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PRELIMINARY EVALUATION OF REMEDIAL ACTION ALTERNATIVES FOR FORMER GRIMIT AUTO AND REPAIR SITE STID #553 1970 SEMINARY AVENUE OAKLAND, CALIFORNIA

July 28, 1996

Prepared by

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TRANSMITTAL

TO Alameda County Health
Haz. Mat. Div
1131 Harbor Bay Pkwy #250
Alameda CA 94502-6577

DATE 7/29/96

VIA US Mail

FAX NO.

ATTENTION Dale Klettke

PROJECT 1970 Seminary
Oakland CA

JOB NO. E-10-1B-192B

DESCRIPTION 7/28/96 report

Number of pages, including cover page, if FAX

COMMENTS I will be out of town 7/30/96 → 8/20/96. Please call David Glick of Geo Plexus 408-987-0210 if you have any questions.

ENVIRONMENTAL PROTECTION
96 JUL 30 PM 3:11

ACTION

- ___ As requested
- ✓ For your use
- ___ Please return when finished
- ___ Please review and comment
- ___ Other ___

COPY TO Doyle Grimit
David Glick

BY [signature]
David F. Hoexter

If enclosures are not as noted, kindly notify us at once

Rev. 7/6/93

Geology / Engineering Geology / Environmental Studies

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July 28, 1996

E-10-1B-192B
HCEnvtInvestRpts:SeminaryRemedAlts

Mr. Doyle Grimit
14366 Lark Street
San Leandro, California 94578

RE: **PRELIMINARY EVALUATION OF REMEDIAL ACTION ALTERNATIVES**
FORMER GRIMIT AUTO AND REPAIR - STID 553
1970 SEMINARY AVENUE
OAKLAND, CALIFORNIA

Dear Mr. Grimit:

Enclosed is our preliminary evaluation of remedial alternatives for the property located at 1970 Seminary Avenue, Oakland, California. The report contains a discussion of previous investigations, presents our evaluations of the various remedial alternatives, and describes our conclusions and recommendations regarding site remediation. The general scope of investigation was presented in our proposal dated June 20, 1996.

We appreciate the opportunity to provide services to you on this project and trust this report meets your needs at this time. If you have any questions, or require additional information, please do not hesitate to call.

Very truly yours,

HOEXTER CONSULTING, INC.

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

PRELIMINARY EVALUATION OF REMEDIAL ACTION ALTERNATIVES

For

STID 553 - Grimit Auto and Repair
1970 Seminary Avenue
Oakland, California

To

Mr. Doyle Grimit
14366 Lark Street
San Leandro, California 94578

Prepared by:

Hoexter Consulting, Inc.
734 Torreya Court
Palo Alto, California 94303

July 28, 1996

REGISTERED GEOLOGIST
DAVID F. HOEXTER
No. 1190
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

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Principal Geologist

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EXECUTIVE SUMMARY

Previous investigations have identified shallow soil contamination and two zones of ground water contamination. Ground water contamination, particularly by solvents, is the primary consideration of site remediation. A preliminary evaluation of remedial alternatives has been completed. The following options have been considered:

1 No Remedial Action

- 1a Natural Attenuation (no further work).
- 1b Natural Attenuation (plume definition and quarterly monitoring).
- 1c ASTM Tier 2 RBCA Evaluation (including plume definition and quarterly monitoring).

2 Interim Remediation (additional source delineation and removal).

3 Ground Water Extraction.

4 Vapor / Ground Water Co-Extraction.

5 Vapor / Ground Water Co-Extraction with Air Sparging or ORC.

The evaluation concludes that :

1a,b The natural attenuation alternatives do not meet current Alameda County remedial criteria.

1c Tier 2 evaluation would not be likely to result in acceptable levels of residual contamination in the ground water. Tier 2 evaluation does not include solvents, which are present at the site.

2 Interim remediation, while beneficial, would not be sufficient due to constraints imposed by the existing building and adjacent property line.

3 Due to complex hydrogeology, ground water extraction would not be cost effective and is not a current remedial solution.

4 Vapor / ground water co-extraction could be beneficial for timely remediation.

5 Vapor / ground water co-extraction with air sparging or ORC is recommended.

Supplemental ground water contaminant plume definition and further soil source delineation is warranted, followed by preparation of a remedial action feasibility study, development of a corrective action plan, and initiation of soil / ground water remediation.

PRELIMINARY EVALUATION OF REMEDIAL ACTION ALTERNATIVES FOR FORMER GRIMIT AUTO AND REPAIR SITE STID #553 1970 SEMINARY AVENUE OAKLAND, CALIFORNIA

1.0 INTRODUCTION

This report presents the results of a preliminary evaluation of remediation alternatives and of the usefulness of an ASTM RBCA Tier Two study of the former Grimit Auto and Repair site, located at 1970 Seminary Avenue, Oakland, California. The project location is shown on the Location Map, Figure 1, and the site is shown on the Site Plan, Figure 2. This investigation has been conducted in response to a request by the Alameda County Health Care Services Agency, Local Oversight Program, specifically a letter from Mr. Dale Klettke, Hazardous Materials Specialist, to the property owner, Doyle Grimit, dated May 15, 1996. Mr. Klettke's letter requested *"a report which evaluates whether remedial action, interim remedial action, or further tier evaluation is warranted for your site"*.

