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WORK PLAN
ASTM RBCA TIER TWO EVALUATION
STID 553 - GRIMIT AUTO AND REPAIR
1970 SEMINARY AVENUE
OAKLAND, CALIFORNIA

19

October 24, 1997

Prepared by

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Geology / Engineering Geology / Environmental Studies

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October 24, 1997

E-10-1B-192B
HC/WP: SeminaryRBCAIIWP10/97

Ms Eva Chu
Hazardous Materials Specialist
Alameda County Environmental Health Services
Environmental Protection (LOP)
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-9335

RE: **WORK PLAN**
ASTM RBCA TIER TWO EVALUATION
STID 553 - GRIMIT AUTO AND REPAIR
1970 SEMINARY AVENUE
OAKLAND, CALIFORNIA

Dear Ms Chu:

INTRODUCTION

The purpose of this letter is to present a work plan for an ASTM RBCA Tier Two evaluation of the above-referenced site. The purpose of the Tier Two evaluation will be to assess the documented presence of soil and ground water contamination at the site, as required by the Alameda County Health Care Services Agency. This plan provides the assumptions and methods to be used in conducting the evaluation.

This evaluation was required by the Alameda County Health Department, as specified in a letter from Eva Chu dated March 11, 1997. The general scope of work is based on our subsequent proposal to the owner, Mr. Doyle Grimit, dated April 21, 1997. This work was approved by the California Underground Storage Tank Cleanup Fund on May 20, 1997. On May 23, 1997, we issued a "Project Status and Investigation Plan" for the work, which was verbally approved by Eva Chu on May 28, 1997.

BACKGROUND

A detailed background description is included in our April 22, 1996 report. The project site is located at 1970 Seminary Avenue, at the southern corner of the Seminary Avenue - Harmon Avenue intersection, in Oakland, Alameda County, California. The immediate site vicinity is primarily residential. The site is currently utilized as an automotive repair facility. The property is owned by Mr. Doyle Grimit, and is leased to the repair facility.

The site is approximately 50 by 100 feet in plan dimension. Three former gasoline and one former waste oil tank were removed in 1989. Fuel has not been dispensed since that time. One inactive hydraulic lift remains at the the site within the service building.

Three exploratory borings and one monitoring well (MW-1) were installed by Kaldveer Associates in August, 1990 (report dated September 28, 1990). The well was sampled once by Kaldveer. Limited soil excavation was subsequently conducted at the location of the former waste oil tank. Hoexter Consulting subsequently sampled the well three times. In January and February, 1994, Hoexter Consulting conducted further subsurface investigation, including installation of two additional wells. Additional monitoring was followed by a supplemental investigation conducted in March, 1996, which included four soil borings and three additional monitoring wells. The following report (April 22, 1996) included a preliminary ASTM RBCA Tier One evaluation of the data. A May 15, 1996 Alameda County letter followed, commented upon the April, 1996 subsurface investigation report, and requested an evaluation of remedial action alternatives.

The preliminary evaluation of remedial action alternatives was then conducted, and a report issued July 28, 1996. The evaluation report recommended supplemental ground water contaminant plume definition and further soil source delineation, followed by preparation of a remedial action feasibility study, development of a corrective action plan, and initiation of soil / ground water remediation. Finally, two additional quarterly ground water sampling events occurred, reported on October 21, 1996 and January 28, 1997.

The subsurface investigations indicated complex soil and ground water conditions consisting of interbedded discontinuous relatively thin lenses of silty and clayey sediments, with relatively limited deposits of "clean" sand or gravel. Based on the investigations, there are two connected and overlapping ground water contamination zones, a "perched" or shallow zone ranging from 7 to 13 feet, and a deeper zone of from 20 to 30 feet. Based on well development and purging data, the strata yield relatively low volumes of water, and there is poor conductivity between strata.

On February 15, 1997, Hoexter Consulting issued its "Corrective/Interim Remedial Action Plan" for the site. Prior to initiating the recommended remediation, the Alameda County Health Department requested that Hoexter Consulting install the additional monitoring recommended in the report, and then conduct additional, Tier Two, RBCA analysis. A report documenting the additional field investigation was issued July 25, 1997. One additional "quarterly" ground water sampling round was conducted October 6 and 7, 1997. The data from this sampling are included in Appendix A of this work plan; the sampling will be documented in the report which will follow from this plan.

This plan includes two figures. Figure 1 is a location map. Figure 2 is a site plan.

PREVIOUS TIER ONE RBCA EVALUATION

Based on our investigations, contamination consists of gasoline (TPH-G), purgeable aromatic compounds (BTEX), and halogenated volatile compounds (HVOC), particularly PCE, TCE, and DCE. Napthalene and phenanthrene have also been detected in the site's ground water. The data are summarized in Appendix A.

BTEX and individual HVOC levels exceeded California Maximum Contaminant Levels for drinking water (MCLs). The human health risk exposure pathways delineated in our previous ASTM Tier One evaluation included:

* Dermal contact/ingestion of soil.
* Soil leaching potential to ground water.
* Soil gas volatilization to indoor/outdoor air.
* Gas volatilization from water to indoor/outdoor air.
* Ground water ingestion.

Our ASTM RBCA Tier One analysis indicated that screening levels were exceeded for soil volatilization to the air, soil and ground water vapor intrusion to buildings, and ground water ingestion. The Tier One RBCA study indicated that risk-based screening levels (RBSLs) were exceeded by up to **four orders of magnitude** for the 1970 Seminary Avenue site. The critical compound was **benzene**.

TIER TWO RBCA EVALUATION METHODOLOGY

A Tier Two Risk Based Corrective Action (RBCA) analysis will be performed in accordance with the American Society for Testing and materials (ASTM) standards for health risk based site evaluations for petroleum contaminated sites, as presented in ASTM E-1739-95. This analysis will be performed using a commercially available, automated process known as "Tier Two RBCA Tool Kit", published by Groundwater Services, Inc. (GSI). The RBCA methodology provides a decision making process for the assessment and response to subsurface (soil and ground water) contamination based on risk to human health and environmental resources. The RBCA process recognizes the variability in complexity, physical and chemical characteristics and risk to human health and environmental resources of sites and utilizes a tiered approach to match appropriate assessments and remedial activities in consideration of more cost-effective remedial action.

As required by the January 5, 1996 San Francisco Bay Region Water Quality Control Board memorandum, benzene risk based screening levels in the ASTM document will be multiplied by a factor of 0.29.

IMPORTANT FACTORS TO RBCA EVALUATION

Site

The site is zoned commercial, and is an operating automotive repair facility. It is unlikely that the site will be developed for residential use. Therefore, commercial/industrial criteria will be used for RBCA evaluation of the site. There are no on-site basements or sub surface spaces. The property is almost completely covered with asphalt in the outdoor area and a concrete slab underlying the building. The former UST excavation ground surface consists of gravel, but this area is used for vehicular parking only. Much of the work conducted at the site is out of doors. Occupancy consists primarily of a maximum of two people approximately eight hours per day, five days per week. Customer exposure is occasional and short term (a few hours per year). The GSI model assumes 24 hour

occupancy of the site. The 24 hour model may be corrected to reflect this reduced site utilization. Direct contact of individuals with the soil does not occur, although future contact of construction workers, if a new facility is built, may occur. Based on these factors, a cancer risk of 10^{-4} is considered to be conservative, and will be used in the evaluation.

