Weiss Associates *Environmental and Geologic Services*

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December 19, 1996

Eva Chu
Alameda County Health Care Services Agency
Department of Environmental Health
1131 Harbor Bay Parkway, 2nd Floor
Alameda, California, 94502

RE: **Low Risk Fuel Site Evaluation**
Former Chevron Service Station #9-2582
7240 Dublin Boulevard
Dublin, California
WA Job #4-1232-83

Dear Ms. Chu:

The following low risk fuel site evaluation is being presented to the Alameda County Health Care Services Agency by Weiss Associates (WA) on behalf of Chevron Products Company. As you recommended, WA has evaluated the environmental conditions at the former Chevron service station referenced above to determine if continued operation of the soil vapor extraction system is justified and whether case closure is appropriate. WA conducted this evaluation in accordance with the California Regional Water Quality Control Board's "Interim Guidance on Required Cleanup at Low Risk Fuel Sites."[1] A brief site background, a site analysis to determine whether the site can be classified as a low risk case, and WA's conclusions and recommendations for further action are presented below.

Site Background

Location: The former service station is located at the southwest corner of Dublin Boulevard and Village Parkway in a commercial area of Dublin, California.

Hydrogeology: The site is underlain by silty clay from ground surface to at least 26 ft depth. Between 1988 and 1996, the depth to water has ranged between 7 and 14 ft below ground surface. Ground water elevation data collected between October 1988 and February 1996 generally indicated a ground water flow direction toward the west and northwest. However, data collected from the site wells and two newly installed monitoring wells located northwest of the site shows that ground water

[1] Regional Water Quality Control Board - San Francisco Bay Region, "Interim Guidance on Required Cleanup at Low Risk Fuel Sites," January 5, 1996.

flows south to southeastward north of the property and west to northwestward on the property since February 1996 when two new monitoring wells were installed (Figure 1). very flat gradient

Local Surface Water: Martin Canyon Creek, an engineered flood control channel, bounds the site on the west. This channel and two other flood control channels, Dublin Creek and South San Ramon Creek flow into the Alamo Canal about a quarter mile south of the site.

what is construction of flood channel

Local Ground Water Use: WA did not locate any water-supply wells within one-half mile of the site. Although ground water in the Dublin Sub-Basin is designated as a potential drinking water supply, no ground water is currently being used for municipal supply.[2] Because the local well permitting agency requires a 50-ft deep well seal for all municipal and industrial supply wells, future ground water supply wells will likely be protected from hydrocarbons in the shallow water-bearing zone.

Hydrocarbon Distribution in Soil: Total petroleum hydrocarbons as gasoline (TPH-G) have been detected at or above 100 parts per million (ppm) with benzene concentrations above 1 ppm in soil samples between 2 and 11.5 ft depth near the western end of the former station's southern pump island and beneath the former USTs. Subsequently, most of the hydrocarbon-bearing soil near the southern pump island, the largest area of hydrocarbon-bearing soil, was excavated and disposed offsite. Soil from 10 ft depth in the borings for wells MW-2 and MW-3 also contained more than 100 ppm TPH-G. The hydrocarbon concentrations in soil between 7 and 14 ft depth may be the result of smearing due to the fluctuating water table. Much of the impacted soil in the source areas and the smear zone was likely remediated by the site's soil vapor extraction (SVE) system, which operated for over four years.

~1,300cy

15000 ppb HCs removed? How many cubic yards?

Hydrocarbon Distribution in Ground Water: Ground water from wells EA-1, MW-1, MW-2, MW-3 has consistently contained over 1,000 parts per billion (ppb) TPH-G and 100 ppb benzene, although hydrocarbon concentrations in ground water from wells MW-1, MW-2 and MW-3 have declined significantly since 1994. Hydrocarbon concentrations in ground water from wells EA-2, EA-3, MW-4 and MW-5 are generally below laboratory method detection limits. Therefore, these wells adequately delineate the northern and eastern extent of dissolved hydrocarbons. Hydrocarbons were not detected in ground water from well EA-1, located near the former Chevron and current Beacon southern pump island until after Chevron left the property and excavated over 1,300 cubic yards from the area. It appears that hydrocarbons detected in ground water from EA-1 are from a release following Chevron's departure from the property. Since June 1995, up to 850 and 100,000 ppb methyl tertiary-butyl ether (MTBE) has been detected in samples from wells MW-2 and MW-3, respectively.

