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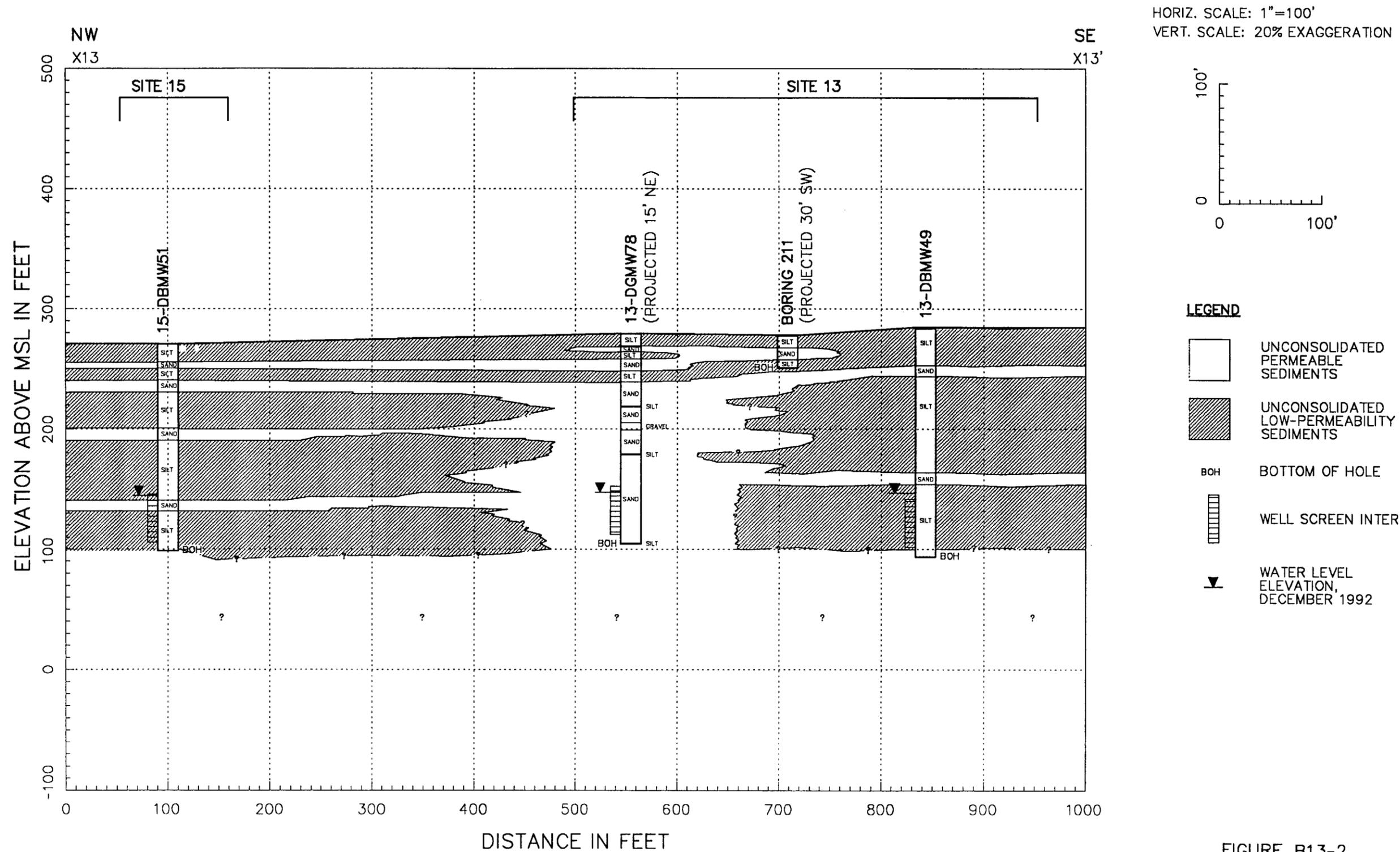


FIGURE B13-2
 SITE 13 (OU-3)
 GEOLOGIC CROSS SECTION X13-X13'
 MCAS EL TORO PHASE I RI
 TECHNICAL MEMORANDUM

PAGE NUMBER B13-6

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B13.3.2 Surface and Near-Surface Soils

Three shallow soil borings were drilled in Stratum 2 (13_GN1, 13_GN2, and 13_GN3); three shallow borings were drilled in Stratum 1 (13_SA1, 13_SA2, and 13_SA3); one shallow boring (13_UGS) was drilled near the upgradient well; one surface sample was collected near the 25-foot boring (13_25B211S); and one surface sample was collected near the deep boring converted to a monitoring well (13_DBMW49S).

B13.3.3 Vadose Zone Soils (Soil Borings)

Nine soil samples were collected for laboratory analysis in the deep boring converted to a monitoring well (13_DBMW49). Three samples were collected in downgradient well 13_DGMW78, and two from upgradient well 13_UGMW32. Five samples and one duplicate were collected from the 25-foot boring (13_25B211).

B13.3.4 Groundwater Monitoring Wells

Three groundwater wells were installed at the site. Each was sampled in the fall of 1992 for water quality testing of groundwater. A 4-hour pumping test was conducted at the downgradient well, and a slug test was conducted at 13_UGMW32.

Boring locations within each stratum were randomized, as described in the *SAP* (Subsection 6.4.2). At the time the *SAP* was prepared, the groundwater flow direction was believed to be to the west. However, groundwater measurements taken during the RI field investigation indicated that groundwater actually flows to the northwest. Therefore, 13_UGMW32, is not directly upgradient of Site 13 because it was installed before the regional gradient had been verified.

Surface soils and lithologic samples from the borings were tested for organic vapors using an HNu photo-ionization detector (PID) or a flame ionization detector/organic vapor analyzer (FID/OVA). The field headspace values are in Attachment 1 to Appendix B.

B13.4 Surface Water and Sediments

(Surface water and sediment samples were not collected at this site.)

B13.5 Surface and Near-Surface Soils

B13.5.1 Description of Surface and Near-Surface Soil Samples

The surface soils at Site 13 are Sorrento loam series, characterized by 0 to 2 percent slopes typical of alluvial fans and flood plains (Wachtell, 1978). The permeability for this series ranges from 0.6 to 2.0 inches per hour. The moisture holding capacity of the near surface is from 0.16 to 0.21 inches per inch. This soil is classified as Hydrologic Group B, which has a moderate water infiltration rate when saturated.

B13.5.2 Analytical Results

Surface and near-surface soils (0 to 4 feet bgs) were sampled by stratum. In addition, one upgradient surface soil sample was collected. A summary of detected chemicals is in Table B13-2.

B13.5.2.1 Upgradient Area

Two samples from upgradient of Site 13 were analyzed for TFH, TRPH, and metals. The samples were taken from 0 and 2 feet bgs near the upgradient monitoring well location (13_UGS).

Total hydrocarbons (TFH) were not detected in either of the upgradient samples. TRPH was detected in the surface sample at 936 mg/kg; however, TRPH was below the detection limit (20 mg/kg) in the 2-foot sample. This sampling location is paved with 3 to 4 inches of asphalt. The field notes indicate that some pieces of asphalt may have been incorporated in the surface soil sample (S1454218).

The shallow samples at Well 13_UGMW32 do not contain high levels of TRPH, TFH, or metals.

The metals concentrations are presented in Table B13-2.

The soil vapor headspace values for the samples were less than 1 ppmv or not detected.

B13.5.2.2 Stratum 1: Southeast of the Tank Farm

Eight shallow soil samples were analyzed from Stratum 1 for VOCs, SVOCs, TRPH, TFH, and metals.

Acetone was the only VOC detected in the samples from Stratum 1, at concentrations of 12, 16, and 34 $\mu\text{g}/\text{kg}$; it was also identified in other samples below the CRDL. Acetone is a demonstrated laboratory contaminant; the maximum detected concentration in the trip blanks is 37 $\mu\text{g}/\text{L}$. Toluene was identified in some Stratum 1 samples at concentrations below the CRDL.

No SVOCs were detected in the soil samples. Miscellaneous SVOCs (i.e., benzo(b)fluoranthene, benzo(k)fluoranthene, bis(2-ethylhexyl)phthalate), chrysene, fluoranthene, phenanthrene, and pyrene) were identified at levels below the CRDL.

TRPH was not detected at elevated levels in any of the samples. When detected, the concentration ranged from 22 to 457 mg/kg. TFH-gasoline concentrations were below 1 mg/kg in all samples; TFH-diesel was below 100 mg/kg.

Metals concentrations are presented in Table B13-2.

Headspace values were mainly nondetects, although up to 3 ppmv was measured at 2 feet at 13_SA3. The values do not appear to correlate with analytical results for soil samples.

TRPH levels in Stratum 1 are below 1,000 mg/kg. However, these samples are located at the periphery of the stain.

B13.5.3.3 Stratum 2: Between Tank Farm and Building 242

Seven samples and two field duplicates were analyzed, for VOCs, SVOCs, TRPH, TFH, and metals.

Acetone was the only VOC detected; it was detected in three samples, ranging from 10 to 43 $\mu\text{g}/\text{kg}$, although a duplicate of the sample with 43 $\mu\text{g}/\text{kg}$ showed a nondetect. Acetone is a demonstrated laboratory contaminant; the maximum detected concentration in the trip blanks is 37 $\mu\text{g}/\text{L}$. Toluene was identified in some samples at concentrations below the CRDL.

No SVOCs were detected in the samples. Miscellaneous SVOCs (i.e., benzylbutylphthalate, benzo(g,h,i)perylene, and benzo(b)fluoranthene) were identified at levels below the CRDL.

Elevated levels of TRPH were not detected in any of the samples. TRPH was detected in three of the samples, ranging from 33 to 328 mg/kg. TFH-gasoline concentrations for the samples are all below 1 mg/kg. TFH-diesel was not detected in any of the samples.

Metals concentrations are presented in Table B13-2.

The only organic vapors detected in soil headspace were at 13_GN2, with up to 3.4 ppmv at 2 and 4 feet. In general, there appears to be no correlation between soil vapor headspace and analytical results.

None of the compounds identified in Stratum 2 appears to be a concern at the levels detected.

B13.6 Vadose Zone Soils

B13.6.1 Description of Subsurface Soil Samples

Sampling stations in the vadose zone include soil samples collected during installation of the monitoring wells, and samples from the 25-foot boring.

B13.6.2 Subsurface Geology

Site 13 overlies approximately 575 feet of unconsolidated Quaternary sediments, which in turn overlie the semiconsolidated bedrock of the Irvine Area Groundwater Basin (Figure 3-2). From youngest to oldest, the Quaternary sediments are differentiated into Holocene alluvial and colluvial deposits, primarily coarse stream channels within a matrix of finer overbank deposits, and Pleistocene beach-lagoonal and near-shore deposits (SAP, 1991).

Lithologies encountered during drilling at Site 13 were mainly silt with trace-to-minor amounts of sand and fine gravel, and, in one well (13_DGMW78) mainly sand containing varying minor amounts of clay, silt, and gravel. (See the soil boring logs in Appendix K for more detailed lithologic descriptions.) These lithologies suggest that a buried channel may be located at or near 13_DGMW78, as shown in cross sections S13-S13' and S13A-S13A' (Figure B13-2). The cross sections show a predominantly fine-grained, low-permeability matrix containing a buried channel and a few continuous sand lenses. The trend of the possible buried channel is not known because it was indicated at only one well; however, it could be the former location of Bee Canyon Wash or a tributary to it. Bee Canyon Wash now is in an aqueduct about 950 feet southeast of 13_DGMW78 (Figure 1-2, Section 1).

B13.6.3 Analytical Results

In general, vadose zone soils were analyzed for VOCs, SVOCs, TRPH, TFH, and metals. Soils from the deep boring were also analyzed for pesticides. A summary of detected chemicals in the vadose zone soils is in Table B13-3.

Volatile Organic Compounds (VOCs). Acetone was the only VOC detected in vadose zone samples. It was detected at 13 $\mu\text{g}/\text{kg}$ in the 135-foot sample from 13_DGMW78, and at 58 and 48 $\mu\text{g}/\text{kg}$ in the 5- and 30-foot samples from 13_UGMW32. Acetone was also detected at 120 $\mu\text{g}/\text{kg}$ in the 130-foot sample from 13_DBMW49. Acetone was also identified below the CRDL in various other samples. Acetone is a demonstrated laboratory contaminant; its maximum detected concentration in the trip blanks is 37 $\mu\text{g}/\text{L}$. Other VOCs identified below the CRDL include 2-butanone and benzene.

Semivolatile Organic Compounds (SVOCs). No SVOCs were detected in vadose zone samples at Site 13. Bis(2-ethylhexyl)phthalate was identified at levels below the CRDL in two of the samples.

Pesticides, Polychlorinated Biphenyls (PCBs), and Herbicides. Five different pesticides were detected in the 5-foot sample from the deep boring, ranging from 5.03 to 12.5 $\mu\text{g}/\text{kg}$.

Hydrocarbons (TRPH, TFH). TRPH was detected at elevated levels in only one sample (1,605 mg/kg in the 5-foot sample in 13_DBMW49). TFH-gasoline was detected at levels below 1 mg/kg in all of the samples. TFH-diesel was detected at a maximum concentration of 109 mg/kg in the 5-foot sample from 13_DBMW49.

Metals. Metals results are presented in Table B13-3.

Total Organic Carbon (TOC). TOC was detected at 13_DBMW49 (147 feet bgs) at 183 mg/kg.

B13.6.3 Soil Vapor Headspace Concentrations

Figure B13-2 shows organic vapor analysis (OVA) headspace contours (ppmv) superimposed on the geologic cross section. An area above the water table and another area near the ground surface had elevated readings. The maximum concentrations observed were 477 ppmv in the deep area and 21 ppmv in the

near-surface area. There does not appear to be a relationship between field soil headspace (organic vapor) levels and requested volatile analytes.

B13.7 Groundwater

Three monitoring wells were drilled during the investigation of Site 13. Table B13-4 summarizes the well construction, pump installation, and water quality sampling data. Detailed construction diagrams are presented for each well in Appendix E. Depth to groundwater at Site 13 is approximately 130 to 140 feet bgs.

B13.7.1 Site-Specific Hydrogeology

Water table elevations at the wells are shown on the geologic cross section (Figure B13-2). All of the wells are screened across the water table, with 40-foot screens. The hydraulic gradient at the site is about 0.008 ft/ft toward the northwest (see Figures 3-4a, b, and c).

A 4-hour pumping test was run on Well 13_DGMW78, and a slug test was conducted on Well 13_UGMW32; analysis of the test data is in Appendix F. Transmissivities for Wells 32 and 78 are estimated to be 47 and 690 ft²/day, respectively; hydraulic conductivities are 1.1 and 21.4 ft/day, respectively. These measured values are within the range of typical conductivities for silt and silty sand, respectively (Freeze and Cherry, 1979) and are also consistent with lithologies logged during drilling. The approximately twentyfold difference in hydraulic conductivity and transmissivity contributes to evidence that a buried channel may be located at or near 13_DGMW78.

Using the range of hydraulic conductivities measured, the average linear groundwater velocity is between 0.03 and 0.57 ft/day, assuming a porosity of 30 percent (Freeze and Cherry, 1979).

B13.7.2 Analytical Results

Table B13-4 contains well completion details and groundwater sampling information for the site. Groundwater samples were collected from the three wells between 28 October and 23 November 1992. These samples, collected within a time frame of one month, represent groundwater quality conditions at about the same time. A summary of chemicals detected is given in Table B13-6.

Volatile Organic Compounds (VOCs). VOCs detected in groundwater include benzene, ethylbenzene, toluene, xylene, and chloromethane. Benzene was detected in all Site 13 wells, ranging from 23 to 730 $\mu\text{g/L}$, with the highest value occurring in 13_UGMW32. Ethylbenzene was detected only in the downgradient well at 2 $\mu\text{g/L}$. Toluene was detected only in 13_UGMW32 at 2 $\mu\text{g/L}$. Xylene was detected in all three wells, ranging from 5 to 58 $\mu\text{g/L}$; as with benzene, the well with the highest concentration was 13_UGMW32. Chloromethane was detected in 13_DBMW49 at 6 $\mu\text{g/L}$.

Semivolatile Organic Compounds (SVOCs). Bis(2-ethylhexyl)phthalate was the only SVOC detected, at 26 $\mu\text{g/L}$ in groundwater from well 13_UGMW32.

Pesticides, Polychlorinated Biphenyls (PCBs), and Herbicides. No pesticides or PCBs were detected in the groundwater samples.

Hydrocarbons (TRPH, TFH). Total recoverable petroleum hydrocarbons were not found above the detection limit. The TFH-gasoline fraction, detected in groundwater from all wells, ranged from 0.068 to 1.690 mg/L; the highest level was in 13_UGMW32. TFH-diesel was found at 0.308 mg/L in 13_UGMW32 and 0.436 mg/L in the downgradient well; it was undetected in the deep boring monitor well.

Metals and Cyanide. Mercury was detected in the downgradient well sample at 0.16 mg/L; however, it was also found in the laboratory blank. No lead was detected. A discussion of those groundwater constituents (including metals) exceeding regulatory guidelines is presented below. Cyanide was not detected.

General Chemistry. The concentrations of total dissolved solids (TDS) increase across the site, from 1,540 mg/L at 13_UGMW32 to 2,910 mg/L at the downgradient well. TDS is an indicator of dissolved chemical constituents in groundwater, which also show the same trend: they all increase in concentration as the sampling locations are further downgradient. This is shown graphically in Appendix J, Piper and Stiff-type Diagrams. Alkalinity shows a different trend; it ranges from 273 to 398 mg/L, and is highest in the well 013_DBMW49.

B13.7.3 Comparison with Drinking Water Standards

Analytical results were compared with the most stringent of three drinking water guidelines: EPA maximum contaminant levels (MCLs), California MCLs, and California action levels. Compounds that exceeded the state or federal MCLs in the groundwater at Site 13 are listed in Table B13-7.

B13.8 Potential Contaminant Migration Pathways

Surface water runoff is not deemed to be a significant contaminant migration pathway because the site topography is relatively flat and there are no discrete drainage ways. The most significant pathway is migration downward through the vadose zone and into the groundwater. Although the dominant lithology is silt, which may attenuate the downward movement, deep horizontal sand lenses appear to be continuous over the site. These sand lenses would permit lateral migration in the vadose zone. Below the water table the preferential pathway is downgradient along the higher-conductivity, more sandy zones.

B13.9 Summary and Conclusions

None of the samples from Stratum 1 or Stratum 2 had elevated levels of petroleum hydrocarbons, VOCs, SVOCs, or metals. A 5-foot sample in the deep boring at the site located in Stratum 1 did have an elevated TRPH concentration of 1,605 mg/kg.

A concentration of benzene exists in the groundwater below Site 13, extending beyond the site boundaries, and may be contributing to regional groundwater contamination (Figure A1-4f). Fuel Tank Farm No. 2 may be the source of the benzene.

The groundwater contains elevated levels of aluminum, cadmium, manganese, selenium, benzene, sulfate, chloride, nitrate/nitrite-N, and TDS. Analytical results from the shallow soil strata and the vadose zone do not indicate Site 13 to be the source of these contaminants.

TCE was not detected in the groundwater samples or in any of the soil samples at the site. Site 13 does not appear to be a potential source for the regional groundwater VOC contamination (OU-1).

**Table B13-1
Site 13 (OU-3): Types of Samples and Chemical Analyses
MCAS El Toro Phase I RI Technical Memorandum**

Location/ Stratum	Station Identifi- cation	Sample Identifi- cation	Sample Depth (ft)	Groups of Analytes Requested ^a										
				VOCs	Semi- VOCs	Pesti- cides/ PCBs	Herbi- cides	TPH	TFH	Metals	CN	Genl. Chem- istry	TOC	Dioxins/ Furans
Surface Water and Sediments (Not sampled)														
Surface and Near-Surface Soils														
Upgradient	13_UGS	S1454218	0					X	X	X				
		S1454219	2					X	X	X				
	13_DBMW49S	S1454236	0	X	X			X	X	X				
	13_25B211S	S1454220	0	X	X			X	X	X				
Stratum 2	13_GN1	S1454227	0	X	X			X	X	X				
		S1454228	2	X	X			X	X	X				
Stratum 2	13_GN2	S1454230	0	X	X			X	X	X				
		S1454231	2	X	X			X	X	X				
		S1454494 ^b	2	X	X			X	X	X				
		S1454232	4	X	X			X	X	X				
Stratum 2	13_GN3	S1454233	0	X	X			X	X	X				
		S1454234	2	X	X			X	X	X				
		S1454495 ^b	2	X	X			X	X	X				
Stratum 1	13_SA1	S1454221	0	X	X			X	X	X				
		S1454222	2	X	X			X	X	X				
Stratum 1	13_SA2	S1454224	0	X	X			X	X	X				
		S1454225	2	X	X			X	X	X				
		S1454226	4	X	X			X	X	X				
Stratum 1	13_SA3	S1454156	0	X	X			X	X	X				
		S1454157	2	X	X			X	X	X				
		S1454158	4	X	X			X	X	X				
Vadose Zone Soils														
	13_UGMW32	S1456210	5	X	X	X ^c		X	X	X				
		S1456204	30	X								X		
	13_DBMW49	S1456201	5	X	X	X ^c		X	X	X				
		S1456202	10	X	X	X ^c		X	X	X				
		S1456217	16	X	X	X ^c		X	X	X				
		S1456216	20	X	X	X ^c		X	X	X				
		S1456215	25	X	X	X ^c		X	X	X				
		S1456208	30	X	X	X ^c		X	X	X				
		S1456214	80	X	X	X ^c		X	X	X				
		S1456207	130	X	X	X ^c		X	X	X				
		S1456203	147								X		X	
	13_DGMW78	S1456675	120	X	X			X	X	X				
		S1456677 ^b	120	X	X			X	X	X				
		S1456676	135	X								X		
	13_25B211	S1456206	5	X	X			X	X	X				
		S1456205	10	X	X			X	X	X				
		S1456312 ^b	10	X	X			X	X	X				
		S1456213	15	X	X			X	X	X				
		S1456212	20	X	X			X	X	X				
		S1456209	25	X	X			X	X	X				

**Table B13-1
Site 13 (OU-3): Types of Samples and Chemical Analyses
MCAS El Toro Phase I RI Technical Memorandum**

Location/ Stratum	Station Identifi- cation	Sample Identifi- cation	Sample Depth (ft)	Groups of Analytes Requested ^a											
				VOCs	Semi- VOCs	Pesti- cides/ PCBs	Herbi- cides	TPH	TFH	Metals	CN	Genl. Chem- istry	TOC	Dioxins/ Furans	Gross Alpha/ Beta
Groundwater															
	13_UGMW32	S1452083		X	X	X		X	X	X	X	X ^d			
	13_DBMW49	S1452078		X	X	X		X	X	X	X	X ^d			
	13_DGMW78	S1452079		X	X	X		X	X	X	X	X ^d			

^a VOCs = Volatile Organic Compounds; Semi-VOCs = Semivolatile Organic Compounds;
PCBs = Polychlorinated Biphenyls; TPH = Total Recoverable Petroleum Hydrocarbons;
TFH = Total Fuel Hydrocarbons; CN = Total Cyanide; TOC = Total Organic Carbon.

^b Duplicate

^c Pesticides and PCBs were not required by the SAP Amendment; these were analyzed before the SAP Amendment was implemented.

^d Nitrogen and inorganics

Table B13-2

Site13 (OU- 3): Summary of Detected Chemicals in Sediments and Surface/Near-Surface Soil

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	13_25B211S S1454220 (0)	DVF(a)	13_DBMW49S S1454236 (0)	DVF(a)	13_GN1 S1454227 (0)	DVF(a)	13_GN1 S1454228 (2)	DVF(a)	13_GN2 S1454230 (0)	DVF(a)	13_GN2 S1454231 (2)	DVF(a)	13_GN2 S1454494 (2)	DVF(a)	13_GN2 S1454232 (4)	DVF(a)
METALS																	
SILVER	MG/KG	0.43	U	0.43	U	0.43	U	0.48	U	0.43	U	0.48	U	0.49	U	0.49	U
ALUMINUM	MG/KG	5690		6550		6030		9130		6250		8030		17600		14500	
ARSENIC	MG/KG	2.5		2.9		2.7		2.2	U	2.9		1.7	b	2.3		3.9	
BARIUM	MG/KG	86.9		102		79.2		160		97.6		122		182		212	
BERYLLIUM	MG/KG	0.22	b	0.33	b	0.22	b	0.23	b	0.45	b	0.47	b	0.58	b	0.59	b
CALCIUM	MG/KG	2440		10600		3030		7940		4330		3780		5450		14800	
CADMIUM	MG/KG	1	b	2		0.93	b	1	b	1.3		0.76	b	1.3		1.2	
COBALT	MG/KG	1.2	U	3.6	b	3.2	b	5.7	b	2.7	b	3.5	b	6	b	7.1	b
CHROMIUM	MG/KG	8.8		14.3		7.3		9.5		9.4		8.7		15.2		13.7	
COPPER	MG/KG	6.2		13.5		5.7		7.5		8.4		6.9		10.2		9.9	
IRON	MG/KG	7840		9770		8540		12500		9080		11900		20700		19400	
MERCURY	MG/KG	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U
POTASSIUM	MG/KG	2580		2420		2510		4090		2840		4040		6130		5390	
MAGNESIUM	MG/KG	2930		3610		3310		6140		3890		4780		6300		9730	
MANGANESE	MG/KG	136		214		147		240		172		219		306		308	
SODIUM	MG/KG	172	b	394	b	219	b	306	b	275	b	217	b	292	b	632	b
NICKEL	MG/KG	3.6	b	7.9	b	3.9	b	7.2	b	6.1	b	5.7	b	10.5		8.1	b
LEAD	MG/KG	27.6		74.2		17.8		2.2		43.3		1.8		2.7		2.7	
ANTIMONY	MG/KG	2.5	U	2.5	U	2.5	U	2.8	U	2.5	U	2.7	U	2.8	U	3.7	b
SELENIUM	MG/KG	0.1	U	0.14	b	0.1	U	0.11	U	0.11	b	0.11	U	0.18	b	0.12	U
THALLIUM	MG/KG	0.14	U	0.14	U	0.16	b	0.25	b	0.14	U	0.15	b	0.28	b	0.21	b
VANADIUM	MG/KG	18.3		23.3		20.9		29.4		21.5		26.5		49		47.2	
ZINC	MG/KG	57.9		90.1		60.2		43.9		58.5		39		58.5		60	
VOLATILE ORGANIC COMPOUNDS																	
TOLUENE	UG/KG	3	J	8	J	4	J	11	U	9	J	11	U	2	J	12	U
ACETONE	UG/KG	3	J	14		10		11	U	10	U	11	U	11	U	12	U
SEMI-VOLATILE ORGANIC COMPOUNDS																	
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	670	U	780	UJ	270	J	740	U	670	U	750	U	740	U	770	U
PYRENE	UG/KG	270	J	780	UJ	670	U	740	U	670	U	750	U	740	U	770	U
BENZO(GH)PERYLENE	UG/KG	200	J	780	UJ	670	U	740	U	160	J	750	U	740	U	770	U
INDENO(1,2,3-CD)PYRENE	UG/KG	230	J	780	UJ	670	U	740	U	670	U	750	U	740	U	770	U
BENZO(B)FLUORANTHENE	UG/KG	260	J	780	UJ	670	U	740	U	670	U	750	U	740	U	770	U
FLUORANTHENE	UG/KG	330	J	780	U	670	U	740	U	670	U	750	U	740	U	770	U
BENZO(K)FLUORANTHENE	UG/KG	190	J	780	UJ	670	U	740	U	670	U	750	U	740	U	770	U
CHRYSENE	UG/KG	210	J	780	UJ	670	U	740	U	670	U	750	U	740	U	770	U
BENZO(A)PYRENE	UG/KG	210	J	780	UJ	670	U	740	U	670	U	750	U	740	U	770	U
PHENANTHRENE	UG/KG	670	U	780	U	670	U	740	U	670	U	750	U	740	U	770	U
BENZYL BUTYL PHTHALATE	UG/KG	670	U	780	UJ	670	U	160	J	670	U	750	U	740	U	770	U
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																	
TFH DIESEL	MG/KG	12.5	U	490		12.6	UJ	14.1	UJ	12.6	U	14.3	U	14	U	14.5	U
TFH GASOLINE	MG/KG	0.149		0.264		0.137		0.056	U	0.196		0.057	U	0.056	U	0.056	U
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																	
TRPH	MG/KG	54		3340		16	U	20	U	328		20	U	20	U	20	U

Table B13-2

Site13 (OU- 3): Summary of Detected Chemicals in Sediments and Surface/Near-Surface Soil

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	13_GN3 81464233 (0)	DVF(a)	13_GN3 81464234 (2)	DVF(a)	13_GN3 81464496 (2)	DVF(a)	13_SA1 81464221 (0)	DVF(a)	13_SA1 81464222 (2)	DVF(a)	13_SA2 81464224 (0)	DVF(a)	13_SA2 81464225 (2)	DVF(a)	13_SA2 81464226 (4)	DVF(a)
METALS																	
SILVER	MG/KG	0.45	b	0.47	U	0.46	U	0.43	U	0.48	U	0.43	U	0.33	U	0.33	U
ALUMINIUM	MG/KG	8910		10300		9410		8320		8910		9570		12700		15100	
ARSENIC	MG/KG	2.5		1.7	b	1.3	b	2.8		3.6		2	b	2.4	U	2.8	U
BARIUM	MG/KG	111		155		149		105		119		115		174		163	
BERYLLIUM	MG/KG	0.23	b	0.19	b	0.19	b	0.2	b	0.23	b	0.28	b	0.51	b	0.56	b
CALCIUM	MG/KG	5190		5470		5060		5560		6570		6970		5120		6290	
CADMIUM	MG/KG	1.5		0.9	b	0.74	b	0.78	b	1.4		1		0.62	U	0.61	U
COBALT	MG/KG	4.4	b	5.9	b	4	b	4.4	b	5.2	b	4.3	b	7.8	b	8.3	b
CHROMIUM	MG/KG	10.6		9.9		9.3		9.4		12.1		10.3		12.8		13.7	
COPPER	MG/KG	9.3	U	7.6	U	7.2	U	7.8		9.9		8.6	U	7.8		8.6	
IRON	MG/KG	11600		13800		12900		12000		12900		13000		18900		18600	
MERCURY	MG/KG	0.03	U	0.55		0.14											
POTASSIUM	MG/KG	3040		4260		3990		3180		3400		3720		5890		5320	
MAGNESIUM	MG/KG	4590		6120		5620		4540		5090		5360		7100		8290	
MANGANESE	MG/KG	186		222		216		203		234		211		298		302	
SODIUM	MG/KG	303	b	269	b	326	b	207	b	315	b	363	b	354	U	386	U
NICKEL	MG/KG	6.6	b	6.4	b	7.6	b	5.3	b	8.1	b	7	b	8	b	6.7	U
LEAD	MG/KG	34.2		2.4		2.4		6		32.7		13.5		3.6		3.2	
ANTIMONY	MG/KG	2.5	U	2.7	U	2.7	U	2.5	U	2.8	U	2.5	U	2.8	U	2.7	U
SELENIUM	MG/KG	0.1	U	0.11	U	0.11	U	0.1	U	0.11	U	0.1	U	4.7	U	4.8	U
THALLIUM	MG/KG	0.14	U	0.29	b	0.15	b	0.14	U	0.23	b	0.14	b	0.36	U	0.35	U
VANADIUM	MG/KG	28.2		32.1		30.4		27.3		30.8		31.4		41.1		45.5	
ZINC	MG/KG	65.1		43.5		41.6		43.9		64		53		58.3		57.8	
VOLATILE ORGANIC COMPOUNDS																	
TOLUENE	UG/KG	5	J	11	U	4	J	8	J	3	J	8	J	6	J	11	U
ACETONE	UG/KG	23		43		12	U	16		11	U	34		5	J	8	J
SEMI-VOLATILE ORGANIC COMPOUNDS																	
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	670	U	720	UJ	770	U	670	U	750	U	20000	U	760	U	740	U
PYRENE	UG/KG	670	U	720	UJ	770	U	670	U	750	U	20000	U	760	U	740	U
BENZO(GH)PERYLENE	UG/KG	670	U	720	UJ	770	U	670	U	750	U	20000	U	760	U	740	U
INDENO(1,2,3-CD)PYRENE	UG/KG	670	U	720	UJ	770	U	670	U	750	U	20000	U	760	U	740	U
BENZO(B)FLUORANTHENE	UG/KG	140	J	720	UJ	770	U	670	U	750	U	20000	U	760	U	740	U
FLUORANTHENE	UG/KG	670	U	720	UJ	770	U	670	U	750	U	20000	U	760	U	740	U
BENZO(Q)FLUORANTHENE	UG/KG	670	U	720	UJ	770	U	670	U	750	U	20000	U	760	U	740	U
CHRYSENE	UG/KG	670	U	720	UJ	770	U	670	U	750	U	20000	U	760	U	740	U
BENZO(A)PYRENE	UG/KG	670	U	720	UJ	770	U	670	U	750	U	20000	U	760	U	740	U
PHENANTHRENE	UG/KG	670	U	720	UJ	770	U	670	U	750	U	20000	U	760	U	740	U
BENZYL BUTYL PHTHALATE	UG/KG	670	U	720	UJ	770	U	670	U	750	U	20000	U	760	U	740	U
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																	
TFH DIESEL	MG/KG	12.7	U	13.4	U	14.4	U	12.8	UJ	52.1	J	12.8	U	14.2	U	14	U
TFH GASOLINE	MG/KG	0.056		0.054	U	0.059	U	0.13		0.319		0.09		0.057	U	0.056	U
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																	
TRPH	MG/KG	160		20	U	33		22		197		147		20	U	20	U

Table B13-2

Site13 (OU- 3): Summary of Detected Chemicals in Sediments and Surface/Near-Surface Soil

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STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT,BGS) ANALYTE BY GROUP	UNITS	13_SA3 S1454156 (0)	DVF(a)	13_SA3 S1454157 (2)	DVF(a)	13_SA3 S1454158 (4)	DVF(a)	13_UGS S1454218 (0)	DVF(a)	13_UGS S1454219 (2)	DVF(a)								
METALS																			
SILVER	MG/KG	0.43	U	0.46	b	0.63	b	0.44	U	0.47	U								
ALUMINUM	MG/KG	6110		8970		16700		11300		11400									
ARSENIC	MG/KG	3.5		276	U	3.4		3.1		1.8	b								
BARIUM	MG/KG	100		110		177		62.6		160									
BERYLLIUM	MG/KG	0.18	b	0.35	b	0.63	b	0.22	b	0.47	b								
CALCIUM	MG/KG	6510		3230		7520		3460		9540									
CADMIUM	MG/KG	1.3		0.61	U	0.65	U	1	b	1.1	b								
COBALT	MG/KG	3.8	b	5.5	b	9	b	9	b	6.5	b								
CHROMIUM	MG/KG	9		9		15.8		18.3		10.7									
COPPER	MG/KG	10.2	U	7.5		10.3		14.8		8.7									
IRON	MG/KG	9490		12300		19900		18900		14100									
MERCURY	MG/KG	0.03	U	0.22		0.25	J	0.03	U	0.03	U								
POTASSIUM	MG/KG	2710		4020		5400		4820		4370									
MAGNESIUM	MG/KG	3850		4610		9120		7280		6960									
MANGANESE	MG/KG	162		219		323		250		253									
SODIUM	MG/KG	351	b	276	U	368	U	398	b	302	b								
NICKEL	MG/KG	5	b	5.3	b	10.5		11.5		8.4	b								
LEAD	MG/KG	250		2.6		4.4		9.7		1.9									
ANTIMONY	MG/KG	2.5	U	2.7	U	2.9	U	2.6	U	2.7	U								
SELENIUM	MG/KG	0.15	b	4.6	U	4.9	U	0.11	U	0.11	U								
THALLIUM	MG/KG	0.14	U	0.35	U	0.37	U	0.25	b	0.25	b								
VANADIUM	MG/KG	22.7		30.2		50.7		41.5		34									
ZINC	MG/KG	56.7		39.9		63.4		42.9		49.4									
VOLATILE ORGANIC COMPOUNDS																			
TOLUENE	UG/KG	6	J	3	J	5	J	-		-									
ACETONE	UG/KG	12		5	J	6	J	-		-									
SEMI-VOLATILE ORGANIC COMPOUNDS																			
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	150	J	730	U	780	U	-		-									
PYRENE	UG/KG	170	J	730	U	780	U	-		-									
BENZO(GH)PERYLENE	UG/KG	670	U	730	U	780	U	-		-									
INDENO(1,2,3-CD)PYRENE	UG/KG	670	U	730	U	780	U	-		-									
BENZO(B)FLUORANTHENE	UG/KG	210	J	730	U	780	U	-		-									
FLUORANTHENE	UG/KG	300	J	730	U	780	U	-		-									
BENZO(K)FLUORANTHENE	UG/KG	180	J	730	U	780	U	-		-									
CHRYSENE	UG/KG	170	J	730	U	780	U	-		-									
BENZO(A)PYRENE	UG/KG	670	U	730	U	780	U	-		-									
PHENANTHRENE	UG/KG	200	J	730	U	780	U	-		-									
BENZYL BUTYL PHTHALATE	UG/KG	670	U	730	U	780	U	-		-									
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																			
TFH DIESEL	MG/KG	35.4		13.8	U	14.6	U	13	U	13.9	U								
TFH GASOLINE	MG/KG	0.068		0.056	U	0.059	U	0.052	U	0.056	U								
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																			
TRPH	MG/KG	457		20	U	20	U	936		20	U								

(a) A definition of each data validation flag (DVF) is provided in Table B-1.

Table B13-3

Site13 (OU- 3): Summary of Detected Chemicals in the Vadose Zone (Subsurface) Samples

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STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	13_25B211 S1456208 (5)	DVF(a)	13_25B211 S1456208 (10)	DVF(a)	13_25B211 S1456213 (15)	DVF(a)	13_25B211 S1456212 (20)	DVF(a)	13_25B211 S1456209 (25)	DVF(a)	13_DBMW49 S1456201 (5)	DVF(a)	13_DBMW49 S1456202 (10)	DVF(a)	13_DBMW49 S1456217 (15)	DVF(a)
GENERAL CHEMISTRY																	
TOTAL ORGANIC CARBON	MG/KG	-		-		-		-		-		-		-		-	
METALS																	
SILVER	MG/KG	0.61	J	0.43	UJ	0.53	J	0.89	J	0.91	J	0.33	U	0.32	U	0.31	U
ALUMINIUM	MG/KG	19700	J	2420	J	11900	J	19600	J	13800	J	8450	J	8700	J	5400	J
ARSENIC	MG/KG	3.3	J	0.92	J	3.1	J	3.8	J	3	J	2.4		2.2	b	2.1	b
BARIUM	MG/KG	248	J	81.8	J	194	J	271	J	173	J	125		154		128	
BERYLLIUM	MG/KG	0.95	J	0.21	UJ	0.69	J	0.81	J	0.69	J	0.19	U	0.25	b	0.18	U
CALCIUM	MG/KG	10800	J	4540	J	5730	J	15300	J	11200	J	9860		11200		3030	
CADMIUM	MG/KG	1.8	J	0.29	J	1.2	J	1.9	J	1.4	J	1	b	1	b	0.84	b
COBALT	MG/KG	8.7	J	1.7	J	5.4	J	9.3	J	7	J	5	b	5.3	b	3.2	b
CHROMIUM	MG/KG	19	J	3.3	J	12.5	J	19.9	J	14.6	J	10.4		9.1		5.7	
COPPER	MG/KG	15.5	J	2.7	UJ	9.4	J	13.5	J	10.8	J	10.7		8.8		6.3	
IRON	MG/KG	25800	J	3770	J	17100	J	24400	J	18500	J	12100		12600		8300	
POTASSIUM	MG/KG	6860	J	981	J	5390	J	5930	J	4940	J	3680		3650		2840	
MAGNESIUM	MG/KG	12100	J	1670	J	8010	J	11900	J	9370	J	5340		8960		3770	
MANGANESE	MG/KG	395	J	93.4	J	291	J	355	J	302	J	227		255		183	
SODIUM	MG/KG	1400	J	308	J	1070	J	1570	J	1310	J	322	b	848	b	722	b
NICKEL	MG/KG	15.9	J	1.6	UJ	9	J	12.7	J	10.9	J	6.1	b	5.8	b	4.2	b
LEAD	MG/KG	3.3	J	0.64	J	2.2	J	3.1	J	2.4	J	15.1	J	1.6		1.6	
ANTIMONY	MG/KG	2.9	UJ	2.5	UJ	2.8	UJ	2.8	UJ	2.8	UJ	2.6	U	2.5	U	2.5	U
SELENIUM	MG/KG	0.12	UJ	0.1	UJ	0.14	J	0.12	UJ	0.12	UJ	0.1	U	0.09	U	0.09	U
THALLIUM	MG/KG	0.38	J	0.14	UJ	0.27	J	0.38	J	0.21	J	0.19	U	0.21	b	0.18	U
VANADIUM	MG/KG	61.6	J	9.7	J	41.2	J	64.4	J	50.1	J	28.9		31.3		20.4	
ZINC	MG/KG	78	J	11.6	J	53.5	J	72.3	J	57	J	58.2		46.7		30	
VOLATILE ORGANIC COMPOUNDS																	
ACETONE	UG/KG	12	U	10	U	4	J	12	U	4	J	15	U	90	U	38	U
BENZENE	UG/KG	12	U	10	U	11	U	12	U	12	U	11	U	12	U	11	U
2-BUTANONE	UG/KG	12	U	10	U	11	U	12	U	12	U	3	J	4	J	11	U
SEMI-VOLATILE ORGANIC COMPOUNDS																	
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	810	U	680	U	750	U	800	U	770	U	280	J	770	U	750	U
PESTICIDES AND PCBs																	
ENDOSULFAN SULFATE	UG/KG	-		-		-		-		-		5.77		3.83	U	3.74	U
BHC-DELTA	UG/KG	-		-		-		-		-		5.03		1.97	U	1.93	U
4,4'-DDT	UG/KG	-		-		-		-		-		12.5		3.83	U	3.74	U
ENDRIN KETONE	UG/KG	-		-		-		-		-		5.2		3.83	U	3.74	U
4,4'-DDD	UG/KG	-		-		-		-		-		6.89		3.83	U	3.74	U
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																	
TFH DIESEL	MG/KG	15.2	U	12.8	U	14	U	15.5	U	14.4	U	109	J	18.1	UJ	14.2	UJ
TFH GASOLINE	MG/KG	0.081	U	0.051	U	0.057	U	0.241	U	0.08	U	0.058	U	0.058	U	0.057	U
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																	
TRPH	MG/KG	20	U	20	U	20	U	20	U	20	U	1805		20	U	20	U

Table B13-3

Site13 (OU- 3): Summary of Detected Chemicals in the Vadose Zone (Subsurface) Samples

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STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	13_DBMW49 S1456216 (20)	DVF(a)	13_DBMW49 S1456216 (28)	DVF(a)	13_DBMW49 S1456208 (30)	DVF(a)	13_DBMW49 S1456214 (80)	DVF(a)	13_DBMW49 S1456207 (130)	DVF(a)	13_DBMW49 S1456203 (147)	DVF(a)	13_DGMW78 S1456675 (120)	DVF(a)	13_DGMW78 S1456677 (120)	DVF(a)
GENERAL CHEMISTRY																	
TOTAL ORGANIC CARBON	MG/KG	-		-		-		-		-		183		-		-	
METALS																	
SILVER	MG/KG	0.5	b	0.33	U	0.33	U	0.33	U	0.3	U	-		0.46	U	0.43	U
ALUMINUM	MG/KG	20300		11500		6710		6880		2270		-		4680		894	
ARSENIC	MG/KG	6		3.6		1.8	b	2.9		0.93	b	-		0.72	b	0.24	b
BARIUM	MG/KG	178		182		96.9		168		26.4	b	-		52.2		12.4	b
BERYLLIUM	MG/KG	0.5	b	0.38	b	0.19	U	0.19	U	0.17	U	-		0.19	U	0.1	U
CALCIUM	MG/KG	15700		11700		7890		20000		1420		-		11700		755	b
CADMIUM	MG/KG	1.7		1.4		1.3		1.1	b	0.52	b	-		1.8		0.24	U
COBALT	MG/KG	9.2	b	7.5	b	4.2	b	4.3	b	1.7	U	-		1.9	b	1.2	U
CHROMIUM	MG/KG	18.6		12.2		7.5		7.4		3.2		-		4.9		1.4	b
COPPER	MG/KG	12.7		9.8		5.6	b	4.7	b	1.7	b	-		3.7	b	0.87	b
IRON	MG/KG	25800		15900		10300		9920		2910		-		5170		1060	
POTASSIUM	MG/KG	7200		4810		2710		2420		718	b	-		1170		218	b
MAGNESIUM	MG/KG	12400		9100		4930		4760		1110		-		2470		432	b
MANGANESE	MG/KG	378		298		195		201		58.9		-		119		19.9	
SODIUM	MG/KG	2040		1960		872	b	543	b	204	b	-		253	b	170	b
NICKEL	MG/KG	13.3		10.8		7.4	b	5.6	b	1.7	U	-		5.5	U	1.8	U
LEAD	MG/KG	4.2		3		1		1.8		0.72		-		0.95		0.35	b
ANTIMONY	MG/KG	3	b	2.6	U	2.7	b	2.6	U	2.4	U	-		2.8	U	2.5	U
SELENIUM	MG/KG	0.1	U	0.09	U	0.09	U	0.09	U	0.09	U	-		0.11	U	0.1	U
THALLIUM	MG/KG	0.42	b	0.42	b	0.19	U	0.24	b	0.17	U	-		0.15	b	0.14	U
VANADIUM	MG/KG	63.8		43.4		29.3		29.2		9	b	-		14.7		3.7	b
ZINC	MG/KG	81		60.4		35		30.5		9.1		-		18.9		5.9	
VOLATILE ORGANIC COMPOUNDS																	
ACETONE	UG/KG	79	B	98	U	29	U	40	U	120	DB	-		11	U	10	U
BENZENE	UG/KG	13	U	12	U	11	U	12	U	11	U	-		11	U	10	U
2-BUTANONE	UG/KG	5	J	12	U	3	J	12	U	5	J	-		11	U	10	U
SEMI-VOLATILE ORGANIC COMPOUNDS																	
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	870	U	780	U	200	J	780	U	730	U	-		720	U	680	U
PESTICIDES AND PCBs																	
ENDOSULFAN SULFATE	UG/KG	4.35	U	3.91	U	3.69	U	3.9	U	3.64	U	-		-		-	
BHC-DELTA	UG/KG	2.24	U	2.01	U	1.9	U	2.01	U	1.87	U	-		-		-	
4,4'-DDT	UG/KG	4.35	U	3.91	U	3.69	U	3.9	U	3.64	U	-		-		-	
ENDRIN KETONE	UG/KG	4.35	U	3.91	U	3.69	U	3.9	U	3.64	U	-		-		-	
4,4'-DDD	UG/KG	4.35	U	3.91	U	3.69	U	3.9	U	3.64	U	-		-		-	
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																	
TFH DIESEL	MG/KG	16.5	UJ	14.8	UJ	14	UJ	14.8	UJ	13.8	UJ	-		13.7	U	12.7	U
TFH GASOLINE	MG/KG	0.066	U	0.059	U	0.056	U	0.059	U	0.055	U	-		0.055	U	0.051	U
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																	
TRPH	MG/KG	20	U	20	U	20	U	20	U	20	U	-		43		20	U

Table B13-3

Site13 (OU- 3): Summary of Detected Chemicals in the Vadose Zone (Subsurface) Samples

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT,BGS) ANALYTE BY GROUP	UNITS	13_DGMW78 S1456676 (135)	DVF(a)	13_UGMW32 S1456210 (5)	DVF(a)	13_UGMW32 S1456204 (30)	DVF(a)											
GENERAL CHEMISTRY																		
TOTAL ORGANIC CARBON	MG/KG	-		-		314	J											
METALS																		
SILVER	MG/KG	-		0.43	UJ	-												
ALUMINIUM	MG/KG	-		4980		-												
ARSENIC	MG/KG	-		1.1	b	-												
BARIIUM	MG/KG	-		118		-												
BERYLLIUM	MG/KG	-		0.14	b	-												
CALCIUM	MG/KG	-		6740		-												
CADMIUM	MG/KG	-		1.1		-												
COBALT	MG/KG	-		2.5	J	-												
CHROMIUM	MG/KG	-		5.3		-												
COPPER	MG/KG	-		4.1	b	-												
IRON	MG/KG	-		8330		-												
POTASSIUM	MG/KG	-		2340		-												
MAGNESIUM	MG/KG	-		3630		-												
MANGANESE	MG/KG	-		182		-												
SODIUM	MG/KG	-		576	b	-												
NICKEL	MG/KG	-		5.9	b	-												
LEAD	MG/KG	-		0.95		-												
ANTIMONY	MG/KG	-		2.5	U	-												
SELENIUM	MG/KG	-		0.1	U	-												
THALLIUM	MG/KG	-		0.19	b	-												
VANADIUM	MG/KG	-		21.1		-												
ZINC	MG/KG	-		26		-												
VOLATILE ORGANIC COMPOUNDS																		
ACETONE	UG/KG	13		58		48												
BENZENE	UG/KG	11	U	10	U	8	J											
2-BUTANONE	UG/KG	11	U	10	U	12	U											
SEMI-VOLATILE ORGANIC COMPOUNDS																		
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	-		690	U	-												
PESTICIDES AND PCBs																		
ENDOSULFAN SULFATE	UG/KG	-		3.44	U	-												
BHC-DELTA	UG/KG	-		1.77	U	-												
4,4'-DDT	UG/KG	-		3.44	U	-												
ENDRIN KETONE	UG/KG	-		3.44	U	-												
4,4'-DDD	UG/KG	-		3.44	U	-												
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																		
TFH DIESEL	MG/KG	-		13	U	-												
TFH GASOLINE	MG/KG	-		0.052	U	-												
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																		
TRPH	MG/KG	-		20	U	-												

(a) A definition of each data validation flag (DVF) is provided in Table B-1.

**Table B13-4
Site 13 (OU-3): Well Construction Details
MCAS El Toro Phase I RI Technical Memorandum**

Item	Station Identification		
	13_UGMW32	13_DBMW49	13_DGMW78
Survey Location--Northing	552185.56	551909.33	552020.52
Survey Location--Easting	1546830.70	154690.64	1546324.24
Ground Surface Elevation (ft above MSL ^a)	285.37	280.08	276.34
Measuring Point Elevation (ft above MSL ^a)	285.22	280.63	276.14
Measuring Point Location	Top of well casing	Top of well casing	Top of well casing
Type of Surface Completion	Below ground	Above ground	Below ground
Casing Diameter and Material	4-inch Schedule 40 PVC	4-inch Schedule 40 PVC	4-inch Schedule 40 PVC
Screen Diameter and Material	4-inch SS	4-inch SS	4-inch SS
Screen Interval (ft bgs ^b)	144-184	142-182	127-167
Length of Drop Pipe (ft bgs ^b)	181	175	168
Make and Model of Installed Pump	Grundfos Rediflow 2	Grundfos Rediflow 2	Grundfos Rediflow 2
Date of Pumping Test	Slug tested 23 Oct 92	NA	4-hour pumping test 23 Nov 92
Date of Water Quality Sampling	28 Oct 92	16 Nov 92	23 Nov 92
^a Mean sea level ^b Below ground surface NA=Not Applicable SS=Stainless Steel			

<p align="center">Table B13-5 Site 13 (OU-3): Summary of Hydraulic Parameters MCAS El Toro Phase I RI Technical Memorandum</p>						
Well Identification	Type of Test	Analysis Method	Transmissivity (ft ² /day)	Hydraulic Conductivity (ft/day)	Storage Coefficient ^a	Leakance Factor ^a
13_UGMW32	Slug test	Bouwer and Rice (1976); Bouwer (1989)	47	1.1	8E-05	NA
13_DGMW78	Pumping	Theis-Recovery (1935)	690	21.4	NA	NA

^aNA = Not applicable.
 Source: Table F-2 (Appendix F)

Table B13-6

Site13 (OU- 3): Summary of Detected Chemicals in Groundwater Samples

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SCREEN INTERVAL ANALYTE BY GROUP	REG.CODE(b)	REG.LEVEL(c)	UNITS	13_DBMW49 S1452078 (142-182)	DVF(a)	13_DGMW78 S1452079 (127-167)	DVF(a)	13_UGMW32 S1452083 (144-184)	DVF(a)
GENERAL CHEMISTRY									
ALKALINITY AS CaCO3	NA	NA	MG/L	398		273		362	
CARBONATE	NA	NA	MG/L	-		-		-	
BICARBONATE	NA	NA	MG/L	484		333		441	
CHLORIDE	3	250	MG/L	346		522		184	
SULFATE	3	250	MG/L	651		1040		511	
NITRATE/NITRITE-N	1	10	MG/L	11.8		28.7		9.82	
TOTAL DISSOLVED SOLIDS	3	500	MG/L	2050		2910		1540	
METALS									
ALUMINUM	3	50	UG/L	31	U	51.9	b	31	U
BARIUM	2	2000	UG/L	34.3	b	23.6	b	32.5	b
CALCIUM	NA	NA	UG/L	290000		383000		202000	
CADMIUM	2	5	UG/L	1.2	U	8		1.2	U
COPPER	2	1300	UG/L	0.9	U	2	b	4.8	b
IRON	3	300	UG/L	2.3	U	17.3	b	2.3	U
MERCURY	2	2	UG/L	0.1	U	0.16	b	0.1	U
POTASSIUM	NA	NA	UG/L	4860	b	4520	b	4330	b
MAGNESIUM	NA	NA	UG/L	110000		199000		96400	
MANGANESE	3	50	UG/L	99.2		1800		85.5	
SODIUM	NA	NA	UG/L	160000		177000		99800	
NICKEL	NA	NA	UG/L	7.7	U	27.2	b	7.7	U
ANTIMONY	NA	NA	UG/L	19.5	b	23.7	b	17.4	b
SELENIUM	1	10	UG/L	20.4	b	152		19.3	
VANADIUM	NA	NA	UG/L	24	b	16	b	17.8	b
ZINC	2	5000	UG/L	5	U	38.4		11.3	b
VOLATILE ORGANIC COMPOUNDS									
ETHYLBENZENE	NA	NA	UG/L	1	U	2		1	U
TOLUENE	2	1000	UG/L	1	U	1	U	2	
XYLENE (TOTAL)	NA	NA	UG/L	5		26		58	
BENZENE	1	1	UG/L	23		110	D	730	D
CHLOROMETHANE (METHYL CHLORIDE)	NA	NA	UG/L	6		2	U	2	U
SEMIVOLATILE ORGANIC COMPOUNDS									
BIS(2-ETHYLHEXYL)PHTHALATE	NA	NA	UG/L	10	U	10	U	26	
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)									
TFH DIESEL	NA	NA	UG/L	250	U	436		308	
TFH GASOLINE	NA	NA	UG/L	68.1		138		1690	

(a) A definition of each data validation flag (DVF) is provided in Table B-1.

(b) Regulatory Codes are:

- 1 = California MCL
- 2 = EPA primary MCL
- 3 = EPA secondary MCL
- 4 = California DTSC Action Level

(c) The given concentration represents the California MCL, the EPA primary MCL, the EPA secondary MCL, or the California DTSC Action Level, whichever is most stringent.

Table B13-7
Site 13 (OU-3): Analyte Concentrations in Groundwater
Exceeding Regulatory Standards or DTSC^a Action Levels
MCAS El Toro Phase I RI Technical Memorandum

Page 1 of 2

Well Identification	SI (ft bgs) ^b	Analyte	Units	Concentration	Regulatory Level ^c	Regulatory Code ^d
13_DGMW78	(127-167)	Aluminum	µg/L	51.9	50	1
		Cadmium	µg/L	8	5	1
		Manganese	µg/L	1,800	50	3
		Selenium	µg/L	152	10	2
		Chloride	mg/L	522	250	3
		Nitrate/Nitrite-N	mg/L	28.7	10	2
		Sulfate	mg/L	1,040	250	3
		Total Dissolved Solids	mg/L	2,910	500	3
		Benzene	µg/L	110	1	2
		13_DBMW49	(142-182)	Manganese	µg/L	99.2
Selenium	µg/L			20.4	10	2
Chloride	mg/L			346	250	3
Nitrate/Nitrite-N	mg/L			11.8	10	2
Sulfate	mg/L			651	250	3
Total Dissolved Solids	mg/L			2,050	500	3
13_UGMW32	(144-184)	Benzene	µg/L	23	1	2
		Manganese	µg/L	85.5	50	3
		Selenium	µg/L	19.3	10	2
		Sulfate	mg/L	511	250	3
		Total Dissolved Solids	mg/L	1,540	500	3
		Benzene	µg/L	730	1	2

Table B13-7
Site 13 (OU-3): Analyte Concentrations in Groundwater
Exceeding Regulatory Standards or DTSC^a Action Levels
MCAS El Toro Phase I RI Technical Memorandum

Well Identification	SI (ft bgs) ^b	Analyte	Units	Concentration	Regulatory Level ^c	Regulatory Code ^d
<p>^aCalifornia Department of Toxic Substances Control</p> <p>^bScreen interval (feet below ground surface)</p> <p>^cThe most stringent federal/state drinking water standard was applied. In the presence of both an EPA MCL and a California MCL, the most stringent MCL is represented. If neither an EPA or California MCL is listed, the California DTSC action level was applied.</p> <p>^dRegulatory Code:</p> <p>1=EPA Primary MCL: Federally enforceable drinking water standard established for the health effects of contaminants</p> <p>2=California MCL: Health-based drinking water standard enforceable at the state level</p> <p>3=EPA Secondary MCL: Nonenforceable standard based on aesthetic qualities of taste, color, and odor (Includes chloride, iron, manganese, sulfate, and TDS)</p> <p>4=DTSC Action Level: Nonenforceable levels at which DTSC strongly urges water purveyors to take corrective action to reduce the level of contamination in the water they supply (Action levels cease to exist when state MCLs are promulgated.)</p>						

Appendix B14

**Nature and Extent of Contamination:
Site 14 (OU-3) – Battery Acid Disposal Area**

Appendix B14
NATURE AND EXTENT OF SITE-SPECIFIC CONTAMINATION:
SITE 14 (OU-3) - BATTERY ACID DISPOSAL AREA

This discussion of Site 14 is supplemented by the figures and data tables listed below. The figures begin on page B14-3, and the tables are grouped at the end of this Appendix B14. Field headspace values for soils at this site are presented in Table BA1-14, in Attachment 1 to Appendix B (directly following Appendix B22).

Figure B14-1: (Site Map)

Figure B14-2: Geologic Cross Section

Table B14-1: Types of Samples and Chemical Analyses

Table B14-2: Summary of Detected Chemicals in Sediments and Surface/Near-Surface Soil

Table B14-3: Summary of Detected Chemicals in Vadose Zone (Subsurface) Samples

Table B14-4: Well Construction Details

Table B14-5: (Not applicable at this site)

Table B14-6: Summary of Detected Chemicals in Groundwater Samples

Table B14-7: Analyte Concentrations in Groundwater Exceeding Regulatory Standards or DTSC Action Levels

B14.1 Site Description

Site 14 (OU-3) is the Battery Acid Disposal Area. It is located west of Building 245, which was a heavy equipment maintenance shop. The site consists of two subareas:

- Stratum 1: The acid disposal and paint waste stain area
- Stratum 2: Drainage ditch and catch basin

Reportedly, batteries from MCAS El Toro vehicles were drained onto the soil west of Building 245 between 1977 and 1983. It is estimated that 210 gallons of battery acid, as well as paints and paint wastes, were disposed of at this location (Brown and Caldwell, 1986). Although staining and stressed vegetation have been noted in the past, neither is visible at present.

Each of the two strata is a statistically homogeneous sampling stratum. Surface water runoff also flowed into the drainage ditch and catch basin, which drain into Bee Canyon Wash.

B14.2 Suspected Waste Types and Contaminants

Batteries contain sulfuric acid which, over time, becomes enriched with metals dissolved from the inside of the battery. The potential contaminants of concern for Site 14 include sulfuric acid, priority pollutant metals from battery acid, waste oil, methylene chloride and other solvents associated with paints, and phenols from paint strippers.

B14.3 Field Investigation

As described in the *SAP Amendment*, the field investigation at Site 14 consisted of drilling and sampling one downgradient monitoring well and one deep boring completed as a monitoring well, and collecting surface and near-surface soil and sediment samples. The upgradient well for Site 13 (13_UGMW32) also serves as an upgradient well for Site 14. The sampling stations, depths of sampling, and types of analyses performed are presented in Table B4-1.

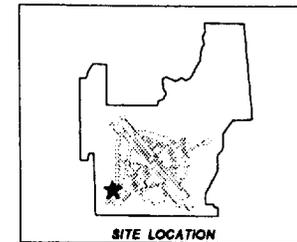
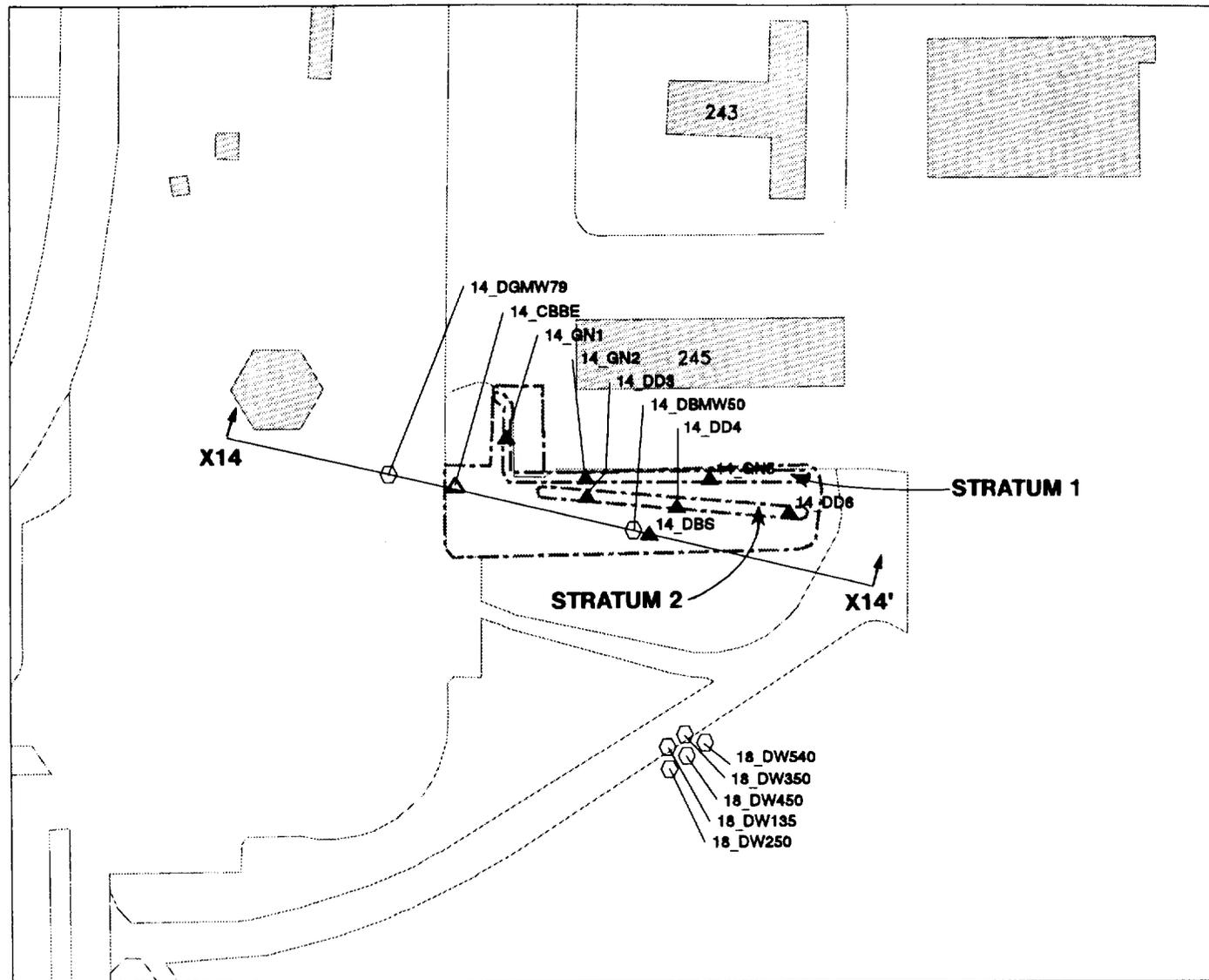
Each sampling stratum contains three randomly distributed shallow soil borings. Following is a summary of the remedial investigation work performed at Site 14:

B14.3.1 Surface Water and Sediments

One sediment sample was collected in the catch basin (14_CBBE). (No surface water samples were collected at this site.)

B14.3.2 Surface and Near-Surface Soils

Three shallow borings were drilled in Stratum 1 (14_GN1, 14_GN2, and 14_GN5). Three shallow borings were drilled in Stratum 2 (14_DD3, 14_DD4, and 14_DD6). One surface sample (14_DBS) was collected near the deep boring converted to a monitoring well.