Off Site

The adjacent surrounding area is occupied by apartments and single family residences. The two adjacent residences (Figure 2) are single story wood frame structures, which do not have basements. One is located near surface grade, approximately 10 feet southeast of the southeast property line. The other is raised on a perimeter footing, and is approximately 20 feet southwest of the southwest property line. A detached garage (Figure 2), used for storage only, is located between this residence and the site. Prior to initiating the evaluation, we will determine whether the building located near grade is on a concrete slab or low, raised perimeter footing. Actual distances from the property line will also be measured. The former residence is down gradient of the site ("deeper" water bearing zone); the second residence is lateral gradient from both the "shallow" and "deeper" zones. Based on the residential use of these buildings, risk factors of 1 X 10^{-4} and 10^{-6} will be evaluated.

Ground Water Resources

The ASTM RBCA process uses cancer risk values of both 10^{-4} and 10^{-6}. To our knowledge, there is no ground water utilization for drinking water in the site vicinity (see well survey in March 23, 1994 Hoexter Consulting report), although one well used for garden irrigation is located approximately 250 feet west of the site. According to the property owner, this well is approximately 80 feet deep. We previously tested this well for gasoline and BTEX, and found it to be non-detect for these compounds. It is down gradient of the "shallow" site ground water, but up gradient of the "deeper" ground water. Based on the very low potential that known or undocumented wells are used for drinking water, a risk factor of 10^{-4}, as opposed to 10^{-6}, will be employed for this category.

Ground Water Conditions

As discussed in previous reports, site ground water conditions are variable. An apparent "perched" zone observed in wells completed to 20 feet (the "shallow zone") indicates a ground water gradient direction to the northwest. A "deeper" zone observed in wells completed to approximately 35 feet indicates gradient direction to the southeast. Ground water levels in the wells recover over a period of many hours to days when purged; therefore ground water flow is inferred to be very slow.

Also as discussed, depth to ground water varies seasonally, with the depth of the well, and from one part of the site to another. Ground water data are summarized on Table 1 of Appendix A. The "deeper" wells appear to be more representative of regionally shallow ground water conditions at the site. An average depth to ground water of [illegible] will be employed in the RBCA analysis.

Hydrogeologic site characteristics have been determined for the site based on data generated throughout the Bay Area for similar low yield sites with effective well recharge rates from 0.003 to 0.1 gallons per minute. An effective well recharge rate of 0.01 gallons per minute has been selected for this site. Estimates of the hydraulic properties for shallow, unconfined and semi-confined alluvial aquifer conditions provide a range of Transmisivity

values from 0.5 to 37 gpd/ft (gallons per day per foot of saturated sediment) with Darcy flow velocities ranging from 0.1 to 5 ft/dy (feet per day). Based on the site well recharge rates, a Transmisivity of 3.0 gpd/ft and a Darcy Velocity of 0.4 ft/dy are currently planned for use in the RBCA Tier Two analysis.

Physical Parameters

As a part of our most recent subsurface investigation, we tested two soil samples for organic carbon content; water content; bulk density; and porosity. The test results are summarized on Table 4 of Appendix A. An average of these values will be employed in the Tier Two analysis.

Soil Contaminant Depth

Soil contaminant depths are inconsistent. In general, elevated contaminant levels are present 5 to 11 feet. Therefore, we will utilize a depth of 10 feet for on and off-site soil contamination.

Contaminant Levels

Analytical data are summarized in Tables 2A, 2B (soil), 3A, 3B, 3C, and 3D (ground water) of Appendix A. Based on our investigations, contamination consists of oil and grease; gasoline (TPH-G); purgeable aromatic compounds (BTEX) and MTBE; halogenated volatile compounds (HVOC), particularly PCE, TCE, and DCE; and semi-volatile organic compounds, particularly napthalene and phenanthrene. These compounds have been detected in soil samples from various locations and in water samples from all nine monitoring wells. The most elevated soil and ground water contaminant levels have been observed in the general vicinity of the service building, particularly in the vicinity of well MW-1 and MW-4, located within the former gasoline UST backfill.

The following tables indicate the maximum and typical values of the various detected compounds. They also indicate the values we currently plan to utilize for the on-site and off-site RBCA evaluations, based on the observations and assumptions discussed above.

SOIL CONTAMINANT VALUES

(Reported in parts per million, mg/kg)

Compound	Maximum Detected Value	Typical Detected Values	On-Site RBCA Analysis	Off-Site RBCA Analysis
Gasoline	910		—	—
Oil & Grease	15,000		—	—
Benzene	2.4	ND - 0.21	2.4	0.17
Toluene	3.5	ND - 0.76	3.5	0.5
Ethylbenzene	4.2	ND - 1.3	4.2	0.51
Xylenes	8.3	ND - 2.9	8.3	2.9
MTBE	ND (a)	ND (a)	0.1 (f)	0.1 (f)
PCE	1.8	ND - 1.5	1.8	1.8
TCE	0.82	ND - 0.25	0.82	0.82

Compound	Maximum Detected Value	Typical Detected Values	On-Site RBCA Analysis	Off-Site RBCA Analysis
VCL	ND	ND	0.1 (f)	0.1 (f)
DCE (cis)	0.031	ND	0.031	0.031
DCE (trns)	ND	ND	0.1 (f)	0.1 (f)
DCA	ND	ND	0.1 (f)	0.1 (f)
DCB	1.7	ND - 0.06	1.7	0.055
Napthalene (c)	---	---	0.1 (f)	0.1 (f)
Phenanthrene (c)	---	---	0.1 (f)	0.1 (f)

GROUND WATER CONTAMINANT VALUES

(Reported in parts per billion, ppb or ug/kg)

Compound	Maximum Detected Value (e) 8/90-9/94	Maximum Detected Value (e) 12/94-present	On-Site RBCA Analysis	Off-Site RBCA Analysis
Gasoline	23,000,000	40-50,000	---	---
Oil\ & Grease	880,000	11-190,000	---	---
Benzene	3500-7400	2300-4000	4000	1100
Toluene	3200-61,000	3200-5300	5300	260
Ethylbenzene	1900-28,000	1400-1700	1700	920
Xylenes	9400-137,000	5100-7100	1700	800
MTBE	---	490	490	220
PCE	---	97	97	97
TCE	---	150	150	110
VCL	---	83	83	13
DCE (cis)	---	380	380	64
DCE (trns)	---	10	10	2.4
DCA	---	18	18	4.9
DCB	---	22	22	3.9
Napthalene (c)	---	2200	2200	1100 (d)
Phenanthrene (c)	---	12	12	6 (d)

Notes

(a) MTBE analyzed in two samples only

(b) PCE (Tetrachloroethene/perchloroethene)
TCE (Trichloroethene)
VCL (Vinyl chloride
DCE (cis) (cis 1,2 Dichloroethene)
DCE (trns) (trans 1,2 Dichloroethene)
DCA (1,2 Dichloroethane)
DCB (1,2-Dichlorobenzene)

(c) Not tested for in soil.

(d) No site margin data exists; we have used 50 % of on-site values.

(e) **Note that the detected levels of gasoline and related components were higher between August, 1990** and September, 1994, than during the subsequent period. This may have been related to the sampling method, which consisted of decanting the sample bailer from the top. This method probably incorporated "floating product", and is representative of the upper two feet of the saturated sediments. Subsequent samples (from December, 1994) were obtained from the approximate middle of the water column, and slowly drained from the bailer bottom using a constricted flow tube. These samples are more representative of an "average" value for the water column.

(f) These compounds were not detected in soil but were present in water. Therefore, we have selected the analytical reporting limits as contaminant levels.