A scope of investigation was presented in our proposal dated June 20, 1996. The proposed cost for this evaluation was pre-approved for reimbursement by the State of California Underground Storage Tank Cleanup Fund Program in a letter dated June 28, 1996.

The scope of services generally provided during this investigation consisted of a review of the Tier 1 analysis; qualitative evaluation of remediation alternatives and of the usefulness of conducting an ASTM Tier 2 analysis in lieu of remediation; and preparation of this report.

2.0 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. The referenced May

15, 1996 Alameda County letter followed and commented upon the April, 1996 subsurface investigation report.

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 investigation, there are two separate 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. There are also two depth zones of soil contamination; shallower soils, to approximately 15 feet depth, are generally more highly contaminated than deeper soils, which are primarily saturated.

Based on our investigations, contamination consists of gasoline (TPH-G), purgeable aromatic compounds (BTEX), and halogenated volatile compounds (HVOC), particularly PCE, TCE, and DCE. The data are summarized in Appendix A of this report, with slight modifications (corrections) from the April 22, 1996 Hoexter Consulting report. BTEX and individual HVOC levels exceed California MCLs, and the ASTM RBCA Tier 1 analysis indicates that screening levels (see following discussion) are exceeded for soil volatilization to the air, soil and ground water vapor intrusion to buildings, and ground water ingestion. In our opinion, the primary environmental concern may be soil and ground water vapor intrusion to the adjacent residential buildings. These buildings, however, do not appear to have basements.

3.0 ASTM RBCA ANALYSIS

3.1 Previous RBCA Tier One Analysis

The ASTM RBCA Tier One analysis included in our April 22, 1996 report concluded that the ASTM Tier 1 risk based screening levels (RBSLs), based primarily on benzene, were exceeded for soil volatilization to the air, soil and ground water vapor intrusion to buildings, and ground water ingestion. A conservative one-in-one million (10^{-6}) cancer risk level was generally employed, due to the adjacent residential properties. In addition, the less conservative ground water ingestion risk, with a cancer risk level of 10^{-4}, was exceeded.

In summary, the RBSL is exceeded for the following:

* soil volatilization to outdoor air at a cancer risk level of 10^{-6}.

* soil vapor intrusion to buildings at risk levels of 10^{-4} and 10^{-6}, and from ground water to buildings.

* ground water vapor intrusion to buildings at a risk level of 10^{-6}.

* ground water ingestion at a risk level of 10^{-4} and 10^{-6} and a health quotient of 1.0.

In our opinion, ground water utilization for consumption in the site vicinity is minimal or does not exist, and therefore this particular route of entry / exposure pathway may not need to be considered.

The May 15, 1996 Alameda County letter commented on the Hoexter analysis. The Hoexter results were based on representative or down-gradient values; the County letter stated that the highest site values (generally at or near the source area) should be utilized, as well as generally more strict cancer risk values. Thus, based on the County's response letter, the RBSL is additionally exceeded or modified for the following:

* soil volatilization to outdoor air at a risk level of 10^{-4} (Hoexter study indicated exceedance of RBSL at 10^{-6}).

* vapor intrusion from ground water to buildings at a risk level of 10^{-4} (Hoexter study indicated exceedance of RBSL at 10^{-6}).

* ground water volatilization to outdoor air at a risk level of 10^{-4}.

3.2 Supplemental RBCA Tier One Analysis

In the course of conducting the present assessment, we have re-evaluated the soil and ground water data from the site. We have tabulated the maximum levels of contamination, utilizing the source area as the RBCA point of compliance. The tabulation (Table 1) utilizes target levels presented in the Tier 1 RBSL Look-up Table in ASTM E-1739 (1995). The two pathways for soil and ground water which are exceeded by the greatest degree are shown on Table 1. As indicated in the preceding discussion, cancer risk levels for additional exposure pathways are also exceeded at the site. In addition to the RBCA levels, Table 1 includes often-applied State of California Regional Water Quality Control Board (RWQCB) cleanup goals for soils and State of California maximum contaminant levels (MCLs) for ground water.

These exposure pathways are as follows:

<u>Soil</u>

Vapor intrusion to buildings at residential cancer risk target levels of 10^{-4} and 10^{-6}.

Leachate to protect residential ground water ingestion target levels of 10^{-4} and 10^{-6}.

<u>Ground Water</u>

Ingestion at residential cancer risk target levels of 10^{-4} and 10^{-6}.

Vapor intrusion to buildings at residential cancer risk target levels of 10^{-4} and 10^{-6}.