FEATURES:

- BUILDING OR PAD
- MONITORING WELL
- DEEP, 25-FOOT, OR ANGLE BORING
- SEDIMENT SAMPLE
- SURFACE WATER AND SEDIMENT SAMPLE
- SURFACE AND NEAR-SURFACE SOIL SAMPLE
- ROAD
- STRATUM BOUNDARY
- WASH OR STREAM
- LINE OF GEOLOGIC CROSS-SECTION
- END OF LINE OF CROSS-SECTION
- LINE OF CROSS-SECTION EXTENDS BEYOND AREA SHOWN

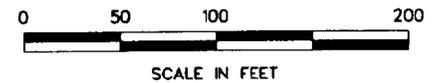


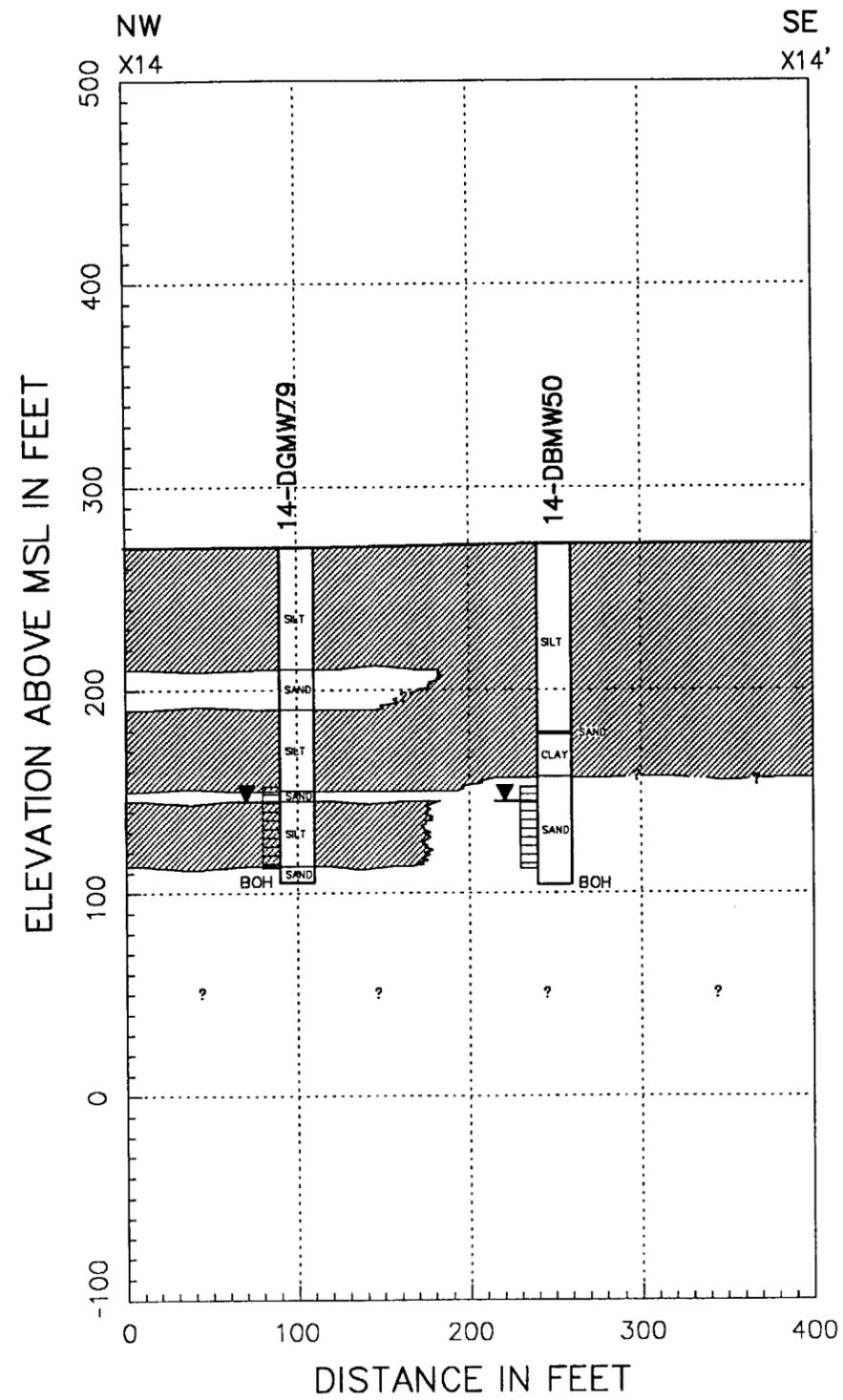
FIGURE B14-1

SITE 14 (OU-3): BATTERY ACID DISPOSAL AREA

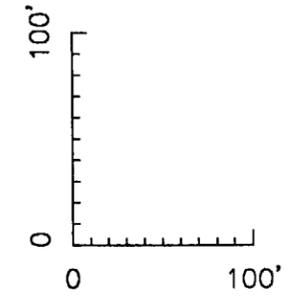
MCAS EL TORO PHASE I RI TECHNICAL MEMORANDUM

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HORIZ. SCALE: 1"=100'
 VERT. SCALE: 20% EXAGGERATION



LEGEND

-  UNCONSOLIDATED PERMEABLE SEDIMENTS
-  UNCONSOLIDATED LOW-PERMEABILITY SEDIMENTS
-  BOTTOM OF HOLE
-  WELL SCREEN INTERVAL
-  WATER LEVEL ELEVATION, DECEMBER 1992

FIGURE B14-2
 SITE 14 (OU-3)
 GEOLOGIC CROSS SECTION X14-X14'
 MCAS EL TORO PHASE I RI
 TECHNICAL MEMORANDUM

PAGE NUMBER B14-6

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B14.3.3 Vadose Zone Soils (Soil Borings)

Two samples were collected in downgradient Well (14_DGMW79), and nine samples collected in the deep boring converted to a Well (14_DBMW50).

B14.3.4 Groundwater Monitoring Wells

Two wells were constructed. One water quality sample was collected from each of the two wells in late 1992. No aquifer testing was done at Site 14.

B14.4 Surface Water and Sediments

One surface sediment sample (14_CBBE) was collected from the catch basin leading to Bee Canyon Wash. Analytical results for this sample are shown in Table B14-2. The sample was analyzed for TRPH, TFH, VOCs, SVOCs, and metals.

The sediment sample contained 7,364 mg/kg of TRPH. The TFH analysis showed TFH-gasoline at 0.108 mg/kg, and TFH-diesel at 11,100 mg/kg. The catch basin is contaminated with petroleum hydrocarbons, possibly occurring through direct dumping into the basin or via runoff from the battery acid disposal area.

Acetone at 13 $\mu\text{g}/\text{kg}$ was the only VOC. Acetone is a demonstrated laboratory contaminant; the maximum detected concentration in the trip blanks is 37 $\mu\text{g}/\text{L}$.

The following SVOCs were detected: bis(2-ethylhexyl)phthalate at 7,400 $\mu\text{g}/\text{kg}$, fluoranthene at 770 $\mu\text{g}/\text{kg}$, and pyrene at 1,500 $\mu\text{g}/\text{kg}$. Indeno(1,2,3-cd)pyrene was also identified at levels below the contract-required detection limit (CRDL).

The results of detected metals are presented in Table 14-2.

B14.5 Surface and Near-Surface Soils

B14.5.1 Description of Surface and Near-Surface Soil Samples

The surface soils at Site 14 are Sorrento Loam Series, characterized by 0 to 2 percent slopes typical of alluvial fans and flood plains (Orange County Soil Survey). The permeability for this series ranges from 0.6 to 2.0 inches per hour. The moisture holding capacity of the near surface is from 0.16 to 0.21 inches per inch. This soil is classified as Hydrologic Group B, which has a moderate water infiltration rate when saturated (Wachtell, 1978).

The seven surface soil locations (14_DBS, 14_GN1, 14_GN2, 14_GN5, 14_DD3, 14_DD4, and 14_DD6) are shown on Figure B14-1. Soil samples from the shallow borings in each stratum were screened in the field with an organic vapor analyzer (OVA) to determine whether a sample would also be collected at a depth of 4 feet.

All surface and near-surface samples were analyzed for petroleum hydrocarbons, VOCs, SVOCs, and metals. Results of detected analytes are presented in Table B14-2.

B14.5.2 Analytical Results and Soil Vapor Headspace Values

B14.5.2.1 Upgradient Area

(No upgradient samples were taken for Site 14.)

B14.5.2.2 Stratum 1: Battery Acid and Paint Waste Disposal Area

Six individual soil samples were taken from Stratum 1. Field headspace values for the samples, summarized in Attachment 1 (Appendix B) ranged from not detected to 0.3 ppmv.

TRPH was detected in three of the samples, ranging from 127 to 1,367 mg/kg. TFH-gasoline, detected in five of the samples, ranged from 0.0685 to 1.640 mg/kg. TFH-diesel was detected in three samples, ranging from 22 to 383 mg/kg. No BTEX was detected.

Two VOCs, acetone and toluene, were detected. Toluene was identified below the CRDL. Acetone was detected in three samples, at levels ranging from 10 to 66 $\mu\text{g}/\text{kg}$. Acetone is a demonstrated laboratory contaminant; the maximum detected concentration in the trip blanks is 37 $\mu\text{g}/\text{L}$. Toluene was identified at levels below the CRDL in three samples, ranging from 3 to 5 $\mu\text{g}/\text{kg}$.

Fourteen SVOCs (see Table B14-2) were detected in four of the six samples in Stratum 1, with a maximum concentration of 5,800 $\mu\text{g}/\text{kg}$ for fluoranthene.

Metal results are presented in Table 14-2.

B14.5.2.3 Drainage Ditch

Seven soil samples were taken in Stratum 2. Field headspace values for these samples ranged from not detected to 0.4 ppmv (Attachment 1).

TRPH was detected in three samples, ranging from 66 to 960 mg/kg. TFH-gasoline, present in five samples, ranged from 0.126 to 1.64 mg/kg. TFH-diesel was detected in two samples, ranging from 21.6 to 198 mg/kg.

Acetone was the only VOC detected in samples from Stratum 2; it was in two samples, at 28 and 29 $\mu\text{g}/\text{kg}$. Acetone is a demonstrated laboratory contaminant; the maximum detected concentration in the trip blanks is 37 $\mu\text{g}/\text{L}$. Carbon tetrachloride and toluene were identified below the CRDL.

Fluoranthene (970 $\mu\text{g}/\text{kg}$) and pyrene (760 $\mu\text{g}/\text{kg}$) were the only SVOCs detected in the samples both at 14_DD4 at 0 feet. Ten other SVOCs (see Table B14-2) were identified at levels below the CRDL in this sample and the sample from 14_DD6 at 0 feet.

Metals concentrations are presented in Table 14-2.

B14.5.2.4 Other Surface Samples

One surface sample (14_DBS) was taken near the deep boring converted to a monitoring well. The headspace reading for this sample was 0 ppmv.

No SVOCs, TRPH, or TFH-diesel were detected for this sample. TFH-gasoline was detected at 0.264 $\mu\text{g}/\text{kg}$.

Toluene was identified at 5 $\mu\text{g}/\text{kg}$, which is below the CRDL. No other VOCs were detected.

Metals concentrations are presented in Table 14-2.

B14.6 Vadose Zone Soils

B14.6.1 Description of Subsurface Soil Samples

The vadose zone investigation included the subsurface area between 5 feet bgs and the potentiometric surface. At Site 14, the water table is unconfined, and is therefore the same as the potentiometric surface. Drive samples were taken in the deep boring converted to a monitoring Well (14_DBMW50) at 5-foot intervals to 25 feet bgs, and then every 10 feet to 60 feet bgs, then every 20 feet to the water table. Nine samples were submitted for chemical analysis.

Samples were taken at the downgradient Well (14_DGMW79) at similar depths, mainly for lithologic description. Two samples were submitted for chemical analysis: one from within 30 feet of the water table and one from the screened interval.

All vadose zone samples were analyzed for VOCs, SVOCs, TRPH, TFH-gasoline, TFH-diesel, and metals. Detected analytes are presented in Table B14-3.

B14.6.2 Subsurface Geology

Site 14 overlies approximately 575 feet of unconsolidated Quaternary sediments, which in turn overlie the semiconsolidated bedrock of the Irvine Area Groundwater Basin. From youngest to oldest, the Quaternary sediments are differentiated into Holocene alluvial and colluvial deposits, primarily coarse stream channels within a matrix of finer overbank deposits, and Pleistocene beach-lagoonal and near-shore deposits.

Lithologies encountered during drilling at Site 14 were mainly silt with varying amounts of sand and clay (see soil boring logs, Appendix K, for detailed lithologic descriptions). A few silty sand lenses were encountered, and these are shown on the geologic cross section (Figure B14-2). The cross section shows a predominantly fine-grained, low permeability matrix containing a few sand stringers or lenses. The sand lens at the water table appears to be continuous across the site.

B14.6.3 Analytical Results

Hydrocarbons (TRPH, TFH). TRPH was detected at 16 mg/kg in one sample at 25 feet in 14_DBMW50. Neither TFH-gasoline nor TFH-diesel was detected.

Volatile Organic Compounds (VOCs). Acetone was the only VOC detected; it was detected only in Well 14_DBMW50, at 16 $\mu\text{g}/\text{kg}$ in the 55-foot sample and at 19 $\mu\text{g}/\text{kg}$ in the 133-foot sample. Acetone is a demonstrated laboratory contaminant; the maximum detected concentration in the trip blanks is 37 $\mu\text{g}/\text{L}$.

1,1,1-TCA was identified in 14_DBMW50 (10 feet).

Semivolatile Organic Compounds (SVOCs). Bis(2-ethylhexyl)phthalate was the only SVOC detected in the vadose zone; it was detected at 28,000 $\mu\text{g}/\text{kg}$ in the 10-foot sample in Well 14_DBMW50.

Pesticides, Polychlorinated Biphenyls (PCBs), and Herbicides. One sample (14_DBMW50 at 55 feet) was analyzed for pesticides and PCBs. Pesticides and PCBs were not detected.

Metals and Cyanides. Metals concentrations are presented in Table 14-3.

B14.6.4 Soil Vapor Headspace Concentrations

Field headspace values are presented in Attachment 1 to Appendix B. Headspace values as measured with the HNu were detected throughout Well 14_DGMW79, reaching a peak of 80 ppmv at 110 bgs. The field crew noted up to 230 ppmv in the cuttings from this depth; a strong solvent odor was also observed. No headspace values were obtained with the HNu from the drilling of Well 14-DBMW50; however, headspace values were obtained with the OVA, and the levels peaked at 135 feet bgs (9 ppmv). The headspace readings show little correlation with the laboratory analytical results.

B14.7 Groundwater

B14.7.1 Site-Specific Hydrogeology

Water table elevations at the wells are shown on the geologic cross section (Figure B14-2). The depth to water is approximately 125 feet bgs. Well construction data are summarized in Table B14-4. Both wells installed at Site 14 are screened across the water table, with 40-foot screens. The hydraulic gradient at the site is approximately 0.008 feet per foot toward the northwest.

No aquifer testing was done at Site 14. Aquifer testing was conducted at Site 13, and the results for that testing are considered applicable to Site 14 because the lithologies are similar and the sites are reasonably close together (about 500 feet apart). Thus, the hydraulic conductivity at Site 14 is estimated to be between 1.1 and 21.4 feet/day, and the transmissivity between 47 and 690 feet²/day. The lower end of this range for Site 13 will apply at Site 14

because there is possibly a buried channel at Site 13, which would provide higher values. It is not known if the channel extends to Site 14.

Using the range of hydraulic conductivities measured for Site 13 and a gradient of 0.008, the average linear groundwater velocity is estimated to be between 0.03 and 0.57 feet/day, assuming a porosity of 30 percent (Freeze and Cherry, 1979). The lower end of this range is a realistic expectation for Site 14.

B14.7.2 Analytical Results

Groundwater in the two Wells (14_DBMW50 and 14_DGMW79) was tested for general water chemistry, hydrocarbons, VOCs, SVOCs, pesticides, PCBs, and metals. Table B14-6 lists the analytical results for detected compounds.

No hydrocarbons, SVOCs, pesticides or PCBs were detected in the groundwater.

General Chemistry. The general chemistry of the two wells is very similar, as the Piper diagram shows (Appendix J). Field pH was 6.9 and 6.7 for water from Wells 14_DBMW50 and 14_DGMW79, respectively, field electrical conductivity (EC) at the wells was 2,360 and 2,840 $\mu\text{mhos/cm}$, respectively. The anion/cation balance for the water samples is within 5 percent, indicating a good degree of consistency in the analysis. Calcium is the dominant cation and sulfate is the dominant anion in both wells. Like EC, the total dissolved solids (TDS) increase downgradient, from 1,950 to 2,330 mg/L.

Volatile Organic Compounds (VOCs). Three VOCs were detected in both wells. Carbon tetrachloride was detected at 19 $\mu\text{g/L}$ in Well 14_DBMW50, and 5 $\mu\text{g/L}$ in Well 14_DGMW79. Chloroform was detected at 9 and 12 $\mu\text{g/L}$; TCE was detected at 2 $\mu\text{g/L}$ in both wells.

Semivolatile Organic Compounds (SVOCs). No SVOCs were detected in the groundwater.

Pesticides and Polychlorinated Biphenyls (PCBs). No pesticides or PCBs were detected in the groundwater.

Metals. The metals detected in groundwater are listed in Table B14-6.

B14.7.3 Comparison with Drinking Water Standards

Analytical results for the groundwater samples were compared to the most stringent of the following three drinking water guidelines: EPA maximum contaminant levels (MCLs), California MCLs, and California action levels. Groundwater samples that exceed the state or federal drinking water guidelines are presented in Table B14-7.

B14.8 Potential Contaminant Migration Pathways

The drainage ditch represents a discrete pathway by which contaminants may be transported by surface water runoff to surface waters in Bee Canyon Wash. During storms, this may involve transport of not only dissolved constituents but also sediments.

In addition, this site is mostly unpaved; contaminants may move downward through the vadose zone to the water table from the infiltration of rainwater. In the subsurface, several pathways exist in the form of aerially extensive sand lenses that may enable transport of contaminants, both as vapors through the vadose zone and as dissolved constituents in groundwater.

B14.9 Conclusions

Significant soil contamination does not appear to be present at the site. The sediment sample collected at the catch basin showed indication of petroleum contamination. Since surface soil samples in the two strata in the site do not indicate similar levels of petroleum hydrocarbons, it seems probable that the petroleum in the sediment sample may have originated from a direct dumping of petroleum (e.g., waste oil) into the basin as opposed to resulting from surface water runoff from the site.

Carbon tetrachloride was also present at levels above drinking water guidelines. There is no indication that Site 14 is the source of this VOC detected in the groundwater.

Other contaminants above drinking water guidelines include aluminum, chloride, manganese, nitrate/nitrite, selenium, sulfate, and TDS. There is no evidence that any of these is related to activities associated with Site 14.

TCE was detected in groundwater at Site 14 at $2\ \mu\text{g/L}$ in both downgradient Well 14_DGMW79 and the deep boring converted to a Well (14_DBMW50), within the site boundaries. The TCE concentration of $2\ \mu\text{g/L}$ detected at this site is also below drinking water guidelines of $5\ \mu\text{g/L}$ for TCE. Site 14 does not appear to be a potential source for the observed regional groundwater VOC contamination (OU-1, Site 18).

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**Table B14-1
Site 14 (OU-3): Types of Samples and Chemical Analyses
MCAS El Toro Phase I RI Technical Memorandum**

Location/ Stratum	Station Identifi- cation	Sample Identifi- cation	Sample Depth (ft)	Groups of Analytes Requested ^a										
				VOCs	Semi- VOCs	Pesti- cides/ PCBs	Herbi- cides	TPH	TFH	Metals	CN	Geni. Chem- istry	TOC	Dioxins/ Furans
Surface Water and Sediments														
	14_CBBE	S1450131	0	X	X			X	X	X				
Surface and Near-Surface Soils														
	14_DBS	S1454253	0	X	X			X	X	X				
Stratum 1	14_GN1	S1454237	0	X	X			X	X	X				
		S1454238	2	X	X			X	X	X				
Stratum 1	14_GN2	S1454240	0	X	X			X	X	X				
		S1454241	2	X	X			X	X	X				
Stratum 2	14_DD3	S1454243	0	X	X			X	X	X				
		S1454244	2	X	X			X	X	X				
Stratum 2	14_DD4	S1454246	0	X	X			X	X	X				
		S1454247	2	X	X			X	X	X				
		S1454248	4	X	X			X	X	X				
Stratum 1	14_GN5	S145424801	0	X	X			X	X	X				
		S1454249	2	X	X			X	X	X				
Stratum 2	14_DD6	S1454251	0	X	X			X	X	X				
		S1454252	2	X	X			X	X	X				
Vadose Zone Soils														
	14_DBMW50	S1456220	5	X	X			X	X	X				
		S1456221	10	X	X			X	X	X				
		S1456222	15	X	X			X	X	X				
		S1456223	20	X	X			X	X	X				
		S1456224	25	X	X			X	X	X				
		S1456225	55	X	X	X		X	X	X				
		S1456226	73	X	X			X	X	X				
		S1456227	118	X	X			X	X	X				
	14_DGMW79	S1456413	110	X	X			X	X	X				
		S1456414	125	X								X		
Groundwater														
	14_DBMW50	S1452084	GW	X	X	X		X	X	X		X ^b		
	14_DGMW79	S1452085	GW	X	X	X		X	X	X		X ^b		

^a VOCs = Volatile Organic Compounds; Semi-VOCs = Semivolatile Organic Compounds;
PCBs = Polychlorinated Biphenyls; TPH = Total Recoverable Petroleum Hydrocarbons;
TFH = Total Fuel Hydrocarbons; CN = Total Cyanide; TOC = Total Organic Carbon.

^b Inorganics

Table B14-2

Site14 (OU- 3): Summary of Detected Chemicals in Sediments and Surface/Near-Surface Soil

MCA&S El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	14_CBBE S1451031 (0)	DVF(a)	14_DBS S1454253 (0)	DVF(a)	14_DD3 S1454243 (0)	DVF(a)	14_DD3 S1454244 (2)	DVF(a)	14_DD4 S1454246 (0)	DVF(a)	14_DD4 S1454247 (2)	DVF(a)	14_DD4 S1454248 (4)	DVF(a)	14_DD6 S1454251 (0)	DVF(a)
METALS																	
SILVER	MG/KG	0.44	U	2.4		1.5	b	0.49	U	2.4	U	0.44	U	0.48	U	5.6	
ALUMINIUM	MG/KG	1500		9480		10400		21700		11500		4100		15800		10100	
ARSENIC	MG/KG	1.5	b	3.4		2	b	3.2		4.2		1.5	U	3.7		2.1	b
BARIUM	MG/KG	59.9		151		130		200		136		85.9		169		226	
BERYLLIUM	MG/KG	0.1	U	0.37	b	0.38	b	0.75	b	0.41	U	0.32	U	0.69	b	0.45	U
CALCIUM	MG/KG	2530		3950		3510		7500		4010		2260		5870		5580	
CADMIUM	MG/KG	1.1		1.5		2.3		1.5		3.3		0.78	b	1.4		2.7	
COBALT	MG/KG	2.3	b	4	b	4.2	b	8.4	b	5.6	b	2.1	b	7.8	b	5.5	b
CHROMIUM	MG/KG	6		10.8		13.4		18.6		20.6		4.8		15.6		19.2	
COPPER	MG/KG	5.1	b	10.7		14.4		13.9		21.2		4.2	b	11.8		16.4	
IRON	MG/KG	3000		14900		13300		24500		14700		6340		19000		14000	
MERCURY	MG/KG	1.4		0.03	U	0.04	U	0.03	U								
POTASSIUM	MG/KG	485	b	4660		3920		6720		4460		1740		5450		4480	
MAGNESIUM	MG/KG	1030	b	5120		4880		10700		5240		2340		8040		5680	
MANGANESE	MG/KG	45.1		208		204		368		232		149		298		227	
SODIUM	MG/KG	262	b	348	b	193	b	343	b	249	b	212	b	335	b	271	b
NICKEL	MG/KG	5.2	b	8.8		8	b	14.7		9.3		4	b	10.8		11	
LEAD	MG/KG	21		46.2		75.4		6.6		161		3.1		22.1		145	
ANTIMONY	MG/KG	2.5	U	2.5	U	2.5	U	2.8	U	2.9	b	2.5	U	2.7	U	2.5	U
SELENIUM	MG/KG	0.1	U	0.11	b	0.1	U	0.12	U	0.29	b	0.19	b	0.11	U	0.29	b
THALLIUM	MG/KG	0.15	U	0.15	U	0.15	U	0.3	U	0.15	U	0.14	U	0.18	b	0.31	U
VANADIUM	MG/KG	7.2	b	32.2		31.2		58.4		33.8		17.8		44.4		32.7	
ZINC	MG/KG	57.9		93.2		122		75.8		189		22.6		71.5		118	
VOLATILE ORGANIC COMPOUNDS																	
TOLUENE	UG/KG	10	U	5	J	2	J	11	U	6	J	11	U	11	U	5	J
CARBON TETRACHLORIDE	UG/KG	10	U	10	U	2	J	11	U	10	U	11	U	11	U	10	U
ACETONE	UG/KG	13		10	U	29		11	U	10	U	11	U	11	U	10	U
SEMI-VOLATILE ORGANIC COMPOUNDS																	
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	7400		690	U	680	U	760	U	220	J	740	U	720	U	690	U
ANTHRACENE	UG/KG	680	U	690	U	690	U	760	U	680	U	740	U	720	U	690	U
PYRENE	UG/KG	1500		690	U	680	U	760	U	780	U	740	U	720	U	340	J
BENZO(GH)PERYLENE	UG/KG	680	U	690	U	680	U	760	U	460	J	740	U	720	U	690	U
INDENO(1,2,3-CD)PYRENE	UG/KG	230	J	690	U	680	U	760	U	450	J	740	U	720	U	220	J
BENZO(B)FLUORANTHENE	UG/KG	680	U	690	U	680	U	760	U	590	J	740	U	720	U	460	J
FLUORANTHENE	UG/KG	770		690	U	680	U	760	U	970		740	U	720	U	420	J
BENZO(K)FLUORANTHENE	UG/KG	680	U	690	U	680	U	760	U	580	J	740	U	720	U	330	J
CHRYSENE	UG/KG	680	U	690	U	680	U	760	U	680	J	740	U	720	U	320	J
BENZO(A)PYRENE	UG/KG	680	U	690	U	680	U	760	U	580	J	740	U	720	U	240	J
DIBENZO(A,H)ANTHRACENE	UG/KG	680	U	690	U	680	U	760	U	680	U	740	U	720	U	690	U
BENZO(A)ANTHRACENE	UG/KG	680	U	690	U	680	U	760	U	360	J	740	U	720	U	690	U
PHENANTHRENE	UG/KG	680	U	690	U	680	U	760	U	270	J	740	U	720	U	180	J
CARBAZOLE	UG/KG	680	U	690	U	680	U	760	U	150	J	740	U	720	U	690	U
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																	
TFH DIESEL	MG/KG	11100		13	U	198		14.2	U	16	J	13.8	UJ	13.4	UJ	21.6	
TFH GASOLINE	MG/KG	0.108		0.264		0.194		0.057	U	1.64		0.727		1.14		0.126	
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																	
TRPH	MG/KG	7364		20	U	20	U	20	U	66		20	U	20	U	980	

Table B14-2

Site14 (OU- 3): Summary of Detected Chemicals in Sediments and Surface/Near-Surface Soil

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	14_DD6 S1484262 (2)	DVF(a)	14_GN1 S1484237 (0)	DVF(a)	14_GN1 S1484238 (2)	DVF(a)	14_GN2 S1484240 (0)	DVF(a)	14_GN2 S1484241 (2)	DVF(a)	14_GN6 S148424801 (0)	DVF(a)	14_GN6 S1484249 (2)	DVF(a)
METALS															
SILVER	MG/KG	0.5	U	0.43	U	0.46	U	3		0.82	U	4.1		0.45	U
ALUMINUM	MG/KG	25200		5770		13800		7630		6790		6310		7820	
ARSENIC	MG/KG	2	b	6.2		3.2		6.3		3.9		5.3		1.4	b
BARIUM	MG/KG	191		80.8		124		111		79.9		303		107	
BERYLLIUM	MG/KG	0.89	U	0.2	U	0.65	U	0.42	U	0.5	U	0.27	U	0.46	U
CALCIUM	MG/KG	7960		2990		4830		2950		2840		3070		3340	
CADMIUM	MG/KG	1.8		1.4	U	1.3	U	4.5		2.1		7.2		1	U
COBALT	MG/KG	8.7	b	3.1	b	6.1	b	6.9	b	5	b	3.4	b	5	b
CHROMIUM	MG/KG	19.6		10.4		12.9		38.4		15.2		34.1		6.1	
COPPER	MG/KG	13.6		9.5		7.8		31		16.9		30.8		7.5	
IRON	MG/KG	28600		9910		16400		11400		10900		9940		11800	
MERCURY	MG/KG	0.03	U	0.03	U	0.03	U	0.19		0.03	U	0.03	U	0.03	U
POTASSIUM	MG/KG	6540		2780		4420		2410		2380		2320		3480	U
MAGNESIUM	MG/KG	12200		3190		6580		3490		3220		2820		4380	
MANGANESE	MG/KG	354		158		240		180		166		126		211	
SODIUM	MG/KG	537	b	193	b	203	b	206	b	180	b	175	b	220	b
NICKEL	MG/KG	13.5		6.8	U	9.2		11.8		10.2		11.6		6.1	U
LEAD	MG/KG	3.7		7.8		2.8		4.5		69.3		923		5	
ANTIMONY	MG/KG	2.9	U	2.5	U	2.6	U	4.2	b	2.5	U	2.9	b	2.8	U
SELENIUM	MG/KG	0.33	b	0.15	b	0.15	b	0.23	b	0.15	b	0.48	b	0.11	b
THALLIUM	MG/KG	0.33	U	0.18	U	0.2	U	0.14	U	0.15	U	0.14	U	0.17	U
VANADIUM	MG/KG	82		21		39.3		26.4		23.1		21.7		27.4	
ZINC	MG/KG	74.8		115		47.1		255		106		288		40.3	
VOLATILE ORGANIC COMPOUNDS															
TOLUENE	UG/KG	12	U	5	J	11	U	10	U	3	J	5	J	10	U
CARBON TETRACHLORIDE	UG/KG	12	U	10	U	11	U	10	U	11	U	10	U	10	U
ACETONE	UG/KG	28		10	J	12		10	U	11	U	86		10	U
SEMI-VOLATILE ORGANIC COMPOUNDS															
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	770	U	670	U	710	U	440	J	700	U	330	J	690	U
ANTHRACENE	UG/KG	770	U	670	U	710	U	240	J	700	U	180	J	690	U
PYRENE	UG/KG	770	U	800	J	710	U	4700		730		2600		690	U
BENZO(GH)PERYLENE	UG/KG	770	U	670	U	710	U	1300		440	J	680	U	690	U
INDENO(1,2,3-CD)PYRENE	UG/KG	770	U	200	J	710	U	1500		400	J	790		690	U
BENZO(B)FLUORANTHENE	UG/KG	770	U	340	J	710	U	3800		600	J	2500		690	U
FLUORANTHENE	UG/KG	770	U	620	J	710	U	5800		960		3500		690	U
BENZO(K)FLUORANTHENE	UG/KG	770	U	460	J	710	U	3100		500	J	1600		690	U
CHRYSENE	UG/KG	770	U	500	J	710	U	3600		610	J	2100		690	U
BENZO(A)PYRENE	UG/KG	770	U	270	J	710	U	3100		500	J	1400		690	U
DIBENZO(A,H)ANTHRACENE	UG/KG	770	U	670	U	710	U	640	J	700	U	420	J	690	U
BENZO(A)ANTHRACENE	UG/KG	770	U	280	J	710	U	2200		330	J	1300		690	U
PHENANTHRENE	UG/KG	770	U	400	J	710	U	1800		320	J	1000		690	U
CARBAZOLE	UG/KG	770	U	670	U	710	U	670		700	U	510	J	690	U
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)															
TFH DIESEL	MG/KG	14.5	U	12.5	U	13.4	U	383	J	22	J	39.9		13	U
TFH GASOLINE	MG/KG	0.058	U	0.068		0.054	U	1.55		1.64		0.303		0.101	
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)															
TRPH	MG/KG	114		20	U	20	U	350		127		1367		160	

(a) A definition of each data validation flag (DVF) is provided in Table B-1.

Table B14-3

Site14 (OU- 3): Summary of Detected Chemicals in the Vadose Zone (Subsurface) Samples

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	14_DBMW50 S1456220 (5)	DVF(a)	14_DBMW50 S1456221 (10)	DVF(a)	14_DBMW50 S1456222 (15)	DVF(a)	14_DBMW50 S1456223 (20)	DVF(a)	14_DBMW50 S1456224 (25)	DVF(a)	14_DBMW50 S1456225 (55)	DVF(a)	14_DBMW50 S1456226 (73)	DVF(a)	14_DBMW50 S1456227 (118)	DVF(a)
METALS																	
SILVER	MG/KG	8.5	b	0.49	U	0.52	U	0.51	U	0.47	U	0.5	U	0.48	U	0.46	U
ALUMINIUM	MG/KG	10700		16200		25400		14800		11900		20000		9960		5120	
ARSENIC	MG/KG	2.9		3.7		3.5		4.1		1.9	b	2.8		2.6		1.6	b
BARIUM	MG/KG	120		218		220		204		144		136		83.1		79.9	
BERYLLIUM	MG/KG	0.14	b	0.3	b	0.43	b	0.66	b	0.42	b	0.3	b	0.35	b	0.24	b
CALCIUM	MG/KG	3850		15200		7070		9800		7780		3710		3570		1680	
CADMIUM	MG/KG	1.2		1.4		1.7		1.6		1.1	b	0.99	b	0.82	b	0.61	b
COBALT	MG/KG	5	b	6.9	b	10.8	b	6.3	b	5.9	b	7.5	b	5.1	b	2.9	b
CHROMIUM	MG/KG	13.6		14.8		22.8		14.8	b	12.2		22.3		12		5.7	
COPPER	MG/KG	9.8		10		13.9		11.5		8.1		8.3		8.8		3.3	b
IRON	MG/KG	13900		21200		29500		19200		15900		22000		14600		6570	
POTASSIUM	MG/KG	4220		5300		8700		5780		4150		3970		3940		1530	
MAGNESIUM	MG/KG	5090		10300		13700		9710		7520		8270		4910		2300	
MANGANESE	MG/KG	209		325		417		321		264		294		145		130	
SODIUM	MG/KG	260	b	1440		2260		2000		1210		1030	b	654	b	306	b
NICKEL	MG/KG	9.2		10.2		13.7		11.1		9.9		12.7		10.5		6.1	b
LEAD	MG/KG	4.8		2.9		2.9		3.2		1.5		4.7		1.9		1.4	
SELENIUM	MG/KG	0.28	b	0.12	U	1.2	U	0.12	U	0.11	U	0.12	U	0.11	U	0.11	U
THALLIUM	MG/KG	0.19	U	0.3	b	0.47	U	0.44	U	0.29	U	0.29	U	0.23	b	0.15	U
VANADIUM	MG/KG	32.4		53		71.7		48.8		41.9		58		40.1		18.1	
ZINC	MG/KG	65.9		61.5		83.4		61		48.2		52.1		38.8		18.6	
VOLATILE ORGANIC COMPOUNDS																	
ACETONE	UG/KG	12	U	12	U	11	U	12	U	12	U	16		11	U	11	U
1,1,1-TRICHLOROETHANE	UG/KG	12	U	3	J	11	U	12	U	12	U	13	U	11	U	11	U
SEMI-VOLATILE ORGANIC COMPOUNDS																	
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	810	U	28000		940	U	780	U	780	U	680	U	760	U	730	U
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																	
TRPH	MG/KG	20	U	20	U	20	U	20	U	16		20	U	20	U	20	U

Table B14-3

Site 14 (OU-3): Summary of Detected Chemicals in the Vadose Zone (Subsurface) Samples

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	14_DBMW60 S1456218 (133)	DVF(a)	14_DGMW79 S1456413 (110)	DVF(a)	14_DGMW79 S1456414 (125)	DVF(a)													
METALS																				
SILVER	MG/KG	-		0.49	UJ	-														
ALUMINUM	MG/KG	-		17900		-														
ARSENIC	MG/KG	-		2.7		-														
BARIUM	MG/KG	-		89.1		-														
BERYLLIUM	MG/KG	-		0.58	b	-														
CALCIUM	MG/KG	-		3590		-														
CADMIUM	MG/KG	-		1.8		-														
COBALT	MG/KG	-		6.6	b	-														
CHROMIUM	MG/KG	-		20.6		-														
COPPER	MG/KG	-		10.5		-														
IRON	MG/KG	-		19700		-														
POTASSIUM	MG/KG	-		4870		-														
MAGNESIUM	MG/KG	-		7390		-														
MANGANESE	MG/KG	-		291		-														
SODIUM	MG/KG	-		457	b	-														
NICKEL	MG/KG	-		12.8		-														
LEAD	MG/KG	-		2.9		-														
SELENIUM	MG/KG	-		0.12	U	-														
THALLIUM	MG/KG	-		0.19	J	-														
VANADIUM	MG/KG	-		53.4		-														
ZINC	MG/KG	-		56.1		-														
VOLATILE ORGANIC COMPOUNDS																				
ACETONE	UG/KG	19		12	U	10	U													
1,1,1-TRICHLOROETHANE	UG/KG	12	U	12	U	12	U													
SEMI-VOLATILE ORGANIC COMPOUNDS																				
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	-		790	U	-														
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																				
TRPH	MG/KG	-		20	U	-														

(a) A definition of each data validation flag (DVF) is provided in Table B-1.

**Table B14-4
Site 14 (OU-3): Well Construction Details
MCAS El Toro Phase I RI Technical Memorandum**

Item	Station Identification	
	14_DBMW50	14_DGMW79
Survey Location--Northing	551634.50	551755.03
Survey Location--Easting	1546098.94	1546010.00
Ground Surface Elevation (ft above MSL ^a)	270.32	268.93
Measuring Point Elevation (ft above MSL ^a)	270.80	268.74
Measuring Point Location	PVC sounding tube	PVC sounding tube
Type of Surface Completion	Above ground	Below ground
Casing Diameter and Material	4" Sch. 40 PVC	4" Sch. 40 PVC
Screen Diameter and Material	4" SS	4" SS
Screen Interval (ft bgs ^b)	120-160	118-158
Length of Drop Pipe (ft bgs ^b)	150	150
Make and Model of installed Pump	Grundfos Rediflow 2	Grundfos Rediflow 2
Date of Pumping Test	Not tested	Not tested
Date of Water Quality Sampling	02 Dec 92	20 Nov 92

^aMean sea level

^bBelow ground surface

^c13_UGMW32 serves as an upgradient well for sites 13 and 14

^dSS = Stainless Steel

Table B14-6

Site14 (OU- 3): Summary of Detected Chemicals in Groundwater Samples

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SCREEN INTERVAL ANALYTE BY GROUP	REG.CODE(b)	REG.LEVEL(c)	UNITS	14_DBMW50 S1452084 (120-160)	DVF(a)	14_DGMW79 S1452085 (118-158)	DVF(a)
GENERAL CHEMISTRY							
ALKALINITY AS CaCO3	NA	NA	MG/L	246		328	
CARBONATE	NA	NA	MG/L	-		-	
CYANIDE	NA	NA	UG/L	3	U	3	B
BICARBONATE	NA	NA	MG/L	300		400	
CHLORIDE	3	250	MG/L	304		313	
SULFATE	3	250	MG/L	670		907	
NITRATE/NITRITE-N	1	10	MG/L	22.2		10.9	
TOTAL DISSOLVED SOLIDS	3	500	MG/L	1920		2330	
METALS							
SILVER	1	50	UG/L	2.4	b	2.1	U
ALUMINUM	3	50	UG/L	68.4	b	31	U
BARIUM	2	2000	UG/L	32.4	b	21.1	b
CALCIUM	NA	NA	UG/L	275000		307000	
CADMIUM	2	5	UG/L	3.9	b	1.4	b
COPPER	2	1300	UG/L	2.9	b	1.3	b
IRON	3	300	UG/L	2.3	U	5.9	b
MERCURY	2	2	UG/L	0.12	b	0.1	U
POTASSIUM	NA	NA	UG/L	4450	b	4580	b
MAGNESIUM	NA	NA	UG/L	102000		127000	
MANGANESE	3	50	UG/L	542		119	
SODIUM	NA	NA	UG/L	139000		172000	
NICKEL	NA	NA	UG/L	27.2	b	10.5	b
ANTIMONY	NA	NA	UG/L	28	b	19	b
SELENIUM	1	10	UG/L	38.4		6	J
VANADIUM	NA	NA	UG/L	18.5	b	16.7	b
ZINC	2	5000	UG/L	72.2		69.1	
VOLATILE ORGANIC COMPOUNDS							
CARBON TETRACHLORIDE	1	0.5	UG/L	19		5	
CHLOROFORM	2	100	UG/L	9		12	
TRICHLOROETHYLENE	2	5	UG/L	2		2	

(a) A definition of each data validation flag (DVF) is provided in Table B-1.

(b) Regulatory Codes are:

- 1 = California MCL
- 2 = EPA primary MCL
- 3 = EPA secondary MCL
- 4 = California DTSC Action Level

(c) The given concentration represents the California MCL, the EPA primary MCL, the EPA secondary MCL, or the California DTSC Action Level, whichever is most stringent.

**Table B14-7
Site 14 (OU-3): Analyte Concentrations in Groundwater
Exceeding Regulatory Standards or DTSC^a Action Levels
MCAS El Toro Phase I RI Technical Memorandum**

Well Identification	SI (ft bgs) ^b	Analyte	Units	Concentration	Regulatory Level ^c	Regulatory Code ^d
14_DGMW79	(118-158)	Manganese	µg/L	119	50	3
		Chloride	mg/L	313	250	3
		Nitrate/Nitrite-N	mg/L	10.9	10	2
		Sulfate	mg/L	907	250	3
		Total Dissolved Solids	mg/L	2,330	500	3
		Carbon Tetrachloride	µg/L	5	0.5	2
		14_DBMW50	(120-160)	Aluminum	µg/L	68.4
Manganese	µg/L			542	50	3
Selenium	µg/L			38.4	10	2
Chloride	mg/L			304	250	3
Nitrate/Nitrite-N	mg/L			22.2	10	2
Sulfate	mg/L			670	250	3
Total Dissolved Solids	mg/L			1,920	500	3
		Carbon Tetrachloride	µg/L	19	0.5	2

^aCalifornia Department of Toxic Substances Control

^bScreen interval (feet below ground surface)

^cThe most stringent federal/state drinking water standard was applied. In the presence of both an EPA MCL and a California MCL, the most stringent MCL is represented. If neither an EPA or California MCL is listed, the California DTSC action level was applied.

^dRegulatory Code:

- 1=EPA Primary MCL: Federally enforceable drinking water standard established for the health effects of contaminants
- 2=California MCL: Health-based drinking water standard enforceable at the state level
- 3=EPA Secondary MCL: Nonenforceable standard based on aesthetic qualities of taste, color, and odor (Includes chloride, iron, manganese, sulfate, and TDS)
- 4=DTSC Action Level: Nonenforceable levels at which DTSC strongly urges water purveyors to take corrective action to reduce the level of contamination in the water they supply (Action levels cease to exist when state MCLs are promulgated.)

Appendix B15

**Nature and Extent of Contamination:
Site 15 (OU-3) — Suspended Fuel Tanks**

Appendix B15
NATURE AND EXTENT OF SITE-SPECIFIC CONTAMINATION:
SITE 15 (OU-3) - SUSPENDED FUEL TANKS

This discussion of Site 15 is supplemented by the figures and data tables listed below. The figures begin on page B15-3, and the tables are grouped at the end of this Appendix B15. Field headspace values for soils at this site are presented in Table BA1-15, in Attachment 1 to Appendix B (directly following Appendix B22).

Figure B15-1: (Site Map)

Table B15-1: Types of Samples and Chemical Analyses

Table B15-2: Summary of Detected Chemicals in Sediments and Surface/Near-Surface Soil

Table B15-3: Summary of Detected Chemicals in Vadose Zone (Subsurface) Samples

Table B15-4: Well Construction Details

Table B15-5: Summary of Hydraulic Parameters

Table B15-6: Summary of Detected Chemicals in Groundwater Samples

Table B15-7: Analyte Concentrations in Groundwater Exceeding Regulatory Standards or DTSC Action Levels

B15.1 Site Description

Site 15 (OU-3) is a former suspended fuel tanks area. It is located north of Building 31 and west of Building 29. The site consists of one sampling stratum (Stratum 1), comprising the stained areas beneath and in the general area around the fuel tanks (Figure B15-1).

Two 500-gallon above-ground diesel fuel tanks were located here from approximately 1979 to mid-1984. Reportedly, diesel fuel leaked from the tank hoses and nozzles onto the ground during this entire period. Staining of the soil below and around the tanks has been noted in the past, although at present no staining is visible. It is estimated that 500 gallons of diesel fuel leaked onto the ground before the tanks were removed (1984).

B15.2 Suspected Waste Types and Contaminants

The contaminants of concern at Site 15 are diesel fuel, related petroleum compounds, and metals.

B15.3 Field Investigation

The field investigation for Site 15 consisted of drilling and sampling a deep boring completed as a monitoring well, and collecting surface and near-surface soil samples. The sampling stations, depths of sampling, and types of analyses requested are summarized in Table B15-1. Sampling was conducted in accordance with the *SAP Amendment*. Well 13_DGMW78 at Site 13 serves as an upgradient well for this site. Three shallow soil borings are randomly distributed in the single stratum.

B15.3.1 Surface Water and Sediments

(Surface water and sediment samples were not collected at this site.)

B15.3.2 Surface and Near-Surface Soils

Three shallow borings were drilled in Stratum 1 (15_GN1, 15_GN2, and 15_GN3); two shallow soil samples (15_UGS at 0 and 2 feet) were collected upgradient of the site; and one surface sample (15_DBS) was collected near the deep boring converted to a monitoring well.

B15.3.3 Vadose Zone Soils (Soil Borings)

Nine samples were collected in the deep boring converted to a well (15_DBMW51).

B15.3.4 Groundwater

One well, 15_DBMW51, was constructed at Site 15 in the middle of the larger of the two stained areas. In late 1992, a slug test was conducted and groundwater was sampled for water quality testing.

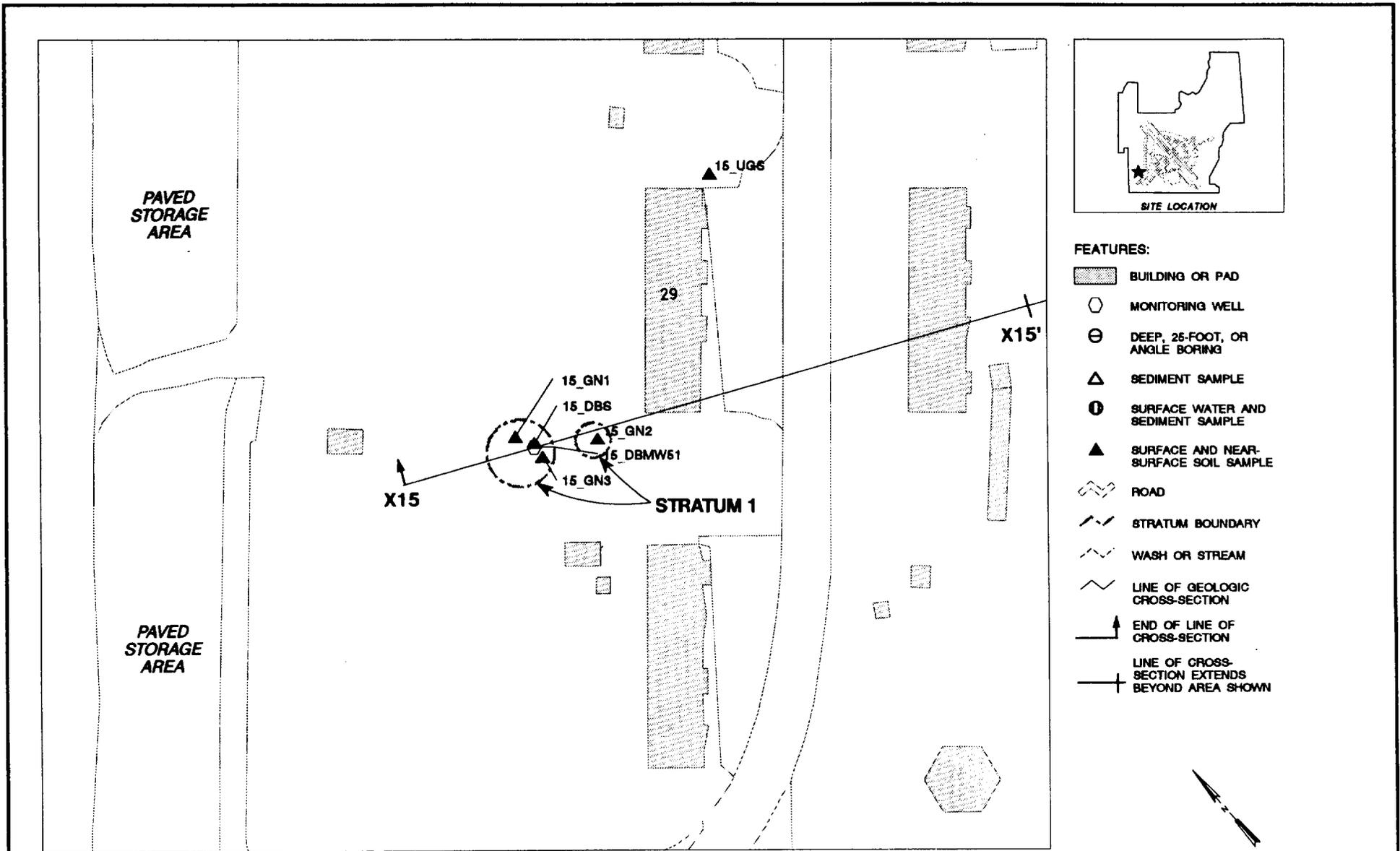


FIGURE B15-1

SITE 15 (OU-3): SUSPENDED FUEL TANKS

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B15.4 Surface Water and Sediments

(Surface water and sediment samples were not collected at this site.)

B15.5 Surface and Near-Surface Soils

B15.5.1 Description of Surface and Near-Surface Soil Samples

The surface soils are Sorrento loam series, characterized by 0 to 2 percent slopes typical of alluvial fans and flood plains (Wachtell, 1978). The permeability for this series ranges from 0.6 to 2.0 in./hr and the moisture-holding capacity is from 0.16 to 0.21 in./in. This soil is classified as Hydrologic Group B, which has a moderate water infiltration rate when saturated.

Samples were collected in the shallow borings at 0- and 2-foot depths. Station locations are shown in Figure B15-1. The 0- and 2-foot soil samples were screened in the field using organic vapor headspace values to determine whether a sample would be collected at 4 feet.

All surface and near-surface samples were analyzed for TRPH, TFH, VOCs, SVOCs, and metals. Soil vapor headspace concentrations are presented in Attachment 1 to Appendix B.

B15.5.2 Analytical Results and Soil Vapor Headspace Values

Analytical results are presented in Table B15-2; and soil vapor headspace values are listed in Attachment 1 to Appendix B.

B15.5.2.1 Upgradient Area

Two samples, at 0 and 2 feet below ground surface (bgs), were collected at the upgradient location. The shallow boring at upgradient station 15_UGS had an elevated concentration of petroleum hydrocarbons in the 0-foot sample (TRPH of 3,751 mg/kg). The TFH analyses for gasoline and diesel for this sample were

0.374 and 63.2 mg/kg, respectively. The 2-foot sample at 15_UGS does not show elevated TRPH or TFH.

VOCs were not detected in the upgradient soil samples except toluene, which was identified below the CRDL in the 0-foot sample.

One SVOC was detected: chrysene, at below the CRDL in the 0-foot sample.

Metals concentrations are shown in Table B15-2.

Headspace values were 0.8 ppmv at the surface and 4.0 ppmv at 2 feet bgs.

B15.5.2.2 Stratum 1: Stained Areas

Seven individual soil samples were taken from Stratum 1.

TRPH was detected at elevated levels in two samples: 1,233 mg/kg in 15_GN1 at 0 feet and 2,694 mg/kg in 15_GN3 at 0 feet. All other samples were below 1,000 mg/kg for TRPH. TFH-gasoline concentrations for the seven samples were below 1 mg/kg. TFH-diesel concentrations were below 100 mg/kg, with the exception of the sample at 15_GN3 at 0 feet, which had a TFH-diesel concentration of 2,780 mg/kg.

VOCs detected in Stratum 1 include acetone and methylene chloride. Acetone was detected in five samples at levels ranging from 5 to 59 $\mu\text{g}/\text{kg}$. Acetone is a demonstrated laboratory contaminant; the maximum detected concentration in the trip blanks is 37 $\mu\text{g}/\text{L}$. Methylene chloride was detected in both samples at Station 15_GN1 (52 and 45 $\mu\text{g}/\text{kg}$); it was also detected in the laboratory blank. Toluene was identified at levels below the CRDL in three of the samples, ranging from 2 to 4 $\mu\text{g}/\text{kg}$.

The only SVOC detected was benzyl butyl phthalate, at 1,200 $\mu\text{g}/\text{kg}$ in the 2-foot sample at 15_GN2. Bis(2-ethylhexylphthalate) was identified below the CRDL in this same sample.

Metals concentrations in the samples are presented in Table B15-2.

Headspace levels for the samples were primarily 0 ppmv, with the highest reading being 0.2 ppmv.

Analytical results indicate that Stratum 1 is contaminated with petroleum hydrocarbons in the upper 6 inches. Samples at the 2-foot depth do not show elevated petroleum concentrations.

B15.5.2.3 Other Surface Samples

One surface soil sample (15_DBS) was taken near the deep boring converted to a well.

TRPH was detected at 23,034 mg/kg in this sample; TFH-gasoline and TFH-diesel were detected at 21.1 and 8,530 mg/kg, respectively. The TRPH and TFH-diesel concentrations are above California LUFT action levels.

Acetone and methylene chloride were VOCs detected in the sample at 87 and 58 $\mu\text{g}/\text{kg}$, respectively. Methylene chloride was also detected in the lab blank run with the sample, and acetone is a demonstrated laboratory contaminant. Toluene was identified in the sample below the CRDL.

One SVOC was detected in the sample: phenanthrene was identified at levels below the CRDL.

Metals concentrations are presented in Table B15-2.

Headspace was 22.0 ppmv, measured with the organic vapor analyzer (OVA).

B15.6 Vadose Zone Soils

B15.6.1 Description of Subsurface Soil Samples

Drive samples were taken in the deep boring monitoring well at 5-foot intervals to 25 feet bgs, then every 10 feet to 60 feet bgs, then every 20 feet to the water table. Nine samples were submitted for chemical analysis. (See Table B15-1 for sample depths and specific analyses requested.)

All vadose zone samples were analyzed for VOCs, SVOCs, TRPH, TFH-gasoline, TFH-diesel, and metals, except the sample from the screened interval, which was analyzed only for VOCs and TOC.

B15.6.2 Subsurface Geology

Site 15 overlies approximately 575 feet of unconsolidated Quaternary sediments, which in turn overlie the semiconsolidated bedrock of the Irvine Area Groundwater Basin (see Figure 3-2, Bedrock Elevation Map). From youngest to oldest, the Quaternary sediments are differentiated into Holocene alluvial and colluvial deposits, primarily coarse stream channels within a matrix of finer overbank deposits, and Pleistocene beach-lagoonal and near-shore deposits (SAP, 1991).

Soils encountered during drilling at Site 15 are composed mainly of silt with varying amounts of sand and clay. (See soil boring logs, Appendix K, for detailed lithologic descriptions.) Several silty sand lenses were encountered, and these are shown on the geologic cross section (Figure B15-2). The cross section shows a predominantly fine-grained, low-permeability matrix containing four sand stringers or lenses. The sand lenses appear to be continuous to Site 13, located approximately 400 feet southeast of Site 15.

B15.6.3 Analytical Results

Hydrocarbons (TRPH, TFH). Petroleum hydrocarbons were detected only in the 5-foot sample in Well 15_DBMW51. This sample has a TRPH concentration of

1,377 mg/kg, a TFH-diesel concentration of 2,540 mg/kg, and a TFH-gasoline concentration of 4.44 mg/kg. Petroleum hydrocarbons were below the CRDL for all other samples.

Volatile Organic Compounds (VOCs). Five VOCs were detected in the vadose zone samples; carbon disulfide was detected at a concentration of 14 $\mu\text{g}/\text{kg}$ in the 10-foot sample. Carbon disulfide, toluene, 2-butanone, xylene (total), and acetone were also identified below the CRDL in various vadose zone samples.

Semivolatile Organic Compounds (SVOCs). SVOCs were not detected.

Metals. Metals concentrations are presented in Table B15-3.

Total Organic Carbon (TOC). The soil sample from the well screen interval (just below the water table) had 100 mg/kgw (estimated) of TOC.

B15.6.4 Soil Vapor Headspace Concentrations

Soil vapor headspace values, as measured with the OVA, are shown contoured on the geologic cross section (Figure B15-2); measured values are in Attachment 1 to Appendix B. Elevated headspace values occurred near the ground surface in the upper 5 feet of soil and in the zone between the water table and 30 feet above the water table.

Headspace was also measured with an HNu photo-ionization detector in the field (not shown on the figure); the data results are in Attachment 1. Headspace levels are also elevated at the surface; however, unlike the OVA values, HNu readings peak at 200 to 210 ppmv between 60 and 70 feet bgs. Neither the OVA or HNu readings correlated well with the laboratory analysis of soil samples.

B15.7 Groundwater

B15.7.1 Site-Specific Hydrogeology

The water table elevation at Well 15_DBMW51 is shown on the geologic cross section (Figure B15-2). The depth to water is approximately 130 feet bgs. The well is screened across the water table, with a 40-foot screen. Well construction details are in Table B15-4. The hydraulic gradient at the site, estimated from wells at Sites 13, 14 and 15, is approximately 0.008 ft/ft toward the northwest (see Figure 2-A, Section 2).

A slug test was conducted on 15_DMMW51. Analysis of the aquifer test data is presented in Appendix F, and hydraulic parameters are summarized in Table B15-5. The transmissivity and hydraulic conductivity are estimated to be 20 ft²/day and 0.52 ft/day, respectively. These measured values are within the typical range for silt and silty sand (Freeze and Cherry, 1979), and are also consistent with lithologies logged during drilling.

From the measured hydraulic conductivity, the average linear groundwater velocity is estimated to be 0.01 ft/day, assuming a porosity of 30 percent (Freeze and Cherry, 1979).

B15.7.2 Analytical Results

Groundwater was analyzed for general water chemistry, TPH, TFH, VOCs, SVOCs, pesticides, PCBs, metals, and cyanide. Detected compounds are presented in Table B15-6.

General Chemistry. The general chemistry of the groundwater at Site 15 is presented in Table B15-6. The anion/cation balance for the water samples is within 5 percent, indicating a reasonable degree of consistency in the analysis. Calcium is the dominant cation and chloride is the dominant anion. There is a shift in the dominant anion at this site from calcium sulfate dominated waters upgradient at Sites 13 and 14. The level of total dissolved solids (TDS) is also

high at Site 15, and it appears that calcium chloride and magnesium show an increase corresponding to the rise in TDS. Field pH of the groundwater was 6.8; field electrical conductivity (EC) was 7,000 $\mu\text{mhos/cm}$.

Hydrocarbons (TRPH, TFH). TRPH was not detected in the groundwater; however, TFH-diesel and TFH-gasoline were detected at 3,370 and 348 $\mu\text{g/L}$, respectively.

Volatile Organic Compounds (VOCs). Two VOCs were detected in the groundwater sample: benzene at 120 $\mu\text{g/L}$, and xylene at 36 $\mu\text{g/L}$.

Semivolatile Organic Compounds (SVOCs). SVOCs were not detected.

Pesticides and Polychlorinated Biphenyls (PCBs). Pesticides and PCBs were not detected.

Metals and Cyanide. Metals and their detected concentrations are listed in Table B15-6. Cyanide was not detected.

B15.7.3 Comparison with Drinking Water Standards

Analytical results were compared to the most stringent of the following three drinking water guidelines: EPA maximum contaminant levels (MCLs), California MCLs, and California action levels.

Table B15-7 lists the analytes detected at concentrations that exceed these guidelines.

B15.8 Potential Contaminant Migration Pathways

Surface water runoff from Site 15 does not appear to be a very significant contaminant migration pathway because the site topography is relatively flat and there are no discrete drainage ways. However, during storms it is possible for contaminated surface soils to be transported as sheet flow to storm sewers and into Marshburn Channel.

The more likely contaminant migration pathway at Site 15 (an unpaved site) is downward vertical migration of water through the vadose zone and into the groundwater.

B15.9 Summary and Conclusions

There does not appear to be significant VOC, SVOC, or metals contamination in soils at the site. The upper 5 feet of soil in the larger stained area at Site 15 is contaminated with petroleum hydrocarbons, mainly diesel. The smaller stained area does not have elevated levels of petroleum hydrocarbons.

Groundwater beneath the site is contaminated with petroleum hydrocarbons. Because petroleum contamination in soil is limited to the upper 5 feet, Site 15 does not appear to be the source of this contamination. A potential source may be the Tank Farm 2 upgradient of the site, near Site 13.

TCE was not detected in the groundwater or in any of the soil samples at the site.

Benzene and xylene in the groundwater also do not appear to be associated with Site 15 activities, because of their absence in vadose zone samples. The benzene and xylene at Site 15 appear to be extending from near Site 13, where concentrations of benzene are as high as 730 $\mu\text{g/L}$.

The high TDS levels suggest that groundwater at, or slightly upgradient of, Site 15 has been contaminated by high levels of salts. General chemistry results indicate that the groundwater is enriched with calcium and possibly magnesium chloride when compared with upgradient waters. However, it does not appear that Site 15 has had any impact on the general water quality of the regional groundwater.

Site 15 is not a potential source for the observed regional groundwater VOC contamination.

**Table B15-1
Site 15 (OU-3): Types of Samples and Chemical Analyses
MCAS El Toro Phase I RI Technical Memorandum**

Location/ Stratum	Station Identifi- cation	Sample Identifi- cation	Sample Depth (ft)	Groups of Analytes Requested ^a											
				VOCs	Semi- VOCs	Pesti- cides/ PCBs	Herbi- cides	TPH	TFH	Metals	CN	Genl. Chem- istry	TOC	Dioxins/ Furans	Gross Alpha/ Beta
Surface Water and Sediments (Not sampled)															
Surface and Near-Surface Soils															
	15_UGS	S1454265 S1454266	0 2	X X	X X			X X	X X	X X					
	15_DBS	S1454284	0	X	X			X	X	X					
Stratum 1	15_GN1	S1454267	0	X	X			X	X	X					
		S1454269	2	X	X			X	X	X					
	15_GN2	S1454274	0	X	X			X	X	X					
		S1455276	2	X	X			X	X	X					
		S1454501	2	X	X			X	X	X					
	15_GN3	S1454279	0	X	X			X	X	X					
		S1454281	2	X	X			X	X	X					
Vadose Zone Soils															
	15_DBMW51	S1456235	5	X	X	X			X	X	X				
		S1456236	10	X	X	X			X	X	X				
		S1456237	15	X	X	X			X	X	X				
		S1456238	20	X	X	X			X	X	X				
		S1456239	25	X	X	X			X	X	X				
		S1456240	50	X	X	X			X	X	X				
		S1456241	60	X	X	X			X	X	X				
		S1456242	100	X	X	X			X	X	X				
		S1456234	130	X										X	
Groundwater															
	15_DBMW51	S1452088		X	X	X		X	X	X	X	X _c			
^a VOCs = Volatile Organic Compounds; Semi-VOCs = Semivolatile Organic Compounds; PCBs = Polychlorinated Biphenyls; TPH = Total Recoverable Petroleum Hydrocarbons; TFH = Total Fuel Hydrocarbons; CN = Total Cyanide; TOC = Total Organic Carbon.															
^b Duplicate															
^c Inorganics															

Table B15-2

Site15 (OU- 3): Summary of Detected Chemicals in Sediments and Surface/Near-Surface Soil

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	15_DBS S1454284 (0)	DVF(a)	15_GN1 S1454267 (0)	DVF(a)	15_GN1 S1454269 (2)	DVF(a)	15_GN2 S1454274 (0)	DVF(a)	15_GN2 S1454278 (2)	DVF(a)	15_GN2 S1454501 (2)	DVF(a)	15_GN3 S1454279 (0)	DVF(a)	15_GN3 S1454281 (2)	DVF(a)
METALS																	
SILVER	MG/KG	0.79	b	0.45	U	0.45	U	0.43	U	0.47	U	0.47	U	0.45	U	0.47	U
ALUMINIUM	MG/KG	5720		6230		5620		4870		13400		10800		9160		18300	
ARSENIC	MG/KG	2.9		2.5		1.4	b	3.5		2.7		3.4		2.9		2.6	
BARIUM	MG/KG	94.4		83		80.9		51		153		142		119		149	
BERYLLIUM	MG/KG	0.3	b	0.29	b	0.3	b	0.15	b	0.46	b	0.28	b	0.21	b	0.58	b
CALCIUM	MG/KG	4790		4390		2840		4330		8850		6880		4700		7810	
CADMIUM	MG/KG	1	b	1	b	0.53	b	0.84	b	0.99	b	0.9	b	1.6		1.2	
COBALT	MG/KG	3.3	b	3.2	b	2.5	b	4.1	b	7.5	b	5.8	b	4.8	b	7.7	b
CHROMIUM	MG/KG	30.9		13		5.8		6.5		12.2		10.9		28.1		14.8	
COPPER	MG/KG	13.8		15		4.8	b	7.5		10.3		8.4		9.6		9.1	
IRON	MG/KG	9940		10600		8300		8000		17900		15000		13200		20200	
MERCURY	MG/KG	0.03	U	0.07	U	0.03	U										
POTASSIUM	MG/KG	2890		2550		3010		1220		5020		4680		3100		5350	
MAGNESIUM	MG/KG	3590		3430		3430		2200		7820		6430		4390		6990	
MANGANESE	MG/KG	169		168		165		122		288		260		194		288	
SODIUM	MG/KG	258	b	231	b	184	b	226	b	282	b	269	b	292	b	455	b
NICKEL	MG/KG	15		10.5		4.7	b	10.9		6.7	b	6.8	b	9.8		8.6	b
LEAD	MG/KG	30.4		18.3		1.5		6.9		3.3		12.7		34.5		9.8	
SELENIUM	MG/KG	0.19	b	0.25	b	0.11	U	0.11	U	0.2	U	0.2	U	0.17	U	0.18	U
THALLIUM	MG/KG	0.15	U	0.15	U	0.17	U	0.14	U	0.32	b	0.33	b	0.15	b	0.31	b
VANADIUM	MG/KG	24		25.4		19.3		25.3		41.7		35.2		28.8		46.7	
ZINC	MG/KG	61.5		68.2		30.4		31.4		71.1		51.8		57.5		56.9	
VOLATILE ORGANIC COMPOUNDS																	
TOLUENE	UG/KG	3	J	3	J	11	U	10	U	11	U	10	U	2	J	4	J
ACETONE	UG/KG	87		55		59		18		11	U	5	J	19		11	U
METHYLENE CHLORIDE	UG/KG	58	B	52	B	45	B	37	U	1	U	10	U	11	U	11	U
SEMI-VOLATILE ORGANIC COMPOUNDS																	
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	21000	UJ	710	U	720	U	670	U	740	U	370	J	750	U	740	U
CHRYSENE	UG/KG	21000	UJ	710	U	720	U	670	U	740	U	670	U	750	U	740	U
PHENANTHRENE	UG/KG	5300	J	710	U	720	U	670	U	740	U	670	U	750	U	740	U
BENZYL BUTYL PHTHALATE	UG/KG	21000	UJ	710	U	720	U	670	U	740	U	1200		750	U	740	U
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																	
TFH DIESEL	MG/KG	8530		58		13.5	U	17.7	J	22.8	J	12.6	UJ	2780	J	48.3	J
TFH GASOLINE	MG/KG	21.1		0.122		0.128		0.05	U	0.056	U	0.051	U	0.99		0.124	
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																	
TRPH	MG/KG	23034		1233		74		555		20	U	20	U	2694		229	

Table B15-2

Site15 (OU- 3): Summary of Detected Chemicals in Sediments and Surface/Near-Surface Soil

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	15_UGS S1484288 (0)	DVF(a)	15_UGS S1484288 (2)	DVF(a)															
METALS																				
SILVER	MG/KG	0.44	U	0.49	U															
ALUMINIUM	MG/KG	4470		11100																
ARSENIC	MG/KG	3.1		3																
BARIIUM	MG/KG	81.2		157																
BERYLLIUM	MG/KG	0.18	b	0.36	b															
CALCIUM	MG/KG	4850		9530																
CADMIUM	MG/KG	0.76	b	0.66	b															
COBALT	MG/KG	3.5	b	5.4	b															
CHROMIUM	MG/KG	9		10.3																
COPPER	MG/KG	10.5		7																
IRON	MG/KG	8800		15200																
MERCURY	MG/KG	0.35		0.03	U															
POTASSIUM	MG/KG	1450		4520																
MAGNESIUM	MG/KG	2660		6780																
MANGANESE	MG/KG	180		247																
SODIUM	MG/KG	252	b	393	b															
NICKEL	MG/KG	11.9		7.8	b															
LEAD	MG/KG	23.5		2.1																
SELENIUM	MG/KG	0.1	U	0.14	b															
THALLIUM	MG/KG	0.15	U	0.18	U															
VANADIUM	MG/KG	21.2		35.8																
ZINC	MG/KG	46.4		47.1																
VOLATILE ORGANIC COMPOUNDS																				
TOLUENE	UG/KG	3	J	12	U															
ACETONE	UG/KG	32	U	14	U															
METHYLENE CHLORIDE	UG/KG	10	U	12	U															
SEMI-VOLATILE ORGANIC COMPOUNDS																				
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	680	U	770	U															
CHRYSENE	UG/KG	210	J	770	U															
PHENANTHRENE	UG/KG	680	U	770	U															
BENZYL BUTYL PHTHALATE	UG/KG	680	U	770	U															
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																				
TFH DIESEL	MG/KG	63.2		14.6	U															
TFH GASOLINE	MG/KG	0.374		0.058	U															
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																				
TRPH	MG/KG	3751		71																

(a) A definition of each data validation flag (DVF) is provided in Table B-1.

