Environmental
Resources
Management

1777 Botelho Drive
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RO 313

ERM

10 September 2003

Mr. Amir K. Gholami
Environmental Health Services
Environmental Protection
1131 Harbor Bay Parkway
Alameda, CA 94502

Subject: 2415 and 2425 Mariner Square Drive, Alameda, CA 94501

Dear Mr. Gholami:

Environmental Resources Management (ERM) has prepared this letter on behalf of Mariner Square and Associates to summarize available soil and ground water information regarding the commercial property at 2415 Mariner Square Drive and the residential property at 2425 Mariner Square Drive (collectively referred to as 'the site'). This document also recommends procedures and protocol to be followed during development of the residential parcel, consistent with closure at the site.

A detailed discussion of previous investigations and site history is presented in *Risk-Based Corrective Action Report, Mariner Square, 2415 Mariner Square Drive, Alameda, California,* prepared by Earth Systems Consultants in February 1999. For convenience, this document is included as an attachment (Appendix A).

Key current and former site features are shown on Figure 1 and include 12 to 16 aboveground storage tanks (ASTs), two underground storage tanks (USTs), a firewall surrounding the ASTs, two underground pipelines, and various buildings.

Current Site Status – Commercial Parcel 2415 Mariner Square

Fifty-six discrete soil samples have been collected on the commercial portion of the site from 1992 to present. The historical soil analytical results are presented in Table 1 and are summarized below:

John Cavanaugh, R.G.
Program Director

**Environmental
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Management**

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Email: john.cavanaugh@erm.com

- A total of 26 samples were analyzed for total petroleum hydrocarbons in the gasoline range (TPH-g). TPH-g was detected within seven of the samples at a maximum concentration of 1,100 parts per million (ppm).
- A total of 45 samples were analyzed for total petroleum hydrocarbons in the diesel and motor oil range (TPH-d/mo; measured as diesel, motor oil, or total recoverable petroleum hydrocarbons). TPH-d/mo has been detected at concentrations ranging from non-detectable to 24,000 ppm. TPH-d/mo concentrations are shown on Figure 1.
- A total of 45 samples (including the greatest TPH-d/mo detection) were analyzed for benzene, toluene, ethylbenzene and xylenes (BTEX compounds). Benzene was not detected in any of the samples. Other BTEX compounds were only detected occasionally, with a maximum detection reported at 31 ppm (sum of all compounds). Other volatile organic compounds (VOCs) were reported below detection limits.
- A total of 14 samples were analyzed for polynuclear aromatic hydrocarbons (PNAs). In general, PNA concentrations were low (less than 20 ppm) or non-detected with two exceptions. Naphthalene and methylnaphthalene were reported at concentrations of 230 and 260 ppm, respectively, in sample PL1-2.
- A total of 28 discrete samples were analyzed for lead. Concentrations ranged from non-detect to 5,700 ppm with an average of approximately 284 ppm. Only two of the 28 samples contained concentrations greater than 400 ppm, the preliminary remediation goal developed by U.S. Environmental Protection Agency for residential soils.

Ground water samples have been collected from six monitoring wells associated with the commercial parcel (MW-2, MW-3 MW-4, MW-6/6A, MW-9, and MW-10– see residential property discussion for MW-5). Sampling was performed between 1992 and 1998, with a limited additional event in 2002. In addition grab ground water samples have been collected from one-time temporary borings at a total of seven locations. Historical ground water results are presented on Table 2 and are summarized below.

- The hydraulic gradient for the entire site is typically to the southeast at 0.005 feet per foot (ft/ft). This direction is away from the Oakland-Alameda Estuary.
- Depth to ground water for the entire site ranges from 3.57 to 5.84 feet below ground surface (bgs).

- The area of MW-6/MW-9, consisting of MW-6, MW-9 and grab samples collected in the vicinity, typically contain the greatest concentrations of TPH-g and TPH-d/mo (analytical results shown in Figure 2). A thin sheen of separate-phase hydrocarbons has been observed in MW-6.
- The maximum concentration of benzene detected in ground water from the commercial parcel was 31 parts per billion (ppb).
- MTBE concentrations have ranged from non-detectable to 460 ppb. Vinyl chloride has been detected at a maximum concentration of 9 ppb.

In a letter dated 23 June 2000, Alameda County Health Care Services Agency (ACHCSA) requested additional monitoring of wells MW-5 (to be relocated to the commercial parcel), MW-6A, MW-9, and MW-10 and removal of soil containing concentrations of lead above 400 ppm or naphthalene above 49 ppm. The requested wells were sampled most recently in January 2002. Results are included in the attached tables. Plans to remove the naphthalene-impacted soil are under development.

Current Site Status – Residential Parcel 2425 Mariner Square

Thirty-one soil samples have been collected from the residential portion of the site from 1992 to present. The historical soil analytical results are presented in Table 3 and are summarized below:

- A total of 26 samples were analyzed for TPH-d/mo, with a maximum concentration detection of 13,000 ppm. TPH-d/mo concentrations are shown on Figure 3.
- Higher concentrations of TPH-d/mo (greater than 2,000 ppm) were only detected at depths below 4 feet.
- A total of 11 samples (including the greatest TPH-d/mo detection) were analyzed for BTEX compounds. BTEX compounds typically were not detected. The maximum detection was reported at 3.5 ppm. Other VOCs were below detection limits.
- Seven samples were analyzed for lead with concentrations ranging from 5.8 to 250 ppm.

Ground water samples have been collected from five monitoring wells associated with the residential parcel (MW-1, MW-7, and MW-8 within the residential property and MW-5 adjacent to the residential property). The samples were collected between 1992 and 1998, with a limited

additional event in 2002. Historical results are presented on Table 4 and Figure 4, and are summarized below.

- Hydraulic gradient - typically to the southeast at 0.005 ft/ft. This direction is away from the Oakland-Alameda Estuary.
- Depth to ground water - ranges from 3.57 to 5.84 feet bgs.
- MW-5, located on the commercial parcel but adjacent to the residential parcel, typically contains the greatest concentrations of dissolved constituents.
- TPH-g has ranged from non-detectable to 9,000 ppb.
- TPH-d/mo has ranged from non-detectable to 6,600 ppb.
- Benzene has ranged from non-detectable to 89 ppb.
- MTBE has ranged from non-detectable to 34 ppb. Vinyl chloride has not been detected in any of the residential parcel wells.
- Lead was detected at a concentration of 12.8 ppb in MW-5 in 2002, the only sampling event involving lead analysis.

In a letter dated 2 June 2002, Alameda County Health Care Services Agency (ACHCSA) stated "Based upon the Risk Assessment no remediation is necessary for 2425 Mariner Square Drive." This determination was based upon the February 1999 Risk Assessment and is supported by the following:

- Hydrocarbons remaining in soil will not likely further impact ground water at the site. Significant concentrations of BTEX compounds or other VOCs have not been detected in soil samples collected from the residential parcel.
- Concentrations of VOCs (including BTEX compounds) in ground water do not pose a significant risk to residential use of the parcel. The ground water at the site is not considered drinking water quality. Ground water monitoring and sampling have not shown significant changes in ground water quality.
- The risk of exposure to soil and ground water is currently low in the present configuration as well as the proposed residential configuration. The receptor pathways are limited to dermal contact during construction and excavation.

Recommended Actions – Residential Property 2425 Mariner Square

Consistent with the findings of the risk assessment and conclusions developed by ACHCSA in their 2 June 2002 letter, ERM recommends the following actions to ensure that site development is performed in a manner protective of human health and the environment:

- Full disclosure of known environmental conditions to contractors planning to perform subsurface work. This will allow the contractors to evaluate the need for training, the modification of work practices, or the use of personal protective equipment to ensure adequate protection of worker health and safety.
- Monitoring of excavations deeper than 3 feet bgs to determine if potentially impacted soils are present.
- Segregation and stockpiling of impacted material disturbed during development. Currently soils containing TPH-d/mo at concentrations greater than 2,000 ppm are only present at depths greater than 3 feet bgs. The segregation of impacted material upon excavation will help ensure that significantly impacted soils (TPH-d/mo greater than 2,000 ppm) are not introduced into shallow depths via reuse during site grading activities.

  To accomplish this, materials exhibiting field evidence of significant petroleum impact (nuisance odors, discoloration, free-phase nonaqueous liquids) will be segregated upon excavation and stored in separate stockpiles. Impacted stockpiles will be covered with visqueen. Run-on/run-off controls such as hay bales or silt fencing will be placed around the impacted stockpiles. Impacted stockpiles will then be sampled on a minimum frequency of one 4-part sample per 500 cubic yards. Samples will be analyzed for TPH-d/mo and BTEX compounds. Stockpiles containing TPH-d/mo at concentrations greater than 2,000 ppm or a BTEX compound above its RWQCB risk-based screening level for surface soil (Table A in *Application of Risk-based Screening Levels and Decision Making to Site with Impacted Soil and Groundwater*, RWQCB, December 2001) will be disposed off-site.
- Skimming/pumping and off-site disposal of any nonaqueous-phase liquids encountered on the ground water surface during excavation activities.

- Pre-treatment of construction-generated ground water to be discharged to the any storm or sanitary sewer in accordance with NPDES or local POTW requirements.

Please contact me if you have any comments or questions.

Sincerely,

John Cavanaugh
Project Manager

JOC/kmm/5383.00
enclosures

cc: John Beery, Mariner Square and Associates
Bill Mabry, Oakmont Senior Living LLC
Helen Mawhinney, Environmental Technical Services

Project No. 5383.00
Date: 09/09/03
Drawn By: J. Estrada
CAD File: g:\5383\53830002.dwg

Restaurant
Concrete Sheetpile Wall
Former Tidal Flat
Boat Sales
Former Tidal Flat
Former Channel
Former Underground Pipeline
Former Channel
Offices
Mariner Square Drive
Edge of Concrete
Property Boundary
Webster Street Tube
Proposed Residential Parcel
Property Boundary
Mitchell Avenue

MW-10 SB-E 9/16/94 60*
MW-3 7/22/92 <1
SB-G
SB-G
MW-2 7/22/92 40
4/7/92 290
MS-7
SB-1
MS-8 4/7/92 46*
SB-H
SB-K
MW-5
MS-22 4/8/92 <10
9/16/94 950*
SB-D
MS-10 4/7/92 37
MS-9 4/7/92 12
NS7
NS8
NS6
NS5
SB-B
MS-15
MS-14
4/8/92 6,400
NS4
CY3
NS3
CY2
#1
#2
#3
MS-16 4/8/92 27
MW-6 4/28/98 27,200*
MW-9 (SB-C) 9/16/94 9,200*
MW-6A
MS-18 4/8/92 11,000
MS-19 4/8/92 3,900
4/8/92 3,300
MS-17
NS2
MS-13
NS1
CY1
MS-11
MS-3
SB-A
MS-4
4/8/92 3,200
MS-12
MS-20
4/8/92 970
MS-21
4/8/92 39
MS-6 4/7/92 520
MW-4 7/22/92 <1
MW-7
MS-2
MS-1
MW-8
DP-2
MW-1

LEGEND
- Trench Sample Location
- Monitoring Well
- Destroyed Well
- Soil Boring
- Existing Structures
- Former Aboveground Fuel Storage Tanks
- Former Underground Gasoline Storage Tank
- Former Tidal Channel (Radbruch, 1957)
- Approximate Property Boundary
- 4/7/92 46* — Date of Sample; TRPH Concentration (mg/L), (Most Current Data) *=Surrogate of Diesel

Note: The sample data for MS-5 = 4/7/92 170*
However, the sample location is currently undetermined.

N
0 60
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Figure 1
Soil Sample Analytical Results
Commercial Property
Mariner Square
Alameda, California
ERM 09/03

Project No. 5383.00
Date: 09/09/03
Drawn By: J. Estrada
CAD File: g:\5383\53830002.dwg

Restaurant

Date	TPH-G	TPH-D
3/15/00	88	–
3/19/02	–	<50

Date	TPH-G	TPH-D
3/15/00	91	110

Date	TPH-G	TPH-D
1/12/01	140	–
1/11/02	–	330

Concrete Sheetpile Wall

Former Tidal Flat

MW-2

MW-3

MW-10

SB-E

SB-G

SB-G

MS-7

Boat Sales

MS-8

SB-1

Former Channel

Former Underground Pipeline

Former Channel

Offices

SB-H

SB-K

MS-22

MW-5

NS7

NS8

MS-9

SB-D

T-2

MS-10

NS6

NS5

SB-B

MS-15

MS-14

NS4

CY3

NS3

MS-16

CY2

NS2

MS-13

#1

#2

#3

Proposed Residential Parcel

MW-6

MW-9 (SB-C)

MW-6A

MS-18

MS-19

MS-17

NS1

CY1

MS-11

MS-3

SB-A

MS-4

MS-2

MS-1

MW-8

DP-2

MW-1

MS-20

MS-12

MS-21

MS-6

MW-4

MW-7

Date	TPH-G	TPH-D
8/3/00	<50	–
1/11/02	–	2,000

Date	TPH-G	TPH-D
1/12/01	170	–
1/11/02	–	250

Date	TPH-G	TPH-D
3/15/00	82	300

Date	TPH-G	TPH-D
9/9/99	56	120

Property Boundary

Edge of Concrete

Property Boundary

Webster Street Tube

Mariner Square Drive

Former Tidal Flat

Mitchell Avenue

LEGEND

- Trench Sample Location
- Monitoring Well
- Destroyed Well
- Soil Boring
- Existing Structures
- Former Aboveground Fuel Storage Tanks
- Former Underground Gasoline Storage Tank
- Former Tidal Channel (Radbruch, 1957)
- Approximate Property Boundary
- Date of Sample
- TPH as Diesel Concentration, (µg/L); Most Current Data
- TPH as Gasoline Concentration, (µg/L); Most Current Data

Date	TPH-G	TPH-D
1/12/01	140	–
1/11/02	–	330

N

0 60

FEET

Figure 2

Groundwater Analytical Results
Commercial Property
Mariner Square
Alameda, California

ERM 09/03

Project No. 5383.00
Date: 09/09/03
Drawn By: J. Estrada
CAD File: g:\5383\53830002.dwg

Restaurant
Concrete Sheetpile Wall
Former Tidal Flat
Boat Sales
Former Channel
Former Underground Pipeline
Offices
Former Channel
Former Tidal Flat
Mariner Square Drive
Webster Street Tube
Edge of Concrete
Property Boundary
Proposed Residential Parcel
Property Boundary
Mitchell Avenue

MW-10
SB-E
T-1
MW-3
SB-G
SB-G
MW-2
MS-7
SB-1
MS-8
SB-H
6/18/03 1,200*
SB-K
7/22/92 220*
MW-5
MS-22
MS-9
NS7
NS8 6/18/03 23.8*
SB-D
T-2
MS-10
6/18/03 770*
NS6
NS5
6/18/03 15,300*
SB-B
MS-15
MS-14
4/8/92 6,300
6/18/03 4,600*
NS4
CY3
6/18/03 14,500*
#1
1/9/02 <60*
MS-16
NS3
6/18/03 460*
1/9/02 150*
MW-6
MW-9 (SB-C)
MW-6A
MS-18
6/18/03 2,600*
NS2
CY2
6/18/03 4,200*
#2
#3
1/9/02 670*
MS-17
MS-13
MS-19
6/18/03 35*
4/8/92 4,900
NS1
CY1
MS-11
4/8/92 3,000
MS-3
4/7/92 870
SB-A
MS-4
4/7/92 13,000
MS-2
MS-1
MW-8
MS-12
MS-20
7/22/92 <1*
DP-2
MW-1
4/7/92 <10
MS-21
9/15/94 200*
MW-7
MS-6
MW-4

LEGEND
- Trench Sample Location
- Monitoring Well
- Destroyed Well
- Soil Boring
- Existing Structures
- Former Aboveground Fuel Storage Tanks
- Former Underground Gasoline Storage Tank
- Former Tidal Channel (Radbruch, 1957)
- Approximate Property Boundary
- Date of Sample
- 4/8/92 6,300 — TRPH Concentration (mg/L). (Most Current Data)
- *=Surrogate of Diesel

Note: The sample data for MS-23 = 4/8/92 6,200
However, the sample location is currently undetermined.