The tabulation includes segregation of the soils and ground water into two depth zones. Soil is segregated into zones of from the surface to approximately 15 - 20 feet depth below the ground surface (BGS), and from 15 - 20 to 30 feet BGS. Ground water is segregated by the depth of well completions: wells MW- 3 and 6 are screened as "shallower" wells, at depths of 10 to 20 feet BGS, and wells MW- 1, 2, 4, and 5 are screened as "deeper" wells, at depths of 15 to 35 feet BGS.

We derive the following conclusions from Table 1:

* Contaminant levels in the relatively shallow soils are significantly higher than the deeper soils, particularly the levels of benzene. Both TPH-G and oil detections exceed the RWQCB criteria. However, the RBCA process does not consider these compounds to be of concern.

* The RBSL for benzene in shallow soils for target levels of 10^{-4} and 10^{-6} is exceeded for both soil leaching to ground water and soil vapor intrusion to buildings. Benzene concentrations in deeper soils also exceed the threshold concentration for the 10^{-6} risk factor, although this is unlikely to be a factor at depths of 15-20 to 30 feet. For the most part, however, the deeper soils are below RBCA RBSLs and at or below the RWQCB criteria.

* The detected levels for benzene in both shallow and deeper ground water exceeds the RBSL for ground water ingestion and ground water vapor intrusion to buildings for a 10^{-4} and for a 10^{-6} target level. Benzene also exceeds the MCL value.

* There are no example Tier 1 RBSLs for HVOCs. HVOC in soil, based on limited analyses, exceeds the often-applied RWQCB standard of 1.0 ppm for only one compound, PCE, in relatively shallow soils.

* HVOCs in ground water exceed their respective MCL values for five compounds, PCE, TCE, VCL, DCE, and DCA (abbreviations defined in Table 1), by as much as two orders of magnitude. The MCL for all five compounds is exceeded by deeper wells (including the near-source EB-4), with exceedance by only one compound (DCE) in the shallow wells. The shallow wells are located distant from the source area.

Although not evident from Table 1, the RBSLs are exceeded at both the primary point of compliance (source area), as well as the down- or lateral- gradient wells at the site periphery, distant from the source area.

4.0 REMEDIAL CRITERIA EVALUATION

Site soil and ground water contaminant levels clearly exceed the Tier 1 RBSLs by as much as three to four orders of magnitude. The site is located in a residential area, with nearby residences and possible (although limited) ground water utilization. Therefore, it is our opinion that some site remediation is warranted to meet Alameda County and State water quality goals.

There appear to be two objectives of remedial action at the 1970 Seminary Avenue site. One objective would be to remediate, to the extent practicable, the residual contaminated soils in the immediate source area, and possibly elsewhere within the site. The second objective would be to remediate the ground water, within and adjacent to the site, to the extent practicable. Remediation could include both volatile petroleum hydrocarbons and HVOCs.

It is our opinion that the clean up values presented in the ASTM RBCA guideline document represent appropriate initial clean up objectives. It may, however, be reasonable to utilize less stringent values, for example, target levels of 10^{-4} instead of 10^{-6}, particularly due to the relatively limited population (several dozen individuals ?) likely to be impacted by the site. As there are no RBCA values recommended for HVOC compounds, the Regional Board values should be considered for the present time. Specific target levels should be established as part of a subsequent Feasibility Study (FS) and Corrective Action Plan (CAP).

It is not known whether the shallow soils (0 to 3 feet) are a current vapor pathway to adjacent properties. Vapor sampling at the site boundaries (property line) adjacent to nearby residences could be conducted, to evaluate whether shallow soil is a current contaminant transport pathway.

5.0 EVALUATION OF REMEDIAL ACTION ALTERNATIVES

5.1 No Remedial Action

5.1a Natural Attenuation (no further work)

Under this option, there would be no further attempt to complete plume definition or to remediate ground water or the remaining soil contamination. Ground water monitoring would be discontinued. The ground water contamination would remain elevated as a result of continued leaching of gasoline and HVOC compounds from the remaining contaminated soil. The lateral (off site) extent of ground water contamination would not be determined. Without further evaluation, there is no indication that the existing contaminant levels are acceptable.

Although this option has a significant financial benefit to the responsible parties and to the State, it does not comply with or achieve cleanup directives. Therefore, in our opinion "no action" is not an acceptable alternative.

5.1b Natural Attenuation (plume definition and quarterly monitoring)

This option would include continued ground water monitoring and definition of the ground water contamination plume. Ground water contaminant levels near the source area (as indicated by MW-1), particularly purgeable aromatic compounds (BTEX), remain at essentially the same levels as initially detected in 1990, without significant degradation. Contaminant levels in the peripheral wells may be increasing. Without further evaluation, there is no indication that the existing contaminant levels are acceptable.