Table B15-3

Site15 (OU- 3): Summary of Detected Chemicals in the Vadose Zone (Subsurface) Samples

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	15_DBMW51 S1456235 (5)	DVF(a)	15_DBMW51 S1456236 (10)	DVF(a)	15_DBMW51 S1456237 (15)	DVF(a)	15_DBMW51 S1456238 (20)	DVF(a)	15_DBMW51 S1456239 (25)	DVF(a)	15_DBMW51 S1456240 (50)	DVF(a)	15_DBMW51 S1456241 (60)	DVF(a)	15_DBMW51 S1456242 (100)	DVF(a)
GENERAL CHEMISTRY																	
TOTAL ORGANIC CARBON	MG/KG	-		-		-		-		-		-		-		-	
METALS																	
ALUMINIUM	MG/KG	11300		20500		4190		14600		12400		6140		3000		3180	
ARSENIC	MG/KG	3.5		3.1		2.1	b	3.1		3.5		1.7	b	0.53	b	1.2	b
BARIUM	MG/KG	146		396		60.7		219		184		74.3		52.2		67.7	
BERYLLIUM	MG/KG	0.29	b	0.71	b	0.13	b	0.37	b	0.36	b	0.26	b	0.11	U	0.11	U
CALCIUM	MG/KG	4500		9970		7120		6090		10000		1580		677		1970	
CADMIUM	MG/KG	1.2		1.7		0.83	b	1.5		1.7		0.54	b	0.38	b	1.1	b
COBALT	MG/KG	5.5	b	9.3	b	2.4	b	7.1	b	7.2	b	2.3	b	1.4	b	1.6	b
CHROMIUM	MG/KG	13.6		19.4		4.7		14.5		13.7		8.1		3.2		3.9	
COPPER	MG/KG	9.5		14.1		3.3	b	10.6		10.8		4.7	b	2	b	3	b
IRON	MG/KG	15500		26300		6700		19800		18000		9360		4280		4930	
POTASSIUM	MG/KG	4780		7140		1870		5130		5320		1740		941	b	1150	
MAGNESIUM	MG/KG	6000		13200		3680		9080		8420		2710		1150		1910	
MANGANESE	MG/KG	266		416		142		317		309		142		106		145	
SODIUM	MG/KG	280	b	2350		537	b	1960		1990		865	b	356	b	266	b
NICKEL	MG/KG	7.9	b	14.3		4.2	b	8.2	b	10		2.1	b	2.3	b	3.9	b
LEAD	MG/KG	4.7		3.6		1.5		3.2		3		3.4		0.96		0.97	
ANTIMONY	MG/KG	3.5	b	3	U	2.6	U	2.9	U	3.7	b	2.8	U	2.6	U	2.7	U
THALLIUM	MG/KG	0.2	b	0.48	b	0.15	b	0.31	b	0.29	b	0.21	b	0.15	U	0.16	U
VANADIUM	MG/KG	34.5		54.7		18.5		43.9		46.5		23		11.6		15.3	
ZINC	MG/KG	69.5		81.7		21.5		60.8		61.4		24.1		11.1		16.7	
VOLATILE ORGANIC COMPOUNDS																	
TOLUENE	UG/KG	4	J	3	J	11	U	12	U	12	U	12	U	11	U	12	U
XYLENE (TOTAL)	UG/KG	3	J	13	U	11	U	12	U	12	U	12	U	11	U	12	U
ACETONE	UG/KG	50	U	13	U	11	U	12	U	38	U	12	U	26	U	10	J
CARBON DISULFIDE	UG/KG	11	UB	14		5	J	12	U	3	J	12	U	11	U	12	U
2-BUTANONE	UG/KG	4	J	8	J	4	J	5	J	12	U	4	J	4	J	12	U
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																	
TFH DIESEL	MG/KG	2540		16.4	U	13.4	U	15.3	U	15.1	U	14.6	U	13.2	U	14.4	U
TFH GASOLINE	MG/KG	4.44		0.065	U	0.054	U	0.061	U	0.06	U	0.059	U	0.053	U	0.058	U
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																	
TRPH	MG/KG	1377		20	U	20	U										

Table B15-3

Site15 (OU- 3): Summary of Detected Chemicals in the Vadose Zone (Subsurface) Samples

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	15_DBMW51 S1456234 (130)	DVF(a)																	
GENERAL CHEMISTRY																				
TOTAL ORGANIC CARBON	MG/KG	100	J																	
METALS																				
ALUMINIUM	MG/KG	-																		
ARSENIC	MG/KG	-																		
BARIUM	MG/KG	-																		
BERYLLIUM	MG/KG	-																		
CALCIUM	MG/KG	-																		
CADMIUM	MG/KG	-																		
COBALT	MG/KG	-																		
CHROMIUM	MG/KG	-																		
COPPER	MG/KG	-																		
IRON	MG/KG	-																		
POTASSIUM	MG/KG	-																		
MAGNESIUM	MG/KG	-																		
MANGANESE	MG/KG	-																		
SODIUM	MG/KG	-																		
NICKEL	MG/KG	-																		
LEAD	MG/KG	-																		
ANTIMONY	MG/KG	-																		
THALLIUM	MG/KG	-																		
VANADIUM	MG/KG	-																		
ZINC	MG/KG	-																		
VOLATILE ORGANIC COMPOUNDS																				
TOLUENE	UG/KG	12	U																	
XYLENE (TOTAL)	UG/KG	12	U																	
ACETONE	UG/KG	12	U																	
CARBON DISULFIDE	UG/KG	12	U																	
2-BUTANONE	UG/KG	12	U																	
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																				
TFH DIESEL	MG/KG	-																		
TFH GASOLINE	MG/KG	-																		
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																				
TRPH	MG/KG	-																		

(a) A definition of each data validation flag (DVF) is provided in Table B-1.

**Table B15-4
Site 15 (OU-3): Well Construction Details
MCAS EI Toro Phase I RI Technical Memorandum**

Item	Station Identification
	15_DBMW51
Survey Location--Northing	552218.90
Survey Location--Easting	1545914.95
Ground Surface Elevation (ft above MSL ^a)	269.72
Measuring Point Elevation (ft above MSL ^a)	269.26
Measuring Point Location	Top of Casing
Type of Surface Completion	Below ground
Casing Diameter and Material	4" Schedule 40 PVC
Screen Diameter and Material	4" Stainless Steel
Screen Interval (ft bgs ^b)	125-165
Length of Drop Pipe (ft bgs ^b)	162
Make and Model of Installed Pump	Grundfos Rediflow 2
Date of Pumping Test	Slug tested 22 Oct 92
Date of Water Quality Sampling	04 Dec 92
^a Mean sea level ^b Below ground surface	

<p align="center">Table B15-5 Site 15 (OU-3): Summary of Hydraulic Parameters MCAS El Toro Phase I RI Technical Memorandum</p>						
Well Identification	Type of Test	Analysis Method	Transmissivity (ft²/day)	Hydraulic Conductivity (ft/day)	Storage Coefficient^a	Leakance Factor^a
15_DBMW51	Slug test	Bouwer and Rice (1976); Bouwer (1989)	20	0.52	NA	NA
<p>^aNA = Not applicable. Source: Table F-2 (Appendix F)</p>						

Table B15-6

Site15 (OU- 3): Summary of Detected Chemicals in Groundwater Samples

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SCREEN INTERVAL ANALYTE BY GROUP	REG.CODE(b)	REG.LEVEL(c)	UNITS	15_DBMW51 S1452088 (125-165)	DVF(a)
GENERAL CHEMISTRY					
ALKALINITY AS CaCO3	NA	NA	MG/L	252	
CARBONATE	NA	NA	MG/L	-	
BICARBONATE	NA	NA	MG/L	307	
CHLORIDE	3	250	MG/L	1570	
SULFATE	3	250	MG/L	1470	
NITRATE/NITRITE-N	1	10	MG/L	63.4	
TOTAL DISSOLVED SOLIDS	3	500	MG/L	5260	
METALS					
BARIUM	2	2000	UG/L	38.3	b
CALCIUM	NA	NA	UG/L	869000	
CADMIUM	2	5	UG/L	3.9	b
IRON	3	300	UG/L	69.8	b
POTASSIUM	NA	NA	UG/L	7200	
MAGNESIUM	NA	NA	UG/L	351000	
MANGANESE	3	50	UG/L	296	
SODIUM	NA	NA	UG/L	244000	
NICKEL	NA	NA	UG/L	13.6	b
ANTIMONY	NA	NA	UG/L	40.7	b
SELENIUM	1	10	UG/L	108	
VANADIUM	NA	NA	UG/L	18.7	b
ZINC	2	5000	UG/L	232	
VOLATILE ORGANIC COMPOUNDS					
XYLENE (TOTAL)	NA	NA	UG/L	36	
BENZENE	1	1	UG/L	120	D
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)					
TFH DIESEL	NA	NA	UG/L	3370	
TFH GASOLINE	NA	NA	UG/L	348	

(a) A definition of each data validation flag (DVF) is provided in Table B-1.

(b) Regulatory Codes are:

- 1 = California MCL
- 2 = EPA primary MCL
- 3 = EPA secondary MCL
- 4 = California DTSC Action Level

(c) The given concentration represents the California MCL, the EPA primary MCL, the EPA secondary MCL, or the California DTSC Action Level, whichever is most stringent.

Table B15-7
Site 15 (OU-3): Analyte Concentrations in Groundwater
Exceeding Regulatory Standards or DTSC^a Action Levels
MCAS El Toro Phase I RI Technical Memorandum

Well Identification	SI (ft bgs) ^b	Analyte	Units	Concentration	Regulatory Level ^c	Regulatory Code ^d
15_DBMW51	(125-165)	BENZEN	UG/L	120	1	2
		MANGANESE	UG/L	296	50	3
		SELENIUM	UG/L	108	10	2
		CHLORIDE	MG/L	1570	250	3
		NITRATE/NITRITE-N	MG/L	63.4	10	2
		SULFATE	MG/L	1470	250	3
		TOTAL DISSOLVED SOLIDS	MG/L	5260	500	3

^aCalifornia Department of Toxic Substances Control

^bScreen interval (feet below ground surface)

^cThe most stringent federal/state drinking water standard was applied. In the presence of both an EPA MCL and a California MCL, the most stringent MCL is represented. If neither an EPA or California MCL is listed, the California DTSC action level was applied.

^dRegulatory Code:

- 1=EPA Primary MCL: Federally enforceable drinking water standard established for the health effects of contaminants
- 2=California MCL: Health-based drinking water standard enforceable at the state level
- 3=EPA Secondary MCL: Nonenforceable standard based on aesthetic qualities of taste, color, and odor (includes chloride, iron, manganese, sulfate, and TDS)
- 4=DTSC Action Level: Nonenforceable levels at which DTSC strongly urges water purveyors to take corrective action to reduce the level of contamination in the water they supply (Action levels cease to exist when state MCLs are promulgated.)

Appendix B16

**Nature and Extent of Contamination:
Site 16 (OU-3) — Crash Crew Pit No. 2**

Appendix B16
NATURE AND EXTENT OF CONTAMINATION:
SITE 16 (OU-3): CRASH CREW PIT NO. 2

This discussion of Site 16 is supplemented by the figures and data tables listed below. The figures begin on page B16-3, and the tables are grouped at the end of this Appendix B16. Field headspace values for soils at this site are presented in Table BA1-16, in Attachment 1 to Appendix B (directly following Appendix B22).

Figure B16-1: (Site Map)

Figure B16-2: Geologic Cross Section

Table B16-1: Types of Samples and Chemical Analyses

Table B16-2: Summary of Detected Chemicals in Sediments and Surface/Near-Surface Soil

Table B16-3: Summary of Detected Chemicals in Vadose Zone (Subsurface) Samples

Table B16-4: Well Construction Details

Table B16-5: Summary of Hydraulic Parameters

Table B16-6: Summary of Detected Chemicals in Groundwater Samples

Table B16-7: Analyte Concentrations in Groundwater Exceeding Regulatory Standards or DTSC Action Levels

B16.1 Site Description

Site 16, the Crash Crew Pit No. 2, is near the center of the air field, near the intersection of Runways 34-16 and 25-07. A small drainage channel runs along Runway 21-30 to the northwest that eventually discharges into Bee Canyon Wash (Figure B16-1). The site consists of three strata:

- Stratum 1: The Disturbed-Earth Area (including two filled-in pits)
- Stratum 2: The Main Fire-Fighting Pit
- Stratum 3: The Drainage Channel (along the western boundary)

From 1972 to 1985, three pits in this area were used for Crash Crew practice and training in extinguishing aircraft fires. The main pit, used for larger fire-fighting training exercises, was about 50 to 60 feet in diameter and 3 feet deep. This main pit was periodically filled with water, and covered with various mixtures of residual waste fuels

and fluids; the mixture was then ignited. The main pit was connected by a drain pipe to a secondary pit about 40 feet away, which was about 12 by 35 feet, and 4 to 5 feet deep; this secondary pit stored the residual liquids from the main pit. The third pit was smaller (about 10 feet by 3 feet) and was used for practicing with hand-held fire extinguishers.

B16.2 Suspected Waste Types and Contaminants

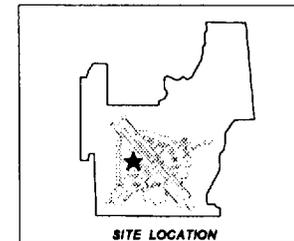
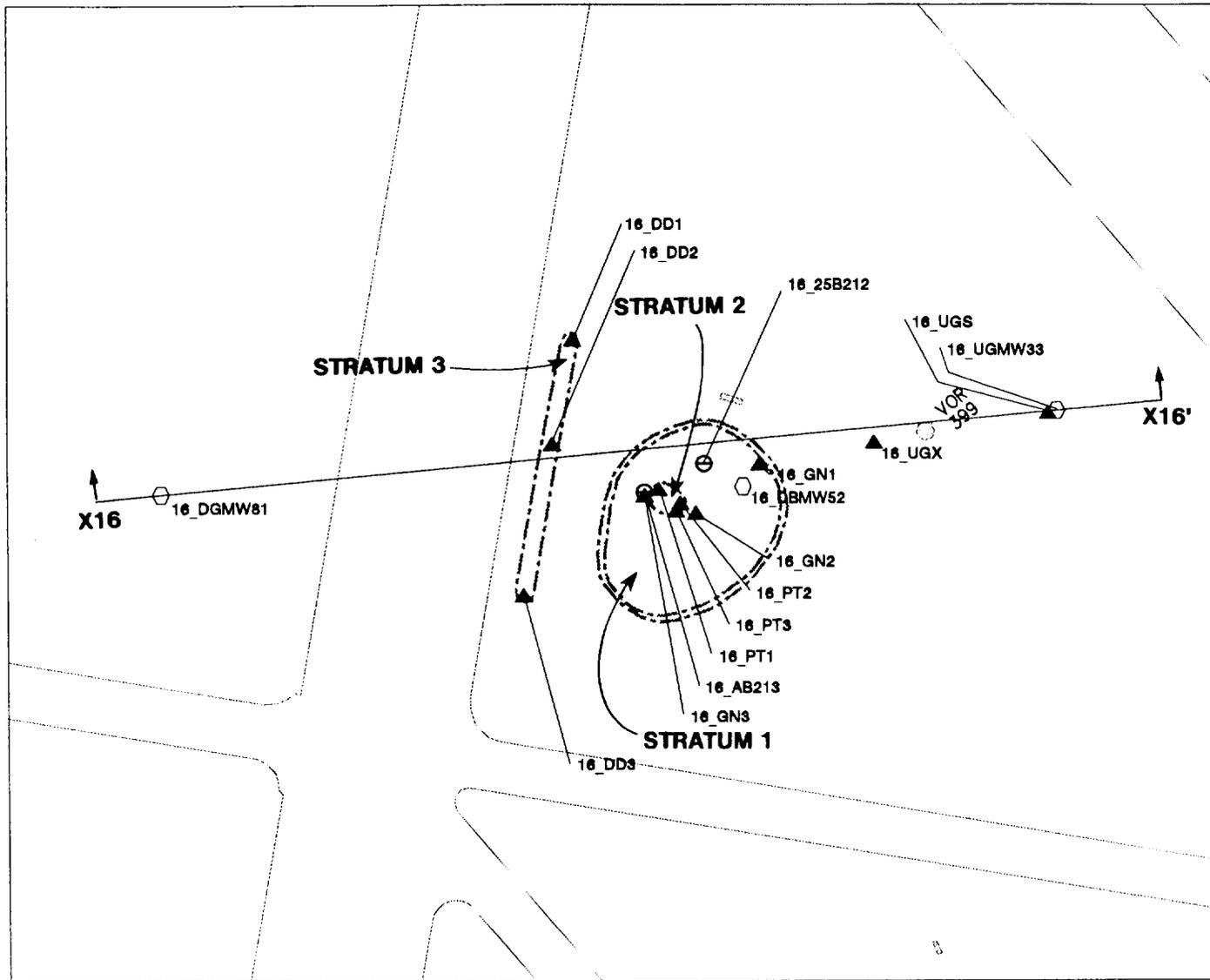
Previous investigators estimated that about 275,000 gallons of residual fluids (various mixtures of JP-5 fuel, leaded aviation gasoline, hydraulic fluid and crankcase oil waste) were placed in these fire-fighting training pits. These estimates are based on assumed application rates and the frequency of training exercises. Small quantities of napalm, white phosphorus, and magnesium phosphate were also reported burned at this site, but were probably completely consumed in the fire. Because of fuel and waste oil burning, Site 16 is a suspected source of contamination, primarily from hydrocarbons.

B16.3 Field Investigation

Field investigations consisted of the collection of 27 surface and near-surface samples, collection of 22 subsurface (vadose zone) soil samples, and the installation and sampling of 3 monitoring wells. The locations of soil sampling stations and monitoring wells are shown on Figure 16-1. Table B16-1 lists the samples collected by medium, depth, and the analyses requested.

Every soil sample was initially tested for VOCs in the field using the headspace technique and an HNu photo-ionization detector or flame ionization detector (OVA). Results of headspace testing are described in detail below and presented in Table BA1-16.

Changes to the original *SAP* and *SAP Amendment* included moving the locations of two monitoring wells. These relocations were based on new water level information from recently completed wells at other sites, which showed that groundwater flow was northwest (rather than west, as had been previously estimated). It was therefore



- FEATURES:**
- BUILDING OR PAD
 - MONITORING WELL
 - DEEP, 25-FOOT, OR ANGLE BORING
 - SEDIMENT SAMPLE
 - SURFACE WATER AND SEDIMENT SAMPLE
 - SURFACE AND NEAR-SURFACE SOIL SAMPLE
 - ROAD
 - STRATUM BOUNDARY
 - WASH OR STREAM
 - LINE OF GEOLOGIC CROSS-SECTION
 - END OF LINE OF CROSS-SECTION
 - LINE OF CROSS-SECTION EXTENDS BEYOND AREA SHOWN

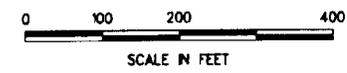
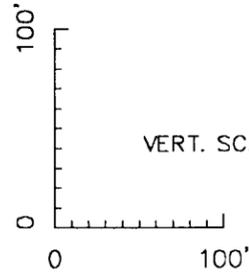
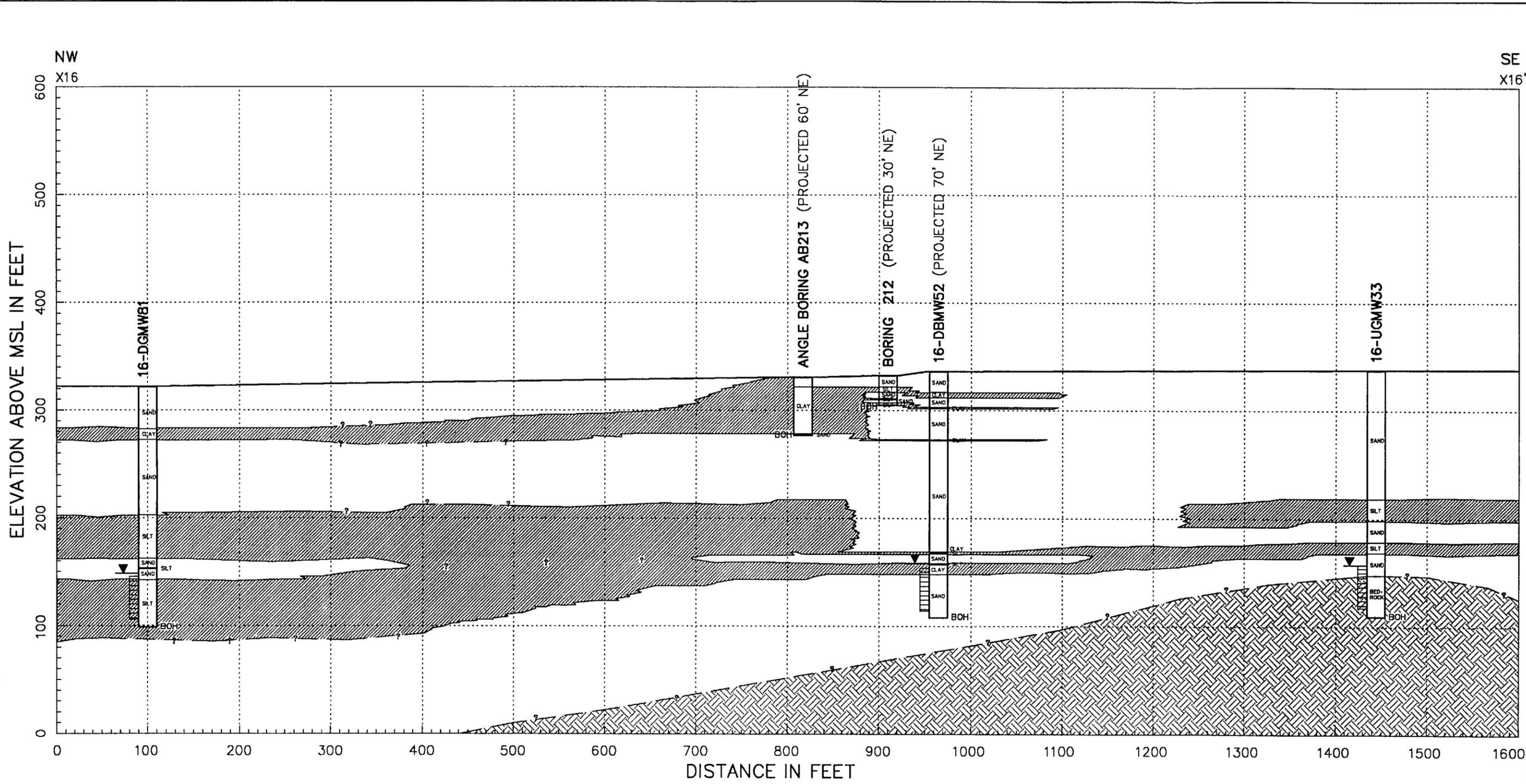


FIGURE B16-1
SITE 16 (OU-3): CRASH CREW PIT NO. 2
 MCAS EL TORO PHASE I RI TECHNICAL MEMORANDUM

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- LEGEND**
- UNCONSOLIDATED PERMEABLE SEDIMENTS
 - UNCONSOLIDATED LOW-PERMEABILITY SEDIMENTS
 - SEMICONSOLIDATED LOW-PERMEABILITY SEDIMENTS
 - BOH BOTTOM OF HOLE
 - WELL SCREEN INTERVAL
 - WATER LEVEL ELEVATION, DECEMBER 1992

FIGURE B16-2
 SITE 16 (OU-3)
 GEOLOGIC CROSS SECTION X16-X16'
 MCAS EL TORO PHASE I RI
 TECHNICAL MEMORANDUM

PAGE NUMBER BIG-6

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advantageous to move the upgradient Well (16_UGMW33) 200 feet southwest and the downgradient Well (16_DGMW81) about 500 feet northwest.

Changes to the shallow soil sampling plan were:

- Addition of one upgradient location (16_UGX) because of the upgradient well relocation.
- Analysis of shallow soil samples at 0 and 2 feet from 16_UGMW33 for the standard soil suite rather than for metals only

The following subsections summarize the field investigation at Site 16.

B16.3.1 Surface Water and Sediments

No surface water or sediment samples were collected at this site.

B16.3.2 Surface and Near-Surface Soils

Surface and near-surface soil samples were collected from the three strata and at upgradient locations, as shown on Figure B16-1. Table B16-1 presents sampling station and sample identification numbers and the depth of each sample. A total of 27 samples were collected at eleven sampling stations:

- Stratum 1 (16_GN1, 16_GN2, 16_GN3)
- Stratum 2 (16_PT1, 16_PT2, 16_PT3)
- Stratum 3 (16_DD1, 16_DD2, 16_DD3)
- Upgradient (16_UGX, 16_UGS)

B16.3.3 Vadose Zone Soils (Soil Borings)

A total of five vadose zone soil samples were collected at five stations:

- 16_25B212 (25-foot soil boring)
- 16_AB213 (angle boring)
- 16_UGMW33 upgradient monitoring well

- 16_DBMW52 (deep boring/monitoring well)
- 16_DGMW81 (downgradient monitoring well)

Section B16.6 presents the physical descriptions and laboratory analyses of the vadose zone samples. Table 16-1 presents the depths at which samples were collected.

B16.3.4 Groundwater Monitoring Wells

Groundwater investigations consisted of the installation and sampling of three monitoring wells. 16_UGMW33 is an upgradient well, 16_DBMW52 was completed near the center of the site (closest to the potential source of contamination), and 16_DGMW81 is a downgradient well. Each well was screened in the shallowest water-bearing zone. Locations of the wells are shown on Figure B1-1. Table B16-4 presents the screened interval of each well. One groundwater sample was collected from each well. Slug tests were performed on 16_UGMW33 and 16_DBMW52; these aquifer test results are described in Subsection B16-7, and test data are presented in Appendix F.

Subsection B16-7 presents a discussion of Site 16 hydrogeology and the analytical results of the groundwater samples.

B16.4 Surface Water and Sediments

Surface water runoff and sediment samples were not collected at this site.

B16.5 Surface and Near-Surface Soils

B16.5.1 Description of Surface and Near-Surface Soil Samples

The surface soils at Site 16 are classified as Sorrento loam, with 0 to 2 percent slopes (Wachtell 1978). The permeability for this soil series ranges from 0.2 to 2.0 inch/hour. The available water-holding capacity ranges from 10.0 to

to 13.0 inches, and available water capacity is 0.16 to 0.21 inch/inch. These values are for the upper 72 inches of soil.

B16.5.2 Analytical Results and Soil Vapor Headspace Values

This subsection focuses on contaminants found above the detection limits in the upgradient area and in each stratum. Table B16-2 summarizes detected chemicals, and Attachment 1 (Appendix B) lists field headspace values for surface and near-surface soil samples.

B16.5.2.1 Upgradient Area

Two stations (16_UGS and 16_UGX) were sampled in the upgradient area, and both showed petroleum hydrocarbon contamination. TRPH was detected in 16_UGS at the surface and in 16_UGX at 2 feet at concentrations of 68 and 85 mg/kg, respectively. TFH-gasoline was detected at both stations in the surface samples at concentrations of 0.062 mg/kg (16_UGS) and 0.213 mg/kg (16_UGX). TFH-diesel was also found at both stations and ranged from below detection limits to 28.4 mg/kg. Metals detected are listed in Table 16-2. These samples were not analyzed for VOCs and other organic chemicals.

Field screening using soil vapor headspace (Attachment 1 to Appendix B) found 40.0 ppm at the surface in 16_UGS, and detected 2.6 ppm at the surface and 1.0 ppm at a depth of 2 feet at 16_UGX.

The petroleum hydrocarbon contamination found in these two upgradient samples suggests that the area of impact from the fire-fighting training is larger than originally anticipated. Therefore, the full extent of contamination in the upgradient area cannot be known at this time.

B16.5.2.2 Stratum 1: Disturbed-Earth Area

Three stations (16_GN1, 16_GN2 and 16_GN3) were sampled in Stratum 1. TFH-diesel was detected in all samples at each station, with concentrations ranging from 24 to 54,000 mg/kg; the highest concentration was detected at the surface at 16_GN3. TFH-gasoline was also found in all samples and ranged from 0.17 to 12 mg/kg. TRPH was detected at 16_GN1 and 16_GN3, and ranged from 184 to 17,486 mg/kg.

The surface sample at 16_GN3 was the only Stratum 1 sample containing SVOCs. Fluorene was detected at 2,000 $\mu\text{g}/\text{kg}$. The remaining SVOCs detected were below CRDLs. Toluene was detected in 16_GN1 below the CRDL, and methylene chloride was detected in 16_GN3 below the CRDL and also in the blank. Methylene chloride is a demonstrated laboratory contaminant; the maximum detected concentration in the trip blanks was 42 $\mu\text{g}/\text{L}$.

Field screening using soil vapor headspace (see Attachment 1 to Appendix B) detected 450 ppm at the 2-foot depth at 16_GN3. All other samples were below detection limits.

Based on the results of the sample analyses, the soils at this stratum have been affected by hydrocarbon contamination to a depth of at least 4 feet.

B16.5.2.3 Stratum 2: Main Fire-Fighting Pit

Three stations (16_PT1, 16_PT2 and 16_PT3) were sampled in Stratum 2. TFH-diesel and TFH-gasoline were found in all samples and ranged from 838 to 75,200 mg/kg and from 14.9 to 3,120 mg/kg, respectively. TRPH was estimated in all samples, and ranged from 2,844 to 39,101 mg/kg.

VOCs detected include 2-butanone, acetone, carbon tetrachloride, ethylbenzene, toluene, and xylene. The levels of several of these VOCs are 13,000 $\mu\text{g}/\text{kg}$ for 2-butanone, 3,600 $\mu\text{g}/\text{kg}$ for ethylbenzene, and 23,000 $\mu\text{g}/\text{kg}$ for xylene.

2-Butanone and acetone are demonstrated laboratory contaminants; their maximum detected concentrations in the trip blanks were 33 and 37 $\mu\text{g/L}$, respectively.

SVOCs detected were 2-methylnaphthalene (3,300 $\mu\text{g/kg}$ at 16_PT1 at 0 feet) and naphthalene (15,000 $\mu\text{g/kg}$ at 16_PT3 at 2 feet, and 33,000 $\mu\text{g/kg}$ at 16_PT2 at 4 feet), both indicators of heavy petroleum fractions or coal tars. Dibenzofuran was detected at 990 $\mu\text{g/kg}$ in the 4-foot depth sample from 16_PT2.

Phenanthrene was detected at 870 $\mu\text{g/kg}$ in 16_PT3 at 4 feet and was estimated in several other samples. Bis(2-ethylhexyl)phthalate and pyrene were estimated in several samples.

No pesticides, PCBs, or dioxins were detected. Metals are presented in Table B16-2.

Field screening using soil vapor headspace (see Attachment 1 to Appendix B) found positive concentrations in all samples, ranging from 940 to 1,000 ppm.

Based on these analyses, the soils within Stratum 2 have been affected by VOCs, SVOCs, and petroleum hydrocarbons to a depth of at least 4 feet.

B16.5.2.4 Stratum 3: Drainage Channel

Three stations (16_DD1, 16_DD2 and 16_DD3) were sampled in Stratum 3. TFH-diesel was detected at all three stations, showing the highest values at the surface; concentrations ranged from 17.8 to 65.9 mg/kg . Station 16_DD1 is the only station with TFH-diesel detected below the surface. TFH-gasoline was also detected only at the surface at each station at concentrations below 1 mg/kg . TRPH was detected at each station to depths of 2 feet. VOCs, including toluene, carbon tetrachloride, and 2-butanone, were detected at concentrations below CRDLs. 2-Butanone is a demonstrated laboratory contaminant; the maximum

detected concentration in the trip blanks was 33 $\mu\text{g}/\text{l}$ analyzed for SVOCs, pesticides, PCBs, herbicides, dioxin

Field screening using soil vapor headspace (see Attac found very low levels (less than 2.0 ppm) in all samples.

Based on these results, the contamination in the drainage ditch is primarily petroleum hydrocarbons and is limited mainly to the surface soil. All values are well below the California LUFT action levels.

B16.6 Vadose Zone Soils

B16.6.1 Description of Subsurface Soil Samples

The following vadose zone soil samples were collected at five stations:

- 16_25B212 (25-foot soil boring at 5, 10, 15, 20 and 25 feet)
- 16_AB213 (angle boring at 10, 20, 30, 40, 50 and 60 feet)
- 16_UGMW33 (upgradient monitoring well at 158 feet)
- 16_DBMW52 (deep boring/monitoring well at 5, 10, 13, 18, 23, 33 and 168 feet)
- 16_DGMW81 (downgradient monitoring well at 168 and 188 feet)

B16.6.2 Subsurface Geology

Based on boring logs (Appendix K), the Site 16 lithology consists of lenses of clay, silt, sandy silt, silty sand and sand. The aerial geology includes Holocene alluvium and colluvium overlying bedrock Pleistocene-age sediments. The site geology consists primarily of alluvial materials. Detailed geologic descriptions of the overall MCAS El Toro site are presented in Section 1.

Figure B16-2 is a geologic cross section of Site 16, based on the lithologic logs from the five borings. The interbedded clays and silts could not be correlated across the site.

B16.6.3 Analytical Results

Table B16-3 summarizes the results of the chemical analysis, as discussed below.

Only one boring (16_AB213), an angle boring drilled beneath the main pit (Stratum 1), detected significant hydrocarbon contamination. TFH-diesel and TFH-gasoline concentrations ranged from 7,040 to 40,000 mg/kg and 3,470 to 7,040 mg/kg, respectively. Both TFH-diesel and TFH-gasoline generally decreased with depth in this boring. TRPH was detected at 16_25B212 at 25 feet (29 mg/kg), 16_AB213 (high value of 5,524 mg/kg), and at 16_DBMW52 at 13 feet (814 mg/kg).

All the remaining borings showed hydrocarbon contamination of less than 2 mg/kg.

Volatile Organic Compounds (VOCs). With the exception of the angle boring (16_AB213), VOCs were either not detected or are present at very low levels. Acetone, 2-butanone, ethylbenzene, methylene chloride, toluene, and xylene were detected at all depths in 16_AB213. Acetone is a demonstrated laboratory contaminant; the maximum detected concentration in the trip blanks is 37 µg/L. Methylene chloride and 2-butanone are also demonstrated laboratory contaminants; their maximum detected concentrations in the trip blanks were 42 µg/L and 33 µg/L, respectively. No TCE was detected.

Semivolatile Organic Compounds (SVOCs). Naphthalene was detected in 16_AB213 at concentrations of 17 mg/kg, 26 mg/kg, and 6.8 mg/kg at 10, 20, and 60 feet, respectively. 16_AB213 also shows 2-methylnaphthalene from the 10-foot depth at 10 mg/kg. No SVOCs were found in the other borings.

Metals Detected. Detected metals are presented in Table B16-3.

Total Organic Carbon (TOC). TOC was detected at both 16_DBMW52 and 16_DGMW81 at a concentration of 106 mg/kg.

Dioxins and Furans. Dioxins and furans were not detected.

B16.6.4 Soil Vapor Headspace Concentrations

Field screening values using soil vapor headspace (see Attachment 1 to Appendix B) were generally low or nondetections; the exception was 16_AB213, at which the values were about 1,000 ppm for each sample.

In summary, the vadose zone sampling at Site 16 found primarily hydrocarbon contamination, directly beneath the main pit, where VOCs and SVOCs were also found.

B16.7 Groundwater

B16.7.1 Site Hydrogeology

Three monitoring wells were installed at Site 16:

- 16_UGMW33 (upgradient monitoring well)
- 16_DBMW52 (deep boring/monitoring well)
- 16_DGMW81 (downgradient monitoring well)

Table B16-4 summarizes the well construction details and survey elevations. Depth to groundwater is about 170 feet. The groundwater flow direction at Site 16, as shown in Figures 3-4a, b, and c, is northwest. The groundwater gradient calculated at this site is 0.0045. Slug testing was performed at 16_UGMW33 and 16_DBMW52, and the results are shown on Table B16-5. Using the higher K value of 0.69 feet/day and a conservative assumption of 0.3 for porosity, the calculated average groundwater flow at Site 16 is 0.01 feet/day.

B16.7.2 Analytical Results

General Chemistry. The groundwater facies change dramatically across MCAS El Toro, and this change in water quality is evident at Site 16. Differences can be seen in TDS, nitrate, and chloride between the upgradient well, the deep boring/well, and the downgradient well (Table B16-6). These differences are most likely the result of natural variations. Appendix A1 provides a more complete discussion of the general inorganic groundwater chemistry. It is believed that Site 16 has had no impact on inorganic water quality parameters.

The pH of the groundwater samples varied from 7.2 to 7.3.

Hydrocarbons (TRPH, TFH). No TFH or TRPH was detected.

Volatile Organic Compounds (VOCs). Only low levels of chloroform and methylene chloride were found in the upgradient Well (16_UGMW33). Methylene chloride is a demonstrated laboratory contaminant; the maximum detected concentration in the trip blanks was 42 µg/L.

Semivolatile Organic Compounds (SVOCs). No SVOCs were detected.

Pesticides and Polychlorinated Biphenyls (PCBs). No pesticides or PCBs were detected.

Metals and Cyanide. As discussed above, Site 16 sits within a groundwater facies change and natural water quality varies widely across the Station.

B16.7.3 Comparison with Drinking Water Standards

Table B16-7 presents analyte concentrations in groundwater that exceed regulatory standards or action levels. It is important to note that several naturally occurring inorganic chemicals exceed regulatory standards. It is believed that the inorganic results represent background conditions and are not site-related.

No VOCs or SVOCs were detected that exceed regulatory limits for drinking water. No TCE was detected.

B16.8 Potential Contaminant Migration Pathways

Two potential contaminant migration pathways exist at Site 16, erosion and subsequent transport of surface soils to surface water drainages, and leaching of contaminants by precipitation or water ponding in the former pits and possible migration to the groundwater.

Based on the results of surface soil samples collected in the Drainage Ditch (Stratum 3), it is likely that hydrocarbon-contaminated soils have been eroded and deposited in the ditch. These results, however, indicate low levels that are far below the regulatory standards.

Depth to groundwater is approximately 170 feet. To date, no contamination has been detected in groundwater beneath the main pit (Stratum 2) or downgradient of Site 16. It is likely that the hydrocarbon contamination in the soils would tend to sorb to the soil matrix in the 170 feet of vadose zone. However, it is possible that leaching of the soils may eventually transport hydrocarbon contaminants to the groundwater.

B16.9 Summary and Conclusions

An estimated 275,000 gallons of residual fluids (primarily fuels) were placed in pits and burned. Results of surface soil sampling found primarily hydrocarbon contamination. The highest level of contamination was within the main pit. Concentrations of TFH-diesel ranged from 838 to 75,200 mg/kg. The area directly adjacent to the main pit (Stratum 1) was contaminated with 54,000 mg/kg of TFH-diesel. Stratum 3, the Drainage Ditch northwest source area, was also contaminated with hydrocarbons, but to a far lesser extent (maximum level of 66 mg/kg of TFH-diesel).

Vadose zone soil sampling found the area beneath the main pit to be contaminated to at least approximately 50 feet (vertical depth corrected from the angle boring).

Concentrations in the deepest sample found 11,900 mg/kg of TFH-diesel. The vertical extent of contamination beneath the main source area is unknown.

Groundwater flow at Site 16 is towards the northwest, at an estimated rate of 0.01 feet/day. Depth to groundwater is approximately 170 feet. Groundwater sampling found that natural inorganics exceed certain regulatory standards. It is believed that these inorganics are naturally occurring and represent background conditions. No hydrocarbon or organic contamination was found. It does not appear that soil contamination at Site 16 is contributing to groundwater contamination at MCAS El Toro.

blank

**Table B16-1
Site 16 (OU-3): Types of Samples and Chemical Analyses
MCAS El Toro Phase I RI Technical Memorandum**

Location/ Stratum	Station Identi- fication	Sample Identi- fication	Sample Depth (ft)	Groups of Analytes Requested ^a											
				VOCs	Semi- VOCs	Pesti- cides/ PCBs	Herbi- cides	TPH	TFH	Metals	CN	General Chemistry	TOC	Dioxins/ Furans	Gross Alpha/ Beta
Surface and Near-Surface Soils															
1	16_GN1	S1454304	0	X	X			X	X	X					
1	16_GN2	S145 4301	0	X	X			X	X	X					
1	16_GN3	S1454294	0	X	X			X	X	X					
		S1454296	2	X	X			X	X	X					
2	16_PT1	S1454305	0	X	X			X	X	X					
		S1454320	2	X	X			X	X	X					
		S1454315	4	X	X			X	X	X					
2	16_PT2	S1454318	0	X	X			X	X	X				X	
		S1454319	2	X	X			X	X	X				X	
		S1454308	4	X	X			X	X	X				X	
2	16_PT3	S1454307	0	X	X			X	X	X					
		S1454297	2	X	X			X	X	X					
		S1454314	4	X	X			X	X	X					
3	16_DD1	S1454317	0	X	X			X	X	X					
		S1454316	2	X	X			X	X	X					
		S1454286 ^b	2	X	X			X	X	X					
3	16_DD2	S1454306	0	X	X			X	X	X					
		S1454288	2	X	X			X	X	X					
		S1454505 ^b	2	X	X			X	X	X					
		S1454293	4	X	X			X	X	X					
3	16_DD3	S1454289	0	X	X			X	X	X					
		S1454287	2	X	X			X	X	X					
		S1454504	4	X	X			X	X	X					
UG	16_UGX	S1454299	0					X	X	X					
		S1454302	2					X	X	X					
UG	16_UGS	S1454528	0					X	X	X					
		S1454529	2					X	X	X					
Vadose Zone Soils															
UG	16_UGMW33	S1456256	158	X	X			X	X	X					
	16_AB213	S1456249	10	X	X			X	X	X					
		S1456250	20	X	X			X	X	X					
		S1456247	30	X	X			X	X	X					
		S1456261	40	X	X			X	X	X					
		S1456262	50	X	X			X	X	X					
		S1456263	60	X	X			X	X	X					
	16_25B212	S1456517	5	X	X			X	X	X					
		S1456518	10	X	X			X	X	X					
		S1456519	15	X	X			X	X	X					
		S1456520	20	X	X			X	X	X					
		S1456521	25	X	X			X	X	X					

**Table B16-1
Site 16 (OU-3): Types of Samples and Chemical Analyses
MCAS El Toro Phase I RI Technical Memorandum**

Location/ Stratum	Station Identifi- cation	Sample Identifi- fication	Sample Depth (ft)	Groups of Analytes Requested ^a											
				VOCs	Semi- VOCs	Pesti- cides/ PCBs	Herbi- cides	TPH	TFH	Metals	CN	General Chemistry	TOC	Dioxins/ Furans	Gross Alpha/ Beta
	16_DBMW52	S1456258	5	X	X			X	X	X					
		S1456259	10	X	X			X	X	X					
		S1456254	13	X	X			X	X	X					
		S1455255	18	X	X			X	X	X					
		S1456252	23	X	X			X	X	X					
		S1456245	33	X	X			X	X	X					
		S1456257	168								X				
DG	16_DGMW81	S1457073	168	X	X			X	X						
		S1456260	188	X								X			
Groundwater															
UG	16_UDMW33	S1452097	188-220	X	X	X	X	X	X	X	X	X			
	16_DBMW52	S1452090	182-222	X	X	X	X	X	X	X	X	X			
		S1452094		X											
DG	16_DGMW81	S1452040	175-216	X	X	X	X	X	X	X	X	X			
^a VOCs = Volatile Organic Compounds; Semi-VOCs = Semivolatile Organic Compounds; PCBs = Polychlorinated Biphenyls; TPH = Total Recoverable Petroleum Hydrocarbons; TFH = Total Fuel Hydrocarbons; CN = Total Cyanide; TOC = Total Organic Carbon. ^b Duplicate															

Table B16-2

Site16 (OU- 3): Summary of Detected Chemicals in Sediments and Surface/Near-Surface Soil

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	16_DD1 S1484317 (0)	DVF(a)	16_DD1 S1484286 (2)	DVF(a)	16_DD1 S1484316 (2)	DVF(a)	16_DD2 S1484306 (0)	DVF(a)	16_DD2 S1484288 (2)	DVF(a)	16_DD2 S1484298 (2)	DVF(a)	16_DD2 S1484506 (2)	DVF(a)	16_DD2 S1484293 (4)	DVF(a)
METALS																	
SILVER	MG/KG	0.43	U	0.45	U	0.45	U	0.43	U	0.49	U	0.46	U	0.47	U	0.44	U
ALUMINUM	MG/KG	6610		8370		12400		4680		15400		10800		9640		4250	
ARSENIC	MG/KG	1.9	b	1.6	b	1.7	b	2.7		5.2		2	b	2.1	b	1.4	b
BARIUM	MG/KG	82.3		115		142		66.6		191		128		132		81.5	
BERYLLIUM	MG/KG	0.44	U	0.27	U	0.49	U	0.4	U	0.85	U	0.39	U	0.34	U	0.23	U
CALCIUM	MG/KG	2710		7450		9520		2480		8220		5010		5340		4800	
CADMIUM	MG/KG	0.67	U	0.85	U	1	U	0.59	U	1.5		0.87	U	0.74	U	0.3	U
COBALT	MG/KG	4.1	b	4.4	b	4.8	b	4.2	b	8.2	b	5.8	b	5.8	b	2.8	b
CHROMIUM	MG/KG	7.3		7.8		11.3		5.5		14.3		10.5		9.2		4.2	
COPPER	MG/KG	7.9		6.5		6.2		6.5		12		8.1		6.2		3.4	b
IRON	MG/KG	10100		12000		15700		7010		20800		14000		12800		7080	
POTASSIUM	MG/KG	3210		3200		4220		1780		6510		3890		3900		2250	
MAGNESIUM	MG/KG	3430		5140		8670		2190		9950		5770		5680		2900	
MANGANESE	MG/KG	187		199		230		161		349		233		214		144	
SODIUM	MG/KG	193	b	253	b	262	b	197	b	468	b	272	b	234	b	287	b
NICKEL	MG/KG	6.9	b	6.1	b	7.4	b	6.9	b	10.9		6.5	b	7.1	b	2.4	b
LEAD	MG/KG	15.8		2.9		3.6		15.7		5.4		4.1		3.5		1.3	
ANTIMONY	MG/KG	2.5	U	2.6	U	2.8	U	2.5	U	2.8	U	2.6	U	2.7	U	2.6	U
SELENIUM	MG/KG	0.51	U	0.53	U	0.11	U	0.1	U	0.15	b	0.11	U	0.11	U	0.11	U
THALLIUM	MG/KG	0.14	U	0.19	U	0.15	U	0.29	U	0.38	b	0.15	U	0.16	U	0.32	U
VANADIUM	MG/KG	24.7		28		37.7		16.2		49		33.2		29.9		17.4	
ZINC	MG/KG	45.6		39.1		46.4		36		69.3		41.7		41.8		24.2	
VOLATILE ORGANIC COMPOUNDS																	
ETHYLBENZENE	UG/KG	10	U	11	U	11	U	10	U	12	U	11	U	11	U	10	U
TOLUENE	UG/KG	7	J	11	U	11	U	5	J	12	U	11	U	4	J	10	U
XYLENE (TOTAL)	UG/KG	10	U	11	U	11	U	10	U	12	U	11	U	11	U	10	U
CARBON TETRACHLORIDE	UG/KG	3	J	11	U	11	U	10	U	12	U	11	U	11	U	10	U
2-HEXANONE	UG/KG	10	U	11	U	11	U	10	U	12	U	11	U	11	U	10	U
ACETONE	UG/KG	32	U	27	U	23	U	19	U	12	U	15	U	18	U	18	U
BENZENE	UG/KG	10	U	11	U	11	U	10	U	12	U	11	U	11	U	10	U
METHYLENE CHLORIDE	UG/KG	17	U	11	U	11	U	11	U	24	U	11	U	11	U	10	U
2-BUTANONE	UG/KG	10	U	11	U	11	U	10	U	3	J	11	U	11	U	10	U
SEMI-VOLATILE ORGANIC COMPOUNDS																	
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	670	U	700	U	700	U	20000	U	770	U	710	U	700	U	680	U
PYRENE	UG/KG	670	U	700	U	700	U	20000	U	770	U	710	U	700	U	680	U
DIBENZOFURAN	UG/KG	670	U	700	U	700	U	20000	U	770	U	710	U	700	U	680	U
FLUORANTHENE	UG/KG	670	U	700	U	700	U	20000	U	770	U	710	U	700	U	680	U
PHENANTHRENE	UG/KG	670	U	700	U	700	U	20000	U	770	U	710	U	700	U	680	U
FLUORENE	UG/KG	670	U	700	U	700	U	20000	U	770	U	710	U	700	U	680	U
NAPHTHALENE	UG/KG	670	U	700	U	700	U	20000	U	770	U	710	U	700	U	680	U
2-METHYLNAPHTHALENE	UG/KG	670	U	700	U	700	U	20000	U	770	U	710	U	700	U	680	U
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																	
TFH DIESEL	MG/KG	65.9		39.1		59.1		17.8		14.4		13.4		13.1		12.9	
TFH GASOLINE	MG/KG	0.212		0.053		0.053		0.105		0.059		0.054		0.053		0.052	
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																	
TRPH	MG/KG	457		20		88		575		20		107		105		20	

Table B16-2

Site16 (OU- 3): Summary of Detected Chemicals in Sediments and Surface/Near-Surface Soil

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	16_DD3 S1454289 (0)	DVF(a)	16_DD3 S1454804 (2)	DVF(a)	16_DD3 S1454287 (4)	DVF(a)	16_GN1 S1454304 (0)	DVF(a)	16_GN2 S1454301 (0)	DVF(a)	16_GN3 S1454294 (0)	DVF(a)	16_GN3 S1454296 (0)	DVF(a)	16_PT1 S1454305 (0)	DVF(a)
METALS																	
SILVER	MG/KG	0.43	U	0.49	U	0.47	U	0.8	b	0.43	U	0.44	U	0.44	U	0.43	U
ALUMINUM	MG/KG	8240		22500		13500		7710		4660		4450		7330		6100	
ARSENIC	MG/KG	1.8	b	3.1		1.6	b	0.83	b	0.47	U	0.88	U	2.1		1.3	b
BARIIUM	MG/KG	75.3		185		186		119		72.9		85.7		159		86.4	
BERYLLIUM	MG/KG	0.36	U	0.97	b	0.56	U	0.26	U	0.17	U	0.23	U	0.16	U	0.35	U
CALCIUM	MG/KG	2640		9310		4820		6220		4320		4620		4600		5420	
CADMIUM	MG/KG	0.96	b	1.7		1.3		0.88	U	0.58	U	0.89	U	2.9		0.92	b
COBALT	MG/KG	4.3	b	9.6	b	6.4	b	4.4	b	2.6	b	2.3	b	3.1	b	3.1	b
CHROMIUM	MG/KG	9.4		17.9		11.9		7		4.9		6.1		26.3		6.2	
COPPER	MG/KG	10.2		13.6		9.7		5	b	3.8	b	8.1		51.1		10	
IRON	MG/KG	11200		25200		15900		11000		6950		6370		9910		9120	
POTASSIUM	MG/KG	2760		6750		4240		5190		2000		2210		3860		2400	
MAGNESIUM	MG/KG	3820		11600		6630		4150		2520		2520		3330		3100	
MANGANESE	MG/KG	205		365		271		201		150		132		145		158	
SODIUM	MG/KG	203	b	443	b	314	b	295	b	159	b	277	b	394	b	241	b
NICKEL	MG/KG	6.1	b	10.6		9.3		5.1	b	2.7	b	2.4	b	5.4	b	4.4	U
LEAD	MG/KG	27.2		3.8		2.5		3.7		5.6		16.7		291		19.5	
ANTIMONY	MG/KG	2.5	U	2.8	U	3.3	b	2.4	U	2.5	U	2.5	U	2.6	U	2.5	U
SELENIUM	MG/KG	0.1	U	0.12	U	0.11	U	0.16	b	0.1	U	0.1	U	0.14	b	0.1	U
THALLIUM	MG/KG	0.14	U	0.38	b	0.29	b	0.14	U	0.14	U	0.15	U	0.15	U	0.16	b
VANADIUM	MG/KG	26.2		57		36.8		25.2		16.7		15.3		20.7		18.7	
ZINC	MG/KG	61.9		74.7		49.2		38.4		26.4		39.8		198		53.2	
VOLATILE ORGANIC COMPOUNDS																	
ETHYLBENZENE	UG/KG	10	U	11	U	11	U	10	U	10	U	10	U	53	U	1400	U
TOLUENE	UG/KG	3	J	11	U	11	U	3	J	10	U	10	U	53	U	1400	U
XYLENE (TOTAL)	UG/KG	10	U	11	U	11	U	10	U	10	U	10	U	53	U	1400	U
CARBON TETRACHLORIDE	UG/KG	4	J	11	U	11	U	10	U	10	U	10	U	53	U	1400	U
2-HEXANONE	UG/KG	10	U	3	J	11	U	10	U	10	U	10	U	53	U	1400	U
ACETONE	UG/KG	10	U	11	U	11	U	31	U	17	U	24	U	59	U	830	J
BENZENE	UG/KG	10	U	11	U	11	U	10	U	10	U	10	U	53	U	1400	U
METHYLENE CHLORIDE	UG/KG	30	U	22	U	18	U	10	U	10	U	10	U	50	JB	1400	U
2-BUTANONE	UG/KG	2	J	2	J	11	U	10	U	10	U	10	U	53	U	3500	
SEMIVOLATILE ORGANIC COMPOUNDS																	
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	670	U	730	U	760	U	660	U	670	U	680	U	700	U	720	U
PYRENE	UG/KG	670	U	730	U	760	U	660	U	670	U	680	U	270	J	720	U
DIBENZOFURAN	UG/KG	670	U	730	U	760	U	660	U	670	U	680	U	700	U	720	U
FLUORANTHENE	UG/KG	670	U	730	U	760	U	660	U	670	U	680	U	210	J	720	U
PHENANTHRENE	UG/KG	670	U	730	U	760	U	660	U	670	U	680	U	420	J	720	J
FLUORENE	UG/KG	670	U	730	U	760	U	660	U	670	U	680	U	2000	U	720	U
NAPHTHALENE	UG/KG	670	U	730	U	760	U	660	U	670	U	680	U	700	U	720	U
2-METHYLNAPHTHALENE	UG/KG	670	U	730	U	760	U	660	U	670	U	680	U	700	U	3300	
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																	
TFH DIESEL	MG/KG	29.9		13.6	U	14.2	U	48.7		24.6		119		54000		12100	
TFH GASOLINE	MG/KG	0.152		0.055	U	0.057	U	0.275		0.213		0.171		12.4		166	
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																	
TRPH	MG/KG	283		76		20	U	184		20	U	960		17486		8404	J

Table B16-2

Site 16 (OU- 3): Summary of Detected Chemicals in Sediments and Surface/Near-Surface Soil

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS)	UNITS	16_PT1 S1464320 (2)	DVF(a)	16_PT1 S1464316 (4)	DVF(a)	16_PT2 S1464318 (0)	DVF(a)	16_PT2 S1464319 (2)	DVF(a)	16_PT2 S1464308 (4)	DVF(a)	16_PT3 S1464307 (0)	DVF(a)	16_PT3 S1464297 (2)	DVF(a)	16_PT3 S1464314 (4)	DVF(a)
ANALYTE BY GROUP																	
METALS																	
SILVER	MG/KG	0.46	U	0.56	U	0.46	U	0.45	U	0.49	U	0.43	U	0.44	U	0.47	U
ALUMINUM	MG/KG	5030		20800		6350		4470		10200		2510		4260		6240	
ARSENIC	MG/KG	1.2	b	5.1		1.3	b	1.2	b	2.9		1.3	b	0.59	b	1.1	b
BARIIUM	MG/KG	78.9		243		94		72.9		142		54.7		58.8		109	
BERYLLIUM	MG/KG	0.44	U	1.1		0.37	b	0.42	U	0.5	U	0.2	U	0.42	U	0.49	U
CALCIUM	MG/KG	5830		14300		6380		4590		4700		3320		4210		7680	
CADMIUM	MG/KG	0.46	b	1.5		0.9	b	0.49	b	0.88	b	0.54	b	0.4	b	0.86	b
COBALT	MG/KG	2.5	b	10.2	b	3.2	b	2.9	b	5.8	b	1.6	b	2.8	b	4.2	b
CHROMIUM	MG/KG	5.8		19.2		7.4		5.9		12		4.3		5.3		6.5	
COPPER	MG/KG	3.9	b	12.7		9.1		4.5	b	8.6		5.8		2.9	b	5.8	
IRON	MG/KG	7500		26700		8740		6940		13600		4300		6740		9240	
POTASSIUM	MG/KG	2210		7510		3260		2330		4360		1460		2310		3630	
MAGNESIUM	MG/KG	3400		12400		3730		2650		6030		1540		2360		3860	
MANGANESE	MG/KG	148		428		188		137		248		79.4		130		161	
SODIUM	MG/KG	221	b	845	b	318	b	229	b	345	b	159	U	152	U	234	b
NICKEL	MG/KG	3.7	U	12.6		4.4	U	4.3	U	10.7		3.4	U	4.2	U	3.8	U
LEAD	MG/KG	1.5		4.5		25.3		7		4.6		22.6		3.4		6.1	
ANTIMONY	MG/KG	2.6	U	3.2	U	2.7	U	2.9	U	2.8	U	2.5	U	2.6	U	2.7	U
SELENIUM	MG/KG	0.11	U	0.13	U	0.11	U	0.11	U	0.15	U	0.1	U	0.11	U	0.11	U
THALLIUM	MG/KG	0.15	b	0.64	b	0.15	U	0.15	U	0.16	U	0.18	b	0.21	b	0.22	b
VANADIUM	MG/KG	17.5		58.8		21.9		17.1		32.4		9	b	16.6		22.7	
ZINC	MG/KG	23.1		80		54.3		28.6		47.6		35		22.7		36.3	
VOLATILE ORGANIC COMPOUNDS																	
ETHYLBENZENE	UG/KG	1300	U	64	U	11	U	420		1700		10	U	1000	J	3600	
TOLUENE	UG/KG	1300	U	64	U	11	U	490		1700		10	U	940	J	3400	
XYLENE (TOTAL)	UG/KG	1300	U	64	U	11	U	3000		12000		10	U	5900		23000	
CARBON TETRACHLORIDE	UG/KG	1300	U	64	U	11	U	62	U	1500	U	2	J	1400	U	2800	U
2-HEXANONE	UG/KG	1300	U	64	U	11	U	62	U	1500	U	10	U	1400	U	2800	U
ACETONE	UG/KG	1100	J	220	U	16		190	U	1500	U	38	U	5200	U	2800	U
BENZENE	UG/KG	1300	U	64	U	11	U	30	J	1500	U	10	U	1400	U	2800	U
METHYLENE CHLORIDE	UG/KG	1300	U	64	U	11	U	65	U	1500	U	10	U	1400	U	2800	U
2-BUTANONE	UG/KG	4100		64	U	11	U	62	U	13000		10	U	12000		3800	
SEMI-VOLATILE ORGANIC COMPOUNDS																	
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	680	U	840	U	280	J	220	J	210	J	690	U	230	J	520	J
PYRENE	UG/KG	680	U	840	U	170	J	810	U	770	U	690	U	730	U	160	J
DIBENZOFURAN	UG/KG	680	U	840	U	690	U	810	U	990	U	690	U	730	U	730	U
FLUORANTHRENE	UG/KG	680	U	840	U	690	U	810	U	770	U	690	U	730	U	730	U
PHENANTHRENE	UG/KG	210	J	180	J	690	U	670	J	650	J	690	U	730	U	670	U
FLUORENE	UG/KG	680	U	840	U	690	U	810	U	770	U	690	U	730	U	730	U
NAPHTHALENE	UG/KG	680	U	840	U	690	U	-		33000	D	690	U	15000		-	
2-METHYLNAPHTHALENE	UG/KG	680	U	840	U	690	U	810	U	770	U	690	U	730	U	730	U
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																	
TFH DIESEL	MG/KG	17500		38100		838		57700		88800		617		55400		75200	
TFH GASOLINE	MG/KG	168		299		178		2690		2230		14.9		2420		3120	
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																	
TRPH	MG/KG	6956	J	17190	J	7636	J	28559	J	18933	J	2644	J	23766	J	39101	J

Table B16-2

Site16 (OU- 3): Summary of Detected Chemicals in Sediments and Surface/Near-Surface Soil

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STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	18 UGS S1484528 (0)	DVF(a)	16 UGS S1484629 (2)	DVF(a)	16 UGX S1484299 (0)	DVF(a)	16 UGX S1484302 (2)	DVF(a)										
METALS																			
SILVER	MG/KG	0.43	U	0.44	U	0.43	U	0.44	U										
ALUMINUM	MG/KG	4140		3980		4820		5190											
ARSENIC	MG/KG	0.93	b	0.48	U	1.1	b	1.4	b										
BARIIUM	MG/KG	83.9		83.7		80.3		89.2											
BERYLLIUM	MG/KG	0.29	U	0.17	U	0.16	U	0.16	U										
CALCIUM	MG/KG	2550		5260		4100		6990											
CADMIUM	MG/KG	0.75	U	0.52	U	0.84	U	0.81	U										
COBALT	MG/KG	2.8	b	1.9	b	2.9	b	3.2	b										
CHROMIUM	MG/KG	4.5		3.8		5.1		4.6											
COPPER	MG/KG	3.8	b	3.8	b	4	b	4.2	b										
IRON	MG/KG	6400		5740		7450		8390											
POTASSIUM	MG/KG	2310		1630		2830		2530											
MAGNESIUM	MG/KG	2350		2270		2650		3330											
MANGANESE	MG/KG	131		149		161		174											
SODIUM	MG/KG	184	b	224	b	168	b	169	b										
NICKEL	MG/KG	4	b	3.9	b	3.4	b	3.6	b										
LEAD	MG/KG	4.5		0.79		6.8		1.1											
ANTIMONY	MG/KG	2.5	U	2.5	U	2.5	U	2.5	U										
SELENIUM	MG/KG	0.11	b	0.2	b	0.11	b	0.1	U										
THALLIUM	MG/KG	0.14	U	0.15	U	0.14	U	0.15	U										
VANADIUM	MG/KG	15.3		14.8		17.2		20.7											
ZINC	MG/KG	24.2		18.7		29.2		25.7											
VOLATILE ORGANIC COMPOUNDS																			
ETHYLBENZENE	UG/KG	-		-		-		-											
TOLUENE	UG/KG	-		-		-		-											
XYLENE (TOTAL)	UG/KG	-		-		-		-											
CARBON TETRACHLORIDE	UG/KG	-		-		-		-											
2-HEXANONE	UG/KG	-		-		-		-											
ACETONE	UG/KG	-		-		-		-											
BENZENE	UG/KG	-		-		-		-											
METHYLENE CHLORIDE	UG/KG	-		-		-		-											
2-BUTANONE	UG/KG	-		-		-		-											
SEMIVOLATILE ORGANIC COMPOUNDS																			
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	-		-		-		-											
PYRENE	UG/KG	-		-		-		-											
DIBENZOFURAN	UG/KG	-		-		-		-											
FLUORANTHENE	UG/KG	-		-		-		-											
PHENANTHRENE	UG/KG	-		-		-		-											
FLUORENE	UG/KG	-		-		-		-											
NAPHTHALENE	UG/KG	-		-		-		-											
2-METHYLNAPHTHALENE	UG/KG	-		-		-		-											
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																			
TFH DIESEL	MG/KG	22.4		13	U	18.3		28.4											
TFH GASOLINE	MG/KG	0.062		0.052	U	0.213		0.052	U										
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																			
TRPH	MG/KG	85		20	U	20	U	85											

(a) A definition of each data validation flag (DVF) is provided in Table B-1.

