1,2-DCA)	11	---	99	1.9	910 (freshwater)	5.2 (11)
1,2-Dichloroethene (1,2-DCE)	240	---	22,400	8,818	590 (freshwater)	Cis – 18 Trans – 38
Ethyl benzene	**110**	**20.0**	86	13	290 (freshwater)	24
Fluoranthene	---	---	15	19	8.1 (freshwater)	60
Fluorene	---	---	15	19	3.9 (freshwater)	5.1
Methylene chloride (dichloroethane)	---	<0.05	1,600	89	2200 (freshwater)	34
2-Methylnaphthalene	---	---	470	456	2.1 (freshwater)	0.25
4-Methyl-2-pentanone	200	---	---	---	---	
Methyl tert-butyl ether	5.5	---	8,000	447	---	1.0
Naphthalene	---	15.0	470	402	24 (freshwater)	4.9

TABLE 12 – ECOLOGICAL RISK ASSESSMENT SUMMARY

Chemical of Concern (COC)	MF25/26 Maximum reported concentrations*		SFIA Tier 1 Ecological Protection Zone Standards		Tier 1 Risk-Based Screening Levels (RBSLs) - Application of RBSLs and Decision Making to Sites With Impacted Soil and Groundwater	
	Groundwater (ug/L)	Soil (mg/kg)	Groundwater (ug/L)	Soil (mg/kg)	Chronic and Acute Surface Water Criteria (ug/L) Table F-4c	Commercial/Industrial Groundwater Protection Soil Leaching (mg/kg) Table G
Oil & Grease		<50	Site Specific	Site Specific		
Phenanthrene	---	---	15	19	4.6	11
Phenol	---	---	500	5.8	2560 (freshwater)	39
Pyrene (nc-PAH)	---	---	15	19	4.0 (freshwater)	55
Tetrachloroethylene (PCE)	**9.0**	<0.02	6.9	0.29	120 (freshwater)	19
Toluene	680	11.0	5000	930	130 (freshwater)	8.4
Total petroleum hydrocarbons as diesel	**79000**	7	640	518	---	500
Total petroleum hydrocarbons as gasoline	**17000**	**2800.0**	3,700	629	---	400
Total petroleum hydrocarbons as jet fuel	**110000**	**9500.0**	640	640	---	500
Total petroleum hydrocarbons as motor oil	31000	1600	---	---	---	1000
Total xylenes	580	44.0	2200	358	13 (freshwater)	1.0
1,1,1-Trichloroethane (1,1,1-TCA)	20	<0.02	3,120	827	62 (freshwater)	8.0
Trichloroethylene (TCE)	6.7	<0.02	81	4.3	360 (freshwater)	29
Vinyl chloride	10	---	34	0.72	782 (freshwater)	0.84 (130)

* Groundwater monitoring well concentrations only, screening-level concentrations were not considered to be representative of actual groundwater conditions
NOTE: Tier 1 RBSLs for surface soil and groundwater where GROUNDWATER IS **NOT** A CURRENT OF POTENTIAL SOURCE OF DRINKING WATER
Soil RBSLs intended to address groundwater protection and ecological concerns under noted land-use scenarios.
Chronic and acute surface water RBSL criteria addresses potential impact on marine aquatic life, unless otherwise noted.
Values in parentheses applicable if vadose zone soils are predominantly fine-grained, silty, clayey loams (<20% sand-size (0.075mm) or larger material – i.e. > or = to 80% of soil material will pass through 200 mesh sieve). Bolded values exceed one or more standard/RBSL.

- Toluene, ethyl benzene, and total xylene isomers (TEX) were detected at maximum soil concentrations of 11.0 mg/kg, 20 mg/kg and 44.0 mg/kg, respectively (sample UW-5).

  The toluene soil concentration of 11.0 mg/kg is approximately two (2) orders of magnitude less than the SFIA SEPZ Tier 1 soil standard of 930 mg/kg, without applying the dilution attenuation factor. The toluene concentration of 11.0 mg/kg is slightly greater than the RWQCB Commercial/Industrial Tier 1 RBSL soil leaching standard of 8.4 mg/kg.

  Toluene was detected at a maximum concentration of 680 ug/L in the groundwater sample collected from monitoring well MW-2 (on 8/11/95). The toluene concentration of 680 ug/L is approximately seven (7) times less than the SFIA SEPZ Tier 1 RBSL standard of 5,000 ug/L, without applying the dilution attenuation factor. The toluene concentration of 680 ug/L is approximately five (5) times greater than the RWQCB Chronic and Acute Surface Water Criteria Tier 1 RBSL freshwater standard of 130 ug/L.

- The ethyl benzene soil concentration of 20 mg/kg is slightly greater than the SFIA SEPZ Tier 1 standard of 13 mg/kg, without applying the dilution attenuation factor. The ethyl benzene soil concentration of 20 mg/kg is slightly less than the RWQCB Commercial/Industrial Tier 1 RBSL soil leaching standard of 24 mg/kg.

  Ethyl benzene was detected at a maximum concentration 110 ug/L in the groundwater sample collected from monitoring well MW-2 (on 4/25/95 and 8/1/95). The ethyl benzene concentration of 110 ug/L is slightly greater than the SFIA SEPZ Tier 1 RBSL standard of 86 ug/L. However, the ethyl benzene concentration of 110 ug/L is approximately twenty (20) times less than the SFIA HMMZ Tier 1 RBSL standard of 2.1 mg/L (DAF = 24, estimated from ethyl benzene chart).

- The total xylene isomers soil concentration of 44.0 mg/kg is approximately eight (8) times less than the SFIA SEPZ Tier 1 standard of 358 mg/kg, without applying the dilution attenuation factor.

  The total xylenes concentration of 44.0 mg/kg is fourty-four (44) times greater than the RWQCB Commercial/Industrial Tier 1 RBSL soil leaching standard of 1.0 mg/kg.

  Total xylene isomers were detected at a maximum concentration of 580 ug/L in the groundwater sample collected from monitoring well MW-2 (on 4/25/95). The total xylenes groundwater concentration of 580 ug/L is approximately four (4) times less than the SFIA SEPZ Tier 1 standard of 2,200 ug/L, without applying the dilution attenuation factor.

  The total xylenes groundwater concentration of 580 ug/L is approximately fourty-five (45) times greater than the RWQCB Chronic and Acute Surface Water Criteria Tier 1 RBSL freshwater standard of 13 ug/L.

- The maximum detected TPHd soil concentration of 7.0 mg/kg (shallow excavation periphery sample E-6) is approximately two orders of magnitude less than the SFIA SEPZ Tier 1 standard of 518 mg/kg, without applying the dilution attenuation factor.

  The TPHd concentration of 7.0 mg/kg is approximately two orders of magnitude less than the RWQCB Commercial/Industrial Tier 1 RBSL soil leaching standard of 500 mg/kg.

The maximum detected TPHd monitoring well groundwater concentration of 79,000 ug/L (MW-3 on 12/23/97) is approximately two (2) orders of magnitude greater than the SFIA SEPZ Tier 1 standard of 640 ug/L. The TPHd concentration of 79,000 ug/L is approximately five (5) times greater than the SFIA HMMZ Tier 1 RBSL standard of 15.1 mg/L (DAF = 24, estimated from TPHd chart).

However, a thick sheen was reported in monitoring well MW-3 during the 12/23/97 sampling of well MW-3. The elevated TPHd concentration probably resulted from trace free product being present in the monitoring well MW-3 water sample.

- The maximum detected TPHg soil concentration of 2,800 mg/kg (sample UW-5 collected on 12/28/88) is approximately four (4) times greater than the SFIA SEPZ Tier 1 standard of 629 mg/kg. However, the TPHg soil concentration of 2,800 mg/kg is approximately six (6) times less than the SFIA HMMZ Tier 1 RBSL standard of 15,000 mg/kg (DAF = 24, estimated from TPHg chart-at soil saturation point).

  The maximum detected TPHg soil concentration of 2,800 mg/kg is fifty-six (56) times greater than the RWQCB Soil Leaching standard of 500 mg/kg. However, soil leaching assumptions may not be representative of actual groundwater conditions at sites with both limited soil contamination and well-defined groundwater plume(s).

  The maximum detected TPHg groundwater monitoring well concentration of 17,000 ug/L (MW-2 on 8/17/99) is approximately thirty (30) times greater than the SFIA SEPZ Tier 1 standard of 3,700 ug/L. However, the TPHg concentration of 17,000 ug/L is approximately five (5) times less than the SFIA HMMZ Tier 1 RBSL standard of 88,000 ug/L (DAF = 24, estimated from TPHg chart). In addition, fuel odor and a slight sheen was reported in monitoring well MW-2 during the 8/17/99 sampling of well MW-2. The elevated TPHg concentration probably resulted from trace free product being present in the monitoring well MW-4 water sample.

- The maximum detected TPHj soil concentration of 9,500 mg/kg (sample UW-5 collected on 12/28/88) is approximately fifteen (15) times greater than the SFIA SEPZ Tier 1 standard of 640 mg/kg. However, the TPHj soil concentration of 9,500 mg/kg is approximately two (2) times less than the SFIA HMMZ Tier 1 RBSL standard of 15,500 mg/kg (DAF = 24, estimated from TPHj chart).

  The maximum detected TPHj soil concentration of 9,500 mg/kg is nineteen (19) times greater than the RWQCB Soil Leaching standard of 500 mg/kg. However, soil leaching assumptions may not be representative of actual groundwater conditions at sites with both limited soil contamination and well-defined groundwater plume(s).

  The maximum detected TPHj groundwater monitoring well concentration of 110,000 ug/L (MW-3 on 12/23/97) is approximately two-hundred (200) times greater than the SFIA HHPZ Outdoor/Maintenance Worker and Construction Worker Tier 1 standard of 500 ug/L. However, a thick sheen was reported in monitoring well MW-3 during the sampling of monitoring well MW-3 on 12/23/97. The elevated TPHj concentration probably resulted from trace free product being present in the monitoring well MW-3 water sample.

- The maximum detected 1,1-DCE (dichloroethene) groundwater monitoring well concentration of 700 ug/L (MW-8 on 8/17/99) is approximately two-hundred (200) times greater than the SFIA SEPZ Tier 1 standard of 3.2 ug/L. The 1,1-DCE concentration of 700 ug/L is

approximately nine (9) times greater than the SFIA HMMZ Tier 1 RBSL standard of 77 ug/L (DAF=24, estimated from 1,1-DCE chart).

The 1,1-DCE concentration of 700 ug/L is approximately thirty (30) times greater than the RWQCB Chronic and Acute Surface Water Criteria Tier 1 RBSL freshwater standard of 25 ug/L.

Please note that the highest 1,1-DCE concentrations were detected in groundwater samples collected from the "inferred" up-gradient well MW-8. These concentrations were approximately two (2) orders of magnitude higher than the concentrations of 1,1-DCE historically detected in the monitoring wells closest to the former MF25/26 UST excavation.

In addition, non-detectable concentrations of 1,1-DCE were found in soil samples collected from the excavation interior (E-1 through E-4), and shallow and deep excavation periphery (E-5 through E-12) sampling locations.

- The maximum detected tetrachloroethylene (PCE) groundwater monitoring well concentration of 9.0 ug/L (MW-8 on 8/17/99) is slightly greater than the SFIA SEPZ Tier 1 standard of 6.9 ug/L. The PCE concentration of 9.0 ug/L is approximately eighteen (18) times less than the SFIA HMMZ Tier 1 RBSL standard of 163 ug/L (DAF=24, estimated from tetrachloroethylene chart).

  The PCE concentration of 9.0 ug/L is approximately thirteen (13) times less than the RWQCB Chronic and Acute Surface Water Criteria Tier 1 RBSL freshwater standard of 120 ug/L.

Conclusions

Based on the information presented in this UST closure report, former USTs MF25 and MF26 pose a low risk to human health and the environment. Therefore, the Port of Oakland requests that the Alameda County Health Care Services Agency (ACHCSA) submit this site for case closure to the Regional Water Quality Control Board for all UST sites at 1100 Airport Drive at the Oakland International Airport.

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Harding Lawson Associates - "Quarterly Groundwater Monitoring Report, April 1 through June 30, 1999", dated July 9, 1999.

Harding Lawson Associates - "Quarterly Groundwater Monitoring Report, July 1 through September 30, 1999", dated September 17, 1999.

Harding Lawson Associates - "Quarterly Groundwater Monitoring Report, October 1 through December 31, 1999", dated January 25, 2000.

Harding Lawson Associates - "Quarterly Groundwater Monitoring Report, January 1 through March 31, 2000", dated July 11, 2000.