The contaminant levels used for the evaluation will be based on the particular exposure pathway and receptor. Thus, for example, the maximum regional down gradient value for benzene in ground water (MW-7 1,100 ppb) will be employed for vapor intrusion to off-site buildings and for ground water ingestion, instead of the maximum detected site value (MW-4, 4,000 ppb), located near the source area.

Maximum soil values, regardless of depth of the sample, will be used for on-site evaluations. For halogenated volatile compounds, this selection will inject a degree of conservativeness due to the relatively small number of analyses for these compounds. Similarly, the highest values will be used for the BTEX compounds, even though the large number of analyses indicates that maximum values are not representative of the concentration of these compounds in the site soils. The maximum detected value of benzene, for example, was 2.4 ppm, obtained during the initial tank removal confirmation testing (north tank). This value in our opinion is not considered to be representative of the site as a whole, but has been utilized to maintain conservativeness in the evaluation.

Exposure Pathways

The following human health risk pathways will be considered:

* Dermal contact/ingestion of soil (on-site only).
* Soil leaching potential to ground water (use on-site values).
* Soil gas volatilization to indoor/outdoor air (on and off-site).
* Gas volatilization from water to indoor/outdoor air (on and off-site).
* Ground water ingestion (off-site).
* Construction worker exposure (on-site).

PROJECT MANAGEMENT

The project will be managed by David F. Hoexter. Mr. Hoexter is a California registered geologist and certified engineering geologist, and registered environmental assessor. The evaluation will be conducted by Mr. Hoexter and by David C. Glick, California registered and certified engineering geologist / hydrogeologist.

LIMITATIONS

This work plan has been prepared according to generally accepted geologic and environmental practices. No other warranty, either expressed or implied as to the methods, results, conclusions or professional advice provided is made. It should be recognized that

certain limitations are inherent in the evaluation of subsurface conditions, and that certain conditions may not be detected during an investigation of this type. If you wish to reduce the level of uncertainty associated with this study, we should be contacted for additional consultation.

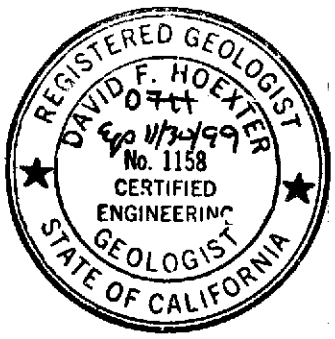
The analysis, conclusions and recommendations contained in this report are based on-site conditions as they existed at the time of our investigation; review of previous reports relevant to the site conditions; and laboratory results from an outside analytical laboratory. Changes in the information or data gained from any of these sources could result in changes in our conclusions or recommendations. If such changes do occur, we should be advised so that we can review our report in light of those changes.

CLOSING

We trust this plan will satisfy your needs. Please call if you have any questions.

Very truly yours,

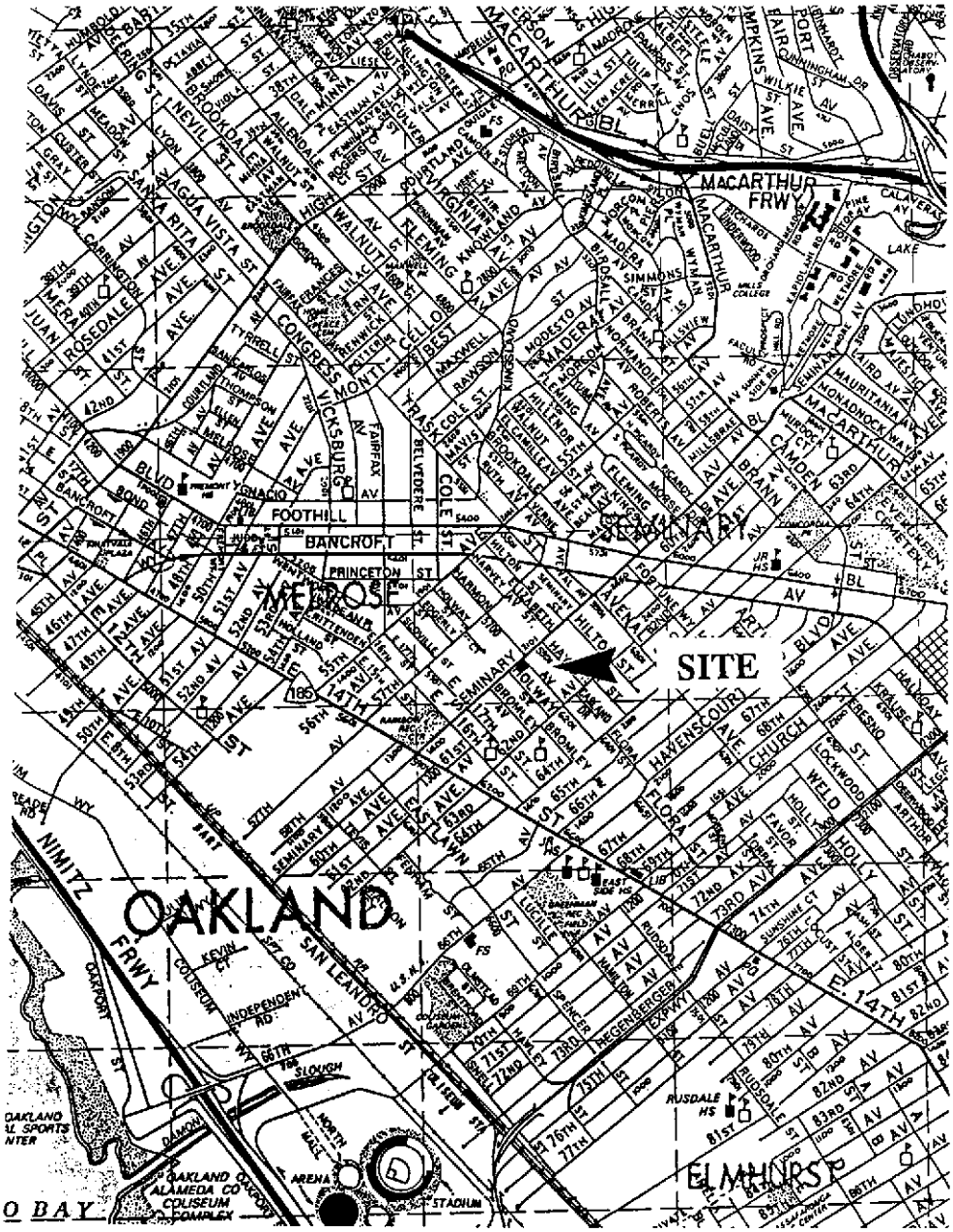
HOEXTER CONSULTING, INC.