Table B16-3

Site16 (OU- 3): Summary of Detected Chemicals in the Vadose Zone (Subsurface) Samples

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STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	16_26B212 S1456517 (5)	DVF(a)	16_26B212 S1456518 (10)	DVF(a)	16_26B212 S1456519 (15)	DVF(a)	16_26B212 S1456519D (15)	DVF(a)	16_26B212 S1456520 (20)	DVF(a)	16_26B212 S1456521 (25)	DVF(a)	16_AB213 S1456249 (10)	DVF(a)	16_AB213 S1456763 (10)	DVF(a)
GENERAL CHEMISTRY																	
TOTAL ORGANIC CARBON	MG/KGW	-		-		-		-		-		-		-		-	
METALS																	
CHROMIUM	MG/KG	10.9	J	5	J	4	J	5.3	J	11.6	J	19.6	J	13.7		14.9	
LEAD	MG/KG	2.8	J	0.88	J	0.6	J	1	J	2.1	J	3.7	J	4.2		4.7	
NICKEL	MG/KG	3.9	J	2.4	J	2.9	J	3.7	J	7.8	J	13.8	J	8.4	b	7.6	b
BARIIUM	MG/KG	153	J	110	J	90.4	J	101	J	199	J	254	J	184		210	
ARSENIC	MG/KG	3	J	1.3	J	0.7	J	1.3	J	2.3	J	3.8	J	3.1		3.4	
SODIUM	MG/KG	295	J	421	J	289	J	486	J	849	J	2280	J	862	b	897	b
MAGNESIUM	MG/KG	6990	J	3180	J	2620	J	3790	J	8800	J	14000	J	6090		8890	
BERYLLIUM	MG/KG	0.81	J	0.33	UJ	0.32	UJ	0.32	UJ	0.51	UJ	0.9	J	0.57	b	0.65	b
COPPER	MG/KG	8.8	J	4	UJ	2.8	UJ	5.7	J	8.4	J	15.1	J	9		11	
MANGANESE	MG/KG	259	J	158	J	129	J	157	J	315	J	417	J	272		312	
VANADIUM	MG/KG	35	J	18.8	J	15.6	J	21.7	J	42.1	J	86.3	J	44		48.1	
IRON	MG/KG	15000	J	6630	J	6280	J	8080	J	17200	J	26000	J	18300		20700	
SELENIUM	MG/KG	0.12	UJ	0.11	UJ	0.1	UJ	0.11	UJ	0.12	UJ	0.13	UJ	5.1	U	5.2	U
COBALT	MG/KG	6.3	J	2.8	J	2.8	J	2.8	J	6.7	J	9.4	J	7.1	b	9.2	b
CADMIUM	MG/KG	0.77	J	0.44	J	0.33	J	0.52	J	1.1	J	1.5	J	1.2	b	0.69	U
MERCURY	MG/KG	0.03	UJ	0.03	UJ	0.03	UJ	0.03	UJ	0.03	UJ	0.04	UJ	0.03	UJ	0.25	
SILVER	MG/KG	0.51	UJ	0.45	UJ	0.43	UJ	0.45	UJ	0.55	J	0.67	J	0.38	U	0.49	b
CALCIUM	MG/KG	8430	J	4870	J	5050	J	8150	J	10700	J	15000	J	4940		5330	
POTASSIUM	MG/KG	4840	J	1970	J	1590	J	2100	J	5810	J	6640	J	5230		6150	
ANTIMONY	MG/KG	2.9	UJ	2.6	UJ	2.5	UJ	2.8	UJ	2.8	UJ	3.2	UJ	3	U	3.6	b
THALLIUM	MG/KG	0.27	J	0.17	J	0.14	UJ	0.17	J	0.26	J	0.63	J	0.39	U	0.4	U
ALUMINIUM	MG/KG	10500	J	4390	J	3940	J	5310	J	11300	J	19300	J	15400		17200	
ZINC	MG/KG	47.1	J	24.4	J	16.9	J	24.9	J	56.3	J	83.9	J	57.3		61.7	
VOLATILE ORGANIC COMPOUNDS																	
ETHYLBENZENE	UG/KG	12	U	12	U	10	U	11	U	11	U	13	U	1800	J	2300	J
TOLUENE	UG/KG	12	U	12	U	10	U	11	U	11	U	13	U	1800	J	2400	J
XYLENE (TOTAL)	UG/KG	12	U	12	U	10	U	11	U	11	U	13	U	10000		13000	
ACETONE	UG/KG	12	U	12	U	10	U	11	U	11	U	22	U	2200	J	2300	J
METHYLENE CHLORIDE	UG/KG	12	U	5	U	12	U	11	U	11	U	13	U	2900	U	670	J
2-BUTANONE	UG/KG	12	U	12	U	10	U	11	U	11	U	13	U	8300		7200	
SEMI-VOLATILE ORGANIC COMPOUNDS																	
NAPHTHALENE	UG/KG	770	U	800	U	690	U	710	U	710	U	850	U	17000	J	24000	U
2-METHYLNAPHTHALENE	UG/KG	770	U	800	U	690	U	710	U	710	U	850	U	23000	U	10000	J
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																	
TFH DIESEL	MG/KG	14.8	U	15.2	U	13.1	U	13.5	U	13.5	U	15.8	U	20800		7040	
TFH GASOLINE	MG/KG	0.058	U	0.06	U	0.052	U	0.054	U	0.054	U	0.064	U	5540		3470	
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																	
TRPH	MG/KG	20	U	20	U	20	U	20	U	20	U	29		3986		91.5	

Table B16-3

Site16 (OU- 3): Summary of Detected Chemicals in the Vadose Zone (Subsurface) Samples

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	16_AB213 S1456250 (20)	DVF(a)	16_AB213 S1456247 (30)	DVF(a)	16_AB213 S1456261 (40)	DVF(a)	16_AB213 S1456262 (50)	DVF(a)	16_AB213 S1456263 (60)	DVF(a)	16_DBMW52 S1456258 (5)	DVF(a)	16_DBMW52 S1456259 (10)	DVF(a)	16_DBMW52 S1457053 (10)	DVF(a)
GENERAL CHEMISTRY																	
TOTAL ORGANIC CARBON	MG/KGW	-		-		-		-		-		-		-		-	
METALS																	
CHROMIUM	MG/KG	11.3		13.8		11.4		14.8		6.1		10.4		19.9		9.2	
LEAD	MG/KG	3.6		3.3		3.7		4.3		2.1		1.8		2.1		1.3	
NICKEL	MG/KG	4.6	b	7.5	b	5.3	b	11.4		4	b	6.6	b	12.4		7.2	b
BARIUM	MG/KG	150		158		146		183		93.4		136		289		150	
ARSENIC	MG/KG	3.6		2.8		2.1	U	3.2		1.6	U	2.5		3.2		1.7	b
SODIUM	MG/KG	1000	b	1340		1130	b	1150	b	433	U	223	b	1270	b	762	b
MAGNESIUM	MG/KG	6450		7780		4330		5820		1380		6370		14000		6360	
BERYLLIUM	MG/KG	0.39	b	0.48	b	0.54	b	0.54	b	0.1	b	0.33	b	0.7	b	0.35	b
COPPER	MG/KG	5.4	b	7.4		8.2		9.9		3.6	b	8.4		13.1		6	
MANGANESE	MG/KG	246		273		134		293		97.8		266		362		240	
VANADIUM	MG/KG	37.1		45.2		33.1		42.8		14.3		35.1		65.1		31.3	
IRON	MG/KG	14500		16900		12800		17400		5090		14800		29000		13400	
SELENIUM	MG/KG	0.47	U	5.1	U	5.5	BWNJ	8.8	b	4.4	U	0.11	U	0.13	U	0.11	U
COBALT	MG/KG	6.6	b	7.6	b	6.2	b	9.2	b	2.1	b	4.4	b	8.9	b	4.8	b
CADMIUM	MG/KG	0.62	U	0.89	b	0.66	U	0.64	U	0.58	U	0.85	b	1.4		0.66	b
MERCURY	MG/KG	0.16	J	0.24	J	0.17	J	0.1	J	0.18	U	0.03	U	0.04	U	0.03	U
SILVER	MG/KG	0.42	b	0.36	U	0.36	U	0.71	b	0.31	U	0.45	UJ	0.55	U	0.47	U
CALCIUM	MG/KG	9700		8310		2780		8450		1870		8630		18800		6830	
POTASSIUM	MG/KG	3400		4100		2870		4860		1090		3930		6550		4080	
ANTIMONY	MG/KG	2.8	U	3.5	b	3	U	3.2	b	2.6	U	2.8	U	3.2	U	2.7	U
THALLIUM	MG/KG	0.36	U	0.38	U	0.38	U	0.37	UJ	0.33	U	0.26	b	0.37	b	0.29	U
ALUMINIUM	MG/KG	11300		13200		10400		13700		3250		9630		23900		8630	
ZINC	MG/KG	42.5		51.9		38		55.3		15.4		43.9		83.5		42.9	
VOLATILE ORGANIC COMPOUNDS																	
ETHYLBENZENE	UG/KG	2900	U	1000	J	1900	J	1700	J	1200	J	10	U	12	U	12	U
TOLUENE	UG/KG	2900	U	2900	U	3000	U	1300	J	790	J	10	U	12	U	12	U
XYLENE (TOTAL)	UG/KG	2200	J	5700		9300		9900		7100		10	U	12	U	12	U
ACETONE	UG/KG	2900	U	1700	J	2200	J	2200	J	1800	J	10	U	43	U	28	U
METHYLENE CHLORIDE	UG/KG	580	J	910	J	3000	U	600	J	2600	U	10	U	12	U	12	U
2-BUTANONE	UG/KG	8900		9200		12000		14000		10000		10	U	12	U	12	U
SEMI-VOLATILE ORGANIC COMPOUNDS																	
NAPHTHALENE	UG/KG	26000		23000	U	23000	U	23000	U	6800	J	690	U	770	UJ	800	UJ
2-METHYLNAPHTHALENE	UG/KG	23000	U	23000	U	23000	U	23000	U	21000	U	690	U	770	UJ	800	UJ
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																	
TFH DIESEL	MG/KG	23600		17700		14800		40000		11900		-		14.5	U	15	U
TFH GASOLINE	MG/KG	7040		5620		5020		6440		4690		0.088		0.059	U	0.06	U
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																	
TRPH	MG/KG	5524		5428		2664		4731		2025		20	U	20	U	20	U

Table B16-3

Site16 (OU- 3): Summary of Detected Chemicals in the Vadose Zone (Subsurface) Samples

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	16_DBMW52 S1456254 (13)	DVF(a)	16_DBMW52 S1456255 (18)	DVF(a)	16_DBMW52 S1456252 (23)	DVF(a)	16_DBMW52 S1456245 (33)	DVF(a)	16_DBMW52 S1456246 (53)	DVF(a)	16_DBMW52 S1456257 (166)	DVF(a)	16_DBMW52 S1457054 (166)	DVF(a)	16_DBMW52 S1456248 (188)	DVF(a)
GENERAL CHEMISTRY																	
TOTAL ORGANIC CARBON	MG/KGW	-		-		-		-		-		-		-		-	106
METALS																	
CHROMIUM	MG/KG	8.8		20.7		14.1		8.2		7.1		33.3		18.3		-	
LEAD	MG/KG	0.86		2.9		3		1.3		1.5		4.4		2.3		-	
NICKEL	MG/KG	3.1	b	16.8		12.4		6.5	b	9.6		28		15		-	
BARIUM	MG/KG	96.3		308		201		111		143		288		115		-	
ARSENIC	MG/KG	1.4	b	3.6		3.7		0.77	b	2	b	4.5		4.4		-	
SODIUM	MG/KG	495	b	1300	b	1480		1100	b	610	b	518	b	383	b	-	
MAGNESIUM	MG/KG	3540		15800		9630		3800		3630		13600		8790		-	
BERYLLIUM	MG/KG	0.2	b	0.83	b	0.5	b	0.31	b	0.23	b	1	b	0.45	b	-	
COPPER	MG/KG	5.4	b	15.7		10.1		4	b	5	b	20.1		10.3		-	
MANGANESE	MG/KG	162		450		326		196		234		507		371		-	
VANADIUM	MG/KG	22.8		68.3		48.7		26.3		25.9		82.7		51.1		-	
IRON	MG/KG	8540		28900		20100		10300		9720		33400		18200		-	
SELENIUM	MG/KG	0.12	U	0.13	U	0.13	U	0.11	U	0.11	U	0.13	U	0.12	U	-	
COBALT	MG/KG	2.2	b	12.2	b	7	b	3.2	b	2.8	b	9.9	b	6.2	b	-	
CADMIUM	MG/KG	0.73	b	1.8		1.3		0.52	b	0.88	b	4.3		1.5		-	
MERCURY	MG/KG	0.03	U	0.04	U	0.04	U	0.03	U	0.03	U	0.04	U	0.03	U	-	
SILVER	MG/KG	0.49	U	0.55	U	0.53	U	0.48	U	0.46	U	0.53	U	0.49	U	-	
CALCIUM	MG/KG	7400		13300		8350		3880		4950		11600		4400		-	
POTASSIUM	MG/KG	2340		9540		6410		1890		2820		7990		4610		-	
ANTIMONY	MG/KG	2.8	U	3.2	U	3.1	U	2.8	U	2.6	U	3	U	2.8	U	-	
THALLIUM	MG/KG	0.35	U	0.52	U	0.43	U	0.34	U	0.17	U	0.5	U	0.26	U	-	
ALUMINUM	MG/KG	4790		21000		14600		6860		5810		26900		13500		-	
ZINC	MG/KG	26.6		94.8		64		28.2		31.1		104		55.1		-	
VOLATILE ORGANIC COMPOUNDS																	
ETHYLBENZENE	UG/KG	11	U	13	U	13	U	11	U	11	U	-		12	U	12	U
TOLUENE	UG/KG	11	U	13	U	13	U	11	U	11	U	-		12	U	12	U
XYLENE (TOTAL)	UG/KG	11	U	13	U	13	U	11	U	11	U	-		12	U	12	U
ACETONE	UG/KG	24	U	24	U	20	U	35	U	17	U	-		37	U	21	U
METHYLENE CHLORIDE	UG/KG	11	U	13	U	13	U	11	U	11	U	-		12	U	12	U
2-BUTANONE	UG/KG	11	U	13	U	13	U	11	U	11	U	-		12	U	12	U
SEMI-VOLATILE ORGANIC COMPOUNDS																	
NAPHTHALENE	UG/KG	700	UJ	840	UJ	830	UJ	740	UJ	730	UJ	-		790	UJ	770	UJ
2-METHYLNAPHTHALENE	UG/KG	700	UJ	840	UJ	830	UJ	740	UJ	730	UJ	-		790	UJ	770	UJ
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																	
TFH DIESEL	MG/KG	13.2	U	15.8	U	15.4	U	13.9	U	13.5	U	-		14.9	U	14.4	U
TFH GASOLINE	MG/KG	0.053	U	0.064	U	0.063	U	0.058	U	0.055	U	-		0.06	U	0.058	U
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																	
TRPH	MG/KG	814		20	U	20	U	20	U	20	U	-		20	U	20	U

Table B16-3

Site16 (OU- 3): Summary of Detected Chemicals in the Vadose Zone (Subsurface) Samples

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	16_DGMW81 S1456243 (168)	DVF(a)	16_DGMW81 S1457073 (168)	DVF(a)	16_DGMW81 S1456260 (168)	DVF(a)	16_UGMW33 S1456256 (158)	DVF(a)									
GENERAL CHEMISTRY																		
TOTAL ORGANIC CARBON	MG/KG	-		-		106		-										
METALS																		
CHROMIUM	MG/KG	14.3		9.9		-		13.2										
LEAD	MG/KG	3.6		4		-		3.1										
NICKEL	MG/KG	9.5		8.9	b	-		13.4										
BARIUM	MG/KG	93		90		-		147										
ARSENIC	MG/KG	3.3		2.9		-		5.8										
SODIUM	MG/KG	349	U	302	U	-		440	b									
MAGNESIUM	MG/KG	5520		3610		-		7120										
BERYLLIUM	MG/KG	0.81	U	0.44	U	-		0.68	b									
COPPER	MG/KG	8.4		11.2		-		10										
MANGANESE	MG/KG	140		183		-		251										
VANADIUM	MG/KG	42.7		31.7		-		46.4										
IRON	MG/KG	15300		10500		-		18200										
SELENIUM	MG/KG	0.49	U	0.47	U	-		0.2	b									
COBALT	MG/KG	4.2	b	4.5	b	-		6.4	b									
CADMIUM	MG/KG	0.88	b	0.89	b	-		2.8										
MERCURY	MG/KG	0.05	U	0.06	U	-		0.03	U									
SILVER	MG/KG	0.35	U	0.34	U	-		0.54	U									
CALCIUM	MG/KG	4210		3180		-		15700										
POTASSIUM	MG/KG	3600		2400		-		4240										
ANTIMONY	MG/KG	2.9	U	2.8	U	-		2.7	U									
THALLIUM	MG/KG	0.37	U	0.36	U	-		0.25	b									
ALUMINUM	MG/KG	10400		7580		-		11600										
ZINC	MG/KG	44.2		31.4		-		50.4										
VOLATILE ORGANIC COMPOUNDS																		
ETHYLBENZENE	UG/KG	11	U	10	U	12	U	12	U									
TOLUENE	UG/KG	11	U	10	U	12	U	12	U									
XYLENE (TOTAL)	UG/KG	11	U	10	U	12	U	12	U									
ACETONE	UG/KG	11	U	10	U	16	U	12	U									
METHYLENE CHLORIDE	UG/KG	11	U	10	U	12	U	12	U									
2-BUTANONE	UG/KG	4	J	3	J	4	J	12	U									
SEMI-VOLATILE ORGANIC COMPOUNDS																		
NAPHTHALENE	UG/KG	750	U	680	U	-		770	U									
2-METHYLNAPHTHALENE	UG/KG	750	U	680	U	-		770	U									
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																		
TFH DIESEL	MG/KG	14	U	12.9	U	-		14.5	UJ									
TFH GASOLINE	MG/KG	0.24		0.3		-		1.33										
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																		
TRPH	MG/KG	20	U	20	U	-		20	U									

(a) A definition of each data validation flag (DVF) is provided in Table B-1.

**Table B16-4
Site 16 (OU-3): Well Construction Details
MCAS El Toro Phase I RI Technical Memorandum**

Item	Station Identification		
	16_DBMW52	16_DGMW81	16_DBMW81
Survey Location--Northing	552267	552487	553042
Survey Location--Easting	1549826	1549394	1548728
Ground Surface Elevation (ft above MSL ^a)	337	333	324
Measuring Point Elevation (ft above MSL ^a)	337	332	323
Measuring Point Location	PVC sounding tube	PVC sounding tube	PVC sounding tube
Type of Surface Completion	Below ground	Below ground	Below ground
Casing Diameter and Material	4" Schedule 40 PVC	4" Schedule 40 PVC	4" Schedule 40 PVC
Screen Diameter and Material	4" Schedule 40 0.02" Slot Stainless Steel	4" Schedule 40 0.02" Slot Stainless Steel	4" Schedule 40 0.02" Slot Stainless Steel
Screen Interval (ft bgs ^b)	180-220	182-222	176-216
Length of Drop Pipe (ft bgs ^b)	219	220	214
Make and Model of Installed Pump	Grundfos Rediflow 2 2" dia. submersible	Grundfos Rediflow 2 2" dia. submersible	Grundfos Rediflow 2 2" dia. submersible
Date of Pumping Test	Slug tested 16 Oct 92	Slug tested 16 Oct 92	(Not tested)
Date of Water Quality Sampling	17 Dec 92	4 Nov 92	11 Dec 92
^a Mean sea level			
^b Below ground surface			

<p align="center">Table B16-5 Site 16 (OU-3): Summary of Hydraulic Parameters MCAS EI Toro Phase I RI Technical Memorandum</p>						
Well Identification	Type of Test	Analysis Method	Transmissivity (ft²/day)	Hydraulic Conductivity (ft/day)	Storage Coefficient^a	Leakance Factor^a
16_UGMW33	Slug	Bower and Rice (1976); Bower (1989)	1.1	0.03	NA	NA
16_DBMW52	Slug	Bower and Rice (1976); Bower (1989)	28	0.69	NA	NA

^aNA = Not applicable.
 Source: Table F-2 (Appendix F)

Table B16-6

Site16 (OU- 3): Summary of Detected Chemicals in Groundwater Samples

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SCREEN INTERVAL ANALYTE BY GROUP	REG.CODE(b)	REG.LEVEL(c)	UNITS	16_DBMW52 S1452090 (182-222)	DVF(a)	16_DGMW81 S1452040 (176-216)	DVF(a)	16_UGMW33 S1452097 (180-220)	DVF(a)
GENERAL CHEMISTRY									
BICARBONATE	NA	NA	MG/L	214		198		323	
CARBONATE	NA	NA	MG/L	-		-		-	
TOTAL DISSOLVED SOLIDS	3	500	MG/L	1360		2040		639	
ALKALINITY AS CaCO3	NA	NA	MG/L	175		162		265	
CHLORIDE	3	250	MG/L	305		412		19.5	
SULFATE	3	250	MG/L	408		660		201	
NITRATE/NITRITE-N	1	10	MG/L	22.3		25.1		5.21	
METALS									
ALUMINIUM	3	50	UG/L	49.1	b	36.6	J	31	UJ
SODIUM	NA	NA	UG/L	129000		166000		88700	
NICKEL	NA	NA	UG/L	497		229		7.7	UJ
ARSENIC	2	50	UG/L	0.7	U	0.7	U	17	
ZINC	2	5000	UG/L	2.2	U	10.7	U	15	J
BARIUM	2	2000	UG/L	35.2	b	37.3	b	22.5	b
CALCIUM	NA	NA	UG/L	141000		241000		65400	
VANADIUM	NA	NA	UG/L	8.6	b	17.1	b	20.8	b
CADMIUM	2	5	UG/L	8.7		4.1	b	1.2	U
COBALT	NA	NA	UG/L	6.6	b	5.8	U	5.8	U
COPPER	2	1300	UG/L	0.9	U	0.9	U	2.1	b
SELENIUM	1	10	UG/L	25.2	U	144		34.2	b
MERCURY	2	2	UG/L	0.1	U	0.1	b	0.1	U
ANTIMONY	NA	NA	UG/L	20.5	b	20.2	b	15.6	b
POTASSIUM	NA	NA	UG/L	4880	b	5310		3410	b
MAGNESIUM	NA	NA	UG/L	106000		112000		37400	
MANGANESE	3	50	UG/L	157		110		5.1	b
SILVER	1	50	UG/L	2.1	U	2.3	b	2.1	U
VOLATILE ORGANIC COMPOUNDS									
CHLOROFORM	2	100	UG/L	1	U	1	U	0.4	J
METHYLENE CHLORIDE	4	40	UG/L	1	U	1	U	0.5	J

(a) A definition of each data validation flag (DVF) is provided in Table B-1.

(b) Regulatory Codes are:

- 1 = California MCL
- 2 = EPA primary MCL
- 3 = EPA secondary MCL
- 4 = California DTSC Action Level

(c) The given concentration represents the California MCL, the EPA primary MCL, the EPA secondary MCL, or the California DTSC Action Level, whichever is most stringent.

**Table B16-7
Site 16 (OU-3): Analyte Concentrations in Groundwater
Exceeding Regulatory Standards or DTSC^a Action Levels
MCAS El Toro Phase I RI Technical Memorandum**

Well Identification	SI (ft bgs) ^b	Analyte	Units	Concentration	Regulatory Level ^c	Regulatory Code ^d
16_DBMW52	(182-222)	Chloride	mg/L	305	250	3
		Nitrate/Nitrite-N	mg/L	22.3	10	2
		Sulfate	mg/L	408	250	3
		Total Dissolved Solids	mg/L	1360	500	3
		Cadmium	µg/L	8.7	5	1
		Manganese	µg/L	157	50	3
16_DGMW81	(176-216)	Chloride	mg/L	412	250	3
		Nitrate/Nitrite-N	mg/L	25.1	10	2
		Sulfate	mg/L	660	250	3
		Total Dissolved Solids	mg/L	2040	500	3
		Manganese	µg/L	110	50	3
		Selenium	µg/L	144	10	2
16_UGMW33	(180-220)	Total Dissolved Solids	mg/L	639	500	3
		Selenium	µg/L	34.2	10	2

^aCalifornia Department of Toxic Substances Control

^bScreen interval (feet below ground surface)

^cThe most stringent federal/state drinking water standard was applied. In the presence of both an EPA MCL and a California MCL, the most stringent MCL is represented. If neither an EPA or California MCL is listed, the California DTSC action level was applied.

^dRegulatory Code:

- 1=EPA Primary MCL: Federally enforceable drinking water standard established for the health effects of contaminants
- 2=California MCL: Health-based drinking water standard enforceable at the state level
- 3=EPA Secondary MCL: Nonenforceable standard based on aesthetic qualities of taste, color, and odor (Includes chloride, iron, manganese, sulfate, and TDS)
- 4=DTSC Action Level: Nonenforceable levels at which DTSC strongly urges water purveyors to take corrective action to reduce the level of contamination in the water they supply (Action levels cease to exist when state MCLs are promulgated.)

Appendix B17

**Nature and Extent of Contamination:
Site 17 (OU-2) — Communication Station Landfill**

Appendix B17

NATURE AND EXTENT OF SITE-SPECIFIC CONTAMINATION: SITE 17 (OU-2) - COMMUNICATION STATION LANDFILL

This discussion of Site 17 is supplemented by the figures and data tables listed below. The figures begin on page B17-3, and the tables are grouped at the end of this Appendix B17. Field headspace values for soils at this site are presented in Table BA1-17, in Attachment 1 to Appendix B (directly following Appendix B22).

Figure B17-1:	(Site Map)
Figure B17-2:	Geologic Cross Section
Figure B17-3:	SCS Soils Map
Figure B17-4:	Geology Map
Table B17-1:	Types of Samples and Chemical Analyses
Table B17-2:	Summary of Detected Chemicals in Sediments and Surface/Near-Surface Soil
Table B17-3:	Summary of Detected Chemicals in Vadose Zone (Subsurface) Samples
Table B17-4:	Well Construction Details
Table B17-5:	(Not applicable at this site.)
Table B17-6:	Summary of Detected Chemicals in Groundwater Samples
Table B17-7:	Analyte Concentrations in Groundwater Exceeding Regulatory Standards or DTSC Action Levels
Table B17-8:	Soil Survey Classification

B17.1 Site Description

Site 17, the Communication Station Landfill, is approximately 1,800 feet west of the Magazine Road Landfill and covers a 26-acre rectangular area in a small canyon in the foothills of the Santa Ana Mountains. The site consists of two strata:

- Stratum 1: The Landfill (as determined by the physical boundaries of the canyon that contains the landfill)
- Stratum 2: The Stained Area.

The landfill was used from 1981 through 1983 as a stationwide disposal facility. Reportedly, any waste generated from the facility during the landfill's operation may have been disposed of at this landfill.

B17.2 Suspected Waste Types and Contaminants

Wastes that could potentially be found in the landfill include domestic waste and rubble (e.g., couches, washing machines, refrigerators); cooking grease; oils and fuels from sumps; empty drums; and other unknown material. It is estimated that as much as 36,000 gallons of liquid waste may have been dumped at this site (Brown and Caldwell, 1986), assuming that a full vacuum truck discharged its load on an average of once a month. An area of stained soil is visible where dumping is suspected to have occurred.

During 1990 the landfill was monitored for air emissions as part of an Air Solid Waste Assessment Test (SWAT). Of the compounds analyzed for, only methylene chloride was above the California Air Resources Board (CARB) detection limit (Work Plan, 1991). Contaminants may include VOCs, petroleum products, vinyl chloride, and metals.

B17.3 Field Investigation

The field investigation at Site 17 consisted of:

- Drilling and sampling one deep boring and one downgradient well
- Collecting surface soil samples from seven sampling stations.

Because of the permeable soils, the small watershed area, and the filling in of the natural drainageway with excavated materials from a nearby hill, surface water is not expected to be a significant transport pathway for contaminants. Thus, surface water and sediment samples were not collected at this site.

Site boundaries and the number and location of monitoring wells at Site 17 were changed from those planned in the *SAP*, as documented by the *SAP Amendment*. The site boundary was extended further north (up the drainage area) to include pit areas

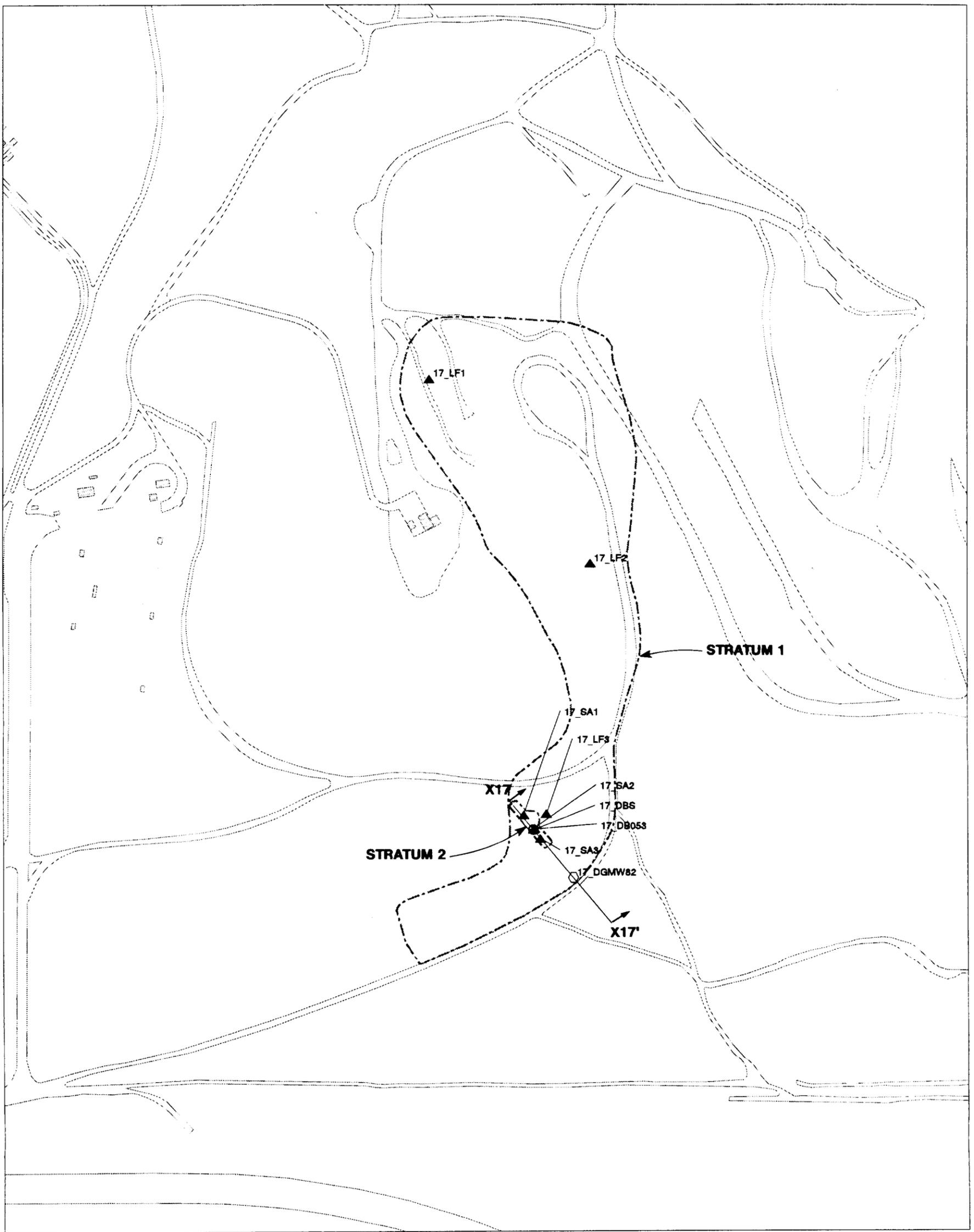
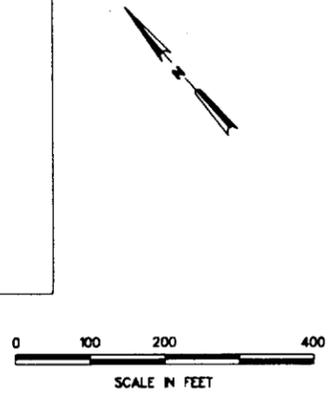
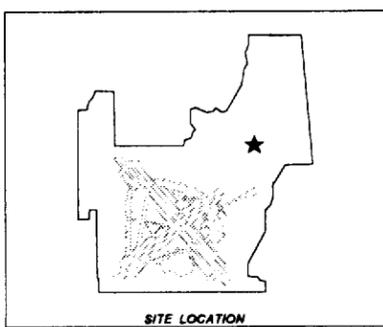


FIGURE B17-1
SITE 17 (OU-2):
COMMUNICATION
STATION LANDFILL
MCAS EL TORO PHASE I RI
TECHNICAL MEMORANDUM

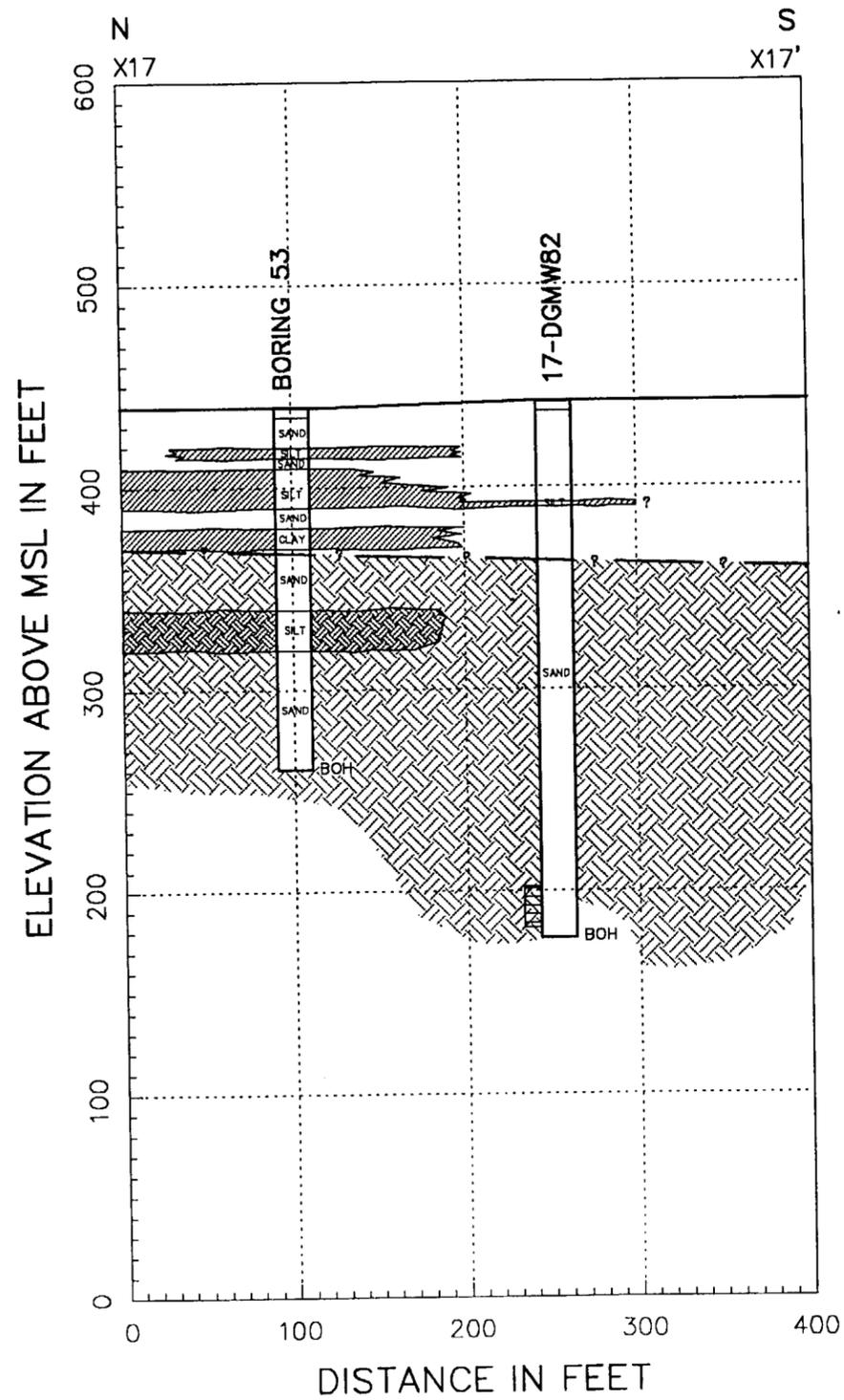
- FEATURES:**
- BUILDING OR PAD
 - MONITORING WELL
 - DEEP, 25-FOOT, OR ANGLE BORING
 - SEDIMENT SAMPLE
 - SURFACE WATER AND SEDIMENT SAMPLE
 - SURFACE AND NEAR-SURFACE SOIL SAMPLE
 - ROAD
 - STRATUM BOUNDARY
 - WASH OR STREAM
 - LINE OF GEOLOGIC CROSS-SECTION
 - END OF LINE OF CROSS-SECTION
 - LINE OF CROSS-SECTION EXTENDS BEYOND AREA SHOWN



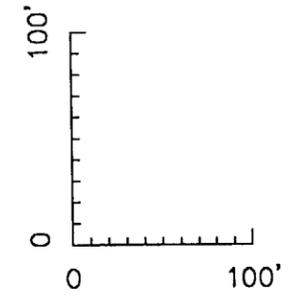
B17-3

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HORIZ. SCALE: 1"=100'
 VERT. SCALE: 20% EXAGGERATION



LEGEND

-  UNCONSOLIDATED PERMEABLE SEDIMENTS
-  UNCONSOLIDATED LOW-PERMEABILITY SEDIMENTS
-  SEMICONSOLIDATED LOW-PERMEABILITY SEDIMENTS: SAND OR SANDSTONE
-  UNCONSOLIDATED LOW-PERMEABILITY SEDIMENTS: SILT OR SILTSTONE
-  BOH BOTTOM OF HOLE
-  WELL SCREEN INTERVAL

FIGURE B17-2
 SITE 17 (OU-2)
 GEOLOGIC CROSS SECTION X17-X17'
 MCAS EL TORO PHASE I RI
 TECHNICAL MEMORANDUM

PAGE NUMBER B17-6

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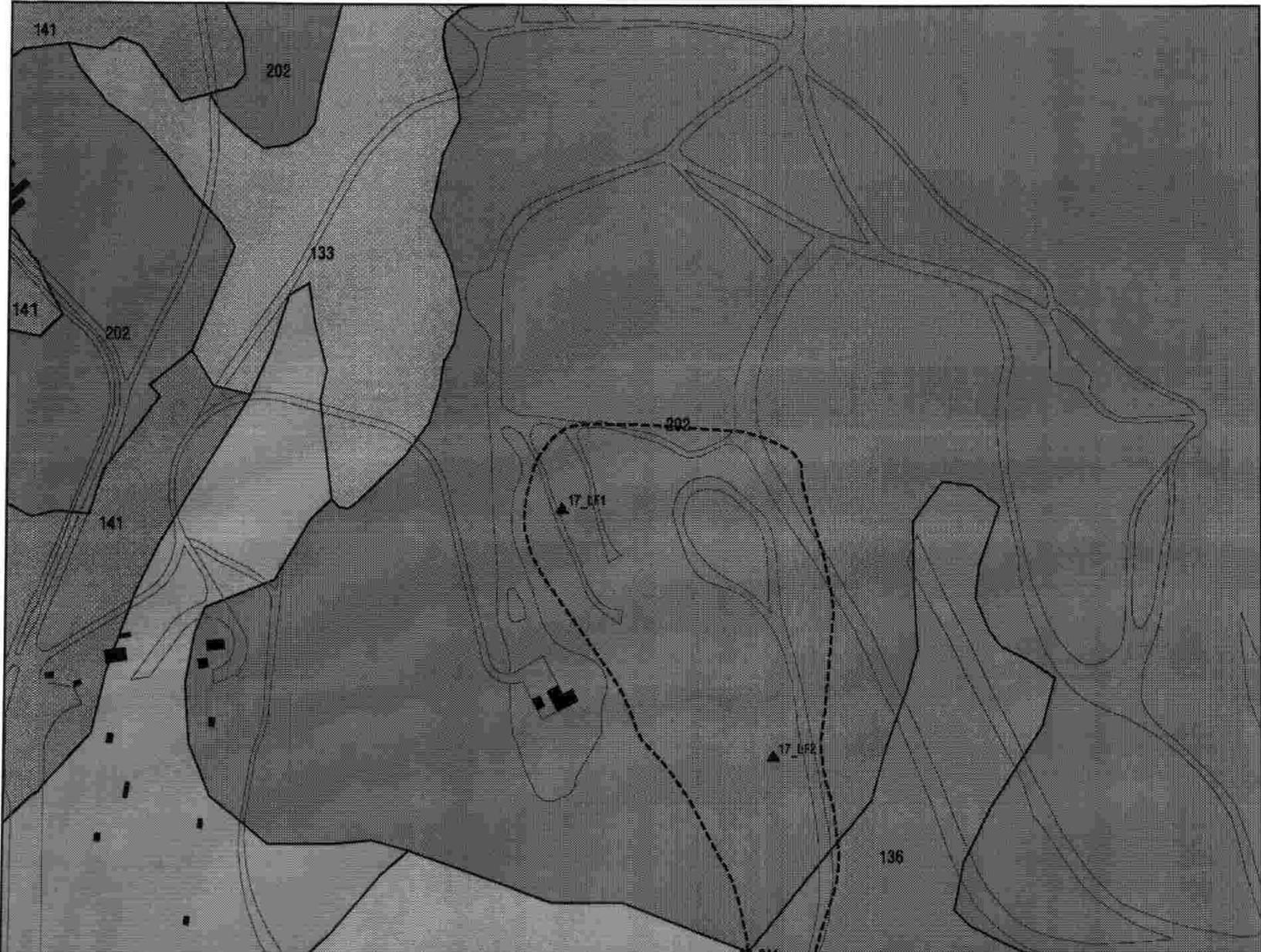




FIGURE B17-3

**SITE 17 (OU-2):
SCS SOILS MAP**

**MCAS EL TORO PHASE I RI
TECHNICAL MEMORANDUM**

FEATURES:

-  133 - BOTELLA
-  138 - CAPISTRANO
-  141 - CIENEBA
-  163 - METZ
-  177 - MYFORD
-  195 - SAN EMIGDIO
-  202 - SOPER
-  BUILDINGS

-  SITE BOUNDARY
-  ROAD
-  WASH OR STREAM
-  MONITORING WELL
-  DEEP, 25-FOOT, OR ANGLE BORING
-  SEDIMENT SAMPLE
-  SURFACE WATER AND SEDIMENT SAMPLE
-  SURFACE AND NEAR-SURFACE SOIL SAMPLE



SOURCE: SCS, 1978

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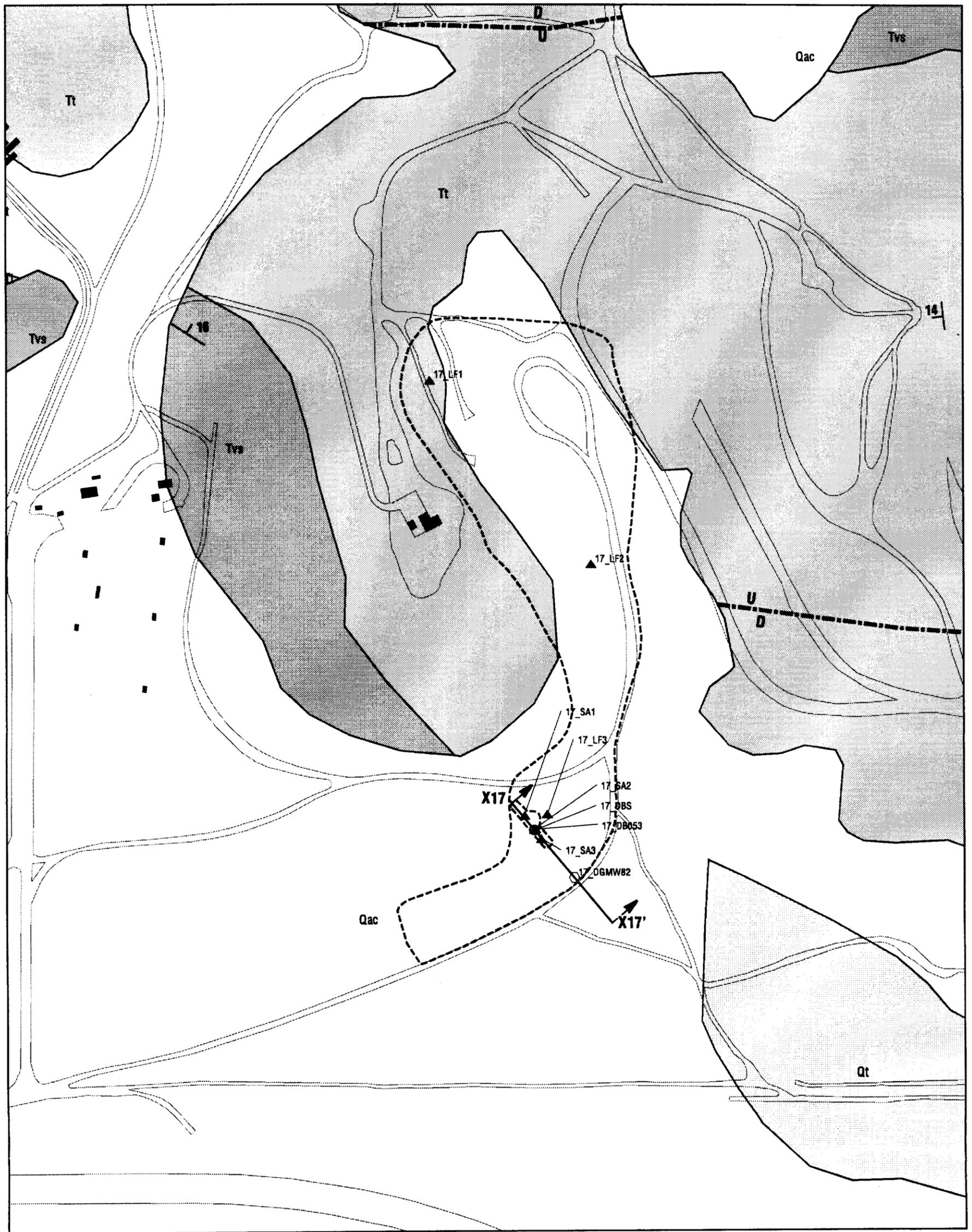


FIGURE B17-4

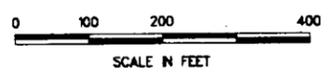
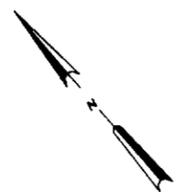
**SITE 17 (OU-2):
GEOLOGY MAP**

**MCAS EL TORO PHASE I RI
TECHNICAL MEMORANDUM**

SOURCE: CA. DIVISION OF MINES
AND GEOLOGY, 1981

FEATURES:

- | | |
|---|--|
|  Qac - ALLUVIUM AND COLLUVIUM |  MONITORING WELL |
|  Qt - NONMARINE TERRACE DEPOSITS |  DEEP, 25-FOOT, OR ANGLE BORING |
|  Tr - TOPANGA FORMATION |  SEDIMENT SAMPLE |
|  Tvs - VAQUEROS/SESPE FORMATION |  SURFACE WATER AND SEDIMENT SAMPLE |
|  BUILDING |  SURFACE AND NEAR-SURFACE SOIL SAMPLE |
|  SITE BOUNDARY |  STRIKE AND DIP |
|  FAULT |  DOWNTHROWN SIDE OF FAULT |
|  GEOLOGIC CROSS SECTION |  UPTHROWN SIDE OF FAULT |
|  ROAD | |



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observed on historical aerial photographs. The boundaries were also adjusted at the mouth of the canyon to approximate more closely the observed physical dimensions of the landfill. A seismic survey at the mouth of the canyon was proposed to evaluate the distribution of bedrock. This would benefit designing a well assuming that the groundwater is perched on top of and controlled by bedrock. The upgradient well was eliminated and two of the three downgradient well locations were relocated to the mouth of the canyon. Together with the deep boring completed as a well, a total of four wells were planned to be constructed (for a net decrease of one). The upgradient shallow soil boring was eliminated.

Several field changes were made from the *SAP Amendment*. After evaluating the results of the boring at 17_DB53, the seismic survey was not conducted. Because the drilling at this location resulted in drill refusal on presumed bedrock and no water was found at refusal depth, the borehole was not completed as a monitoring well. Further, only one of the three proposed downgradient monitoring wells was drilled because access was limited by severe weather conditions (rainfall and surface water runoff) and completion would be so late that their sampling results could not be included in this document.

Changes in analyses were also made in the field: analyses for TFH, TRPH, SVOCs, pesticides and PCBs were added for the 238-foot sample from 17_MW82.

Gross alpha and beta samples were not collected from the groundwater sample from 17_MW82, and the VOC analysis was not requested for the 17_LF2 surface soil sample.

B17.3.1 Surface Water and Sediment

(No surface water or sediment samples were collected at this site.)

B17.3.2 Surface and Near-Surface Soils

Within the Stratum 1 (Landfill), three surface soil stations (17_LF1, 17_LF2, and 17_LF3) were sampled at the surface only (0 feet). At 17_LF3, a duplicate was collected, bringing the total of surface soil samples to four. Within Stratum 2,

three surface and near-surface soil stations (17_SA1, 17_SA2, and 17_SA3) were each sampled at depths of 0, 2, and 4 feet bgs, for a total number of nine samples. The 0-foot sample at 17_DBS is the surface soil sample associated with Deep Boring 17_DB53.

B17.3.3 Vadose Zone Soils (Soil Borings)

The only soil boring, 17_DB53, was drilled and sampled, but not completed as a monitoring well. It was sampled for lithologic logging and chemical analyses at 0, 5, 10, 15, 20, 25, 40, and 60 feet, and a duplicate sample at 60 feet was analyzed. Nine samples were analyzed from this boring.

B17.3.4 Groundwater Monitoring Wells

One soil boring was drilled and sampled, completed as a well (17_MW82), and then sampled for groundwater. Three samples were analyzed from the soil collected during drilling from depths of 25, 235, and 238 feet. Well 17_MW82 is a downgradient well outside of the site boundary. No aquifer tests were performed on this well. The well was sampled once for groundwater.

B17.4 Surface Water and Sediments

(Surface water and sediments were not sampled at this site.)

B17.5 Surface and Near-Surface Soils

B17.5.1 Description of Surface and Near-Surface Soil Samples

The surface soils at Site 17 are Capistrano, San Emigdio, and Soper series (Figure B17-3, Soils Map). These soils are well-drained, sandy to gravelly loam with a thickness of 2.5 to 5 feet. The percolation rate ranges from 0.2 to 6.0 in/hr and the available water capacity rate ranges from 0.09 to 0.18 in/in (Wachtell, 1978).

Surface and near-surface soils (to 4 feet below the surface) were sampled by stratum: 17_LF1, 17_LF2, and 17_LF3 in Stratum 1, and 17_SA1, 17_SA2, and 17_SA3 in Stratum 2.

B17.5.2 Analytical Results

The sample from 17_DBS contained no detected concentration of VOCs, SVOCs, pesticides, PCBs, herbicides, or TRPH. This sample is therefore omitted from further discussion in this section.

B17.5.2.1 Stratum 1: Landfill Area

Four surface soil samples were collected from the landfill area (17_LF) (see Table B17-1).

No organic chemicals were detected in 17_LF2. Only trace amounts of toluene and acetone were detected in 17_LF1. The 17_LF3 sample results were above the detection limit for VOCs, SVOCs, pesticides, TFH-gasoline, TFH-diesel, and TRPH. Metals results are presented in Table 17-2.

Hydrocarbons (TRPH, TFH). TFH-gasoline was detected in 17_LF3 at 0.125 mg/kg and not detected in the duplicate. TFH-diesel was detected in 17_LF3 at 51.4 mg/kg. TRPH was detected in 17_LF3, at 402 mg/kg.

Volatile Organic Compounds (VOCs). Toluene was estimated below the CRDL in 17_LF1 and 17_LF3 (not detected in the duplicate sample). Acetone was detected in 17_LF1 at 30 $\mu\text{g}/\text{kg}$, 17_LF3 at 34 $\mu\text{g}/\text{kg}$, and in the duplicate sample at 28 $\mu\text{g}/\text{kg}$. Acetone is a demonstrated laboratory contaminant; the maximum detected concentration in the trip blanks is 37 $\mu\text{g}/\text{L}$.

Semivolatile Organic Compounds (SVOCs). Seven SVOCs were detected below the CRDL in the 17_LF3 sample: benzo(a)pyrene, benzo(ghi)perylene, chrysene, flouranthene, indeno(1,2,3-cd)pyrene, pyrene, and benzo(a)anthracene.

Pesticides and Herbicides. Two pesticides were detected below the CRDL in the 17_LF3 sample: 4,4'-DDD and 4,4'-DDT. None of the Stratum 1 surface soil samples showed herbicides.

Metals. The metals results are presented in Table B17-3.

B17.5.2.2 Stratum 2 (Stained Area)

Nine samples were analyzed from the stained area (17_SA1, 17_SA2, and 17_SA3 each at depths of 0, 2, and 4 feet).

B17.5.2.1 Analytical Results

Samples at 17_SA1, 17_SA2, and 17_SA3 showed detected levels of hydrocarbons (TFH-gasoline, TFH-diesel, and TRPH). Acetone and toluene (VOCs) were detected in all three stained area locations, but the 17_SA2 sample at 4 feet showed the highest concentrations. Methylene chloride was detected in 17_SA2 at 2 and 4 feet. In general, 17_SA2 samples (especially at 4 feet) have the highest concentrations of hydrocarbons and VOCs. 17_SA3 has the lowest concentrations among the three Stratum 2 samples. Samples worth noting are 17_SA1 at 0 feet with TFH-diesel at 1,010 mg/kg (which exceeds the California LUFT guideline of 1,000 mg/kg), 17_SA1 at 0 feet with TRPH at 1,831 mg/kg, and 17_SA2 at 4 feet with TRPH at 2,733 mg/kg.

Pesticides and herbicides results are below the CRDLs. SVOC results are either not detected or below the CRDL (except for 4-methylphenol, found in SA1 at 0 feet). The metals results are presented in Table 17-2.

Hydrocarbons (TRPH, TFH). TFH-gasoline was detected at 17_SA1 at 0 (0.27 mg/kg), 2 (0.34 mg/kg), and 4 (0.47 mg/kg) feet; 17_SA2 at 2 (0.17 mg/kg) and 4 (0.53 mg/kg) feet; and 17_SA3 at 0 (0.15 mg/kg) and 4 (0.07 mg/kg) feet. TFH-diesel was detected at 17_SA1 at 0 (1,010.0 mg/kg), 2 (223 mg/kg), and 4 (63 mg/kg) feet; 17_SA2 at 4 (453 mg/kg) feet; and 17_SA3 at 0

(118 mg/kg) feet. TRPH was detected at 17_SA1 at 0 (1,831 mg/kg), and 4 (772 mg/kg) feet; 17_SA2 at 2 (278 mg/kg) and 4 (2,733 mg/kg) feet; and 17_SA3 at 0 (981 mg/kg) and 4 (66 mg/kg) feet.

Volatile Organic Compounds (VOCs). The VOCs detected were acetone, methylene chloride, and toluene. Acetone was detected at 17_SA1 at 0 (26 $\mu\text{g}/\text{kg}$) and 2 (13 $\mu\text{g}/\text{kg}$) feet; 17_SA2 at 2 (16 $\mu\text{g}/\text{kg}$) and 4 (86 $\mu\text{g}/\text{kg}$) feet; and 17_SA3 at 0 (21 $\mu\text{g}/\text{kg}$), 2 (26 $\mu\text{g}/\text{kg}$), and 4 (15 $\mu\text{g}/\text{kg}$) feet. Acetone is a demonstrated laboratory contaminant, the maximum detected concentration in the trip blanks is 37 $\mu\text{g}/\text{L}$.

Methylene chloride was detected at 17_SA2 at 4 (47 $\mu\text{g}/\text{kg}$) feet. Methylene chloride is also a demonstrated laboratory contaminant; its maximum detected concentration in the trip blanks was 42 $\mu\text{g}/\text{L}$. Toluene was detected at 17_SA1 at 0 (13 $\mu\text{g}/\text{kg}$), 2 (17 $\mu\text{g}/\text{kg}$), and 4 (14 $\mu\text{g}/\text{kg}$) feet; at 17_SA2 at 2 (27 $\mu\text{g}/\text{kg}$) and 4 (180 $\mu\text{g}/\text{kg}$) feet. Toluene was also detected below the CRDL at 17_SA3 at 0 feet.

Semivolatile Organic Compounds (SVOCs). Two SVOCs detected were 2,4-dimethylphenol, and 4-methylphenol. 2,4-Dimethylphenol was detected at 17_SA1 at 0 feet at 6,000 $\mu\text{g}/\text{kg}$, estimated. 4-Methylphenol was detected at 17_SA1 at 0 feet at 34,000 $\mu\text{g}/\text{kg}$; it was also found below the CRDL in 17_SA1 at 4 feet.

Pesticides and Herbicides. Pesticides were detected below the CRDL, at 17_SA1 at 0 and 2 feet; 17_SA2 at 4 feet; and 17_SA3 at 0 feet. Dieldrin, gamma-chlordane, endrin ketone, alpha-chlordane, 4,4'-DDE, endosulfan sulfate, and 4,4'-DDD were detected below the CRDL at 17_SA1 at 0 feet. Dieldrin, heptachlor epoxide, 4,4'-DDD, endosulfan sulfate, and BCH-delta were detected below the CRDL at 17_SA1 at 2 feet.

4,4'-DDE, gamma-chlordane, dieldrin, methoxychlor, 4,4'-DDD, and endosulfan sulfate were detected below the CRDL at 17_SA2 at 4 feet. 4,4'-DDE and endosulfan sulfate were detected below the CRDL at 17_SA3 at 0 feet.

One herbicide, 2,4-DB, was detected below at CRDL at 17_SA1 at 2 feet; 17_SA2 at 4 feet; and 17_SA3 at 0 feet.

Metals. The metals results are in Table 17-3.

B17.6 Vadose Zone Soils

B17.6.1 Description of Subsurface Soil Samples

A total of 13 samples were analyzed from the vadose zone (17_DB53 and 17_DGMW82) (Table B17-1). The analytical results for these samples is presented in Table B17-3.

B17.6.2 Subsurface Geology

Site 17 is at the base of the foothills of the Santa Ana Mountains, within a small canyon and along the southern slope of a small hill. The stratigraphy at the site consists of Holocene surface stream channel deposits that conformably overlie Tertiary marine semiconsolidated rocks of the Topanga and Vaqueros/Sespe Formations (undifferentiated). The geology of the site can be seen in Figure B17-4.

The area bedrock appears to be faulted and folded, based on the orientation of the strike and dip symbols and the presence of mapped faults (CDMG, 1981). A mapped fault is near the middle of the site above the stained area. The boring logs of the 17_DB53 and 17_MW82 supply the only subsurface lithologic information for the site (Appendix K). Figure B17-2 is the interpretive cross section formed from these logs.

The predominant soil lithology seen in these two logs is silty sand. Deep Boring 17_DB53 appears to have a higher percentage of fines (silts and clays). Since these two borings are only about 130 feet apart, it seems likely that the lower-permeability strata logged in 17_DB53 became thinner and the percentage

of fines decreased in the area of 17_MW82. Semiconsolidated bedrock is interpreted to first occur at about 70 feet.

B17.6.3 Analytical Results

The analytical results for the vadose zone samples are presented in Table B17-3.

Herbicides were detected in all the soil samples (except the surface sample, 17_DBS). (Herbicides analysis was not run on 17_MW82 soil samples.) Fuel hydrocarbons (TFH-gasoline, TFH-diesel, and TRPH) were detected in some of the samples from 17_DB53 and 17_MW82. TFH-gasoline and TRPH were detected from the relatively shallow samples (5 and 10 feet) in 17_DB53. TFH-diesel was also seen in 5- and 10-foot samples and additionally in the 40-foot sample. TFH-gasoline and TRPH were seen in the deep samples from 17_MW82.

TFH-diesel is below the CRDL for all of the 17_MW82 samples. SVOCs were not detected. Pesticides are below the CRDL or at low levels. Metals results are also included in Table 17-3.

Hydrocarbons (TRPH, TFH). TFH-gasoline was detected at 17_DB53 at 5 (0.39 mg/kg) feet and 10 (0.58 mg/kg) feet, and at 17_MW82 at 235 (0.35 mg/kg) feet and at 238 (0.10 mg/kg) feet. TFH-diesel was detected at 17_DB53 at 5 (15 mg/kg) feet, 10 (106 mg/kg) feet, and at 40 (17 mg/kg) feet and again at 40 feet in the duplicate sample (15.5 mg/kg). TRPH was detected at 17_DB53 at 5 (457 mg/kg) feet, 10 (1,886 mg/kg) feet, and at 17_MW82 at 235 (77 mg/kg) feet.

Volatile Organic Compounds (VOCs). Three compounds were detected in the subsurface soil samples: acetone, 2-butanone, and toluene. Acetone was detected at 17_DB53 at 10 (24 $\mu\text{g}/\text{kg}$) feet, 20 (14 $\mu\text{g}/\text{kg}$) feet, and 25 (14 $\mu\text{g}/\text{kg}$) feet, and at 17_MW82 at 25 (38 $\mu\text{g}/\text{kg}$) feet. Acetone is commonly found in the trip blanks at these concentrations. 2-Butanone was detected at 17_MW82 at 25 feet (16 $\mu\text{g}/\text{kg}$). 2-Butanone is a demonstrated laboratory contaminant; the

maximum detected concentration in the trip blanks was 33 $\mu\text{g/L}$. Toluene was detected below the CRDL at 17_DB53 at 10 feet.

Semivolatile Organic Compounds (SVOCs). SVOCs were not detected.

Pesticides, Polychlorinated Biphenyls (PCBs), and Herbicides. Endosulfan sulfate at 7 $\mu\text{g/kg}$ and endrin ketone at 3 $\mu\text{g/kg}$ were detected at 17_DB53 at 10 feet.

Herbicides were detected at 17_DB53 at 5, 10, 15, 20, 25, 40, and 60 feet. (The soil from 17_MW82 was not analyzed for herbicides.)

- 2,4-DB (up to 200 $\mu\text{g/kg}$) was detected at 17_DB53 at 25, 40, and 60 feet, but was not in the duplicates.
- Dichloroprop (171 $\mu\text{g/kg}$) was detected at 17_DB53 at 40 foot, but was not in the duplicate.
- Dalapon (up to 172 $\mu\text{g/kg}$) was detected at 17_DB53 at 5, 10, 15, 20 feet.
- Dinoseb (39 $\mu\text{g/kg}$) was detected at 17_DB53 at 60 feet, but was not in the duplicate.
- MCPA (up to 70,300 $\mu\text{g/kg}$) was detected at 17_DB53 at 5 and 40 feet, but was not in the duplicate.
- MCPP (up to 58,300 $\mu\text{g/kg}$) was detected at 17_DB53 at 40 feet (also detected at 40 feet for the duplicate) and at 60 feet (not in the 60-foot duplicate).

Metals. Metals detected are presented in Table 17-3.

Total Organic Carbon (TOC). TOC was detected at 17_DGMW82 at 238 feet at 107 mg/kg.

B17.6.4 Soil Vapor Headspace Concentrations

A deep boring into the stain area and a downgradient well were drilled during the investigation of Site 17. Headspace results for subsurface soils are summarized in

Attachment 1 to Appendix B. A moderate correlation exists between the headspace results and the analytical results for the subsurface soil samples. The headspace values above 2.5 ppmv are associated with the samples from 5 feet and 40 feet in 17_DB53 and with the samples from 55, 236.5, 238, and 239.5 feet in 17_MW82. The detect values of TRPH are for the 5- and 10-foot samples in 17_DB53 and the 235-foot samples in 17_MW82. The detection values of TFH-gasoline are for the 5- and 10-foot samples in 17_DB53 and 235- and 238-foot samples in 17_MW82. The detection values of TFH-diesel are for the 5-, 10-, and 40-foot samples in 17_DB053.