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Figure 3
Soil Sample Analytical Results
Residential Property
Mariner Square
Alameda, California
ERM 09/03

CAD File: G:\5383\53830002.dwg
Drawn By: J. Estrada
Date: 09/09/03
Project No. 5383.00

Restaurant
Concrete Sheetpile Wall
Former Tidal Flat
Boat Sales
Former Channel
Former Underground Pipeline
Former Channel
Offices
Former Tidal Flat
Mariner Square Drive
Webster Street Tube
Edge of Concrete
Property Boundary
Proposed Residential Parcel
Property Boundary
Mitchell Avenue

MW-10
SB-E
MW-3
SB-G
SB-G
MW-2
MS-7
SB-1
MS-8
SB-H
SB-K
MS-22
MW-5
NS7
NS8
MS-9
SB-D
T-1
T-2
MS-10
NS6
NS5
SB-B
MS-15
MS-14
NS4
CY3
NS3
MS-16
MW-6
MW-9 (SB-C)
MW-6A
MS-18
MS-19
MS-17
NS2
MS-13
CY2
#1
#2
#3
NS1
CY1
MS-11
MS-3
SB-A
MS-4
MS-2
MS-1
MW-8
DP-2
MW-1
MS-12
MS-20
MS-21
MS-6
MW-4
MW-7

Date	TPH-G	TPH-D
1/12/01	250	–
1/11/02	–	1,100

Date	TPH-G	TPH-D
9/9/99	420	400

Date	TPH-G	TPH-D
6/24/99	<50	<50

Date	TPH-G	TPH-D
9/9/99	56	120

LEGEND

- Trench Sample Location
- Monitoring Well
- Destroyed Well
- Soil Boring
- Existing Structures
- Former Aboveground Fuel Storage Tanks
- Former Underground Gasoline Storage Tank
- Former Tidal Channel (Radbruch, 1957)
- Approximate Property Boundary

Date of Sample

Date	TPH-G	TPH-D
1/12/01	250	–
1/11/02	–	1,100

TPH as Diesel Concentration, (µg/L); Most Current Data

TPH as Gasoline Concentration, (µg/L); Most Current Data

N

0 60
FEET

Figure 4
Groundwater Analytical Results
Residential Property
Mariner Square
Alameda, California

ERM 09/03

BEERY - CAVANAUGH - 5383

ALAMEDA COUNTY
HEALTH CARE SERVICES
AGENCY
DAVID J. KEARS, Agency Director

ENVIRONMENTAL HEALTH SERVICES
ENVIRONMENTAL PROTECTION
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577
(510) 567-6700
FAX (510) 337-9335

June 2, 2000

Mr. Bill Mabry
Aegis Assisted Living
220 Concourse Blvd.
Santa Rosa, CA 94503
STID 2945

RE: 2425 Mariner Square, Alameda, CA

Dear Mr. Mabry:

This site was part of the parcel of 2415 Mariner Square, Alameda. The property owner, John Beery subdivided the parcel into two parcels. The western parcel (industrial/commercial) will retain the address of 2415 Mariner Square. The eastern parcel (residential) new address is 2425 Mariner Square.

Both parcels 2415 and 2425 Mariner Square was marshland prior to filling with "hydraulic fill" in the late 1800's, and was then the site of bulk fuel storage and distribution activities as early as 1916. The site was previously owned by Tidewater/Texaco then Phillips Petroleum, and was used for bulk fuel storage and distribution of refined oils, motor lubricants, and fuel oils for ships until 1972. Since 1972, the site use has been mixed office, restaurant, boat sales, sail manufacturing, boat motor repair, automobile repair, boat hull repair, boat hull stripping and painting.

SOIL SUMMARY AND EVALUATION

The borings advanced on the residential portion include MS-1 through MS-4, MS-11, MS-13 MS-14, MS-23, SB-A, and SB-B. Soil samples from borings MS-1, MS-3, MS-4, MS-11, MS-13, MS-14 and MS-23 were analyzed for TRPH, BTEX and VOC's. Soil samples from borings SB-A at 1.5 feet, and SB-B at 1.5 feet bgs were analyzed for total organic carbon. Soil samples SB-A and SB-B were analyzed for 17 metals at 1.5 feet, and for total lead at 3.0 feet. The soil sample from SB-A at 5.5 feet bgs was analyzed for BTEX, vinyl chloride and total organic carbon. TRPH was detected at concentrations ranging from nondetectable (MS-1) to 13,000 ppm (MS-4). Benzene was below detection limits. TEX and VOCs concentrations ranged from nondetectable to 1.2 ppm (MS-4).

The monitoring wells installed on the residential portion include MW-1, MW-7 and MW-8. In addition, well MW-5 is located north and adjacent to the northern boundary of the residential portion. Due to the lack of photoionization detector (PID) readings, no soil samples from well MW-8 were analyzed. The soil sample collected from well MW-1 and MW-5 were analyzed for TPH(d), oil and grease, BTEX and VOCs. The soil sample collected from well MW-7 was analyzed for TPH(g), TPH(d), TPHmo, BTEX, VOCs, and vinyl chloride. All analytes were below detection limits in the sample from MW-1. Oil and grease, benzene and VOCs were not detected in the sample from MW-5. TPH(d) and TEX were detected in MW-5 at 220 ppm, 0.5 ppm, 1.6 ppm and 1.4 ppm respectively. TPH(g), TPH(d), benzene, total xylenes, and vinyl chloride were not detected in the sample from MW-7. TPHmo and toluene were detected in the sample from MW-7 at 200 and 0.014 ppm respectively.

GROUNDWATER SUMMARY AND EVAULATION

The following summary is based on the analytical results of groundwater samples collected from wells MW-1, MW-7, and MW-8 within the residential portion of the site. TPH(g) has ranged from nondetectable to 750 ppb, TPH(d) has ranged from nondetectable to 1,800 ppb, and TPHmo has been nondetectable in all three wells except for 110 ppb in MW-1 on 6/24/99 and 130 ppb in MW-8 on 9/9/99. Benzene has ranged form nondetectable to 89 ppb, and the highest level of TEX was 64 ppb total xylenes. MTBE was not detected in wells MW-1 or MW-8. Although, MTBE was detected at concentrations of 16 and 34 ppb in well MW-7 on 2/18/98 and 5/8/98 respectively, vinyl chloride has not been detected in these wells.

Well MW-5 is located north of and adjacent to the northern boundary of the residential portion. However, due to the proximity to the residential portion, the analytical results are summarized. TPH(g) has ranged from 290 to 9,000 ppb, TPH(d) has ranged from nondetectable to 8,800 ppb, and TPHmo has ranged from nondetectable to 860 ppb. Benzene has ranged from 1.2 to 48 ppb, and the highest level of TEX was 49 ppb ethylbenzene. MTBE has ranged from nondetectable to 12 ppb. Vinyl chloride has not been detected in well MW-5. Lead was detected in well MW-5 at 82 ppb on 5/25/93 and nondetectable on 9/26/94.

The primary contaminant of concern in groundwater is benzene. The possible exposure pathway is volatilization from groundwater to the enclosed space of the residential structure, and the calculated risk is between 1E-05 and 1E-06. However, the actual risk of exposure by this pathway is minimal due to the proposed configuration of buildings and pavement.

Mr. Bill Mabry
Aegis Assisted Living
220 Concourse Blvd.
Santa Rosa, CA 94503

The Saltwater Ecological Protection Zone (SEPZ) at the San Francisco International Airport (SFIA) was used in the Risk Assessment as a basis for comparison of similar background conditions. The residential portion is within the SEPZ 300 foot evaluation area. The benzene concentrations in groundwater sample results reported from the three well within the parcel and well MW-5 is, on average below the SEPZ value of 71 ppb. The SFIA SEPZ value for TPH(g) is 9,150 ppb. The TPH(g) concentrations from the three parcel wells and MW-5 average below this value.

To evaluate the risk to human health and environment due to the remaining contamination at the site, a Risk-Based Corrective Action (RBCA) Tier 2 evaluation using a residential scenario was performed. The results for the assessment of the site indicate the following:

1) Hydrocarbons remaining in soil will not likely further impact groundwater at the site. Volatile compounds were not reported in the soil samples from the site.
2) Volatile compounds remaining in groundwater do not pose a significant risk to residential use of the parcel. The groundwater at the site is not considered drinking water quality. Continued groundwater monitoring and sampling has not shown significant change in the three wells located on the residential parcel.
3) The risk of exposure to soil and groundwater is currently low due to the present configuration and in the proposed residential configuration. The receptor pathways are limited to dermal contact during construction and excavation.
4) **Base upon the Risk Assessment, no remediation is necessary for 2425 Mariner Square Drive, Alameda, CA 94502**

Presently there are four monitoring wells (MW-1, MW-5, MW-7 & MW-8) on the property at 2425 Mariner Square Drive, Alameda, CA. Monitoring well MW-5 will be relocated from the residential parcel to the commercial parcel. Sampling of monitoring wells MW-1, MW-7 and MW-8 has been discontinued.

If you have any questions, please contact me at (510) 567-6774.

RBCA ASSESSMENT APPLIES FOR RESIDENTIAL AREA

Sincerely,

Larry Seto
Sr. Hazardous Materials Specialist

Cc: John Beery, 2900 Main Street, Suite 100, Alameda, CA 94501
Files

Table 1

Summary of Soil Analytical Results, Commercial Property
2415 Mariner Square Drive, Alameda, California

Sample	Development type	Date Collected	Depth	Lead	Total Petroleum Hydrocarbons				Volatiles	
					Gasoline	Diesel	Motor Oil	Total Recoverable	BTEX	VOCs
			(ft bgs)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
T-1	Commercial	12/17/90	5.0	11	ND	--	--	--	0.0063	--
T-2	Commercial	12/17/90	5.0	150	ND	--	--	--	0.037	--
MS-6	Commercial	4/7/92	4.0	--	--	--	--	520	< 0.5	ND
MS-7	Commercial	4/7/92	4.0	--	--	--	--	290	< 0.025	ND
MS-9	Commercial	4/7/92	4.0	--	--	--	--	12	< 0.025	ND
MS-10	Commercial	4/7/92	4.0	--	--	--	--	37	< 0.025	ND
MS-12	Commercial	4/8/92	4.0	--	--	--	--	3,200	0.41	ND
MS-15	Commercial	4/8/92	4.0	--	--	--	--	6,400	< 0.025	ND
MS-16	Commercial	4/8/92	0.4	--	--	--	--	27	< 0.025	ND
MS-17	Commercial	4/8/92	0.2	--	--	--	--	3,300	10	ND
MS-18	Commercial	4/8/92	0.4	--	--	--	--	11,000	< 1	ND
MS-19	Commercial	4/8/92	0.4	--	--	--	--	3,900	< 0.5	ND
MS-20	Commercial	4/8/92	0.4	--	--	--	--	970	< 0.02	ND
MS-21	Commercial	4/8/92	0.4	--	--	--	--	39	< 0.025	ND
MS-22	Commercial	4/8/92	0.4	--	--	--	--	< 10	< 0.025	ND
MW-2	Commercial	7/22/92	6.0	--	--	40	--	--	31	ND
MW-3	Commercial	7/22/92	4.5	--	--	< 1	--	--	< 0.02	ND
MW-4	Commercial	7/22/92	4.0	--	--	< 1	--	--	< 0.02	ND
SB-C/MW-9	Commercial	9/16/94	1.5	1000	--	--	9,200	--	18.8	--
SB-C/MW-9	Commercial	9/16/94	3.0	5.7	--	--	--	--	--	--
SB-C/MW-9	Commercial	9/16/94	5.5	--	--	--	--	--	--	--
SB-D	Commercial	9/16/94	1.5	8.0	< 50	810	140	--	1.38	--
SB-E	Commercial	9/16/94	1.5	38	< 10	< 10	60	--	0.019	--
SB-F	Commercial	9/16/94	1.5	12	--	--	--	--	--	--
SB-G	Commercial	9/16/94	1.5	59	--	--	--	--	--	--
SB-G	Commercial	9/16/94	3.0	25	--	--	--	--	--	--
SB-H	Commercial	9/16/94	1.5	68	--	--	--	--	--	--
SB-H	Commercial	9/16/94	3.0	26	--	--	--	--	--	--
SB-I	Commercial	9/16/94	1.5	38	--	--	--	--	--	--
SB-J	Commercial	9/16/94	1.5	5700	--	--	--	--	--	--
SB-J	Commercial	9/16/94	3.0	4.6	--	--	--	--	--	--
SB-K	Commercial	9/16/94	1.5	30	--	--	--	--	--	--
SB-K	Commercial	9/16/94	3.0	--	--	--	--	--	--	--
MW6-N1	Commercial	4/28/98	4.5	--	< 1	< 9	41	--	< 0.02	--
MW6-S1	Commercial	4/28/98	3.0	--	< 1	3,200	24,000	--	< 0.02	--
MW6-W1	Commercial	4/28/98	3.0	--	< 1	2,100	6,800	--	< 0.02	--
MW6-E1	Commercial	4/28/98	3.0	--	< 1	47	380	--	< 0.02	--
MW6-W2	Commercial	5/4/98	3.0	--	< 1	< 1	< 5	--	< 0.02	--
MW6-N2	Commercial	5/4/98	3.5	--	< 1	< 1	< 5	--	< 0.02	--
MW6-E2	Commercial	5/4/98	3.0	--	< 1	< 1	8	--	< 0.02	--
T1-5.5 (1)	Commercial	8/6/97	5.5	--	350	230	8,900	--	1.01	--
T2-4.5 (1)	Commercial	8/6/97	4.5	--	0.55	10	12	--	< 0.009	--
PL1-1	Commercial	11/21/98	2.0	140	< 1	590	1,600	--	< 0.02	--
PL1-2	Commercial	11/21/98	2.0	130	1,100	470	920	--	1.7	--
PL1-3	Commercial	11/21/98	2.2	37	25	30	28	--	0.322	--
PL1-4	Commercial	11/21/98	2.0	150	< 1	15	24	--	< 0.02	--
PL1-5	Commercial	11/21/98	1.8	<5.0	< 1	< 1	< 1	--	< 0.02	--

Table 1
Summary of Soil Analytical Results, Commercial Property
2415 Mariner Square Drive, Alameda, California

Sample	Development type	Date Collected	Depth (ft bgs)	Lead (mg/kg)	Total Petroleum Hydrocarbons				Volatiles	
					Gasoline (mg/kg)	Diesel (mg/kg)	Motor Oil (mg/kg)	Total Recoverable (mg/kg)	BTEX (mg/kg)	VOCs (mg/kg)
PL1-6	Commercial	11/21/98	1.8	33	23	110	200	--	0.997	--
PL1-7	Commercial	11/21/98	2.0	63	130	59	89	--	4.8	--
PL2-1	Commercial	11/21/98	2.3	120	< 100	210	81	--	1.64	--
PL2-2	Commercial	11/21/98	2.2	28	8.3	28	46	--	< 0.02	--
PL2-3	Commercial	11/21/98	1.9	150	< 1	< 1	73	--	0.0061	--
PL2-4	Commercial	11/21/98	2.0	58	< 1	< 1	130	--	< 0.02	--
PL2-5	Commercial	11/21/98	2.0	140	150	1,000	1,400	--	< 0.02	--
D-1	Commercial	12/17/90	1.0	12	ND	--	--	--	ND	--
MS-5	Commercial	4/7/92	4.0	--	--	--	--	170	< 0.025	ND
MS-8	Commercial	4/7/92	4.0	--	--	--	--	46	< 0.025	ND
SP1 (A-D)		6/19/03	--	150	< 2.5	87	240	--	--	ND
SP2 (A-D)		6/19/03	--	53	46	90	86	--	--	ND
SP3 (A-D)		6/19/03	--	110	63	39	64	--	--	ND

284.9767

Notes

All samples analyzed by Entech Analytical Labs, Inc., Santa Clara, CA
TPH analyses performed via USEPA Method 8015M with silica gel cleanup

x	Non-standard fuel chromatogram
--	Not sampled/not available
ND	Non-detect; reporting limit not specified