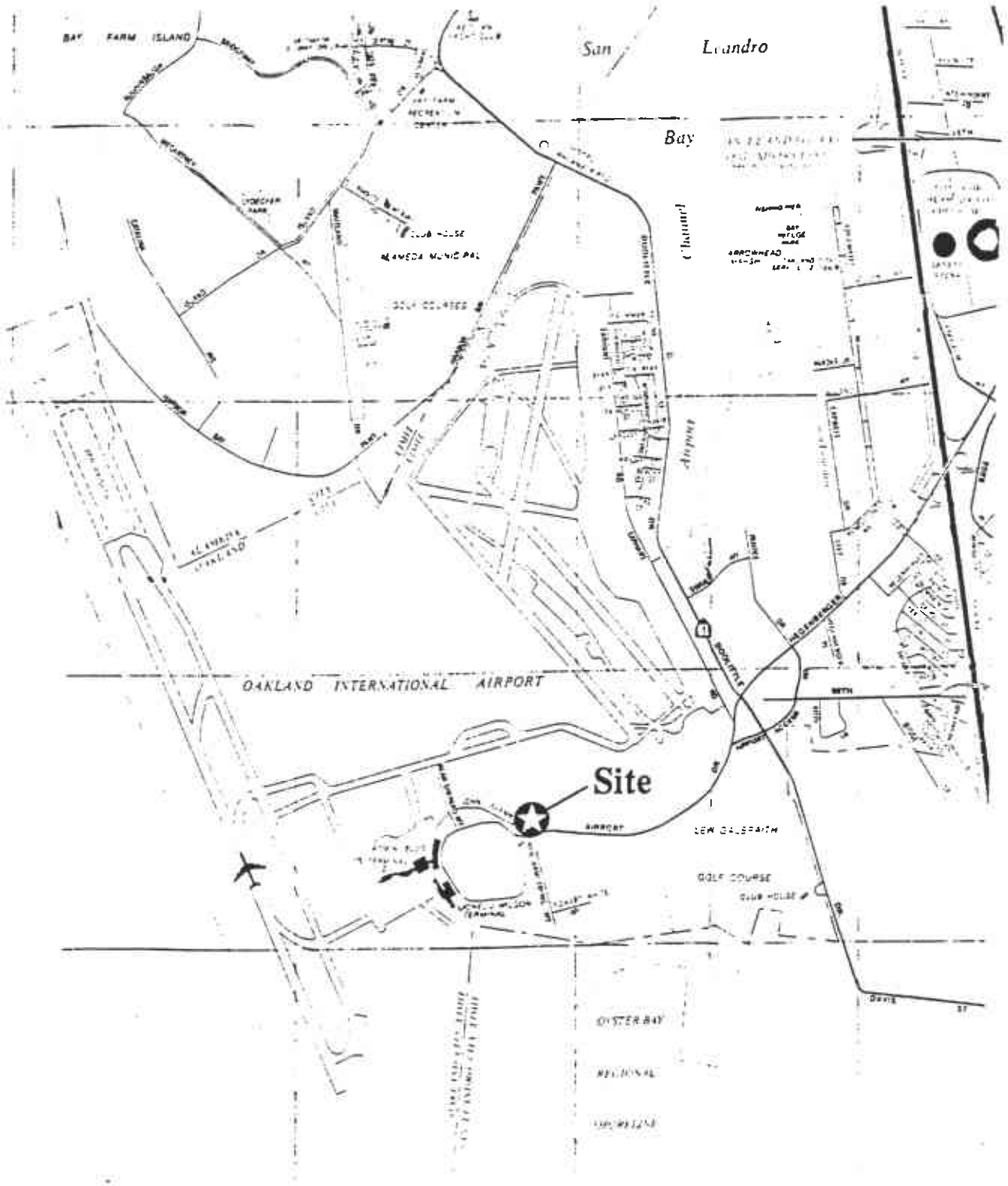
Harding Lawson Associates - "Quarterly Groundwater Monitoring Report, April 1 through June 30, 2000", dated September 9, 2000.

Harding ESE - "Quarterly Groundwater Monitoring Report, July 1 through September 30, 2000", dated January 12, 2001.

Harding ESE - "Quarterly Groundwater Monitoring Report, October 1 through December 31, 2000", dated March 1, 2001.

REGIONAL LOCATION

Figure 1



Building M-110
United Airlines
Maintenance Hangar

0 5000 Feet

BASELINE

GENERAL SITE PLAN
United Airlines Maintenance Hanger
Oakland International Airport
Oakland, California

Figure 2

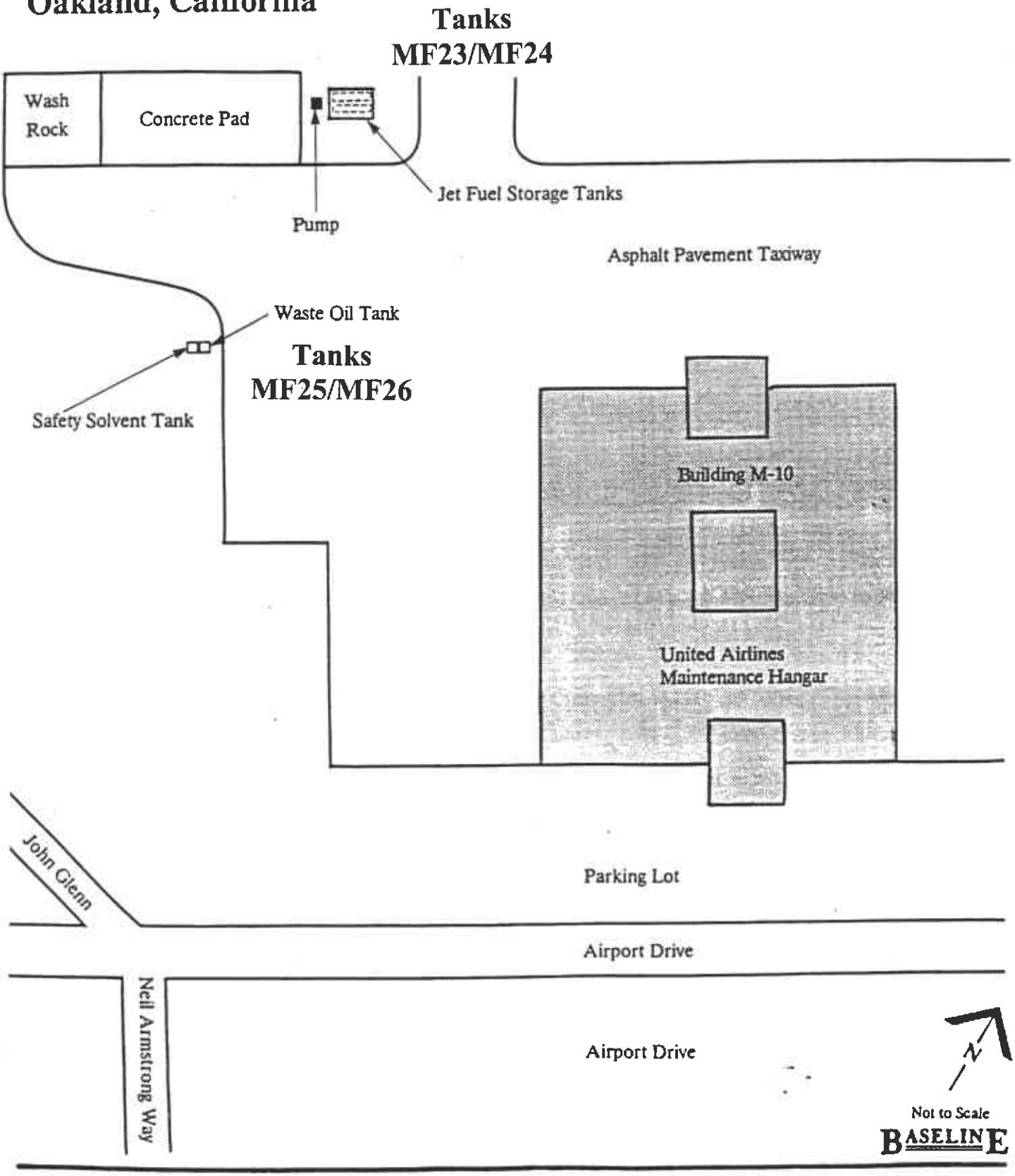
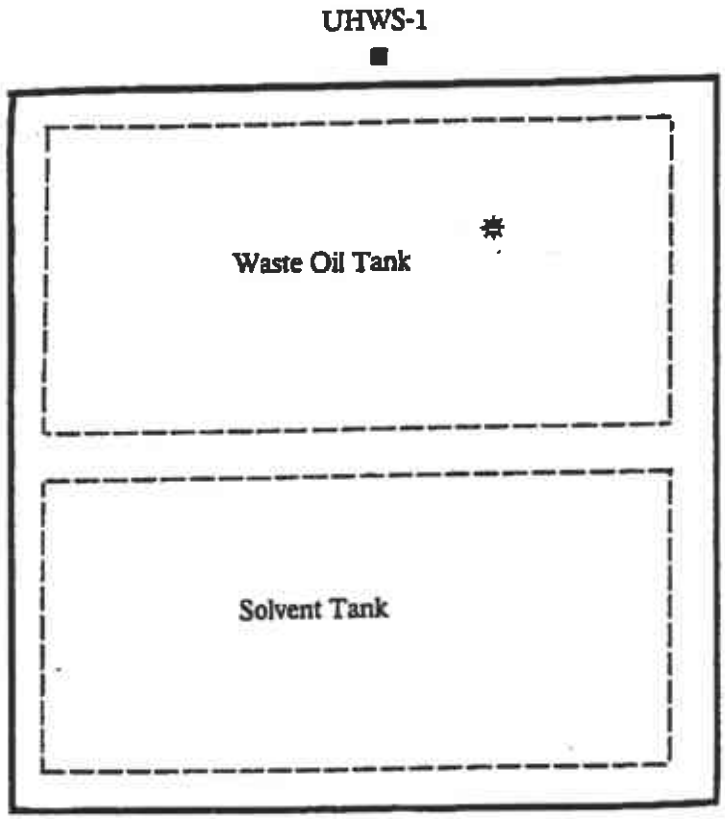


Figure 3

SITE LOCATION
Waste Oil Tank and Safety Solvent Tanks United Airlines Maintenance, Hanger



Legend:

- ■ Soil Sampling Location
- ✱ Oil Fill Pipe

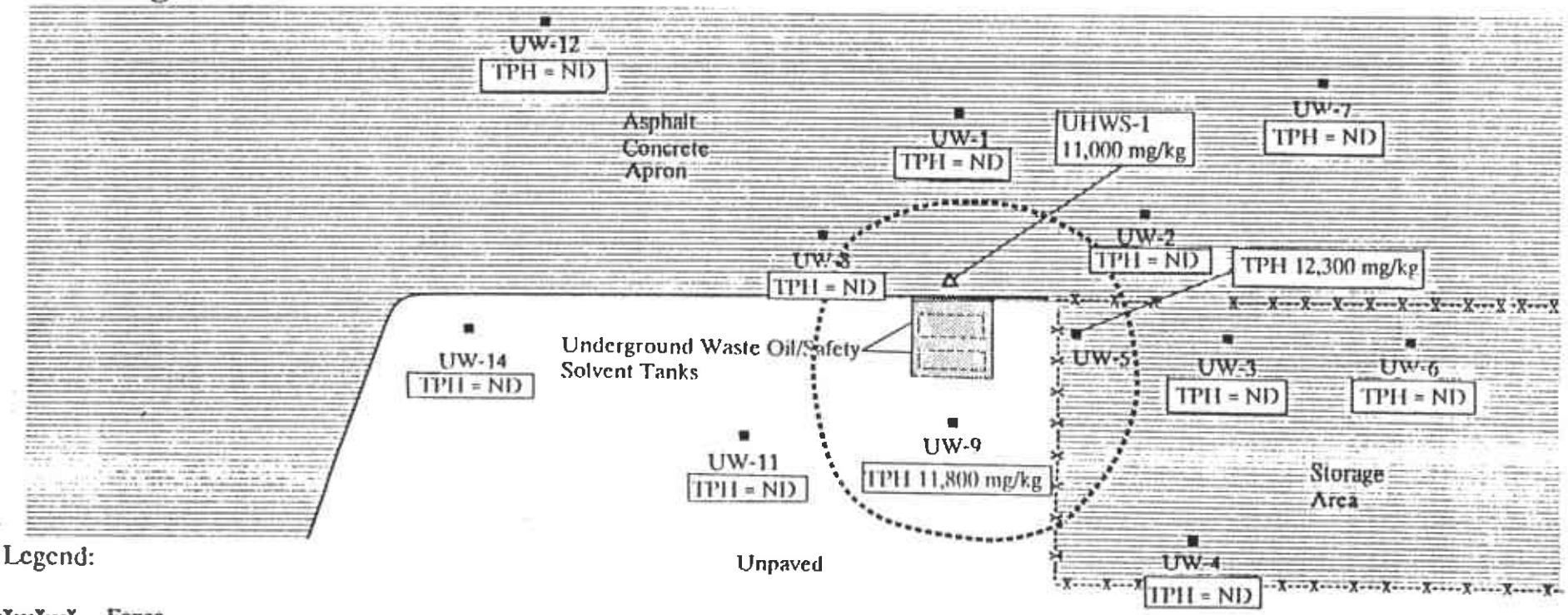
N

Not to Scale

BASELINE

SAMPLING LOCATIONS AND TPH RESULTS
Waste Oil/Safety Solvent Storage Tank Area
United Airline Maintenance Hangar
Building M-110

Figure 4



Legend:

-x---x---x Fence

Concrete Pad

Asphalt Concrete

△ UHWS-1 Soil Sample Locations 10/4/88

UW-1 Soil Sample Locations 12/28/88

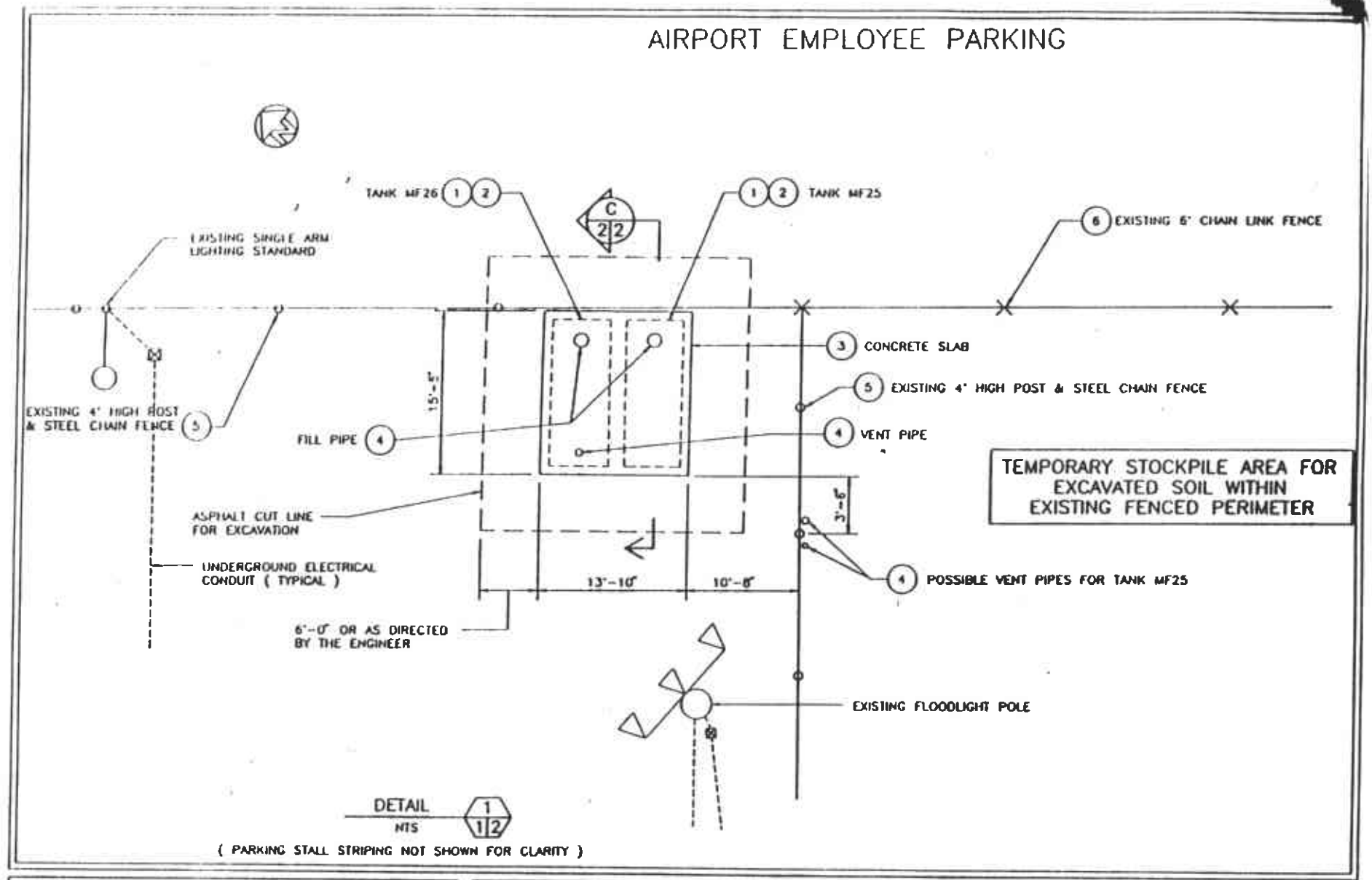
ND = Compound Not Detected

Estimated Extent of TPH Contaminated Soils Above 100 mg/kg

Note: TPH Values are an addition of jet fuel and gasoline concentrations

0 20 Feet

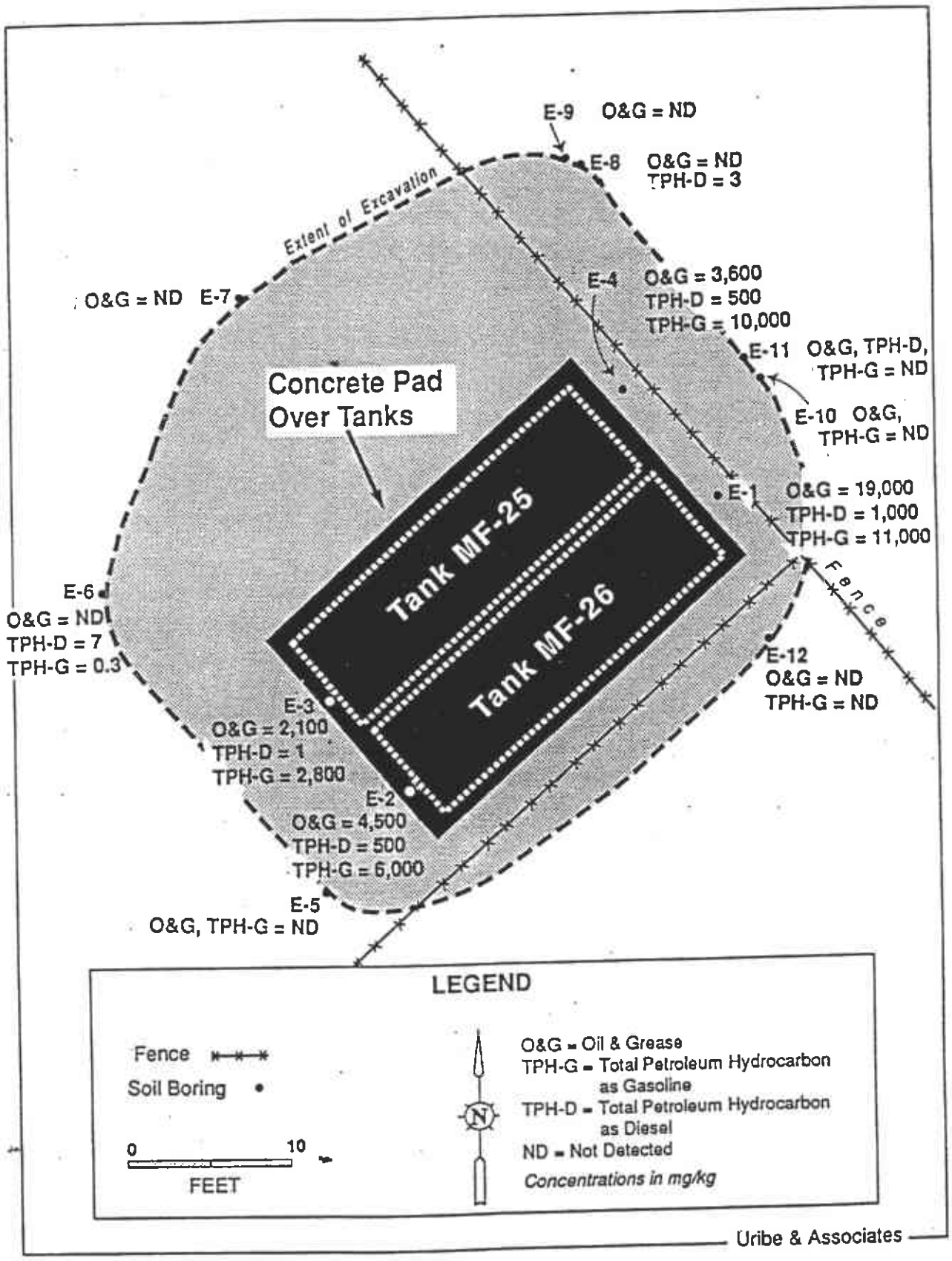
BASELINE



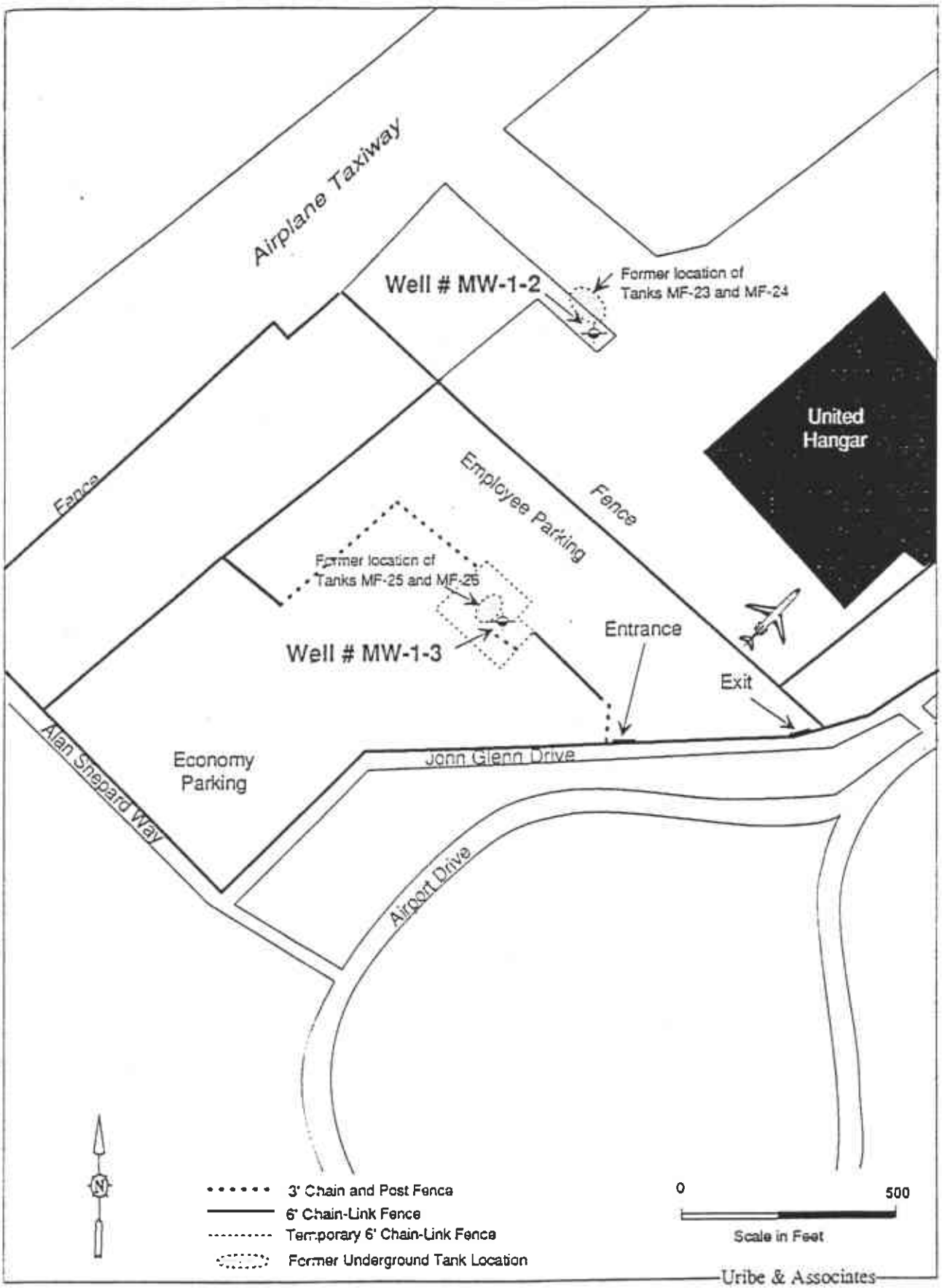
SITE PLAN
PORT OF OAKLAND
1100 AIRPORT DRIVE
OAKLAND, CA 94621

Figure 5

Figure 6



Soil Sampling Locations Near Excavated Tanks



Site Plan Map of Monitoring Wells MW-1-2 and MW-1-3 at United Hangar

Figure 7

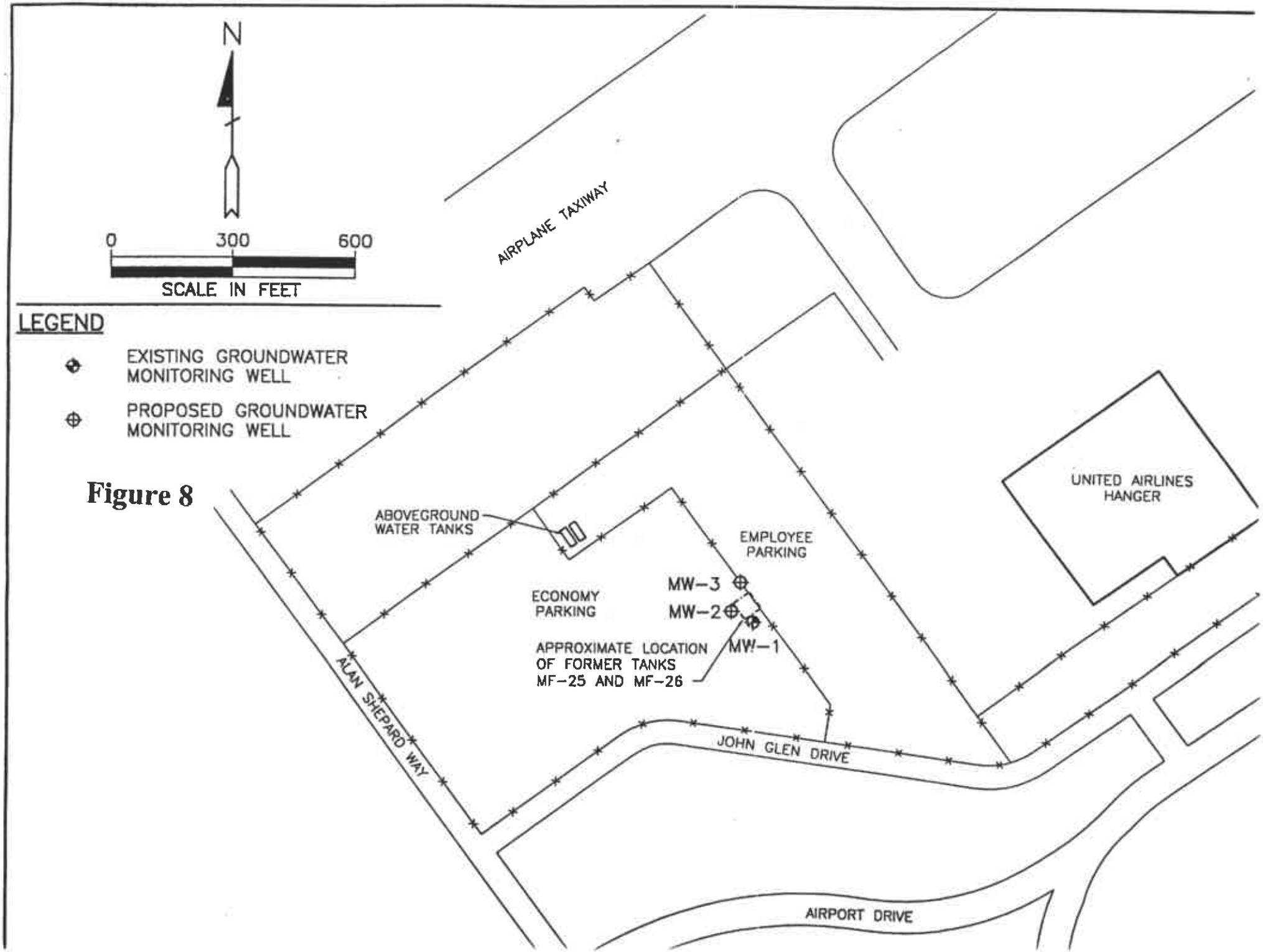
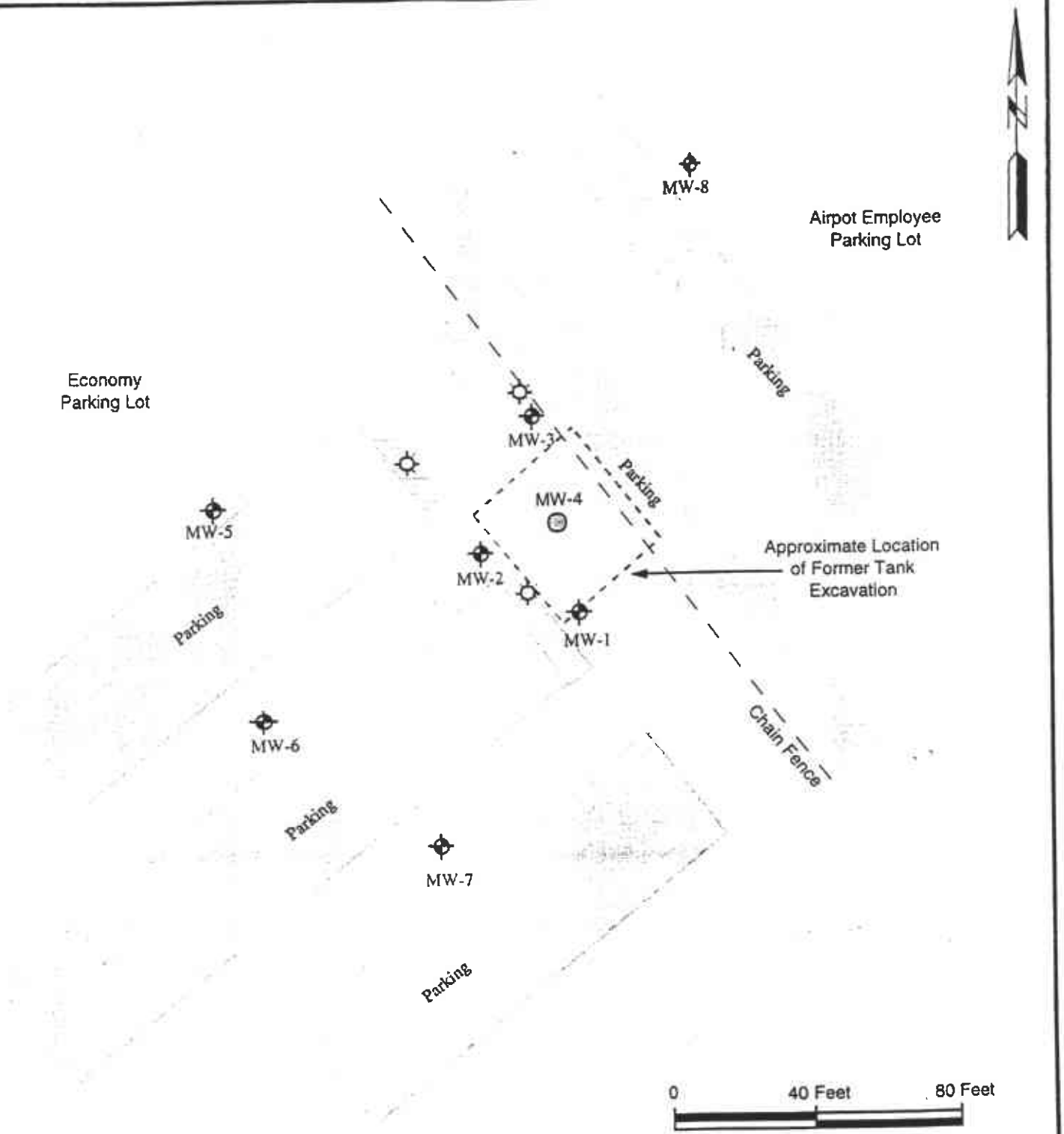

N
0
300
600
SCALE IN FEET
LEGEND
EXISTING GROUNDWATER MONITORING WELL
PROPOSED GROUNDWATER MONITORING WELL
AIRPLANE TAXIWAY
UNITED AIRLINES HANGER
ABOVEGROUND WATER TANKS
EMPLOYEE PARKING
ECONOMY PARKING
MW-3
MW-2
MW-1
APPROXIMATE LOCATION OF FORMER TANKS MF-25 AND MF-26
ALAN SHEPARD WAY
JOHN GLEN DRIVE
AIRPORT DRIVE

Figure 8



Legend
- Monitoring Well