B17.7 Groundwater

B17.7.1 Site-Specific Hydrogeology

Depth to groundwater is approximately 200 feet. Groundwater occurs in the bedrock, which is permeable. Table B17-4 summarizes well construction, pump installation, and water quality sampling data.

The site-specific aquifer parameter and groundwater flow information is limited since only one well was completed for Site 17. The regional groundwater flow map (Figure 3-4a, b, and c) indicates that in the area of Site 17 the groundwater flow is toward the west, at a gradient of approximately 0.02 (ft/ft). The linear groundwater velocity is estimated to be 0.1 ft/day, assuming a gradient of 0.02 ft/ft; effective porosity at 20 percent; and hydraulic conductivity at 1 ft/day (a value consistent with the wells from nearby Site 2).

Due to the recent completion of 17_MW82, no aquifer testing was conducted.

B17.7.2 Analytical Results

The groundwater sample from 17_MW82 is free of all organics except for three VOCs at values that are commonly seen in trip and rinsate blanks.

General Chemistry. The groundwater quality can be characterized as fairly good, due to relatively low concentration of constituents analyzed with a sodium sulfate dominant chemistry.

Hydrocarbons (TRPH, TPH). No hydrocarbons were detected.

Volatile Organic Compounds (VOCs). Three VOCs were detected in the groundwater sample from 17_MW82. They are bromodichloromethane at 7 $\mu\text{g/l}$, chlorodibromomethane at 6 $\mu\text{g/l}$, and chloroform at 7 $\mu\text{g/l}$. These three compounds are commonly seen in trip and rinsate blanks at these values.

Semivolatile Organic Compounds (SVOCs). No SVOCs were detected.

Pesticides and Polychlorinated Biphenyls (PCBs). No pesticides or PCBs were detected.

Metals. The results for metals are summarized in Table B1-6.

B17.7.3 Comparison with Drinking Water Standards

No regulatory standards for water were exceeded by the 17_MW82 groundwater sample results. Table 17-7 presents exceedence results.

B17.8 Potential Contaminant Migration Pathways

The primary route of contaminant transport at the site is most likely to be infiltration of infrequent rain water in the coarse soil to groundwater. However, there is little evidence to show that the leachate from the landfill, as well as liquid contaminants dumped at the landfill, may have infiltrated the coarse soil and migrated vertically down to groundwater; no groundwater contamination was detected in the groundwater sample collected from the downgradient well 17_MW82.

B17.9 Summary and Conclusions

The surface soil is contaminated with fuel hydrocarbons. TFH-gasoline concentrations ranged up to 0.47 mg/kg; TFH-diesel ranged up to 453 mg/kg; and TRPH ranged up to 1,831 mg/kg. The 17_LF1 and 17_LF2 results were below the CRDL for all organic compounds analyzed (except for trace toluene and acetone). Acetone is a demonstrated lab contaminant. The maximum detected concentration of acetone in the trip blanks is 37 µg/L. Surface soils sample results for VOCs, SVOCs, pesticides and PCBs, and herbicides are generally below the CRDLs (except for 4-methylphenol, an SVOC in 17_SA1 at 0 feet).

Vadose zone soils show the presence of herbicides, trace pesticides, TFH-gasoline, TFH-diesel, and TRPH. TFH-gasoline concentrations range up to 0.58 mg/kg. TFH-diesel concentrations range up to 106 mg/kg. TRPH concentrations range up to 1,886 mg/kg.

The groundwater quality appears to be good due to relatively low concentrations of sulfate and TDS. No organic compounds were seen, except for three VOCs at values that are commonly seen in the trip and rinsate blanks.

The site does not appear to be a potential source of groundwater contamination. The site is not a likely source of surface water contamination, and is not a potential source of regional groundwater VOC contamination (OU-1).

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**Table B17-1
Site 17 (OU-2): Types of Samples and Chemical Analyses
MCAS El Toro Phase I RI Technical Memorandum**

Location/ Stratum	Station Identi- fication	Sample Identi- fication	Sample Depth (ft)	Groups of Analytes Requested ^a										
				VOCs	Semi- VOCs	Pesti- cides/ PCBs	Herbi- cides	TPH	TFH	Metals	CN	Genl. Chem- istry ^c	TOC	Dioxins/ Furans
Surface Water and Sediments (Not sampled)														
Surface and Near-Surface Soils														
	17_DBS	S1454329	0		X	X	X	X	X	X				
1	17_LF1	S1454332	0	X	X	X	X	X	X	X				
1	17_LF2	S1454330	0		X	X	X	X	X	X				
1	17_LF3	S1454324	0	X	X	X	X	X	X	X				
1	17_LF3	S1454405 ^b	0	X	X	X	X	X	X	X				
2	17_SA1	S1454322	0	X	X	X	X	X	X	X				
2	17_SA2	S1454334	0	X	X	X	X	X	X	X				
2	17_SA3	S1454327	0	X	X	X	X	X	X	X				
2	17_SA1	S1454325	2	X	X	X	X	X	X	X				
2	17_SA1	S1454326	4	X	X	X	X	X	X	X				
2	17_SA2	S1454333	2	X	X	X	X	X	X	X				
2	17_SA2	S1454323	4	X	X	X	X	X	X	X				
2	17_SA3	S1454331	2	X	X	X	X	X	X	X				
2	17_SA3	S1454336	4	X	X	X	X	X	X	X				
Vadose Zone Soils														
	17_DB053	S1456276	5	X	X	X	X	X	X	X				
	17_DB053	S1456279	10	X	X	X	X	X	X	X				
	17_DB053	S1456280	15	X	X	X	X	X	X	X				
	17_DB053	S1456281	20	X	X	X	X	X	X	X				
	17_DB053	S1456282	25	X	X	X	X	X	X	X				
	17_DB053	S1456283	40	X	X	X	X	X	X	X				
	17_DB053	S1457155 ^b	40	X	X	X	X	X	X	X				
	17_DB053	S1456284	60	X	X	X	X	X	X	X				
	17_DB053	S1457156 ^b	60	X	X	X	X	X	X	X				
	17_DGMW82	S1457170	25	X	X									
	17_DGMW82	S1457171	235	X	X	X		X	X	X		X		
	17_DGMW82	S1457172	238	X	X	X		X	X	X		X		

**Table B17-1
Site 17 (OU-2): Types of Samples and Chemical Analyses
MCAS El Toro Phase I RI Technical Memorandum**

Location/ Stratum	Station Identi- fication	Sample Identi- fication	Sample Depth (ft)	Groups of Analytes Requested ^a											
				VOCs	Semi- VOCs	Pesti- cides/ PCBs	Herbi- cides	TPH	TFH	Metals	CN	Geni. Chem- istry ^c	TOC	Dioxins/ Furans	Gross Alpha/ Beta
Groundwater															
	17_DGMW82	S1452099	NA	X	X	X	X	X	X	X	X	X			

^a VOCs = Volatile Organic Compounds; Semi-VOCs = Semivolatile Organic Compounds;
PCBs = Polychlorinated Biphenyls; TPH = Total Recoverable Petroleum Hydrocarbons;
TFH = Total Fuel Hydrocarbons; CN = Total Cyanide; TOC = Total Organic Carbon.

^b Duplicate

^c Chloride, sulfate, carbonate, bicarbonate, nitrate/nitrite, and total dissolved solids.

Table B17-2

Site17 (OU- 2): Summary of Detected Chemicals in Sediments and Surface/Near-Surface Soil

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	17_DBS S1454329 (0)	DVF(a)	17_LF1 S1454332 (0)	DVF(a)	17_LF2 S1454330 (0)	DVF(a)	17_LF3 S1454324 (0)	DVF(a)	17_LF3 S1454405 (0)	DVF(a)	17_SA1 S1454322 (0)	DVF(a)	17_SA1 S1454325 (2)	DVF(a)	17_SA1 S1454326 (4)	DVF(a)
METALS																	
SILVER	MG/KG	0.43	U	0.43	U	0.43	U	0.42	U	0.45	U	0.85	b	0.44	U	0.44	U
ALUMINIUM	MG/KG	2670		4200		5150		7150		4750		5180		6320		4330	
ARSENIC	MG/KG	1.5	b	4.4		3.4		1.9	b	1.6	b	2.3		2.3		2.7	
BARIUM	MG/KG	39.3	b	46		81.4		94.5		50.7		184		92		86.1	
BERYLLIUM	MG/KG	0.1	U	0.1	b	0.12	b	0.23	b	0.21	b	0.14	b	0.14	b	0.21	b
CALCIUM	MG/KG	2490		2990		3880		3080		1870		3570		2760		2740	
CADMIUM	MG/KG	0.39	b	0.81	b	0.71	b	3.1		0.46	b	12		4.5		2.9	
COBALT	MG/KG	1.6	b	2.4	b	3	b	5.9	b	1.9	b	2.8	b	3.5	b	3.4	b
CHROMIUM	MG/KG	6		8.6		9.9		297		7.5		81.9		31.1		29.7	
COPPER	MG/KG	2.9	U	3.5	U	3.4	U	18.1		2.9	U	82.5		32.3		20.5	
IRON	MG/KG	4560		7700		8940		12900		6910		10400		9080		7490	
MERCURY	MG/KG	0.03	U	0.14		0.09	U	0.03	U								
POTASSIUM	MG/KG	1450		1890		1980		1840		1890		2090		2240		1860	
MAGNESIUM	MG/KG	1320		2660		2550		3100		1870		2320		2240		1640	
MANGANESE	MG/KG	103		91.9		136		220		104		95		90.3		113	
SODIUM	MG/KG	208	b	195	b	245	b	247	b	239	b	188	b	199	b	243	b
NICKEL	MG/KG	5.2	b	5.7	b	4.4	b	138		4.1	b	12.7		9		6.9	b
LEAD	MG/KG	4.8		2.4		1.9		22.2		1.4		381		92.8		348	
ANTIMONY	MG/KG	2.5	U	2.5	U	2.5	U	2.4	U	2.6	U	2.7	b	2.5	U	2.5	U
SELENIUM	MG/KG	0.1	U	1.4		0.28	b	0.1	b	0.11	b	0.4	b	0.18	b	0.24	b
THALLIUM	MG/KG	0.14	U	0.14	U	0.14	U	0.14	U	0.15	U	0.15	U	0.15	b	0.15	b
VANADIUM	MG/KG	11.4		32.1		23.1		29.4		18.3		19.2		19.8		18.3	
ZINC	MG/KG	16.8		25.4		25.4		47.9		18.3		260		114		87.4	
VOLATILE ORGANIC COMPOUNDS																	
TOLUENE	UG/KG	-		3	J	-		7	J	11	U	13		17		14	
ACETONE	UG/KG	-		30		-		34		28		26		13		10	U
METHYLENE CHLORIDE	UG/KG	-		26	U	-		20	N	24	U	16	U	28	U	22	U
SEMI-VOLATILE ORGANIC COMPOUNDS																	
2,4-DIMETHYLPHENOL	UG/KG	20000	U	690	U	680	U	670	U	700	U	6000	J	710	U	680	U
4-METHYLPHENOL	UG/KG	20000	U	690	U	680	U	670	U	700	U	34000		710	U	390	J
PYRENE	UG/KG	20000	U	690	U	680	U	320	J	700	U	20000	U	710	U	680	U
BENZO(GH)PERYLENE	UG/KG	20000	U	690	U	680	U	180	J	700	U	20000	U	710	U	680	U
INDENO(1,2,3-CD)PYRENE	UG/KG	20000	U	690	U	680	U	240	J	700	U	20000	U	710	U	690	U
FLUORANTHENE	UG/KG	20000	U	690	U	680	U	360	J	700	U	20000	U	710	U	680	U
CHRYSENE	UG/KG	20000	U	690	U	680	U	220	J	700	U	20000	U	710	U	680	U
BENZO(A)PYRENE	UG/KG	20000	U	690	U	680	U	390	J	700	U	20000	U	710	U	680	U
BENZO(A)ANTHRACENE	UG/KG	20000	U	690	U	680	U	200	J	700	U	20000	U	710	U	680	U
PESTICIDES AND PCBs																	
HEPTACHLOR EPOXIDE	UG/KG	1.71	UJ	1.78	UJ	1.72	UJ	1.72	UJ	1.79	UJ	1.77	UJ	2.91	J	1.74	UJ
ENDOSULFAN SULFATE	UG/KG	3.32	UJ	3.45	UJ	3.33	UJ	33.4	UJ	3.47	UJ	27.6	J	5.82	J	3.38	UJ
BHC-DELTA	UG/KG	1.71	UJ	1.78	UJ	1.72	UJ	1.72	UJ	1.79	UJ	1.77	UJ	6.84	J	1.74	UJ
4,4'-DDT	UG/KG	3.32	UJ	3.45	UJ	3.33	UJ	135	J	3.47	UJ	3.44	UJ	3.54	UJ	3.38	UJ
ALPHA-CHLORDANE	UG/KG	1.71	UJ	1.78	UJ	1.72	UJ	1.72	UJ	1.79	UJ	8.81	J	1.82	UJ	1.74	UJ
GAMMA-CHLORDANE	UG/KG	1.71	UJ	1.78	UJ	1.72	UJ	1.72	UJ	1.79	UJ	7.88	J	1.82	UJ	1.74	UJ
ENDRIN KETONE	UG/KG	3.32	UJ	3.45	UJ	3.33	UJ	33.4	UJ	3.47	UJ	8.66	J	3.54	UJ	3.38	UJ
DIELDRIN	UG/KG	3.32	UJ	3.45	UJ	3.33	UJ	33.4	UJ	3.47	UJ	3.77	J	0.858	J	3.38	UJ
METHOXYCHLOR	UG/KG	17.1	UJ	17.8	UJ	17.2	UJ	172	UJ	17.9	UJ	17.7	UJ	18.2	UJ	17.4	UJ
4,4'-DDD	UG/KG	3.32	UJ	3.45	UJ	3.33	UJ	35.3	J	3.47	UJ	38.1	J	4.32	J	3.38	UJ
4,4'-DDE	UG/KG	3.32	UJ	3.45	UJ	3.33	UJ	33.4	UJ	3.47	UJ	11.6	J	3.54	UJ	3.38	UJ
HERBICIDES																	
2,4-DB	UG/KG	49.5	UJ	51.5	UJ	50.9	UJ	49.8	UJ	53	UJ	50.7	UJ	283	J	50.7	UJ
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																	
TFH DIESEL	MG/KG	12.5	U	12.9	U	12.8	U	51.4		13.1	U	1010		223		62.9	
TFH GASOLINE	MG/KG	0.051	U	0.052	U	0.051	U	0.125		0.053	U	0.27		0.339		0.471	
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																	
TRPH	MG/KG	20	U	20	U	9	U	402		18	U	1831		107		772	

Table B17-2

Site17 (OU- 2): Summary of Detected Chemicals in Sediments and Surface/Near-Surface Soil

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STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	17_SA2 S1484334 (0)	DVF(a)	17_SA2 S1484333 (2)	DVF(a)	17_SA2 S1484323 (4)	DVF(a)	17_SA3 S1484327 (0)	DVF(a)	17_SA3 S1484331 (2)	DVF(a)	17_SA3 S1484338 (4)	DVF(a)						
METALS																			
SILVER	MG/KG	0.44	U	0.44	U	0.44	U	0.43	U	0.45	U	0.45	U						
ALUMINUM	MG/KG	4750		6630		7340		3940		6550		4200							
ARSENIC	MG/KG	2.3		2.5		2.2		2.1		2.1	b	2.2							
BARIUM	MG/KG	58.1		66.1		75.4		54.5		64.2		81.1							
BERYLLIUM	MG/KG	0.21	b	0.26	b	0.25	b	0.14	b	0.2	b	0.15	b						
CALCIUM	MG/KG	2340		2090		2270		2100		2330		2180							
CADMIUM	MG/KG	0.55	b	0.68	b	2.1		0.95	b	0.61	b	0.56	b						
COBALT	MG/KG	2.7	b	2.9	b	2.8	b	3.2	b	2.7	b	3.5	b						
CHROMIUM	MG/KG	9.4		9.5		18.5		7.7		9.9		6.5							
COPPER	MG/KG	3.9	U	3.6	U	14.5	U	5.9	U	3.8	U	3.3	U						
IRON	MG/KG	7430		9010		9140		6190		6650		6980							
MERCURY	MG/KG	0.03	U																
POTASSIUM	MG/KG	1890		2270		2370		1760		2070		1850							
MAGNESIUM	MG/KG	1900		2180		2350		1690		2300		2040							
MANGANESE	MG/KG	127		105		75.4		112		123		129							
SODIUM	MG/KG	198	b	175	b	159	b	200	b	228	b	227	b						
NICKEL	MG/KG	5.9	b	5.5	b	5.7	b	3.8	b	5.4	b	4.9	b						
LEAD	MG/KG	5.5		2.5		44.2		17		2.2		1.9							
ANTIMONY	MG/KG	2.5	U	2.6	U	2.5	U	2.8	b	2.6	U	2.6	U						
SELENIUM	MG/KG	0.14	b	0.16	b	0.22	b	0.18	b	0.11	U	0.18	b						
THALLIUM	MG/KG	0.15	U	0.15	U	0.15	U	0.14	U	0.15	U	0.15	U						
VANADIUM	MG/KG	16.2		19.2		20.9		14		20.2		18.5							
ZINC	MG/KG	25.7		24.6		83.6		43.1		22.7		19.4							
VOLATILE ORGANIC COMPOUNDS																			
TOLUENE	UG/KG	11	U	27		180		5	J	11	U	11	U						
ACETONE	UG/KG	11	U	16		86	D	21		26		15							
METHYLENE CHLORIDE	UG/KG	11	U	12	U	47	B	11	U	17	U	15	U						
SEMI-VOLATILE ORGANIC COMPOUNDS																			
2,4-DIMETHYLPHENOL	UG/KG	700	UJ	690	U	20000	U	660	U	700	U	710	U						
4-METHYLPHENOL	UG/KG	700	UJ	690	U	20000	U	660	U	700	U	710	U						
PYRENE	UG/KG	700	UJ	690	U	20000	U	660	U	700	U	710	U						
BENZO(GH)PERYLENE	UG/KG	700	UJ	690	U	20000	U	660	U	700	U	710	U						
INDENOX(1,2,3-CD)PYRENE	UG/KG	700	UJ	690	U	20000	U	660	U	700	U	710	U						
FLUORANTHENE	UG/KG	700	UJ	690	U	20000	U	660	U	700	U	710	U						
CHRYSENE	UG/KG	700	UJ	690	U	20000	U	660	U	700	U	710	U						
BENZO(A)PYRENE	UG/KG	700	UJ	690	U	20000	U	660	U	700	U	710	U						
BENZO(A)ANTHRACENE	UG/KG	700	UJ	690	U	20000	U	660	U	700	U	710	U						
PESTICIDES AND PCBs																			
HEPTACHLOR EPOXIDE	UG/KG	1.8	UJ	1.77	UJ	1.73	UJ	1.7	UJ	1.81	UJ	1.82	UJ						
ENDOSULFAN SULFATE	UG/KG	3.49	UJ	3.44	UJ	15.3	J	2.66	J	3.52	UJ	3.53	UJ						
BHC-DELTA	UG/KG	1.8	UJ	1.77	UJ	1.73	UJ	1.7	UJ	1.81	UJ	1.82	UJ						
4,4'-DDT	UG/KG	3.49	UJ	3.44	UJ	3.36	UJ	3.29	UJ	3.52	UJ	3.53	UJ						
ALPHA-CHLORDANE	UG/KG	1.8	UJ	1.77	UJ	1.73	UJ	1.7	UJ	1.81	UJ	1.82	UJ						
GAMMA-CHLORDANE	UG/KG	1.8	UJ	1.77	UJ	2.72	J	1.7	UJ	1.81	UJ	1.82	UJ						
ENDRIN KETONE	UG/KG	3.49	UJ	3.44	UJ	3.36	UJ	3.29	UJ	3.52	UJ	3.53	UJ						
DIELDRIN	UG/KG	3.49	UJ	3.44	UJ	3.38	J	3.29	UJ	3.52	UJ	3.53	UJ						
METHOXYCHLOR	UG/KG	18	UJ	17.7	UJ	7.56	J	17	UJ	18.1	UJ	18.2	UJ						
4,4'-DDD	UG/KG	3.49	UJ	3.44	UJ	13	J	3.29	UJ	3.52	UJ	3.53	UJ						
4,4'-DDE	UG/KG	3.49	UJ	3.44	UJ	1.65	J	0.638	J	3.52	UJ	3.53	UJ						
HERBICIDES																			
2,4-DB	UG/KG	52.1	UJ	51.3	UJ	402	J	70.5	J	52.1	UJ	53.7	UJ						
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																			
TFH DIESEL	MG/KG	13.2	U	13.1	U	453		118		13.2	U	13.4	U						
TFH GASOLINE	MG/KG	0.053	U	0.173		0.526		0.152		0.053	U	0.07							
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																			
TRPH	MG/KG	20	U	278		2733		961		20	U	66							

(a) A definition of each data validation flag (DVF) is provided in Table B-1.

Table B17-3

Site17 (OU- 2): Summary of Detected Chemicals in the Vadose Zone (Subsurface) Samples

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STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	17_DB053 S1456276 (5)	DVF(a)	17_DB053 S1456279 (10)	DVF(a)	17_DB053 S1456280 (15)	DVF(a)	17_DB053 S1456281 (20)	DVF(a)	17_DB053 S1456282 (25)	DVF(a)	17_DB053 S1456283 (40)	DVF(a)	17_DB053 S1457155 (40)	DVF(a)	17_DB053 S1456284 (60)	DVF(a)
GENERAL CHEMISTRY																	
TOTAL ORGANIC CARBON	MG/KG	-		-		-		-		-		-		-		-	
METALS																	
ALUMINUM	MG/KG	8180		8330		8720		8340		7950		4560		4440		6880	
ARSENIC	MG/KG	2.3		2.1		3.2		1.9	b	2.5		2	b	2.8		4.4	
BARIIUM	MG/KG	72.9		68.9		73.4		51.3		53.3		48.7		50.6		103	
BERYLLIUM	MG/KG	0.2	b	0.21	b	0.22	b	0.22	b	0.22	b	0.11	U	0.11	U	0.29	b
CALCIUM	MG/KG	2290		2180		2580		2610		2450		2140		1930		3610	
CADMIUM	MG/KG	1.9		1.1		0.74	b	0.51	b	0.58	b	0.32	b	0.88	b	0.88	b
COBALT	MG/KG	3.8	b	3.2	b	4.1	b	3.1	b	3.2	b	3.1	b	3.4	b	5.2	b
CHROMIUM	MG/KG	19.2		12.5		10.6		11.8		11.6		7.5		8.7		11.4	
COPPER	MG/KG	12.4		7.8		3.7	b	3.4	b	3.8	b	2.7	b	4.2	b	3.7	b
IRON	MG/KG	9720		8630		9110		9190		9420		6580		7110		9850	
MERCURY	MG/KG	0.07	U	0.03	U	0.03	U	0.03	U	0.04	U	0.03	U	0.03	U	0.03	U
POTASSIUM	MG/KG	2400		2140		1850		1870		1960		1210		1800		2030	
MAGNESIUM	MG/KG	2480		2250		2880		3140		3140		2100		1930		3210	
MANGANESE	MG/KG	88.8		94.8		127		97.5		95.1		86		82.2		157	
SODIUM	MG/KG	185	b	219	b	287	b	350	b	284	b	287	b	229	b	385	b
NICKEL	MG/KG	5	b	4.8	b	6.4	b	8.7	b	6	b	3.5	b	4.1	b	7.4	b
LEAD	MG/KG	29.1		18.5		2.2		1.8		2		1.9		3.7		1.9	
ANTIMONY	MG/KG	2.5	U	2.5	U	2.7	U	2.8	U	2.7	U	2.7	U	2.7	U	2.7	U
SELENIUM	MG/KG	0.2	U	0.15	b	0.12	U	0.11	U	0.11	U	0.11	U	0.12	U	0.11	U
VANADIUM	MG/KG	21.6		19.1		21.6		19.6		22.4		14.4		15.9		22.4	
ZINC	MG/KG	76.4		53.1		23.2		23.7		21.7		16.8		25.7		24.9	
VOLATILE ORGANIC COMPOUNDS																	
TOLUENE	UG/KG	10	U	4	J	11	U	11	U	11	U	12	U	12	U	11	U
ACETONE	UG/KG	10	U	24		11	U	14		14		16	U	14	U	11	U
2-BUTANONE	UG/KG	10	U	10	U	11	U	11	U	11	U	12	U	12	U	11	U
PESTICIDES AND PCBs																	
ENDOSULFAN SULFATE	UG/KG	3.4	U	7.29		3.58	U	3.61	U	3.61	U	3.93	U	3.87	U	3.77	U
ENDRIN KETONE	UG/KG	3.4	U	2.9		3.58	U	3.61	U	3.61	U	3.93	U	3.87	U	3.77	U
HERBICIDES																	
DICHLOROPROP	UG/KG	103	U	102	U	109	U	110	U	109	U	171		118	U	114	U
DALAPON	UG/KG	145		172		122		137		54.7	U	59.1	U	58.8	U	57	U
DINoseb	UG/KG	25.7	U	25.8	U	27.2	U	27.4	U	27.4	U	29.6	U	29.4	U	38.8	U
MCPP	UG/KG	25700	U	25600	U	27200	U	27400	U	27400	U	57400		58300		28500	U
MCPA	UG/KG	70300		25600	U	27200	U	27400	U	27400	U	70000		29400	U	28500	U
2,4-DB	UG/KG	51.3	U	51.2	U	54.4	U	54.8	U	103		80.4		58.8	U	57	U
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																	
TFH DIESEL	MG/KG	15		106		13.8	U	13.8	U	13.7	U	17		15.5		14.3	U
TFH GASOLINE	MG/KG	0.389		0.584		0.054	U	0.055	U	0.055	U	0.06	U	0.059	U	0.057	U
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																	
TRPH	MG/KG	457		1886		20	U										

Table B17-3

Site17 (OU- 2): Summary of Detected Chemicals in the Vadose Zone (Subsurface) Samples

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STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	17_DB053 S1457156 (80)	DVF(a)	17_DGMW02 S1457170 (25)	DVF(a)	17_DGMW02 S1457171 (235)	DVF(a)	17_DGMW02 S1457172 (238)	DVF(a)									
GENERAL CHEMISTRY																		
TOTAL ORGANIC CARBON	MG/KG	-		-		100	U	107										
METALS																		
ALUMINUM	MG/KG	8700		-		5430		188										
ARSENIC	MG/KG	13.1		-		4		2.5										
BARIUM	MG/KG	93.4		-		38.8	b	4.4	b									
BERYLLIUM	MG/KG	2.1		-		0.11	U	0.12	U									
CALCIUM	MG/KG	84500		-		6000		93900										
CADMIUM	MG/KG	11.7		-		2.2		0.29	U									
COBALT	MG/KG	3.9	b	-		1.4	b	1.4	U									
CHROMIUM	MG/KG	14.1		-		11.3		0.88	U									
COPPER	MG/KG	5.4		-		5.7	b	1.3	U									
IRON	MG/KG	8530		-		6180		445										
MERCURY	MG/KG	0.03	U	-		0.9		0.13										
POTASSIUM	MG/KG	1530		-		1050	b	45.5	U									
MAGNESIUM	MG/KG	3180		-		1830		173	b									
MANGANESE	MG/KG	112		-		41.5		10.1										
SODIUM	MG/KG	1260		-		234	b	1150	b									
NICKEL	MG/KG	4.3	b	-		8.3	U	1.8	U									
LEAD	MG/KG	1.4		-		1.9		1.8										
ANTIMONY	MG/KG	2.8	U	-		2.8	U	5.1	b									
SELENIUM	MG/KG	0.45	b	-		0.11	U	0.12	U									
VANADIUM	MG/KG	34.2		-		21.8		1.9	b									
ZINC	MG/KG	62.8		-		19.8		2.7	b									
VOLATILE ORGANIC COMPOUNDS																		
TOLUENE	UG/KG	11	U	11	U	12	U	12	U									
ACETONE	UG/KG	11	U	38		12	U	12	U									
2-BUTANONE	UG/KG	11	U	18		12	U	12	U									
PESTICIDES AND PCBs																		
ENDOSULFAN SULFATE	UG/KG	3.78	U	-		3.88	U	3.86	U									
ENDRIN KETONE	UG/KG	3.78	U	-		3.88	U	3.86	U									
HERBICIDES																		
DICHLOROPROP	UG/KG	115	U	-		-		-										
DALAPON	UG/KG	57.3	U	-		-		-										
DINoseb	UG/KG	28.8	U	-		-		-										
MCP P	UG/KG	40800		-		-		-										
MCPA	UG/KG	28800	U	-		-		-										
2,4-DB	UG/KG	200		-		-		-										
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																		
TFH DIESEL	MG/KG	14.3	U	-		14.8	U	14.6	U									
TFH GASOLINE	MG/KG	0.057	U	-		0.349		0.1										
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																		
TRPH	MG/KG	20	U	-		77		20	U									

(a) A definition of each data validation flag (DVF) is provided in Table B-1.

Table B17-4	
Site 17 (OU-3): Well Construction Details	
MCAS El Toro Phase I RI Technical Memorandum	
Item	Station Identification
	17_DGMW82
Survey Location--Northing	550923
Survey Location--Easting	1557708
Ground Surface Elev. (ft above MSL ^a)	442
Measuring Point Elev. (ft above MSL ^a)	442.12
Measuring Point Location	Top of Casing
Type of Surface Completion	Above ground
Casing Diameter and Material	5" Schedule 80 PVC
Screen Diameter and Material	5" Sch. 80 0.02"-slot SS ^c
Screen Interval (ft bgs ^b)	235-255
Length of Drop Pipe (ft bgs ^b)	260
Make and Model of Installed Pump	(Not recorded)
Date of Pumping Test	(Not tested)
Date of Water Quality Sampling	8 Feb 93
^a Mean sea level ^b Below ground surface ^c SS = Stainless Steel	

Table B17-6

Site17 (OU- 2): Summary of Detected Chemicals in Groundwater Samples

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SCREEN INTERVAL ANALYTE BY GROUP	REG.CODE(b)	REG.LEVEL(c)	UNITS	17_DGMW82 S1452099 (235-255)	DVF(a)
GENERAL CHEMISTRY					
CARBONATE	NA	NA	MG/L	-	
ALKALINITY AS CaCO3	NA	NA	MG/L	155	
BICARBONATE	NA	NA	MG/L	155	
TOTAL DISSOLVED SOLIDS	3	500	MG/L	817	
CHLORIDE	3	250	MG/L	101	
SULFATE	3	250	MG/L	315	
NITRATE/NITRITE-N	1	10	MG/L	0.91	
METALS					
ALUMINUM	3	50	UG/L	40.5	b
COPPER	2	1300	UG/L	3.8	b
ZINC	2	5000	UG/L	31.4	
ARSENIC	2	50	UG/L	5.6	b
BARIIUM	2	2000	UG/L	30.8	b
POTASSIUM	NA	NA	UG/L	5830	
MAGNESIUM	NA	NA	UG/L	32400	
MANGANESE	3	50	UG/L	51.3	
SODIUM	NA	NA	UG/L	124000	
SELENIUM	1	10	UG/L	9	b
CALCIUM	NA	NA	UG/L	83700	
THALLIUM	NA	NA	UG/L	0.8	b
VANADIUM	NA	NA	UG/L	7.2	b
VOLATILE ORGANIC COMPOUNDS					
CHLORODIBROMOMETHANE	2	100	UG/L	6	
CHLOROFORM	2	100	UG/L	7	
BROMODICHLOROMETHANE	2	100	UG/L	7	

(a) A definition of each data validation flag (DVF) is provided in Table B-1.

(b) Regulatory Codes are:

- 1 = California MCL
- 2 = EPA primary MCL
- 3 = EPA secondary MCL
- 4 = California DTSC Action Level

(c) The given concentration represents the California MCL, the EPA primary MCL, the EPA secondary MCL, or the California DTSC Action Level, whichever is most stringent.

**Table B17-7
 Site 17 (OU-2): Analyte Concentrations in Groundwater
 Exceeding Regulatory Standards or DTSC^a Action Levels
 MCAS El Toro Phase I RI Technical Memorandum**

Well Identification	SI (ft bgs) ^b	Analyte	Units	Concentration	Regulatory Level ^c	Regulatory Code ^d
17_DGMW82	(0-0)	Sulfate	mg/L	315	250	3
		Total Dissolved Solids	mg/L	817	500	3
		Manganese	µg/L	51.3	50	3

^aCalifornia Department of Toxic Substances Control

^bScreen interval (feet below ground surface)

^cThe most stringent federal/state drinking water standard was applied. In the presence of both an EPA MCL and a California MCL, the most stringent MCL is represented. If neither an EPA or California MCL is listed, the California DTSC action level was applied.

^dRegulatory Code:

- 1=EPA Primary MCL: Federally enforceable drinking water standard established for the health effects of contaminants
- 2=California MCL: Health-based drinking water standard enforceable at the state level
- 3=EPA Secondary MCL: Nonenforceable standard based on aesthetic qualities of taste, color, and odor (Includes chloride, iron, manganese, sulfate, and TDS)
- 4=DTSC Action Level: Nonenforceable levels at which DTSC strongly urges water purveyors to take corrective action to reduce the level of contamination in the water they supply (Action levels cease to exist when state MCLs are promulgated.)

Table B17-8 Soil Survey Classification					
Soil series #	Soil series name	Depth of soil/weathered bedrock interface (inches)	Brief description	Percolation rate (inch/hr)	Available water capacity (in/in)
136	Capistrano Series	65	Well drained soils on uplands. Soils formed in granitic alluvium on alluvial fans and plains in small valleys. 0-27" Dark grayish brown sandy loam. 27-65" Grayish brown sandy loam.	2.0-6.0	0.09-0.13
195	San Emigdio Series	61	Well drained soils on flood plains and alluvial fans. 0-7" light brownish gray fine sandy loam. 7-61 light gray to pale brown stratified sandy loam with minor gravel at depth.	2.0-6.0	0.12-0.17
202	Soper Series	29	Well drained soils on foothills. They form in weakly consolidated sandstone and conglomerate. 0-8" brown slightly acid gravelly loam. 8-29" reddish brown and yellowish red neutral gravelly clay loam and gravelly loam. 29-62" weathered weakly consolidated conglomerate.	0.2-6.0	0.13-0.18
<p>Source: Soil Survey of Orange County and Western Part of Riverside County, California. United States Department of Agriculture Soil Conservation Service and Forest Service, September, 1978.</p>					

Appendix B19

**Nature and Extent of Contamination:
Site 19 (OU-3) Aircraft Expeditionary Refueling (ACER) Site**

Appendix B19

NATURE AND EXTENT OF SITE-SPECIFIC CONTAMINATION:

Site 19 (OU-3) - Aircraft Expeditionary Refueling (ACER) Site

This discussion of Site 19 is supplemented by the figures and data tables listed below. The figures begin on page B19-3, and the tables are grouped at the end of this Appendix B19. Field headspace values for soils at this site are presented in Table BA1-19, in Attachment 1 to Appendix B (directly following Appendix B22).

Figure B19-1: (Site Map)

Figure B19-2: Geologic Cross Section

Table B19-1: Types of Samples and Chemical Analyses

Table B19-2: Summary of Detected Chemicals in Sediments and Surface/Near-Surface Soil

Table B19-3: Summary of Detected Chemicals in Vadose Zone (Subsurface) Samples

Table B19-4: Well Construction Details

Table B19-5: Summary of Hydraulic Parameters

Table B19-6: Summary of Detected Chemicals in Groundwater Samples

Table B19-7: Analyte Concentrations in Groundwater Exceeding Regulatory Standards or DTSC Action Levels

B19.1 Site Description

The Aircraft Expeditionary Refueling (ACER) site is located in the southeast portion of the facility, southwest of Buildings 404 and 415. From 1964 to 1986, six 20,000-gallon fuel bladder revetments (FBR) in bermed areas were used to store JP-5 fuel. All FBRs were removed in 1986 and an area 300 feet long, 60 feet wide, and 2 feet deep was excavated. Within this area, a 30-square-foot area was excavated to a depth of 15 feet; the highest concentration of hydrocarbons was found here. The soil was disposed of in a Class I landfill. Soil stockpiled on the site was identified during an initial field investigation, and collection and analysis of soil samples are in process under the RI Waste Management Plan.

For investigative purposes, the ACER site is divided into three statistical strata based on historical information that includes aerial photographs. Surface sampling locations in each stratum are statistically located according to the method discussed in the SAP.

Other locations were selected based on suspect areas where contamination was believed most probable, and generally coincide with well or deep boring locations. Strata 1 and 3 were added based on the review of historical aerial photographs that identified stained areas (*SAP Amendment*). The three strata are:

- Stratum 1: Stained area in the northeast area where fuel was stored
- Stratum 2: Excavated FBR Area in the west area
- Stratum 3: Stained area surrounding the excavation

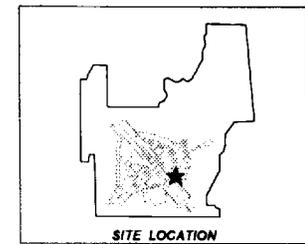
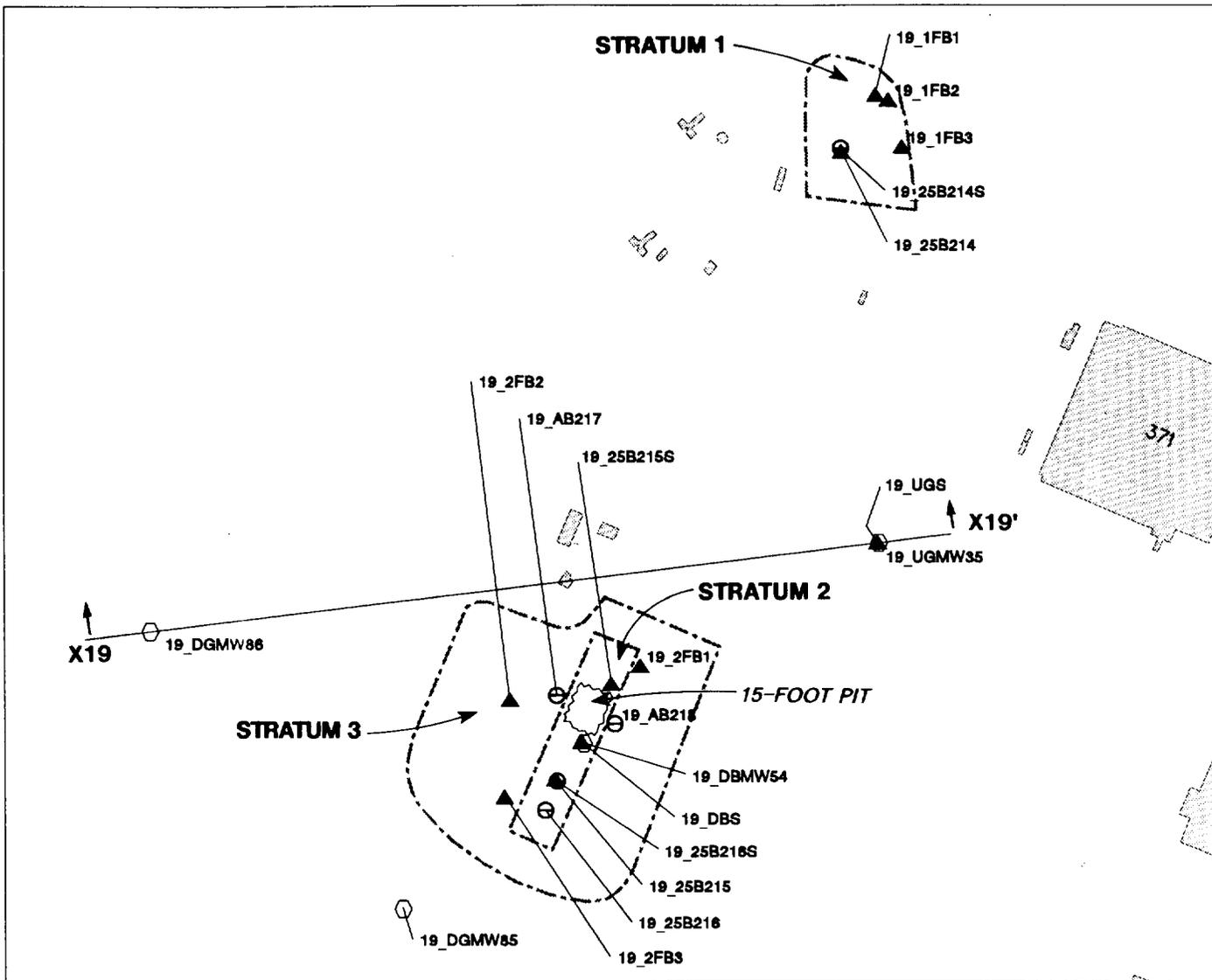
B19.2 Suspected Waste Types and Contaminants

In 1986, one of the fuel bladder tanks ruptured and an estimated 15,000 gallons of JP-5 fuel were released into the soil. Following the rupture, an investigation showed that total hydrocarbons in soil samples contained a maximum of 11,300 mg/kg (Harding, Lawson & Associates in JMM, 1988). Suspected contaminants include volatile and semivolatile organic compounds (VOCs and SVOCs), fuel and other petroleum compounds, and heavy metals.

B19.3 Field Investigation

The field investigation consisted of drilling three 25-foot borings, two 60-foot angle borings, one deep boring completed as a monitoring well, and three monitoring wells. In addition, surface and near-surface soil samples were collected from 10 locations. The sample location, sample depth, and types of chemical analyses completed are provided for each sample in Table B19-1.

Deviations from the *SAP* and *SAP Amendment* included relocating two monitoring wells. The direction of groundwater movement was determined from water level information gathered from monitoring wells constructed during the initial phase of the RI. Groundwater was determined to be flowing northwest (rather than west, as had been previously estimated in the *SAP*). As a result, upgradient well 19_UGMW35 was relocated approximately 800 feet southwest of its designated location, and



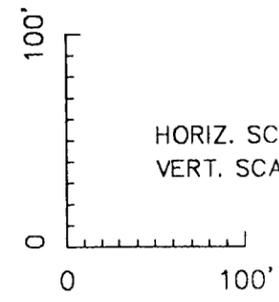
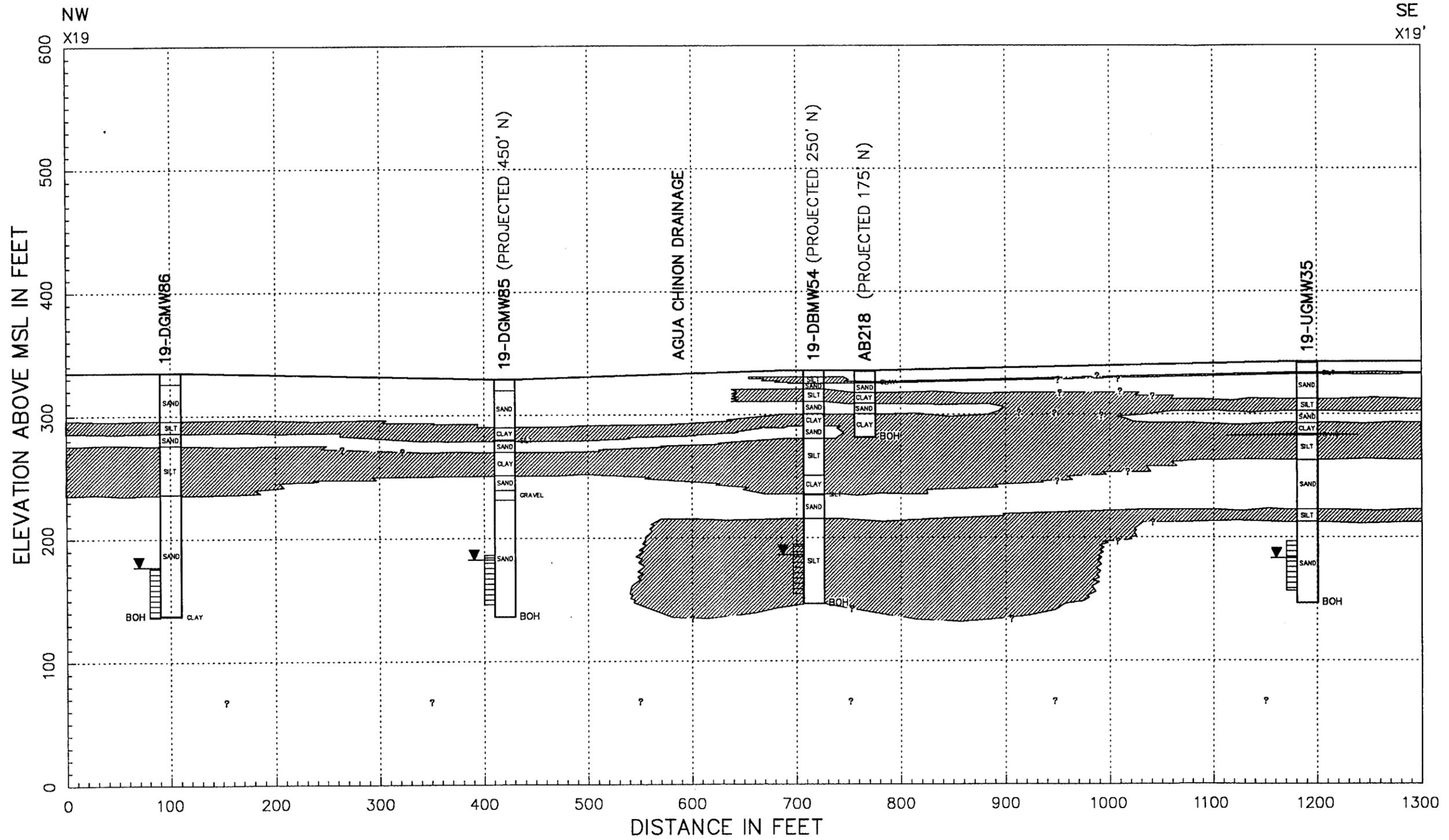
- FEATURES:**
- BUILDING OR PAD
 - MONITORING WELL
 - DEEP, 25-FOOT, OR ANGLE BORING
 - SEDIMENT SAMPLE
 - SURFACE WATER AND SEDIMENT SAMPLE
 - SURFACE AND NEAR-SURFACE SOIL SAMPLE
 - ROAD
 - STRATUM BOUNDARY
 - WASH OR STREAM
 - LINE OF GEOLOGIC CROSS-SECTION
 - END OF LINE OF CROSS-SECTION
 - LINE OF CROSS-SECTION EXTENDS BEYOND AREA SHOWN



FIGURE B19-1
SITE 19 (OU-3): AIRCRAFT EXPEDITIONARY REFUELING SITE (ACER)
 MCAS EL TORO PHASE I RI TECHNICAL MEMORANDUM

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- LEGEND**
- UNCONSOLIDATED PERMEABLE SEDIMENTS
 - UNCONSOLIDATED LOW-PERMEABILITY SEDIMENTS
 - BOH BOTTOM OF HOLE
 - WELL SCREEN INTERVAL
 - WATER LEVEL ELEVATION, DECEMBER 1992

FIGURE B19-2
 SITE 19 (OU-3)
 GEOLOGIC CROSS SECTION X19-X19'
 MCAS EL TORO PHASE I RI
 TECHNICAL MEMORANDUM

PAGE NUMBER B19-6

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downgradient well 19_DGMW85 was relocated approximately 650 feet northwest of its designated location. The revised locations are shown in Figure B19-1.

The following sections summarize (by medium) the field work at Site 19.

B19.3.1 Surface Water and Sediments

Surface water and sediment samples were not collected at this site.

B19.3.2 Surface and Near-Surface Soils

A total of 24 surface and near-surface soil samples were collected from 10 locations. The number of samples collected and the number of sampling locations within each stratum are as follows:

- Stratum 1: Nine samples were collected from the northeast stain area at four locations, designated 19_1FB1, 19_1FB2, 19_1FB3, and 19_25B214S.
- Stratum 2: Six samples were collected from the FBR Area at three locations designated 19_25B215S, 19_25B216S, and 19_DBS.
- Stratum 3: Five samples were collected from the stain area at excavation of two locations, designated 19_2FB1, 19_2FB2, and 19_2FB3.

In addition, four samples were collected from one location upgradient of Strata 1 and 2, designated 19_UGS.

Samples were collected at the surface (0 feet) and at 2 feet bgs. At some locations, a 4-foot sample was also collected, depending on headspace readings for the 0- and 2-foot samples.

B19.3.3 Vadose Zone Soils (Soil Borings)

In total, 53 vadose zone samples, including duplicates, were collected from three 25-foot vertical soil borings, two 60-foot angle borings, one deep boring, and three monitoring well boreholes. The angle borings were drilled at 30-degree angles

from vertical on opposite sides of the deep excavation. The total drilling depth was 60 feet along the length of the borehole (about 50 feet in vertical depth beneath the ground surface). Table B19-1 lists the sampling locations with their associated samples and analyses.

B19.3.4 Groundwater Monitoring Wells

The groundwater investigation at Site 19 consisted of installing and sampling four shallow groundwater monitoring wells. Well 19_UGMW35 serves as the upgradient well for the western area of Site 19; Wells 19_DGMW85 and 19_DGMW86 are downgradient wells, located in the northeastern and western areas of the site, respectively. Well 19_DBMW54 was completed from a deep boring and is located in the west, within the excavated area boundaries, just east of the 15-foot-deep pit. Well construction details are provided in Table B19-4.

One groundwater sample was collected from each well and analyzed for VOCs, SVOCs, pesticides and PCBs, TRPH, TFH, metals, cyanide, and general chemistry. Samples (including one duplicate) collected from Well 19_DGMW85 were analyzed for gross alpha and gross beta particle activity.

Slug tests to determine local aquifer characteristics were conducted at Wells 19_DGMW85 and 19_DBMW54. Two consecutive slug tests were performed on each well. Test results are summarized in Section B19.7.1. A detailed description of the test method and results is provided as Appendix F of this report.

B19.4 Surface Water and Sediments

(Surface water and sediment samples were not collected at Site 19.)

B19.5 Surface and Near-Surface Soils

B19.5.1 Description of Surface and Near-Surface Soil Samples

The soils at Site 19 are classified as Sorrento loam series, which is the typical soil type of alluvial fan deposits (Wachtell, 1978). Slopes generally range from 0 to 2 percent. The upper 72 inches of soil are characterized by permeability ranging from 0.6 to 2.0 inches per hour, and moisture-holding capacity ranging from 0.16 to 0.21 inch per inch (Wachtell, 1978). This soil at Site 19 is classified as Hydrologic Group B, which is characterized by soils that maintain a moderate infiltration rate when wet.

A total of 24 surface and near-surface soil (2 and 4 feet bgs) samples were collected. The 0- and 2-foot samples were screened for organic vapor content in the field. If organic vapors were detected, a 4-foot sample was collected; two such 4-foot samples were collected, one from Stratum 3 and the other near Well 19_UGMW35.

Of the 24 samples, five surface samples and four near-surface samples were collected from Stratum 1; four surface samples were collected from Stratum 2; and three surface and four near-surface samples were collected from Stratum 3. Two surface and two near-surface samples were collected upgradient of Strata 2 and 3.

B19.5.2 Analytical Results and Soil Vapor Headspace Values

Soil samples were field-screened for organic vapors using a photo-ionization detector (HNu) or a flame ionization detector (OVA). Surface and near-surface samples from 19_UGS have organic vapor concentrations of 50.0 ppmv (0 feet bgs) and 1,700.0 ppmv (4 feet bgs) using the OVA; the 2-foot sample from this location has a concentration of 500 ppmv using the HNu. All other surface and near-surface soil samples contained organic vapor concentrations of less than 1.0 ppmv. In the vadose zone, OVA readings are 5.0 ppmv at 148 feet bgs at location 19_UGMW35; and 9.6 ppmv at 10 feet bgs at location 19_25B215. The

remaining samples were measured at less than the criterion of 5.0 ppmv. The OVA results are presented in Attachment 1 to Appendix B.

Table B19-2 presents the concentrations of chemicals detected.

Four upgradient soil samples were collected and analyzed for hydrocarbons and metals. All other samples were analyzed for VOCs, SVOCs, TPH, TFH, metals, and nitrate/nitrite (as N), except for the surface soil sample from location 19_25B214S, which was not analyzed for VOCs and SVOCs. Table B18-2 lists the detected analytes by group for all samples. If the concentration is below the CRDL, the detection limit is provided and qualified with a "U" flag; this notation is modified when the concentration is below the CRDL, but detected in mass spectral data. In this case, the estimated concentration is reported and qualified with a "J" flag.

B19.5.2.1 Upgradient Area

Four upgradient shallow soil samples (19_UGS) were collected and analyzed for hydrocarbons and metals. Laboratory results indicate that concentrations of TFH (diesel and gas) and TRPH are below their CRDLs.

B19.5.2.2 Stratum 1: Stained Area in the Northeast Area

Five surface and four near-surface soil samples were collected and analyzed for VOCs, SVOCs, TRPH, and TFH (gasoline and diesel).

Laboratory results indicate that TFH-diesel, TFH-gasoline, and TRPH are present in samples collected at 19_1FB1, 19_1FB2, and 19_1FB3. TFH-diesel and TFH-gasoline were detected below California LUFT action levels. TRPH was detected at low concentrations ranging from 55 mg/kg (19_1FB2 [0 feet bgs]) to 230 mg/kg (19_1FB1 [2 feet bgs]).

For all Stratum 1 samples, VOCs are below the CRDLs.

Twenty of sixty-four SVOCs analyzed were detected in Stratum 1 surface and near-surface soil samples. Table B19-2 lists the detected analytes and concentrations for 19_1FB1, 19_1FB2, and 19_1FB3. (The sample from 19_25B214S was not analyzed for SVOCs.) In general, the highest SVOC concentrations occur in the surface and 2-foot samples from 19_1FB2.

Metal results are presented in Table B19-2.

B19.5.2.3 Stratum 2: Excavated FBR Area

Four surface soil samples were collected and analyzed. TFH-diesel, TFH-gasoline, and TRPH concentrations are below the CRDL for all samples.

Detected VOCs include toluene and acetone. Concentrations of toluene and acetone in surface soil collected from 19_25B215S (a nonstatistical location) are 11.0 and 24 $\mu\text{g}/\text{kg}$, respectively. Toluene and acetone both have estimated concentrations below their CRDLs at other sample locations (Table B19-2). All other VOCs are below their respective CRDLs. Acetone is a demonstrated laboratory contaminant; the maximum detected concentration in the trip blanks is 37 $\mu\text{g}/\text{L}$.

SVOCs were not detected in any of the Stratum 2 soil samples.

B19.5.2.4 Stratum 3: Stained Area Surrounding the Excavation

Stratum 3 is located in the western region of Site 19 and represents the surrounding area in the vicinity of Stratum 2. Three surface and four near-surface soil samples were collected and analyzed. One 4-foot sample was collected at location 19_2FB2. TFH-diesel, TFH-gasoline, and TRPH concentrations are below the CRDL for all samples. TFH-diesel was also detected in the 19_2FB2 rinsate at 0.333 mg/kg.

VOCs were below the CRDLs for all Stratum 3 samples. (Concentrations of two VOCs, toluene and acetone, are below CRDLs at estimated concentrations).

Acetone is a demonstrated laboratory contaminant. The maximum detected concentration of acetone in the trip blanks is 37 $\mu\text{g/L}$. SVOCs were not detected.

B19.6 Vadose Zone Soils

B19.6.1 Description of Vadose Soil Samples

Vadose zone soil samples were collected during drilling at three 25-foot borings, one deep boring (completed as a monitoring well), two 60-foot angle borings, and three monitoring wells. The deep boring (19_DBMW) was drilled to a depth of 189 feet bgs and is located in the excavated area just west of the 15-foot pit. Well 19_UGMW35, drilled to a depth of 195 feet bgs, is in the southwestern region of the site and serves as the upgradient well for the western region of the site. The remaining two wells, 19_DGMW85 and 19_DGMW86, are downgradient wells in the western and northwestern regions of the site. Wells 19_DGMW85 and 19_DGMW86 were drilled to depths of 193 and 208 feet bgs, respectively.

Vadose zone samples were analyzed for VOCs, SVOCs, TRPH, TFH (diesel and gasoline), and total metals. Five soil samples were also analyzed for total organic carbon (TOC).

B19.6.2 Subsurface Geology

Site 19 overlies approximately 300 feet of unconsolidated Quaternary alluvial deposits. The alluvial deposits overlie semiconsolidated bedrock of the Irvine Area Groundwater Basin. Site-specific geology is provided in Figure B19-3.

Site 19 boring logs (Appendix K) display the subsurface lithology as composed predominantly of interbedded silty sand to well-graded sand. Boring logs were used to construct a northwest- to- southeast cross section (Figure B19-2). The subsurface lithology comprises 10- to 40-foot layers of fine-grained silts and clays interbedded with sand, 10 to more than 60 feet thick, with occasional occurrences of gravel. Finer-grained sediments (clays and silt) appear to be more prominent in the southeast at approximately 80 feet bgs. Agua Chinon Wash (projected

between Wells 19_DBMW54 and 19_DGMW85) was historically a major flow channel during Recent geologic history. Coarser-grained sediments were probably deposited during periods of high stream flow, with finer-grained sediments being deposited as overbank deposits.

B19.6.3 Analytical Results

The following subsection discusses the analytical result for the samples collected from the vadose zone at Site 19. Table B19-3 lists detected analytes by chemical group and sampling location.

Hydrocarbons (TRPH, TFH). TFH-diesel was detected in three samples collected at 19_DBMW54 and 19_DGMW85. Concentrations from 19_DBMW54 are 16.1 mg/kg at 5 feet bgs and 14.3 mg/kg at 25 feet bgs, all below California LUFT action levels. One sample in Boring 19_DGMW85 contains 31.4 mg/kg of TPH-diesel at 140 feet bgs. All other samples have concentrations below the detection limit.

TFH-gasoline was detected in samples from all three 25-foot borings. The maximum concentration of 1.68 mg/kg occurs in the sample collected at 20 feet bgs at 19_25B215. Samples taken from the deep boring and the monitoring wells have concentrations below the detection limit. Concentrations of TFH-gasoline are below the California LUFT action levels. TRPH was detected at a concentration of 200 mg/kg in Well 19_DBMW54 and at 35 mg/kg at 19_UGMW35. TRPH was below the detection limit at all other locations.

Volatile Organic Compounds (VOCs). Three out of 34 analytes were detected in the western region of Site 19 and include: toluene, acetone, and 2-butanone. Toluene was detected at a concentration of 11 $\mu\text{g}/\text{kg}$ at 19_DGMW54 (5 feet bgs). Acetone was detected at low concentrations at 19_AB218, 19_AB217, 19_25B216, 19_DBMW54, and 19_DBMW85; its maximum concentration was 47 $\mu\text{g}/\text{kg}$ at 140 feet bgs (19_DBMW85). Acetone is a demonstrated laboratory contaminant; the maximum detected concentration in the trip blanks is 37 $\mu\text{g}/\text{L}$. Estimated concentrations of 2-butanone below the CRDL were found in five samples

collected from 19_25B214 and two samples from 19UGMW35. 2-Butanone is a demonstrated laboratory contaminant; the maximum detected concentration in the trip blanks was 33 $\mu\text{g/L}$. All other VOCs are below the CRDL.

Semivolatile Organic Compounds (SVOCs). Twenty of sixty-four SVOCs analyzed were detected in two samples; one at 35 feet bgs and the other at 140 feet bgs from locations 19_DBMW54 and 19_DGMW85, respectively. SVOCs in all other samples were below their CRDLs.

Pesticides and Polychlorinated Biphenyls (PCBs). Two samples were collected at 148 feet bgs from 19_UGMW35 and analyzed for pesticides and PCBs. Concentrations in both samples are below the detection limits for all pesticides and PCBs analyzed.

Metals. All detected metals are presented in Table B19-3.

Total Organic Carbon (TOC). Five soil samples (including one duplicate) from the screen interval at each well were analyzed for TOC. The highest concentrations occurred at Wells 19_UGMW35 (208 and 249 mg/kg [duplicate]) and 19_DBMW54 (212 mg/kg).

B19.6.4 Soil Vapor Headspace Concentrations

Organic vapor concentrations measured in the field were generally low, exceeding the 5-ppm screening concentration at 19_25B214 (9.6 ppm) and 19_AB217 (7.5 ppm). No apparent correlation was found between the soil vapor headspace concentrations and the laboratory reported chemical analyses.

B19.7 Groundwater

B19.7.1 Site-Specific Hydrogeology

The regional groundwater flow direction in the vicinity of Site 19 is approximately northwest, as shown in Figures 3-4a, b, and c. The hydraulic gradient calculated

from the regional groundwater flow map is approximately 0.009 ft/ft. Water level elevations were measured monthly from October 1992 through February 1992, and fluctuated only slightly. Hydrographs are presented by well in Appendix I. Table B19-4 summarizes well construction details, pump installation information, and water quality sampling data.

Two aquifer tests, both slug tests, were performed on Wells 19_DBMW54 and 19_DGMW85. Results indicate that the aquifer beneath Site 19 has relatively low hydraulic conductivity (0.37 and 0.86 feet/day) as compared to other areas of the Station. The storage coefficient and leakance factor could not be calculated from the aquifer test data. The hydraulic conductivity and transmissivity for both wells are listed in Table B19-5.

The rate of groundwater flow (average linear velocity) ranges from approximately 0.02 to 0.04 feet/day. This range is calculated by applying the lower hydraulic conductivity of 0.37 feet/day or the higher hydraulic conductivity of 0.86 feet/day, to an assumed effective porosity of 20 percent and hydraulic gradient of 0.009 feet/foot.

B19.7.2 Analytical Results

Groundwater was analyzed for general chemistry, VOCs, SVOCs, particle pesticides and PCBs, TRPH, TFH, total metals, and total cyanide (Table B19-1). Two samples at 19_DGMW85 were also analyzed for gross alpha and gross beta activity. Table B19-6 lists the detected analytes by group for all sampling locations.

PCE was detected at low levels (below the MCL) in both the upgradient well (19_UGMW35) and deep boring (19_DBMW54). TCE was estimated in (19_DGMW85 and 19_DGMW86) and was not detected in the upgradient well or the deep boring.

General Chemistry. Data on pH was collected in the field and ranged from 6.89 to 7.10. Electrical conductivity ranged from 680 to 1,240 μmhos , with the maximum occurring in Well 19_DGMW85. Temperature ranged from 22.1 to 25.1 degrees C. Total dissolved solids (TDS) ranged from 650 to 823 mg/l.

The major ion distribution is presented in Stiff-type and Piper diagrams (Appendix J). The Stiff diagram reflects the relative major ion content of groundwater from each well in meq/l, and the Piper diagram illustrates the distribution of groundwater types within the site. Site 19 is characterized as having a calcium-chloride/sulfate and calcium-bicarbonate groundwater type.

Hydrocarbons. TFH-gasoline and TFH-diesel concentrations are below the detection limits in all groundwater samples.

Volatile Organic Compounds (VOCs). PCE is detected in Wells 19_DGMW35 and 19_DBMW54, both at 1 $\mu\text{g/l}$, which is below the MCL of 5 $\mu\text{g/l}$. Other VOCs, including PCE (in 19_DGMW85 and 19_DGMW86) and 4-methyl-2-pentanone (in 19_DGMW85), were detected below the CRDL at estimated concentrations of 0. to 0.86 $\mu\text{g/l}$.

Semivolatile Organic Compounds (SVOCs). SVOCs were not detected in the groundwater.

Pesticides and Polychlorinated Biphenyls (PCBs). Pesticides and PCBs were not detected in the groundwater.

Metals and Cyanide. Table B19-7 lists all analytes that exceed the MCL or California action levels. The EPA MCL for selenium is 10 $\mu\text{g/l}$; its maximum concentration (36.6 $\mu\text{g/l}$) occurs in Well 19DBMW54. Nitrate/nitrite (as N) concentrations exceed the MCL of 10.0 mg/l in groundwater from Wells 19_DGMW85, 19_DBMW54, and 19_DGMW86; concentrations for these wells are 12.8, 12.2, and 11.9 mg/l, respectively.

Gross Alpha and Beta Particle Activity. Gross alpha and beta particle activity were detected in groundwater from Well 19_DGMW85 at concentrations of 15.9 and 12.8 pCi/L, respectively. Gross alpha in this well exceeds the MCL of 15 pCi/L. Other samples were not analyzed for gross alpha and beta activity.

B19.7.3 Comparison with Drinking Water Standards

Table B19-7 lists all analytes that exceed the MCL for each well. Analytes that exceed the federal or state primary MCL include nitrate/nitrite (as N), selenium, and gross alpha particle activity.

B19.8 Potential Contaminant Migration Pathways

Groundwater appears to be the main mechanism of contaminant transport at Site 19. Low levels of soil contamination appear to occur at isolated locations. Vertical migration through the soil is not evident.

B19.9 Summary and Conclusions

Surface and near-surface contamination occurs in Stratum 1. Contaminants included TFH and TRPH and a number of SVOCs. Of the four locations sampled, all contained hydrocarbon or SVOC contamination at both the 0- and 2-foot depths.

Surface samples collected from 19_25215S and 19_2FB2 (0- and 2-foot samples) contain toluene and acetone (detected also in laboratory blanks). SVOC-contaminated soil occurs in samples collected at 5 feet bgs and 35 feet bgs at 19_DGMW54 and at 140 feet bgs at 19_DGMW85.

PCE was detected below the MCL in groundwater at Deep Boring 19_DBMW54 and Upgradient Well 19_UGMW35. TCE was at estimated concentrations below the CRDL at Downgradient Wells 19_DGMW85 and 19_DGMW86. Samples collected from the vadose zone indicate that the source is not in the vadose zone but is possibly upgradient of Site 19.