Low Risk Ground Water Criteria

After reviewing the site's environmental history, WA evaluated the site using the classification criteria for low risk ground water cases as specified in the "Interim Guidance on

[2] Personal communication, Telephone conversation between Wyman Hong, Alameda County Flood Control and Water Conservation Department, Zone 7 Water Agency and Tom Fojut, Weiss Associates, October 21, 1996.

Required Cleanup at Low Risk Fuel Sites." Each of the six criteria for low risk ground water cases is discussed below:

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

The Chevron station closed in 1989, and the station's underground storage tanks were removed, product lines and fuel dispensers were removed and disposed offsite. Therefore, the former Chevron USTs and dispensers have not been a source of hydrocarbons to the subsurface since 1989. Chevron has actively remediated hydrocarbons in the site's former source area since the Chevron station closed. As a result of the remediation, it appears that hydrocarbons released into the vadose zone during Chevron's occupancy of the property have been sufficiently remediated because:

- No separate-phase hydrocarbons exist or have ever been measured at the site.
- After the 1989 tank removals, Chevron over-excavated over 1,300 cubic yards of hydrocarbon-bearing soil west of former southern pump island. Based on an average concentration of 79 ppm TPH-G in soil, about 260 pounds of hydrocarbons were removed.
- Chevron commenced operation of a soil vapor extraction system during March 1992. From March 1992 until April 1996 over 15,000 pounds of hydrocarbons were removed and hydrocarbon removal rates have decreased from about 40 pounds per day in December 1992 to less than 5 pounds per day since April 1995[3].
- Benzene concentrations in ground water from monitoring wells MW-1, MW-2 and MW-3 have decreased by one order of magnitude over the past two years[4], evidence that the extent of dissolved hydrocarbons is shrinking due to Chevron's source removal efforts.

2) The site has been adequately characterized.

Clean ground water monitoring wells MW-4, MW-5, EA-3 and EA-2 delineate that detectable dissolved hydrocarbons have not migrated beyond these wells north and east of the site. Well MW-2, located at the site's western property boundary, characterizes the western side of the hydrocarbon plume to the most practical extent due to the flood control channel that parallels the other side of the property line. The southern extent of the dissolved hydrocarbon plume is currently undefined.

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[3] Geraghty and Miller, Inc. Table 1 - Pounds Extracted as VOC's Based on Temperature Chart Recorder Data.

[4] Blaine Tech Services, Inc., 2nd Quarter 1996 Monitoring at Chevron 9-2582.

Prior to the installation of monitoring wells MW-4 and MW-5 in February, 1996, ground water elevation measurements indicated the plume gradient direction was towards the west and northwest and relatively flat. Inclusion of ground water elevation data from monitoring wells MW-4 and MW-5 indicates that the plume gradient direction is towards the southeast with a gradient of approximately 0.02 feet/foot upgradient of the site and approximately 0.007 feet/foot on the site. The southeast ground water flow direction is consistent with the regional ground water flow direction reported by the Zone 7 Water Agency.

Although no monitoring points exist south of the source area near well EA-1, it appears the hydrocarbons now present in EA-1 are the result of activities on the property after Chevron's occupancy. The elevated levels of MTBE detected in ground water from well MW-3, appear to be localized because no, or only low, concentrations of MTBE have been detected in surrounding wells MW-1, EA-1, EA-3 and MW-4. The MTBE concentration in well MW-3 (up to 100,000 ug/L) appears to be from a different release than the Chevron release from near the southern pump island because only 79 ug/L MTBE has been detected in well EA-1. The presence of MTBE in any well at this site indicates that a release has occurred since Chevron operated its service station at this site, because **Chevron's fuels did not contain MTBE before 1992** and Chevron discontinued dispensing fuel at this site in 1989. Did the station buy gasoline from any other refineries besides Chevron?

3) The dissolved hydrocarbon plume is not migrating.

The extent of impacted ground water appears to be limited to beneath the western portion of the property and centered around well EA-1. However, the extent that hydrocarbons may have migrated to the south, southeast of well EA-1 is undefined. Wells MW-5, MW-4, EA-3 and EA-2 are clean wells and delineate the northern and eastern extent of hydrocarbons in ground water. Hydrocarbon concentrations in wells MW-1 and MW-2 have decreased during the past two years, suggesting that the hydrocarbon plume is attenuating.

4) No water wells, deeper drinking water aquifers, surface water, or other sensitive receptors are likely to be impacted.