- Remediation Well
- Light Pole

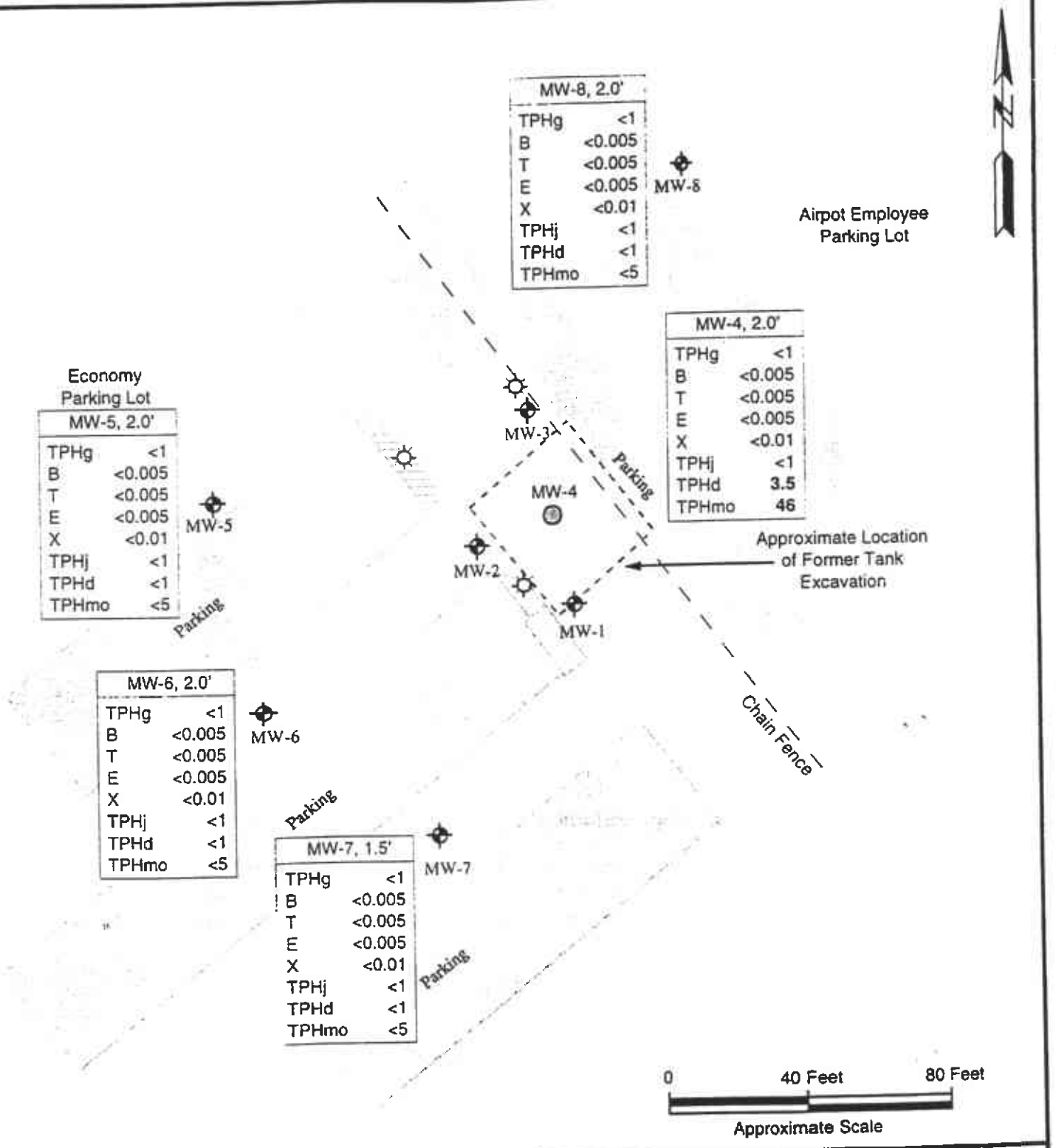
Figure 9

APPROXIMATE LOCATIONS OF NEW AND EXISTING MONITORING WELLS

United Airlines Hangar-Economy Parking Lot Site
Oakland International Airport
1100 Airport Drive

PORT OF OAKLAND

ITSI
INNOVATIVE TECHNICAL SOLUTIONS, INC.



Legend

- Monitoring Well
- Remediation Well
- Light Pole

TPH AND BTEX Concentrations in mg/kg from Soil Samples Collected on May 5, 1998

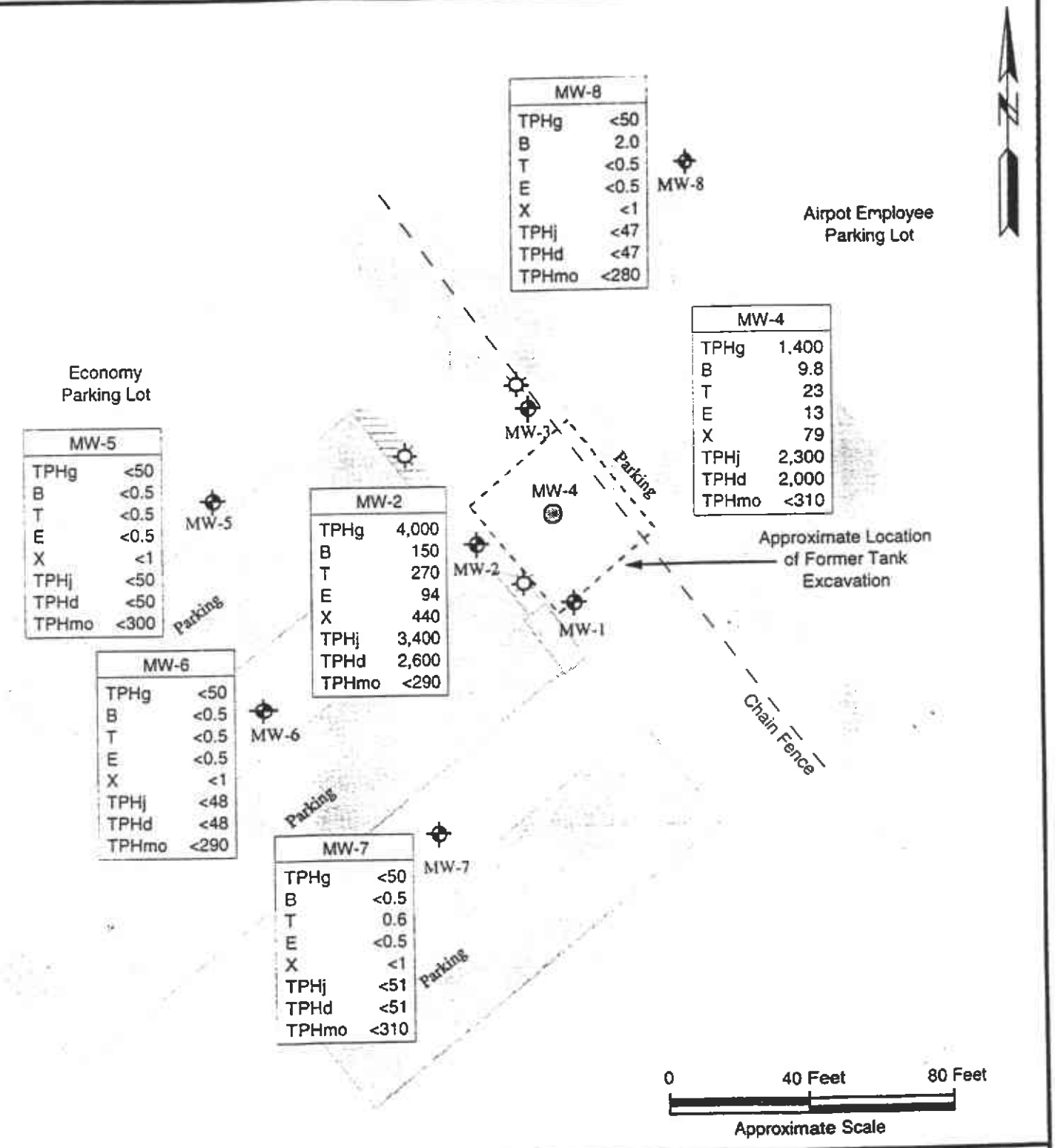
Figure 10

PETROLEUM HYDROCARBONS IN SOIL IN NEWLY INSTALLED MONITORING WELLS

United Airlines Hangar-Economy Parking Lot Site
Oakland International Airport
1100 Airport Drive

PORT OF OAKLAND

INNOVATIVE TECHNICAL SOLUTIONS, INC.



Legend

- Monitoring Well
- Remediation Well
- Light Pole

TPH AND BTEX Concentrations in µg/l from Groundwater Samples Collected on May 13, 1998

Figure 11

PETROLEUM HYDROCARBONS IN WATER IN NEWLY INSTALLED MONITORING WELLS

United Airlines Hangar-Economy Parking Lot Site
Oakland International Airport
1100 Airport Drive

ITSI

PORT OF OAKLAND

INNOVATIVE TECHNICAL SOLUTIONS, INC.