Although this option has a significant financial benefit to the responsible parties and to the State, it does not comply with or achieve cleanup directives. Therefore, in our opinion natural attenuation, even with plume definition and quarterly monitoring, is not an acceptable alternative.

5.1c ASTM Tier Two RBCA Evaluation (including plume definition and quarterly monitoring)

Tier 2 RBCA evaluation would consist of developing site specific target levels (SSTLs) and points of compliance. The Tier 2 SSTLs would be based on measured and predicted attenuation of chemicals away from the source area(s). In addition, the Tier 2 evaluation could include an evaluation of the theoretical cancer risk factor, and possible reduction of the 10^{-6} factor to as low as 10^{-4}. As HVOC compounds are not included in the RBCA look-up tables, it would be necessary to establish reasonable HVOC cleanup criteria at the same time, possibly utilizing the RBCA process. We understand that ASTM is currently developing HVOC Tier 1 RBSLs and methodology. This work, however, will probably not be available for at least one year. The RWQCB is currently mandating MCL levels for solvents in ground water, unless extensive risk assessment is conducted (effectively, Tier 3 evaluation).

In order to conduct a Tier 2 evaluation, it will be necessary to conduct further subsurface investigation, particularly additional soil contamination delineation within the site, and complete plume definition away from the site. Site specific soil and ground water parameters should be obtained, to be included in the contaminant transport evaluation. There would be no benefit to conducting the Tier 2 evaluation without consideration of the HVOCs. It may not be possible to utilize alternate points of compliance, as the elevated levels in shallow soils from the waste oil tank source area are directly adjacent to a property line.

Based on the detected contaminant levels, particularly of benzene, it is likely that Tier 2 RBSLs would be be exceeded by the levels present at the site, and thus remediation would still be warranted. In our opinion, the Tier 2 evaluation would not prevent remediation or significantly lower subsequent remedial costs. Finally, it is our understanding that the State of California currently may not accept Tier 2 evaluation for ground water.

5.2 Interim Remediation (additional source delineation and removal)

Interim remediation would consist of contaminant source removal. Soil excavation would be conducted in the vicinity of the former waste oil tank, within the adjacent part of the service building, and possibly within open parts of the site adjacent to Seminary Avenue. However, without removing the existing building (and thus requiring the present tenant to vacate a successful business), much of the soil contamination would be left in place. In addition, the shallow soil contamination adjacent to the former waste oil tank extends under the adjacent property to the south. This soil, also, could not be removed. Finally, the work would need to be preceded by an intensive subsurface investigation of soil quality, to outline the area to be excavated.

Thus, a significant expenditure would be required to only partially alleviate the contaminant source, and there would be minimal direct ground water remediation benefit. If the existing service building were removed, and more extensive excavation conducted, the property would no longer be available for rental unless the owner invested in construction of a new building, and even greater remediation expense would be incurred. Ground water remediation would most likely still be required.

5.3 Ground Water Extraction

Ground water extraction would be conducted on-site only. Data from development and purging of the existing monitoring wells indicate that the wells yield only relatively low volumes of water. The low ground water transmissivity would preclude off-site remediation (off-site contaminants would not be drawn onto the site for remediation). In addition, ground water extraction would likely dewater the shallower strata, reducing remediation of the shallow contamination. This option does not provide for direct remediation of the unsaturated zone and would require the contaminants to desorb from the soil particles and become soluble for extraction. Contaminants situated in the vadose zone would be only minimally impacted. Finally, pump and treat performance has been shown (Lawrence Livermore National Laboratory, 1995) to be a relatively ineffective remedial method, requiring numerous annual cycles to achieve cleanup objectives. Therefore, ground water extraction is not recommended.

5.4 Vapor / Ground Water Co-Extraction

A vapor extraction system could prove beneficial for remediation of the unsaturated zone over the long term, perhaps four to six or more annual cycles. Vapor / ground water co-extraction would provide effective remediation of petroleum constituents and solvents from soil and shallow ground water. The process could consist of installing extraction wells to approximately 25 feet depth. A drop pipe could be placed to near the bottom of each well, to intercept and control water and thus providing effective dewatering of the shallow sediments. The entire well column would be perforated. Vapors extracted from the wells would be treated by a carbon adsorption vapor extraction system. The extracted ground water would be conveyed to a separate carbon treatment system. The system's effectiveness could be limited primarily to the saturated zone despite draw down in the wells.

5.5 Vapor / Ground Water Co-Extraction with Air Sparging or ORC

Addition of air sparging to the co-extraction system could provide the added benefit of increasing oxygenation (resulting in enhanced bacterial degradation of contaminants) of deeper strata. Volatile gases generated by the sparge system would be recovered by the vapor extraction wells. Effective remediation of both saturated and unsaturated strata would be accomplished.