Historical data obtained from *A Report Documenting Groundwater Sampling of Monitoring Wells and Collection of Soil Grab Samples* prepared by Greensfelder and Associates, April 2002

BTEX	Benzene, toluene, ethylbenzene, xylenes (total given)
VOCs	Volatile Organic Compounds

Table 2
Summary of Ground Water Analytical Results, Commercial Property
2415 Mariner Square Drive, Alameda, California

Well Number	Development type	Date Collected	Total Petroleum Hydrocarbons				Volatiles			
			Gasoline (µg/L)	Diesel (µg/L)	Motor Oil (µg/L)	Total Recoverable (µg/L)	BTEX (µg/L)	MTBE (µg/L)	Vinyl Chloride (µg/L)	VOCs (µg/L)
MS-7	Commercial	4/7/92	--	--	--	< 1	< 25	--	--	ND
MS-18	Commercial	4/7/92	--	--	--	1,200	< 250	--	--	ND
MW-2	Commercial	8/3/92	--	2,200	< 5,000	--	15	--	--	--
		11/20/92	340	2,100	< 5,000	--	2.4	--	< 2	--
		9/26/94	320	< 50	240	--	< 12	--	--	--
		6/28/96	980	100	< 200	--	5.9	--	< 0.5	--
		10/31/96	220	180	< 200	--	< 4.5	< 10	< 1.0	--
		9/30/97	900	150	< 200	--	9	< 10	< 0.8	--
		12/12/97	360	< 50	< 200	--	6.3	< 5	< 2	--
		2/18/98	90	< 50	< 200	--	3.1	< 5	< 2	--
		5/8/98	170	< 50	< 200	--	4.7	< 5	< 2	--
		6/24/99	< 50	< 50	< 100	--	0.66	< 5	< 0.5	--
		9/9/99	120	130	< 100	--	< 2	< 5	--	--
		11/24/99	770	260	< 250	--	7.02	< 5	--	--
		3/15/00	91	110	< 250	--	< 2	< 5	--	--
MW-3	Commercial	8/3/92	--	1,000	< 5,000	--	3.4	--	--	--
		11/20/92	98	2,000	< 5,000	--	1	--	< 2	--
		9/27/94	< 50	720	< 50	--	< 3.9	--	--	--
		6/28/96	< 100	120	< 200	--	< 4.5	--	< 0.5	--
		10/31/96	< 100	160	< 200	--	< 4.5	< 10	< 1.0	--
		9/30/97	< 100	70	< 200	--	4.1	< 10	< 0.8	--
		12/12/97	80	< 50	< 200	--	4.7	9	< 2	--
		2/18/98	60	< 50	< 200	--	4	7	< 2	--
		5/8/98	< 50	< 50	< 200	--	5	< 5	< 2	--
		6/24/99	< 50	< 50	< 100	--	3.7	5	< 0.5	--
		9/9/99	64	100	< 100	--	0.65	< 5	--	--
		11/24/99	95	140	< 250	--	< 2	< 5	--	--
		3/15/00	88	350	440	--	< 2	< 5	--	--
		3/19/02	--	< 50	--	--	--	--	--	--
MW-4	Commercial	8/2/92	--	1,300	< 5,000	--	21.9	--	9	--
		11/20/92	330	2,400	< 5,000	--	38.9	--	13	--
		9/27/94	< 50	890	< 50	--	12.43	--	8	--
		6/28/96	180	170	< 200	--	4	--	2.5	--
		10/31/96	110	330	< 200	--	6.2	< 10	4.3	--
		9/30/97	650	170	< 200	--	3.9	460	3.1	--
		12/12/97	260	< 50	< 200	--	5.8	320	3	--
		2/18/98	240	< 50	< 200	--	14.1	290	2	--
		5/8/98	90	< 50	< 200	--	6.8	30	< 2	--
		8/10/99	93	270	320	--	6.19	11	< 0.5	--
		9/9/99	72	250	< 100	--	< 2	25	--	--
		11/24/99	200	280	330	--	5.38	26	--	--
		3/15/00	82	300	390	--	1.2	6.7	--	--
MW-6	Commercial	5/25/93	460	2,700,000	--	--	< 20	--	< 10	--
		9/27/94	1,100	9,900	3,200	--	< 12	--	< 1.0	--
		10/7/94								
		10/14/94								
		10/21/94								
		10/25/94	**Not Sampled - Sheen Present**							

Table 2
Summary of Ground Water Analytical Results, Commercial Property
2415 Mariner Square Drive, Alameda, California

Well Number	Development type	Date Collected	Total Petroleum Hydrocarbons				Volatiles			
			Gasoline (µg/L)	Diesel (µg/L)	Motor Oil (µg/L)	Total Recoverable (µg/L)	BTEX (µg/L)	MTBE (µg/L)	Vinyl Chloride (µg/L)	VOCs (µg/L)
		6/28/96								
		10/31/96								
		9/30/97								
		12/12/97	21,000	1,900,000	43,000	--	32	< 50	< 2	--
		2/18/98	70,000	< 50	< 200	--	130	< 100	< 2	--
		4/28/98	800	920	< 200	--	< 3.5	< 5	< 2	--

Table 2

Summary of Ground Water Analytical Results, Commercial Property
2415 Mariner Square Drive, Alameda, California

Well Number	Development type	Date Collected	Total Petroleum Hydrocarbons				Volatiles			
			Gasoline (µg/L)	Diesel (µg/L)	Motor Oil (µg/L)	Total Recoverable (µg/L)	BTEX (µg/L)	MTBE (µg/L)	Vinyl Chloride (µg/L)	VOCs (µg/L)
MW-6A	Commercial	8/10/99	770	5,400	3,900	--	3.6	< 5	< 0.5	--
		9/9/99	670	180,000	< 5, 000	--	1.27	< 5	--	--
		11/24/99	29,000	7,900	11,000	--	< 100	< 250	--	--
		3/15/00	4,400	6,700	8,100	--	1.4	< 10	--	--
		8/3/00	Not Sampled - Sheen Present							
		9/6/00	290	3,600	4,600	--	1.84	< 5	--	--
		1/12/01	170	2,200	4,100	--	4	< 5	--	--
		1/11/02	--	250	--	--	--	--	< 1	--
MW-9	Commercial	9/26/94	< 500	2,200	< 500	--	< 1.2	--	< 1.0	--
		6/28/96	390	550	< 200	--	5.2	--	< 0.5	--
		10/31/96	300	590	720	--	5.9	< 10	< 1.0	--
		9/30/97	150	460	< 200	--	3.3	< 10	< 0.8	--
		12/12/97	180	< 50	< 200	--	< 3.5	< 5	< 2	--
		2/18/98	100	< 50	< 200	--	< 3.5	6	< 2	--
		5/8/98	70	130	< 200	--	< 3.5	16	< 2	--
		6/24/99	380	140	< 100	--	111	< 5	< 0.5	--
		9/9/99	140	340	< 100	--	1	< 5	--	--
		3/15/00	< 50	650	900	--	< 2	< 5	--	--
		8/3/00	< 50	610	650	--	< 2	< 5	--	--
		1/11/02	--	2,000	--	--	--	--	< 1	ND
MW-10	Commercial	8/10/99	1,300	3,000	8,200	--	69.1	< 5	--	--
		9/9/99	890	8,600	210,000	--	55.2	< 5	--	--
		11/24/99	1,700	< 500	17,000	--	44.87	< 5	--	--
		3/15/00	1,200	< 500	14,000	--	23.7	< 10	--	--
		9/6/00	350	< 260	6,400	--	20.4	< 5	--	--
		1/12/01	140	4,500	16,000	--	14.3	< 5	--	--
		1/11/02	--	330	--	--	--	--	--	--
T1-D	Commercial	8/6/97	--	9,800	--	29	--	--	ND	--
T1-G	Commercial	8/6/97	230	78,000	3,000	--	109.3	< 0.5	ND	--
HP-1		9/3/98	10,000	410,000	12,000	--	89	< 0.5	< 5.0	--
HP-2		9/3/98	1,400	230,000	10,000	--	30	< 0.5	< 5.0	--
HP-3		9/3/98	230	78,000	3,000	--	1	< 0.5	< 5.0	--

Notes

All samples analyzed by Entech Analytical Labs, Inc., Santa Clara, CA
TPH analyses performed via USEPA Method 8015M with silica gel cleanup

x	Non-standard fuel chromatogram
--	Not sampled/not available
ND	Non-detect; reporting limit not specified

Historical data obtained from *A Report Documenting Groundwater Sampling of Monitoring Wells and Collection of Soil Grab Samples* prepared by Greensfelder and Associates, April 2002

BTEX	Benzene, toluene, ethylbenzene, xylenes (total given)
VOCs	Volatile Organic Compounds
*	Tetrachloroethene

Table 3
Summary of Soil Analytical Results, Residential Property
2415 Mariner Square Drive, Alameda, California

Sample	Development type	Date Collected	Depth (ft bgs)	Lead (mg/kg)	Total Petroleum Hydrocarbons				Volatiles	
					Gasoline (mg/kg)	Diesel (mg/kg)	Motor Oil (mg/kg)	Total Recoverable (mg/kg)	BTEX (mg/kg)	VOCs (mg/kg)
MS-1	Residential	4/7/92	4.0	--	--	--	--	< 10	< 0.025	ND
MS-3	Residential	4/7/92	4.0	--	--	--	--	870	0.081	--
MS-4	Residential	4/7/92	4.0	--	--	--	--	13,000	2.2	ND
MS-11	Residential	4/8/92	4.0	--	--	--	--	3,000	< 0.025	ND
MS-13	Residential	4/8/92	4.0	--	--	--	--	4,900	< 0.5	ND
MS-14	Residential	4/8/92	4.0	--	--	--	--	6,300	< 0.025	ND
MS-23	Residential	4/8/92	0.3	--	--	--	--	6,200	< 0.025	ND
MW-1	Residential	7/22/92	7.0	--	--	< 1	--	--	< 0.02	ND
MW-5	Residential	7/22/92	4.5	--	--	220	--	--	3.5	ND
SB-A	Residential	9/15/94	1.5	250	--	--	--	--	--	--
SB-A	Residential	9/15/94	3.0	4.2	--	--	--	--	--	--
SB-A	Residential	9/15/94	5.5	250	--	--	--	--	< 0.062	--
SB-B	Residential	9/16/94	1.5	14	--	--	--	--	--	--
SB-B	Residential	9/16/94	3.0	--	--	--	--	--	--	--
SB-B	Residential	9/16/94	4.5	--	--	--	--	--	--	--
MW-7	Residential	9/15/94	4.0	--	< 30	< 30	200	--	0.014	--
1	Residential	1/9/02	0.25	5.8	--	< 10	<50	--	--	--
2	Residential	1/9/02	0.25	250	--	120	550	--	--	--
3	Residential	1/9/02	0.25	85	--	20	130	--	--	--
NS2 1.5'	Residential	6/18/03	1.5	15	--	1,000	< 260	--	--	--
NS2 5.0'	Residential	6/18/03	5.0	--	--	2,600	< 650	--	--	--
NS3 4.5'	Residential	6/18/03	4.5	--	--	240	220	--	--	--
NS4 4.0'	Residential	6/18/03	4.0	--	--	4,600	< 1,300	--	--	--
NS5 4.0'	Residential	6/18/03	4.0	--	--	11,000	4,300 x	--	--	--
NS6 4.5'	Residential	6/18/03	4.5	--	--	770	< 260	--	--	--
NS7 4.0'	Residential	6/18/03	4.0	--	--	1,200 x	< 650	--	--	--
NS8 3.5'	Residential	6/18/03	3.5	--	--	9.8 x	14 x	--	--	--
CY1 6"	Residential	6/18/03	0.5	72	--	310	450	--	--	--
CY1 4.5'	Residential	6/18/03	4.5	--	--	35	< 130	--	--	--
CY2 6"	Residential	6/18/03	0.5	57	--	56	150	--	--	--
CY2 4.0'	Residential	6/18/03	4.0	--	--	3,100	1,100	--	--	--
CY3 6"	Residential	6/18/03	0.5	80	--	8.9	< 13	--	--	--
CY3 4.0'	Residential	6/18/03	4.0	--	--	11,000	3,500 x	--	--	--

Table 4
Summary of Ground Water Analytical Results, Residential Property
2415 Mariner Square Drive, Alameda, California

Well Number	Development type	Date Collected	Total Petroleum Hydrocarbons				Volatiles			
			Gasoline (µg/L)	Diesel (µg/L)	Motor Oil (µg/L)	Total Recoverable (µg/L)	BTEX (µg/L)	MTBE (µg/L)	Vinyl Chloride (µg/L)	VOCs (µg/L)
MS-1	Residential	4/7/92	--	--	--	< 1	< 25	--	--	ND
MS-13	Residential	4/7/92	--	--	--	23	< 25	--	--	ND
MW-1	Residential	8/3/92	--	580	< 5,000	--	< 2	--	--	--
		11/20/92	< 50	600	< 5,000	--	< 2		< 2	--
		9/27/94	< 50	530	< 50	--	< 1.2		--	--
		6/28/96	< 100	< 50	< 200	--	< 4.5		< 0.5	--
		10/31/96	< 100	93	< 200	--	< 4.5	< 10	< 1.0	--
		9/30/97	120	< 50	< 200	--	29.4	< 10	< 0.8	--
		12/12/97	< 50	< 50	< 200	--	< 3.5	< 5	< 2	--
		2/18/98	< 50	< 50	< 200	--	11.9	< 5	< 2	--
		5/8/98	< 50	< 50	< 200	--	6.7	< 5	< 2	--
		6/24/99	< 50	< 50	110	--	< 3	< 5	< 0.5	--
		11/24/99	--	--	< 250	--	--	--	--	--
MW-5	Residential	8/3/92	--	2,200	< 5,000	--	75	--	--	--
		11/20/92	4,800	1,500	< 5,000	--	51.4	--	< 2	--
		9/26/94	3,100	780	< 50	--	41.6	--	--	--
		6/28/96	5,000	610	790	--	43	--	< 0.5	--
		10/31/96	6,800	4,900	860	--	59.9	< 10	< 1.0	--
		9/30/97	9,000	4,100	520	--	108.3	12	< 0.8	--
		12/12/97	3,400	90	< 200	--	49.5	11	< 2	--
		2/18/98	3,200	< 50	< 200	--	35.3	< 5	< 2	--
		5/8/98	3,900	< 50	< 200	--	59	< 5	< 2	--
		6/24/99	290	60	< 100	--	98.4	< 5	< 0.5	--
		9/9/99	5,000	8,800	< 100	--	82	12	--	--
		11/24/99	3,200	3,400	1,700	--	50	< 25	--	--
		3/15/00	1,400	6,600	4,200	--	17.5	< 5	--	--
		8/3/00	2,700	3,500	1,000	--	58.6	< 5	--	--
		1/12/01	250	670	840	--	6.13	< 5	--	--
		1/11/02	--	1,100	--	--	--	--	--	--
MW-7	Residential	9/27/94	< 250	1,800	< 250	--	< 1.2	--	< 1	--
		6/28/96	560	490	< 200	--	3.3	--	< 0.5	--
		10/31/96	200	420	< 200	--	1.1	< 10	< 1.0	--
		9/30/97	750	190	< 200	--	20.3	< 10	< 0.8	--
		12/12/97	420	< 50	< 200	--	12.9	< 5	< 2	--
		2/18/98	650	< 50	< 200	--	16.1	16	< 2	--
		5/8/98	710	< 50	< 200	--	16	34	< 2	0.9*
		6/24/99	620	< 250	< 100	--	185	< 5	< 0.5	--
		9/9/99	420	400	< 100	--	6.45	< 5	--	--
MW-8	Residential	9/27/94	< 50	320	< 50	--	< 1.2	--	--	--
		6/28/96	< 100	58	< 200	--	< 4.5	--	< 0.5	--
		10/31/96	< 100	120	< 200	--	< 4.5	< 10	< 1.0	--
		9/30/97	110	70	< 200	--	23.6	< 10	< 0.8	--
		12/12/97	< 50	< 50	< 200	--	< 3.5	15	< 2	--
		2/18/98	< 50	< 50	< 200	--	4.7	< 5	< 2	--
		5/8/98	< 50	< 50	< 200	--	< 3.5	< 5	< 2	--