David F. Hoexter, RG/CEG/REA
Principal Geologist

Attachments:

Figure 1	Location Map
Figure 2	Site Plan
Appendix A	Analytical Test Data Summary Tables



ALAMEDA COUNTY

1991 *Thomas Guide.*

0 1/4 1/2 3/4 MILES
0 .1 .2 .5 1 KILOMETERS

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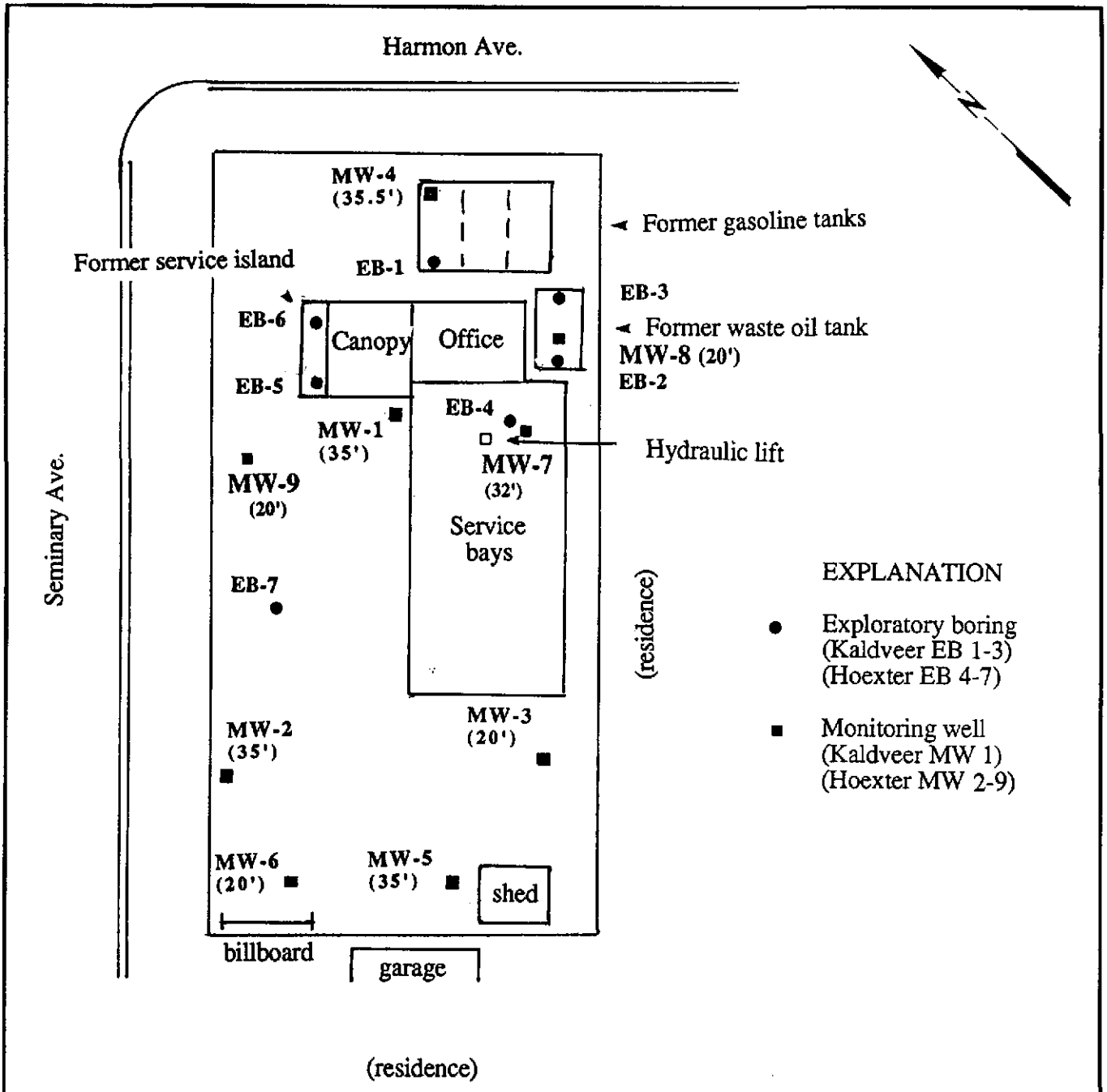
LOCATION MAP

1970 Seminary Ave.
Oakland, California

Project No.	Date	Figure 1
E-10-1A-163A	October, 1997	



Base: A. Deak, Licensed Land Surveyor, 3/21/96 (wells, streets & property line); Hoexter field sketch, 10/25/93 (explor. borings, other features)

20 0 20 40

Approximate Scale in Feet

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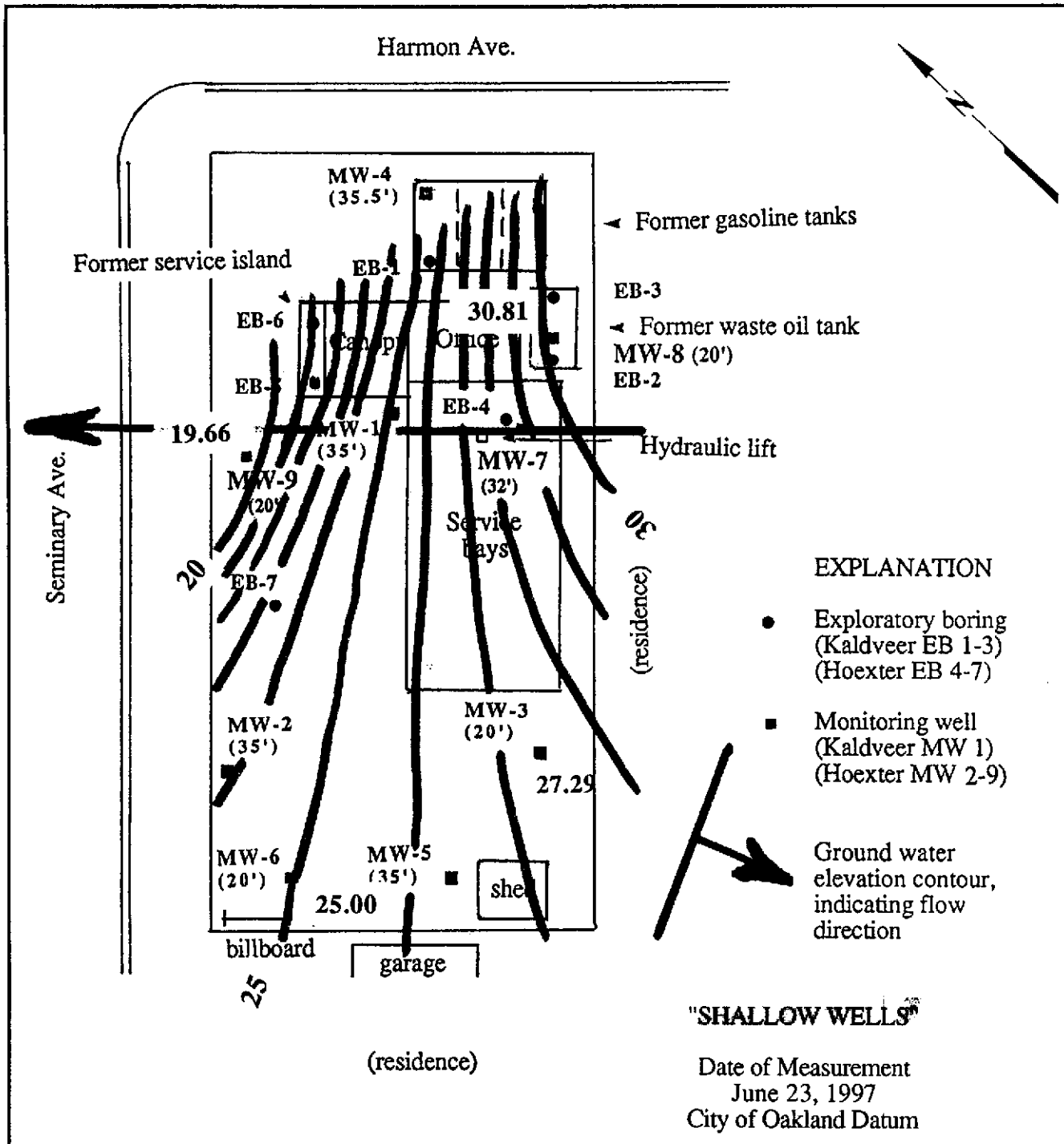
SITE PLAN