According to the Zone 7 Water Agency, no water supply wells occur within one-half mile of the site. Due to the low permeability clayey soils at this site, hydrocarbon migration much beyond the site boundary is unlikely. The ~~clayey soil~~ and the fact that no deeper water supply wells have been identified in the site vicinity **make downward migration to deeper aquifers unlikely**. Potential preferential migration pathways, such as utility trenches, were investigated, but ~~none were identified~~. The **only identified potentially sensitive receptor is the adjacent Martin Canyon Creek flood control** canal, located along the eastern property line, near well MW-2. The canal is located southwest and cross gradient to the dominant ground water flow direction and the suspected source areas. The dissolved hydrocarbon concentrations observed in well MW-2, suggest that **if hydrocarbons have migrated to the flood control canal, the concentrations should be less than** the dissolved concentrations reported in well MW-2.

~18ppb benzene (Sep 1996)
~3,100ppb MTBE

not necessarily since [EA-1] + [MW-2] are comparable for benzene

5) The site presents no significant risk to human health.

WA compared current site usage and maximum detected hydrocarbon concentrations in soil and ground water to commercial/industrial risk-based screening levels (RBSLs) following ASTM methodology, assuming a carcinogenic risk of 1 in 100,000 and a chronic hazard quotient of 1.0, and using California's cancer-slope factor of 0.1 mg/kg-day.[5] The site data and RBSLs are shown on Table 1. Since the collection of these soil data Chevron operated a soil vapor extraction system for four years so current soil concentrations are likely to be lower. The RBSL values assume higher permeability soil with lower water content than occurs at this site so they may be overly conservative. Given the current site usage and the configuration of the service station, residual hydrocarbons beneath the site are not likely to pose a potential health risk. What is risk to canal - actual proof? ecological risk?

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

Indigenous organisms that may be sensitive to petroleum hydrocarbons are unlikely to inhabit the site due to lack of habitat and the disruption caused by the normal service station operations. The only potential sensitive environmental receptor identified is the adjacent Martin Canyon Creek flood control canal.

Conclusions and Recommended Future Action

Data collected at the subject site, and the low risk ground water case evaluation presented above indicate that:

- The tanks, dispensers and piping which were the sources of the hydrocarbons released by Chevron's past operations have been removed, no free product has been observed at the site and Chevron has removed approximately 15,260 pounds of residual hydrocarbons by excavation and SVE. Hydrocarbons were not detected in ground water from well EA-1, located near the former Chevron and current Beacon southern pump island until after Chevron left the property and removed over 1,300 cubic yards of soil from the area. Since Chevron's fuel release had to happen at least eight years ago, before Beacon began its service station operations in 1990, ground water hydrocarbon concentrations should be decreasing if no new releases have occurred. However, hydrocarbons were never detected in well EA-1 until Beacon began operation of its service station at the site, suggesting that hydrocarbons detected in ground water from EA-1 are from a release which occurred after Beacon began service station operations at the site. The presence of MTBE in wells EA-1, EA-3, MW-1, MW-2, and MW-3 indicates that a release has occurred after Chevron operated its service station at this site, because Chevron's fuels did not contain MTBE before 1992 and Chevron discontinued dispensing fuel at this site in 1989.

[5] American Society for Testing and Materials, Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites, E 1739-95, 50 pages.

- The site has been adequately characterized with the exception of the distribution of hydrocarbons dissolved in ground water along the southern property line.
- Hydrocarbon concentrations in ground water from monitoring wells MW-1, MW-2 and MW-3 have decreased significantly over the past two years, correlating with Chevron's source removal efforts.
- Based on comparison of site conditions, identified open exposure pathways and comparison to the ASTM RBSLs, the site is unlikely to pose a potential health risk.

The above conclusions are based on current site usage and evaluation of the available data and represent Weiss Associate's interpretation of these data.

Based on the above conclusions we recommend:

- Discontinue the operation of the soil vapor extraction system. This recommendation is based on the fact that SVE system hydrocarbon removal rates have decreased from about 40 pounds per day in 1992 to less than 5 pounds per day since April 1995 and because the objective for operating the system is to remove hydrocarbons released due to Chevron's former operations at this site, not releases that have occurred since.
- That Chevron be granted case closure for the hydrocarbons released during Chevron's tenure at the site. This would conclude Chevron's activities related to the hydrocarbons released during the operation of their service station at the site.