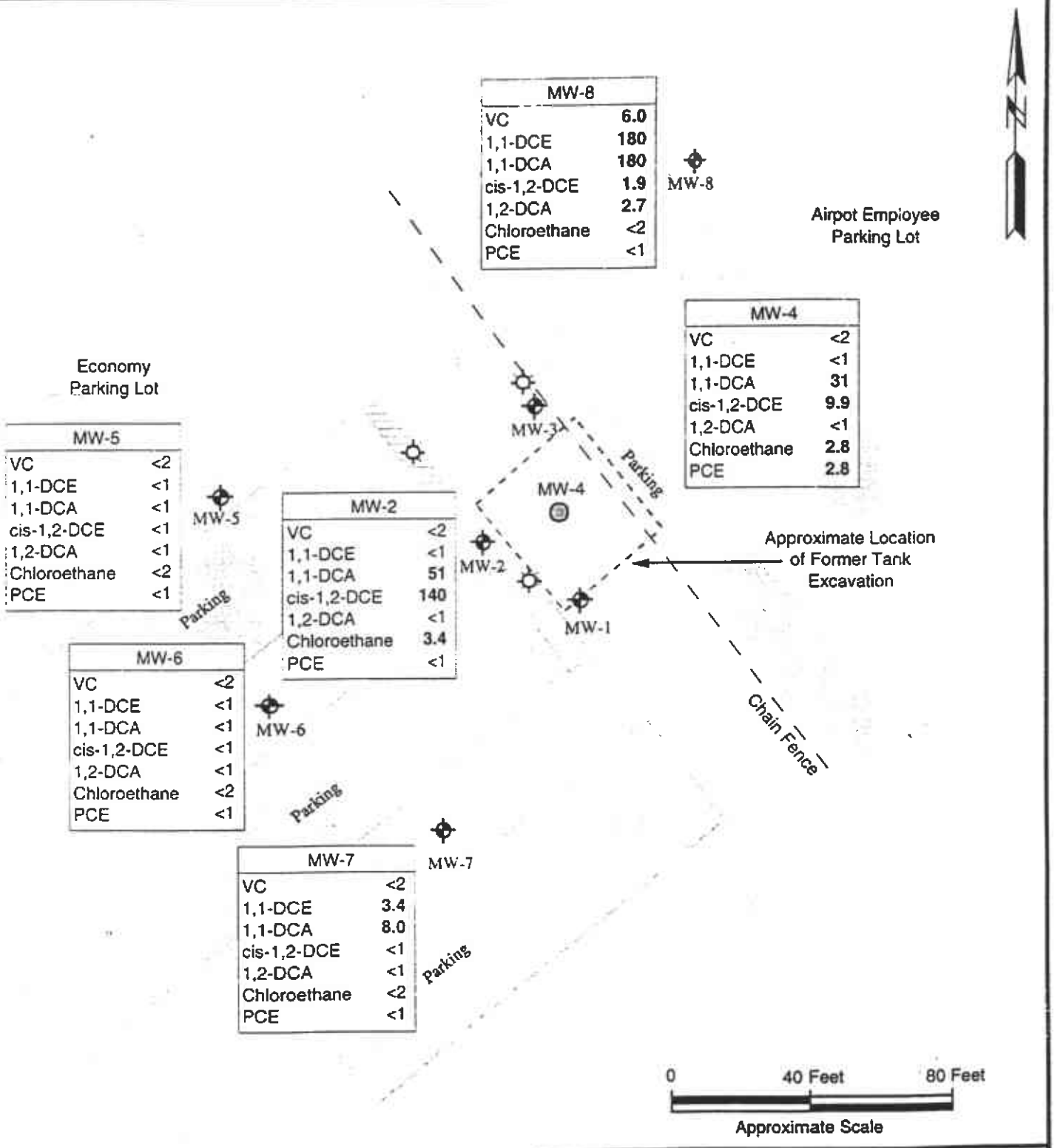


Figure 12

VOCS IN WATER IN NEWLY INSTALLED MONITORING WELLS

United Airlines Hangar-Economy Parking Lot Site
Oakland International Airport
1100 Airport Drive

ITSI

PORT OF OAKLAND

INNOVATIVE TECHNICAL SOLUTIONS, INC.

Table 3 - HMMZ Standards

Derivation of Standards

The chemical standards for the Horizontal Migration Management Zone (HMMZ) are all derived from the groundwater standards applicable to the Saltwater Ecological Protection Zone (SEPZ). The SEPZ groundwater standards are aquatic toxicity values taken from various references (see Table 2). Groundwater standards for interior portions of the airport within the HMMZ are calculated as follows:

SEPZ Groundwater Standard x DAF - HMMZ Groundwater Standard

The DAF (dilution-attentuation factor) is a value ranging from 3 at the inside edge of the SEPZ to greater than 50 at airport locations furthest from the Bay. The DAF is distance dependent and is set at a value of 1 per 100 feet from the Bay. A DAF of I is imposed throughout the SEPZ to protect the Bay.

SEPZ and HMMZ soil standards for a particular location are calculated from the groundwater standards for the location using either a chemical specific Kd value (as for TPH) or USEPA's Organic Leachate Model (OLM). The OLM equation is:

$$C_L = 0.00221\ Cs^{0.678}\ S^{0.373}$$

Rearranging to solve for soil concentration yields:

$$C_S = [CL/0.00221\ S^{0.373})]^{1.47}$$

Wbere:

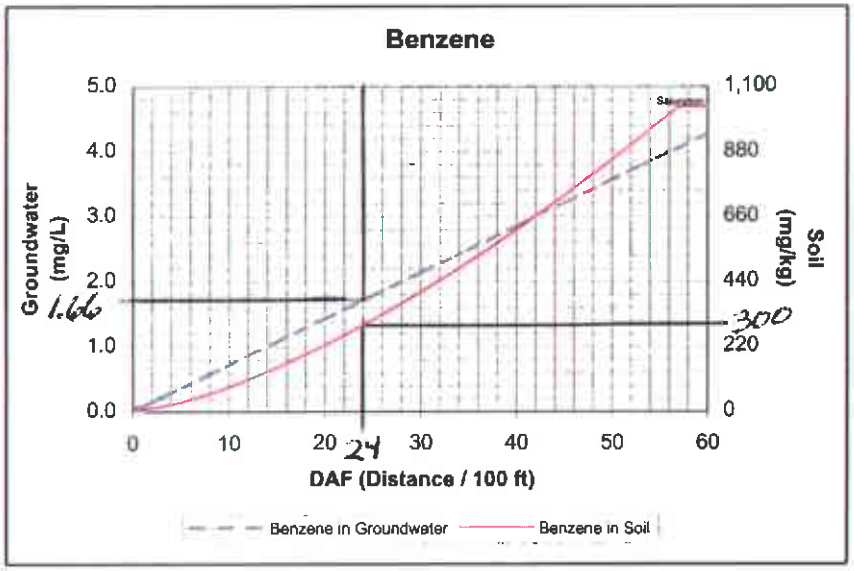
CL - Concentration in water (mg/L)

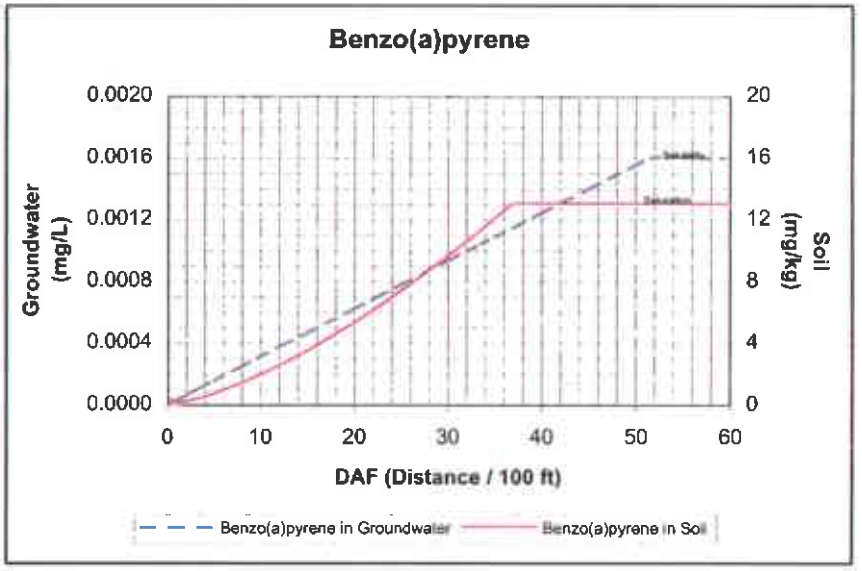
Cs - Concentration in sail (mg/kg)

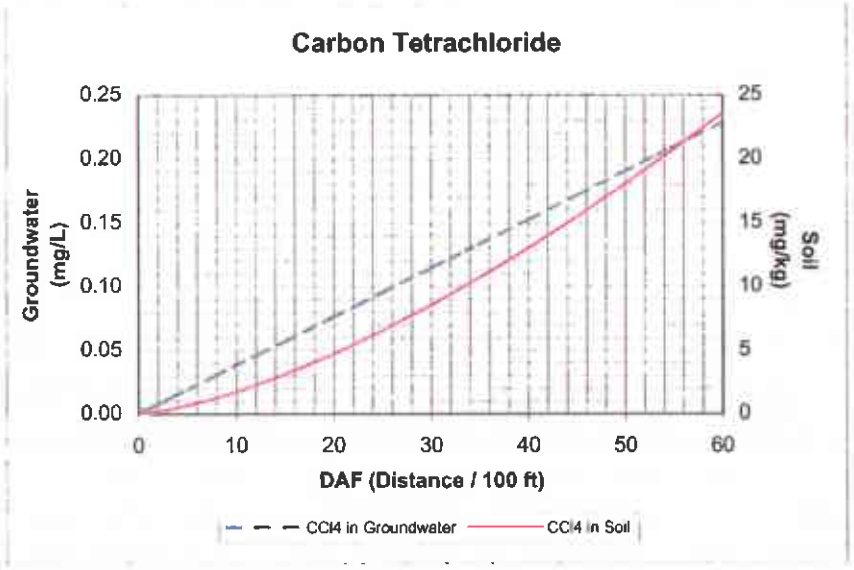
S - Solubility of chemical in water (mg/L)

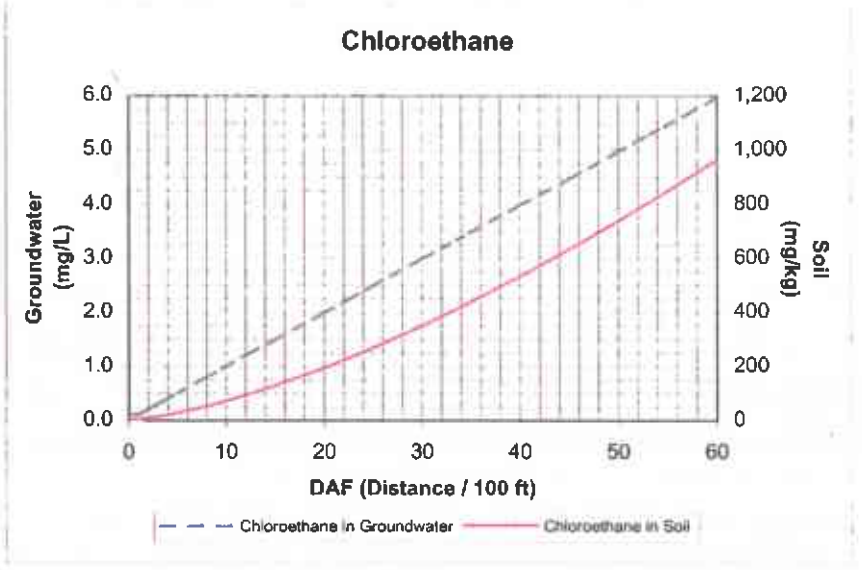
Use of Graphs

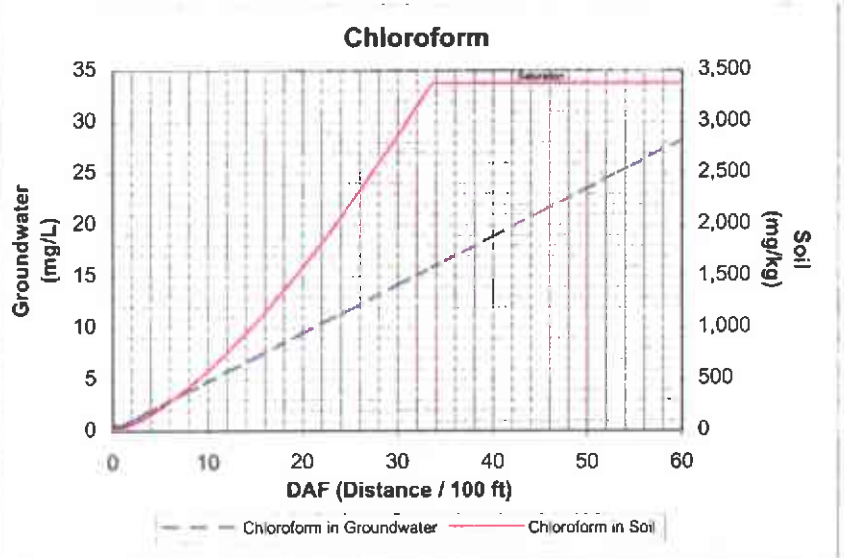
To determine the HMMZ soil and groundwater standards for a particular site, first the distance is measured from the edge of the site's contaminated area to the nearest point on the Bay (mean high tide line). This distance is divided by 100 to calculate the site-specific DAF. The DAF is used as the entering argument on the graph of each chemical of concern. The DAFs are along the bottom of the graphs, soil concentrations are on the right side, and groundwater concentrations are on the left side. Where the vertical DAF line intersects the soil line (a solid, usually curved line) is allowable soil concentration, which is read from the intersection point horizontally to the soil concentrations on the right side. The point where the vertical DAF line intersects the groundwater line (dashed) is the allowable groundwater concentration, which is read from the intersection point horizontally to the groundwater concentrations on the left.