1970 Seminary Ave.
Oakland, California

Project No.	Date	Figure 2
E-10-1B-192B	October, 1997	



Base: A. Deak, Licensed Land Surveyor, 3/21/96 (wells, streets & property line); Hoexter field sketch, 10/25/93 (explor. borings, other features)

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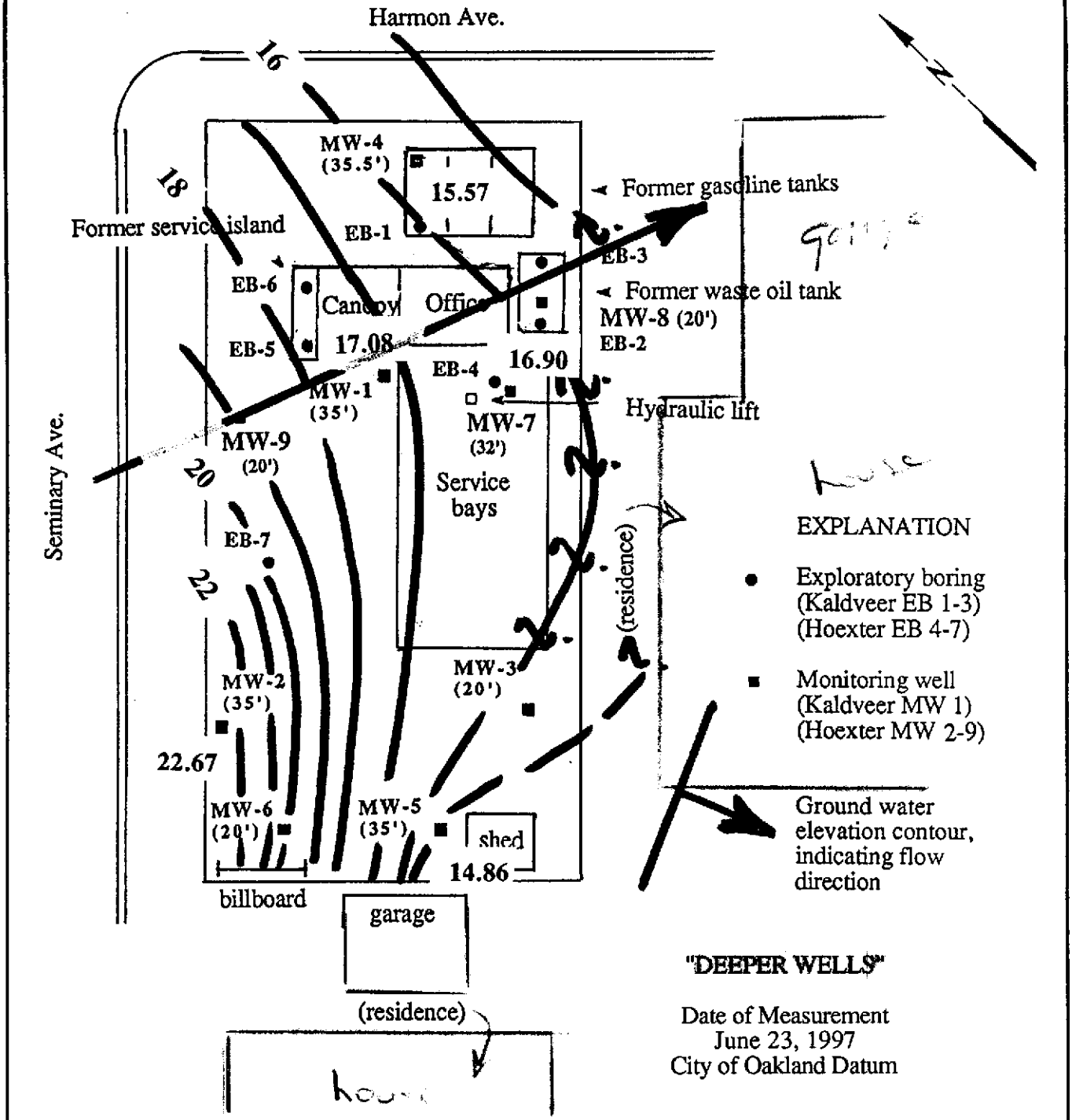
GROUND WATER CONTOUR AND GRADIENT DIRECTION MAP

1970 Seminary Ave.
Oakland, California

Project No.	Date	Figure 3A
E-10-1B-192B	July, 1997	



Base: A. Deak, Licensed Land Surveyor, 3/21/96 (wells, streets & property line); Hoexter field sketch, 10/25/93 (explor. borings, other features)

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GROUND WATER CONTOUR AND GRADIENT DIRECTION MAP

1970 Seminary Ave.
Oakland, California

Project No.	Date	Figure
E-10-1B-192B	July, 1997	3B

APPENDIX A

ANALYTICAL TEST DATA SUMMARY TABLES

TABLE 1

GROUND WATER ELEVATION DATA

(All Measurements in Feet)

Well Number and Date of Measurement	Reference Elevation (2)	Depth to Water	Relative Ground Water Elevation (2)
MW-1 ("deep")			
8/6/90	37.0	21.5	15.5
1/28/92		21.0	16.0
4/27/92		20.95	16.05
8/10/92		22.20	14.8
2/11/94		15.93 (3)	21.07 (3)
2/28/94		13.85 (4)	23.15 (4)
9/9/94		20.19	16.81
12/28/94		14.91	22.09
4/13/95		14.18	22.82
11/1/95		20.90	16.10
3/8/96		11.82	25.18
3/25-26/96	36.97	13.54	23.43
10/7/96		21.41	15.59
1/15/97		13.34	23.63
6/23/97	36.99	19.91	17.08
10/6/97		21.55	15.44
MW-2 ("deep")			
2/11/94	36.40	14.16 (3)	22.24 (3)
2/28/94		16.01 (4)	20.39 (4)
9/9/94		18.96	17.44
12/28/94		21.42	14.98
4/13/95		19.69	16.71
11/1/95		21.91	14.49
3/8/96		14.56 (6)	21.84 (6)
3/25-26/96	36.39	10.84	25.55
10/7/96		18.41	17.98
1/15/97		10.07	26.32
6/23/97	36.40	13.73	22.67
10/6/97		17.03	19.37
MW-3 ("shallow")			
2/11/94	36.94	6.97 (3)	29.97 (3)
2/28/94		7.74 (4)	29.20 (4)
9/9/94		9.68	27.26
12/28/94		8.15	28.79
4/13/95		8.05	28.89
11/1/95		7.82	29.12
3/8/96		5.69	31.25
3/25-26/96	36.94	6.91	30.03
10/7/96		9.51	27.43
1/15/97		6.23	30.71

Table 1 continued following page

Table 1 continued

Well Number and Date of Measurement	Reference Elevation (2)	Depth to Water	Relative Ground Water Elevation (2)
MW-3 (cont')			
6/23/97	36.94	9.65	27.29
10/6/97		10.53	26.41
MW-4 ("deep")			
3/25-26/96	36.46	14.14	22.32
10/7/96		22.31	14.15
1/15/97		13.78	22.68
6/23/97	36.47	20.90	15.57
10/6/97		22.77	13.60
MW-5 ("deep")			
3/25-26/96	36.77	15.63	21.14
10/7/96		22.86	13.91
1/15/97		17.33	19.44
6/23/97	36.77	21.91	14.86
10/6/97		24.26	12.51
MW-6 ("shallow")			
3/25-26/96	36.42	8.52	27.90
10/7/96		12.82	23.60
1/15/97		7.72	28.70
6/23/97	36.42	11.42	25.00
10/6/97		12.67	23.75
MW-7 ("deep")			
6/23/97	36.83	19.93	16.90
10/6/97		21.43	15.40
MW-8 ("shallow")			
6/23/97	36.55	5.74	30.81
10/6/97		5.69	30.86
MW-9 ("shallow")			
6/23/97	36.70	17.04	19.66
10/6/97		19.17	20.53

Notes to Table 1

(1) N/A = not applicable.
(2) Elevations from a survey conducted by Andreas Deak, California Licensed Land Surveyor, March 21, 1996, City of Oakland datum.
(3) Well under pressure when locking cap removed; water level may not have been stabilized.