However, to classify the site as a "low risk fuel site" we recommend that the responsible party:

- Install a monitoring well along the southern property line near the southwestern corner of the station building to better define the down gradient extent of the dissolved hydrocarbon plume.
- Continue ground water monitoring as summarized in the following table to evaluate the apparent increasing dissolved concentrations in well EA-1 and to confirm that dissolved concentrations in MW-2 are continuing to decrease.

Proposed Monitoring and Sampling Schedule. Former Chevron Service Station #9-2582

Well ID	1997				1998			
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
EA-1	G&S		G&S		G&S		G&S	
EA-2	G&S				G&S			
EA-3	G&S		G&S		G&S		G&S	
MW-1	G&S		G&S		G&S		G&S	
MW-2	G&S		G&S		G&S		G&S	
MW-3	G&S		G&S		G&S		G&S	
MW-4	G		G		G		G	
MW-5	G		G		G		G	

G&S = Measure depth to water in well (Gauge well) and sample well for TPH-G, BTEX and MTBE.
G = Gauge well.

- Re-evaluating potential health risks if ground water monitoring shows that dissolved benzene concentrations have increased to more than the 53.4 mg/l RBSL for benzene volatilization from ground water to outdoor air, if site usage or subsurface hydrocarbon distribution changes and if another release occurs.

We appreciate the attention you have given to this case. Please don't hesitate to call either Brett Hunter of Chevron at 842-8695 or Mike Cooke at 450-6150 if you have questions or additional requirements.

Sincerely,
Weiss Associates

Michael Cooke
Project Geologist

Jerry McHugh, P.E.
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER
JERRY McHUGH
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STATE OF CALIFORNIA

Enclosures: 1 Figure
1 Table

cc: Brett Hunter - Chevron Products Company
Janet Clinton (for Parkway Three), 2425 Webb Avenue, Suite 200, Alameda, CA 94501
Rich Hiett, San Francisco Bay RWQCB, Oakland, CA 94612

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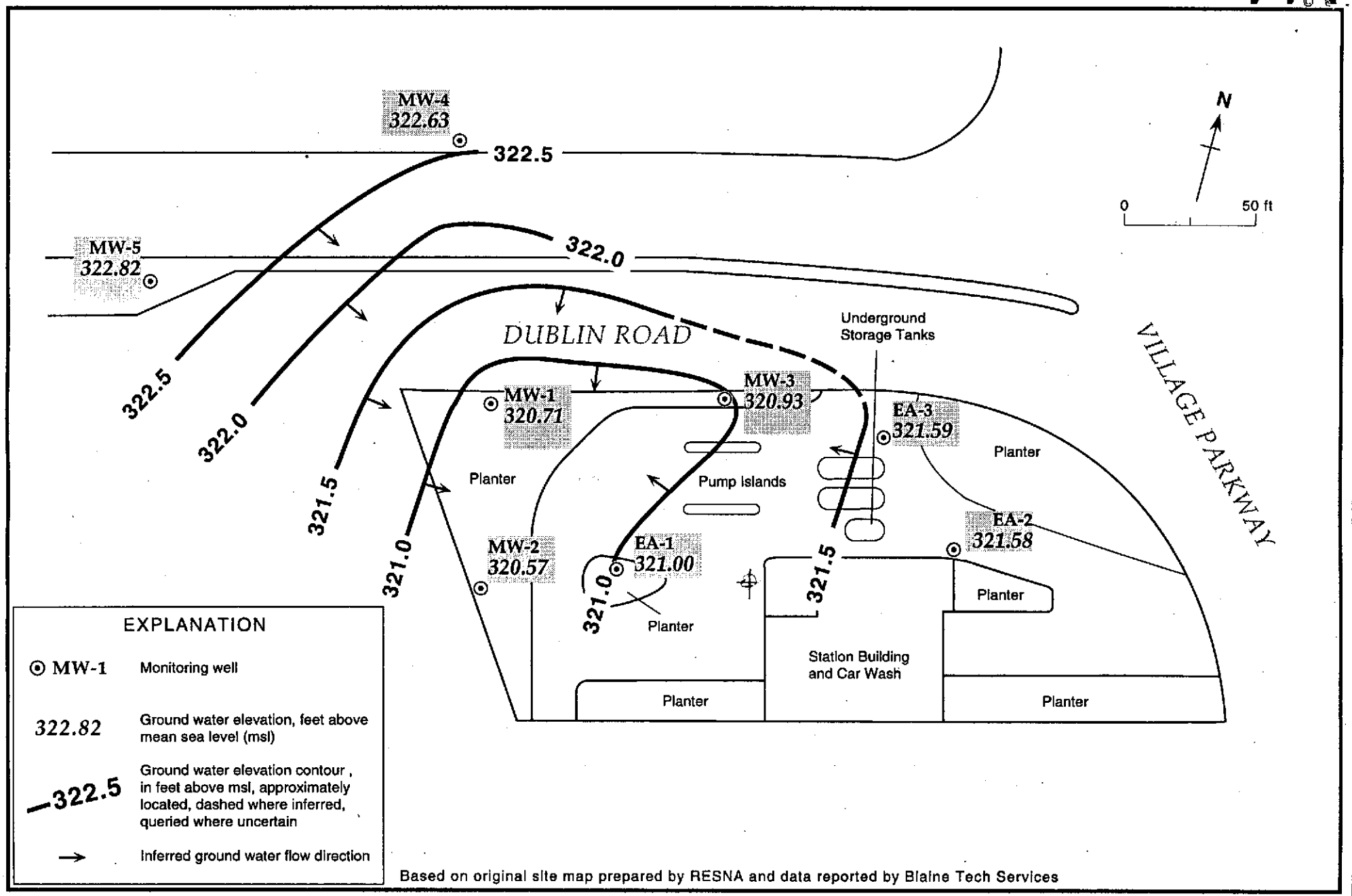