Table 4
Summary of Ground Water Analytical Results, Residential Property
2415 Mariner Square Drive, Alameda, California

Well Number	Development type	Date Collected	Total Petroleum Hydrocarbons				Volatiles			
			Gasoline (µg/L)	Diesel (µg/L)	Motor Oil (µg/L)	Total Recoverable (µg/L)	BTEX (µg/L)	MTBE (µg/L)	Vinyl Chloride (µg/L)	VOCs (µg/L)
MW-8	Residential	6/24/99	350	< 50	< 100	--	132	< 5	< 0.5	--
		9/9/99	56	120	130	--	< 2	< 5	--	--
		11/24/99	--	--	< 250	--	--	--	--	--

Notes

All samples analyzed by Entech Analytical Labs, Inc., Santa Clara, CA
TPH analyses performed via USEPA Method 8015M with silica gel cleanup

x	Non-standard fuel chromatogram
--	Not sampled/not available
ND	Non-detect; reporting limit not specified

Historical data obtained from *A Report Documenting Groundwater Sampling of Monitoring Wells and Collection of Soil Grab Samples* prepared by Greensfelder and Associates, April 2002

BTEX	Benzene, toluene, ethylbenzene, xylenes (total given)
VOCs	Volatile Organic Compounds
*	Tetrachloroethene

Earth Systems Consultants
Northern California

RISK-BASED CORRECTIVE ACTION REPORT

MARINER SQUARE
2415 Mariner Square Drive
Alameda, California

FEBRUARY 1999

Earth Systems Consultants
Northern California

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Fremont, CA 94539-7400
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File No. NFE-4392-01
February 12, 1999

Mariner Square & Associates
2900 Main Street, Suite 100
Alameda, California 94501

Attention: Mr. John Beery

Subject: Mariner Square
2415 Mariner Square Drive
Alameda, California
RISK-BASED CORRECTIVE ACTION REPORT

Dear Mr. Beery:

Earth Systems Consultants Northern California (ESCNC) is providing the Risk-Based Corrective Action (RBCA) report for the above referenced site. The report presents the results of the Tier 2 evaluation for both residential and commercial. The evaluation indicates for each area that the level of risk remaining at the site is below RBCA calculated levels, except for limited areas of high concentrations. These levels indicate a low level of remaining risk from the hydrocarbons and other contaminants in soil at the site. A health based safety plan and recommendations for construction activity are included.

The main conclusions from the RBCA Tier 2 evaluation are as follows:

- Concentrations of TRPH are above the ACHCSA levels for a portion of the former bulk plant and adjacent parking lot. However, the volatile organic compounds normally associated with the TRPH are either reported as non-detectable or at low concentrations. Based upon the lack of volatile compounds, the TRPH concentrations does not provide a significant risk to use of the site.
- Groundwater monitoring and sampling at the site for four consecutive quarters indicates stable or declining concentrations of TPH as gasoline and BTEX. The monitoring results indicate a stable plume that is not migrating towards the estuary.
- Concentrations of lead in soil are generally 150 parts per million (ppm) or less, with two exceptions where the concentrations in soil are greater than 1000 ppm.
- The risk of exposure to soil and groundwater is currently low due to the proposed configuration, and as calculated for the proposed structures is in the 10E-5 to 10E-6 range. The receptor pathways are limited to dermal contact during construction and excavation. The groundwater at the site is not considered drinking water quality.

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We appreciate this opportunity to be of service to Mariner Square & Associates. Should you have any questions or comments regarding this report, please feel free to contact us.

Very truly yours,

EARTH SYSTEMS CONSULTANTS
Northern California

Jeanne Buckthal
Staff Geologist

Gary Pischke
Senior Geologist
CEG 1501

Distribution: 1 to Addressee
1 to Texaco
1 to Phillips
1 to Union Pacific
2 to ACHCSA: Attention: Larry Seto

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INTRODUCTION

The Mariner Square site at 2415 Mariner Square Drive in Alameda, California (Figure 1) has been under assessment for bulk oil and hydrocarbon impacts to soil and groundwater from 1991 to 1998. In 1998, the results from groundwater sampling indicate that hydrocarbon concentrations in groundwater have declined to a level where evaluation of the site by risk assessment would provide conditional closure for the site. The proposed use of the site includes two areas: a commercial use- dry boat stack building on the west side; and a residential use- extended stay hotel use on the east side (Figure 2). Both of these uses are being evaluated in this study.

At the meeting in July 1998, the Alameda County Health Services Agency (ACHCSA) representative requested that a Risk-Based Corrective Action (RBCA) evaluation be performed on the worst case residential and commercial scenarios for the site. The risk based approach to corrective action has been developed after more than a decade of experience remediating petroleum contaminated sites, and is recommended by EPA in a memorandum from the Office of Solid Waste and Emergency Response (OSWER) number 9610.17 dated March 1, 1995. This approach allows an applicant to evaluate the potential risk to identifiable, site specific target receptors of known contaminants. The procedures are designed to provide conservative evaluations such that real risk may actually be lower.

Site Description

The subject site is located in Alameda, California in an area of commercial, light manufacturing and military usage immediately adjacent to and east of the Fleet Industrial Supply Center, Alameda Annex and west of the Oakland Inner Harbor. Currently, the site is occupied by railroad boxcars which have been converted to offices, a restaurant, and several buildings housing companies catering to the marine industry such as boat sales, storage, repairs, painting and sail manufacturing. The site includes an interlocking concrete sheet piling which forms the boundary between the north side of the site and the Alameda Estuary; a sheetpile and concrete bulkhead, which is near the eastern site boundary, installed during the construction of the Webster Tube; and wooden pilings and concrete bulkhead that support the concrete fire wall surrounding the former ASTs. The subject site was reclaimed from marshlands in the late 1890's. Available maps indicate the site now occupies tidal channels present in the former marshland (Figure 2).

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Site Ownership and Past Uses

The site was previously owned by Phillips Petroleum who purchased the site from Tidewater/Texaco. The site was used for bulk fuel storage and distribution of refined oils, motor lubricants, and fuel oils for use by ships until 1972. It is estimated that the site was used for bulk fuel storage and distribution as early as 1916. During the height of bulk fuel storage and distribution, the site consisted of 16 above ground storage tanks (ASTs) of various sizes and contents, two crude oil ASTs (37,000 and 30,000 barrels), a fire wall surrounding the ASTs, two underground pipelines, a pipeline wharf, a mixing tank, a warehouse/pumphouse, a reinforced concrete oil warehouse, and various buildings.

Proposed plans for the site include dividing the property into two parcels. An extended-stay hotel and parking lot would be constructed on the eastern parcel, and a dry boat storage facility and parking lot would be constructed on the western parcel.

Summary of Past Releases/Potential Source Areas

As a result of past operations at the subject site, there is remaining contamination in the soil and groundwater beneath the site. The apparent sources of contamination include the former ASTs and the underground pipelines. The contaminants of concern have included total recoverable petroleum hydrocarbons (TRPH); total petroleum hydrocarbons as gasoline, diesel, and motor oil (TPHg, TPHd, and TPHmo, respectively); benzene, toluene, ethylbenzene, total xylenes (BTEX) and methyl tert-butyl ether (MTBE); polynuclear aromatics (PNAs); total lead; and soluble threshold limit concentration (STLC) lead.

Geology and Hydrogeology

The local geology consists of clayey to silty sand (hydraulic fill) from approximately 7 to 17 feet below ground surface (bgs). Since the site was reclaimed from marshlands, the former tidal channels may contain thicker hydraulic fill deposits than elsewhere. The hydraulic fill was mechanically placed prior to the development of this portion of Alameda. Below the hydraulic fill, the sediment consists of olive-gray sandy to silty clay with sand lenses, shells and organic matter from approximately 13 to 30 feet bgs, known as Bay Mud.

Regional groundwater flow is predominantly westerly toward San Francisco Bay, but groundwater beneath the site generally flows toward the south-southeast. The discrepancy may be the result of

several man-made barriers that could impede groundwater flow beneath the site. These barriers include interlocking concrete sheet piling that forms the boundary between the north side of the site and the Alameda Estuary; a sheetpile and concrete bulkhead, located along the eastern site boundary, installed during the construction of the Webster Tube; and wooden pilings and concrete bulkhead that support the concrete fire wall surrounding the former ASTs.

A tidal influence study completed by SCI (1992) suggests that the concrete sheet piling forming the northern property boundary on the estuary, as well as the sheet piling and bulkhead related to the Webster Tube, form effective barriers to groundwater flow. The fire wall foundation is comprised of spread footing four feet below ground surface, as found at the MW-6 excavation. The firewall's impact to groundwater flow appears to limit contaminant movement within the former tank farm.

Summary of Site Activities

On November 25, 1991, AllWest Environmental, Inc. (AllWest) performed a Phase I Environmental Site Assessment of the property (AllWest, December 3, 1991). AllWest recommended a soil and groundwater investigation related to the fuel and oil storage, refining and distribution, and for contaminants related to boat maintenance, painting and repair.

In April 1992, AllWest supervised the placement of 23 geoprobes (MS-1 through MS-23), collecting and analyzing 23 soil samples and four groundwater samples (AllWest, May 1, 1992). TRPH was detected in 20 of the soil samples with a maximum concentration of 13,000 parts per million (ppm). Two of the groundwater samples contained detectable hydrocarbons with a maximum concentration of 1,200 ppm. The analytical results for soil and groundwater samples are summarized in Tables 1 and 2, respectively.

In July 1992 Subsurface Consultants, Inc. (SCI) supervised the drilling of six soil borings and the installation of six two-inch diameter monitoring wells (MW-1 through MW-6). TPHd concentrations were detected in two of the six soil samples and ranged from non detectable to 220 ppm (SCI, December 23, 1992). The analytical results are summarized in Table 1.

On June 14, 1994, McLaren/Hart supervised the drilling of 11 soil borings (SB-A through SB-K), collecting and analyzing 28 soil samples, and installing three four-inch diameter monitoring wells (MW-7, MW-8, and MW-9 in soil borings MW-7, MW-8, and SB-C, respectively). Soil results indicated the maximum petroleum hydrocarbon level (TPHmo at 9,200 ppm) in SB-C/MW9 at a

depth of 1.5 feet. In addition, initial groundwater results from wells MW-7 through MW-9 indicated the maximum petroleum hydrocarbon level (TPHd at 2,200 parts per billion [ppb]) in well MW-9. Prior to installing the new wells, hydrocarbons were detected in groundwater samples collected from wells MW-1 through MW-6, and vinyl chloride and Freon-113 were detected in groundwater samples collected from wells MW-2 and MW-4 (McLaren/Hart, March 31, 1995). All monitoring well locations are shown on Figure 2. Soil and groundwater analytical results are summarized in Tables 1 and 2, respectively.

In a letter dated December 26, 1995, Ms. Juliet Shin of ACHCSA Environmental Protection Division required removal of the two remaining underground storage tanks (USTs) at the site. Additionally, the letter required a minimum of four consecutive quarterly groundwater monitoring events to delineate the plume of contamination and assure that migration is not occurring offsite or into the San Francisco Bay. Subsequently, groundwater monitoring events were performed in the third and fourth quarters during 1997 and the first and second quarters during 1998. The latest groundwater monitoring and sampling was performed on May 8, 1998 (Hydro-Environmental Technologies, June 12, 1998). The gradient map is shown on Figure 3.

Well MW-6 was destroyed on April 28, 1998, prior to the second quarter event. The well was destroyed during the excavation of hydrocarbon-bearing soil encountered during the search for a water main leak. The results are discussed in the May 8, 1998 quarterly monitoring report by Hydro-Environmental Technologies, Inc.

As requested in the ACHCSA letter dated July 30, 1998, ESCNC collected three hydropunch groundwater samples (HP-1 through HP-3) in the vicinity of former well MW-6 on September 3, 1998. The analytical results indicated maximum concentrations of TPHg, TPHd, and TPHmo of 10,000 ppb, 410,000 ppb, and 12,000 ppb, respectively. Benzene was only detected in HP-3 at a concentration of 1.0 ppb. Phenanthrene was detected in HP-1 at 27 ppb, and pyrene was detected in HP-3 at 26 ppb. The groundwater analytical results are included in Table 2.

On November 21, 1998, ESCNC personnel supervised the removal of two pipelines (PL1 and PL2) near MW-5 and MW-2 by Zaccor Companies, Inc. (Figure 2). All of pipeline PL1 and approximately half of pipeline PL2 were removed. The remainder of PL2 was not accessible due to overlying concrete. Twelve (12) soil samples were collected from depths ranging from 1.8 to

2.3 feet beneath the former pipelines at 20 foot intervals. The samples were analyzed for TPHg, TPHd, and TPHmo, BTEX, MTBE, total lead, and PNAs.

During the preliminary data gathering phase for the RBCA evaluation, data gaps were encountered for STLC lead and PNAs results in soil. The highest concentration of total lead at the site was detected in boring SB-J at 5,700 ppm, but the corresponding STLC lead analysis was not conducted. In addition, there were no background levels for PNAs, total lead, and STLC lead. Metals analyses in soil are summarized in Table 3.

Therefore, on December 7, 1998, two direct push borings (DP-1 and DP-2) were advanced near the locations of former soil borings SB-J and MW-1, respectively, and at depths similar to those for the initial soil samples. Soil samples were collected and analyzed for PNAs, total lead, and STLC lead. PNAs were not detected in soil samples from DP-1 and DP-2. Total lead was detected in DP-1 at 7.5 ppm and not detected in DP-2. Due to the low total lead concentration, the sample from DP-1 was not analyzed for STLC lead.

Concentrations of TPHmo ranged from less than 1.0 to 1,600 ppm; TPHd ranged from less than 1.0 to 1,000 ppm; and TPHg ranged from less than 1.0 to 1,100 ppm. Benzene and MTBE were not detected in any samples. Total lead concentrations ranged from less than 5.0 to 150 ppm. The sample with the reported 150 ppm total lead was also analyzed for STLC lead. The result was 7.9 ppm, indicating some soluble lead in the soil. The PNAs naphthalene and 2-methylnaphthalene were reported at 230 ppm and 260 ppm, respectively. The analytical results are summarized in Tables 1, 3 and 4. The results are reported in the ESCNC pipeline removal report dated January 4, 1999.

Summary of Beneficial Uses

The beneficial uses at the site include a proposed redevelopment of the site to include a dry stack boat storage warehouse, an extended stay hotel, and associated parking lots. The groundwater beneath the site does not appear to have a potential future beneficial use due to its brackish nature. Total dissolved solids (TDS) at the site range from 580 ppm (MW-4) to 4,100 ppm (MW-8). Results are shown in Table 3. Offsite TDS has been reported by the adjacent Navy property as greater than 3,000 ppm. There are no water supply wells located downgradient (south-southeast) within 1/4-mile of the site. Groundwater is not used for beneficial use in the area. There is no

surface water at the site, however, the Oakland/Alameda Estuary is located north of and adjacent to the site. The estuary is used for recreation use.

RISK ASSESSMENT

The risk assessment at the subject site was conducted in accordance with the American Society for Testing and Materials (ASTM) Standard Guide E1739-95e1, the Risk-Based Corrective Action Applied at Petroleum Release Sites. The RBCA is a tiered approach involving increasingly detailed levels of data collection and analysis, and the assumptions of earlier tiers are replaced with site specific data and information. The Tier 1 evaluation involves a general look-up table, containing risk-based screening levels (RBSLs) derived for standard exposure scenarios, to determine whether the site conditions warrant regulatory closure. If site conditions exceed the RBSLs, a Tier 2 evaluation allows the option of determining site-specific target levels (SSTLs) and points of compliance using site-specific parameters. For this site, Tier 2 evaluations for commercial and residential were requested by the ACHCSA.