(4) Depth to water was measured over a 120 minute period; indicated depths appear to be stabilized readings.

(5) Surveyed elevations of wells MW 1 and MW-2 varied to 0.02 foot on March 21, 1996 survey as compared to February 11, 1994 survey; previously calculated measurements of elevation have **not** been modified to reflect the new survey data. Similar slight survey differences on June 20, 1997 have not been corrected.

(6) Well not stabilized (water level rising).

TABLE 2A

SOIL

SUMMARY OF ANALYTICAL TEST RESULTS - PETROLEUM HYDROCARBONS

(Results reported in parts per million, mg/kg) (1) (2)

Sample	TPH-Gasoline	Benzene	Toluene	Ethyl-Benzene	Xylenes	Oil and Grease	HVOC
Initial UST Removal Confirmation Testing							
Gasoline USTs							
South tank	22	ND	ND	ND	ND	NA	NA
South tank	ND	ND	ND	ND	ND	NA	NA
Center tank	20	ND	0.031	ND	0.200	NA	NA
North tank	ND	0.068	ND	ND	ND	NA	NA
	21	2.4	2.9	0.320	1.7	NA	NA
Waste Oil UST							
1	NA	0.093	0.510	0.480	1.7	5500/760 (6)	ND
2	NA	0.160	0.400	0.810	2.4	7200/460 (6)	ND
Previous Kaldveer Investigation							
EB-1							
16.0	4	NA	NA	NA	NA	NA	NA
21.0	0.5	NA	NA	NA	NA	NA	NA
26.0	50	NA	NA	NA	NA	NA	NA
EB-2							
10.0	NA	NA	NA	NA	NA	4,200	NA
16.0	NA	NA	NA	NA	NA	ND	NA
EB-3							
10.0	NA	NA	NA	NA	NA	2,800	NA
16.0	NA	NA	NA	NA	NA	150	NA

Table continued following page

Table 2A continued

Sample	TPH-Gasoline	Benzene	Toluene	Ethyl-Benzene	Xylenes	Oil and Grease	HVOC
Waste Oil Tank Overexcavation Confirmation Testing							
1 (south side)	190	ND	ND	0.58	1.3	15,000/2700 9,800	NA
2 (west side)	ND	ND	ND	ND	ND	1,200/61 890	NA
3 (east side)	4.4	ND	ND	0.0083	0.021	11,000/4400 7,500	NA
4 (north side)	12	0.0042	ND	0.0091	0.021	410/250 230	NA
5 (west floor)	270	ND	3.5	1.3	ND	5,500/670 3,700	NA
6 (east floor)	260	ND	ND	1.2	2.5	3,500/680 2,200	NA
Stockpile	11	0.0031	ND	0.044	0.094 1,000	1,500/710	
Initial Hoexter Investigation							
MW-2							
10.5-11.0	910	ND	0.76	4.2	6.1	38	NA
16.0-16.5	ND	ND	0.022	ND	ND	ND	NA
20.5-21.0							
25.5-26.0 (3)	ND	ND	ND	ND	ND	ND	NA
MW-3							
10.5-11.0	ND	ND	0.020	ND	ND	ND	NA
20.5-21.0	1.2	0.17	0.047	ND	0.085	NA	NA
April, 1996 Hoexter Investigation							
EB-4							
7.5-8.0	300	ND	ND	3.3	8.3	820	**ND**
14.5-15.0	63	ND	ND	ND	0.82	3600	**Det** (5)
EB-5							
3.5-4.0	ND	ND	ND	ND	ND	NA	NA
7.5-8.0	130	ND	ND	0.55	1.3	NA	NA
12.5-13.0120	ND	ND	0.84	1.4	NA	NA	
18.0-18.5							
19.5-20.0 (3)	4.5	0.025	0.015	0.028	0.078	240	**Det** (5)
EB-7							
9.0-9.5	ND	ND	ND	ND	ND	ND	NA
14.0-14.5ND	ND	ND	ND	ND	NA	NA	
20.0-20.5							
23.0-23.5 (3)	130	ND	0.38	1.9	2.9	620	**ND**

Table continued following page

Table 2A continued

Sample	TPH-Gasoline	MTBE	Benzene	Toluene	Ethyl-Benzene	Xylenes	Oil and Grease	HVOC
MW-4								
16.0-16.5	13	NA	0.038	0.015	ND	0.023	NA	NA
26.0-26.5								
31.0-31.5 (3)	68	NA	0.21	0.092	0.15	0.39	190	NA
36.0-36.5	5.4	NA	ND	0.008	0.015	0.011	NA	NA
MW-5								
11.0-11.5	9.7	NA	ND	0.019	ND	0.038	NA	NA
21.0-21.5	ND	NA	ND	ND	ND	ND	NA	NA
21.0-21.5								
35.5-36.0 (3)	NA	NA	NA	NA	NA	NA	ND	NA
MW-6								
11.0-11.5								
16.0-16.5 (3)	10	NA	0.037	0.033	0.18	0.46	ND	NA
June, 1997 Hoexter Investigation								
MW-7								
9.0-9.5	ND	ND	ND	ND	ND	ND	ND	Det (5)
MW-8								
9.0-9.5	71	ND	0.095	0.087	0.13	0.28	2400	Det (5)

Notes to Table 2A

(1) ND = non-detect
(2) NA = not applicable
(3) Composite
(4) Chromatogram patterns/comments
    G - gas
    WG - weathered gas
    NGM - non-gas mix, > C9
    NDM - non-diesel mix, generally C7 - C12/13
(5) Detected: see Table 2B
(6) TOG/Motor Oil

TABLE 2B

SOIL

SUMMARY OF ANALYTICAL TEST RESULTS - HALOGENATED VOLATILE ORGANIC COMPOUNDS

(Results reported in parts per million, mg/kg) (1) (2)

Sample	CA	1,2 DCB	1,2 DCA	cis 1,2 DCE	trns 1,2 DCE	1,2 DCP	PCE	TCE	VCL
EB-4									
7.5-8.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
14.5-15.0	ND	1.7	ND	ND	ND	ND	1.8	0.82	ND
EB-5									
18.0-18.5 19.5-20.0 (3)	ND	ND	ND	ND	ND	ND	0.52	ND	ND
EB-7									
20.0-20.5 23.0-23.5 (3)	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-7									
9.0-9.5	ND	ND	ND	ND	ND	ND	ND	0.0081	ND
MW-8									
9.0-9.5	ND	0.055	ND	0.031	ND	ND	1.5	0.22	ND

Notes to Table 2B

(1) ND = non-detect
(2) NA = not applicable
(3) Composite
(4) Abbreviations as follows:

CA	Chloroethane
1,2 DCB	1,2 Dichlorobenzene
1,2 DCA	1,2 Dichloroethane
cis 1,2 DCE	cis 1,2 Dichloroethene
trans 1,2 DCE	trans 1,2 Dichloroethene
1,2 DCP	1,2 Dichloropropane
PCE	Tetrachloroethene (perchloroethene)
TCE	Trichloroethene
VCL	Vinyl chloride