Alternatively, oxygen releasing compounds (ORC) could be placed in selected wells, particularly in the deeper ground water wells. This technology is relatively untested, but might be a valid alternative (and would be less costly) to air sparging, particularly if sparging proves ineffective.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the evaluations of the site conditions, remedial goals, and various remedial alternatives, it is our opinion that site remediation will be necessary. Natural attenuation, with or without further investigation and monitoring (Section 5.1.a and 5.1.b), is unlikely to result in achieving regulatory agency goals. Based on the elevated levels of detected contaminants, and the presence of HVOCs, further RBCA (Tier 2) analysis would, in our opinion, result in the conclusion that remediation is still necessary. Interim remediation (Section 5.2), although beneficial, would provide only partial site remediation, because much of the source material would remain in place beneath the station building and adjacent property. Ground water extraction (Section 5.3) would most likely be of limited benefit. Therefore, in our opinion, a program of vapor / ground water co-extraction, possibly with air sparging or ORC, should be considered as a remedial alternative.

The following sequence of work is recommended:

1. Complete plume definition studies, particularly off site.

2. Additional definition of shallow soil contamination within the site. This definition could include shallow (less than three feet) vapor sampling at the site boundaries (property line) adjacent to nearby residences, to evaluate whether shallow soil is a current contaminant transport pathway.

3. Feasibility testing of vapor extraction, vapor-ground water co-extraction, and air sparging.

4. Preparation of a corrective action plan, including presentation of site-specific remedial goals.

If the feasibility studies prove that in-situ remediation will not be effective, a Tier 2 and possibly Tier 3 evaluation can be conducted.

7.0 LIMITATIONS

This report 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.

* *

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TABLE 1

Tier 1 Risk Based Screening Level Data

(**Soil** data presented in mg/kg (parts per million, **ppm**;
Ground water data presented in ug/l (parts per billion, **ppb**)

SOIL (ppm)

	Risk-Based Screening Level				Other Standard	Site Value (8)	
Compound	**Vap Intru to Bldg (1) 10^{-6}**	**Leach to gw (2) 10^{-6}**	**Vap Intru to Bldg (1) 10^{-4}**	**Leach to gw (2) 10^{-4}**	**RWQCB (3)**	**0-15/20'**	**15/20-30'**
TPH-G	—	—	—	—	100	*270-910*	*68-130*
Oil/Grease	—	—	—	—	1000	*2700-15,000*	190-620
Benzene (7)	0.002	0.071	0.2	1.72	0.3	**2.4**	**ND-0.17**
Toluene	20.6	129	20.6	129	0.3	0.76-3.5	ND-0.38
Ethylbenzene	427	575	427	575	1	0.32-4.2	1.9
Xylenes	—	—	—	—	1	1.7-8.3	0.078-2.9
PCE (9)	—	—	—	—	1	1.8	0.52
TCE (9)	—	—	—	—	1	0.82	ND
VCL (9)	—	—	—	—	1	ND	ND
DCE (9)	—	—	—	—	1	ND	ND
DCA (9)	—	—	—	—	1	ND	ND

GROUND WATER (ppb)