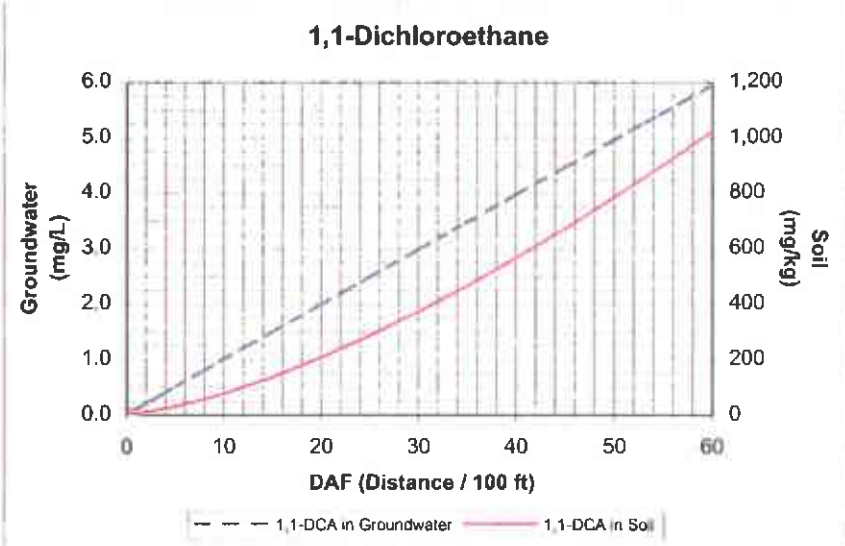

Benzene
Groundwater (mg/L)
Soil (mg/kg)
5.0
4.0
3.0
2.0
1.0
0.0
1,100
880
660
440
220
0
1.66
300
24
0
10
20
30
40
50
60
DAF (Distance / 100 ft)
Benzene in Groundwater
Benzene in Soil

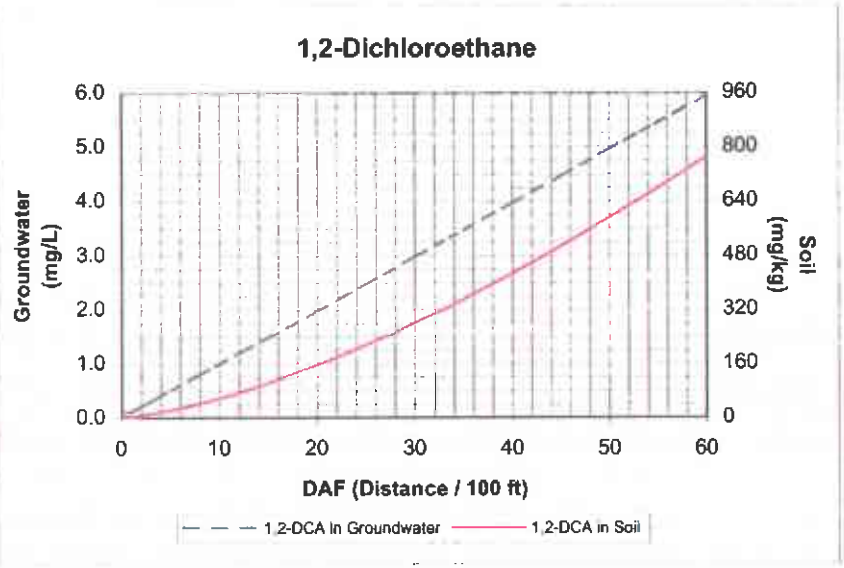

Benzo(a)pyrene
Groundwater (mg/L)
Soil (mg/kg)
0.0020
0.0016
0.0012
0.0008
0.0004
0.0000
20
16
12
8
4
0
0
10
20
30
40
50
60
DAF (Distance / 100 ft)
Benzo(a)pyrene in Groundwater
Benzo(a)pyrene in Soil

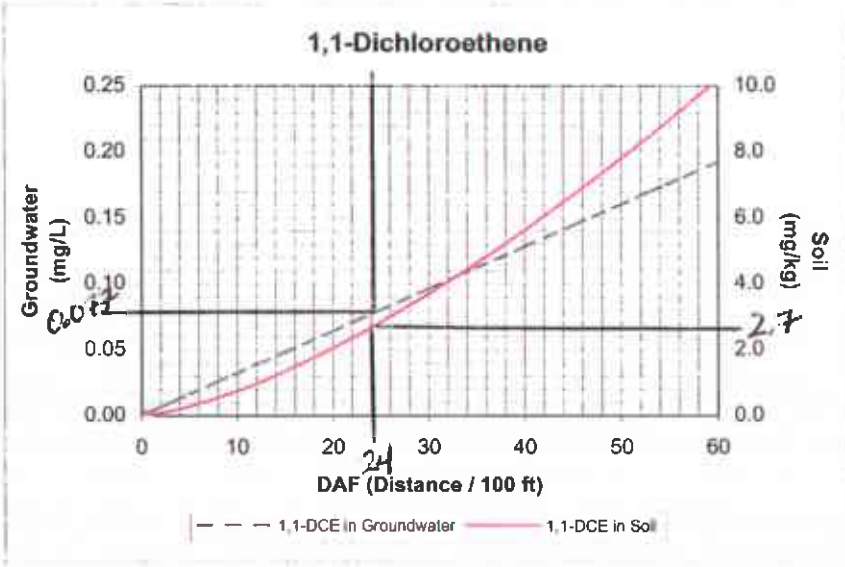

Carbon Tetrachloride
Groundwater (mg/L)
Soil (mg/kg)
0.25
0.20
0.15
0.10
0.05
0.00
25
20
15
10
5
0
0
10
20
30
40
50
60
DAF (Distance / 100 ft)
CCl4 in Groundwater
CCl4 in Soil

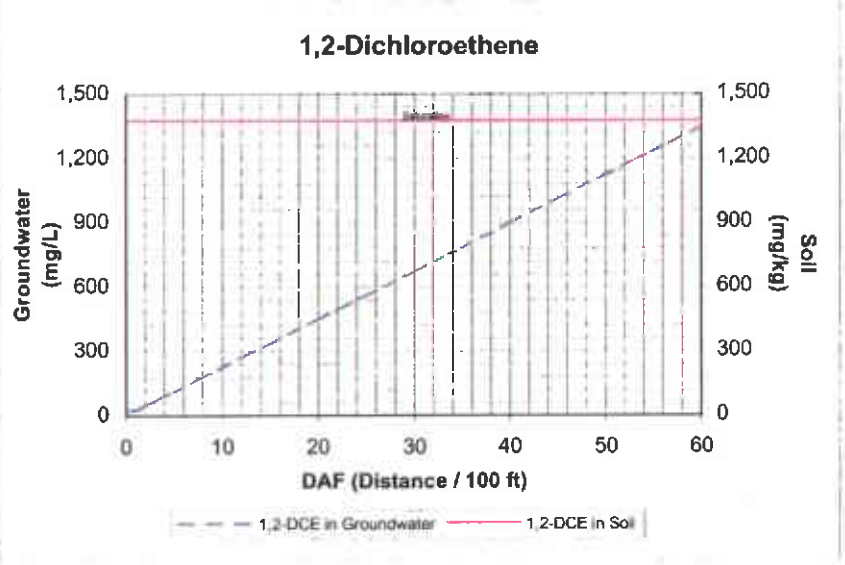

Chloroethane
Groundwater (mg/L)
Soil (mg/kg)
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1,200
1,000
800
600
400
200
0
0
10
20
30
40
50
60
DAF (Distance / 100 ft)
Chloroethane in Groundwater
Chloroethane in Soil

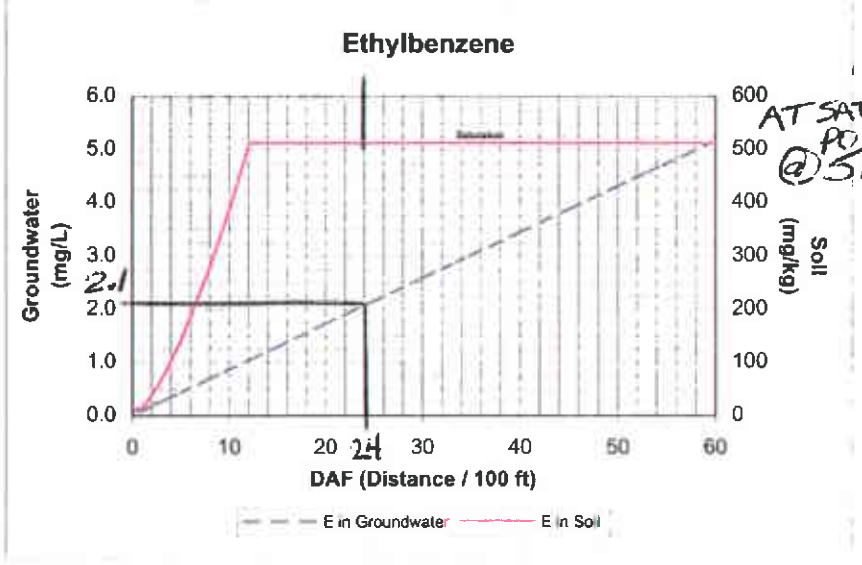

Chloroform
Groundwater (mg/L)
Soil (mg/kg)
DAF (Distance / 100 ft)
Chloroform in Groundwater
Chloroform in Soil

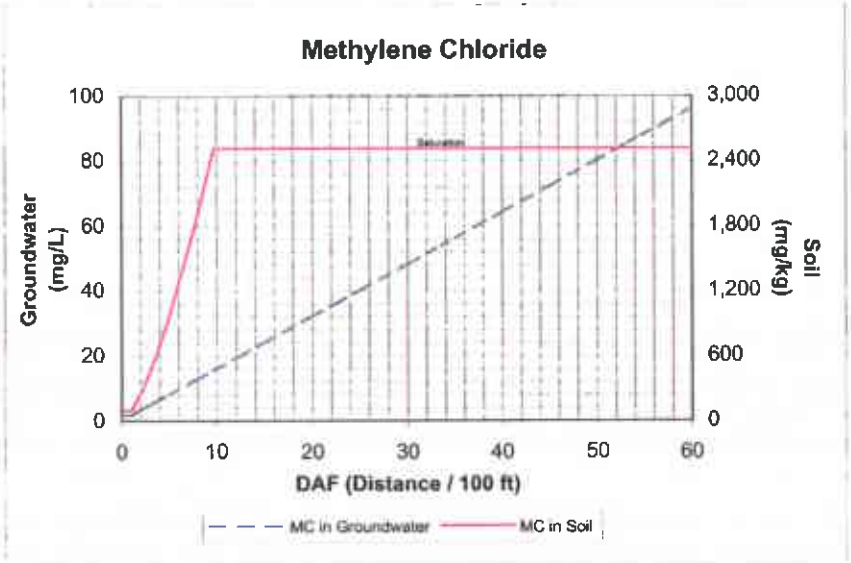

1,1-Dichloroethane
Groundwater (mg/L)
Soil (mg/kg)
DAF (Distance / 100 ft)
1,1-DCA in Groundwater
1,1-DCA in Soil

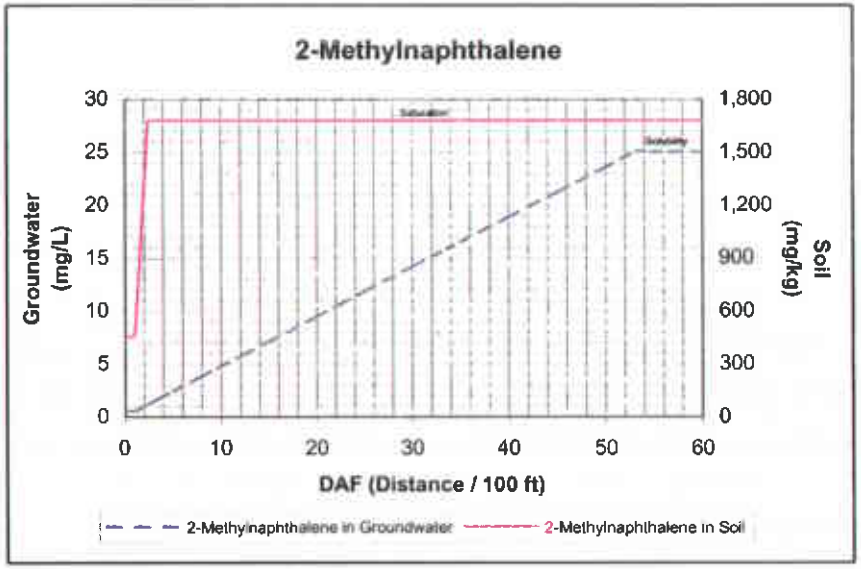

1,2-Dichloroethane
Groundwater (mg/L)
Soil (mg/kg)
DAF (Distance / 100 ft)
1,2-DCA in Groundwater
1,2-DCA in Soil

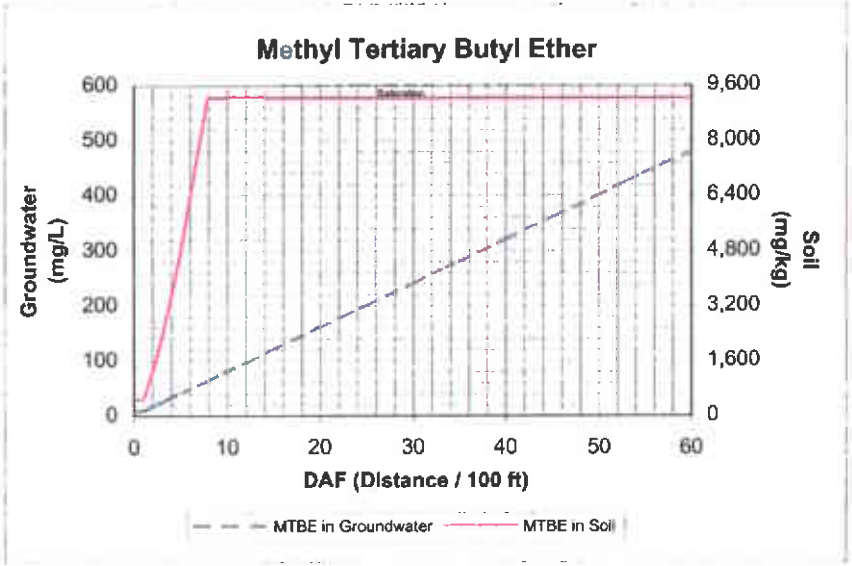

1,1-Dichloroethene
Groundwater (mg/L)
Soil (mg/kg)
DAF (Distance / 100 ft)
1,1-DCE in Groundwater
1,1-DCE in Soil