TABLE 3A

GROUND WATER

SUMMARY OF ANALYTICAL TEST RESULTS - PETROLEUM HYDROCARBONS

(Results reported in parts per *billion*, ug/l) (1)

Well and Date	TPH Gasoline	MTBE	Benzene	Toluene	Ethyl-Benzene	Xylenes	Oil & Grease HVOC (7)
MW-1 ("deep")							
8/6/90 (2)	54,000	NA	3,500	3,200	1,900	9,400	7,600
1/28/92	2,000,000	NA	7,400	17,000	28,000	120,000	7,500 (5)
4/27/92 (3)	500,000	NA	3,400	6,400	10,000	45,000	440,000 (6)
4/27/92 (4)	175,000	NA	4,200	4,400	3,200	14,600	N/A
8/10/92	170,000	NA	4,200	4,200	3,300	15,900	120,000 (6)
2/11/94	1,800,000	NA	ND	5,100	5,200	23,900	16,000 (6)
9/9/94	23,000,000	NA	56,000	61,000	9,100	137,000	880,000 (6)
12/28/94	55,000	NA	3,700	5,300	1,400	5,800	83,000 (6)
4/13/95	45,000	NA	2,800	3,400	1,200	5,100	50,000 (5)
11/1/95	44,000	NA	2,600	3,400	1,400	5,900	52,000 (5)
3/25/96	45,000	NA	3,000	4,100	1,600	6,800	46,000 (5) (7)
10/8/96	55,000	490	3,300	4,500	1,700	7,100	11,000 (5) (7)
1/16/97	48,000	310	2,600	3,200	1,300	5,300	110,000 (5) (7)
6/23/97	40,000	ND<100	2,300	3,500	1,500	6,300	190,000 (5) (7)
10/7/97	45,000	ND<680	2,500	3,600	1,700	6,800	150,000 (5)(7)
MW-2 ("deep")							
2/11/94	130	NA	22	1.1	5.2	7.3	ND (6)
9/9/94	1,000	NA	89	ND	ND	6.9	ND (6)
12/28/94	330	NA	100	3.8	5.4	4.7	5100 (6)
4/13/95	1300	NA	280	6.9	33	23	ND (5)
11/1/95	100	NA	9.9	ND	ND	ND	ND (5)
3/25/96	4500	NA	470	57	220	280	ND (5) (7)
10/8/96	710	41	1.9	0.54	1.0	1.0	ND (5) (7)
1/16/97	330	12	41	2.4	1.3	9.9	ND (5) (7)
6/23/97	280	10	12	0.69	ND	13	NA (7)
10/7/97	320	ND<35	4.5	ND	ND	ND	NA (7)
MW-3 ("shallow")							
2/11/94	ND	NA	ND	ND	ND	ND	ND (6)
9/9/94	710	NA	10	ND	ND	3.5	ND (6)
12/28/94	2,300	NA	7.8	ND	130	73	ND (6)
4/13/95	1,700	NA	2.9	ND	61	24	ND (5)
11/1/95	1,100	NA	4.4	ND	27	22	ND (5)
3/25/96	2,300	NA	4.0	0.96	120	65	ND (5) (7)
10/8/96	160	ND	ND	0.5	1.2	0.77	ND (5) (7)
1/16/97	1,800	7.1	2.8	0.68	48	66	ND (5) (7)
6/23/97	ND	ND	ND	ND	ND	ND	NA (7)
10/7/97	ND	ND	ND	ND	ND	ND	NA (7)

Table continued following page

Table 3A continued

Well and Date	TPH Gasoline	MTBE	Benzene	Toluene	Ethyl-Benzene	Xylenes	Oil & Grease HVOC (7)
MW-4 ("deep")							
3/26/96	9,900	NA	4,000	40	71	100	ND (5) (7)
10/8/96	7,800	140	3,900	33	31	40	ND (5) (7)
1/16/97	4,800	84	1,900	21	2.5	27	5,200 (5) (7)
6/23/97	6,200	160	2,800	20	20	23	ND (5) (7)
10/7/97	4,400	85	1800	14	18	14	ND (5) (7)
MW-5 ("deep")							
3/26/96	1,200	NA	43	8.2	83	95	ND (5) (7)
10/8/96	6,700	190	260	92	410	370	ND (5) (7)
1/16/97	3,000	90	150	68	190	180	ND (5) (7)
6/23/97	12,000	150	410	170	920	800	NA (7)
10/7/97	10,000	ND<480	310	62	530	500	NA (7)
MW-6 ("shallow")							
3/26/96	9,900	NA	1,000	150	470	720	ND (5) (7)
10/8/96	1,300	57	120	2.3	1.4	4.0	ND (5) (7)
1/15/97	6,500	220	570	65	170	630	ND (5) (7)
6/23/97	3,100	100	410	16	110	140	NA (7)
10/7/97	960	ND<74	78	3.4	1.8	5.8	NA (7)
MW-7 (deep")							
6/23/97	8,700	ND<20	950	260	520	380	ND (5) (7)
10/7/97	7,500	ND<310	1100	86	280	150	ND (5) (7)
MW-8 ("shallow")							
6/23/97	610	5.9	25	1.4	4.3	2.4	ND (5) (7)
10/7/97	120	ND	6.9	ND	ND	ND	ND (5) (7)
MW-9 ("shallow")							
6/23/97	32,000	250	340	280	1,500	4,300	ND (5) (7)
10/7/97	33,000	ND<690	880	350	1900	4700	ND (5) (7)
EB-4 ("grab" gw sample)							
3/8/96	15,000	NA	780	840	1,300	590	7,500 (5) (7)
MCL	NA	NA	1	150	700	1750	NA

Notes on following page

Notes to Table 3A

(1) ND - non-detect; N/A - not applicable
(2) Kaldveer Associates report, September, 1990
(3) Sequoia Analytical Laboratory
(4) Applied Remediation Laboratory
(5) Gravimetric Method
(6) Infrared Method
(7) **HVOC detected:** see Table 3B

TABLE 3B

GROUND WATER

SUMMARY OF ANALYTICAL TEST RESULTS - HALOGENATED VOLATILE ORGANIC COMPOUNDS (HVOC)

(Results reported in parts per billion, ug/l) (1) (2)