Additional resources used in this risk assessment were the Rationale for Modifying the Tier 1 Petroleum Hydrocarbon Saltwater Ecological Protection Zone (SEPZ) Levels for the San Francisco International Airport (draft December 10, 1997) by the Regional Water Quality Control Board (RWQCB); the Department of Toxic Substances Control's (DTSC) Assessment of Health Risks from Organic Lead in Soil (August 1992); and the DTSC Memorandum to the Preliminary Endangerment Assessment Guidance Manual - Errata Sheet (March 20, 1998).

For the contamination remaining at the subject site to pose a possible threat to human health or the environment, there must be a transport mechanism, a complete exposure pathway, and a potential receptor. Transport mechanisms may include air, water, or soil. Exposure pathways include ingestion, inhalation, and dermal contact. Potential receptors include any persons, structures, utilities, surface waters, or groundwater that may come into contact with the transport mechanism via an exposure pathway.

For the proposed commercial area of the subject site, the potential onsite receptors would include construction workers, employees, groundwater, and the estuary. For the proposed residential area of the subject site, the potential onsite receptors would include construction workers, employees, short-term hotel residents, groundwater, and the estuary.

Discussion of Evaluation

To evaluate the risk to human health and the environment of the remaining contamination at the subject site, the property was divided into commercial (dry boat storage) and residential (extended-stay hotel) settings based on the boundary shown on Figure 2. The location of contamination within each setting was further subdivided into surface soils (less than 3 feet deep), subsurface soils (equal to and greater than 3 feet deep), and groundwater. The primary remaining contaminants of concern in soil, as identified by the ACHCSA, at the site are TRPH, PNAs, and total lead. Contaminants of concern in groundwater are mainly PNAs and BTEX.

Surface Soil Contamination Evaluation

Surface soil samples were collected from borings MS-16 through MS-23 and analyzed for TRPH and BTEX. TRPH concentrations ranged from non-detectable in MS-22 to 11,000 ppm in MS-18 (Figure 4). The surface soil sample collected from boring SB-C was analyzed for TPHmo and BTEX. TPHmo was detected at a concentration of 9,200 ppm in SB-C. BTEX results for surface soil samples indicated concentrations below detection limits or below levels of regulatory concern.

Surface soil samples were collected from borings SB-A through SB-K and analyzed for total lead. Total lead concentrations ranged from 8.0 ppm in SB-D to 5,700 ppm in SB-J (Figure 5). STLC lead was analyzed for surface samples collected from borings MW-2, MW-5, SB-G, SB-H, and SB-K and ranged from 2.7 ppm in SB-G to 28 ppm in MW-2.

PNAs concentrations in soil ranged from non-detectable to 260 ppm Naphthalene. Analytical results for soil samples are summarized in Tables 1,3 and 4.

Based on analytical results, contamination remaining in surface soil at the subject site includes TRPH, TPHmo, total lead, STLC lead, and PNAs.

Subsurface Soil Contamination Evaluation

TRPH concentrations in subsurface soil ranged from non-detectable up to 13,000 ppm in MS-4. Of the subsurface samples, ten contained TRPH concentrations greater than 2,000 ppm (Figure 4). TPHmo concentrations in subsurface soil greater than 2,000 ppm were identified in two samples collected near MW-6 and one sample collected beneath tank T1. However, the soil in the vicinity of MW-6 was overexcavated and backfilled with clean soil. The maximum concentration of TPHg

in subsurface soil was 350 ppm beneath tank T1. BTEX results for surface soil samples indicated concentrations below detection limits or below levels of regulatory concern.

Total lead concentrations in subsurface soil ranged from 3.5 ppm beneath tank T1 to 150 ppm beneath tank T2 (Figure 5). STLC lead concentrations ranged from non-detectable in DP-2 to 0.79 ppm in MW-3.

PNA concentrations were not detected in subsurface soil samples DP1 and DP2. DP2 was sampled to provide background levels for PNAs.

Based upon soil sample results, TRPH is widespread throughout the site, but does not contain volatile compounds, i.e. BTEX (Table 1). The soil sample results from the pipeline further indicate that the volatile portion of the hydrocarbons in the soil has been reduced by biodegradation or was not present in high percentages in the original fuel oil released at the site. As a result of this evaluation, BTEX has not been included in the chemicals of concern in the RBCA Tier 2 evaluation.

Groundwater Contamination Evaluation

Based upon proximity to the estuary and TDS results, the groundwater at the site is not considered drinking water. As a result of this observation, the potential risk exposure of drinking water was eliminated from the RBCA Tier 2 evaluation.

BTEX have been detected in groundwater beneath the site. However, the most recent four consecutive quarters of monitoring have shown the BTEX levels to be stable or declining in the monitoring wells remaining at the site.

Prior to the destruction of well MW-6, free product was reported. The free product was removed by a combination of Petrotrap collection method and soil excavation in the vicinity of MW-6. A follow-up hydropunch event sampled the groundwater in the area of MW-6, and free product was not encountered. A replacement well is proposed for the MW-6 area after completion of construction on the dry stack building. Free product was not reported in the other wells and has not been included in the RBCA Tier 2 evaluation.

Concentrations of vinyl chloride have been reported in groundwater at the site. Four consecutive quarters of monitoring and sampling results indicated that concentrations of vinyl chloride have declined to non-detectable levels by laboratory methods. Vinyl chloride has not been included in the RBCA evaluation.

Groundwater contamination beneath the site includes PNAs and BTEX. With the TDS levels and the declining BTEX concentrations, BTEX was not included in the RBCA Tier 2 evaluation for drinking water. Benzene in groundwater is included in the evaluation as risk from potential vapor inhalation in an enclosed space. Groundwater analytical results are summarized in Tables 2, 5 and 6.

RBSLs and SSTLs Evaluation

Residential:

The borings and wells located within the residential area are MS-1 through MS-4, MS-7, MS-8, MS-11, MS-13, MS-14, MS-22, MS-23, SB-A, SB-B, SB-F, SB-G, SB-H, SB-I, SB-K, MW-1, MW-2, MW-5, MW-7, and MW-8. The residential evaluation includes the former pipelines adjacent to MW-2 and MW-5.

The Tier 2- Expanded Site Assessment- was used to evaluate the site where the main concerns are contact with TRPH, PNAs (naphthalene) and lead in surface soil, and benzene in groundwater. The pathways, exposure scenarios, and chemicals are limited to the following, respectively, contact from surface soil during construction and from residual amounts in surface soil in landscaped areas, and an enclosed residential structure built as slab on grade. The main exposure pathways would be dermal contact and possible ingestion of surface soil. Based upon surface and subsurface soils results, inhalation from benzene is not considered in the risk evaluation. However, inhalation of benzene from groundwater is considered in the risk evaluation.

The Tier 2 evaluation as defined in the ASTM guidelines makes the following assumptions:

- The equations are biased towards predicting exposure concentrations in excess of those likely to occur.
- The evaluation was performed after biodegradation of hydrocarbon compounds in soil and groundwater has occurred at the site.

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The exposure pathway is limited to dermal contact with the soil, which occurs during construction of the buildings and parking lots, and during contact with residual soil in landscaped areas. Based upon results of volatile contaminants at the site, BTEX, no significant vapor concentrations are anticipated to be encountered at the site from the surface and subsurface soil. The PNAs are considered to not have a vapor component. BTEX in ground water is considered for vapor inhalation in an enclosed space.

The Tier 2 evaluation was performed using the following equations from the ASTM guideline E 1739.

Equation 1 derives the volatilization factors VF_{wesp} for groundwater to enclosed space vapors. The equation is listed in Table X2.5 of the ASTM guideline. Associated equations are $D_{eff/ws}$ Effective diffusion coefficient between groundwater and soil based on vapor-phase concentration, $D_{eff/s}$ Effective diffusion coefficient in soil based on vapor-phase concentration $D_{eff/cap}$ Effective diffusion coefficient through capillary fringe, and $D_{eff/crack}$ Effective diffusion coefficient through foundation cracks. These parameters are contained within the following equations.

Equation 1.

$$VFwesp\left[\frac{(mg/m^3\text{-air})}{(mg/l\text{-}H_2O)}\right] = \frac{H\left[\frac{D_{ws}^{eff}/L_{gw}}{ER*L_B}\right]}{1+\left[\frac{D_{cap}^{eff}/L_{cap}}{ER*L_B}\right]+\left[\frac{D_{ws}^{eff}/L_{gw}}{(D_{crack}^{eff}/L_{crack})\eta}\right]} x10^3 \frac{L}{m^3}$$

Equation 1a.

$$D_{ws}^{eff}\left[\frac{cm^2}{s}\right] = \left(h_{cap}+h_v\right)+\left[\frac{h_{cap}}{D_{cap}^{eff}}+\frac{h_v}{D_s^{eff}}\right]^{-1}$$

Equation 1b.

$$D_s^{eff}\left[\frac{cm^2}{s}\right] = D^{air}\frac{\theta_{as}^{3.33}}{\theta_T^2}+D^{wat}\frac{1}{H}\frac{\theta_{ws}^{3.33}}{\theta_T^2}$$

Equation 1c.

$$D_{cap}^{eff}\left[\frac{cm^2}{s}\right] = D^{air}\frac{\theta_{acap}^{3.33}}{\theta_T^2}+D^{wat}\frac{1}{H}\frac{\theta_{wcap}^{3.33}}{\theta_T^2}$$

Equation 1d.

$$D_{crack}^{eff}\left[\frac{cm^2}{s}\right] = D^{air}\frac{\theta_{scrack}^{3.33}}{\theta_T^2} + D^{wat}\frac{1}{H}\frac{\theta_{wcrack}^{3.33}}{\theta_T^2}$$

A summary of parameters used within the equations is listed in Table 7. The parameters have been adjusted to match the conditions found at the subject site.

Equation 2 develops the Risk-Based Screening Level (RBSL) for groundwater and Enclosed space (indoor) vapor inhalation. The rate of inhalation for air is included with this section as Equation 2a.

Equation 2.

$$RBSL_w\left[\frac{mg}{L\cdot H_2O}\right] = \frac{RBSL_{air}\left[\frac{\mu g}{m^3\cdot air}\right]}{VF_{wesp}} \times 10^{-3}\frac{mg}{\mu g}$$

Equation 2a.

$$RBSL_{air}\left[\frac{\mu g}{m^3\cdot air}\right] = \frac{TR\times BW\times AT_C\times 365\frac{days}{year}\times 10^3\frac{\mu g}{mg}}{SF_I\times IR_{air}\times EF\times ED}$$

Based upon the results from equation 2, a value is calculated which is compared to a residential RBSL which corresponds to a certain risk between 10E-4 and 10E-6 for residential developments.

The Tier 2 Risk evaluation used the above equations with the parameters listed in Table 7. The evaluation is divided into two sections based upon the equations. The first section calculates the volatilization factors for the gasoline compounds, BTEX. The second section calculates the associated risk.

The Tier 2 evaluation as defined in the ASTM guidelines makes the following assumptions:

- The equations are biased towards predicting exposure concentrations in excess of those likely to occur.
- The exposure pathway is limited to vapors in the soil from groundwater, which migrate to hypothetical cracks in a slab causing enclosed space exposure.

- That vapor concentrations remains constant over the duration of exposure, and all inhaled chemicals are absorbed.

Volatilization factor calculations

The volatilization factors were calculated with the parameters as follows:

Equation 1a for benzene.

$$D_{ws}^{eff}\left[\frac{cm^2}{s}\right] = (20+152) + \left[\frac{20}{2.1x10^{-5}} + \frac{152}{.0073}\right]^{-1}$$
$$= 0.0002$$

Equation 1b for benzene:

$$D_s^{eff} = 0.093\frac{0.26^{3.33}}{0.38^2} + 1.1\times10^{-5}\frac{1}{0.22}\frac{0.12^{3.33}}{0.38^2}$$
$$= 0.0073$$

Equation 1c for benzene.

$$D_{cap}^{eff}\left[\frac{cm^2}{s}\right] = 0.093\frac{.038^{3.33}}{.38^2} + 1.1x10^{-5}\frac{1}{.22}\frac{.342^{3.33}}{.38^2}$$
$$= 2.12x10^{-5}$$

Equation 1d for benzene

$$D_{crack}^{eff}\left[\frac{cm^2}{s}\right] = .093\frac{.26^{3.33}}{.38_\tau^2} + 1.1x10^{-5}\frac{1}{.22}\frac{.12^{3.33}}{.38_\tau^2}$$
$$= 0.0073$$

Using the solution for benzene as the most volatile compound, VF_{wesp} was solved with equation 1, as follows:

$$VF_{wesp} = \frac{.22\bullet\left[\frac{.0002/155}{.00014\bullet200}\right]}{1+\left[\frac{.0002/155}{0.00014\bullet200}\right]+\left[\frac{.0002/155}{(0.0073/15)x.01}\right]}\times10^3$$
$$= .3715$$

Risk calculations

Using the above result for benzene, the $RBSL_W$ for benzene in an enclosed space (indoor) vapor inhalation was calculated using Equation 2. The $RBSL_{air}$ was calculated first to derive this parameter for equation 2.

The $RBSL_{air}$ is calculated as follows:

$$RBSL_{air}\left[\frac{\mu g}{m^3 \cdot air}\right] = \frac{10^{-6} \times 70kg \times 70years \times 365days/year \times 10^3 \frac{\mu g}{mg}}{0.029kg \cdot day/mg \times 15m^3/day \times 350days/year \times 30years}$$

$= 39.15$

Solving for $RBSL_W$ yields the following:

$$RBSL_w = \frac{39.15\mu g/m^3}{.3715} \times 10^{-3} mg/\mu g$$

$= 1.05$

The indoor air screening level for inhalation exposure for benzene at a cancer risk of 1E-06 is 0.11 µg/m3, and at a cancer risk of 1E-04 is 11.37 µg/m3. The calculated value is toward the 1E-06 range of risk.

Surficial and Subsurface Soil Evaluation

Equation 3 derives the ingestion of soil, inhalation of vapors and particulates, and dermal contact for surficial and excavated soil less than three feet deep for non-carcinogenic effects. The equation is listed in Table X2.3 of the ASTM guideline. Parameters used within the equation are listed in Table 9. These parameters are contained in the following equations.

Equation 3.

$$RBSL_s\left[\frac{(mg)}{(kg \cdot soil)}\right] = \frac{THQ \times BW \times AT_n \times 365}{EF \times ED\left[10^{-6}\frac{kg}{mg} \times \frac{IR_{soil} \times RAF_o + SA \times M \times RAF_d}{RfD_o} + \frac{SF_i \times IR_{air} \times \left(VF_{ss} + VF_p\right)}{RfD_i}\right]}$$

Equation 3 was calculated using the residential values in Table 7 and for naphthalene, the PNA with highest concentrations in the soil, in Table 4. The PNAs are not considered volatile, and are not solved for the air component.

Equation 3.

$$RBSL_S\left[\frac{(mg)}{(kg\cdot soil)}\right] = \frac{1.0\times70\times30\times365}{350\times30\left[10^{-6}\frac{kg}{mg}\times\frac{100\times1.0\times3160\times0.5\times0.05}{0.004}+\frac{SF_i\times IR_{air}\times\left(VF_{ss}+VF_p\right)}{R/D_i}\right]}$$

$$RBSL_S\left[\frac{(mg)}{(kg\cdot soil)}\right] = \frac{766,500}{10,500\left[10^{-6}\frac{kg}{mg}\times\frac{7,900}{0.004}+0\right]}$$

$$RBSL_S\left[\frac{(mg)}{(kg\cdot soil)}\right] = \frac{766,500}{207,375} = 3.7$$

Based upon the results from equation 3, the calculated value of 3.7 ppm for naphthalene is compared to a residential RBSL. The lookup table value for residential RBSL corresponds to a chronic Health Quotient (HQ) at 977 ppm. The calculated value is higher than most of the reported concentrations for naphthalene, except for the results from samples from PL1-2 (230 ppm), PL1-7 (9.0 ppm), and PL2-1 (5.3 ppm). All of these are below the RBSL in the lookup table. The San Francisco International Airport Saltwater Ecological Protection Zone (SEPZ) includes the soil and groundwater from 300 feet inland to the shoreline of the Bay. The subject site sample results indicate one location in the residential area with naphthalene above the SEPZ concentrations. The SEPZ value for naphthalene is 49 ppm, which can be used as a SSTL at the subject site.