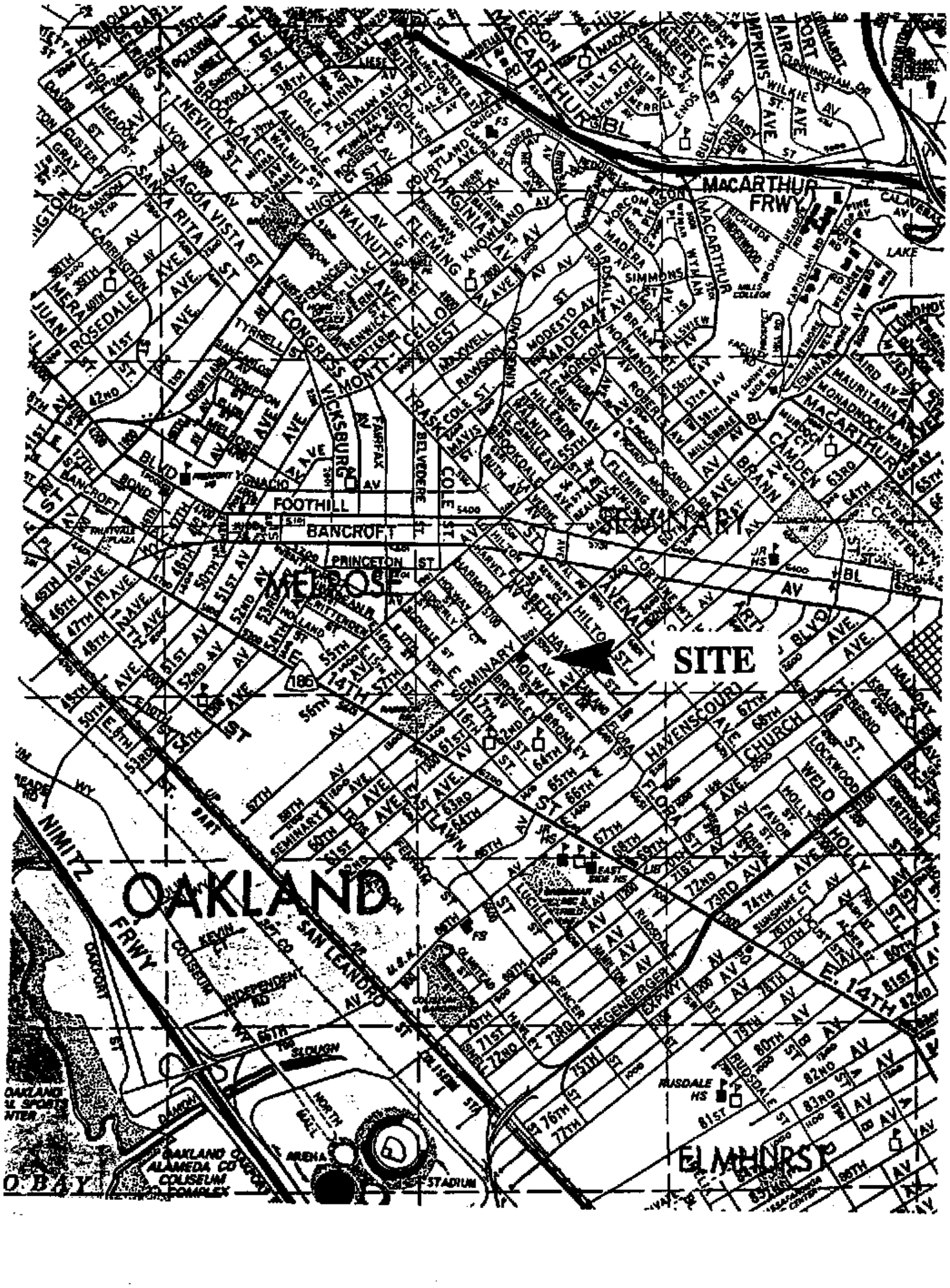
	Risk-Based Screening Level				Other Standard	Site Value (8)	
Compound	**GW Ingest (4) 10^{-6}**	**Vap Intru gw to bldg (5) 10^{-6}**	**GW Ingest (4) 10^{-4}**	**Vap intru gw to bldg (5) 10^{-4}**	**MCL (6)**	**"Shallow" wells**	**"Deep" wells**
TPH-G	—	—	—	—	—	9,900	45,000
Oil/Grease	—	—	—	—	—	ND	46,000
Benzene (7)	0.85	6.9	85.2	690	1	**1000**	**4,000**
Toluene	7,300	32,800	7,300	32,800	150	150	4,100
Ethylbenzene	3,650	77,500	3,650	77,500	700	470	1,600
Xylenes	73,000	—	73,000	—	1750	720	6,800
PCE (9)	—	—	—	—	7	0.77	**130**
TCE (9)	—	—	—	—	5	2	**340**
VCL (9)	—	—	—	—	0.5	ND	**44**
DCE (9)	—	—	—	—	6	**15**	**300**
DCA (9)	—	—	—	—	0.5	3.9	**8.7**

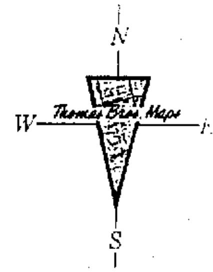
Notes on following page

Notes to Table 1:

1 Soil vapor intrusion from soil to buildings, residential
2 Soil leachate to protect ground water ingestion target level, residential
3 Generally applied RWQCB standard
4 Ground water ingestion, residential
5 Vapor intrusion from ground water to buildings, residential
6 Maximum contaminant level (State of California)
7 All benzene values multiplied by factor of 0.29 per RWQCB guidelines (1/5/96 memorandum)
8 **Bold** site value indicates RBCA or MCL (HVOC only) value exceeded; *italic* site value indicates RWQCB value exceeded
9 Abbreviations as follows:

VCL	vinyl chloride
DCE	1,2 Dichloroethene
DCA	1,2 Dichloroethane
TCE	trichloroethene
PCE	Tetrachloroethene (perchloroethene)