Well and Date	CA	1,2 DCB	1,2 DCA	cis 1,2 DCE	trns 1,2 DCE	1,2 DCP	PCE	TCE	VCL
MW-1 ("deep")									
3/25/96	ND<5	7.2	5.3	82	ND<5	ND<5	ND<5	7.8	25
10/8/96	ND<20	ND<20	ND<20	45	ND<20	ND<20	ND<20	ND<20	26
1/16/97	NA	NA	NA	NA	NA	NA	NA	NA	NA
6/23/97	ND<2	10	4.1	130	3.7	ND<2	5.0	23	54
10/7/97	3.5	7.4	2.2	82	3.8	ND<2	ND<3	9.5	68
MW-2 ("deep")									
3/25/96	ND<0.5	ND<0.5	8.7	11	ND<0.5	1.0	ND<0.5	3.2	0.92
10/8/96	ND<0.5	ND<0.5	15	9.6	ND<0.5	1.1	ND<0.5	6.6	ND<0.5
1/16/97	NA	NA	NA	NA	NA	NA	NA	NA	NA
6/23/97	ND<0.5	ND<0.5	9.7	8.0	ND<0.5	0.86	ND<0.5	9.6	ND<0.5
10/7/97	ND<0.5	ND<0.5	18	11	ND<0.5	1.2	ND<0.5	15	ND<0.5
MW-3 ("shallow")									
3/25/96	ND<0.5	ND<0.5	0.56	1.2	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
10/8/96	ND<0.5	ND<0.5	1.1	0.87	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
1/16/97	NA	NA	NA	NA	NA	NA	NA	NA	NA
6/23/97	ND<0.5	ND<0.5	0.54	0.76	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
10/7/97	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
MW-4 ("deep")									
3/26/96	ND<8	22	ND<8	300	9.2	ND<8	38	150	44
10/8/96	ND<15	22	4.9	320	ND<15	ND<15	52	130	60
1/16/97	NA	NA	NA	NA	NA	NA	NA	NA	NA
6/23/97 **(5)**	3.6	21	5.3	340	10	ND<3	11	110	83
10/7/97	ND<8	20	ND<8	380	9.9	ND<8	ND<12	56	56
MW-5 ("deep")									
3/26/96	1.4	ND<0.5	2.1	6.2	ND<0.5	ND<0.5	ND<0.5	ND<0.5	10
10/8/96	ND<2.5	ND<2.5	4.9	4.4	ND<2.5	ND<2.5	ND<2.5	ND<2.5	9.4
1/16/97	NA	NA	NA	NA	NA	NA	NA	NA	NA
6/23/97 **(5)**	2.0	2.1	2.0	7.2	0.71	ND<0.5	ND<0.5	ND<0.5	13
10/7/97	1.9	1.4	2.8	3.4	ND<0.5	ND<0.5	ND<0.5	ND<0.5	10

Continued following page

Table 3B continued

Well and Date	CA	1,2 DCB	1,2 DCA	cis 1,2 DCE	trns 1,2 DCE	1,2 DCP	PCE	TCE	VCL
MW-6 ("shallow")									
3/26/96	ND<0.5	ND<0.5	3.9	15	ND<0.5	1.9	0.77	2	ND<0.5
10/8/96	ND<0.5	ND<0.5	2.3	9.9	ND<0.5	ND<0.5	ND<0.5	0.57	ND<0.5
1/16/97	NA	NA	NA	NA	NA	NA	NA	NA	NA
6/23/97	ND<0.5	ND<0.5	1.6	10	ND<0.5	ND<0.5	ND<0.5	0.63	0.50
10/7/97	ND<0.5	ND<0.5	3.4	7.9	ND<0.5	ND<0.5	ND<0.5	0.82	ND<0.5
MW-7 ("deep")									
6/23/97	0.93	1.6	ND<0.5	2.4	1.2	ND<0.5	9.8	17	1.5
10/7/97	ND<2	ND<2	ND<2	8.5	2.4	ND<2	38	110	ND<2
MW-8 ("shallow")									
6/23/97	ND<1	5.4	ND<1	64	ND<1	ND<1	97	100	ND<1
10/7/97	ND<0.5	1.1	ND<0.5	16	ND<0.5	ND<0.5	30	27	ND<0.5
MW-9 (shallow")									
6/23/97 **(5)**	ND<1	2.1	ND<1	7.4	ND<1	ND<1	3.5	1.4	ND<1
10/7/97 **(6)**	ND<0.5	1.6	2.1	21	ND<0.5	0.7	ND<2	0.53	2.7
EB-4 (grab)									
3/8/96	ND	ND	ND	42	ND	ND	130	340	ND
MCL	NA	600	0.5	6	10	5	7	5	0.5

Notes to Table 3B

(1) ND = non-detect
(2) NA = not applicable
(3) Composite
(4) Abbreviations as follows:

CA	Chloroethane	1,2 DCP	1,2 Dichloropropane
1,2 DCB	1,2 Dichlorobenzene	PCE	Tetrachloroethene (perchloroeth
1,2 DCA	1,2 Dichloroethane	TCE	trichloroethene
cis 1,2 DCE	cis 1,2 Dichloroethene	VCL	vinyl chloride
trans 1,2 DCE	trans 1,2 Dichloroethene		

(5) 6/23/97 additional detections:
MW-4, 4.8 ppb 1,4-Dichlorobenzene
MW-5, 0.53 ppb 1,4-Dichlorobenzene
MW-9 2.1 ppb chloroform (tetrachloromethane)
(6)10/7/97 additional detections:
MW-9, 0.65 chloroform (tetrachloromethane)

TABLE 3C

GROUND WATER

SUMMARY OF ANALYTICAL TEST RESULTS - POLYNUCLEAR AROMATIC HYDROCARBONS (PNA, PAH)

(Results reported in parts per billion, ug/l) (1) (2) (3)

Well and Date	Phenanthrene	Naphthalene
MW-1 ("deep")		
6/23/97	12	2200
10/7/97	ND<100	810
MCL	NA	NA

Notes to Table 3C

(1) ND = non-detect
(2) NA = not applicable
(3) Detected compounds only

TABLE 3D

GROUND WATER

SUMMARY OF ANALYTICAL TEST RESULTS - ADDITIONAL CHEMICAL PARAMETERS

(Results reported in parts per ***million***, mg/l) (1)

Well and Date	Dissolved Oxygen	Ferrous Iron	Nitrate	Sulfate
MW-1 ("deep")				
10/8/96	1.5	ND	ND	ND
1/16/97	1.4	3.6	ND	ND
6/23/97	NA	NA	NA	NA
10/7/97	NA	NA	NA	NA
MW-2 ("deep")				
10/8/96	3.7	ND	3	25
1/16/97	5.4	0.28	3	25
6/23/97	NA	NA	NA	NA
10/7/97	NA	NA	NA	NA
MW-3 ("shallow")				
10/8/96	3.8	ND	ND	5
1/16/97	5.2	ND	ND	5
6/23/97	NA	NA	NA	NA
10/7/97	NA	NA	NA	NA
MW-4 ("deep")				
10/8/96	3.0	ND	ND	ND
1/16/97	4.7	0.75	ND	5
6/23/97	NA	NA	NA	NA
10/7/97	NA	NA	NA	NA
MW-5 ("deep")				
10/8/96	2.8	ND	ND	8
1/16/97	3.4	0.38	ND	9
6/23/97	NA	NA	NA	NA
10/7/97	NA	NA	NA	NA
MW-6 ("shallow")				
10/8/96	2.7	ND	ND	6
1/16/97	2.7	0.28	ND	8
6/23/97	NA	NA	NA	NA
10/7/97	NA	NA	NA	NA
MW-7 ("deep")				
6/23/97	NA	NA	NA	NA
10/7/97	NA	NA	NA	NA

Continued following page

Table 3B continued

Well and Date	Dissolved Oxygen	Ferrous Iron	Nitrate	Sulfate
MW-8 ("shallow")				
6/23/97	NA	NA	NA	NA
10/7/97	NA	NA	NA	NA
MW-9 ("shallow")				
6/23/97	NA	NA	NA	NA
10/7/97	NA	NA	NA	NA

Notes to Table 3D

(1) ND = non-detect
(2) NA = not applicable

TABLE 4

SOIL

SUMMARY OF PHYSICAL TEST RESULTS

(Units as indicated)

Sample	Organic Carbon (%)	Water Content (%)	Bulk Density (pcf) (1)	Porosity (%)
MW-7				
8.0-8.5	2.9	18.3	113.3	33.8
MW-9				
8.0-8.5	2.1	15.6	118.5	30.0
Average				
Two samples	2.5	17.0	115.9	31.9

Notes

(1) pcf = pounds per cubic foot