Commercial:

Data for the evaluation were taken from boring and wells within the commercial area MS-6, MS-9, MS-10, MS-12, MS-15 through MS-21, SB-C, SB-D, SB-E, SB-J, MW-3, MW-4, MW-6, and MW-9. The commercial evaluation includes the results of the soil sampling at DP-1.

The Tier 2- Expanded Site Assessment- was used to evaluate the site where the main concerns are contact with TRPH, PNAs (naphthalene) and lead in surface soil. The pathways, exposure scenarios, and chemicals are limited to the following, respectively, contact from soil during construction and from residual amounts in soil in landscaped areas.

The Tier 2 evaluation as defined in the ASTM guidelines makes the following assumptions:

- The equations are biased towards predicting exposure concentrations in excess of those likely to occur.

- The evaluation was performed after biodegradation of hydrocarbon compounds in soil and groundwater has occurred at the site.

The exposure pathway is limited to dermal contact with the soil, which occurs during construction of the buildings and parking lots.

The Tier 2 evaluation was performed using the following equations from the ASTM guideline E 1739. Equation 1 derives the ingestion of soil, inhalation of vapors and particulates, and dermal contact for surficial and excavated soil less than three feet in depth for non-carcinogenic effects. The equation is listed in Table X2.3 of the ASTM guideline. Parameters used within the equation are listed in Table 7. These parameters are contained within the following equations.

Equation 3 is calculated using the commercial values in Table 7. Naphthalene is the compound of concern in the equation.

Equation 3b.

$$RBSL_s\left[\frac{(mg)}{(kg\text{-}soil)}\right]=\frac{1.0\times70\times25\times365}{250\times25\left[10^{-6}\frac{kg}{mg}\times\frac{50\times1.0-3160\times0.5\times0.05}{0.004}+\frac{SF_1\times IR_{air}\times\left(VF_{ss}+VF_p\right)}{RfD_i}\right]}$$

$$RBSL_s\ \frac{(mg)}{(kg\text{-}soil)}=\frac{638,750}{6,250\times10^{-6}\frac{kg}{mg}+\frac{3.981}{0.004}+0}$$

$$RBSL_s\ \frac{(mg)}{(kg\text{-}soil)}=\frac{638,750}{61,775}=10.4$$

The calculated value of 10.4 ppm was compared to a commercial RBSL, which corresponds to a chronic HQ at 1500 ppm. Results from boreholes DP-1 and DP-2 for PNAs indicated non-detectable levels. DP-2 results indicate background levels for the site. The evaluation anticipates that PNAs in soil are present in the commercial portion of the site, and would anticipate a similar distribution as found at the residential portion. The SSTL of 49 ppm stated in the residential evaluation will be used for the commercial portion.

No parameters were available for use with total lead and TRPH. The TRPH levels exceed 2,000 ppm as defined by the ACHCSA in ten samples from the bulk terminal. Total lead exceeds 400 ppm US EPA Preliminary Remediation Goals (PRG) in two samples from the bulk terminal.

Summary of Assessment

The main results from the RBCA Tier 2 evaluation are as follows:

- Concentrations of TRPH are above the ACHCSA levels of 2,000 ppm for a portion of the former bulk plant and adjacent parking lot. However, the volatile organic compounds normally associated with TRPH are either reported as non-detectable or at low concentrations.
- Groundwater monitoring and sampling at the site for four consecutive quarters indicates stable or declining concentrations of TPH as gasoline and BTEX. The monitoring results indicate a stable plume that is not migrating towards the estuary, hence groundwater is not considered a transport medium.
- Concentrations of lead in soil are generally 150 ppm or less, except two locations where the concentrations in soil are greater than 1,000 ppm.
- The risk of exposure to soil and groundwater is minimal due to the proposed configuration of buildings and pavement. The calculated risk from benzene in groundwater to the proposed enclosed space within the structures is between 1E-05 and 1E-06. The groundwater at the site is not considered drinking water quality.
- The only complete pathway for the site is limited to dermal contact during construction and excavation. Naphthalene is the only compound that is considered to provide a significant risk during construction. RBSLs levels calculated for naphthalene were 3.7 ppm for residential and 10.4 ppm for commercial. Concentrations of naphthalene reported at the site are generally below these levels. As an alternative value, the SSTL used for naphthalene is considered to be 49 ppm, based upon the SFIA SEPZ value.
- Subsurface soils (below 3 feet) are not included as a transport medium because concentrations are below the levels of concern for volatiles.

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CONCLUSIONS

Based upon the above summary, the following conclusions may be made.

- Risk at the site is limited to dermal contact during construction and excavation at the site. Other risks from contact to groundwater and vapors are limited by site conditions and concentrations, respectively.

- Volatile organic compounds are not present in high enough concentrations in soil to provide a risk from inhalation from vapors in the soil through cracks in foundations or from soil in landscape areas. Benzene was not detected in the soil sample results from the assessments performed at the site. Benzene concentrations were reported in groundwater, and do not provide risk greater than between 1E-05 and 1E-06.

- TRPH in soil at the site does not contain volatile compounds and does not represent a significant risk to human health or the environment for residential or commercial use.

Construction Health and Safety Plan/ Risk Management Plan

Confirmation sampling may be required in known areas of high lead and PNAs concentrations. Sampling may also be required in areas of known high concentrations of TRPH to verify the trend of low volatile organic compounds observed on the site.

Dermal contact with lead and/or PNA bearing soil should be limited by wearing the appropriate personal protection equipment. Lead bearing soil should be maintained in moist condition to prevent inhalation of lead in dust.

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RECOMMENDATIONS

Based upon the RBCA evaluation, ESCNC recommends removal only of the concentrations of lead above 400 ppm and PNAs- naphthalene above 49 ppm.

Based upon the review of existing risk at the site, ESCNC recommends closure of the site conditional on monitoring and sampling of the MW-6 replacement well, removal of lead in soil concentrations above 400 ppm, and destruction of the remaining groundwater monitoring wells. The MW-6 replacement well will be destroyed at a later date after completion of an appropriate monitoring period.

LIMITATIONS

It is possible that variations in soil or groundwater conditions exist beyond the points explored in past investigations. Also, site conditions are subject to change with time due to variations in rainfall, temperature, regional water usage, or other factors.

The service performed by Earth Systems Consultants, Northern California has been conducted in a manner consistent with the level of care and skill ordinarily exercised by members of our profession currently practicing under similar conditions in the area of the site. No other warranty, expressed or implied, is made.

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FIGURES

TABLE I
HISTORICAL SOIL SAMPLE ANALYTICAL RESULTS - ORGANICS
MARINER SQUARE, ALAMEDA, CALIFORNIA

BORING/ WELL NUMBER	DEPTH (feet)	DATE	TPHg (ppm)	TPHd (ppm)	TPHmo (ppm)	TRPH (ppm)	OIL & GREASE (ppm)	BENZENE (ppm)	TOTAL TOLUENE (ppm)	ETHYL-BENZENE (ppm)	XYLENES (ppm)	MTBE (ppm)	VOCs (ppm)	VINYL CHLORIDE (ppb)	TOC (ppm)
T-1	5.0	12/17/90	ND*	-	-	-	-	ND*	ND*	ND*	0.0063	-	-	-	-
T-2	5.0	12/17/90	ND*	-	-	-	-	ND*	0.017	ND*	0.020	-	-	-	-
D-1	1.0	12/17/90	ND*	-	-	-	-	ND*	ND*	ND*	ND *	-	-	-	-
MS-1	4.0	4/7/92	-	-	-	<10	-	<0.005	<0.005	<0.005	<0.010	-	ND	-	-
MS-2	4.0	4/7/92	-	-	-	-	-	-	-	-	-	-	-	-	-
MS-3	4.0	4/7/92	-	-	-	870	-	<0.005	<0.005	0.027	0.054	-	ND	-	-
MS-4	4.0	4/7/92	-	-	-	13,000	-	<0.50	<0.50	1.00	1.20	-	ND	-	-
MS-5	4.0	4/7/92	-	-	-	170	-	<0.005	<0.005	<0.005	<0.010	-	ND	-	-
MS-6	4.0	4/7/92	-	-	-	520	-	<0.10	<0.10	<0.10	<0.20	-	ND	-	-
MS-7	4.0	4/7/92	-	-	-	290	-	<0.005	<0.005	<0.005	<0.010	-	ND	-	-
MS-8	4.0	4/7/92	-	-	-	46	-	<0.005	<0.005	<0.005	<0.010	-	ND	-	-
MS-9	4.0	4/7/92	-	-	-	12	-	<0.005	<0.005	<0.005	<0.010	-	ND	-	-
MS-10	4.0	4/7/92	-	-	-	37	-	<0.005	<0.005	<0.005	<0.010	-	ND	-	-
MS-11	4.0	4/8/92	-	-	-	3,000	-	<0.005	<0.005	<0.005	<0.010	-	ND	-	-
MS-12	4.0	4/8/92	-	-	-	3,200	-	<0.10	<0.10	0.140	0.270	-	ND	-	-
MS-13	4.0	4/8/92	-	-	-	4,900	-	<0.10	<0.10	<0.10	<0.20	-	ND	-	-
MS-14	4.0	4/8/92	-	-	-	6,300	-	<0.005	<0.005	<0.005	<0.010	-	ND	-	-
MS-15	4.0	4/8/92	-	-	-	6,400	-	<0.005	<0.005	<0.005	<0.010	-	ND	-	-
MS-16	0.4	4/8/92	-	-	-	27	-	<0.005	<0.005	<0.005	<0.010	-	ND	-	-
MS-17	0.2	4/8/92	-	-	-	3,300	-	<0.50	<0.50	1.60	8.4	-	ND	-	-
MS-18	0.4	4/8/92	-	-	-	11,000	-	<0.20	<0.20	<0.20	<0.40	-	ND	-	-
MS-19	0.4	4/8/92	-	-	-	3,900	-	<0.10	<0.10	<0.10	<0.20	-	ND	-	-
MS-20	0.4	4/8/92	-	-	-	970	-	<0.005	<0.005	<0.005	<0.005	-	ND	-	-
MS-21	0.4	4/8/92	-	-	-	39	-	<0.005	<0.005	<0.005	<0.010	-	ND	-	-
MS-22	0.4	4/8/92	-	-	-	<10	-	<0.005	<0.005	<0.005	<0.010	-	ND	-	-
MS-23	0.4	4/8/92	-	-	-	6,200	-	<0.005	<0.005	<0.005	<0.010	-	ND	-	-
MW-1	7.0	7/22/92	-	<1	-	-	<50	<0.005	<0.005	<0.005	<0.005	-	ND	-	-
MW-2	6.0	7/22/92	-	40	-	-	66	<0.80	<0.80	21.0	10.0	-	ND	-	-
MW-3	4.5	7/22/92	-	<1	-	-	<50	<.005	<0.005	<0.005	<0.005	-	ND	-	-
MW-4	4.0	7/22/92	-	<1	-	-	<50	<0.005	<0.005	<0.005	<0.005	-	ND	-	-
MW-5	4.5	7/22/92	-	220	-	-	<50	<0.40	0.50	1.6	1.4	-	ND	-	-
SB-A	1.5	9/15/94	-	-	-	-	-	-	-	-	-	-	-	-	6,700
SB-A	5.5	9/15/94	-	-	-	-	-	<0.005	<0.0063	<0.005	<0.046	-	-	<10	960
SB-B	1.5	9/16/94	-	-	-	-	-	-	-	-	-	-	-	-	19,000
SB-B	4.5	9/16/94	-	-	-	-	-	-	-	-	-	-	-	-	<500
SB-C/MW-9	1.5	9/16/94	-	-	9,200	-	-	<0.005	13	5.8	<0.005	-	-	<20	4,000
SB-C/MW-9	5.5	9/16/94	-	-	-	-	-	-	-	-	-	-	-	-	<500
SB-D	4.5	9/16/94	<50	810	140	-	-	<0.050	<0.073	<0.050	1.380	-	-	-	-
SB-E	4.5	9/16/94	<10	<10	60	-	-	<0.005	0.019	<0.005	<0.005	-	-	-	-
MW-7	4.0	9/15/94	<30	<30	200	-	-	<0.005	0.014	<0.005	<0.005	-	-	<10	-

TABLE I
HISTORICAL SOIL SAMPLE ANALYTICAL RESULTS - ORGANICS
MARINER SQUARE, ALAMEDA, CALIFORNIA

BORING/ WELL NUMBER	DEPTH (feet)	DATE	TPHg (ppm)	TPHd (ppm)	TPHmo (ppm)	TRPH (ppm)	OIL & GREASE (ppm)	BENZENE (ppm)	TOTAL TOLUENE (ppm)	ETHYL-BENZENE (ppm)	XYLENES (ppm)	MTBE (ppm)	VOCs (ppm)	VINYL CHLORIDE (ppb)	TOC (ppm)
MW6-N1	4.5	4/28/98	<1	<9	41	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-
MW6-S1	3	4/28/98	<1	3,200	24,000	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-
MW6-W1	3	4/28/98	<1	2,100	6,800	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-
MW6-E1	3	4/28/98	<1	47	380	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-
MW6-W2	3	5/4/98	<1	<1	<5	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-
MW6-N2	3.5	5/4/98	<1	<1	<5	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-
MW6-E2	3	5/4/98	<1	<1	8	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-
T1-5.5 (1)	5.5	8/6/97	350	230	8,900	-	-	<0.05	<0.10	0.3	0.71	<1.0	-	-	-
T2-4.5 (1)	4.5	8/6/97	0.550	10	12	-	-	<0.001	<0.002	<0.002	<0.004	<0.010	-	-	-
PL1-1	2.0	11/21/98	<1	590	1,600	-	-	<0.005	<0.005	<0.005	<0.005	<0.05	-	-	-
PL1-2	2.0	11/21/98	1,100	470	920	-	-	<1.0	<1.0	<1.0	1.7	<10	-	-	-
PL1-3	2.2	11/21/98	25	30	28	-	-	<0.05	0.065	0.087	0.17	<10	-	-	-
PL1-4	2.0	11/21/98	<1	15	24	-	-	<0.005	<0.005	<0.005	<0.005	<0.05	-	-	-
PL1-5	1.8	11/21/98	<1	<1	<1	-	-	<0.005	<0.005	<0.005	<0.005	<0.05	-	-	-
PL1-6	1.8	11/21/98	23	110	200	-	-	<0.05	0.07	0.077	0.85	<0.5	-	-	-
PL1-7	2.0	11/21/98	130	59	89	-	-	<0.5	<0.5	2.8	2	<5.0	-	-	-
PL2-1	2.3	11/21/98	<100	210	81	-	-	<0.5	0.54	1.1	<0.5	<5.0	-	-	-
PL2-2	2.2	11/21/98	8.3	28	46	-	-	<0.005	<0.005	<0.005	<0.005	<0.05	-	-	-
PL2-3	1.9	11/21/98	<1	<1	73	-	-	<0.005	<0.005	.0061	<0.005	<0.05	-	-	-
PL2-4	2.0	11/21/98	<1	<1	130	-	-	<0.005	<0.005	<0.005	<0.005	<0.05	-	-	-
PL2-5	2.0	11/21/98	150	1,000	1,400	-	-	<0.005	<0.005	<0.005	<0.005	<0.05	-	-	-

ppm Parts per million
ppb Parts per billion
< Analyte not detected at or above specified laboratory reporting limit.
- Not Analyzed
ND No analytes detected above laboratory reporting limits, reporting limits vary for each analyte
ND* Analyted not detected, reporting limit not specified
TPHg Total Petroleum Hydrocarbons as gasoline
TPHd Total Petroleum Hydrocarbons as diesel
TPHmo Total Petroleum Hydrocarbons as motor oil
TRPH Total Recoverable Petroleum Hydrocarbons
VOCs Volatile Organic Compounds
TOC Total Organic Carbon
MTBE Methy Tert-Butyl Ether