ALAMEDA COUNTY

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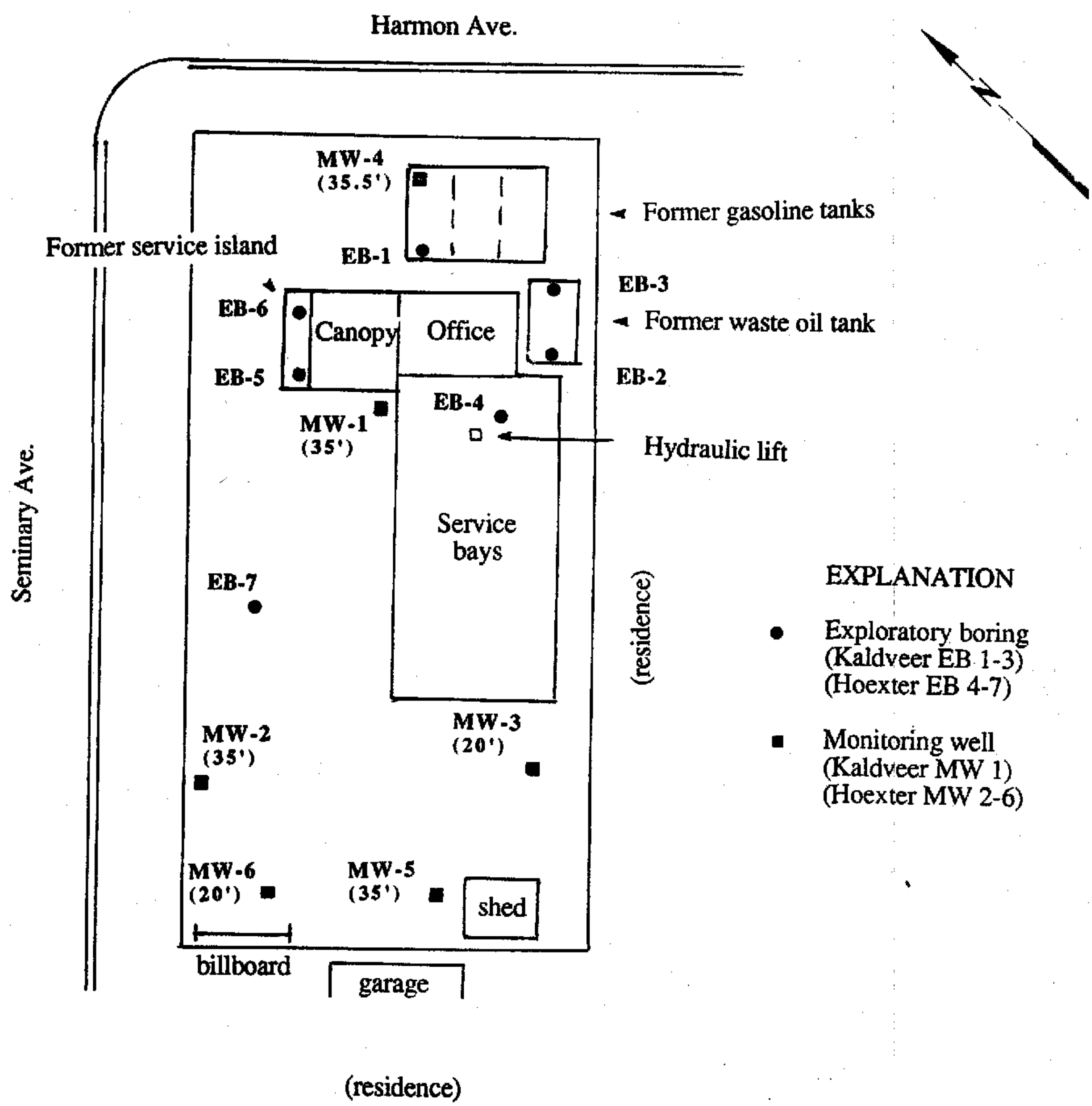
0 ¼ ½ ¾ 1 MILES
0 .1 .2 .5 1 KILOMETERS

HOEXTER CONSULTING Geology Engineering Geology Environmental Studies	LOCATION MAP		
	1970 Seminary Ave. Oakland, California		
	Project No.	**Date**	**Figure 1**
	E-10-1B-192B	July, 1996	



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

HOEXTER CONSULTING
Geology
Engineering Geology
Environmental Studies

SITE PLAN		
1970 Seminary Ave. Oakland, California		
Project No.	**Date**	**Figure** 2
E-10-1B-192B	July, 1996	

APPENDIX A

Analytical Data Summary Tables

(April 22, 1996 report, corrected)

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			
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
MW-2			
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
MW-3			
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

Table 1 continued

Well Number and Date of Measurement	Reference Elevation (2)	Depth to Water	Relative Ground Water Elevation (2)
MW-4			
3/25-26/96	36.46	14.14	22.32
MW-5			
3/25-26/96	36.77	15.63	21.14
MW-6			
3/25-26/96	36.42	8.52	27.90

Notes

(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.
(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

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	

Previous 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

Current 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
12.5-13.0	120	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
14.0-14.5	ND	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**

MW-4							
16.0-16.5	13	0.038	0.015	ND	0.023	NA	NA
26.0-26.5							
31.0-31.5 (3)	68	0.21	0.092	0.15	0.39	190	NA
36.0-36.5	5.4	ND	0.008	0.015	0.011	NA	NA
MW-5							
11.0-11.5	9.7	ND	0.019	ND	0.038	NA	NA
21.0-21.5	ND	ND	ND	ND	ND	NA	NA
21.0-21.5							
35.5-36.0 (3)	NA	NA	NA	NA	NA	ND	NA
MW-6							
11.0-11.5							
16.0-16.5 (3)	10	0.037	0.033	0.18	0.46	ND	NA