Site 19 does not appear to be a source of regional groundwater VOC contamination.

**Table B19-1
Site 19 (OU-3): Types of Samples and Chemical Analyses
MCAS El Toro Phase I RI Technical Memorandum**

Location/ Stratum	Station Identifi- cation	Sample Identifi- cation	Sample Depth (ft)	Groups of Analytes Requested ^a											
				VOCs	Semi- VOCs	Pesti- cides/ PCBs	Herbi- cides	TPH	TFH	Metals	CN	Geni. Chem- istry	TOC	Dioxins/ Furans	Gross Alpha/ Beta
Surface Water and Sediments (Not sampled)															
Surface and Near-Surface Soils															
Upgradient	19_UGS	S1454585	0						X	X	X				
		S1454343 ^b	0						X	X	X				
		S1454547	2						X	X	X				
		S1454586	4						X	X	X				
Stratum 1	19_1FB1	S1454520	0	X	X				X	X	X				
		S1454521	2	X	X				X	X	X				
		S1454576 ^b	2	X	X				X	X	X				
	19_1FB2	S1454577	0	X	X				X	X	X				
		S1454517 ^b	0	X	X				X	X	X				
		S1454518	2	X	X				X	X	X				
	19_1FB3	S1454510	0	X	X				X	X	X				
		S1454515	2	X	X				X	X	X				
	19_25B214S	S1454342	0						X	X	X				
	Stratum 2	19_25B215S	S1454338	0	X	X				X	X	X			
		19_25B216S	S1454506	0	X	X				X	X	X			
			S1454508 ^b	0	X	X				X	X	X			
19_DBS	S1454344	0	X	X				X	X	X					
Stratum 3	19_2FB1	S1454531	0	X	X				X	X	X				
		S1454532	2	X	X				X	X	X				
	19_2FB2	S1454523	0	X	X				X	X	X				
		S1454524	2	X	X				X	X	X				
		S1454525	4	X	X				X	X	X				
	19_2FB3	S1454339	0	X	X				X	X	X				
		S1454340	2	X	X				X	X	X				
	19_DBS	S1454344	0						X	X	X				
Vadose Zone Soils															
	19_25B214	S1456315	5	X	X				X	X	X				
		S1456312	10	X	X				X	X	X				
		S1456313	15	X	X				X	X	X				
		S1456316	20	X	X				X	X	X				
		S1456317	25	X	X				X	X	X				
		S1457082 ^b	25	X	X				X	X	X				
	19_25B215	S1456318	5	X	X				X	X	X				
		S1456319	10	X	X				X	X	X				
		S1456320	15	X	X				X	X	X				
		S1456321	20	X	X				X	X	X				
		S1457003 ^b	20	X	X				X	X	X				
		S1456322	25	X	X				X	X	X				

Table B19-1
Site 19 (OU-3): Types of Samples and Chemical Analyses
MCAS El Toro Phase I RI Technical Memorandum

Location/ Stratum	Station Identifi- cation	Sample Identifi- cation	Sample Depth (ft)	Groups of Analytes Requested ^a											
				VOCs	Semi- VOCs	Pesti- cides/ PCBs	Herbi- cides	TPH	TFH	Metals	CN	Genl. Chem- istry	TOC	Dioxins/ Furans	Gross Alpha/ Beta
19_25B216		S1456538	5	X	X			X	X	X					
		S1456539	10	X	X			X	X	X					
		S1457075 ^b	10	X	X			X	X	X					
		S1456540	15	X	X			X	X	X					
		S1456541	20	X	X			X	X	X					
		S1456542	25	X	X			X	X	X					
19_AB217		S1456302	10	X	X			X	X	X					
		S1456764	20	X	X			X	X	X					
		S1456294 ^b	20	X	X			X	X	X					
		S1456295	30	X	X			X	X	X					
		S1456296	40	X	X			X	X	X					
		S1456297	50	X	X			X	X	X					
		S1456289	60	X	X			X	X	X					
19_AB218		S1456292	10	X	X			X	X	X					
		S1457001 ^b	20	X	X			X	X	X					
		S1456293	20	X	X			X	X	X					
		S1456290	30	X	X			X	X	X					
		S1456291	40	X	X			X	X	X					
		S1456306	50	X	X			X	X	X					
		S1456305	60	X	X			X	X	X					
19_DBMW54		S1456298	5	X	X			X	X	X					
		S1456299	10	X	X			X	X	X					
		S1456307	15	X	X			X	X	X					
		S1457050 ^b	15	X	X			X	X	X					
		S1456308	20	X	X			X	X	X					
		S1456309	25	X	X			X	X	X					
		S1457051 ^b	25	X	X			X	X	X					
		S1456310	35	X	X			X	X	X					
		S1456311	45	X	X			X	X	X					
		S1456303	140	X	X			X	X	X					
		S1456304	160	X									X		
19_DGMW85		S1456323	140	X	X			X	X	X					
		S1457087 ^b	140	X	X			X	X	X					
		S1457089	148										X		
19_DGMW86		S1456324	128	X	X			X	X	X					
		S1457142 ^b	128	X	X			X	X	X					
		S1456300	168	X						X			X		
19_UGMW35		S1456325	128	X	X	X		X	X	X					
		S1457109 ^b	128	X	X	X		X	X	X					
		S1457108	148										X		
		S1457110 ^b	148										X		

**Table B19-1
Site 19 (OU-3): Types of Samples and Chemical Analyses
MCAS El Toro Phase I RI Technical Memorandum**

Location/ Stratum	Station Identifi- cation	Sample Identifi- cation	Sample Depth (ft)	Groups of Analytes Requested ^a											
				VOCs	Semi- VOCs	Pesti- cides/ PCBs	Herbi- cides	TPH	TFH	Metals	CN	Genl. Chem- istry	TOC	Dioxins/ Furans	Gross Alpha/ Beta
Groundwater															
	19_UGMW35	S1452134	148-185	X	X	X		X	X	X	X	X			
	19_DGMW85	S1452112	158-198	X	X	X		X	X	X	X	X			
	19_DGMW85	S1452115	143-183	X	X	X		X	X	X	X	X			X
		S1452399 ^b	143-183	X	X	X		X	X	X	X	X			X
	19_DBMW54	S1452114	141-181	X	X	X		X	X	X	X	X			

^a VOCs = Volatile Organic Compounds; Semi-VOCs = Semivolatile Organic Compounds;
PCBs = Polychlorinated Biphenyls; TPH = Total Recoverable Petroleum Hydrocarbons;
TFH = Total Fuel Hydrocarbons; CN = Total Cyanide; TOC = Total Organic Carbon.

^b Duplicate of previous sample

Table B19-2

Site19 (OU- 3): Summary of Detected Chemicals in Sediments and Surface/Near-Surface Soil

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	19_1FB1 S1454520 (0)	DVF(a)	19_1FB1 S1454521 (2)	DVF(a)	19_1FB1 S1454576 (2)	DVF(a)	19_1FB2 S1454517 (0)	DVF(a)	19_1FB2 S1454577 (0)	DVF(a)	19_1FB2 S1454518 (2)	DVF(a)	19_1FB3 S1454510 (0)	DVF(a)	19_1FB3 S1454515 (2)	DVF(a)
METALS																	
CADMIUM	MG/KG	0.51	b	0.73	b	1.5		0.48	J	0.43	b	1.1	b	0.69	J	2.8	
CALCIUM	MG/KG	44000		13000		5300		82200		41900		18500		51500		9300	
BERYLLIUM	MG/KG	0.28	b	0.33	b	0.58	b	0.32	b	0.11	U	0.31	b	0.33	b	0.81	b
BARIUM	MG/KG	78.3		155		121		102		78.5		123		82		222	
ARSENIC	MG/KG	3.7		4.5		1.9	b	3		3.5		3.4		2.4		4.4	
ALUMINUM	MG/KG	7570		7380		10300		10100		8670		10000		8950		18400	
SILVER	MG/KG	0.47	U	0.48	U	0.48	U	0.48	U	0.48	U	0.47	U	0.48	U	0.51	U
ZINC	MG/KG	26.1		31.5		43.9		29.2		22.4		35		29.7		89.5	
VANADIUM	MG/KG	21.9		23.8		35.3		25.2		17.3		29.2		22.9		54.2	
THALLIUM	MG/KG	0.16	U	0.44	b	0.25	b	0.16	U	0.16	U	0.16	U	0.16	U	0.29	b
SELENIUM	MG/KG	0.11	U	0.13	b	0.11	U	0.27	b								
ANTIMONY	MG/KG	2.7	U	2.8	U	2.8	U	2.8	U	2.8	U	2.7	U	2.8	U	3.1	b
LEAD	MG/KG	9.8		3		2.7		9.3		9.9		6.4		4.5		4	
NICKEL	MG/KG	6.8	b	7.7	b	9.8		8	b	4.9	b	9.1		8.8	b	18.7	
SODIUM	MG/KG	898	b	865	b	271	b	1200		820	b	559	b	823	b	582	b
MANGANESE	MG/KG	133		198		222		182		124		218		218		374	
MAGNESIUM	MG/KG	4340		3670		4970		5380		3840		4710		4700		9540	
POTASSIUM	MG/KG	1110	b	2770		3730		1240		938	b	2690		1500		4750	
MERCURY	MG/KG	0.05	b	0.04	b	0.05	b	0.05	b	0.05	b	0.04	b	0.05	b	0.04	b
IRON	MG/KG	9540		10400		14200		11300		8490		12200		11800		22500	
COPPER	MG/KG	8.9		5.1	b	9.1		11.4		8.7		7.7		17.3		18.3	
CHROMIUM	MG/KG	8.2		9.6		11.2		8.2		5.7		11.7		8.1		17.4	
COBALT	MG/KG	2.8	b	4.5	b	5.3	b	5.8	b	4.6	b	4.1	b	36.4		8.4	b
VOLATILE ORGANIC COMPOUNDS																	
TOLUENE	UG/KG	11	U	13	U												
ACETONE	UG/KG	15	U	20	U	21	U	14	U	32	U	14	U	15	U	17	U
SEMI-VOLATILE ORGANIC COMPOUNDS																	
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	740	U	730	U	760	U	1100	U								
ANTHRACENE	UG/KG	820	J	870	J	730	U	1100	U	840	J	730	J	310	J	830	U
PYRENE	UG/KG	1100		1800		730	U	2700		1000		1900		1800		280	J
DIBENZOFURAN	UG/KG	360	J	480	J	730	U	860		520	J	580	J	750	U	830	U
BENZO(GH)PERYLENE	UG/KG	270	J	450	J	730	U	770		270	J	830		480	J	830	U
INDENO(1,2,3-CD)PYRENE	UG/KG	250	J	400	J	730	U	730	J	250	J	780		420	J	830	U
BENZO(B)FLUORANTHENE	UG/KG	290	J	430	J	730	U	1200		350	J	1000		730	J	830	U
FLUORANTHENE	UG/KG	1500		2400		730	U	3900		1400		2700		2200		370	J
BENZO(K)FLUORANTHENE	UG/KG	420	J	780	J	730	U	970		210	J	930		400	J	830	U
ACENAPHTHYLENE	UG/KG	740	U	730	U	730	U	250	J	730	U	730	U	750	U	830	U
CHRYSENE	UG/KG	470	J	770	J	730	U	1500		450	J	1200		790	U	830	U
BENZO(A)PYRENE	UG/KG	350	J	610	J	730	U	1100		340	J	980		870	J	830	U
DIBENZO(A,H)ANTHRACENE	UG/KG	740	U	150	J	730	U	300	J	730	U	320	J	750	U	830	U
BENZO(A)ANTHRACENE	UG/KG	330	J	550	J	730	U	1200		310	J	840		830	J	830	U
ACENAPHTHENE	UG/KG	420	J	540	J	730	U	670	J	520	J	580	J	750	U	830	U
PHENANTHRENE	UG/KG	2700		4100		730	U	5900		2900		3500		1600		650	J
FLUORENE	UG/KG	280	J	520	J	730	U	960		270	J	380	J	230	J	830	U
CARBAZOLE	UG/KG	560	J	980	J	730	U	1300		880	J	940		250	J	830	U
1-NAPHTHALENE	UG/KG	150	J	170	J	730	U	280	J	200	J	220	J	750	U	830	U
2-METHYLNAPHTHALENE	UG/KG	740	U	180	J	730	U	300	J	180	J	190	J	750	U	830	U
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																	
TFH DIESEL	MG/KG	153		182		13.9	U	151		34.8		141		37.8		86	
TFH GASOLINE	MG/KG	0.058	U	0.488		0.056	U	0.484		0.364		0.127		0.064		0.063	U
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																	
TRPH	MG/KG	152		230		20	U	190		142		142		55		20	U

Table B19-2

Site19 (OU- 3): Summary of Detected Chemicals in Sediments and Surface/Near-Surface Soil

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	19_25B214S S1484342 (0)	DVF(a)	19_25B215S S1484338 (0)	DVF(a)	19_25B216S S1484506 (0)	DVF(a)	19_25B216S S1484508 (0)	DVF(a)	19_2FB1 S1484531 (0)	DVF(a)	19_2FB1 S1484532 (2)	DVF(a)	19_2FB2 S1484523 (0)	DVF(a)	19_2FB2 S1484524 (2)	DVF(a)
METALS																	
CADMIUM	MG/KG	0.88	b	1	b	1.6		1.4		1.2		1.7		0.89	b	1.8	
CALCIUM	MG/KG	4750		7200		4470		4370		5250		8120		4900		4900	
BERYLLIUM	MG/KG	0.46	b	0.37	b	0.29	b	0.23	b	1	b	1.4		0.18	b	0.32	b
BARIUM	MG/KG	82		116		106		104		88.1		254		91.6		140	
ARSENIC	MG/KG	2.2		2.6		2.6		2.7		1.8	b	5.1		1.3	b	1.8	b
ALUMINIUM	MG/KG	9530		8600		8410		8640		7190		18300		7140		9900	
SILVER	MG/KG	0.73	b	0.44	U	0.44	U	0.43	U	2.1		2.4	b	0.43	U	0.47	U
ZINC	MG/KG	36.5		39.5		41.5		43.6		41.9		69.8		33.9		44	
VANADIUM	MG/KG	26.9		26.2		29.8		27.5		22.5		50.7		23.1		31.7	
THALLIUM	MG/KG	0.19	J	0.27	U	0.23	b	0.19	b	0.14	U	0.35	b	0.18	b	0.2	b
SELENIUM	MG/KG	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.12	U	0.1	U	0.11	U
ANTIMONY	MG/KG	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	3	U	2.5	U	2.7	U
LEAD	MG/KG	5.1		3.6		3.3		5.7		10.2		5.5		2.2		2.7	
NICKEL	MG/KG	7.4	b	8	b	7.7	b	8.8	b	5.7	b	10.9	b	8	b	8	b
SODIUM	MG/KG	279	b	475	b	259	b	245	b	226	b	365	b	181	b	251	b
MANGANESE	MG/KG	174		216		217		220		182		353		195		255	
MAGNESIUM	MG/KG	3930		4980		4360		4450		3960		9780		3510		5070	
POTASSIUM	MG/KG	2520		3360		3760		4160		2560		8110		3050		4180	
MERCURY	MG/KG	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U	0.04	b	0.03	U	0.03	U
IRON	MG/KG	10900		11500		12500		12100		10500		22100		10100		13500	
COPPER	MG/KG	7.2	U	7.2		7.8		7.7		7.8		15.8		6.2		8.4	
CHROMIUM	MG/KG	11.8		8		9.1		8.8		8.1		16.7		7.5		9.9	
COBALT	MG/KG	3.5	b	4.7	b	4.7	b	4.2	b	3.2	b	8.2	b	3.8	b	5.3	b
VOLATILE ORGANIC COMPOUNDS																	
TOLUENE	UG/KG	-		11		6	J	3	J	10	U	12	U	9	J	7	J
ACETONE	UG/KG	-		24		10	U	9	J	10	U	12	U	9	J	9	J
SEMI-VOLATILE ORGANIC COMPOUNDS																	
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	-		680	U	680	U	680	U	670	U	780	U	680	U	740	U
ANTHRACENE	UG/KG	-		680	U	680	U	680	U	670	U	780	U	680	U	740	U
PYRENE	UG/KG	-		680	U	680	U	680	U	670	U	780	U	680	U	740	U
DIBENZOFURAN	UG/KG	-		680	U	680	U	680	U	670	U	780	U	680	U	740	U
BENZO(GH)PERYLENE	UG/KG	-		680	U	680	U	680	U	670	U	780	U	680	U	740	U
INDENO(1,2,3-CD)PYRENE	UG/KG	-		680	U	680	U	680	U	670	U	780	U	680	U	740	U
BENZO(B)FLUORANTHENE	UG/KG	-		680	U	680	U	680	U	670	U	780	U	680	U	740	U
FLUORANTHENE	UG/KG	-		680	U	680	U	680	U	670	U	780	U	680	U	740	U
BENZO(K)FLUORANTHENE	UG/KG	-		680	U	680	U	680	U	670	U	780	U	680	U	740	U
ACENAPHTHYLENE	UG/KG	-		680	U	680	U	680	U	670	U	780	U	680	U	740	U
CHRYSENE	UG/KG	-		680	U	680	U	680	U	670	U	780	U	680	U	740	U
BENZO(A)PYRENE	UG/KG	-		680	U	680	U	680	U	670	U	780	U	680	U	740	U
DIBENZO(A,H)ANTHRACENE	UG/KG	-		680	U	680	U	680	U	670	U	780	U	680	U	740	U
BENZO(A)ANTHRACENE	UG/KG	-		680	U	680	U	680	U	670	U	780	U	680	U	740	U
ACENAPHTHENE	UG/KG	-		680	U	680	U	680	U	670	U	780	U	680	U	740	U
PHENANTHRENE	UG/KG	-		680	U	680	U	680	U	670	U	780	U	680	U	740	U
FLUORENE	UG/KG	-		680	U	680	U	680	U	670	U	780	U	680	U	740	U
CARBAZOLE	UG/KG	-		680	U	680	U	680	U	670	U	780	U	680	U	740	U
NAPHTHALENE	UG/KG	-		680	U	680	U	680	U	670	U	780	U	680	U	740	U
2-METHYLNAPHTHALENE	UG/KG	-		680	U	680	U	680	U	670	U	780	U	680	U	740	U
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																	
TFH DIESEL	MG/KG	12.8	U	12.8	U	12.8	U	12.8	U	12.6	U	14.8	U	12.9	U	13.9	U
TFH GASOLINE	MG/KG	0.051	U	0.052	U	0.051	U	0.051	U	0.128	U	0.06	U	0.052	U	0.056	U
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																	
TRPH	MG/KG	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U

Table B19-2

Site 19 (OU-3): Summary of Detected Chemicals in Sediments and Surface/Near-Surface Soil

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	19_2FB2 S1454525 (4)	DVF(a)	19_2FB3 S1454339 (0)	DVF(a)	19_2FB3 S1454340 (2)	DVF(a)	19_DBS S1454344 (0)	DVF(a)	19_UGS S1454343 (0)	DVF(a)	19_UGS S1454585 (0)	DVF(a)	19_UGS S1454547 (2)	DVF(a)	19_UGS S1454586 (4)	DVF(a)
METALS																	
CADMIUM	MG/KG	1.5		0.75	b	0.96	b	1.2		0.56	b	0.81	b	0.72	b	1.2	
CALCIUM	MG/KG	4540		2830		3240		5070		3500		3550		1880		2470	
BERYLLIUM	MG/KG	0.18	b	0.19	b	0.2	b	0.29	b	0.28	b	0.21	b	0.2	b	0.44	b
BARIUM	MG/KG	127		79.9		92.2		114		56.5		56.9		54.5		57.8	
ARSENIC	MG/KG	3.5		2.6		2.6		2.2		2.2	b	1.8	b	1.7	b	2.2	b
ALUMINIUM	MG/KG	10100		6180		7220		9300		4150		3980		5460		3770	
SILVER	MG/KG	0.48	U	0.63	b	0.55	b	0.43	U	0.48	UJ	0.47	UJ	0.46	U	0.49	UJ
ZINC	MG/KG	44.8		32.9		35.9		43.7		20		20.1		23.8		22.5	
VANADIUM	MG/KG	36		20.9		24.3		30.8		17.5		14.4		16.9		15.8	
THALLIUM	MG/KG	0.36	b	0.27	b	0.22	b	0.14	b	0.16	U	0.18	U	0.18	b	0.19	U
SELENIUM	MG/KG	0.15	U	0.1	U	0.11	U	0.1	U	0.11	UJ	0.13	J	0.12	b	0.12	UJ
ANTIMONY	MG/KG	2.7	U	2.5	U	2.7	U	2.5	U	2.8	U	2.7	U	2.7	U	2.8	U
LEAD	MG/KG	3.4		4.3		6.6		2.9		1.7		1.4		4.8		1.7	
NICKEL	MG/KG	10		4.7	b	6.3	b	7.5	b	2.9	U	4.7	U	2.1	b	2.7	U
SODIUM	MG/KG	265	b	154	b	220	b	260	b	209	b	280	b	200	b	280	b
MANGANESE	MG/KG	270		169		216		230		111		120		78.8		104	
MAGNESIUM	MG/KG	5380		3240		3690		5070		2240		2300		2130		2120	
POTASSIUM	MG/KG	4050		2900		3360		4250		1600		1680		2000		1990	
MERCURY	MG/KG	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U
IRON	MG/KG	14500		9160		10800		13100		6270		5870		6890		6360	
COPPER	MG/KG	6.3		6		7.5		7.5		3.8	b	3.7	b	5.2	b	4.3	b
CHROMIUM	MG/KG	10.7		6.6		7.6		9.8		6.4		5.5		5.1		4.3	
COBALT	MG/KG	5	b	3.5	b	4.1	b	4.4	b	3	b	2.6	b	2.1	b	2	b
VOLATILE ORGANIC COMPOUNDS																	
TOLUENE	UG/KG	11	U	4	J	3	J	6	J	-		-		-		-	
ACETONE	UG/KG	10	J	6	J	6	J	8	J	-		-		-		-	
SEMI-VOLATILE ORGANIC COMPOUNDS																	
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	730	U	680	U	720	U	680	U	-		-		-		-	
ANTHRACENE	UG/KG	730	U	680	U	720	U	680	U	-		-		-		-	
PYRENE	UG/KG	730	U	680	U	720	U	680	U	-		-		-		-	
DIBENZOFURAN	UG/KG	730	U	680	U	720	U	680	U	-		-		-		-	
BENZO(GH)PERYLENE	UG/KG	730	U	680	U	720	U	680	U	-		-		-		-	
INDENO(1,2,3-CD)PYRENE	UG/KG	730	U	680	U	720	U	680	U	-		-		-		-	
BENZO(B)FLUORANTHENE	UG/KG	730	U	680	U	720	U	680	U	-		-		-		-	
FLUORANTHENE	UG/KG	730	U	680	U	720	U	680	U	-		-		-		-	
BENZO(K)FLUORANTHENE	UG/KG	730	U	680	U	720	U	680	U	-		-		-		-	
ACENAPHTHYLENE	UG/KG	730	U	680	U	720	U	680	U	-		-		-		-	
CHRYSENE	UG/KG	730	U	680	U	720	U	680	U	-		-		-		-	
BENZO(A)PYRENE	UG/KG	730	U	680	U	720	U	680	U	-		-		-		-	
DIBENZO(A,H)ANTHRACENE	UG/KG	730	U	680	U	720	U	680	U	-		-		-		-	
BENZO(A)ANTHRACENE	UG/KG	730	U	680	U	720	U	680	U	-		-		-		-	
ACENAPHTHENE	UG/KG	730	U	680	U	720	U	680	U	-		-		-		-	
PHENANTHRENE	UG/KG	730	U	680	U	720	U	680	U	-		-		-		-	
FLUORENE	UG/KG	730	U	680	U	720	U	680	U	-		-		-		-	
CARBAZOLE	UG/KG	730	U	680	U	720	U	680	U	-		-		-		-	
NAPHTHALENE	UG/KG	730	U	680	U	720	U	680	U	-		-		-		-	
2-METHYLNAPHTHALENE	UG/KG	730	U	680	U	720	U	680	U	-		-		-		-	
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																	
TFH DIESEL	MG/KG	13.8	U	12.9	U	13.6	U	12.9	U	14.3	U	14.1	U	13.8	U	14.3	U
TFH GASOLINE	MG/KG	0.056	U	0.052	U	0.055	U	0.052	U	0.057	U	0.056	U	0.055	U	0.057	U
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																	
TRPH	MG/KG	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U

(a) A definition of each data validation flag (DVF) is provided in Table B-1.

Table B19-3

Site 19 (OU- 3): Summary of Detected Chemicals in the Vadose Zone (Subsurface) Samples

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	19_25B214 S1456316 (5)	DVF(a)	19_25B214 S1456312 (10)	DVF(a)	19_25B214 S1457082 (10)	DVF(a)	19_25B214 S1456313 (15)	DVF(a)	19_25B214 S1456316 (20)	DVF(a)	19_25B214 S1456317 (25)	DVF(a)	19_25B215 S1456318 (5)	DVF(a)	19_25B215 S1456319 (10)	DVF(a)
GENERAL CHEMISTRY																	
TOTAL ORGANIC CARBON	MG/KGW	-		-		-		-		-		-		-		-	
METALS																	
SILVER	MG/KG	0.46	U	0.49	U	0.48	U	0.43	U	0.48	U	0.43	U	0.48	U	0.44	U
ALUMINUM	MG/KG	16000		12700		9650		2840		9640		1890		6330		4870	
ARSENIC	MG/KG	4.2		3.2		4.4		1.1	b	3.2		0.78	b	2.2	U	1.9	U
BARIUM	MG/KG	148		108		121		65		82.3		25.1	b	128		60.8	
BERYLLIUM	MG/KG	0.53	U	0.31	U	0.31	U	0.1	U	0.37	U	0.1	U	0.48	U	0.33	U
CALCIUM	MG/KG	7300		7800		9370		2960		8190		2190		5160		2940	
CADMIUM	MG/KG	1.9		1.3		1.4		0.28	b	0.88	b	0.33	b	1.1		0.88	b
COBALT	MG/KG	9	b	6.8	b	5	b	1.2	U	3.8	b	1.2	b	4.1	b	2.5	b
CHROMIUM	MG/KG	16.8		11.5		8.9		3.1		9.4		3		7.5		16.9	
COPPER	MG/KG	12.8		8.7		8.2		2.3	b	5.4	b	1.8	b	15.8		5	b
IRON	MG/KG	18800		14800		12700		4070		10900		2740		9070		6810	
MERCURY	MG/KG	0.03	U	0.17		0.03	U	0.03	U	0.03	U	0.03	U	0.18		0.05	U
POTASSIUM	MG/KG	4100		3440		2960		954	b	2850		584	b	2900		1350	
MAGNESIUM	MG/KG	7900		6950		6290		1950		4480		1010	b	4140		2240	
MANGANESE	MG/KG	298		243		234		86.3		185		65.5		188		168	
SODIUM	MG/KG	476	b	753	b	666	b	222	b	441	b	174	b	309	b	239	b
NICKEL	MG/KG	13.4		7.9	U	9.9		1.6	U	6.1	U	2.2	U	6.9	b	9	
LEAD	MG/KG	4.8		2.1		3.1		0.78		2		0.47	b	1.8		1.3	U
ANTIMONY	MG/KG	2.7	U	2.8	U	2.7	U	2.8	b	2.7	U	2.5	U	2.6	U	2.5	U
SELENIUM	MG/KG	0.11	U	0.12	U	0.11	U	0.1	U	0.11	U	0.1	U	0.11	U	0.11	b
THALLIUM	MG/KG	0.18	U	0.16	U	0.16	U	0.14	U	0.22	U	0.14	U	0.2	b	0.15	U
VANADIUM	MG/KG	43.1		38.3		31.9		10	b	26.2		6.7	b	21.9		15.8	
ZINC	MG/KG	57.9		46.8		42.9		13.2		33.7		9.4		34.4		17.8	
VOLATILE ORGANIC COMPOUNDS																	
TOLUENE	UG/KG	11	U	12	U	12	U	10	U	11	U	10	U	11	U	10	U
ACETONE	UG/KG	12	U	12	U	12	U	19	U	11	U	10	U	11	U	10	U
2-BUTANONE	UG/KG	4	J	5	J	4	J	10	U	3	J	3	J	11	U	10	U
SEMI-VOLATILE ORGANIC COMPOUNDS																	
4-NITROPHENOL	UG/KG	1800	U	1900	U	1900	U	1800	U	1800	U	1600	U	1700	U	1700	U
1,4-DICHLOROBENZENE	UG/KG	740	U	790	U	800	U	870	U	720	U	870	U	720	U	890	U
PHENOL	UG/KG	740	U	790	U	800	U	870	U	720	U	870	U	720	U	890	U
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	740	U	790	U	800	U	870	U	580	J	870	U	720	U	890	U
DI-N-OCTYL PHTHALATE	UG/KG	740	U	790	U	800	U	870	U	720	U	870	U	720	U	890	U
ANTHRACENE	UG/KG	740	U	790	U	800	U	870	U	720	U	870	U	720	U	890	U
1,2,4-TRICHLOROBENZENE	UG/KG	740	U	790	U	800	U	870	U	720	U	870	U	720	U	890	U
2,4-DINITROTOLUENE	UG/KG	740	U	790	U	800	U	870	U	720	U	870	U	720	U	890	U
PYRENE	UG/KG	740	U	790	U	800	U	870	U	720	U	870	U	720	U	890	U
BENZO(GH)PERYLENE	UG/KG	740	U	790	U	800	U	870	U	720	U	870	U	720	U	890	U
INDENO(1,2,3-CD)PYRENE	UG/KG	740	U	790	U	800	U	870	U	720	U	870	U	720	U	890	U
BENZO(B)FLUORANTHENE	UG/KG	740	U	790	U	800	U	870	U	720	U	870	U	720	U	890	U
FLUORANTHENE	UG/KG	740	U	790	U	800	U	870	U	720	U	870	U	720	U	890	U
BENZO(K)FLUORANTHENE	UG/KG	740	U	790	U	800	U	870	U	720	U	870	U	720	U	890	U
CHRYSENE	UG/KG	740	U	790	U	800	U	870	U	720	U	870	U	720	U	890	U
BENZO(A)PYRENE	UG/KG	740	U	790	U	800	U	870	U	720	U	870	U	720	U	890	U
DIBENZO(A,H)ANTHRACENE	UG/KG	740	U	790	U	800	U	870	U	720	U	870	U	720	U	890	U
4-CHLORO-3-METHYLPHENOL	UG/KG	740	U	790	U	800	U	870	U	720	U	870	U	720	U	890	U
N-NITROSODIPROPYLAMINE	UG/KG	740	U	790	U	800	U	870	U	720	U	870	U	720	U	890	U
ACENAPHTHENE	UG/KG	740	U	790	U	800	U	870	U	720	U	870	U	720	U	890	U
DIETHYL PHTHALATE	UG/KG	740	U	790	U	800	U	870	U	720	U	870	U	720	U	890	U
PHENANTHRENE	UG/KG	740	U	790	U	800	U	870	U	720	U	870	U	720	U	890	U
CARBAZOLE	UG/KG	740	U	790	U	800	U	870	U	720	U	870	U	720	U	890	U
PENTACHLOROPHENOL	UG/KG	1800	U	1900	U	1900	U	1800	U	1800	U	1600	U	1700	U	1700	U
2-CHLOROPHENOL	UG/KG	740	U	790	U	800	U	870	U	720	U	870	U	720	U	890	U
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																	
TFH DIESEL	MG/KG	14	U	15	U	15	U	12.5	U	13.6	U	12.5	U	13.5	U	13.1	U
TFH GASOLINE	MG/KG	0.288		0.196		0.071		0.131		0.073		0.383		0.054		0.119	
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																	
TRPH	MG/KG	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U

Table B19-3

Site19 (OU- 3): Summary of Detected Chemicals in the Vadose Zone (Subsurface) Samples

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	19_25B215 S1456320 (15)	DVF(a)	19_25B215 S1456321 (20)	DVF(a)	19_25B215 S1457003 (20)	DVF(a)	19_25B215 S1456322 (25)	DVF(a)	19_25B216 S1456538 (5)	DVF(a)	19_25B216 S1456639 (10)	DVF(a)	19_25B216 S14567075 (10)	DVF(a)	19_25B216 S1456540 (15)	DVF(a)
GENERAL CHEMISTRY																	
TOTAL ORGANIC CARBON	MG/KGW	-		-		-		-		-		-		-		-	
METALS																	
SILVER	MG/KG	0.85	U	0.49	U	0.53	U	0.48	U	0.34	U	0.45	b	0.36	b	0.35	U
ALUMINIUM	MG/KG	12200		11800		8970		4580		12900		2600		6950		13600	
ARSENIC	MG/KG	5.2		3.8		4		0.9	U	3.2		0.77	b	1.8	b	4	
BARIUM	MG/KG	147		116		130		31.5	b	146		26.5	b	106		123	
BERYLLIUM	MG/KG	0.77	U	0.8	U	0.63	b	0.38	U	0.51	b	0.15	b	0.29	b	0.61	b
CALCIUM	MG/KG	10500		5880		6380		2620		11000		1860		4360		9010	
CADMIUM	MG/KG	1.9		1.8		1.4		0.28	U	1.5		0.56	U	0.72	b	1.6	
COBALT	MG/KG	8.2	b	5.9	b	5.3	b	1.3	b	6.7	b	2.2	b	4.3	b	8.4	b
CHROMIUM	MG/KG	11.5		12.5		10.1		4.2		12.5		3		6.7		12.4	
COPPER	MG/KG	10.1		8.8		8.5		2	b	8.8		1.9	b	4.1	b	11.3	
IRON	MG/KG	18100		13700		12200		3780		15300		3470		8660		15800	
MERCURY	MG/KG	0.03	U	0.03	U	0.03	U	0.03	U	0.01	U	0.01	U	0.01	U	0.02	U
POTASSIUM	MG/KG	3880		2890		2860		420	b	3650		981	b	2290		3410	
MAGNESIUM	MG/KG	7180		5430		5280		1580		7110		1350		3810		6940	
MANGANESE	MG/KG	279		207		225		14.2		278		114		193		280	
SODIUM	MG/KG	680	b	564	b	729	b	485	b	701	b	280	U	415	U	877	b
NICKEL	MG/KG	12.1		13		9.3	b	1.8	U	10.6		2.3	b	5.3	b	8.8	b
LEAD	MG/KG	3.4		2.6		2.9		1.8		2.9		0.96	U	1.7		4.7	
ANTIMONY	MG/KG	3	U	2.8	U	2.9	U	2.8	U	2.8	U	2.5	U	2.7	U	2.9	U
SELENIUM	MG/KG	0.12	U	0.12	U	0.12	U	0.12	U	4.7	U	0.43	U	0.45	U	0.5	U
THALLIUM	MG/KG	0.22	b	0.23	b	0.4	b	0.16	U	0.36	U	0.32	U	0.34	U	0.43	U
VANADIUM	MG/KG	39.7		36		30.7		10.1	b	40.7		10.1	b	22.9		36.4	
ZINC	MG/KG	51.8		42.2		41		7.6		47.7		12		27.4		50.7	
VOLATILE ORGANIC COMPOUNDS																	
TOLUENE	UG/KG	11	U	12	U	12	U	11	U	12	U	10	U	10	U	12	U
ACETONE	UG/KG	11	U	12	U	12	U	11	U	12	U	28	U	10	U	26	U
2-BUTANONE	UG/KG	11	U	12	U	12	U	11	U	12	U	10	U	10	U	12	U
SEMI-VOLATILE ORGANIC COMPOUNDS																	
4-NITROPHENOL	UG/KG	1800	U	1800	U	1800	U	1800	U	1900	U	1700	U	1600	U	1900	U
1,4-DICHLOROBENZENE	UG/KG	740	U	770	U	780	U	730	U	780	U	680	U	680	U	770	U
PHENOL	UG/KG	740	U	770	U	780	U	730	U	780	U	680	U	680	U	770	U
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	740	U	770	U	780	U	730	U	780	U	370	J	680	U	770	U
DI-N-OCTYL PHTHALATE	UG/KG	740	U	770	U	780	U	730	U	780	U	680	U	680	U	770	U
ANTHRACENE	UG/KG	740	U	770	U	780	U	730	U	780	U	680	U	680	U	770	U
1,2,4-TRICHLOROBENZENE	UG/KG	740	U	770	U	780	U	730	U	780	U	680	U	680	U	770	U
2,4-DINITROTOLUENE	UG/KG	740	U	770	U	780	U	730	U	780	U	680	U	680	U	770	U
PYRENE	UG/KG	740	U	770	U	780	U	730	U	780	U	680	U	680	U	770	U
BENZO(GH)PERYLENE	UG/KG	740	U	770	U	780	U	730	U	780	U	680	U	680	U	770	U
INDENO(1,2,3-CD)PYRENE	UG/KG	740	U	770	U	780	U	730	U	780	U	680	U	680	U	770	U
BENZO(B)FLUORANTHENE	UG/KG	740	U	770	U	780	U	730	U	780	U	680	U	680	U	770	U
FLUORANTHENE	UG/KG	740	U	770	U	780	U	730	U	780	U	680	U	680	U	770	U
BENZO(K)FLUORANTHENE	UG/KG	740	U	770	U	780	U	730	U	780	U	680	U	680	U	770	U
CHRYSENE	UG/KG	740	U	770	U	780	U	730	U	780	U	680	U	680	U	770	U
BENZO(A)PYRENE	UG/KG	740	U	770	U	780	U	730	U	780	U	680	U	680	U	770	U
DIBENZO(A,H)ANTHRACENE	UG/KG	740	U	770	U	780	U	730	U	780	U	680	U	680	U	770	U
4-CHLORO-3-METHYLPHENOL	UG/KG	740	U	770	U	780	U	730	U	780	U	680	U	680	U	770	U
N-NITROSODIPROPYLAMINE	UG/KG	740	U	770	U	780	U	730	U	780	U	680	U	680	U	770	U
ACENAPHTHENE	UG/KG	740	U	770	U	780	U	730	U	780	U	680	U	680	U	770	U
DIETHYL PHTHALATE	UG/KG	740	U	770	U	780	U	730	U	780	U	680	U	680	U	770	U
PHENANTHRENE	UG/KG	740	U	770	U	780	U	730	U	780	U	680	U	680	U	770	U
CARBAZOLE	UG/KG	740	U	770	U	780	U	730	U	780	U	680	U	680	U	770	U
PENTACHLOROPHENOL	UG/KG	1800	U	1900	U	1800	U	1800	U	1900	U	1700	U	1600	U	1900	U
2-CHLOROPHENOL	UG/KG	740	U	770	U	780	U	730	U	780	U	680	U	680	U	770	U
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																	
TFH DIESEL	MG/KG	13.8	UJ	14.5	UJ	14.2	UJ	13.7	UJ	14.5	U	12.9	U	12.7	U	14.4	U
TFH GASOLINE	MG/KG	0.056	U	1.68		0.45		0.412		0.059	U	0.775		0.123		0.109	
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																	
TRPH	MG/KG	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U

Table B19-3

Site19 (OU- 3): Summary of Detected Chemicals in the Vadose Zone (Subsurface) Samples

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT,BGS) ANALYTE BY GROUP	UNITS	19_26B216 S1456541 (20)	DVF(a)	19_26B216 S1456542 (25)	DVF(a)	19_AB217 S1456302 (10)	DVF(a)	19_AB217 S1456294 (20)	DVF(a)	19_AB217 S1456764 (20)	DVF(a)	19_AB217 S1456295 (30)	DVF(a)	19_AB217 S1456296 (40)	DVF(a)	19_AB217 S1456297 (50)	DVF(a)
GENERAL CHEMISTRY																	
TOTAL ORGANIC CARBON	MG/KGW	-		-		-		-		-		-		-		-	
METALS																	
SILVER	MG/KG	0.48	b	0.32	U	0.49	b	0.48	U	0.48	U	0.66	b	0.5	U	0.49	U
ALUMINIUM	MG/KG	4940		5720		13300		5220		9180		10500		12300		11400	
ARSENIC	MG/KG	1.4	b	2.7		4.8		1.5	U	1.9	U	3.6		5.3		7.1	
BARIUM	MG/KG	21.2	b	29.6	b	142		72		118		146		119		187	
BERYLLIUM	MG/KG	0.21	b	0.3	b	0.48	b	0.25	b	0.23	b	0.44	b	0.5	b	0.55	b
CALCIUM	MG/KG	1850		1150		7010		5080		3520		8200		5960		16500	
CADMIUM	MG/KG	0.58	U	0.58	U	1.9		0.95	b	1.1		2.2		0.82	b	2.1	
COBALT	MG/KG	1.9	b	3.1	b	5.9	b	3.7	b	4	b	6.9	b	8.7	b	7.6	b
CHROMIUM	MG/KG	3.9		3.9		15.2		5.5		9.1		12.3		13.2		28.3	
COPPER	MG/KG	3.7	b	2.6	b	9.9		4.4	b	6.2		12.8		7.7		15.9	
IRON	MG/KG	3880		5820		15800		7040		11000		14500		16300		18000	
MERCURY	MG/KG	0.01	U	0.01	U	0.03	U										
POTASSIUM	MG/KG	699	b	883	b	3550		2070		2930		3780		2630		3980	
MAGNESIUM	MG/KG	1090		1320		6710		3260		4280		6030		5960		6430	
MANGANESE	MG/KG	35.2		78		255		156		195		301		154		301	
SODIUM	MG/KG	338	U	369	U	517	b	556	b	667	b	867	b	813	b	752	b
NICKEL	MG/KG	2.9	b	2.4	b	10.9		4.5	b	8.1	b	12.2		7.5	b	17.6	
LEAD	MG/KG	2.4		3.8		4.7		1.3	U	1.6	U	3.5		3.6		5.4	
ANTIMONY	MG/KG	2.6	U	2.6	U	2.7	U	2.6	U	2.7	U	2.9	U	2.9	U	2.8	U
SELENIUM	MG/KG	4.5	U	4.4	U	0.11	U	0.11	U	0.11	U	0.12	U	0.12	U	0.12	U
THALLIUM	MG/KG	0.34	U	0.34	U	0.24	b	0.22	b	0.15	b	0.26	b	0.33	b	0.35	b
VANADIUM	MG/KG	11.1		15.8		38.6		17.1		26		36.3		36.8		41.5	
ZINC	MG/KG	11.2		12.9		48.5		25.3		34.7		48.9		45		70.5	
VOLATILE ORGANIC COMPOUNDS																	
TOLUENE	UG/KG	11	U	10	U	11	U	11	U	11	U	12	U	12	U	11	U
ACETONE	UG/KG	11	U	10	U	12		11	U	8	J	32		36		21	U
2-BUTANONE	UG/KG	11	U	10	U	11	U	11	U	11	U	12	U	12	U	11	U
SEMI-VOLATILE ORGANIC COMPOUNDS																	
4-NITROPHENOL	UG/KG	1800	U	1700	U	1700	U	1700	U	1800	U	1900	U	1900	U	1800	U
1,4-DICHLOROBENZENE	UG/KG	720	U	690	U	710	U	720	U	730	U	780	U	800	U	780	U
PHENOL	UG/KG	720	U	690	U	710	U	720	U	730	U	780	U	800	U	780	U
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	720	U	690	U	710	U	720	U	730	U	780	U	800	U	780	U
DI-N-OCTYL PHTHALATE	UG/KG	720	U	690	U	710	U	720	U	730	U	780	U	800	U	780	U
ANTHRACENE	UG/KG	720	U	690	U	710	U	720	U	730	U	780	U	800	U	780	U
1,2,4-TRICHLOROBENZENE	UG/KG	720	U	690	U	710	U	720	U	730	U	780	U	800	U	780	U
2,4-DINITROTOLUENE	UG/KG	720	U	690	U	710	U	720	U	730	U	780	U	800	U	780	U
PYRENE	UG/KG	720	U	690	U	710	U	720	U	730	U	780	U	800	U	780	U
BENZO(GH)PERYLENE	UG/KG	720	U	690	U	710	U	720	U	730	U	780	U	800	U	780	U
INDENO(1,2,3-CD)PYRENE	UG/KG	720	U	690	U	710	U	720	U	730	U	780	U	800	U	780	U
BENZO(B)FLUORANTHENE	UG/KG	720	U	690	U	710	U	720	U	730	U	780	U	800	U	780	U
FLUORANTHENE	UG/KG	720	U	690	U	710	U	720	U	730	U	780	U	800	U	780	U
BENZO(K)FLUORANTHENE	UG/KG	720	U	690	U	710	U	720	U	730	U	780	U	800	U	780	U
CHRYSENE	UG/KG	720	U	690	U	710	U	720	U	730	U	780	U	800	U	780	U
BENZO(A)PYRENE	UG/KG	720	U	690	U	710	U	720	U	730	U	780	U	800	U	780	U
DIBENZO(A,H)ANTHRACENE	UG/KG	720	U	690	U	710	U	720	U	730	U	780	U	800	U	780	U
4-CHLORO-3-METHYLPHENOL	UG/KG	720	U	690	U	710	U	720	U	730	U	780	U	800	U	780	U
N-NITROSODIPROPYLAMINE	UG/KG	720	U	690	U	710	U	720	U	730	U	780	U	800	U	780	U
ACENAPHTHENE	UG/KG	720	U	690	U	710	U	720	U	730	U	780	U	800	U	780	U
DIETHYL PHTHALATE	UG/KG	720	U	690	U	710	U	720	U	730	U	780	U	800	U	780	U
PHENANTHRENE	UG/KG	720	U	690	U	710	U	720	U	730	U	780	U	800	U	780	U
CARBAZOLE	UG/KG	720	U	690	U	710	U	720	U	730	U	780	U	800	U	780	U
PENTACHLOROPHENOL	UG/KG	1800	U	1700	U	1700	U	1700	U	1800	U	1900	U	1900	U	1800	U
2-CHLOROPHENOL	UG/KG	720	U	690	U	710	U	720	U	730	U	780	U	800	U	780	U
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																	
TFH DIESEL	MG/KG	13.7	U	12.9	U	13.4	UJ	13.4	UJ	13.7	UJ	14.8	UJ	15	UJ	14.2	UJ
TFH GASOLINE	MG/KG	0.156		0.278		0.054	U	0.054	U	0.055	U	0.06	U	0.06	U	0.058	U
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																	
TRPH	MG/KG	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U

Table B19-3

Site 19 (OU- 3): Summary of Detected Chemicals in the Vadose Zone (Subsurface) Samples

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	19_AB217 S1456288 (60)	DVF(a)	19_AB218 S1456292 (10)	DVF(a)	19_AB218 S1456293 (20)	DVF(a)	19_AB218 S1457001 (20)	DVF(a)	19_AB218 S1456290 (30)	DVF(a)	19_AB218 S1456291 (40)	DVF(a)	19_AB218 S1456306 (50)	DVF(a)	19_AB218 S1456305 (60)	DVF(a)
GENERAL CHEMISTRY																	
TOTAL ORGANIC CARBON	MG/KGW	-		-		-		-		-		-		-		-	
METALS																	
SILVER	MG/KG	0.45	U	0.5	U	0.48	U	0.5	U	0.45	U	0.5	U	0.49	U	0.49	U
ALUMINUM	MG/KG	4520		11400		8610		15000		4520		10900		12700		7770	
ARSENIC	MG/KG	1.5	U	2.7		2.3	U	3		1.2	U	2.4	U	1.8	U	2.7	
BARIUM	MG/KG	74.8		122		126		134		34.1	b	117		113		81.6	
BERYLLIUM	MG/KG	0.11	U	0.5	b	0.23	b	0.49	b	0.26	b	0.45	b	0.49	b	0.29	b
CALCIUM	MG/KG	14200		13300		5780		8900		1540		4640		3960		3910	
CADMIUM	MG/KG	1.1		1.6		1.1	b	1.7		0.26	U	1.7		2.8		1.4	
COBALT	MG/KG	2.9	b	6	b	4	b	5.5	b	2.6	b	7.8	b	8.3	b	4.8	b
CHROMIUM	MG/KG	5.7		11.4		8.8		14.2		4		12.9		21.6		10.8	
COPPER	MG/KG	3.6	b	9.6		6		9.1		2.8	b	8.9		10.7		8.3	
IRON	MG/KG	6720		15100		11700		18900		4200		15900		16500		11700	
MERCURY	MG/KG	0.06	b	0.03	U												
POTASSIUM	MG/KG	1830		3690		3020		3780		901	b	4600		3440	U	3000	U
MAGNESIUM	MG/KG	3000		8160		4770		7100		1150		5900		5050		4080	
MANGANESE	MG/KG	149		268		222		265		50.4		301		313		178	
SODIUM	MG/KG	371	b	625	b	651	b	793	b	373	b	686	b	650	b	596	b
NICKEL	MG/KG	3.8	b	10.6		5.7	b	9.2	b	2.1	b	9.5	b	15.9		10.4	
LEAD	MG/KG	1	U	2.2		1.9		2.5		2.2		3.3		3.1		2.4	
ANTIMONY	MG/KG	2.6	U	2.9	U	2.8	U	2.9	U	2.6	U	2.9	U	2.8	U	2.8	U
SELENIUM	MG/KG	0.11	U	0.12	U	0.11	U	0.12	U	0.11	U	0.12	U	0.12	U	0.12	U
THALLIUM	MG/KG	0.17	b	0.29	b	0.18	b	0.29	b	0.15	U	0.41	b	0.21	b	0.3	b
VANADIUM	MG/KG	19		39.7		27.8		40.8		11.4		32.6		37.5		33.7	
ZINC	MG/KG	23.9		52.7		38.1		52.4		11.6		52.8		50.7		36.5	
VOLATILE ORGANIC COMPOUNDS																	
TOLUENE	UG/KG	11	U	12	U	11	U	11	U								
ACETONE	UG/KG	11	U	9	J	11	U	11	U	10	J	11	J	14		18	
2-BUTANONE	UG/KG	11	U	12	U	11	U	11	U								
SEMI-VOLATILE ORGANIC COMPOUNDS																	
4-NITROPHENOL	UG/KG	1700	U	1700	U	1800	U	1800	U	1700	U	1900	U	1800	U	1800	U
1,4-DICHLOROBENZENE	UG/KG	710	U	710	U	720	U	740	U	710	U	780	U	750	U	750	U
PHENOL	UG/KG	710	U	710	U	720	U	740	U	710	U	780	U	750	U	750	U
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	710	U	710	U	720	U	740	U	710	U	780	U	750	U	750	U
DI-N-OCTYL PHTHALATE	UG/KG	710	U	710	U	720	U	740	U	710	U	780	U	750	U	750	U
ANTHRACENE	UG/KG	710	U	710	U	720	U	740	U	710	U	780	U	750	U	750	U
1,2,4-TRICHLOROBENZENE	UG/KG	710	U	710	U	720	U	740	U	710	U	780	U	750	U	750	U
2,4-DINITROTOLUENE	UG/KG	710	U	710	U	720	U	740	U	710	U	780	U	750	U	750	U
PYRENE	UG/KG	710	U	710	U	720	U	740	U	710	U	780	U	750	U	750	U
BENZO(GH)PERYLENE	UG/KG	710	U	710	U	720	U	740	U	710	U	780	U	750	U	750	U
INDENO(1,2,3-CD)PYRENE	UG/KG	710	U	710	U	720	U	740	U	710	U	780	U	750	U	750	U
BENZO(B)FLUORANTHENE	UG/KG	710	U	710	U	720	U	740	U	710	U	780	U	750	U	750	U
FLUORANTHENE	UG/KG	710	U	710	U	720	U	740	U	710	U	780	U	750	U	750	U
BENZO(K)FLUORANTHENE	UG/KG	710	U	710	U	720	U	740	U	710	U	780	U	750	U	750	U
CHRYSENE	UG/KG	710	U	710	U	720	U	740	U	710	U	780	U	750	U	750	U
BENZO(A)PYRENE	UG/KG	710	U	710	U	720	U	740	U	710	U	780	U	750	U	750	U
DIBENZO(A,H)ANTHRACENE	UG/KG	710	U	710	U	720	U	740	U	710	U	780	U	750	U	750	U
4-CHLORO-3-METHYLPHENOL	UG/KG	710	U	710	U	720	U	740	U	710	U	780	U	750	U	750	U
N-NITROSODIPROPYLAMINE	UG/KG	710	U	710	U	720	U	740	U	710	U	780	U	750	U	750	U
ACENAPHTHENE	UG/KG	710	U	710	U	720	U	740	U	710	U	780	U	750	U	750	U
DIETHYL PHTHALATE	UG/KG	710	U	710	U	720	U	740	U	710	U	780	U	750	U	750	U
PHENANTHRENE	UG/KG	710	U	710	U	720	U	740	U	710	U	780	U	750	U	750	U
CARBAZOLE	UG/KG	710	U	710	U	720	U	740	U	710	U	780	U	750	U	750	U
PENTACHLOROPHENOL	UG/KG	1700	U	1700	U	1800	U	1800	U	1700	U	1900	U	1800	U	1800	U
2-CHLOROPHENOL	UG/KG	710	U	710	U	720	U	740	U	710	U	780	U	750	U	750	U
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																	
TFH DIESEL	MG/KG	13.2	UJ	13.1	UJ	13.7	UJ	14	UJ	13.3	UJ	14.7	UJ	14.2	UJ	14.2	UJ
TFH GASOLINE	MG/KG	0.054	U	0.054	U	0.055	U	0.058	U	0.054	U	0.059	U	0.057	U	0.057	U
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																	
TRPH	MG/KG	20	U														

Table B19-3

Site19 (OU- 3): Summary of Detected Chemicals in the Vadose Zone (Subsurface) Samples

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	19_DBMW54 S1456298 (5)	DVF(a)	19_DBMW54 S1456299 (10)	DVF(a)	19_DBMW54 S1456307 (15)	DVF(a)	19_DBMW54 S1457050 (15)	DVF(a)	19_DBMW54 S1456308 (20)	DVF(a)	19_DBMW54 S1456309 (25)	DVF(a)	19_DBMW54 S1457051 (25)	DVF(a)	19_DBMW54 S1456310 (35)	DVF(a)
GENERAL CHEMISTRY																	
TOTAL ORGANIC CARBON	MG/KGW	-		-		-		-		-		-		-		-	
METALS																	
SILVER	MG/KG	0.33	U	0.31	U	0.34	U	0.71	U	0.43	U	0.37	U	0.39	U	0.44	U
ALUMINUM	MG/KG	15200		3490		13500		8940		14200		15200		7330		23700	
ARSENIC	MG/KG	3.8		1.9	b	3.7		2.6		3.8		3.8		1.4	U	4.1	
BARIUM	MG/KG	151		50.9		123		99.5		184		171		36.3	b	195	
BERYLLIUM	MG/KG	0.63	b	0.16	b	0.55	b	0.39	b	0.6	b	0.82	b	0.3	b	0.85	b
CALCIUM	MG/KG	6260		2270		9830		4090		9520		4470		1750		5710	
CADMIUM	MG/KG	1.8		0.61	b	0.63	U	1.1		2.8		0.64	U	0.8	U	2.8	
COBALT	MG/KG	8.6	b	3.2	b	7.8	b	6.1	b	7.9	b	7.4	b	3.6	U	15.3	
CHROMIUM	MG/KG	17.1		4.7		13.2		9.7		14.4		7.4		8.6		26.8	
COPPER	MG/KG	11.7		5.5		8.1		7.7		9		14		4.7	b	12.7	
IRON	MG/KG	17800		4820		15300		11000		16300		18600		6050		28900	
MERCURY	MG/KG	0.02	U	0.02	U	0.02	U	0.02	U	0.05	U	0.02	U	0.02	U	0.02	U
POTASSIUM	MG/KG	4720		1300		3360		2810		3440		4020		980	b	6940	
MAGNESIUM	MG/KG	7190		2000		8500		4270		6880		8310		1820		10500	
MANGANESE	MG/KG	294		97.4		252		205		270		137		46.4		584	
SODIUM	MG/KG	422	U	360	U	884	b	676	b	977	b	792	b	435	U	663	b
NICKEL	MG/KG	12		2.4	b	10.7		7.2	b	9.7		9.7		4.1	b	21	
LEAD	MG/KG	3.7		1.4	U	3.3		2.6		3.9		3.7		2.9		6	
ANTIMONY	MG/KG	2.8	U	2.6	U	2.8	U	2.7	U	3	U	2.9	U	2.7	U	3.1	U
SELENIUM	MG/KG	4.6	U	4.3	U	4.8	U	4.6	U	5	U	4.9	U	4.6	U	5.2	U
THALLIUM	MG/KG	0.35	U	0.33	U	0.36	U	0.35	U	0.38	U	0.41	b	0.35	U	0.5	b
VANADIUM	MG/KG	42.1		13.1		38.1		27.6		40		41.3		15.3		73	
ZINC	MG/KG	59.4		17.7		48.8		37.1		53.4		57		17.7		88.4	
VOLATILE ORGANIC COMPOUNDS																	
TOLUENE	UG/KG	11		10	U	11	U	11	U	12	U	10	U	11	U	3	J
ACETONE	UG/KG	9	J	10	U	8	J	12		14		10	J	14		10	J
2-BUTANONE	UG/KG	11	U	10	U	11	U	11	U	12	U	10	U	11	U	13	U
SEMI-VOLATILE ORGANIC COMPOUNDS																	
4-NITROPHENOL	UG/KG	1700	U	1700	U	1800	U	1800	U	1800	U	1700	U	1700	U	1500	J
1,4-DICHLOROBENZENE	UG/KG	700	U	690	U	750	U	720	U	760	U	690	U	720	U	1500	
PHENOL	UG/KG	700	U	690	U	750	U	720	U	760	U	690	U	720	U	2200	
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	700	U	690	U	750	U	720	U	760	U	690	U	720	U	830	U
DI-N-OCTYL PHTHALATE	UG/KG	700	U	690	U	750	U	720	U	760	U	690	U	720	U	1900	
ANTHRACENE	UG/KG	700	U	690	U	750	U	720	U	760	U	690	U	720	U	830	U
1,2,4-TRICHLOROBENZENE	UG/KG	700	U	690	U	750	U	720	U	760	U	690	U	720	U	1500	
2,4-DINITROTOLUENE	UG/KG	700	U	690	U	750	U	720	U	760	U	690	U	720	U	1400	
PYRENE	UG/KG	700	U	690	U	750	U	720	U	760	U	690	U	720	U	1200	
BENZO(GH)PERYLENE	UG/KG	700	U	690	U	750	U	720	U	760	U	690	U	720	U	830	U
INDENO(1,2,3-CD)PYRENE	UG/KG	700	U	690	U	750	U	720	U	760	U	690	U	720	U	830	U
BENZO(B)FLUORANTHENE	UG/KG	700	U	690	U	750	U	720	U	760	U	690	U	720	U	830	U
FLUORANTHENE	UG/KG	700	U	690	U	750	U	720	U	760	U	690	U	720	U	830	U
BENZO(K)FLUORANTHENE	UG/KG	700	U	690	U	750	U	720	U	760	U	690	U	720	U	830	U
CHRYSENE	UG/KG	700	U	690	U	750	U	720	U	760	U	690	U	720	U	830	U
BENZO(A)PYRENE	UG/KG	700	U	690	U	750	U	720	U	760	U	690	U	720	U	830	U
DIBENZO(A,H)ANTHRACENE	UG/KG	700	U	690	U	750	U	720	U	760	U	690	U	720	U	830	U
4-CHLORO-3-METHYLPHENOL	UG/KG	700	U	690	U	750	U	720	U	760	U	690	U	720	U	1800	
N-NITROSODIPROPYLAMINE	UG/KG	700	U	690	U	750	U	720	U	760	U	690	U	720	U	1300	
ACENAPHTHENE	UG/KG	700	U	690	U	750	U	720	U	760	U	690	U	720	U	1700	
DIETHYL PHTHALATE	UG/KG	700	U	690	U	750	U	720	U	760	U	690	U	720	U	830	U
PHENANTHRENE	UG/KG	700	U	690	U	750	U	720	U	760	U	690	U	720	U	830	U
CARBAZOLE	UG/KG	700	U	690	U	750	U	720	U	760	U	690	U	720	U	830	U
PENTACHLOROPHENOL	UG/KG	1700	U	1700	U	1800	U	1800	U	1800	U	1700	U	1700	U	1200	J
2-CHLOROPHENOL	UG/KG	700	U	690	U	750	U	720	U	760	U	690	U	720	U	2300	
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																	
TFH DIESEL	MG/KG	16.1		13	U	14.1	U	13.7	U	14.3	U	14.3	U	13.4	U	15.8	U
TFH GASOLINE	MG/KG	0.053	U	0.052	U	0.057	U	0.055	U	0.058	U	0.053	U	0.054	U	0.063	U
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																	
TRPH	MG/KG	20	U	20	U	79	U	20	U	200	U	20	U	20	U	20	U

Table B19-3

Site19 (OU- 3): Summary of Detected Chemicals in the Vadose Zone (Subsurface) Samples

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	19_DBMW54 S1456311 (45)	DVF(a)	19_DBMW54 S1456303 (140)	DVF(a)	19_DBMW54 S1457087 (160)	DVF(a)	19_DGMW85 S1456323 (140)	DVF(a)	19_DGMW85 S1457087 (140)	DVF(a)	19_DGMW85 S1457089 (148)	DVF(a)	19_DGMW86 S1456324 (128)	DVF(a)	19_DGMW86 S1457142 (128)	DVF(a)
GENERAL CHEMISTRY																	
TOTAL ORGANIC CARBON	MG/KGW	-		-		212		-		-		104		-		-	
METALS																	
SILVER	MG/KG	0.32	U	0.36	U	-		0.48	U	0.52	U	-		0.51	b	0.55	U
ALUMINIUM	MG/KG	8010		15500		-		8370		12000		-		8710		15900	
ARSENIC	MG/KG	1.4	U	4.9	b	-		2.2	b	3.6		-		2.5		6.2	
BARIUM	MG/KG	58.4		107		-		70.9		120	U	-		98		201	
BERYLLIUM	MG/KG	0.24	b	0.56	b	-		0.4	U	0.89	U	-		0.47	b	0.71	b
CALCIUM	MG/KG	2270		5770		-		3500		10300		-		3220		7170	
CADMIUM	MG/KG	0.58	U	3.3		-		1.4		5.8		-		1.4		3.5	
COBALT	MG/KG	5.9	b	8.8	b	-		2	b	7.3	b	-		4.6	b	7.2	b
CHROMIUM	MG/KG	7.4		22.8		-		9.3		13.7		-		12.4		18.8	
COPPER	MG/KG	5.3	b	12.8		-		5.2	b	10.3		-		8.1		15.2	
IRON	MG/KG	9090		17800		-		8700		15200		-		11200		21200	
MERCURY	MG/KG	0.02	U	0.02	U	-		0.32		0.06	U	-		0.03	U	0.04	U
POTASSIUM	MG/KG	2360		4080		-		1780		3210		-		2550		5220	
MAGNESIUM	MG/KG	3150		5540		-		2710		5100		-		4630		9270	
MANGANESE	MG/KG	164		283		-		103		463		-		209		304	
SODIUM	MG/KG	394	b	485	U	-		283	b	433	b	-		425	b	749	b
NICKEL	MG/KG	5	b	20.4		-		7.7	b	22.8		-		11.5		21.2	
LEAD	MG/KG	1.9	U	4.4		-		1.7		2.8		-		2.1		4.7	
ANTIMONY	MG/KG	2.6	U	2.9	U	-		2.8	U	3	U	-		2.7	U	3.2	U
SELENIUM	MG/KG	4.4	U	4.9	U	-		0.11	U	0.22	U	-		0.11	U	0.19	U
THALLIUM	MG/KG	0.34	U	0.38	b	-		0.16	U	0.17	U	-		0.16	U	0.39	J
VANADIUM	MG/KG	23.5		54.5		-		24.1		43.1		-		29.1		53.2	
ZINC	MG/KG	29.3		80.5		-		28.4		47.8		-		38.6		71.5	
VOLATILE ORGANIC COMPOUNDS																	
TOLUENE	UG/KG	11	U	4	J	12	U	11	U	11	U	-		13	U	11	U
ACETONE	UG/KG	6	J	7	J	38	U	47		45		-		13	U	15	U
2-BUTANONE	UG/KG	11	U	12	U	12	U	11	U	11	U	-		13	U	11	U
SEMI-VOLATILE ORGANIC COMPOUNDS																	
4-NITROPHENOL	UG/KG	1700	U	2000	U	1900	U	1700	U	1700	U	-		2000	U	1700	U
1,4-DICHLOROBENZENE	UG/KG	710	U	810	U	790	U	710	U	720	U	-		840	U	700	U
PHENOL	UG/KG	710	U	810	U	790	U	710	U	720	U	-		840	U	700	U
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	710	U	810	U	790	U	710	U	720	U	-		840	U	700	U
DI-N-OCTYL PHTHALATE	UG/KG	710	U	810	U	790	U	710	U	720	U	-		840	U	700	U
ANTHRACENE	UG/KG	710	U	810	U	790	U	710	U	1200		-		840	U	700	U
1,2,4-TRICHLOROBENZENE	UG/KG	710	U	810	U	790	U	710	U	720	U	-		840	U	700	U
2,4-DINITROTOLUENE	UG/KG	710	U	810	U	790	U	710	U	720	U	-		840	U	700	U
PYRENE	UG/KG	710	U	810	U	790	U	710	U	6800		-		840	U	700	U
BENZO(GH)PERYLENE	UG/KG	710	U	810	U	790	U	710	U	940		-		840	U	700	U
INDENO(1,2,3-CD)PYRENE	UG/KG	710	U	810	U	790	U	710	U	1500		-		840	U	700	U
BENZO(B)FLUORANTHENE	UG/KG	710	U	810	U	790	U	710	U	2700		-		840	U	700	U
FLUORANTHENE	UG/KG	710	U	810	U	790	U	710	U	8000		-		840	U	700	U
BENZO(K)FLUORANTHENE	UG/KG	710	U	810	U	790	U	710	U	2500		-		840	U	700	U
CHRYSENE	UG/KG	710	U	810	U	790	U	710	U	3500		-		840	U	700	U
BENZO(A)PYRENE	UG/KG	710	U	810	U	790	U	710	U	3000		-		840	U	700	U
DIBENZO(A,H)ANTHRACENE	UG/KG	710	U	810	U	790	U	710	U	740		-		840	U	700	U
4-CHLORO-3-METHYLPHENOL	UG/KG	710	U	810	U	790	U	710	U	720	U	-		840	U	700	U
N-NITROSODIPROPYLAMINE	UG/KG	710	U	810	U	790	U	710	U	720	U	-		840	U	700	U
ACENAPHTHENE	UG/KG	710	U	810	U	790	U	710	U	280	J	-		840	U	700	U
DIETHYL PHTHALATE	UG/KG	710	U	180	J	790	U	710	U	720	U	-		840	U	700	U
PHENANTHRENE	UG/KG	710	U	810	U	790	U	710	U	4800		-		840	U	700	U
CARBAZOLE	UG/KG	710	U	810	U	790	U	710	U	990		-		840	U	700	U
PENTACHLOROPHENOL	UG/KG	1700	U	2000	U	1900	U	1700	U	1700	U	-		2000	U	1700	U
2-CHLOROPHENOL	UG/KG	710	U	810	U	790	U	710	U	720	U	-		840	U	700	U
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																	
TFH DIESEL	MG/KG	13.4	U	15.1	U	14.6	U	13.3	U	31.4	U	-		15.6	U	13.1	U
TFH GASOLINE	MG/KG	0.054	U	0.061	U	0.06	U	0.054	U	0.055	U	-		-		-	
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																	
TRPH	MG/KG	20	U	20	U	20	U	20	U	20	U	-		20	U	20	U

Table B19-3

Site19 (OU- 3): Summary of Detected Chemicals in the Vadose Zone (Subsurface) Samples

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	19_DGMW86 S1456300 (168)	DVF(a)	19_UGMW35 S1456325 (128)	DVF(a)	19_UGMW35 S1457108 (128)	DVF(a)	19_UGMW35 S1457108 (148)	DVF(a)	19_UGMW35 S1457110 (148)	DVF(a)							
GENERAL CHEMISTRY																		
TOTAL ORGANIC CARBON	MG/KGW	103		-		-		208		249								
METALS																		
SILVER	MG/KG	0.48	U	0.5	U	0.48	U	-		-								
ALUMINIUM	MG/KG	1090		11800		2040		-		-								
ARSENIC	MG/KG	1	b	3.7	U	1.1	U	-		-								
BARIIUM	MG/KG	16.8	b	133		26	b	-		-								
BERYLLIUM	MG/KG	0.11	U	0.75	U	2.1	U	-		-								
CALCIUM	MG/KG	1980		9280		1710		-		-								
CADMIUM	MG/KG	1	b	5.9		0.88	b	-		-								
COBALT	MG/KG	1.3	U	5.9	b	1.6	b	-		-								
CHROMIUM	MG/KG	1.9	b	17.4		4.1		-		-								
COPPER	MG/KG	2.2	b	9.9		2.1	b	-		-								
IRON	MG/KG	2030		14800		3680		-		-								
MERCURY	MG/KG	0.03	U	0.03	U	0.03	U	-		-								
POTASSIUM	MG/KG	439	b	3320		732	b	-		-								
MAGNESIUM	MG/KG	606	b	4760		947	b	-		-								
MANGANESE	MG/KG	72		363		78		-		-								
SODIUM	MG/KG	182	b	489	b	238	b	-		-								
NICKEL	MG/KG	2.3	b	22.9		6.9	b	-		-								
LEAD	MG/KG	0.48	b	2.8		0.89		-		-								
ANTIMONY	MG/KG	2.7	U	3	b	2.8	U	-		-								
SELENIUM	MG/KG	0.11	U	0.12	U	0.11	U	-		-								
THALLIUM	MG/KG	0.16	UJ	0.24	b	0.16	U	-		-								
VANADIUM	MG/KG	6.7	b	42.2		11.3	b	-		-								
ZINC	MG/KG	7.8		45.4		12.5		-		-								
VOLATILE ORGANIC COMPOUNDS																		
TOLUENE	UG/KG	12	U	11	U	12	U	-		-								
ACETONE	UG/KG	25	U	14	U	19	U	-		-								
2-BUTANONE	UG/KG	12	U	2	J	3	J	-		-								
SEMI-VOLATILE ORGANIC COMPOUNDS																		
4-NITROPHENOL	UG/KG	-		1700	U	1900	U	-		-								
1,4-DICHLOROBENZENE	UG/KG	-		700	U	770	U	-		-								
PHENOL	UG/KG	-		700	U	770	U	-		-								
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	-		700	U	770	U	-		-								
DI-N-OCTYL PHTHALATE	UG/KG	-		700	U	770	U	-		-								
ANTHRACENE	UG/KG	-		700	U	770	U	-		-								
1,2,4-TRICHLOROBENZENE	UG/KG	-		700	U	770	U	-		-								
2,4-DINITROTOLUENE	UG/KG	-		700	U	770	U	-		-								
PYRENE	UG/KG	-		700	U	770	U	-		-								
BENZO(GH)PERYLENE	UG/KG	-		700	U	770	U	-		-								
INDENO(1,2,3-CD)PYRENE	UG/KG	-		700	U	770	U	-		-								
BENZO(B)FLUORANTHENE	UG/KG	-		700	U	770	U	-		-								
FLUORANTHENE	UG/KG	-		700	U	770	U	-		-								
BENZO(K)FLUORANTHENE	UG/KG	-		700	U	770	U	-		-								
CHRYSENE	UG/KG	-		700	U	770	U	-		-								
BENZO(A)PYRENE	UG/KG	-		700	U	770	U	-		-								
DIBENZO(A,H)ANTHRACENE	UG/KG	-		700	U	770	U	-		-								
4-CHLORO-3-METHYLPHENOL	UG/KG	-		700	U	770	U	-		-								
N-NITROSODIPROPYLAMINE	UG/KG	-		700	U	770	U	-		-								
ACENAPHTHENE	UG/KG	-		700	U	770	U	-		-								
DIETHYL PHTHALATE	UG/KG	-		700	U	770	U	-		-								
PHENANTHRENE	UG/KG	-		700	U	770	U	-		-								
CARBAZOLE	UG/KG	-		700	U	770	U	-		-								
PENTACHLOROPHENOL	UG/KG	-		1700	U	1900	U	-		-								
2-CHLOROPHENOL	UG/KG	-		700	U	770	U	-		-								
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																		
TFH DIESEL	MG/KG	-		13.1	U	14.3	U	-		-								
TFH GASOLINE	MG/KG	-		0.053	U	0.058	U	-		-								
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																		
TRPH	MG/KG	-		20	U	58		-		-								

(a) A definition of each data validation flag (DVF) is provided in Table B-1.