TABLE 2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS - ORGANICS and TDS
MARINER SQUARE, ALAMEDA, CALIFORNIA

WELL NUMBER	DATE	TPHg (ppb)	TPHd (ppb)	TPHmo (ppb)	TRPH (ppm)	OIL & GREASE (ppb)	BENZENE (ppb)	TOLUENE (ppb)	ETHYL-BENZENE (ppb)	TOTAL XYLENES (ppb)	MTBE (ppb)	VOCs (ppb)	VINYL CHLORIDE (ppb)	TDS (ppm)
MS-1	4/7/92	-	-	-	<1	-	<5	<5	<5	<10	-	ND	-	-
MS-7	4/7/92	-	-	-	<1	-	<5	<5	<5	<10	-	ND	-	-
MS-13	4/7/92	-	-	-	23	-	<5	<5	<5	<10	-	ND	-	-
MS-18	4/7/92	-	-	-	1,200	-	<50	<50	<50	<100	-	ND	-	-
MW-1	8/3/92	-	580	<5000	-	-	<0.5	<0.5	<0.5	<0.5	-	-	-	-
	11/20/92	<50	600	<5000	-	-	<0.5	<0.5	<0.5	<0.5	-	-	<2	-
	9/27/94	<50	530	<50	-	-	<0.3	<0.3	<0.3	<0.3	-	-	-	-
	6/28/96	<100	<50	<200(1)	-	-	<0.5	<1.0	<1.0	<2.0	-	-	<0.5	-
	10/31/96	<100	93	<200	-	-	<0.5	<1.0	<1.0	<2.0	<10	-	<1.0	-
	9/30/97	120	<50	<200	-	-	4.7	<1.0	1.7	21	<10	-	<0.8	-
	12/12/97	<50	<50	<200	-	-	<0.5	<0.5	<0.5	<2.0	<5	-	<2	-
	2/18/98	<50	<50	<200	-	-	1.5	0.6	1.8	8	<5	-	<2	-
	5/8/98	<50	<50	<200	-	-	1.0	<0.5	0.7	5	<5	-	<2	-
MW-2	8/3/92	-	2200	<5000	-	-	<0.5	6.5	3.2	5.3	-	-	-	-
	11/20/92	340	2100	<5000	-	-	<0.5	<0.5	<0.5	2.4	-	-	<2	-
	9/26/94	320	<50	240	-	-	<3.0	<3.0	<3.0	<3.0	-	-	-	-
	6/28/96 (2)	980	100 (3,4)	<200 (1)	-	-	0.5	<1.0	2.3	3.1	-	-	<0.5	-
	10/31/96	220	180	<200	-	-	<0.5	<1.0	<1.0	<2.0	<10	-	<1.0	-
	9/30/97	900	150 (3)	<200	-	-	0.8	<1.0	2	6.2	<10	-	<0.8	-
	12/12/97	360	<50	<200	-	-	1.1	<0.5	2.2	3	<5	-	<2	-
	2/18/98	90	<50	<200	-	-	<0.5	<0.5	1.1	2	<5	-	<2	-
	5/8/98	170	<50	<200	-	-	<0.5	<0.5	1.7	3	<5	-	<2	-
MW-3	8/3/92	-	1000	<5000	-	-	<0.5	1	<0.5	2.4	-	-	-	-
	11/20/92	98	2000	<5000	-	-	<0.5	<0.5	0.9	1	-	-	<2	-
	9/27/94	<50	720	<50	-	-	<3.0	<0.3	<0.3	<0.3	-	-	-	-
	6/28/96	<100	120 (3)	<200 (1)	-	-	<0.5	<1.0	<1.0	<2.0	-	-	<0.5	-
	10/31/96	<100	160	<200	-	-	<0.5	<1.0	<1.0	<2.0	<10	-	<1.0	-
	9/30/97	<100	70 (8)	<200	-	-	0.8	<1.0	<1.0	3.3	<10	-	<0.8	-
	12/12/97	80	<50	<200	-	-	0.7	<0.5	0.7	4	9	-	<2	-
	2/18/98	60	<50	<200	-	-	<0.5	<0.5	<0.5	4	7	-	<2	-
	5/8/98	<50	<50	<200	-	-	0.5	<0.5	0.5	4	<5	-	<2	-

TABLE 2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS - ORGANICS and TDS
MARINER SQUARE, ALAMEDA, CALIFORNIA

WELL NUMBER	DATE	TPHg (ppb)	TPHd (ppb)	TPHmo (ppb)	TRPH (ppm)	OIL & GREASE (ppb)	BENZENE (ppb)	TOLUENE (ppb)	ETHYL-BENZENE (ppb)	TOTAL XYLENES (ppb)	MTBE (ppb)	VOCs (ppb)	VINYL CHLORIDE (ppb)	TDS (ppm)
MW-4	8/2/92	-	1300	<5000	-	-	16	2.6	0.6	2.7	-	-	9.0	-
	11/20/92	330	2400	<5000	-	-	31	5.2	0.7	2	-	-	13	-
	9/27/94	<50	890	<50	-	-	12	0.43	<0.3	<0.3	-	-	8.0	980
	6/28/96	180	170 (3,4)	<200 (1)	-	-	4	<1.0	<1.0	<2.0	-	-	2.5	-
	10/31/96	110	330	<200	-	-	6.2	<1.0	<1.0	<2.0	<10	-	4.3	-
	9/30/97	650	170 (3)	<200	-	-	3.9	<1.0	<1.0	<2.0	460	-	3.1	-
	12/12/97	260	<50	<200	-	-	4.9	0.9	<0.5	<2.0	320	-	3	-
	2/18/98	240	<50	<200	-	-	1.0	1.0	2.1	10	290	-	2	-
	5/8/98	90	<50	<200	-	-	0.5	0.5	0.8	5	30	-	<2	-
MW-5	8/2/92	-	2200	<5000	-	-	9	6	49	11	-	-	-	-
	8/5/92	-	-	-	-	-	-	-	-	-	-	-	-	-
	11/20/92	4800	1500	<5000	-	-	7.6	12	5.8	26	-	-	<2	-
	9/26/94	3100	780	<500	-	-	7.9	11	8.7	14	-	-	-	-
	6/28/96	5000	610 (3,4)	790 (1)	-	-	1.2	6.8	21	34	-	-	<0.5	-
	10/31/96	6800	4900	860	-	-	20	5.9	85	39	<10	-	<1.0	-
	9/30/97	9000	4100 (3)	520	-	-	35	5.3	36	32	82	-	<0.8	-
	12/12/97	3400	90	<200	-	-	26	4.6	5.9	13	11	-	<2	-
	2/18/98	3200	<50	<200	-	-	7.9	1.4	14	12	<5	-	<2	-
	5/8/98	3900	<50	<200	-	-	8.0	22	19	10	<5	-	<2	-
MW-6	9/27/94	1100	9900	3200	-	-	<3.0	<3.0	<3.0	<3.0	-	-	<1.0	-
	10/7/94	**Not Sampled - Sheen Present**												
	10/14/94													
	10/21/94													
	10/25/94													
	6/28/96													
	10/31/96													
	9/30/97													
	12/12/97	22000	1900000	43000	-	-	5	<0.5	8	19	<50	-	<2	-
	2/18/98	70000	<50	<200	-	-	20	20	20	70	<100	-	<2	-
	4/28/98	800	920	<200	-	-	<0.5	<0.5	<0.5	<2	<5	-	<2	-
	4/28/98	**Well Destroyed**												
MW-7	9/27/94	<250	1800	<250	-	-	<0.3	<0.3	<0.3	<0.3	-	-	<1.0	-
	6/28/94	560	490 (3,4)	<200 (1)	-	-	0.6	<1.0	<1.0	2.7	-	-	<0.5	-
	10/31/96	200	420	<200	-	-	1.1	<1.0	<1.0	<2.0	<10	-	<1.0	-
	9/30/97	750	190 (3)	<200	-	-	8.1	5.3	<1.0	6.9	<10	-	<0.8	-
	12/12/97	420	<50	<200	-	-	7.9	<0.5	<0.5	5	<5	-	<2	-
	2/18/98	650	<50	<200	-	-	9.5	0.6	<0.5	6	16	-	<2	-
	5/8/98	710	<50	<200	-	-	3.4	4.8	0.8	7	34	0.9 (5)	<2	-

TABLE 2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS - ORGANICS and TDS
MARINER SQUARE, ALAMEDA, CALIFORNIA

WELL NUMBER	DATE	TPHg (ppb)	TPHd (ppb)	TPHmo (ppb)	TRPH (ppm)	OIL & GREASE (ppb)	BENZENE (ppb)	TOLUENE (ppb)	ETHYL-BENZENE (ppb)	TOTAL XYLENES (ppb)	MTBE (ppb)	VOCs (ppb)	VINYL CHLORIDE (ppb)	TDS (ppm)
MW-8	9/27/94	<50	320	<50	-	-	<0.3	<0.3	<0.3	<0.3	-	-	-	4100
	6/28/96	<100	58 (3)	<200 (1)	-	-	<0.5	<1.0	<1.0	<2.0	-	-	<0.5	-
	10/31/96	<100	120	<200	-	-	<0.5	<1.0	<1.0	<2.0	<10	-	<1.0	-
	9/30/97	110	70 (3)	<200	-	-	4.2	<1.0	3.4	16	<10	-	<0.8	-
	12/12/97	<50	<50	<200	-	-	<0.5	<0.5	<0.5	<2.0	15	-	<2	-
	2/18/98	<50	<50	<200	-	-	0.9	<0.5	0.8	3	<5	-	<2	-
	5/8/98	<50	<50	<200	-	-	<0.5	<0.5	<0.5	<2.0	<5	-	<2	-
MW-9	9/26/94	<500	2200	<500	-	-	<0.3	<0.3	<0.3	<0.3	-	-	<1.0	-
	6/28/96	390	550 (3,4)	<200 (1)	-	-	5.2	<1.0	<1.0	<2.0	-	-	<0.5	-
	10/31/96	300	590	720	-	-	5.9	<1.0	<1.0	<2.0	<10	-	<1.0	-
	9/30/97	150	460 (3)	<200	-	-	0.6	<1.0	<1.0	2.7	<10	-	<0.8	-
	12/12/97	180	<50	<200	-	-	<0.5	<0.5	<0.5	<2.0	<5	-	<2	-
	2/18/98	100	<50	<200	-	-	<0.5	0.5	<0.5	<2.0	6	-	<2	-
	5/8/98	70	130	<200	-	-	<0.5	<0.5	<0.5	<2.0	16	-	<2	-
HP-1	9/3/98	10,000 (6)	410,000	12,000	-	-	<0.5	18	8	63	<0.5	-	<5.0	-
HP-2	9/3/98	1,400 (6)	230,000	10,000	-	-	<0.5	4	2	24	<0.5	-	<5.0	-
HP-3	9/3/98	230 (6)	78,000	3,000	-	-	1.0	<0.5	<0.5	<1.0	<0.5	-	<5.0	-
TI-D	8/6/97	-	9,800	-	29	-	-	-	-	-	-	-	ND	-
TI-G	8/6/97	230 (6)	78,000	3,000	-	-	4.3	9	12	84	<0.5	-	ND	-

Notes:

TPHG	Total Petroleum Hydrocarbons as gasoline
TPHd	Total Petroleum Hydrocarbons as diesel
TPHmo	Total Petroleum Hydrocarbons as motor oil
TRPH	Total Recoverable Petroleum Hydrocarbons
MTBE	Methyl Tert-butyl ether
VOCs	Volatile Organic Compounds
TDS	Total Dissolved Solids
ppb	parts per billion
ppm	parts per million
<	Analyte not detected at or above stated detection limit

(1) Lubricating oil can not be qualitatively identified by type of oil because of chromatographic likeness of different oil types. Due to non-volatility of certain oils, much of the oil present may never be quantified by this gas chromatographic method. Quantitation obtained for lubricating oil by this method should, therefore, be treated as an estimate. This method quantifies lubricating oil against 10-W-40 standards. For the most accurate analysis of lubricating oil, an infrared method is recommended.

(2) Water sample also analyzed for Freon 113 by EPA Method 8010A. Results were below the detection limit of 1.0 µg/L.

(3) Quantitative identification is uncertain because the material present does not match laboratory standards.

(4) Quantitation uncertain due to matrix interferences

(5) Tetracholoroethene

TABLE 3
HISTORICAL SOIL SAMPLE ANALYTICAL RESULTS - INORGANICS
MARINER SQUARE, ALAMEDA, CALIFORNIA

BORING/WELL NUMBER	Depth (feet)	Date	TTLC METALS (ppm)																	STLC (ppm)
			Sb	As	Ba	Be	Cd	Cr	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	V	Zn	Pb
T-1	5.0	12/17/90	-	-	-	-	-	-	-	-	11	-	-	-	-	-	-	-	-	-
T-2	5.0	12/17/90	-	-	-	-	-	-	-	-	150	-	-	-	-	-	-	-	-	-
T-E	1.0	12/17/90	-	-	-	-	-	-	-	-	12	-	-	-	-	-	-	-	-	-
MW-1	4.0	7/22/92	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW-2	1.5	7/22/92	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.10
MW-3	4.5	7/22/92	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28.0
MW-4	4.5	7/22/92	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.79
MW-5	1.5	7/22/92	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.09
SB-A	1.5	9/15/94	29	7.2	410	0.32	<0.50	44	6.7	28	250	0.33	1.7	26	<0.25	<1.0	<0.50	33	330	20.0
	3.0	9/15/94	-	-	-	-	-	-	-	-	4.2	-	-	-	-	-	-	-	-	-
SB-B	1.5	9/16/94	<2.5	1.8	88	<0.25	1.2	40	7.3	17	250	0.20	<1.0	36	<0.25	<1.0	<0.50	28	580	-
	3.0	9/16/94	-	-	-	-	-	-	-	-	14	-	-	-	-	-	-	-	-	-
SB-C	1.5	9/16/94	<2.5	3.4	120	<0.25	<0.50	52	8.5	25	1,000	0.26	1.4	47	<0.25	<1.0	<0.50	38	210	-
	3.0	9/16/94	-	-	-	-	-	-	-	-	5.7	-	-	-	-	-	-	-	-	-
SB-D	1.5	9/16/94	<2.5	3.3	36	<0.25	<0.50	35	3.8	18	8.0	<0.10	<1.0	25	<0.25	<1.0	<0.50	30	18	-
SB-E	1.5	9/16/94	<2.5	1.4	82	<0.25	<0.50	35	4.3	14	38	<0.10	<1.0	28	<0.25	<1.0	<0.50	25	51	-
SB-F	1.5	9/16/94	<2.5	1.2	31	<0.25	<0.50	31	3.1	6.2	12	<0.10	<1.0	20	<0.25	<1.0	<0.50	18	34	-
SB-G	1.5	9/16/94	<2.5	2.2	69	<0.25	<0.50	39	4.9	13	59	<0.10	<1.0	31	<0.25	<1.0	<0.50	25	150	2.7
	3.0	9/16/94	-	-	-	-	-	-	-	-	25	-	-	-	-	-	-	-	-	-
SB-H	1.5	9/16/94	<2.5	3.0	76	<0.25	<0.50	46	5.1	47	68	<0.10	<1.0	35	<0.25	<1.0	<0.50	28	160	2.8
	3.0	9/16/94	-	-	-	-	-	-	-	-	26	-	-	-	-	-	-	-	-	-
SB-I	1.5	9/16/94	<2.5	<5.0	48	<0.25	<0.50	36	10	90	38	<0.10	1.1	29	<0.25	<1.0	<0.50	24	100	-
SB-J	1.5	9/16/94	170	11	570	<0.25	1.9	54	11	300	5,700	0.16	2.0	43	<0.25	<1.0	<0.50	31	2,700	-
	3.0	9/16/94	<2.5	-	-	-	-	-	-	5.4	4.6	-	-	-	-	-	-	-	16	-
SB-K	1.5	9/16/94	<2.5	5.0	96	<0.25	<0.50	44	5.6	4,200	30	<0.10	1.3	33	<0.25	1.0	<0.50	28	150	21
	3.0	9/16/94	-	-	-	-	-	-	-	6.5	-	-	-	-	-	-	-	-	-	-
DP-1(PL1-1.5)	1.5	12/7/98	-	-	-	-	-	-	-	-	<5.0	-	-	-	-	-	-	-	-	1.6
DP-1	4.0	12/7/98	-	-	-	-	-	-	-	-	7.5	-	-	-	-	-	-	-	-	0.64
DP-2	4.0	12/7/98	-	-	-	-	-	-	-	-	<5.0	-	-	-	-	-	-	-	-	<0.25
PL1-1	2.0	11/21/98	-	-	-	-	-	-	-	-	140	-	-	-	-	-	-	-	-	-
PL1-2	2.0	11/21/98	-	-	-	-	-	-	-	-	130	-	-	-	-	-	-	-	-	-
PL1-3	2.2	11/21/98	-	-	-	-	-	-	-	-	37	-	-	-	-	-	-	-	-	-
PL1-4	2.0	11/21/98	-	-	-	-	-	-	-	-	150	-	-	-	-	-	-	-	-	-
PL1-5	1.8	11/21/98	-	-	-	-	-	-	-	-	<5.0	-	-	-	-	-	-	-	-	-
PL1-6	1.8	11/21/98	-	-	-	-	-	-	-	-	33	-	-	-	-	-	-	-	-	-
PL1-7	2.0	11/21/98	-	-	-	-	-	-	-	-	63	-	-	-	-	-	-	-	-	-
PL2-1	2.3	11/21/98	-	-	-	-	-	-	-	-	120	-	-	-	-	-	-	-	-	-
PL2-2	2.2	11/21/98	-	-	-	-	-	-	-	-	28	-	-	-	-	-	-	-	-	-
PL2-3	1.9	11/21/98	-	-	-	-	-	-	-	-	150	-	-	-	-	-	-	-	-	7.8
PL2-4	2.0	11/21/98	-	-	-	-	-	-	-	-	58	-	-	-	-	-	-	-	-	-
PL2-5	2.0	11/21/98	-	-	-	-	-	-	-	-	140	-	-	-	-	-	-	-	-	-