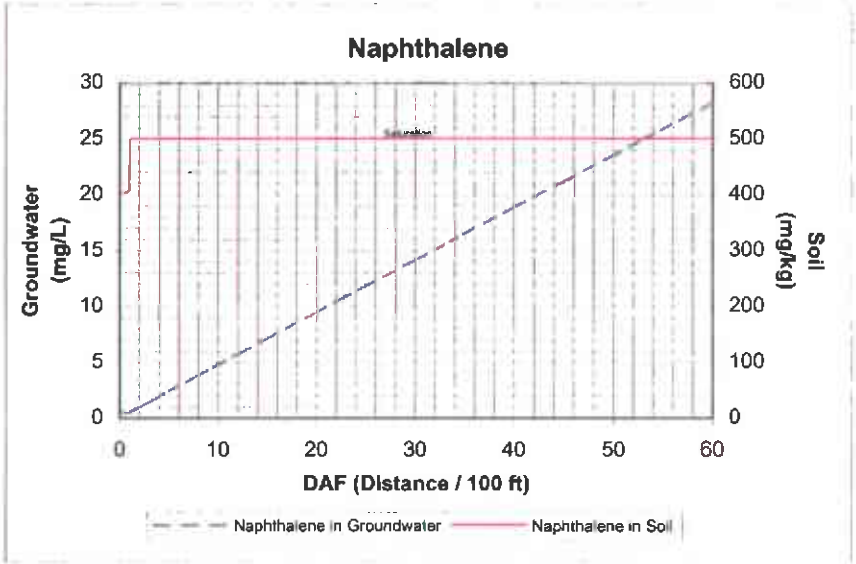

1,2-Dichloroethene
Groundwater (mg/L)
Soil (mg/kg)
DAF (Distance / 100 ft)
1,2-DCE in Groundwater
1,2-DCE in Soil

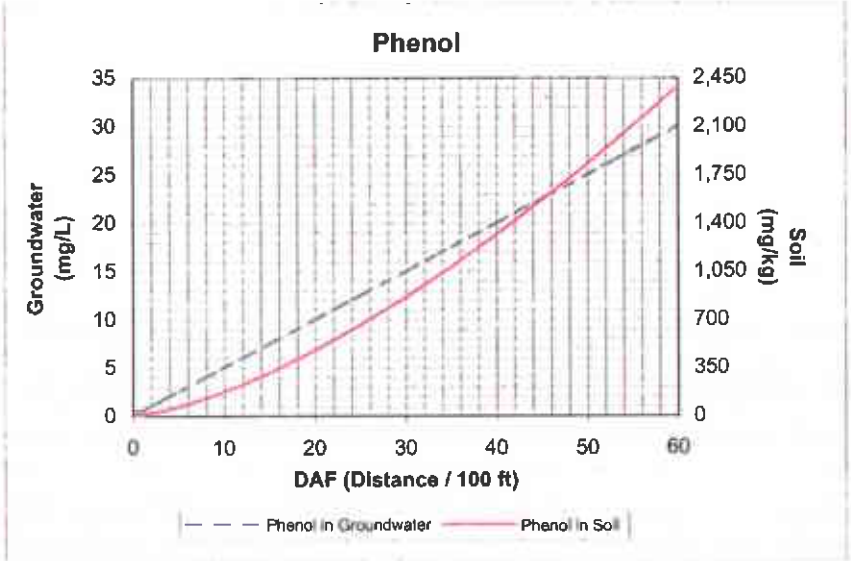

Ethylbenzene
Groundwater (mg/L)
Soil (mg/kg)
DAF (Distance / 100 ft)
E in Groundwater
E in Soil
AT SATURATION POINT @ 515

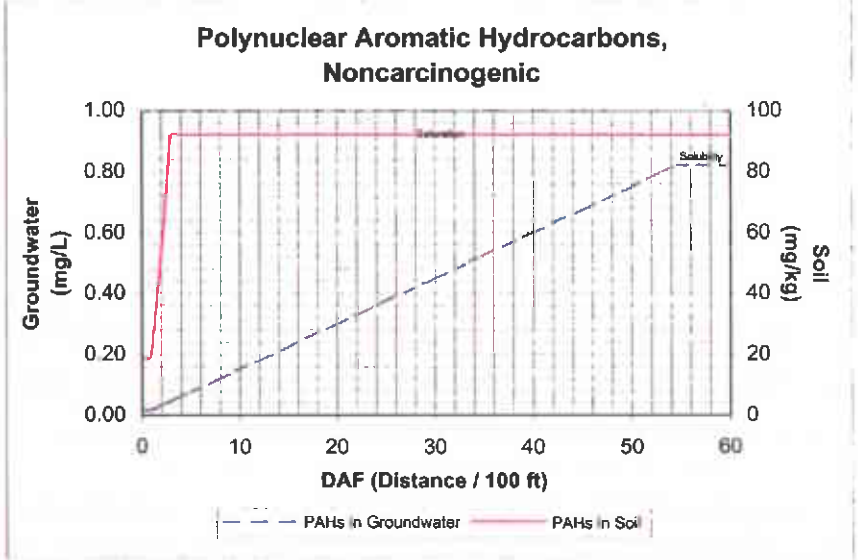

Methylene Chloride
Groundwater (mg/L)
Soil (mg/kg)
DAF (Distance / 100 ft)
MC in Groundwater
MC in Soil

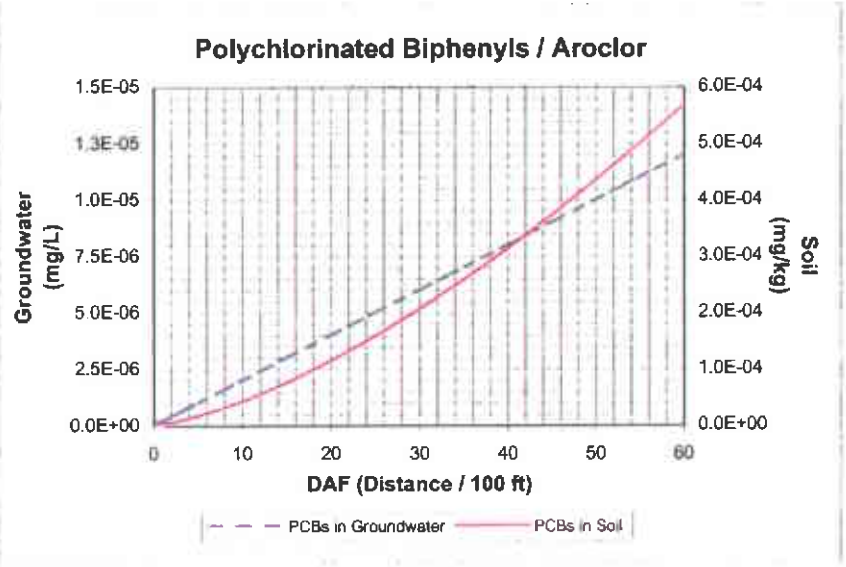

2-Methylnaphthalene
Groundwater (mg/L)
Soil (mg/kg)
DAF (Distance / 100 ft)
2-Methylnaphthalene in Groundwater
2-Methylnaphthalene in Soil

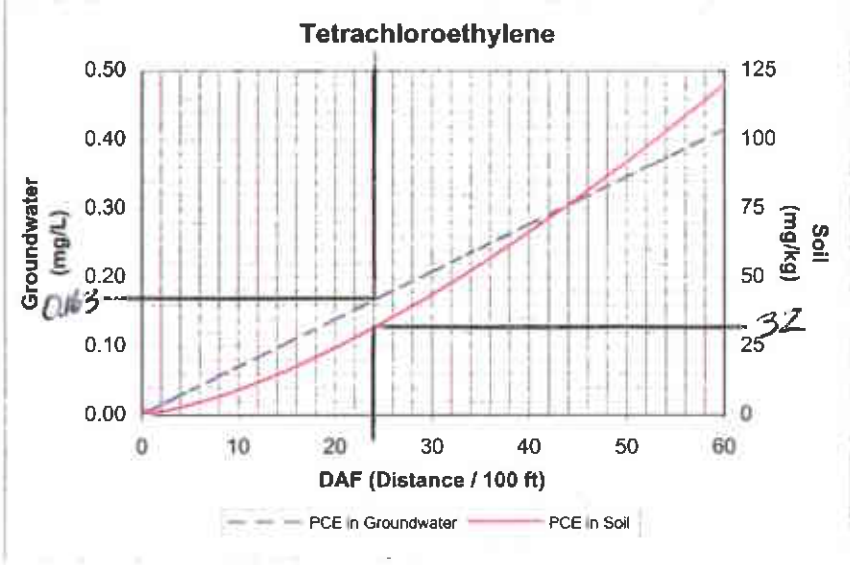

Methyl Tertiary Butyl Ether
Groundwater (mg/L)
Soil (mg/kg)
DAF (Distance / 100 ft)
MTBE in Groundwater
MTBE in Soil

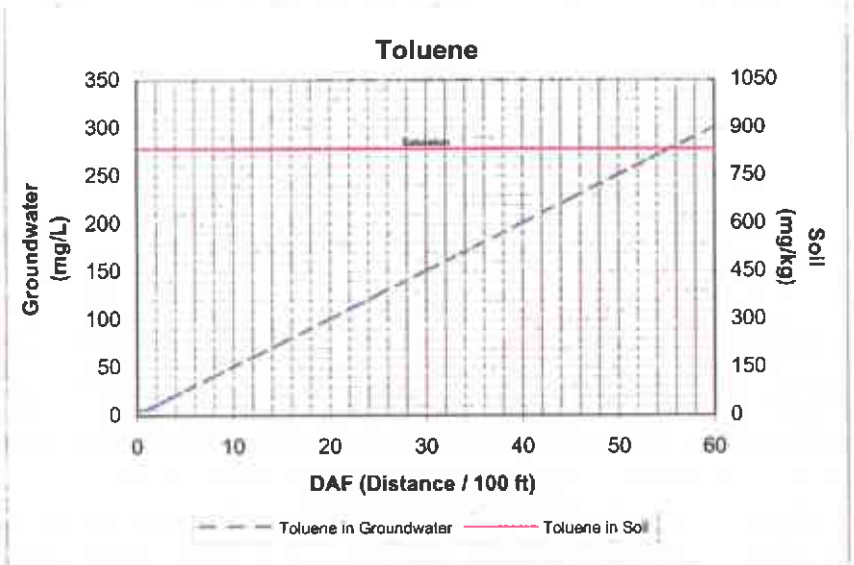

Naphthalene
Groundwater (mg/L)
Soil (mg/kg)
DAF (Distance / 100 ft)
Naphthalene in Groundwater
Naphthalene in Soil

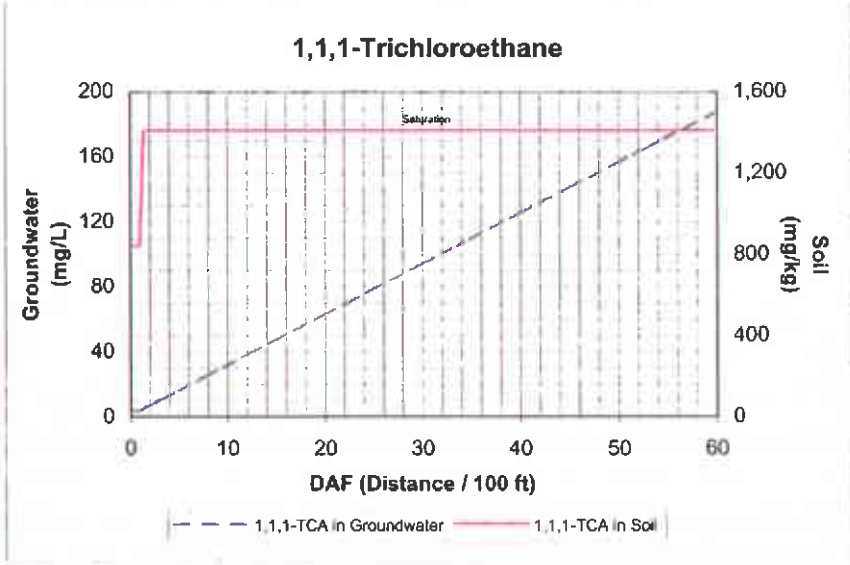

Phenol
Groundwater (mg/L)
Soil (mg/kg)
DAF (Distance / 100 ft)
Phenol in Groundwater
Phenol in Soil

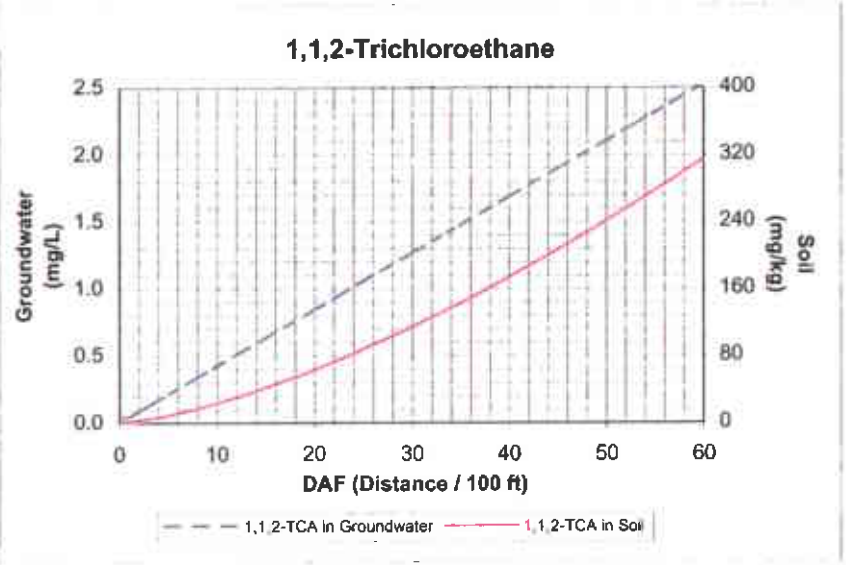

Polynuclear Aromatic Hydrocarbons, Noncarcinogenic
Groundwater (mg/L)
Soil (mg/kg)
DAF (Distance / 100 ft)
PAHs in Groundwater
PAHs in Soil