Notes

(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

Notes on following page

Table 2B Notes

(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	Benzene	Toluene	Ethyl-benzene	Xylenes	Oil & Grease HVOC (7)
MW-1 ("deep")						
8/6/90 (2)	54,000	3,500	3,200	1,900	9,400	7,600
1/28/92	2,000,000	7,400	17,000	28,000	120,000	75,000 (5)
4/27/92 (3)	500,000	3,400	6,400	10,000	45,000	440,000 (6)
4/27/92 (4)	175,000	4,200	4,400	3,200	14,600	N/A
8/10/92	170,000	4,200	4,200	3,300	15,900	120,000 (6)
2/11/94	1,800,000	ND	5,100	5,200	23,900	16,000 (6)
9/9/94	23,000,000	56,000	61,000	9,100	137,000	880,000 (6)
12/28/94	55,000	3,700	5,300	1,400	5,800	83,000 (6)
4/13/95	45,000	2,800	3,400	1,200	5,100	50,000 (5)
11/1/95	44,000	2,600	3,400	1,400	5,900	52,000 (5)
3/25/96	45,000	3,000	4,100	1,600	6,800	46,000 (5) (7)
MW-2 ("deep")						
2/11/94	130	22	1.1	5.2	7.3	ND (6)
9/9/94	1,000	89	ND	ND	6.9	ND (6)
12/28/94	330	100	3.8	5.4	4.7	5100 (6)
4/13/95	1300	280	6.9	33	23	ND 5)
11/1/95	100	9.9	ND	ND	ND	ND (5)
3/25/96	4500	470	57	220	280	ND (5) (7)
MW-3 ("shallow")						
2/11/94	ND	ND	ND	ND	ND	ND (6)
9/9/94	710	10	ND	ND	3.5	ND (6)
12/28/94	2,300	7.8	ND	130	73	ND (6)
4/13/95	1,700	2.9	ND	61	24	ND (5)
11/1/95	1,100	4.4	ND	27	22	ND (5)
3/25/96	2,300	4.0	0.96	120	65	ND (5) (7)
MW-4 ("deep")						
3/26/96	9,900	4,000	40	71	100	ND (5) (7)
MW-5 ("deep")						
3/26/96	1,200	43	8.2	083	95	ND (5) (7)

MW-6 ("shallow")							
3/26/96	9,900	1,000	150	470	720	ND	(5) (7)
EB-4							
3/8/96	15,000	780	840	1,300	590	7,500	(5) (7)
MCL	NA	1	150	700	1750	NA	

Notes

(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 4

Risk Based Screening Level Data

(Results presented in parts per <u>**million**</u>, mg/kg or mg/l)

Exposure Pathway and Receptor	Residential Cancer Risk	Compound RBSL/Site (1) Benzene (5)	Toluene	Ethylbenzene	Xylenes
Soil					
Volatilization to outdoor air	10^{-6}	0.079/**0.21** (9)	–	–	–
	10^{-4}	7.89/0.21 (9)			
	Chronic HQ=1	–	RES (2)	RES	RES
Vapor intrusion from soil to buildings	10^{-6}	0.0016/**0.21** (9)	–	–	–
	10^{-4}	0.156/**0.21** (9)			
	Chronic HQ=1	–	20.8/0.76	34.6/4.2	RES
Leachate to protect ground water ingestion	10-4	0.499/0.21 (6)			
	Chronic HQ=1	–	129/0.76	47.5/4.2	RES
Ground Water					
Volatilization to outdoor air	10^{-6}	3.19/2.0 (7)	–	–	–
	10^{-4}	319/2.0 (7)			
	Chronic HQ=1	–	>S (3)	>S	>S
Ingestion	10^{-4}	0.085/**1.0** (8)			
		0.085/**4.0** (6)			
	Chronic HQ=1	–	7.3/0.76	3.65/**4.2**	73/8.3
Vapor intrusion from ground water to buildings	10^{-6}	0.023/**1.0** (8)	--	--	--
	10^{-4}	2.35/1.0 (8)			
	Chronic HQ=1	–	114	>S	>S

Notes

(1) Risk value (left side of entry) / site value (right side of entry): RBSL = ASTM Risk Based Screening Level (Table 4, ASTM ES 38-94, July, 1994); Site = applicable contaminant level from site (**bold** if site value exceeds RBSL value)
(2) RES = selected risk level not exceeded for pure compound present at any concentration
(3) >S = selected risk level not exceeded for all possible dissolved levels
(4) HQ = health quotient
(5) Benzene risk value is ASTM RBSL multiplied by 0.29 per RWQCB requirement.
(6) Worst case value
(7) Reasonable value based on all wells
(8) Highest <u>regional</u> down-gradient well
(9) Samples <10' are ND or no odor (none or very low levels of contamination)