Table B19-4
Site 19 (OU-3): Well Construction Details
MCAS El Toro Phase I RI Technical Memorandum

Item	Station Identification			
	19_DBMW54	19_DGMW85	19_DGMW86	19_UGMW35
Survey Location--Northing	N548942.84	N548929.76	N549486.93	N548882.76
Survey Location--Easting	E1551442.84	E1551077.99	E1551064.42	E1551972.18
Ground Surface Elev. (ft above MSL ^a)	332.37	329.08	333.34	344.39
Measuring Point Elev. (ft above MSL ^a)	332.59	328.57	332.87	343.66
Measuring Point Location	Top of well casing			
Type of Surface Completion	Above ground	Below ground	Below ground	Below ground
Casing Diameter and Material	4-inch dia. Sch. 40 PVC			
Screen Diameter and Material	4-inch dia. 20-slot SS	4-inch dia. 20-slot SS	4-inch dia. 20-slot SS	4-inch dia. 20-slot SS
Screen Interval (ft bgs ^b)	141-181	143-183	158-198	148-185
Length of Drop Pipe (ft bgs ^b)	175	181	197	181
Make and Model of Installed Pump	Grundfos Rediflow 2	Grundfos Rediflow 2	Grundfos Rediflow 2	Grundfos Rediflow 2
Date of Pumping Test	21 Oct 92	20 Oct 92	None	None
Date of Water Quality Sampling	21 Dec 92	16 Dec 92	17 Dec 92	8 Dec 92
^a Mean sea level ^b Below ground surface SS=Stainless Steel				

<p align="center">Table B19-5 Site 19 (OU-3): Summary of Hydraulic Parameters MCAS EI Toro Phase I RI Technical Memorandum</p>						
Well Identification	Type of Test	Analysis Method	Transmissivity (ft ² /day)	Hydraulic Conductivity (ft/day)	Storage Coefficient ^a	Leakance Factor ^a
19_DBMW54	Slug	Bouwer and Rice (1976), and Bouwer (1989)	26	0.86	NA	NA
19_DGMW85	Slug	Bouwer and Rice (1976), and Bouwer (1989)	13	0.37	NA	NA

^aNA = Not applicable.
 Source: Table F-2 (Appendix F)

Table B19-6

Site19 (OU- 3): Summary of Detected Chemicals in Groundwater Samples

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SCREEN INTERVAL ANALYTE BY GROUP	REG.CODE(b)	REG.LEVEL(c)	UNITS	19_DBMW54 S1452114 (141-181)	DVF(a)	19_DGMW85 S1452115 (143-183)	DVF(a)	19_DGMW85 S1452399 (143-183)	DVF(a)	19_DGMW86 S1452112 (158-198)	DVF(a)	19_UGMW35 S1452134 (148-185)	DVF(a)
GENERAL CHEMISTRY													
ALKALINITY AS CaCO3	NA	NA	MG/L	130		136		138		242		134	
CARBONATE	NA	NA	MG/L	-		-		-		-		-	
BICARBONATE	NA	NA	MG/L	159		166		169		295		164	
CHLORIDE	3	250	MG/L	142		172		172		114		118	
SULFATE	3	250	MG/L	185		193		195		156		148	
NITRATE/NITRITE-N	1	10	MG/L	12.2		12.7		12.8		11.9		9.39	
TOTAL DISSOLVED SOLIDS	3	500	MG/L	763		794		823		729		650	
METALS													
SILVER	1	50	UG/L	2.2	b	2.2	b	3.9	b	2.8	b	2.1	U
ALUMINUM	3	50	UG/L	67.4	b	31	UJ	31	UJ	31	UJ	31	U
ARSENIC	2	50	UG/L	1	b	0.7	b	0.8	b	1	b	0.7	U
BARIUM	2	2000	UG/L	26.5	b	26.5	b	26.3	b	37.9	b	21.2	b
CALCIUM	NA	NA	UG/L	102000		113000		114000		112000		94900	
CADMIUM	2	5	UG/L	2.1	U	3.6	b	3.7	b	2.5	b	3.4	b
COBALT	NA	NA	UG/L	5.8	U	9.3	b	5.8	U	5.8	U	7.4	UJ
CHROMIUM	1	50	UG/L	3.7	U	5.2	b	4.2	b	5	b	4	b
COPPER	2	1300	UG/L	1.2	b	2.1	b	0.9	U	0.9	U	1.2	J
IRON	3	300	UG/L	4.5	U	71.5	b	75.6	b	6.8	U	73	b
POTASSIUM	NA	NA	UG/L	2510	b	3630	b	3660	b	4240	b	3110	b
MAGNESIUM	NA	NA	UG/L	31300		35500		35500		38100		28800	
MANGANESE	3	50	UG/L	8.7	b	73.7		77.4		152		65	
SODIUM	NA	NA	UG/L	71100		83700		82400		74500		54000	
NICKEL	NA	NA	UG/L	40.8	J	167		172		116		178	
ANTIMONY	NA	NA	UG/L	13.2	b	20.2	b	12.1	U	19.4	b	19.6	b
SELENIUM	1	10	UG/L	36.6		21.6		21.8		22.2		16	b
VANADIUM	NA	NA	UG/L	13.8	b	9.9	b	9.9	b	8.1	b	10.1	b
ZINC	2	5000	UG/L	31.3		2.2	UJ	2.2	UJ	20.4		125	
VOLATILE ORGANIC COMPOUNDS													
TRICHLOROETHYLENE	2	5	UG/L	1	U	0.6	J	0.6	J	0.8	J	1	U
4-METHYL-2-PENTANONE	NA	NA	UG/L	2	U	2	U	0.6	J	2	U	2	U
TETRACHLOROETHENE	2	5	UG/L	1		1	U	1	U	1	U	1	
GROSS ALPHA AND BETA													
GROSS ALPHA	2	15	PC/L	-		12.8		0.8		-		-	
GROSS BETA	2	50	PC/L	-		15.9		5.8		-		-	

(a) A definition of each data validation flag (DVF) is provided in Table B-1.

(b) Regulatory Codes are:

- 1 = California MCL
- 2 = EPA primary MCL
- 3 = EPA secondary MCL
- 4 = California DTSC Action Level

(c) The given concentration represents the California MCL, the EPA primary MCL, the EPA secondary MCL, or the California DTSC Action Level, whichever is most stringent.

**Table B19-7
 Site 19 (OU-3): Analyte Concentrations in Groundwater
 Exceeding Regulatory Standards or DTSC^a Action Levels
 MCAS El Toro Phase I RI Technical Memorandum**

Well Identification	SI (ft bgs) ^b	Analyte	Units	Concentration	Regulatory Level ^c	Regulatory Code ^d
19_UGMW35	(148-185)	Manganese	µg/L	65	50	3
		Selenium	µg/L	16	10	2
		Total Dissolved Solids	mg/L	650	500	3
19_DGMW85	(143-183)	Nitrate/Nitrite-N	mg/L	12.8	10	2
		Total Dissolved Solids	mg/L	823	500	3
		Manganese	µg/L	77.4	50	3
		Selenium	µg/L	21.8	10	2
19_DBMW54	(141-181)	Nitrate/Nitrite-N	mg/L	12.2	10	2
		Total Dissolved Solids	mg/L	763	500	3
		Aluminum	µg/L	67.4	50	3
		Selenium	µg/L	36.6	10	2
19_DGMW86	(158-198)	Nitrate/Nitrite-N	mg/L	11.9	10	2
		Total Dissolved Solids	mg/L	729	500	3
		Manganese	µg/L	152	50	3
		Selenium	µg/L	22.2	10	2

Table B19-7
Site 19 (OU-3): Analyte Concentrations in Groundwater
Exceeding Regulatory Standards or DTSC^a Action Levels
MCAS El Toro Phase I RI Technical Memorandum

Well Identification	SI (ft bgs) ^b	Analyte	Units	Concentration	Regulatory Level ^c	Regulatory Code ^d								
<p>^aCalifornia Department of Toxic Substances Control</p> <p>^bScreen interval (feet below ground surface)</p> <p>^cThe most stringent federal/state drinking water standard was applied. In the presence of both an EPA MCL and a California MCL, the most stringent MCL is represented. If neither an EPA or California MCL is listed, the California DTSC action level was applied.</p> <p>^dRegulatory Code:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 20%;">1=EPA Primary MCL:</td> <td>Federally enforceable drinking water standard established for the health effects of contaminants</td> </tr> <tr> <td>2=California MCL:</td> <td>Health-based drinking water standard enforceable at the state level</td> </tr> <tr> <td>3=EPA Secondary MCL:</td> <td>Nonenforceable standard based on aesthetic qualities of taste, color, and odor (Includes chloride, iron, manganese, sulfate, and TDS)</td> </tr> <tr> <td>4=DTSC Action Level:</td> <td>Nonenforceable levels at which DTSC strongly urges water purveyors to take corrective action to reduce the level of contamination in the water they supply (Action levels cease to exist when state MCLs are promulgated.)</td> </tr> </table>							1=EPA Primary MCL:	Federally enforceable drinking water standard established for the health effects of contaminants	2=California MCL:	Health-based drinking water standard enforceable at the state level	3=EPA Secondary MCL:	Nonenforceable standard based on aesthetic qualities of taste, color, and odor (Includes chloride, iron, manganese, sulfate, and TDS)	4=DTSC Action Level:	Nonenforceable levels at which DTSC strongly urges water purveyors to take corrective action to reduce the level of contamination in the water they supply (Action levels cease to exist when state MCLs are promulgated.)
1=EPA Primary MCL:	Federally enforceable drinking water standard established for the health effects of contaminants													
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3=EPA Secondary MCL:	Nonenforceable standard based on aesthetic qualities of taste, color, and odor (Includes chloride, iron, manganese, sulfate, and TDS)													
4=DTSC Action Level:	Nonenforceable levels at which DTSC strongly urges water purveyors to take corrective action to reduce the level of contamination in the water they supply (Action levels cease to exist when state MCLs are promulgated.)													

Appendix B20

**Nature and Extent of Contamination:
Site 20 (OU-3) – Hobby Shop**

Appendix B20
NATURE AND EXTENT OF CONTAMINATION:
SITE 20 (OU-3) - HOBBY SHOP

This discussion of Site 20 is supplemented by the figures and data tables listed below. The figures begin on page B20-3, and the tables are grouped at the end of this Appendix B20. Field headspace values for soils at this site are presented in Table BA1-20, in Attachment 1 to Appendix B (directly following Appendix B22).

- Figure B20-1: (Site Map)
- Figure B20-2: Geologic Cross Section

- Table B20-1: Types of Samples and Chemical Analyses
- Table B20-2: Summary of Detected Chemicals in Sediments and Surface/Near-Surface Soil
- Table B20-3: Summary of Detected Chemicals in Vadose Zone (Subsurface) Samples
- Table B20-4: Well Construction Details
- Table B20-5: Summary of Hydraulic Parameters
- Table B20-6: Summary of Detected Chemicals in Groundwater Samples
- Table B20-7: Analyte Concentrations in Groundwater Exceeding Regulatory Standards or DTSC Action Levels

B.20.1 Site Description

The Hobby Shop is in Building 626, a compound near the intersection of North Ninth Street and West Marine Way in the north part of MCAS El Toro. The structure has a U-shaped roof with the base of the U at the northern side. The east leg is an enclosed building; the west leg and the base are not walled.

Military personnel have used the compound as an auto shop to service and repair their privately owned vehicles. A 600-gallon waste oil tank is underground about 10 feet from the northwest side of the building. The shop has three oil-water separators; their oil is emptied periodically by a private contractor. Water drains from the separators into the (black-stained) ditch that runs along Ninth Street. The shop also has three 50-gallon solvent parts cleaning tanks. Sludge from these tanks is transferred to the oil water separators, and waste solvent is moved to storage drums.

Before 1976, kerosene was used to wash down the asphalt pavement in the compound. Washing is now done with biodegradable soap, which is drained into the oil-water separators. The EPA has expressed concern that the kerosene washdown may have released organic compounds and mobilized heavy metals.

For surface and near-surface soil, Site 20 has been divided into four strata, based on historical use and suspect areas noted in aerial photographs:

- Stratum 1: The drainage ditch on the east
- Stratum 2: The drainage ditch on the south
- Stratum 3: The stained area west of the building
- Stratum 4: The courtyard and front slope

B20.2 Suspected Waste Types and Contaminants

Wastes potentially causing contamination are kerosene solvent from the parts cleaning and lubricating oil, which may contain heavy metals.

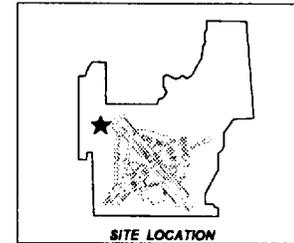
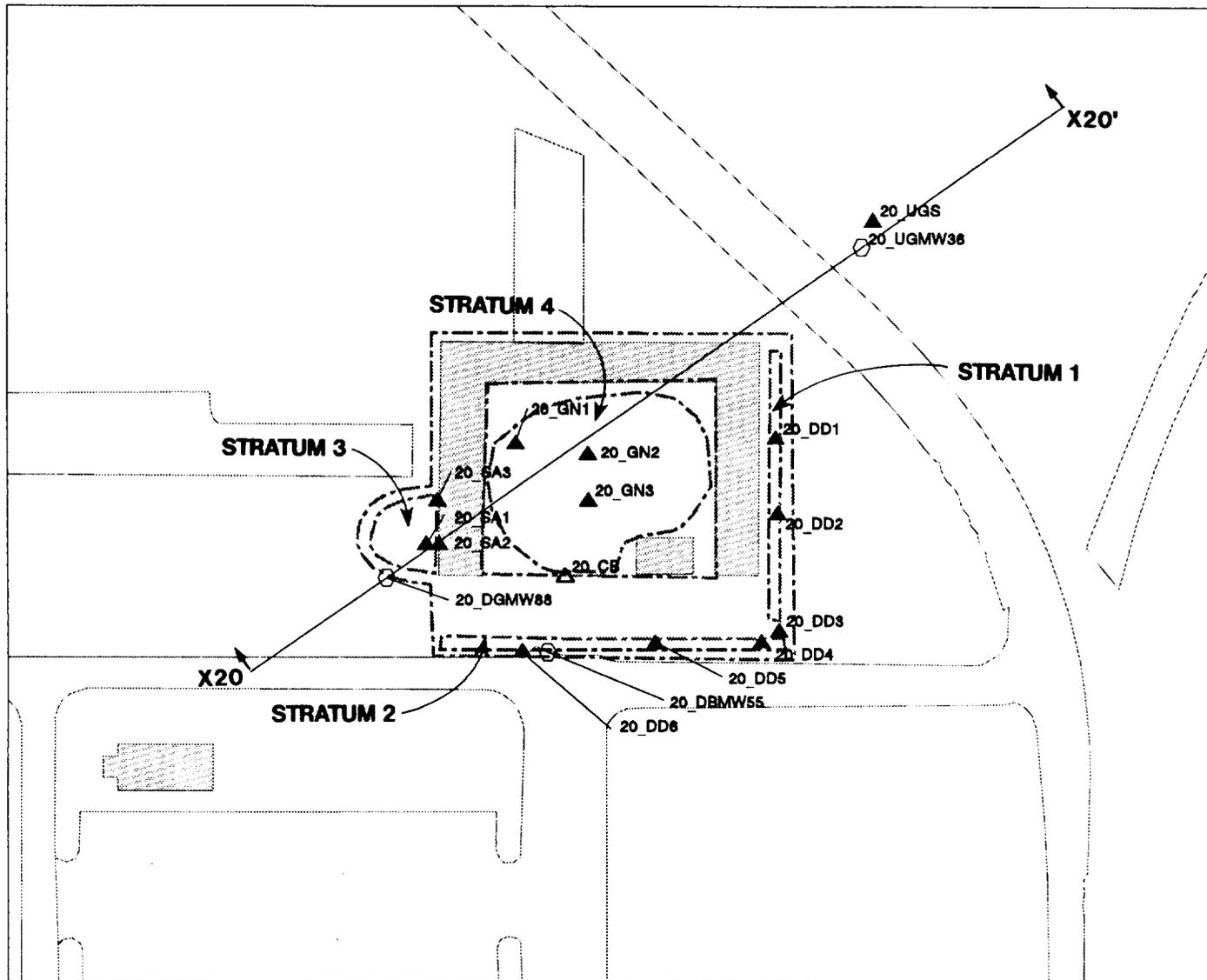
B20.3 Field Investigation

Field investigations consisted of:

- Collecting 38 surface and shallow soil samples
- Collecting 13 subsurface (vadose zone) soil samples
- Installing and sampling three monitoring wells.

The locations of soil samples and monitoring wells are shown in Figure B20-1.

A deviation from the *SAP* and *SAP Amendment* was the relocation of one monitoring well. From new water level information recently completed at other sites, the groundwater flow was determined to be to the northwest (rather than west, as had been estimated in the *SAP*), so the location of the upgradient well (20_UGMW36) was moved east about 75 feet across Marine Way.



FEATURES:

- BUILDING OR PAD
- MONITORING WELL
- DEEP, 25-FOOT, OR ANGLE BORING
- SEDIMENT SAMPLE
- SURFACE WATER AND SEDIMENT SAMPLE
- SURFACE AND NEAR-SURFACE SOIL SAMPLE
- ROAD
- STRATUM BOUNDARY
- WASH OR STREAM
- LINE OF GEOLOGIC CROSS-SECTION
- END OF LINE OF CROSS-SECTION
- LINE OF CROSS-SECTION EXTENDS BEYOND AREA SHOWN

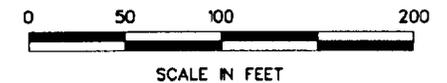


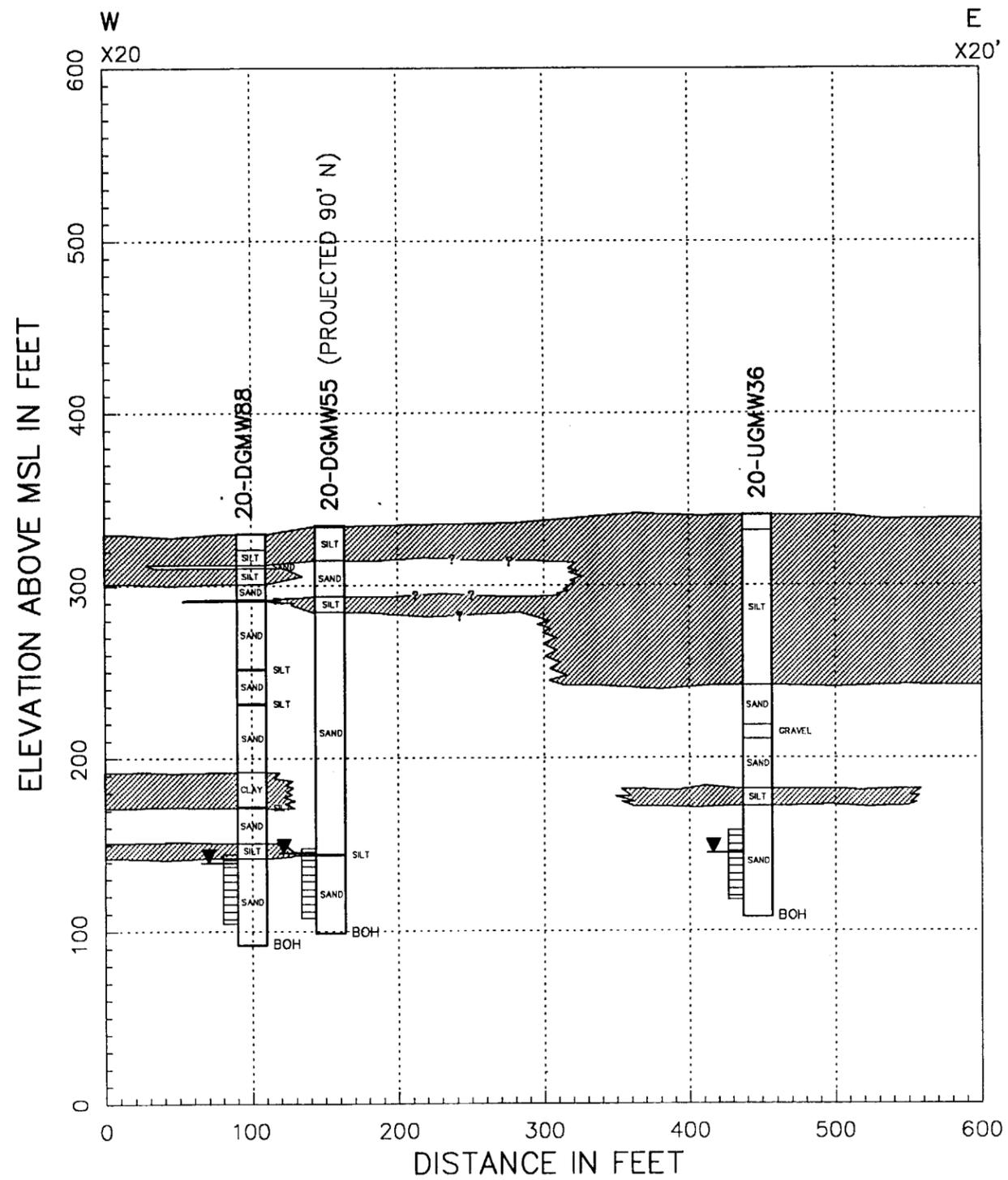
FIGURE B20-1

SITE 20 (OU-3): HOBBY SHOP

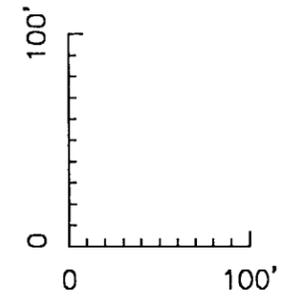
MCAS EL TORO PHASE I RI TECHNICAL MEMORANDUM

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HORIZ. SCALE: 1"=100'
 VERT. SCALE: 20% EXAGGERATION



LEGEND

-  UNCONSOLIDATED PERMEABLE SEDIMENTS
-  UNCONSOLIDATED LOW-PERMEABILITY SEDIMENTS
-  BOTTOM OF HOLE
-  WELL SCREEN INTERVAL
-  WATER LEVEL ELEVATION, DECEMBER 1992

FIGURE B20-2
 SITE 20 (OU-3)
 GEOLOGIC CROSS SECTION X20-X20'
 MCAS EL TORO PHASE I RI
 TECHNICAL MEMORANDUM

PAGE NUMBER B20-10

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Every sample was initially tested in the field using the headspace technique for VOCs with an HNu photo-ionization detector or a flame ionization detector (OVA). The field-recorded values from this testing are in Attachment 1 to Appendix B.

B20.3.1 Surface Water and Sediments

(Surface water and sediment samples were not collected.)

B20.3.2 Surface and Near-Surface Soils

Surface and near-surface soil samples were collected at 13 locations in four strata plus the upgradient area. A summary of the samples collected follows:

- Upgradient Area: Two samples were collected from one location at 0 and 2 feet.
- Stratum 1 (East Drainage Area): Nine samples were collected from three locations at 0, 2, and 4 feet.
- Stratum 2 (South Drainage Area): Nine samples were collected from three locations at 0, 2, and 4 feet.
- Stratum 3 (Stained Area). Nine samples were collected from three locations at 0, 2, and 4 feet.
- Stratum 4 (Courtyard and Front Slope): Eight samples were collected, two each from two locations, at 0, 2 feet, three from one location, at 0, 2, and 4 feet, and one at 0 feet in the catch basin.

Samples were not collected at 4 feet unless a positive HNu value had been obtained at 2 feet deep.

B20.3.3 Vadose Zone Soils

Thirteen vadose zone soil samples were collected in the three monitoring well borings. Nine samples were collected from 19_DBMW55, at 5, 10, 15, 20, 25, 50, 100, 170, and 190 feet; and two samples each in 19_UGMW36 and 19_DGMW88, one within 30 feet of the water table and one in the screen internal zone.

B20.3.4 Groundwater Monitoring Wells

Three monitoring wells were constructed: one upgradient, one downgradient, and one deep boring completed as a monitoring well. Each well was screened in the shallowest water bearing zone; Table B20-4 presents the well construction details. One groundwater sample was collected from each well. One slug test was performed at Well 20_DGMW88; results are discussed in Section B20.7. The data from all aquifer tests are presented in Appendix F.

Section B20.7 discusses Site 20 hydrogeology and analytical results of the groundwater samples.

B20.4 Surface Water and Sediments

(Surface water and sediment samples were not collected.)

B20.5 Surface and Near-Surface Soils

B20.5.1 Description of Surface and Near-Surface Soils

The surface soils at Site 20 are classified as San Emigdio fine sandy loam, 2 to 9 percent slopes. The permeability for this series ranges from 2.0 to 6.0 in/hr. The available water holding capacity is listed as 7.0 to 9.0 inches, and the available water capacity is 0.12 to 0.17 in/in. (Wachtell, 1978).

B20.5.2 Analytical Results and Soil Vapor Headspace Values

Table B20-2 presents the analytical results for the surface and near-surface soils, which are discussed in the following subsections. Surface soils and lithologic samples from the borings were evaluated in the field for organic vapors using an HNu photo-ionization detector or a flame ionization detector OVA. The results of the field headspace analyses are provided in Attachment 1 to Appendix B.

B20.5.2.1 Upgradient Area

The shallow soil sample from the upgradient monitoring well was analyzed only for metals, TFH, and TRPH. Metals results are presented in Table 20-2. A high level of TFH-diesel (16.2 mg/kg) and a low level of TFH-gasoline (0.148 mg/kg and 0.092 mg/kg) were detected from 0 and 2 feet, respectively.

Field screening using soil vapor headspace found no detections in either the surface or the 2-foot sample.

B20.5.2.2 Stratum 1: East Drainage

Three locations were sampled in Stratum 1. Toluene was found below CRDL and so is an estimate. TFH-gasoline was detected at each location, with a maximum concentration of 0.16 mg/kg.

Field screening using soil vapor headspace (Attachment 1 to Appendix B) found sporadic detections, with a maximum value of 2.0 ppm.

Based on the results of these samples, hydrocarbon contamination exists directly east and adjacent to the Hobby Shop. The contamination found is at very low levels, and well below the California LUFT Action Level of 1,000 mg/kg.

B20.5.2.3 Stratum 2: South Drainage

Three locations were sampled in Stratum 2. Acetone, toluene, 2-butanone, and 2-hexanone were detected below CRDLs or at trace levels. 2-Butanone and acetone are demonstrated laboratory contaminants; their maximum detected concentrations in the trip blanks were 33 and 37 $\mu\text{g/L}$, respectively.

At one station (20_DD6), SVOCs, benzo(ghi)perylene, and pyrene were found below CRDLs in the surface sample. Bis(2-ethylhexyl)phthalate was found at this

same location in both the surface and the 2-foot sample. No SVOCs were found at the other two locations.

At all three stations, pesticides and PCBs were detected below the CRDLs.

Petroleum hydrocarbon contamination (TFH-diesel or TFH-gasoline) was detected at each station in minor amounts (Table B20-2). All TFH-gasoline results were less than 1.0 mg/kg, and the TFH-diesel maximum concentration was 59.8 mg/kg.

Station 20_DD4 was analyzed for pesticides, PCBs, dioxins, furans, and herbicides; none were found above CRDLs. Results of metals are presented in Table 20-2.

Metals concentrations are listed in Table 20-2. Field screening using soil vapor headspace (Attachment 1 to Appendix B) yielded sporadic detections, with a maximum value of 2.0 ppm. Based on these results, petroleum hydrocarbons appear to be the primary contaminant in Stratum 2. SVOCs were found at only one station, and only bis(2-ethylhexyl)phthalate was detected above CRDL.

B20.5.2.4 Stratum 3: Stained Area West of Building

Three locations were sampled in Stratum 3. VOCs, carbon tetrachloride, methylene chloride, and toluene were detected below CRDLs in various samples. Methylene chloride is a demonstrated laboratory contaminant; the maximum detected concentration in the trip blanks was 42 µg/L.

At one station (20_SA1), two SVOCs were found: benzo(a)pyrene at the surface and benzo(ghi)perylene in each sample down to 4 feet. Bis(2-ethylhexyl)phthalate, a common oratory artifact, was found at the surface at Station 20_SA2.

Stratum 3 samples were not analyzed for PCBs, herbicides, dioxins, or furans.

TFH-diesel was detected in each sample but was below the CRDL. TFH-gasoline results were all below 10 mg/kg. TRPH was found at Stations 20_SAI and 20-SA2, with values ranging from nondetects to 12,572 mg/kg.

Metals concentrations are presented in Table B20-2.

Field screening using soil vapor headspace (Attachment 1 to Appendix B) found sporadic detections, with a maximum value of 3.0 ppm.

B20.5.2.5 Stratum 4: Courtyard and Front Slope

Four locations were sampled in Stratum 4. Toluene was detected in 20_GN1 and 20_GN3 below CRDLs, and is probably related to a oratory artifact or sampling error. At 20_GN2, 2-butanone and xylene (total) were detected in the surface sample at 8 $\mu\text{g}/\text{kg}$ and 6 $\mu\text{g}/\text{kg}$, respectively. 2-Butanone is a demonstrated laboratory contaminant; the maximum detected concentration in the trip blanks was 33 $\mu\text{g}/\text{L}$. At 20_CB, acetone was detected at 98 $\mu\text{g}/\text{kg}$ in the surface sample. Acetone is also a demonstrated laboratory contaminant; the maximum detected concentration in the trip blanks was 37 $\mu\text{g}/\text{L}$.

At 20_GN2, 20_GN3, and 20_CB, SVOCs were found, but below the CRDLs.

All locations except 20_CB were analyzed for pesticides and PCBs, and none were detected.

Petroleum hydrocarbon contamination (TFH-diesel, TFH-gasoline, or TRPH) was found at each station. TFH-diesel concentrations ranged from 29.2 to 16,700 mg/kg, with the maximum concentration found at 2 feet at 20_GN3.

Metals concentrations are listed in Table 20-2.

Field screening using soil vapor headspace (Attachment 1 to Appendix B) ranged from nondetects to a maximum of 27 ppm. The maximum reading was from the

surface sample at 20_GN2, which corresponds to high VOCs found in the oratory analysis.

Based on the results of these samples, Stratum 4 surface and shallow soils were found to be contaminated by VOCs, SVOCs, hydrocarbons, and metals. It appears that the heaviest contamination is limited to the first 2 feet.

B20.6 Vadose Zone Soils

B20.6.1 Description of Subsurface Soil Samples

Vadose zone soil samples were collected at three locations within Site 20. These locations and the depths at which samples were collected are:

- Upgradient monitoring well (20_UGMW36), 100 and 210 feet
- Site monitoring well (20_DBMW55), 5, 10, 15, 20, 25, 50, 100, 170, and 190 feet
- Downgradient well (20_DGMW88), 107 and 192 feet

B20.6.2 Subsurface Geology

The lithology (based on the boring logs, Appendix K) consists of lenses of clay, silt, sandy silt, silty sand, and sand. The aerial geology includes holocene alluvium and colluvium overlying bedrock Pleistocene sediments. The geology at Site 20 primarily consists of alluvial materials. Detailed geologic discussions are presented in Section 1.5 of this report. Structural geology of the overall MCAS El Toro site is discussed in Section 3.

A geologic cross section (Figure B20-2) was constructed on the basis of lithologic logs from the three borings at Site 20.

B20.6.3 Analytical Results

Table B20-3 summarizes the results of chemical analyses.

Volatile Organic Compounds (VOCs). VOCs were detected at each boring at trace levels or below CRDLs; these results are probably related to oratory artifacts or sampling error.

Semivolatile Organic Compounds (SVOCs). No SVOCs were detected.

Pesticides, Polychlorinated Biphenyls (PCBs), and Herbicides. Pesticides were not detected at 19_UGMW36 (the only vadose zone sample tested). (Samples were not analyzed for herbicides and PCBs).

Metals. Metal concentrations are presented in Table B20-3.

Total Organic Carbon (TOC). TOC was analyzed from samples collected at the well screen depth in 19_UGMW36 and 19_DGMW88; the values were <100 mg/kg and 122 mg/kg, respectively.

In summary, the vadose zone soils do not show major contamination, except for the minor TRPH detection (18 mg/kg) at 5 feet in Boring 20_DBMW55.

B20.6.4 Soil Vapor Headspace Concentrations

Soil vapor headspace values (of Attachment 1 to Appendix B) are generally low, and coincide with the low values of detected VOCs and SVOCs.

B20.7 Groundwater

B20.7.1 Site Hydrogeology

Three monitoring wells were installed:

- Upgradient well (20_UGMW36)
- Monitoring well (20-DBMW55)
- Downgradient well (20_DGMW88)

Table B20-4 summarizes the well construction details and survey elevations. Depth to groundwater is about 200 feet. Groundwater flow direction, as shown in Figure 3-4a, b, and c, is northwest. The groundwater gradient calculated at Site 20 is 0.003 ft/ft. Slug testing was performed at 20_DGMW88; results are shown in Table B20-5. The calculated value of transmissivity is 11 feet²/day, and the hydraulic conductivity is 0.29 feet/day. Using a conservative assumption of 0.3 for porosity, the calculated average groundwater velocity is 0.003 feet/day.

B20.7.2 Analytical Results

Hydrocarbons (TRPH, TFH). No TRPH, TPH-diesel, or TFH-gasoline was detected.

Volatile Organic Compounds (VOCs). Methyl chloride was detected at 19_UGMW36 and 19_DGMW 88 at 0.9 and 0.5 µg/L, respectively, (below CRDLs), and is probably related to a oratory artifact or sampling error. Methylene chloride is a demonstrated laboratory contaminant; the maximum detected concentration in the trip blanks was 42 µg/L. Trichloroethylene (TCE) was detected at 0.5 µg/L (below CRDL) in groundwater at 19_DBMW55.

Semivolatile Organic Compounds (SVOCs). No SVOCs were detected.

Pesticides, Polychlorinated Biphenyls (PCBs), and Herbicides. No pesticides, PCBs, or herbicides were detected.

Metals and Cyanide. As discussed above, natural groundwater quality varies widely across the MCAS El Toro Site. The metal values shown on Table 20-6 are most likely representative of background conditions. Cyanide was not detected.

Gross Alpha and Beta Particle Activity. Samples were not analyzed for gross alpha and beta particle activity.

General Chemistry. The groundwater facies change dramatically across MCAS El Toro. At this site, differences can be seen in TDS, nitrate, sulfate and chloride between the upgradient well, the deep boring/well, and the downgradient well (Table B20-6). These differences are most likely the result of natural variations. Appendix A provides a more complete discussion of the general inorganic groundwater chemistry. It is believed that Site 20 has had no impact on inorganic water quality parameters.

B20.7.3 Comparison with Drinking Water Standards

Table B20-7 presents analyte concentrations in groundwater that exceed regulatory standards or action levels. It is believed that the inorganic results represent background conditions and are not site-related. No VOCs or SVOCs were detected that exceeded regulatory limits for drinking water. TCE was detected at a trace level (0.5 µg/L), but below the regulatory limit.

In summary, no hydrocarbon or organic contamination was found above CRDLs. Naturally occurring inorganics did exceed certain regulatory standards, but it is believed that inorganic results represent background conditions at the MCAS El Toro site, and that Site 20 has had no effect on groundwater beneath the site.

B20.8 Potential Contaminant Migration Pathways

Two potential contaminant migration pathways exist at Site 20, the erosion and subsequent transport of surface soils to surface water drainages, and leaching of contaminants by precipitation and possible migration to the groundwater.

Based on the results of surface soil samples collected in Stratum 1 and 2 (Drainage Ditches), it appears that hydrocarbon-contaminated soils may have been eroded and deposited in the ditches.

Depth to groundwater is approximately 200 feet. To date, no contamination has been detected in groundwater beneath the Hobby Shop or downgradient of the site. It is most likely that the hydrocarbon contamination in the soils would tend to sorb onto the soil matrix in the 200-foot vadose zone. However, it is possible that leaching of the soils may eventually transport hydrocarbon contaminants to the groundwater.

B20.9 Summary and Conclusions

Results of the field investigations found primarily hydrocarbon contamination in the surface and near-surface soils within Stratum 4 (the courtyard and front slope). TFH-gasoline was detected only once, at 423 mg/kg. However, TFH-diesel was detected in all samples, and ranged from 30 to 16,700 mg/kg. TRPH values ranged from 308 to 416 mg/kg. Minor amounts of 2-butanone and xylene (total) were detected, at 8.0 mg/kg and 6.0 mg/kg, respectively. However, 2-butanone is a demonstrated laboratory contaminant; the maximum detected concentration in the trip blanks was 33 µg/L. Based on these sampling results, contamination appears to be limited to the first 2 feet of soils and is most likely confined to the courtyard.

Soil sampling results from Stratum 3 (the stained area west of the building) also suggest contamination from hydrocarbons, as well as metals and SVOCs. TRPH values were as high as 12,572 mg/kg. Lead, zinc, and mercury exceeded background concentrations. Two SVOCs were also detected (benzo(a)pyrene and benzoperylene). The vertical extent of contamination is most probably limited to the first several feet of soil, and the horizontal extent is probably limited to the immediate vicinity around the stained soil.

Soil samples from Strata 1 and 2 and the upgradient location were all well below California LUFT action levels for hydrocarbons. No additional contaminants were detected in any of the samples. Vadose zone soil samples are essentially clean, with a very minor single detection of TRPH (18 mg/kg) at 5 feet in the boring adjacent to the site.

Groundwater sampling found that inorganics exceed certain regulatory standards; it is believed that these inorganics are naturally occurring and so represent background conditions. No hydrocarbon or organic contamination was found. It does not appear

that soil contamination at Site 20 is contributing to groundwater contamination at MCAS El Toro.

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**Table B20-1
Site 20 (OU-3): Types of Samples and Chemical Analyses
MCAS El Toro Phase I RI Technical Memorandum**

Location/ Stratum	Station Identifi- cation	Sample Identifi- cation	Sample Depth (ft)	Groups of Analytes Requested ^a										
				VOCs	Semi- VOCs	Pest- icides/ PCBs	Herbi- cides	TPH	TFH	Metals	CN	Geni. Chem- istry	TOC	Dioxins/ Furans
Surface Water and Sediments (Not sampled)														
Surface and Near-Surface Soils														
UG	20_UG	S1454359	0					X	X	X				
		S1454360	2					X	X	X				
1	20_DD1	S1454362	0	X	X			X	X	X				
		S1454364	2	X	X			X	X	X				
		S1454365	4	X	X			X	X	X				
1	20_DD2	S1454354	0	X	X			X	X	X				
		S1454358	2	X	X			X	X	X				
		S1454357	4	X	X			X	X	X				
1	20_DD3	S1454352	0	X	X			X	X	X				
		S1454353	2	X	X			X	X	X				
		S1454357	4	X	X			X	X	X				
2	20_DD4	S1454511 ^b	0	X	X	X		X	X	X				
		S1454170	0	X	X	X		X	X	X				
		S1454171	2	X	X	X		X	X	X				
		S1454526	4	X	X	X		X	X	X				
2	20_DD5	S1454184	0	X	X	X		X	X	X				
		S1454193	2	X	X	X		X	X	X				
		S1454211	4	X	X	X		X	X	X				
2	20_DD6	S1454212	0	X	X	X		X	X	X				
		S1454215	2	X	X	X		X	X	X				
		S1454254	4	X	X	X		X	X	X				
3	20_SA1	S1454345	0	X	X			X	X	X				
		S1454350	2	X	X			X	X	X				
		S1454355	4	X	X			X	X	X				
3	20_SA2	S1454348	0	X	X			X	X	X				
		S1454349	2	X	X			X	X	X				
		S1454351	4	X	X			X	X	X				
3	20_SA3	S1454346	0	X	X			X	X	X				
		S1454347	2	X	X			X	X	X				
		S1454361	4	X	X			X	X	X				
4	20_GN1	S1454449	0	X	X	X		X	X	X				
		S1454255	2	X	X	X		X	X	X				
4	20_GN2	S1454257	0	X	X	X		X	X	X				
		S1454258	2	X	X	X		X	X	X				
4	20_GN3	S1454578 ^b	0	X	X	X		X	X	X				
		S1454260	0	X	X	X		X	X	X				
		S1454261	2	X	X	X		X	X	X				
		S1454264	4	X	X	X		X	X	X				
4	20_CB	S1451032	0	X	X			X	X	X				

**Table B20-1
Site 20 (OU-3): Types of Samples and Chemical Analyses
MCAS El Toro Phase I RI Technical Memorandum**

Location/ Stratum	Station Identifi- cation	Sample Identifi- cation	Sample Depth (ft)	Groups of Analytes Requested ^a											
				VOCs	Semi- VOCs	Pesti- cides/ PCBs	Herbi- cides	TPH	TFH	Metals	CN	Genl. Chem- istry	TOC	Dioxins/ Furans	Gross Alpha/ Beta
Vadose Zone Soils															
UG	20_UGMW36	S1456327	100	X	X			X	X	X					
		S1456331	210	X	X								X		
	20_DBMW55	S1456428	5	X	X			X	X	X					
		S1456332	10	X	X			X	X	X					
		S1456334 ^b	10	X	X			X	X	X					
		S1456336	15	X	X			X	X	X					
		S1456337	20	X	X			X	X	X					
		S1456339	25	X	X			X	X	X					
		S1456340	50	X	X			X	X	X					
		S1456425	100	X	X			X	X	X					
		S1456426	170	X	X			X	X	X					
S1456427	190	X	X												
DG	20_DGMW88	S145634001	107	X	X			X	X	X					
		S145633201	192	X	X										
Groundwater															
UG	20_UGMW36	S1452125		X	X	X		X	X	X	X	X	X		
		S1452121		X	X	X									
	20_DBMW55	S1452118		X	X	X		X	X	X	X	X	X		
DG	20_DGMW88	S1452119		X	X	X		X	X	X	X	X	X		
		S1452123		X	X	X									
^a VOCs = Volatile Organic Compounds; Semi-VOCs = Semivolatile Organic Compounds; PCBs = Polychlorinated Biphenyls; TPH = Total Recoverable Petroleum Hydrocarbons; TFH = Total Fuel Hydrocarbons; CN = Total Cyanide; TOC = Total Organic Carbon.															
^b Duplicate															

Table B20-2

Site#20 (OU- 3): Summary of Detected Chemicals in Sediments and Surface/Near-Surface Soil

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	20_CB S1451032 (0)	DVF(a)	20_DD1 S1454362 (0)	DVF(a)	20_DD1 S1454364 (2)	DVF(a)	20_DD1 S1454365 (4)	DVF(a)	20_DD2 S1454364 (0)	DVF(a)	20_DD2 S1454357 (2)	DVF(a)	20_DD2 S1454358 (4)	DVF(a)	20_DD3 S1454352 (0)	DVF(a)
METALS																	
SILVER	MG/KG	0.43	U	0.43	U	0.45	U	0.49	U	0.43	U	0.45	U	0.49	U	0.44	U
ALUMINIUM	MG/KG	6880		6340		6910		18800		7380		6590		12500		10200	
ARSENIC	MG/KG	7.1		3		2.2		5.6		3.3		2.4		4.3		3.4	
BARIUM	MG/KG	300		130		114		195		125		111		159		153	
BERYLLIUM	MG/KG	0.13	U	0.19	U	0.32	U	0.85	U	0.3	U	0.32	U	0.58	U	0.48	U
CALCIUM	MG/KG	25400		7490		6830		14000		8920		7620		11200		9000	
CADMIUM	MG/KG	18.8		1.4		1.3		2.7		1.6		1.4		2.4		2	
COBALT	MG/KG	6.2	b	3.6	b	4.5	b	8.7	b	4.9	b	5	b	7.3	b	6.7	b
CHROMIUM	MG/KG	98.8		10.8		7.7		21.8		10.2		7.9		15.1		12.7	
COPPER	MG/KG	228		9.9		6.7		13.3		8.1		6.6		11.5		11.1	
IRON	MG/KG	42400		10700		11400		23500		12000		10300		18600		16200	
MERCURY	MG/KG	0.1	U	0.12		0.23		0.1	U	0.08	U	0.19		0.06	U	0.2	
POTASSIUM	MG/KG	2380		2980		3150		5600		3660		3350		4620		5090	
MAGNESIUM	MG/KG	5360		4100		4710		10300		5000		4560		7920		6650	
MANGANESE	MG/KG	355		179		211		335		224		223		303		281	
SODIUM	MG/KG	1150		225	b	192	b	320	b	212	b	238	b	588	b	282	b
NICKEL	MG/KG	55.3		6.7	b	7.9	b	14.6		8.5		7.1	b	14.8		9.8	
LEAD	MG/KG	800		2		2.2		3.9		4.4		2.1		3.2		9.6	
ANTIMONY	MG/KG	5.1	b	2.5	U	2.6	U	2.8	b	2.5	U	2.6	U	2.8	U	2.5	U
SELENIUM	MG/KG	0.34	b	0.1	U	0.11	U	0.12	U	0.1	U	0.11	U	0.12	U	0.1	U
THALLIUM	MG/KG	0.14	U	0.25	b	0.19	b	0.26	b	0.27	b	0.17	b	0.32	b	0.19	b
VANADIUM	MG/KG	21.8		27.8		27.8		69.1		30.9		25.3		49.7		40.9	
ZINC	MG/KG	2070		51.6		36.7		70.5		64.9		39.4		62.1		67.1	
VOLATILE ORGANIC COMPOUNDS																	
TOLUENE	UG/KG	10	U	10	U	11	U	12	U	6	J	11	U	11	U	10	U
XYLENE (TOTAL)	UG/KG	10	U	10	U	11	U	12	U	10	U	11	U	11	U	10	U
CARBON TETRACHLORIDE	UG/KG	10	U	10	U	11	U	12	U	10	U	11	U	11	U	10	U
2-HEXANONE	UG/KG	10	U	10	U	11	U	12	U	10	U	11	U	11	U	10	U
ACETONE	UG/KG	98		31	U	31	U	30	U	32	U	11	U	30	U	10	U
METHYLENE CHLORIDE	UG/KG	44	B	10	U	22	U	24	U	10	U	19	U	22	U	10	U
2-BUTANONE	UG/KG	10	U	10	U	11	U	12	U	10	U	11	U	11	U	10	U
SEMI-VOLATILE ORGANIC COMPOUNDS																	
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	84000	J	680	U	700	U	780	U	680	U	710	U	760	U	680	U
PYRENE	UG/KG	1300	UJ	680	U	700	U	780	U	680	U	710	U	760	U	680	U
BENZO(GH)PERYLENE	UG/KG	1300	U	680	U	700	U	780	U	680	U	710	U	760	U	680	U
BENZO(A)PYRENE	UG/KG	1300	U	680	U	700	U	780	U	680	U	710	U	760	U	680	U
NAPHTHALENE	UG/KG	1300	U	680	U	700	U	780	U	680	U	710	U	760	U	680	U
2-METHYLNAPHTHALENE	UG/KG	1300	U	680	U	700	U	780	U	680	U	710	U	760	U	680	U
PESTICIDES AND PCBs																	
ENDOSULFAN SULFATE	UG/KG	-		-		-		-		-		-		-		-	
BHC-ALPHA	UG/KG	-		-		-		-		-		-		-		-	
BHC-DELTA	UG/KG	-		-		-		-		-		-		-		-	
4,4'-DDT	UG/KG	-		-		-		-		-		-		-		-	
GAMMA-CHLORDANE	UG/KG	-		-		-		-		-		-		-		-	
ENDRIN KETONE	UG/KG	-		-		-		-		-		-		-		-	
DIELDRIN	UG/KG	-		-		-		-		-		-		-		-	
ENDRIN	UG/KG	-		-		-		-		-		-		-		-	
4,4'-DDD	UG/KG	-		-		-		-		-		-		-		-	
4,4'-DDE	UG/KG	-		-		-		-		-		-		-		-	
ENDOSULFAN I	UG/KG	-		-		-		-		-		-		-		-	
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																	
TFH DIESEL	MG/KG	4830		12.8	UJ	13.1	UJ	14.5	UJ	12.8	UJ	13.4	UJ	14.2	UJ	12.9	UJ
TFH GASOLINE	MG/KG	0.083		0.135		0.147		0.059	U	0.159		0.054	U	0.058	U	0.142	
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																	
TRPH	MG/KG	35708		20	U	20	U	20	U	83		20	U	20	U	20	U

Table B20-2

Site20 (OU- 3): Summary of Detected Chemicals in Sediments and Surface/Near-Surface Soil

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	20_DD3 S1454353 (2)	DVF(a)	20_DD3 S1454356 (4)	DVF(a)	20_DD4 S1454170 (0)	DVF(a)	20_DD4 S1454526 (0)	DVF(a)	20_DD4 S1454171 (2)	DVF(a)	20_DD5 S1454184 (0)	DVF(a)	20_DD5 S1454193 (2)	DVF(a)	20_DD5 S1454509 (2)	DVF(a)
METALS																	
SILVER	MG/KG	0.48	U	0.49	U	0.42	U	-	-	0.49	U	0.42	U	0.46	U	0.47	U
ALUMINUM	MG/KG	12500		11900		2070		-	-	19900		3350		9710		16800	
ARSENIC	MG/KG	2.8		6		0.81	b	-	-	3.7		1.2	b	3		3.3	
BARIUM	MG/KG	139		166		31.7		-	-	173		87.5		155		162	
BERYLLIUM	MG/KG	0.41	U	0.64	U	0.17	U	-	-	0.59	U	0.46	U	0.48	b	0.63	U
CALCIUM	MG/KG	9550		12500		2920		-	-	14200		3210		10600		8910	
CADMIUM	MG/KG	1.3		2.6		0.3	b	-	-	1.7		3.2		1.7		1.9	
COBALT	MG/KG	6.4	b	6.6	b	1.8	b	-	-	9.2	b	1.6	b	4.7	b	6.2	b
CHROMIUM	MG/KG	13		15		2.5		-	-	16		10.4		11		16.8	
COPPER	MG/KG	8.8		12.7		2.3	b	-	-	10.6		57.7		8.7		9.3	
IRON	MG/KG	17200		19000		3340		-	-	23800		6620		14300		18600	
MERCURY	MG/KG	0.22		0.16		0.03	U	-	-	0.08	U	0.03	U	0.18		0.03	U
POTASSIUM	MG/KG	4410		4790		1010	b	-	-	6240		1410		4350		4730	
MAGNESIUM	MG/KG	7230		6290		1270		-	-	10000		1890		5880		7350	
MANGANESE	MG/KG	275		304		78.1		-	-	323		105		250		283	
SODIUM	MG/KG	221	b	301	b	149	b	-	-	288	b	222	b	969	b	922	b
NICKEL	MG/KG	7.8	b	13.9		3	U	-	-	12.3		5.5	U	7.8	U	11.8	
LEAD	MG/KG	2.5		4.2		3.1		-	-	3.2		145		6		4.1	
ANTIMONY	MG/KG	2.8	U	2.9	U	2.4	U	-	-	2.8	U	2.5	b	2.6	U	2.7	U
SELENIUM	MG/KG	0.11	U	0.12	U	0.16	b	-	-	0.12	b	0.21	b	0.19	b	0.24	b
THALLIUM	MG/KG	0.22	b	0.33	b	0.14	U	-	-	0.26	U	0.14	U	0.15	U	0.25	U
VANADIUM	MG/KG	42.8		50.3		8.4	b	-	-	55		12.9		34.8		54.3	
ZINC	MG/KG	52.1		62.9		15.8		-	-	66.2		217		50.2		52.3	
VOLATILE ORGANIC COMPOUNDS																	
TOLUENE	UG/KG	11	U	12	U	4	J	12	U	12	U	5	J	11	U	11	U
XYLENE (TOTAL)	UG/KG	11	U	12	U	10	U	12	U	12	U	10	U	11	U	11	U
CARBON TETRACHLORIDE	UG/KG	11	U	12	U	10	U	12	U	12	U	10	U	11	U	11	U
2-HEXANONE	UG/KG	11	U	12	U	10	U	12	U	12	U	13		11	U	11	U
ACETONE	UG/KG	11	U	12	U	13	U	16	U	12	U	16	U	11	U	11	U
METHYLENE CHLORIDE	UG/KG	11	U	12	U	17	U	43	U	16	U	21	U	13	U	14	U
2-BUTANONE	UG/KG	11	U	12	U	10	U	3	J	12	U	10	U	11	U	11	U
SEMI-VOLATILE ORGANIC COMPOUNDS																	
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	710	U	770	U	660	U	820	U	780	U	20000	U	710	U	720	U
PYRENE	UG/KG	710	U	770	U	660	U	820	U	780	U	20000	U	710	U	720	U
BENZO(GH)PERYLENE	UG/KG	710	U	770	U	660	U	820	U	780	U	20000	U	710	U	720	U
BENZO(A)PYRENE	UG/KG	710	U	770	U	660	U	820	U	780	U	20000	U	710	U	720	U
NAPHTHALENE	UG/KG	710	U	770	U	660	U	820	U	780	U	20000	U	710	U	720	U
2-METHYLNAPHTHALENE	UG/KG	710	U	770	U	660	U	820	U	780	U	20000	U	710	U	720	U
PESTICIDES AND PCBs																	
ENDOSULFAN SULFATE	UG/KG	-		-		3.3	UJ	4.06	UJ	3.79	UJ	3.33	UJ	3.56	UJ	3.83	UJ
BHC-ALPHA	UG/KG	-		-		1.7	UJ	2.09	UJ	1.95	UJ	1.72	UJ	1.83	UJ	1.87	UJ
BHC-DELTA	UG/KG	-		-		1.7	UJ	2.09	UJ	1.95	UJ	1.72	UJ	1.83	UJ	1.87	UJ
4,4'-DDT	UG/KG	-		-		47.5	J	4.06	UJ	3.79	UJ	5.26	J	3.56	UJ	3.83	UJ
GAMMA-CHLORDANE	UG/KG	-		-		1.7	UJ	2.09	UJ	1.95	UJ	1.72	UJ	1.83	UJ	1.87	UJ
ENDRIN KETONE	UG/KG	-		-		3.3	UJ	4.06	UJ	3.79	UJ	7.86	J	3.56	UJ	3.83	UJ
DIELDRIN	UG/KG	-		-		3.3	UJ	4.06	UJ	3.79	UJ	5	J	3.56	UJ	3.83	UJ
ENDRIN	UG/KG	-		-		3.3	UJ	4.06	UJ	3.79	UJ	4.21	J	3.56	UJ	3.83	UJ
4,4'-DDD	UG/KG	-		-		4.86	J	4.06	UJ	3.79	UJ	34	J	3.56	UJ	3.83	UJ
4,4'-DDE	UG/KG	-		-		76.1	J	4.06	UJ	3.79	UJ	31.7	J	3.56	UJ	3.83	UJ
ENDOSULFAN I	UG/KG	-		-		1.7	UJ	2.09	UJ	1.95	UJ	2.95	J	1.83	UJ	1.87	UJ
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																	
TFH DIESEL	MG/KG	13.5	UJ	14.6	UJ	12.5	U	15.3	U	14.3	U	31.5		13.4	U	13.7	U
TFH GASOLINE	MG/KG	0.054	U	0.073		0.235		0.053		0.089		0.301		0.054	U	0.055	U
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																	
TRPH	MG/KG	20	U	20	U	20	U	20	U	231		7046		20	U	20	U

Table B20-2

Site20 (OU- 3): Summary of Detected Chemicals in Sediments and Surface/Near-Surface Soil

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	20_DD6 S1464211 (4)	DVF(a)	20_DD6 S1464212 (0)	DVF(a)	20_DD6 S1464215 (2)	DVF(a)	20_DD6 S1464254 (4)	DVF(a)	20_GN1 S1464449 (0)	DVF(a)	20_GN1 S1464256 (2)	DVF(a)	20_GN2 S1464257 (0)	DVF(a)	20_GN2 S1464258 (2)	DVF(a)
METALS																	
SILVER	MG/KG	0.51	U	0.45	b	0.46	U	0.49	U	0.47	U	0.47	U	0.46	b	0.46	U
ALUMINIUM	MG/KG	19200		8470		9470		13700		4000		10400		3660		6240	
ARSENIC	MG/KG	6.6		2.1		3.4		5.6		2.1	b	2.5		3		3.2	
BARIUM	MG/KG	207		119		126		168		29.2	b	109		46.2	b	105	
BERYLLIUM	MG/KG	0.66	U	0.12	U	0.32	b	0.6	U	0.31	U	0.33	U	0.4	U	0.34	U
CALCIUM	MG/KG	16600		4700		7860		9230		1550		7300		5490		9910	
CADMIUM	MG/KG	3		5.2		1.6		2		0.49	b	1.3		1.2		1.2	
COBALT	MG/KG	6.2	b	4.8	b	4.8	b	6.7	b	42.9		3.6	b	49.4		3.5	b
CHROMIUM	MG/KG	21.4		25.9		11.3		14.8		5.5		11.2		20.2		6.9	
COPPER	MG/KG	13.9		55.2		7.9		10.3		6.9		7		16.2		4.8	b
IRON	MG/KG	24200		18000		12700		18900		7840		12600		8400		9490	
MERCURY	MG/KG	0.03	U	0.05	U	0.03	U										
POTASSIUM	MG/KG	5620		2580		3250		4510		858	b	3090		1200		2630	
MAGNESIUM	MG/KG	10100		3640		4830		7070		1520		5280		1810		4020	
MANGANESE	MG/KG	336		191		204		284		72.6		213		102		170	
SODIUM	MG/KG	1120	b	284	b	242	b	323	b	601	b	671	b	608	b	446	b
NICKEL	MG/KG	16.9		15.2		11.3		13.1		5.6	b	7.6	b	9.9		5.3	b
LEAD	MG/KG	4.5		334		5.8		3.1		3.4		1.6		34.3		1.5	
ANTIMONY	MG/KG	2.9	U	2.6	b	2.6	U	2.8	U	2.7	U	2.7	U	2.8	U	2.6	U
SELENIUM	MG/KG	0.26	b	0.25	b	0.31	b	0.27	b	0.13	U	0.22	b	0.34	U	0.17	U
THALLIUM	MG/KG	0.46	U	0.14	b	0.22	U	0.24	U	0.16	U	0.16	U	0.16	U	0.15	b
VANADIUM	MG/KG	66.7		29.6		37.1		52		16.7		36		15.1		26.9	
ZINC	MG/KG	71.8		577		47.6		60.3		22.2		37.6		66.9		30	
VOLATILE ORGANIC COMPOUNDS																	
TOLUENE	UG/KG	12	U	12		11	U	12	U	7	J	3	J	2800	U	11	U
XYLENE (TOTAL)	UG/KG	12	U	10	U	11	U	12	U	11	U	11	U	6000	U	11	U
CARBON TETRACHLORIDE	UG/KG	12	U	10	U	11	U	12	U	11	U	11	U	2800	U	11	U
2-HEXANONE	UG/KG	12	U	10	U	11	U	12	U	11	U	11	U	2800	U	11	U
ACETONE	UG/KG	13	U	23	U	11	U	12	U	19	U	11	U	3800	U	11	U
METHYLENE CHLORIDE	UG/KG	21	U	32	U	13	U	15	U	14	U	11	U	2800	U	11	U
2-BUTANONE	UG/KG	12	U	10	U	11	U	12	U	11	U	11	U	8000	U	11	U
SEMI-VOLATILE ORGANIC COMPOUNDS																	
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	790	U	22000		180	J	780	U	730	U	730	U	4700	J	710	U
PYRENE	UG/KG	790	U	9600	J	750	U	780	U	730	U	730	U	22000	U	710	U
BENZO(GH)PERYLENE	UG/KG	790	U	5200	J	750	U	780	U	730	U	730	U	22000	U	710	U
BENZO(A)PYRENE	UG/KG	790	U	20000	U	750	U	780	U	730	U	730	U	22000	U	710	U
NAPHTHALENE	UG/KG	790	U	20000	U	750	U	780	U	730	U	730	U	5600	J	710	U
2-METHYLNAPHTHALENE	UG/KG	790	U	20000	U	750	U	780	U	730	U	730	U	7500	J	710	U
PESTICIDES AND PCBs																	
ENDOSULFAN SULFATE	UG/KG	3.95	UJ	117	JN	3.73	UJ	3.78	UJ	16.3	U	3.65	U	18.4	U	3.54	U
BHC-ALPHA	UG/KG	2.03	UJ	40.6	JN	1.92	UJ	1.95	UJ	9.41	U	1.88	U	9.48	U	1.82	U
BHC-DELTA	UG/KG	2.03	UJ	22	JN	1.92	UJ	1.95	UJ	9.41	U	1.88	U	9.48	U	1.82	U
4,4'-DDT	UG/KG	3.95	UJ	130	JN	1.31	DJ	3.78	UJ	18.3	U	3.65	U	18.4	U	3.54	U
GAMMA-CHLORDANE	UG/KG	2.03	UJ	23.9	JN	1.92	UJ	1.95	UJ	9.41	U	1.88	U	9.48	U	1.82	U
ENDRIN KETONE	UG/KG	3.95	UJ	137	JN	3.73	UJ	3.78	UJ	18.3	U	3.65	U	18.4	U	3.54	U
DIELDRIN	UG/KG	3.95	UJ	-	UJR	3.73	UJ	3.78	UJ	18.3	U	3.65	U	18.4	U	3.54	U
ENDRIN	UG/KG	3.95	UJ	27.9	JN	3.73	UJ	3.78	UJ	18.3	U	3.65	U	18.4	U	3.54	U
4,4'-DDD	UG/KG	3.95	UJ	45.6	JN	6.77	J	3.78	UJ	18.3	U	3.65	U	18.4	U	3.54	U
4,4'-DDE	UG/KG	3.95	UJ	-	UJR	72.2	J	3.78	UJ	18.3	U	3.65	U	18.4	U	3.54	U
ENDOSULFAN I	UG/KG	2.03	UJ	-	UJR	1.92	UJ	1.95	UJ	9.41	U	1.88	U	9.48	U	1.82	U
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																	
TFH DIESEL	MG/KG	14.9	U	59.8		14.2	U	14.3	U	50.2		29.2		3300		45.6	
TFH GASOLINE	MG/KG	0.06	U	0.168		0.057	U	0.058	U	0.289		0.055	U	423		0.054	U
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																	
TRPH	MG/KG	20	U	84590		315		60		384		20	U	4186	U	20	U