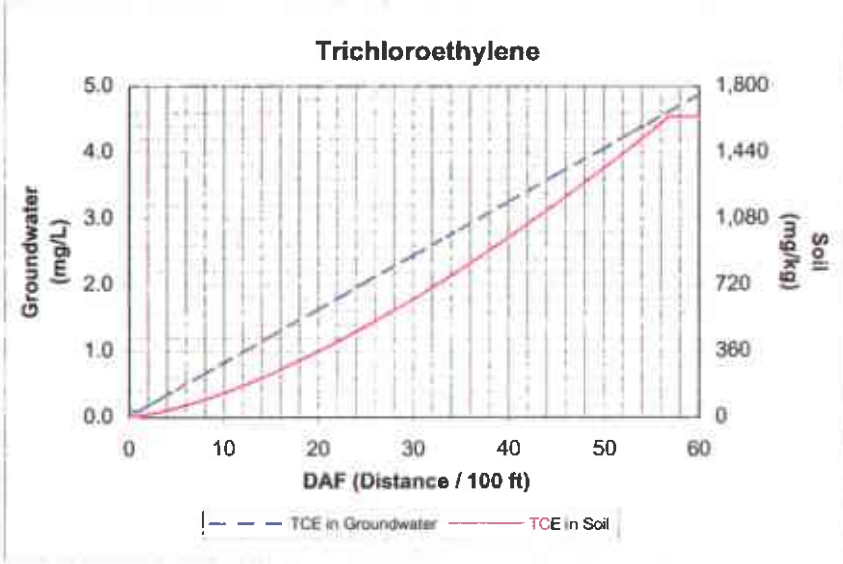

Polychlorinated Biphenyls / Aroclor
Groundwater (mg/L)
1.5E-05
1.3E-05
1.0E-05
7.5E-06
5.0E-06
2.5E-06
0.0E+00
Soil (mg/kg)
6.0E-04
5.0E-04
4.0E-04
3.0E-04
2.0E-04
1.0E-04
0.0E+00
0
10
20
30
40
50
60
DAF (Distance / 100 ft)
PCBs in Groundwater
PCBs in Soil

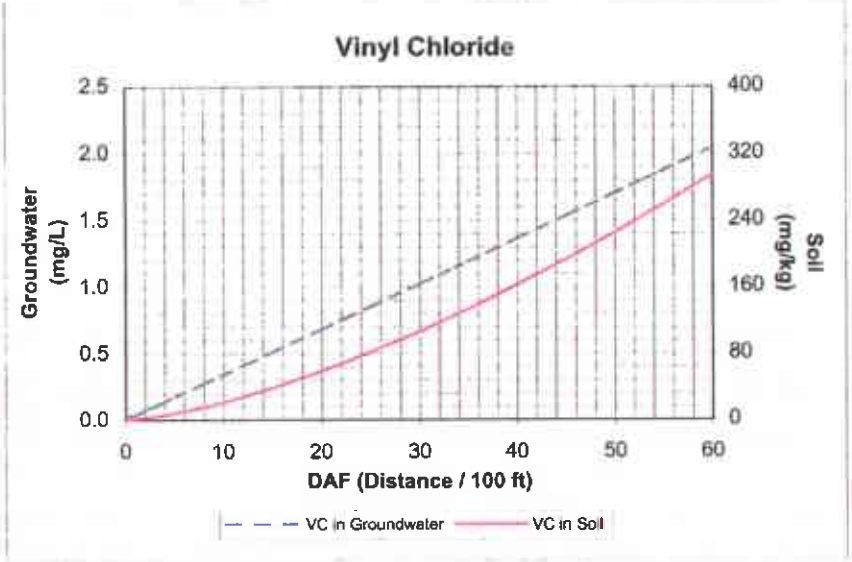

Tetrachloroethylene
Groundwater (mg/L)
0.50
0.40
0.30
0.20
0.10
0.00
Soil (mg/kg)
125
100
75
50
25
0
0
10
20
30
40
50
60
DAF (Distance / 100 ft)
PCE in Groundwater
PCE in Soil

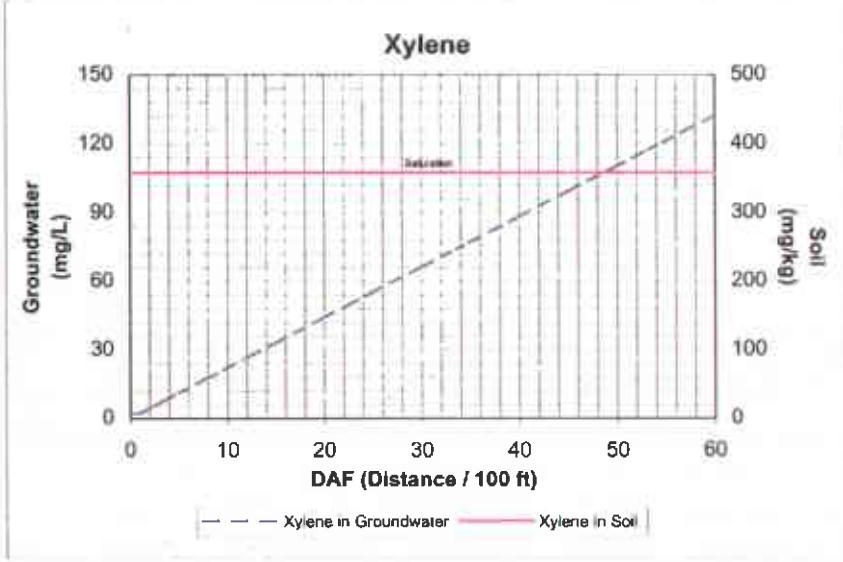

Toluene
Groundwater (mg/L)
350
300
250
200
150
100
50
0
Soil (mg/kg)
1050
900
750
600
450
300
150
0
0
10
20
30
40
50
60
DAF (Distance / 100 ft)
Toluene in Groundwater
Toluene in Soil

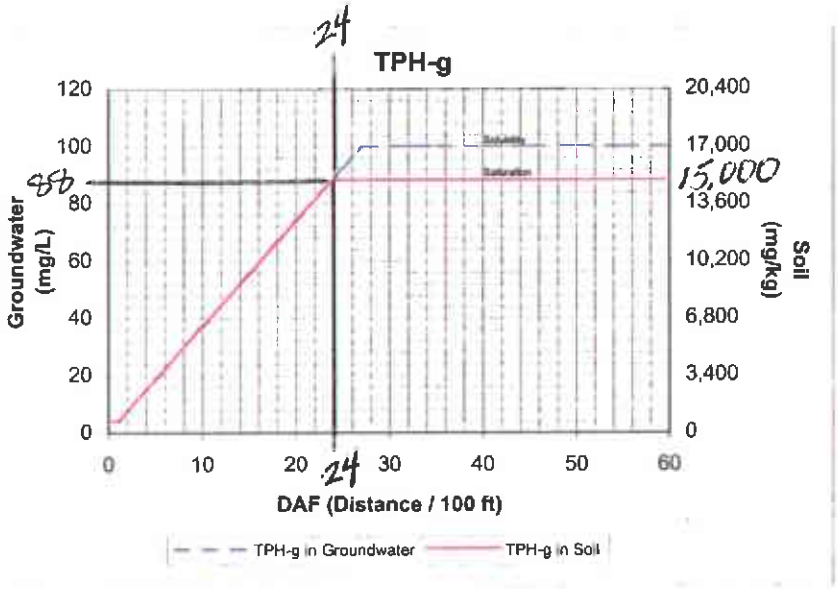

1,1,1-Trichloroethane
Groundwater (mg/L)
200
160
120
80
40
0
Soil (mg/kg)
1,600
1,200
800
400
0
0
10
20
30
40
50
60
DAF (Distance / 100 ft)
1,1,1-TCA in Groundwater
1,1,1-TCA in Soil

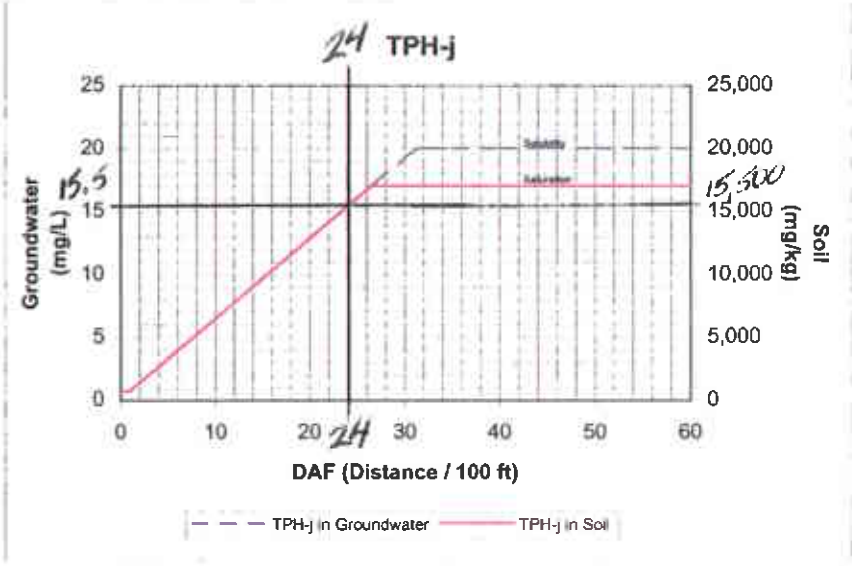

1,1,2-Trichloroethane
Groundwater (mg/L)
Soil (mg/kg)
DAF (Distance / 100 ft)
1,1,2-TCA in Groundwater
1,1,2-TCA in Soil

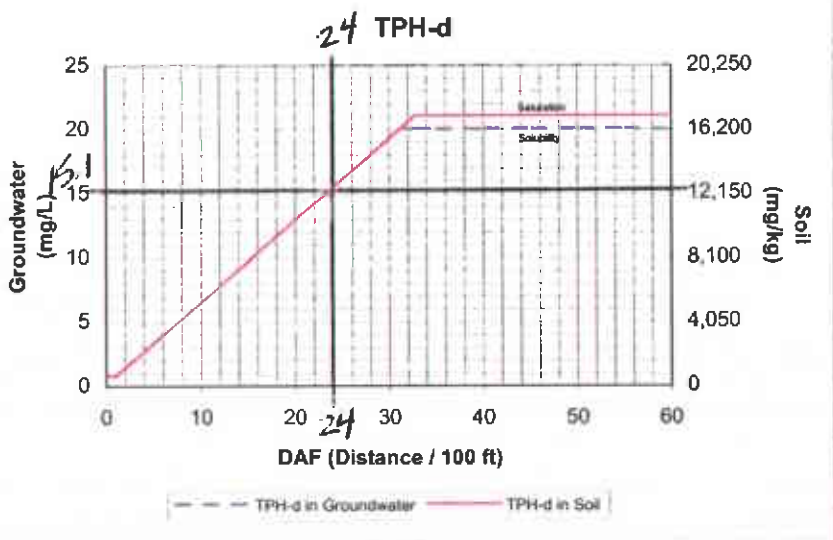

Trichloroethylene
Groundwater (mg/L)
Soil (mg/kg)
DAF (Distance / 100 ft)
TCE in Groundwater
TCE in Soil

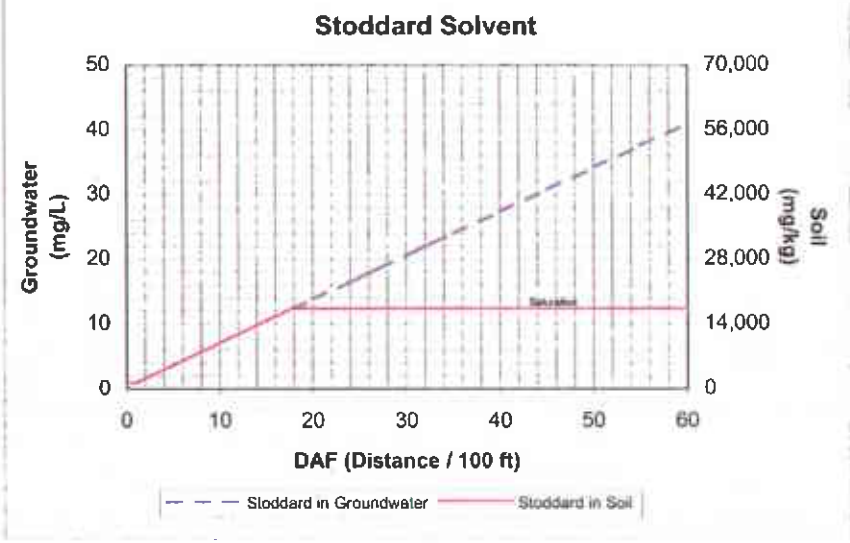

Vinyl Chloride
Groundwater (mg/L)
Soil (mg/kg)
DAF (Distance / 100 ft)
VC in Groundwater
VC in Soil


Xylene
Groundwater (mg/L)
Soil (mg/kg)
DAF (Distance / 100 ft)
Xylene in Groundwater
Xylene in Soil


TPH-g
Groundwater (mg/L)
Soil (mg/kg)
DAF (Distance / 100 ft)
TPH-g in Groundwater
TPH-g in Soil


TPH-j
Groundwater (mg/L)
Soil (mg/kg)
DAF (Distance / 100 ft)
TPH-j in Groundwater
TPH-j in Soil


TPH-d
Groundwater (mg/L)
Soil (mg/kg)
DAF (Distance / 100 ft)
TPH-d in Groundwater
TPH-d in Soil


Stoddard Solvent
Groundwater (mg/L)
Soil (mg/kg)
DAF (Distance / 100 ft)
Stoddard in Groundwater
Stoddard in Soil