ppm = Parts per million
< = Analyte not detected at or above specified reporting limit
TTLC = Total threshold limit concentration (CCR Title 22)
STLC = Soluble threshold limit concentration (CCR Title 22)
- = Not Analyzed
Sb = Antimony
Se = Selenium
Ag = Silver
As = Arsenic
Ba = Barium
Be = Beryllium
Cd = Cadmium
Co = Cobalt
Tl = Thallium
V = Vanadium
Cu = Copper
Pb = Lead
Hg = Mercury
Mo = Molybdenum
Ni = Nickel
Zn = Zinc

TABLE 4
Soil Analytical Results - Polynuclear Aromatic Compounds
Marina Square, Alameda, CA
(in parts per million)

Boring No.	Sample Date	Depth	Naphthalene	2-Methylnaphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo (a) - Anthracene	Chrysene	Benzo (b) - Fluoranthene	Benzo (k) - Fluoranthene	Benzo (a) - Pyrene	Dibenzo (a,h) - Anthracene	Benzo (g,h,i) - Perylene	Indeno (1,2,3-cd) - Pyrene
PL1-1	11-21-98	2.0	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4
PL1-2	11-21-98	2.0	230	260	<34	<34	<34	<34	<34	<34	<34	<34	<34	<34	<34	<34	<34	<34	<34
PL1-3	11-21-98	3.3	0.99	2.6	<0.67	0.86	1.2	2.9	0.83	3.2	4.9	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67
PL1-4	11-21-98	3.0	<0.67	<0.67	<0.67	<0.67	<0.67	1.3	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67
PL1-5	11-21-98	1.8	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67
PL1-6	11-21-98	1.8	1.7	1.2	<0.67	<0.67	<0.67	1.9	<0.67	1.0	1.1	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67
PL1-7	11-21-98	2.0	9.0	<3.4	<3.4	<3.4	4.3	24	8.6	19	14	5.8	4.3	3.7	<3.4	<3.4	<3.4	<3.4	<3.4
PL2-1	11-21-98	1.3	5.3	5.5	<0.67	4.3	5.2	9.2	2.8	3.5	1.6	0.92	0.76	1.1	<0.67	0.82	<0.67	<0.67	<0.67
PL2-2	11-21-98	3.3	1.2	0.81	<0.67	0.86	1.3	3.6	0.91	1.2	3.1	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67
PL2-3	11-21-98	1.9	<0.67	<0.67	<0.67	<0.67	<0.67	1.2	<0.67	1.4	1.2	<0.67	0.78	1.26	<0.67	0.33	<0.67	<0.67	<0.67
PL2-4	11-21-98	3.0	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67
PL2-5	11-21-98	2.6	1.2	<0.67	<0.67	<0.67	<0.67	1.8	<0.67	0.8	1.5	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67
TP-1-4	12/2/98	4.0	<0.67		<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67
TP-2-4	12/2/98	4.0	<0.67	-	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67	<0.67

* Less than indicated detection limit

TABLE 5
Groundwater Analytical Results - Polynuclear Aromatics
Mariner Square, Alameda, CA
(in parts per billion)

Well No.	Sample Date	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo (a) - Anthracene	Chrysene	Benzo [b] - Fluoranthene	Benzo [k] - Fluoranthene	Benzo (a) - Pyrene	Dibenzo [a,h] - Anthracene	Benzo [g,h,i] - Perylene	Indeno [1,2,3-cd] - Pyrene
MW-1	6/28/96	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	10/31/96	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	9/30/97	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	12/12/97	0.6	<1.0	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	2/18/98	2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/8/98	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
MW-2	6/28/96	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	0.82	0.77	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	10/31/96	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	9/30/97	<2.0	12.0	3.3	<2.0	<1.0	<1.0	1.0	1.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	12/12/97	<0.5	<1.0	<0.5	<0.1	<0.1	<0.1	0.2	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	2/18/98	<1.0	8.0	5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/8/98	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
MW-3	6/28/96	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	10/31/96	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	9/30/97	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	12/12/97	0.6	<1.0	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	2/18/98	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/8/98	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
MW-4	6/28/96	<2.0	2.5	2.3	<2.0	<1.0	<1.0	1.8	2.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	10/31/96	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	0.92	1.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	9/30/97	<2.0	<2.0	3.7	<2.0	<1.0	<1.0	1.5	1.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	12/12/97	0.8	<1.0	<0.5	<0.1	<1.0	<0.1	0.4	0.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	2/18/98	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/8/98	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
MW-5	6/28/96	2.0	96 (1)	3.0	<2.0	9.5	2.3	8.6	8.4	1.0	0.68	<0.5	<0.5	0.78	<0.5	0.57	<0.5
	10/31/96	<2.0	150	8.3	2.4	14	2.9	11	15	1.9	1.8	0.51	<0.5	0.84	<0.5	<0.5	<0.5
	9/30/97	2.6	100.0	11.0	5.0	16.0	3.9	15.0	16.0	2.1	2.5	<0.5	<0.5	1.1	<0.5	<0.5	<0.5
	12/12/97	<0.5	<1.0	1.0	0.8	2.9	0.6	1.7	1.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	2/18/98	<1.0	150.0	170.0	6.0	3.0	2.0	11.0	7.0	1.0	2.0	<1.0	<1.0	1.0	<1.0	<1.0	<1.0
	5/8/98	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0

TABLE 5
Groundwater Analytical Results - Polynuclear Aromatics
Mariner Square, Alameda, CA
(in parts per billion)

Well No.	Sample Date	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo (a) - Anthracene	Chrysene	Benzo [b] - Fluoranthene	Benzo [k] - Fluoranthene	Benzo [a] - Pyrene	Dibenzo [a,h] - Anthracene	Benzo [g,h,i] - Perylene	Indeno [1,2,3-cd] - Pyrene
MW-6	6/28/96	Not Sampled - Separate Phase Hydrocarbons															
	10/31/96																
	9/30/97																
	12/12/97	<100	<200	<100	90.0	80.0	<20	250.0	40.0	25.0	<20	<20	<20	<20	<20	<20	<20
	2/18/98	<20	<20	<20	<20	<20	<20	90.0	110.0	<20	190.0	130.0	<20	70.0	62.0	23.0	<20
	4/28/98	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	4/28/98	DESTROYED															
MW-7	6/28/96	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	10/31/96	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	9/30/97	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	12/12/97	1.0	<1.0	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	2/18/98	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/8/98	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0
MW-8	6/28/96	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	10/31/96	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	9/30/97	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	12/12/97	0.6	<1.0	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	2/18/98	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/8/98	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
MW-9	6/28/96	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	0.73	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	10/31/96	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	0.69	1.10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	9/30/97	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	<0.5	0.56	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	12/12/97	1.4	<1.0	<0.5	0.2	<0.1	0.2	0.6	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	2/18/98	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	5/8/98	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0

TABLE 5
Groundwater Analytical Results - Polynuclear Aromatics
Mariner Square, Alameda, CA
(in parts per billion)

Well No.	Sample Date	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo (a) - Anthracene	Chrysene	Benzo [b] - Fluoranthene	Benzo [k] - Fluoranthene	Benzo [a] - Pyrene	Dibenzo [a,h] - Anthracene	Benzo [g,h,i] - Perylene	Indeno [1,2,3-cd] - Pyrene
HP-1(2)	9/3/98	<25	<25	<25	<62	27	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
	9/3/98	<25	<25	<25	<62	<25	26	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
	9/3/98	<42	<42	<42	<110	<42	<42	<42	<42	<42	<42	<42	<42	<42	<42	<42	<42

Notes:

Polynuclear Aromatics analyzed by EPA Method 8310

<: Not detected at or above the specified laboratory detection limit.
(1): The qualitative identification for Acenaphthylene is uncertain due to matrix interferences.
(2): Reporting Limits raised and surrogates out of control limits due to matrix inferences

TABLE 6
HISTORICAL GROUNDWATER SAMPLE ANALYTICAL RESULTS - INORGANCS
MARINER SQUARE, ALAMEDA, CALIFORNIA

WELL NUMBER	DATE	Priority Pollutant Metals (parts per billion)												
		Sb	As	Be	Cd	Cr	Cu	Pb	Hg	Ni	Se	Ag	Tl	Zn
MW-5	5/25/93	<60	10	<2	<5	10	30	82	<0.2	<30	<5	<10	<5	60
MW-5	9/26/94	<50	<10	<5	<10	<10	<20	<3	<0.2	<20	<5	<10	<10	<20
MW-6	9/27/94	<50	<10	<5	<10	<10	<20	<3	<0.2	<20	<5	<10	<10	<20
MW-6	5/25/93	<60	<5	<2	<5	30	30	<3	<0.2	50	<5	<10	<5	40
MW-1	9/27/94	<50	22	<5	<10	<10	<20	<3	<0.2	<20	<5	<10	<10	<20
MW-2	9/26/94	<50	<10	<5	<10	<10	<20	<3	<0.2	<20	<5	<10	<10	<20
MW-3	9/27/94	<50	<10	<5	<10	<10	<20	<3	<0.2	<20	<5	<10	<10	<20
MW-4	9/27/94	<50	<10	<5	<10	<10	<20	<3	<0.2	<20	<5	<10	<10	<20
MW-7	9/27/94	<50	20	<5	<10	<10	<20	<3	<0.2	<20	<5	<10	<10	<20
MW-8	9/27/94	<50	13	<5	<10	<10	<20	<3	<0.2	<20	<5	<10	<10	<20
MW-9	9/26/94	<50	<10	<5	<10	<10	<20	<3	<0.2	<20	<5	<10	<10	<20

Notes:

<	Analyte not detected at or above the specified laboratory reporting limit
Ag	Silver
As	Arsenic
Be	Beryllium
Cd	Cadmium
Cu	Copper
Cr	Chromium
Hg	Mercury
Ni	Nickel
Pb	Lead
Sb	Antimony
Se	Selenium
Tl	Thallium
Zn	Zinc

Table 7
Risk Evaluation Parameters

Tier 2 Soil, Building, Surface and Subsurface Parameters

Parameter	Definition (Units)	Residential
η	Areal fraction of cracks in foundations/walls (cm^2 cracks/ cm^2 total area)	0.01 cm^2 cracks/cm^2 total area
ρ_s	Soil Bulk Density (g soil/ cm^3 soil)	1.7 g / cm^3
θ_t	Total Soil porosity (cm^3/cm^3 soil)	0.38 cm^3/cm^3 soil
θ_{scrack}	Volumetric air content in foundation/wall cracks (cm^3air/cm^3 total volume)	0.26 cm^3 air/cm^3 total volume
θ_{as}	Volumetric air content in vadose zone soils (cm^3 air/cm^3 soil)	0.26 cm^3 air/ cm^3 soil
θ_{wcrack}	Volumetric water content in foundation/wall cracks (cm^3 H_2O/ cm^3 total volume)	0.12 cm^3 H_2O/ cm^3 total volume
θ_{ws}	Volumetric water content in vadose zone soils (cm^3 H_2O/ cm^3 soil)	0.12 cm^3 H_2O/ cm^3 soil
f_{oc}	Fraction of organic carbon in soil (g-C/g soil)	0.01
K_s	Soil-water sorption coefficient (g. H_2O/ g. soil)	$f_{oc} \times k_{oc}$
$D_{eff/crack}$	Effective diffusion coefficient for foundation crack (cm^2/s)	Calculation
$D_{eff/s}$	Effective diffusion coefficient for soil (cm^2/s)	Calculation
D^{air}	Diffusion coefficient in air (cm^2/sec)	Benzene- 0.093 cm^2/sec
D^{wat}	Diffusion coefficient in water (cm^2/sec)	Benzene - 1.1×10^{-5} cm^2/sec
ER	Enclosed space air exchange rate (L/s)	0.00014 s^{-1}
H	Henry's Law constant (cm^3 H_2O/cm^3 air)	Benzene used - 0.22 L H_2O/L air or 5.5×10^{-3} m^3atm/mol
Hcap	Thickness of capillary fringe(cm)	20 cm
Hv	Thickness of vadose zone (cm)	152 cm
L_B	Enclosed space volume/infiltration area ratio (cm)	200 cm
L_{crack}	Enclosed-space foundation or wall thickness (cm)	15 cm
L_{gw}	Depth to groundwater (cm)	155 cm
k_{oc}	Carbon-water sorption coefficient (g. H_2O/g C)	Benzene- log =1.92
VF_{wesp}	Volatilization Factor vapor from groundwater to enclosed space (mg/m^3 air/ mg/kg soil)	Calculation

Tier 2 Exposure Parameters

Parameter	Definition (Units)	Residential	Commercial/Industrial
AT_n	Averaging time for noncarcinogens (year)	30 years	25 years
BW	Adult body weight (kg)	70 kg	70 kg
ED	Exposure duration (years)	30 years	25 years
EF	Exposure frequency (days/year)	350 days/year	250 days/year
IR_{air}	daily outdoor inhalation rate, (m^2/day)	20 m^3/day	20 m^3/day
IR_{soil}	Soil ingestion rate (mg/day)	100 mg/day	50 mg/day
M	soil to skin adherence factor, (mg/cm^2)	0.5	0.5
RAF_d	Dermal relative absorption factor, volatiles/PAHs	0.05	0.05
RAF_o	Oral relative absorption factor	1.0	1.0
$RBSL_s$	Risk-Based screening level for subsurface soil (mg/kg s)	Calculation	Calculation
RfD_o	Oral chronic reference dose, mg/kg-day	Naphthalene,0.004	0.004
SA	Skin surface area,(cm^2/day)	3160	3160
THQ	Target Hazard quotient for individual constituents, unitless	1.0	1.0
VF_{ss}	Volatilization factor, surficial soils vapors	Chemical Specific	Chemical Specific
VF_p	Volatilization factor, surficial soils particulates	Chemical Specific	Chemical Specific Parameters

Derived from ASTM guideline E 1739