Figure 1. Ground Water Elevation Contour Map - June 27, 1996 - Former Chevron Service Station # 9-2582 - 7240 Dublin Blvd., Dublin, California

Table 1. **Commercial/Industrial Receptors** - Comparison of Site Characterization Data to Tier 1 Risk-Based Screening Levels - Former Chevron Service Station #9-2582, 7240 Dublin Boulevard, Dublin, California

Source Medium	Exposure Pathway	Potentially Complete Pathway?	Benzene		Ethylbenzene		Toluene		Xylenes	
			Maximum Detected Concentration[a]	RBSL[b]	Maximum Detected Concentration[a]	RBSL[c]	Maximum Detected Concentration[a]	RBSL[c]	Maximum Detected Concentration[a]	RBSL[c]
Soil (mg/kg)	Volatilization to Outdoor Air	No[d]	20	1.33	32	RES	70	RES	190	RES
	Vapor Intrusion to Buildings	No[e]	20	0.032	32	1,100	70	54.5	190	RES
	Surficial Soil (0-3 ft depth): Ingestion/Dermal/Inhalation	Yes	2.4	29.0	7.4	11,500	5.1	18,700	15	208,000
	Leachate to Ground Water for Ingestion	No	20	0.17	32	1,610	70	361	190	RES
Ground Water (mg/l)	Volatilization to Outdoor Air	Yes	0.76	53.4	0.37	>S	0.62	>S	1.6	>S
	Vapor Intrusion to Buildings	No[f]	0.76	0.21	0.37	>S	0.62	85	1.6	>S
	Ingestion	No	0.76	0.029	0.37	10.2	0.62	20.4	1.6	>S

Notes:

RBSL = ASTM RBCA Tier 1 Risk-Based Screening Level
RES = Selected risk level is not exceeded for pure compound present at any concentration in soil.
>S = At pure compound solubility (mg/l), selected risk level is not exceeded.
a = Maximum concentrations in soil were detected in a sample PS-14-10 collected on May 11, 1989 from 10 ft depth in the soil boring PS-14. Maximum surficial soil concentrations were detected in samples PS-9-2 and PS-20-2.5 collected on March 18, 1989 and May 5, 1989, receptively. Maximum concentrations in ground water during the most recent four quarters of ground water sampling (3rd quarter 1995 - 2nd quarter 1996) were detected in samples collected on December 28, 1995 from well MW-3.
b = The RBSLs used for benzene are based on a carcinogenic risk of 1 in 100,000 (10^{-5}) and California's standard cancer slope factor of 0.1 mg/kg-day.
c = The RBSLs used for non-carcinogenic compounds are based on a chronic hazard quotient of 1.0.
d = Based on the fact that the site is predominately covered with asphalt and concrete and where hydrocarbons have been defined in soil.
e = Based on current site usage (October 1996) and location of buildings with respect to where hydrocarbons have been defined in soil.
f = Based on current site usage (October 1996) and location of buildings with respect to where hydrocarbons dissolved in ground water have been defined.