Table B20-2

Site20 (OU- 3): Summary of Detected Chemicals in Sediments and Surface/Near-Surface Soil

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STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	20_GN3 S1464260 (0)	DVF(a)	20_GN3 S1464878 (0)	DVF(a)	20_GN3 S1464261 (2)	DVF(a)	20_GN3 S1464264 (4)	DVF(a)	20_SA1 S1464345 (0)	DVF(a)	20_SA1 S1464350 (2)	DVF(a)	20_SA1 S1464365 (4)	DVF(a)	20_SA2 S1464348 (0)	DVF(a)
METALS																	
SILVER	MG/KG	0.91	b	0.5	U	0.47	b	0.49	U	0.43	U	0.51	b	0.45	U	0.67	b
ALUMINUM	MG/KG	3140		5370		5430		14100		5620		10300		7850		10600	
ARSENIC	MG/KG	1.8	b	2.4		3.3		4.9		3.3		3.8		3.5		4.7	
BARIUM	MG/KG	30.8	b	33.8	b	88.8		191		109		139		119		119	
BERYLLIUM	MG/KG	0.41	U	0.4	U	0.43	U	0.63	b	0.32	U	0.36	U	0.13	U	0.34	U
CALCIUM	MG/KG	5380		3750		8590		7250		4320		7710		7700		5360	
CADMIUM	MG/KG	0.82	b	0.7	b	1.1	b	1.8		1.8		2.6		1.6		2.6	
COBALT	MG/KG	83.3		57.7		2.7	b	6	b	1.9	b	5.3	b	4.2	b	5.9	b
CHROMIUM	MG/KG	5.3		6.6		6.7		15.7		10.3		15.1		10.4		49.6	
COPPER	MG/KG	10.9		8.7		5.3	b	10.7		15.2		12.4		8.5		14.3	
IRON	MG/KG	7790		9390		8900		18700		9520		14300		11400		16300	
MERCURY	MG/KG	0.04	U	0.03	U	0.03	U	0.03	U	0.1	U	0.58		0.08	U	0.19	
POTASSIUM	MG/KG	888	b	818	b	2450		4930		3190		4050		3070		4430	
MAGNESIUM	MG/KG	1640		2700		3780		7780		3350		5540		4400		5580	
MANGANESE	MG/KG	101		100		166		285		148		281		174		255	
SODIUM	MG/KG	520	b	475	b	464	b	425	b	188	b	238	b	234	b	292	b
NICKEL	MG/KG	5.1	b	7	b	6.6	b	11.6		6.8	b	11.5		9.6		27	
LEAD	MG/KG	6.8		8.2		1.7		3.1		2870		37.9		22.3		37.2	
ANTIMONY	MG/KG	2.9	U	2.9	U	2.7	U	2.8	U	2.5	U	2.6	U	2.6	U	2.5	U
SELENIUM	MG/KG	0.16	U	0.34	U	0.11	U	0.12	U	0.26	b	0.25	b	0.26	b	0.1	U
THALLIUM	MG/KG	0.17	U	0.17	U	0.15	U	0.35	b	0.19	b	0.17	b	0.15	b	0.25	b
VANADIUM	MG/KG	14.2		19.3		24.8		50.4		22.6		39.2		32		40.3	
ZINC	MG/KG	26.9		25.8		29.8		58.1		95.5		62.9		45.8		169	
VOLATILE ORGANIC COMPOUNDS																	
TOLUENE	UG/KG	12	U	7	J	11	U	11	U	2	J	11	U	11	U	10	U
XYLENE (TOTAL)	UG/KG	12	U	12	U	11	U	11	U	10	U	11	U	11	U	10	U
CARBON TETRACHLORIDE	UG/KG	12	U	12	U	11	U	11	U	5	J	4	J	3	J	10	U
2-HEXANONE	UG/KG	12	U	12	U	11	U	11	U	10	U	11	U	11	U	10	U
ACETONE	UG/KG	12	U	16	U	11	U	11	U	23	U	11	U	11	U	10	U
METHYLENE CHLORIDE	UG/KG	12	U	12	U	11	U	11	U	10	U	11	U	11	U	10	U
2-BUTANONE	UG/KG	12	U	12	U	11	U	11	U	10	U	11	U	11	U	10	U
SEMI-VOLATILE ORGANIC COMPOUNDS																	
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	770	U	770	U	720	U	730	U	680	U	710	U	710	U	160	J
PYRENE	UG/KG	770	U	180	J	720	U	730	U	680	U	710	U	710	U	680	U
BENZO(GH)PERYLENE	UG/KG	770	U	770	U	720	U	730	U	4000		980		1000		680	U
BENZO(A)PYRENE	UG/KG	770	U	770	U	720	U	730	U	790		710	U	710	U	680	U
NAPHTHALENE	UG/KG	770	U	770	U	720	U	730	U	680	U	710	U	710	U	680	U
2-METHYLNAPHTHALENE	UG/KG	770	U	770	U	720	U	730	U	680	U	710	U	710	U	680	U
PESTICIDES AND PCBs																	
ENDOSULFAN SULFATE	UG/KG	19.2	U	19.3	U	3.59	U	3.66	U	-		-		-		-	
BHC-ALPHA	UG/KG	9.9	U	9.95	U	1.85	U	1.88	U	-		-		-		-	
BHC-DELTA	UG/KG	9.9	U	9.95	U	1.85	U	1.88	U	-		-		-		-	
4,4'-DDT	UG/KG	19.2	U	19.3	U	3.59	U	3.66	U	-		-		-		-	
GAMMA-CHLORDANE	UG/KG	9.9	U	9.95	U	1.85	U	1.88	U	-		-		-		-	
ENDRIN KETONE	UG/KG	19.2	U	19.3	U	3.59	U	3.66	U	-		-		-		-	
DIELDRIN	UG/KG	19.2	U	19.3	U	3.59	U	3.66	U	-		-		-		-	
ENDRIN	UG/KG	19.2	U	19.3	U	3.59	U	3.66	U	-		-		-		-	
4,4'-DDD	UG/KG	19.2	U	19.3	U	3.59	U	3.66	U	-		-		-		-	
4,4'-DDE	UG/KG	19.2	U	19.3	U	3.59	U	3.66	U	-		-		-		-	
ENDOSULFAN I	UG/KG	9.9	U	9.95	U	1.85	U	1.88	U	-		-		-		-	
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																	
TFH DIESEL	MG/KG	97		91.9		16700		35.4		150	J	43.7	J	17.1	J	12.8	UJ
TFH GASOLINE	MG/KG	0.058	U	0.059	U	0.054	U	0.057		0.31		0.341		0.054	U	0.124	
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																	
TRPH	MG/KG	308		416		20	U	20	U	12572		2861		2963		560	

Table B20-2

Site20 (OU- 3): Summary of Detected Chemicals in Sediments and Surface/Near-Surface Soil

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STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	20_SA2 S1464348 (2)	DVF(a)	20_SA2 S1464351 (4)	DVF(a)	20_SA3 S1464346 (0)	DVF(a)	20_SA3 S1464347 (2)	DVF(a)	20_SA3 S1464361 (4)	DVF(a)	20_UGS S1464359 (0)	DVF(a)	20_UGS S1464360 (2)	DVF(a)
METALS															
SILVER	MG/KG	0.46	U	0.44	U	0.44	U	0.46	U	0.44	U	0.43	U	0.54	b
ALUMINIUM	MG/KG	9990		9050		8880		10000		8230		7970		14800	
ARSENIC	MG/KG	4.8		3.3		6.5		4		2.8		2.8		4.1	
BARIUM	MG/KG	139		93		91.2		133		100		119		139	
BERYLLIUM	MG/KG	0.38	U	0.38	U	0.24	U	0.35	U	0.19	U	0.35	U	0.5	U
CALCIUM	MG/KG	5660		6660		4270		8890		7300		4380		5740	
CADMIUM	MG/KG	2.4		1.4		8.8		2.2		1.2		1.9		2.4	
COBALT	MG/KG	8	b	3.3	b	4.7	b	4.9	b	3.7	b	4.6	b	6.6	b
CHROMIUM	MG/KG	14.1		9.7		14		15		8.9		12.1		17.7	
COPPER	MG/KG	10.7		7.4		11.2		10.4		5.1	b	9.7		10.3	
IRON	MG/KG	15900		8840		13600		15100		8760		12900		17800	
MERCURY	MG/KG	0.15		0.07	U	0.43		0.76		0.05	U	0.06	U	0.22	
POTASSIUM	MG/KG	4970		2110		3350		4060		2170		4500		4940	
MAGNESIUM	MG/KG	5920		3630		4540		5910		3440		4810		6890	
MANGANESE	MG/KG	281		151		222		243		174		238		281	
SODIUM	MG/KG	298	b	204	b	185	b	279	b	180	b	257	b	251	b
NICKEL	MG/KG	12		7.4	b	10.1		12.9		7.3	b	9.9		12.7	
LEAD	MG/KG	3.9		2.3		34.5		2.5		1.4		21.4		3.1	
ANTIMONY	MG/KG	2.6	U	2.5	U	2.5	U	2.7	U	2.5	U	2.6	b	2.6	U
SELENIUM	MG/KG	0.3	b	0.12	b	0.19	b	0.19	b	0.16	b	0.29	b	0.29	b
THALLIUM	MG/KG	0.28	b	0.15	U	0.19	b	0.26	b	0.15	b	0.25	b	0.15	U
VANADIUM	MG/KG	41.5		24.8		27		42.9		27		32.7		53	
ZINC	MG/KG	56.4		37.3		275		46.8		26.6		57.4		55.4	
VOLATILE ORGANIC COMPOUNDS															
TOLUENE	UG/KG	3	J	10	U	2	J	11	U	10	U	-		-	
XYLENE (TOTAL)	UG/KG	11	U	10	U	10	U	11	U	10	U	-		-	
CARBON TETRACHLORIDE	UG/KG	11	U	10	U	10	U	11	U	10	U	-		-	
2-HEXANONE	UG/KG	11	U	10	U	10	U	11	U	10	U	-		-	
ACETONE	UG/KG	11	U	10	U	10	U	11	U	10	U	-		-	
METHYLENE CHLORIDE	UG/KG	11	U	10	U	10	U	11	U	2	J	-		-	
2-BUTANONE	UG/KG	11	U	10	U	10	U	11	U	10	U	-		-	
SEMI-VOLATILE ORGANIC COMPOUNDS															
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	720	U	700	U	680	U	730	U	690	U	-		-	
PYRENE	UG/KG	720	U	700	U	680	U	730	U	690	U	-		-	
BENZO(GH)PERYLENE	UG/KG	720	U	700	U	680	U	730	U	690	U	-		-	
BENZO(A)PYRENE	UG/KG	720	U	700	U	680	U	730	U	690	U	-		-	
NAPHTHALENE	UG/KG	720	U	700	U	680	U	730	U	690	U	-		-	
2-METHYLNAPHTHALENE	UG/KG	720	U	700	U	680	U	730	U	690	U	-		-	
PESTICIDES AND PCBs															
ENDOSULFAN SULFATE	UG/KG	-		-		-		-		-		-		-	
BHC-ALPHA	UG/KG	-		-		-		-		-		-		-	
BHC-DELTA	UG/KG	-		-		-		-		-		-		-	
4,4'-DDT	UG/KG	-		-		-		-		-		-		-	
GAMMA-CHLORDANE	UG/KG	-		-		-		-		-		-		-	
ENDRIN KETONE	UG/KG	-		-		-		-		-		-		-	
DIELDRIN	UG/KG	-		-		-		-		-		-		-	
ENDRIN	UG/KG	-		-		-		-		-		-		-	
4,4'-DDD	UG/KG	-		-		-		-		-		-		-	
4,4'-DDE	UG/KG	-		-		-		-		-		-		-	
ENDOSULFAN I	UG/KG	-		-		-		-		-		-		-	
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)															
TFH DIESEL	MG/KG	13.5	UJ	22.8	J	12.8	UJ	13.7	UJ	13	UJ	12.6	UJ	16.2	J
TFH GASOLINE	MG/KG	0.054	U	0.053	U	0.189		0.058	U	0.053	U	0.148		0.092	
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)															
TRPH	MG/KG	20	U												

(a) A definition of each data validation flag (DVF) is provided in Table B-1.

Table B20-3

Site20 (OU- 3): Summary of Detected Chemicals in the Vadose Zone (Subsurface) Samples

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STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	20_DBMW55 S1456428 (5)	DVF(a)	20_DBMW55 S1456332 (10)	DVF(a)	20_DBMW55 S1456334 (10)	DVF(a)	20_DBMW55 S1456336 (15)	DVF(a)	20_DBMW55 S1456337 (20)	DVF(a)	20_DBMW55 S1456339 (25)	DVF(a)	20_DBMW55 S1456340 (50)	DVF(a)	20_DBMW55 S1456425 (100)	DVF(a)
GENERAL CHEMISTRY																	
TOTAL ORGANIC CARBON	MG/KG	-		-		-		-		-		-		-		-	
METALS																	
SILVER	MG/KG	0.48	U	0.49	U	0.46	U	0.53	U	0.46	U	0.51	U	0.64	b	0.48	U
ALUMINIUM	MG/KG	11900		11700		9020		21700		5210		17800		5790		10900	
ARSENIC	MG/KG	6.1		6.1		4		5.2		2.7		7.2		1.7	b	4.7	
BARIUM	MG/KG	132		161		142		228		229		169		61.9		97.2	
BERYLLIUM	MG/KG	0.62	U	0.27	b	0.28	b	0.87	b	0.17	b	0.45	b	0.21	b	0.48	U
CALCIUM	MG/KG	4410		8500		8670		16600		4690		14800		2040		8960	
CADMIUM	MG/KG	2.5		1.7		1.4		1.8		0.83	b	2.1		0.73	b	0.92	b
COBALT	MG/KG	7.3	b	5.1	b	4.4	b	10	b	2.8	b	7.2	b	4.8	b	4.5	b
CHROMIUM	MG/KG	19.7		12.7		10.1		21		6.2		18.2		6.5		8.2	
COPPER	MG/KG	11		10.9		8.2		13.3		4.9	b	11.3		5.7		6.6	
IRON	MG/KG	17100		16400		13500		26000		7760		20900		7500		12200	
MERCURY	MG/KG	0.34		0.03	U	0.04	U	0.04	U	0.03	U	0.03	U	0.17		0.26	
POTASSIUM	MG/KG	3810		4500		3330		5710		2010		5070		1430		2470	
MAGNESIUM	MG/KG	5870		7110		5880		13000		3210		9670		1800		4480	
MANGANESE	MG/KG	313		285		224		355		156		310		227		188	
SODIUM	MG/KG	301	b	307	b	291	b	1030	b	389	b	937	b	304	b	357	b
NICKEL	MG/KG	15		10.3		8	b	15.2		6.1	b	14.3		5.8	b	6.3	b
LEAD	MG/KG	3.6		3.1		2.5		3.6		1.4		3.4		2.1		2.9	
ANTIMONY	MG/KG	2.8	U	3.4	b	2.8	U	3	U	2.6	U	2.9	U	2.7	U	2.7	U
SELENIUM	MG/KG	0.14	U	0.12	U	0.12	b	0.13	U	0.11	U	0.12	U	0.11	U	0.11	U
THALLIUM	MG/KG	0.23	b	0.19	b	0.21	b	0.3	b	0.15	U	0.34	b	0.16	U	0.16	U
VANADIUM	MG/KG	41.7		44.3		36.2		69.2		21.3		60.8		19.6		32.3	
ZINC	MG/KG	55.7		50.7		42.4		77.3		24.6		59.3		25.7		35.6	
VOLATILE ORGANIC COMPOUNDS																	
TOLUENE	UG/KG	12	U	12	U	11	U	12	U	11	U	12	U	11	U	12	U
ACETONE	UG/KG	12	U	97	U	41	U	49	U	35	U	38	U	11	U	12	U
METHYLENE CHLORIDE	UG/KG	9	U	150	U	120	U	58	U	65	U	120	U	6	U	6	U
CARBON DISULFIDE	UG/KG	12	U	12	U	11	U	12	U	11	U	3	J	11	U	12	U
2-BUTANONE	UG/KG	12	U	12	U	11	U	12	U	3	J	12	U	11	U	12	U
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																	
TRPH	MG/KG	18		20	U	20	U										

Table B20-3

Site20 (OU- 3): Summary of Detected Chemicals in the Vadose Zone (Subsurface) Samples

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STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	20_DBMW56 S1456426 (170)	DVF(a)	20_DBMW56 S1456427 (190)	DVF(a)	20_DGMW88 S145634001 (107)	DVF(a)	20_DGMW88 S145633201 (192)	DVF(a)	20_UGMW36 S1456327 (100)	DVF(a)	20_UGMW36 S1456331 (210)	DVF(a)
GENERAL CHEMISTRY													
TOTAL ORGANIC CARBON	MG/KG	-		-		-		-		-		122	
METALS													
SILVER	MG/KG	0.5	U	0.49	U	0.5	U	-		0.3	U	-	
ALUMINUM	MG/KG	10700		15700		13800		-		2730		-	
ARSENIC	MG/KG	4.3		6.7		5.2		-		2	b	-	
BARIUM	MG/KG	81.4		109		96.8		-		44.8		-	
BERYLLIUM	MG/KG	0.49	U	0.84	b	0.21	U	-		0.17	U	-	
CALCIUM	MG/KG	4960		5150		9950		-		5690		-	
CADMIUM	MG/KG	2.1		2.8		2.9		-		0.44	b	-	
COBALT	MG/KG	6.5	b	6.8	b	6.2	b	-		1.7	U	-	
CHROMIUM	MG/KG	13		18.2		15.4		-		2.8		-	
COPPER	MG/KG	6.3		12		11.3		-		3.3	b	-	
IRON	MG/KG	15000		20900		15400		-		4470		-	
MERCURY	MG/KG	0.32		0.33		0.33		-		0.03	J	-	
POTASSIUM	MG/KG	3190		5120		3270		-		1140		-	
MAGNESIUM	MG/KG	5200		7460		5930		-		1830		-	
MANGANESE	MG/KG	272		359		283		-		108		-	
SODIUM	MG/KG	327	b	344	b	385	b	-		231	b	-	
NICKEL	MG/KG	12.6		14		18.1		-		3.4	b	-	
LEAD	MG/KG	3.1		3.7		2.9		-		1.3		-	
ANTIMONY	MG/KG	3.7	b	2.8	U	2.8	U	-		2.3	U	-	
SELENIUM	MG/KG	0.12	U	0.12	U	0.12	b	-		0.08	U	-	
THALLIUM	MG/KG	0.19	b	0.3	b	0.29	b	-		0.17	U	-	
VANADIUM	MG/KG	37.8		49.8		47		-		13.2		-	
ZINC	MG/KG	45.2		69.3		48.5		-		14.4		-	
VOLATILE ORGANIC COMPOUNDS													
TOLUENE	UG/KG	12	U	12	U	12	U	2	J	11	U	2	J
ACETONE	UG/KG	9	J	11	J	12	U	11	U	6	J	22	U
METHYLENE CHLORIDE	UG/KG	9	U	8	U	6	J	9	U	11	U	12	U
CARBON DISULFIDE	UG/KG	12	U	12	U	12	U	11	U	11	U	12	U
2-BUTANONE	UG/KG	12	U	12	U	12	U	11	U	11	U	12	U
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)													
TRPH	MG/KG	20	U	20	U	20	U	-		20	U	-	

(a) A definition of each data validation flag (DVF) is provided in Table B-1.

Table B20-4
Site 20 (OU-3): Well Construction Details
MCAS El Toro Phase I RI Technical Memorandum

Item	Station Identification		
	20_UGMW36	20_DBMW55	20_DGMW88
Survey Location--Northing	5996917.92	556856.24	556953.00
Survey Location--Easting	1549154.78	1549153.59	1549109.67
Ground Surface Elevation (ft above MSL ^a)	338.01	331.92	332.31
Measuring Point Elevation (ft above MSL ^a)	338.71	331.56	331.65
Measuring Point Location	PVC Sounding tube	PVC Sounding tube	PVC Sounding tube
Type of Surface Completion	Above ground	Below ground	Above ground
Casing Diameter and Material	4" Sch. 40 PVC	4" Sch. 40 PVC	4" Sch. 40 PVC
Screen Diameter and Material	4" Sch. 40 0.02"-slot SS ^C	4" Sch. 40 0.02"-slot SS ^C	4" Sch. 40 0.02"-slot SS ^C
Screen Interval (ft bgs ^b)	183-223	187-227	185-225
Length of Drop Pipe (ft bgs ^b)	222	222	223
Make and Model of Installed Pump	Grundfos Rediflow 2 2" diameter Submersible	Grundfos Rediflow 2 2" diameter Submersible	Grundfos Rediflow 2 2" diameter Submersible
Date of Pumping Test	Not tested	Not tested	Slug tested 20 Oct 92
Date of Water Quality Sampling	28 Oct 92	9 Dec 92	4 Nov 92
^a Mean sea level ^b Below ground surface ^c SS = Stainless Steel			

<p align="center">Table B20-5 Site 20 (OU-3): Summary of Hydraulic Parameters MCAS El Toro Phase I RI Technical Memorandum</p> <p align="right">Sheet 1 of 1</p>						
Well Identification	Type of Test	Analysis Method	Transmissivity (ft²/day)	Hydraulic Conductivity (ft/day)	Storage Coefficient^a	Leakance Factor^a
20_DGMW88	Slug	Bouwer and Rice (1976); Bouwer (1989)	11	0.29	NA	NA

^aNA = Not applicable.
 Source: Table F-2 (Appendix F)

Table B20-6

Site20 (OU- 3): Summary of Detected Chemicals in Groundwater Samples

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SCREEN INTERVAL ANALYTE BY GROUP	REG.CODE(b)	REG.LEVEL(c)	UNITS	20_DBMW55 S1452118 (187-227)	DVF(a)	20_DGMW88 S1452119 (185-225)	DVF(a)	20_UGMW36 S1452125 (183-223)	DVF(a)
GENERAL CHEMISTRY									
ALKALINITY AS CaCO3	NA	NA	MG/L	152		190		132	
CARBONATE	NA	NA	MG/L	-		-		-	
BICARBONATE	NA	NA	MG/L	185		231		161	
CHLORIDE	3	250	MG/L	309		176		336	
SULFATE	3	250	MG/L	854		523		559	
NITRATE/NITRITE-N	1	10	MG/L	15.4		9.35		19.4	
TOTAL DISSOLVED SOLIDS	3	500	MG/L	1900		1260		1780	
METALS									
ARSENIC	2	50	UG/L	0.8	b	0.7	U	0.7	U
BARIUM	2	2000	UG/L	25.9	b	30.8	b	44	b
CALCIUM	NA	NA	UG/L	275000		174000		208000	
CADMIUM	2	5	UG/L	1.4	b	1.2	U	1.2	U
COPPER	2	1300	UG/L	0.9	UJ	1.3	b	0.9	U
IRON	3	300	UG/L	2.3	U	1.3	U	52.4	b
POTASSIUM	NA	NA	UG/L	5910		3450	b	4660	b
MAGNESIUM	NA	NA	UG/L	128000		81600		98200	
MANGANESE	3	50	UG/L	65		21.9		64.2	
SODIUM	NA	NA	UG/L	115000		76200		134000	
NICKEL	NA	NA	UG/L	28.2	U	36	b	73.2	
ANTIMONY	NA	NA	UG/L	31.2	b	16.2	b	12.1	U
SELENIUM	1	10	UG/L	85.8		33.7	b	85.9	
VANADIUM	NA	NA	UG/L	13.6	b	10.5	b	6	b
ZINC	2	5000	UG/L	187		10.5	b	45.1	
VOLATILE ORGANIC COMPOUNDS									
TRICHLOROETHYLENE	2	5	UG/L	0.5	J	1	U	1	U
CHLOROMETHANE (METHYL CHLORIDE)	NA	NA	UG/L	2	U	0.5	J	0.9	J

(a) A definition of each data validation flag (DVF) is provided in Table B-1.

(b) Regulatory Codes are:

- 1 = California MCL
- 2 = EPA primary MCL
- 3 = EPA secondary MCL
- 4 = California DTSC Action Level

(c) The given concentration represents the California MCL, the EPA primary MCL, the EPA secondary MCL, or the California DTSC Action Level, whichever is most stringent.

**Table B20-7
Site 20 (OU-3): Analyte Concentrations in Groundwater
Exceeding Regulatory Standards or DTSC^a Action Levels
MCAS El Toro Phase I RI Technical Memorandum**

Well Identification	SI (ft bgs) ^b	Analyte	Units	Concentration	Regulatory Level ^c	Regulatory Code ^d
20_DBMW55	(187-227)	Manganese	µg/L	65	50	3
		Selenium	µg/L	85.8	10	2
		Chloride	mg/L	309	250	3
		Nitrate/Nitrite-N	mg/L	15.4	10	2
		Sulfate	mg/L	854	250	3
		Total Dissolved Solids	mg/L	1900	500	3
20_DGMW88	(185-225)	Sulfate	mg/L	523	250	3
		Total Dissolved Solids	mg/L	1260	500	3
		Selenium	µg/L	33.7	10	2
20_UGMW36	(183-223)	Manganese	µg/L	64.2	50	3
		Selenium	µg/L	85.9	10	2
		Chloride	mg/L	336	250	3
		Nitrate/Nitrite-N	mg/L	19.4	10	2
		Sulfate	mg/L	559	250	3
		Total Dissolved Solids	mg/L	1780	500	3

^aCalifornia Department of Toxic Substances Control

^bScreen interval (feet below ground surface)

^cThe most stringent federal/state drinking water standard was applied. In the presence of both an EPA MCL and a California MCL, the most stringent MCL is represented. If neither an EPA or California MCL is listed, the California DTSC action level was applied.

^dRegulatory Code:

- 1=EPA Primary MCL: Federally enforceable drinking water standard established for the health effects of contaminants
- 2=California MCL: Health-based drinking water standard enforceable at the state level
- 3=EPA Secondary MCL: Nonenforceable standard based on aesthetic qualities of taste, color, and odor (Includes chloride, iron, manganese, sulfate, and TDS)
- 4=DTSC Action Level: Nonenforceable levels at which DTSC strongly urges water purveyors to take corrective action to reduce the level of contamination in the water they supply (Action levels cease to exist when state MCLs are promulgated.)

Appendix B21

**Nature and Extent of Contamination:
Site 21 (OU-3) – Materials Management Group, Building 320**

Appendix B21

NATURE AND EXTENT OF SITE-SPECIFIC CONTAMINATION: SITE 21 (OU-3): MATERIALS MANAGEMENT GROUP, BUILDING 320

This discussion of Site 21 is supplemented by the figures and data tables listed below. The figures begin on page B21-3, and the tables are grouped at the end of this Appendix B21. Field headspace values for soils at this site are presented in Table BA1-21, in Attachment 1 to Appendix B (directly following Appendix B22).

Figure B21-1: (Site Map)

Figure B21-2: Geologic Cross Section

Table B21-1: Types of Samples and Chemical Analyses

Table B21-2: Summary of Detected Chemicals in Sediments and Surface/Near-Surface Soil

Table B21-3: Summary of Detected Chemicals in Vadose Zone (Subsurface) Samples

Table B21-4: Well Construction Details

Table B21-5: Summary of Hydraulic Parameters

Table B21-6: Summary of Detected Chemicals in Groundwater Samples

Table B21-7: Analyte Concentrations in Groundwater Exceeding Regulatory Standards or DTSC Action Levels

B21.1 Site Description

The Materials Management Group (in Building 320) is a supply distribution center for MCAS El Toro and other USMC facilities. The main area of concern is the outside storage area northwest of the building, where drums of chemicals are stored and drums of chemicals with expired shelf lives are stored temporarily. In 1964, about 1,000 drums were stored at the site; by 1986, only about 125 drums were stored there (Brown and Caldwell, 1986). Contaminants may have leaked from the drums during the life of the storage area, even though no leaks or spills are documented for the site. The areas under investigation are the drum storage area and a catch basin on the southwestern corner of the site.

As described in the *SAP Amendment*, review of the site aerial photographs revealed a possible stain in the northwest portion of the yard in 1952; the aerial photos from other years revealed no significant findings.

Figure B21-1 shows the site and the sampling and well locations. The site has just one stratum, the surface of the materials storage area.

B21.2 Suspected Waste Types and Contaminants

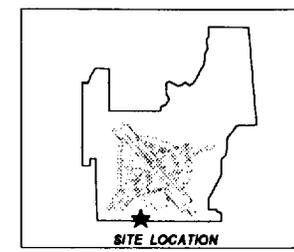
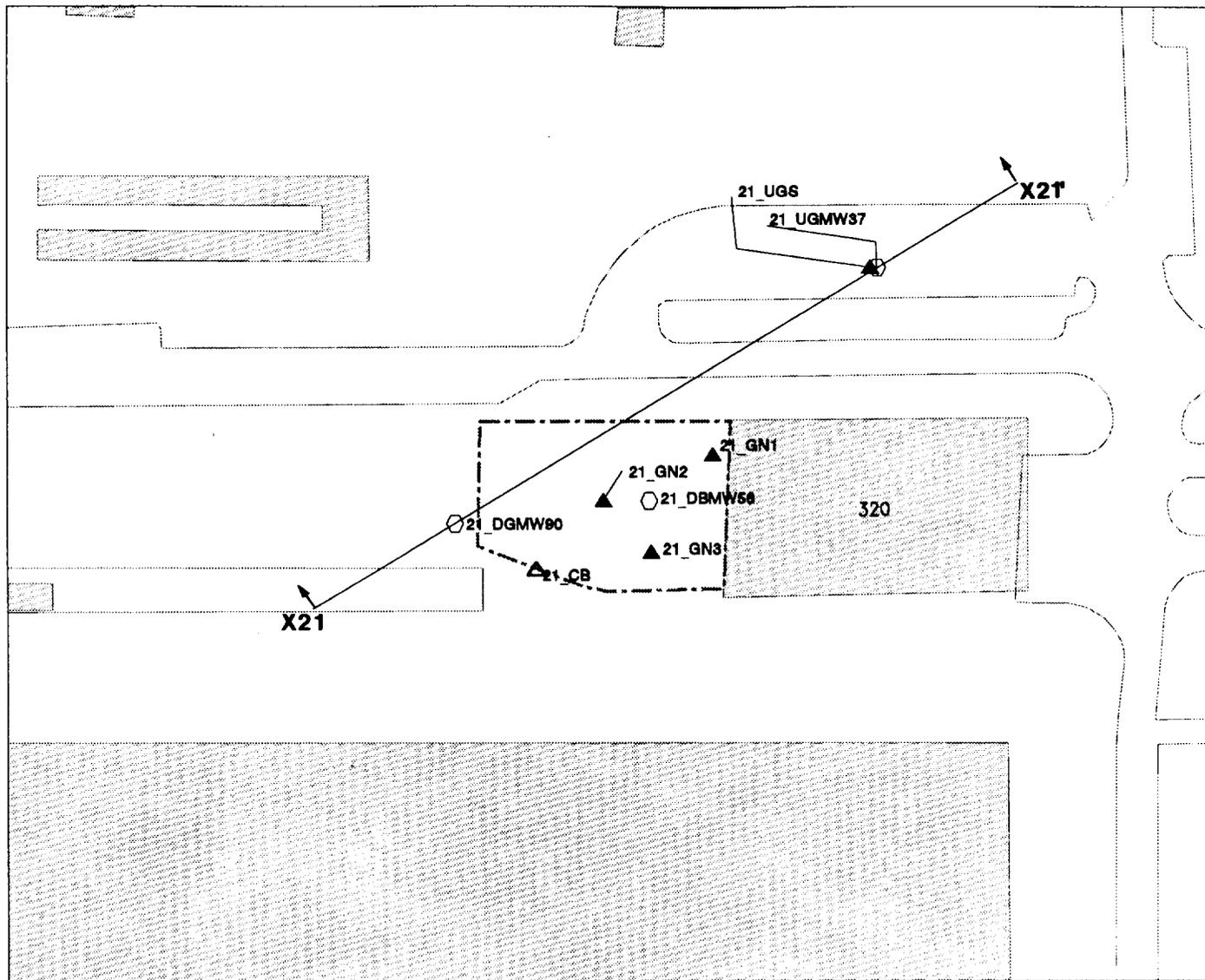
The nature and extent of suspected potential contaminants were unknown at the time of sampling, so samples were analyzed for VOCs, SVOCs, pesticides, PCBs, herbicides, TRPH, TFH-gasoline and TFH-diesel, total organic carbon (TOC), metals, cyanide, and general chemistry.

B21.3 Field Investigation

The field investigation consisted of drilling and sampling one deep soil boring (completed as a monitoring well) and two monitoring wells, and collecting at-surface and near-surface soil and sediment samples. The sample depths and types of analyses requested are shown in Table B21-1. Sampling and laboratory testing was conducted as planned in the *SAP Amendment*, except that herbicide testing was not requested for the upgradient surface and near-surface soil samples or for the upgradient groundwater sample.

B21.3.1 Surface Water and Sediment

A sediment sample was collected from the catch basin (21_CB) (shown in Figure B21-1) to provide information on potential contaminants that may be transported there in surface water runoff during rainfall. This sample was analyzed for VOCs, SVOCs, pesticides, PCBs, TRPH, TFH, and metals.



- FEATURES:**
- BUILDING OR PAD
 - MONITORING WELL
 - DEEP, 25-FOOT, OR ANGLE BORING
 - SEDIMENT SAMPLE
 - SURFACE WATER AND SEDIMENT SAMPLE
 - SURFACE AND NEAR-SURFACE SOIL SAMPLE
 - ROAD
 - STRATUM BOUNDARY
 - WASH OR STREAM
 - LINE OF GEOLOGIC CROSS-SECTION
 - END OF LINE OF CROSS-SECTION
 - LINE OF CROSS-SECTION EXTENDS BEYOND AREA SHOWN

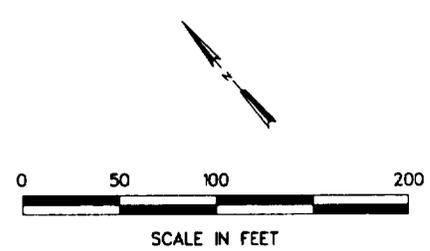
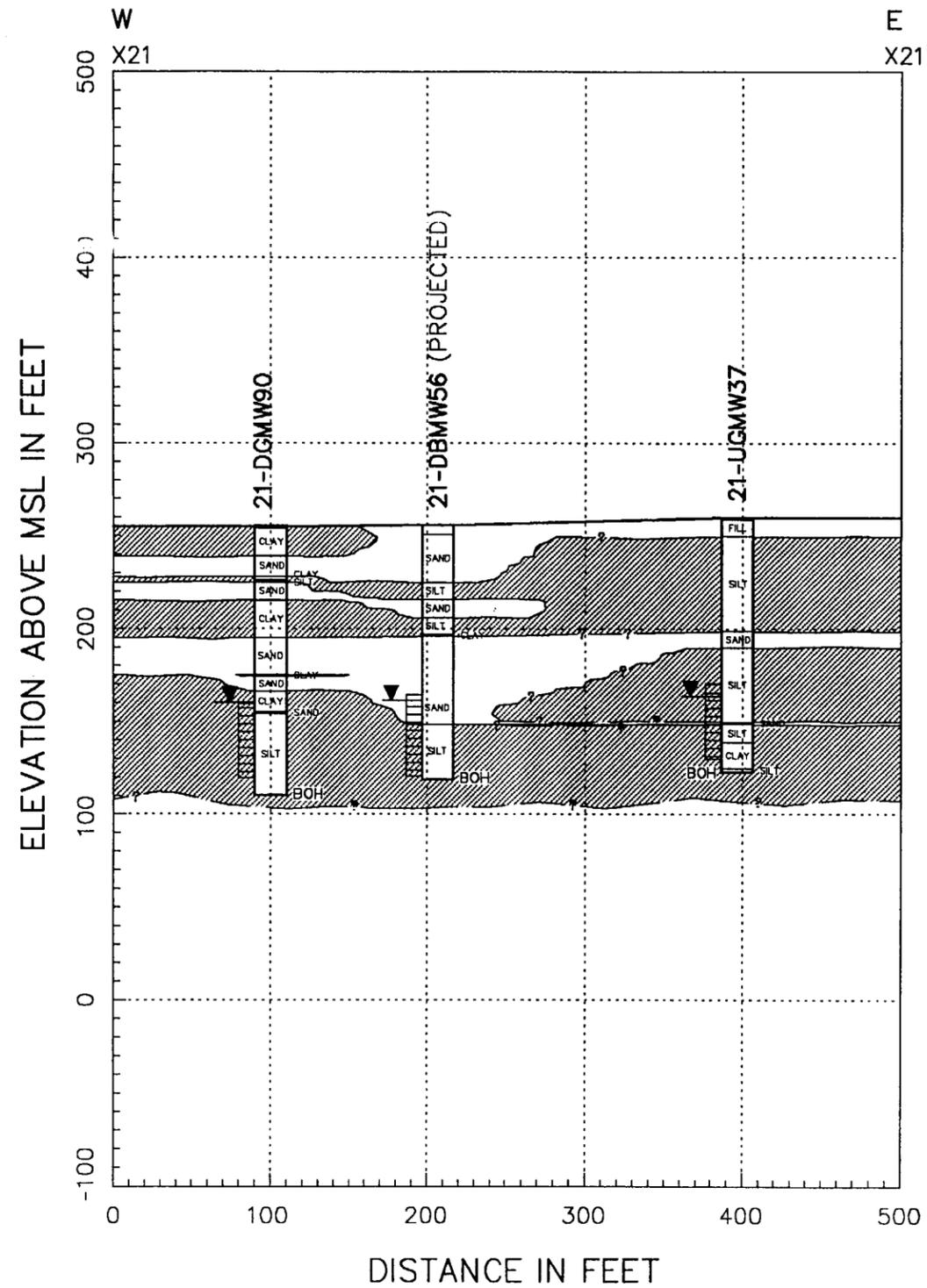


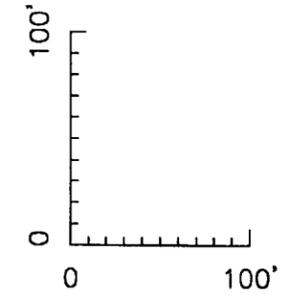
FIGURE B21-1
SITE 21 (OU-3): MATERIALS MANAGEMENT GROUP, BUILDING 320
 MCAS EL TORD PHASE I RI TECHNICAL MEMORANDUM

PAGE NUMBER B21-4

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HORIZ. SCALE: 1"=100'
 VERT. SCALE: 20% EXAGGERATION



LEGEND

-  UNCONSOLIDATED PERMEABLE SEDIMENTS
-  UNCONSOLIDATED LOW-PERMEABILITY SEDIMENTS
-  BOH BOTTOM OF HOLE
-  WELL SCREEN INTERVAL
-  WATER LEVEL ELEVATION, DECEMBER 1992

FIGURE B21-2
 SITE 21 (OU-3)
 GEOLOGIC CROSS SECTION X21-X21'
 MCAS EL TORO PHASE I RI
 TECHNICAL MEMORANDUM

Page

B21-6

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B21.3.2 Surface and Near-Surface Soils

Samples were collected from four sampling stations, as shown on the site map. Sample depths and analytes are summarized in Table B21-1. In general, the surface and near-surface soils were analyzed for VOCs, SVOCs, pesticides, PCBs, herbicides, TRPH, TFH, and metals.

Samples from the upgradient location (21_UGS) at 0 and 2 feet were tested for TRPH, TFH, and metals, but were not tested for herbicides. These soils were identified in the *SAP Amendment* to be tested only for herbicides and metals; TFH and TRPH analyses were added during the field investigation.

B21.3.3 Vadose Zone Soils (Soil Borings)

One deep boring (21_DBMW56) was drilled near the middle of the site to 137 feet bgs, and converted into a monitoring well. Sample depths and analytes are summarized in Table B21-1.

B21.3.4 Groundwater Monitoring Wells

Two wells were drilled: one upgradient well (21_UGMW37), and one down-gradient well (21_DGMW90). No changes were made to the wells planned for Site 21 in the *SAP Amendment*.

An aquifer test was conducted at 08_DBMW56 as summarized in Table B21-5 were not conducted at the upgradient or downgradient wells. The results of the aquifer test are summarized in Subsection B20.7. Groundwater samples were collected at each well as shown in Table B21-6.

B21.4 Surface Water and Sediments

Surface water samples were not collected at this site. Sediment sample analyses indicate that petroleum and fuel hydrocarbons, VOCs, several SVOCs, pesticides, and

metals are present in the catch basin sediments. PCE, TCE, and benzene were not detected in the sediments.

B21.4.1 Description of Surface Water and Sediment Samples

The sediment sample was collected at 21_CB, and it was analyzed for VOCs, SVOCs, pesticides, PCBs, TRPH, TFH, and metals.

B21.4.2 Analytical Results

Analytes requested are summarized in Table B21-1. The analytical results from sample 21_CB are summarized in Table B21-2. Contaminants from each analyte group (except PCBs) were found in the sediment samples.

Low levels of petroleum hydrocarbon contamination are present in the sediment. Total recoverable petroleum hydrocarbons (TRPH) are present at 160 mg/kg, with TFH-gasoline at 0.168 mg/kg, and TFH-diesel at 192 mg/kg. The TRPH and TFH values are below the California LUFT action levels.

VOCs detected in the sediment include acetone (460 $\mu\text{g}/\text{kg}$), methylene chloride (380 $\mu\text{g}/\text{kg}$), and toluene (27 $\mu\text{g}/\text{kg}$). Acetone and methylene chloride are demonstrated laboratory contaminants; their maximum detected concentrations in the trip blanks are 37 $\mu\text{g}/\text{L}$ and 42 $\mu\text{g}/\text{L}$, respectively.

Twenty SVOCs were detected in the sediment sample, seventeen of which are polynuclear aromatic hydrocarbons (PAHs). The compounds that are not PAHs are benzyl butyl phthalate and bis(2-ethylhexyl)phthalate, which are plasticizers, and carbazole, which is a dye intermediate used in making photographic plates. The detected SVOCs and their concentrations are shown in Table B21-2. Three of the PAH compounds had concentrations greater than 5,000 $\mu\text{g}/\text{kg}$: fluoranthene (10,000 $\mu\text{g}/\text{kg}$), phenanthrene (14,000 $\mu\text{g}/\text{kg}$), and pyrene (6,200 $\mu\text{g}/\text{kg}$).

Eleven pesticides were detected. The concentrations of the various pesticides range from 4.87 to 557 $\mu\text{g}/\text{kg}$. The pesticides with the highest concentrations are 4,4-DDD (109 $\mu\text{g}/\text{kg}$), 4,4-DDE (109 $\mu\text{g}/\text{kg}$), and 4,4-DDT (557 $\mu\text{g}/\text{kg}$).

Three metals (antimony, beryllium, and silver) were not detected in the sediment sample. The detected metals are listed in Table B21-2.

B21.5 Surface and Near-Surface Soils

Compounds detected in the surface and near-surface soils are primarily herbicides, pesticides, petroleum hydrocarbons, and volatiles. PCE, TCE, and benzene were not detected in the surface or near-surface soils.

B21.5.1 Description of Surface and Near-Surface Soil Samples

The surface soils at Site 21 are mapped as Sorrento loam of the Sorrento Series (Wachtell, 1978). The Sorrento loam generally consists of well-drained loam from 0 to 12 inches below ground surface (bgs) overlying silty clay loam to 62 inches bgs, below which lies sandy loam to 72 inches bgs. The percolation rate of the Sorrento loam ranges from 0.2 to 6.0 in/hr, and the available water capacity rate ranges from 0.16 to 0.21 in/hr.

There were three sampling stations (randomly located) for surface and near-surface soils: 21_GN1, 21_GN2, and 21_GN3. Samples were collected at 0, 2, and 4 feet bgs in 21_GN1 and 21_GN3, and at 0 and 2 feet bgs in 21_GN2. In addition, upgradient surface samples were taken at 0 and 2 feet bgs at 21_UGS, in an unpaved parking area upgradient of Site 21.

The surface and near-surface soils were analyzed for VOCs, SVOCs, pesticides, PCBs, herbicides, TRPH, TFH, and total metals. Samples at 21_GN3 at 2 feet and both 21_UGS samples were not evaluated for herbicides as had been planned in

the *SAP Amendment*. Sample depths and analytes are summarized in Table B21-1.

B21.5.2 Analytical Results and Soil Vapor Headspace Values

Surface soils and lithologic samples from the borings were evaluated in the field for organic vapors using an HNu photo-ionization detector or a flame ionization detector (OVA). The results of the field head space analyses are provided in Attachment 1 (Appendix B).

Table B21-2 presents all detected analytes for the surface and near-surface soils. In general, the analyses indicate the presence of petroleum and fuel hydrocarbons, pesticides, herbicides, and VOCs in the surface and near-surface soils. PCE and TCE were not detected in the surface soils.

B21.5.2.1 Upgradient Area

Fuel and petroleum hydrocarbons and metals were detected in the upgradient surface sample; this sample was analyzed only for TRPH, TFH, and metals.

Fuel and petroleum hydrocarbons were detected in both the surface and 2-foot-depth samples. In the surface sample, total recoverable petroleum hydrocarbons (TRPH) are present at 2,556 mg/kg, TFH-diesel was detected at 34.6 mg/kg and TFH-gasoline was detected at 0.0731 mg/kg. In the 2-foot sample, TRPH was detected at 56 mg/kg, but neither TFH-gasoline nor TFH-diesel was detected. The TRPH concentration detected in the surface sample is above California LUFT action levels.

Four metals (antimony, mercury, silver, and selenium) were not detected in the upgradient samples. The remaining metals are listed in Table B21-2.

B21.5.2.2 Materials Storage Area

The analytical results indicate the presence of petroleum and fuel hydrocarbons, pesticides, herbicides, and VOCs in the surface and near-surface soils. PCE and TCE were not detected in the surface soils.

Neither TRPH nor TFH-diesel were detected; TFH-gasoline was detected in the surface soil sample from 21_GN3 at a concentration of 0.0991 mg/kg, which is below the California LUFT action level.

VOCs detected in the surface and near-surface soils include acetone (7 to 26 $\mu\text{g}/\text{kg}$), chloroform (3 $\mu\text{g}/\text{kg}$) and toluene (3 to 6 $\mu\text{g}/\text{kg}$, estimated), as shown in Table B21-3. Acetone is a demonstrated laboratory contaminant; the maximum detected concentration in the trip blanks was 37 $\mu\text{g}/\text{L}$. Toluene values are below the CRDL and are therefore estimates. Chloroform was detected in the rinsate sample from 21_UGS (the upgradient surface sample); this may be an anomaly.

SVOCs and PCBs were not detected.

Five pesticides are present in the surface soils at concentrations ranging from 0.14 to 50.90 $\mu\text{g}/\text{kg}$. Pesticides were not detected in the samples at 2 and 4 feet bgs.

Two herbicides were detected in the surface sample at 21_GN2: 2,4,5-T at 67.3 $\mu\text{g}/\text{kg}$, and dalapon at 167 $\mu\text{g}/\text{kg}$. Dalapon was also detected at 21_GN1 at 0, 2, and 4 feet bgs at concentrations of 707, 609, and 270 $\mu\text{g}/\text{kg}$, respectively, and in the duplicate of the surface sample at a concentration of 370 $\mu\text{g}/\text{kg}$.

All of the metals (except antimony, mercury, silver, and selenium) were detected in the surface and near-surface soils.

B21.6 Vadose Zone Soils

B21.6.1 Description of Subsurface Soil Samples

One deep boring (21_DBMW56) was drilled to 137 feet bgs in the storage yard and was completed as a monitoring well. Two monitoring wells were drilled and sampled (21_UGMW237 and 21_DGMW90). Sample depths and analytes are summarized in Table B21-1, and boring locations are shown in Figure B21-1.

B21.6.2 Subsurface Geology

Subsurface soils encountered at the site were Quaternary alluvium, and the primary materials were sandy lean clay, lean silt, sandy silt, silty sand, and poorly graded sand. The sand was generally fine grained, with occasional gravel encountered in the sand layers. The soils were heterogeneous with generally discontinuous soil layering. At 20 feet bgs, a well-graded, fine to medium sand layer was encountered in 21_DGMW90 and 21_UGMW37. Figure B21-2 presents a generalized cross section of the site geology. Detailed boring logs that describe the specific soil layers are presented in Appendix K.

B21.6.3 Analytical Results

The results of the laboratory testing on the subsurface soils are presented in Table B21-3, which includes soil samples from the deep boring and the well borings. Low concentrations of one VOC, one pesticide, TFH-gasoline, and metals are present in the subsurface soils. Visible contamination was noted on the boring log for 21_DGMW90 at 30 and 80 feet bgs; contamination was not identified on the logs for 21_DBMW56 or 21_UGMW37.

Total Petroleum Hydrocarbons (TRPH, TFH). TFH-gasoline was detected in 21_DBMW56 at 50 feet at a concentration of 0.107 mg/kg; this value is below the California LUFT action level. TFH-diesel and TRPH were not detected.

Volatile Organic Compounds (VOCs). Acetone was detected at an estimated concentration of 7 $\mu\text{g}/\text{kg}$ in 21_UGMW37 (the upgradient well) at 90 feet; no other VOCs were detected. Acetone is a demonstrated laboratory contaminant; the maximum detected concentration in the trip blanks was 37 $\mu\text{g}/\text{L}$.

Semivolatile Organic Compounds (SVOCs). SVOCs were not detected.

Pesticides, Polychlorinated Biphenyls (PCBs), and Herbicides. One pesticide, methoxychlor, was detected at a concentration of 17.7 to 25.4 $\mu\text{g}/\text{kg}$ at 50 and 60 feet in 21_DBMW56; no other pesticides, herbicides, or PCBs were detected.

Metals. Metals results are presented in Table B21-3.

Total Organic Carbon (TOC). TOC was detected at concentrations ranging from 100 to 318 mg/kg at the screened intervals at 21_DGMW90 and 21_DBMW56.

B21.6.4 Soil Vapor Headspace Concentrations

Soil vapor headspace concentrations are presented in Attachment 1 (Appendix B). Low to moderate headspace concentrations, ranging from 0 to 5.8 ppmv, were detected with an HNW photo-ionization detector and a flame ionization detector (OVA). No correlation can be made between the soil vapor headspace and the laboratory detected concentrations.

B21.7 Groundwater

B21.7.1 Site-Specific Hydrogeology

Groundwater was first observed in 21_DGMW90 and 21_UGMW37 at about 100 and 94 feet bgs, respectively; the approximate depth to water observed during drilling was not recorded for 21_DBMW56. Groundwater quality sampling of the wells in February 1993 indicated potentiometric water levels at elevations of 162.55, 161.95, and 161.18 feet msl in 21_UGMW37, 21_DBMW56, and

21_DGMW90, respectively. Information on the specific well construction, including screen setting and surface elevations, is provided in Table B21-4, Well Construction Details.

A 4-hour pumping test was performed on Well 21_DBMW56. The water-quality sample from this well was collected during the pumping test; the water-quality samples from 21_UGMW37 and 21_DGMW90 were collected with dedicated pumps on 13 and 20 November 1992, respectively.

Estimated transmissivity and hydraulic conductivity are provided in Table B21-5, Summary of Hydraulic Parameters. A storage coefficient and leakance factor could not be calculated for this site. The average groundwater gradient is approximately 0.007 ft/ft, or about 38 ft/mile to the north-northwest. Groundwater generally flows toward the northwest at the Station.

Using a gradient of 0.007, a hydraulic conductivity of 19.6 ft/day, and an assumed effective porosity of 0.3, the average linear velocity of groundwater would be 0.46 ft/day.

B21.7.2 Analytical Results

Groundwater quality samples were analyzed for the parameters shown in Table B21-1. The analytical results are summarized in Table B21-6. In the tested groundwater samples, drinking water standards (MCLs) were exceeded by two VOCs, two metals, total dissolved solids (TDS), chloride, and sulfate.

General Chemistry. Nitrate/nitrite and TDS exceeded the MCLs at water quality samples from both upgradient and Site 21 wells. Chloride and sulfate concentrations in groundwater exceeded MCLs at the downgradient well, 21_MW90. Concentrations of the contaminants were detected at:

- Nitrate/nitrite - 19.3 (MW37), 22.0 and 22.7 (MW56), and 23.5 (MW90) mg/L

As discussed in Section 3, the groundwater facies change dramatically across MCAS El Toro, and this change in water quality is evident at Site 21. Differences can be seen in TDS, chloride, and sulfate between the upgradient well, the source area well, and the downgradient well. Appendix A1 presents a more complete discussion of the general inorganic chemistry of the regional groundwater underlying the site. It appears that Site 21 has had no impact on inorganic water quality of the regional groundwater.

Hydrocarbons (TRPH, TFH). Hydrocarbons were not detected.

Volatile Organic Compounds (VOCs). Two VOCs were detected in the groundwater from the upgradient well (21_UGMW37) at levels exceeding the groundwater quality standards: tetrachloroethylene (PCE) ($7 \mu\text{g/L}$) and trichloroethylene (TCE) ($11 \mu\text{g/L}$). TCE and PCE were detected in the downgradient well (21_DGMW90) at levels below the maximum contaminant limit (MCL), and were not detected in 21_DBMW56.

Three VOCs were detected at levels below the MCL: chloroform (0.6 to $1 \mu\text{g/L}$), methyl chloride (3 to $4 \mu\text{g/L}$) and methylene chloride ($0.6 \mu\text{g/L}$, estimated). Methylene chloride is a demonstrated laboratory contaminant; the maximum detected concentration in the trip blanks was $42 \mu\text{g/L}$.

Semivolatile Organic Compounds (SVOCs). SVOCs were not detected.

Pesticides, Polychlorinated Biphenyls (PCBs), and Herbicides. Pesticides, herbicides, and PCBs were not detected.

Metals. At 21_DGMW90, selenium was detected at concentrations exceeding drinking water standards (at $11.6 \mu\text{g/L}$).

B21.7.3 Comparison with Drinking Water Standards

A summary of detected contaminants at concentrations exceeding MCLs is provided in Table B21-7.

B21.8 Potential Contaminant Migration Pathways

The potential contaminant sources are spills or leaks from stored drums of chemicals. Leaked or spilled chemicals may have flowed across the paved storage area and onto the ground or into the catch basin located at the southwest corner of the site. Water from the catch basin flows into the Bee Canyon Wash. It is possible that the surface water runoff may have infiltrated the soil and migrated into the groundwater.

B21.9 Summary and Conclusions

In summary, analyses of the sediment sample indicates the presence of petroleum hydrocarbons, VOCs, SVOCs, pesticides, and metals. Chemicals in the surface and near-surface soils are primarily herbicides, pesticides, petroleum hydrocarbons, and VOCs. One VOC, one pesticide, TFH-gasoline, and metals are present in the subsurface soils. TCE, PCE, and benzene are not present in the sediment or soils at Site 21. Groundwater samples analyzed indicate that concentrations of two VOCs (TCE and PCE), two metals (manganese and selenium), nitrate, TDS, chloride, and sulfate exceed the MCLs.

In conclusion, laboratory analyses of surface, near-surface, and vadose zone soils indicate the presence of hydrocarbons, VOCs, pesticides, herbicides, and metals. Those compounds plus SVOCs are also present in the catch basin sediment. These compounds do not appear to be entering the groundwater at this site. It does not appear that the soil contamination at Site 21 is a potential contributor to regional groundwater VOC contamination (OU-1).

**Table B21-1
Site 21 (OU-3): Types of Samples and Chemical Analyses
MCAS El Toro Phase I RI Technical Memorandum**

Location/ Stratum	Station Identi- fication	Sample Identi- fication	Sample Depth (ft)	Groups of Analytes Requested ^a											
				VOCs	Semi- VOCs	Pesti- cides/ PCBs	Herbi- cides	TPH	TFH	Metals	TCN	General Chem- istry	TOC	Dioxins/ Furans	Gross Alpha/Beta
Surface Water and Sediments															
Catch basin	21_CB	S1451033	0	X	X	X		X	X	X					
Surface and Near-Surface Soils															
Storage Area	21_GN1	S1454512	0	X	X	X	X	X	X	X					
Storage Area	21_GN1	S1454373 ^b	0	X	X	X	X	X	X	X					
Storage Area	21_GN1	S1454379	2	X	X	X	X	X	X	X					
Storage Area	21_GN1	S1454378	4	X	X	X	X	X	X	X					
Storage Area	21_GN2	S1454371	0	X	X	X	X	X	X	X					
Storage Area	21_GN2	S1454370	2	X	X	X	X	X	X	X					
Storage Area	21_GN3	S1454366	0	X	X	X	X	X	X	X					
Storage Area	21_GN3	S1454369	2	X	X	X		X	X	X					
Storage Area	21_GN3	S145436901 ^b	2	X	X	X	X	X	X	X					
Storage Area	21_GN3	S1454375	4	X	X	X	X	X	X	X					
Storage Area	21_UGS	S1454368	0					X	X	X					
Storage Area	21_UGS	S1454367	2					X	X	X					
Vadose Zone Soils															
Storage Area	21_DBMW56	S1457136	5	X	X	X		X	X	X					
Storage Area	21_DBMW56	S1457138 ^b	5	X	X	X		X	X	X					
Storage Area	21_DBMW56	S1457139	10	X	X	X		X	X	X					
Storage Area	21_DBMW56	S1457140 ^b	10	X	X	X		X	X	X					
Storage Area	21_DBMW56	S1456567	15	X	X	X		X	X	X					

Table B21-1
Site 21 (OU-3): Types of Samples and Chemical Analyses
MCAS EI Toro Phase I RI Technical Memorandum

Location/ Stratum	Station Identi- fication	Sample Identi- fication	Sample Depth (ft)	Groups of Analytes Requested ^a											
				VOCs	Semi- VOCs	Pesti- cides/ PCBs	Herbi- cides	TPH	TFH	Metals	TCN	General Chem- istry	TOC	Dioxins/ Furans	Gross Alpha/Beta
Storage Area	21_DBMW56	S1456568	20	X	X	X		X	X	X					
Storage Area	21_DBMW56	S1456569	25	X	X	X		X	X	X					
Storage Area	21_DBMW56	S1456570	50	X	X	X		X	X	X					
Storage Area	21_DBMW56	S1456571	60	X	X	X		X	X	X					
Storage Area	21_DBMW56	S1456572	80	X	X	X		X	X	X					
Storage Area	21_DBMW56	S1456573	95										X		
Down-gradient	21_DGMW90	S1457090	80	X	X	X		X	X	X					
Down-gradient	21_DGMW90	S1457091	120	X									X		
Down-gradient	21_DGMW90	S1457093 ^b	120	X									X		
Up-gradient	21_UGMW37	S1456393	90	X	X	X		X	X	X					
Up-gradient	21_UGMW37	S1456394	100	X									X		
Groundwater															
Storage Area	21_DBMW56	S1452126	92-132	X	X	X	X	X	X	X	X	X			
Storage Area	21_DBMW56	S1452472 ^b	92-132	X	X	X	X	X	X	X	X	X			
Down-gradient	21_DGMW90	S1452127	95-135	X	X	X	X	X	X	X	X	X			
Down-gradient	21_DGMW90	S1452457	95-135	X											
Up-gradient	21_UGMW37	S1452128	230-270	X	X	X		X	X	X	X	X			

^a VOCs = Volatile Organic Compounds; Semi-VOCs = Semivolatile Organic Compounds;
 PCBs = Polychlorinated Biphenyls; TPH = Total Recoverable Petroleum Hydrocarbons;
 TFH = Total Fuel Hydrocarbons; TCN = Total Cyanide; TOC = Total Organic Carbon.

^b Duplicate

Table B21-2

Site21 (OU- 3): Summary of Detected Chemicals in Sediments and Surface/Near-Surface Soil

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS)	21_CB S1481033 (0)	21_GN1 S1484373 (0)	21_GN1 S1484512 (0)	21_GN1 S1484379 (2)	21_GN1 S1484378 (4)	21_GN2 S1484371 (0)	21_GN2 S1484370 (2)	21_GN3 S1484386 (0)
ANALYTE BY GROUP	UNITS	DVF(a)						
METALS								
ALUMINUM	MG/KG	16800	4550	4550	8030	13700	3760	8300
ARSENIC	MG/KG	9.9	9.6	9.5	2.1	b	4.3	1.8
BARIUM	MG/KG	227	60.3	59.1	101		213	59.7
BERYLLIUM	MG/KG	0.49	U	0.35	b	0.35	b	0.51
CALCIUM	MG/KG	5260	3200	2950	3040	10600	3010	3580
CADMIUM	MG/KG	4.1	0.99	b	0.8	b	0.86	b
COBALT	MG/KG	11.5	3.7	b	3.6	b	4	b
CHROMIUM	MG/KG	29.1	5.4	b	5.9		14.2	b
COPPER	MG/KG	41.4	5.2	b	5	b	6.5	11.4
IRON	MG/KG	28400	8360	8110	12300	18500	6960	12000
MERCURY	MG/KG	0.95	0.03	U	0.03	U	0.03	U
POTASSIUM	MG/KG	8550	824	b	883	b	3090	4500
MAGNESIUM	MG/KG	8980	1530	1520	4480	8150	1480	4690
MANGANESE	MG/KG	468	213	199	218	314	163	234
SODIUM	MG/KG	400	b	292	b	307	b	235
NICKEL	MG/KG	20.4	7	b	6.1	b	5.3	b
LEAD	MG/KG	171	10.2	9.8	2.4	4.5	11.6	2.2
SELENIUM	MG/KG	0.17	b	0.1	U	0.11	U	0.12
THALLIUM	MG/KG	0.19	b	0.15	b	0.17	b	0.28
VANADIUM	MG/KG	54.2	11.5	12	29.8	45.5	10.3	27.7
ZINC	MG/KG	507	23.1	21.9	38.1	59.6	22.9	42.9
VOLATILE ORGANIC COMPOUNDS								
TOLUENE	UG/KG	27	J	3	J	3	J	11
ACETONE	UG/KG	460	U	10	U	7	J	11
METHYLENE CHLORIDE	UG/KG	380	B	-	10	U	11	U
SEMI-VOLATILE ORGANIC COMPOUNDS								
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	1300		670	U	680	U	720
ANTHRACENE	UG/KG	1900		670	U	680	U	720
PYRENE	UG/KG	6200		670	U	680	U	720
DIBENZOFURAN	UG/KG	490	J	670	U	680	U	720
BENZO(GH)PERYLENE	UG/KG	670	J	670	U	680	U	720
INDENO(1,2,3-CD)PYRENE	UG/KG	1100		670	U	680	U	720
BENZO(B)FLUORANTHENE	UG/KG	2100		670	U	680	U	720
FLUORANTHENE	UG/KG	10000		670	U	680	U	720
BENZO(K)FLUORANTHENE	UG/KG	2000		670	U	680	U	720
ACENAPHTHYLENE	UG/KG	170	J	670	U	680	U	720
CHRYSENE	UG/KG	3100		670	U	680	U	720
BENZO(A)PYRENE	UG/KG	2000		670	U	680	U	720
DIBENZO(A,H)ANTHRACENE	UG/KG	570	J	670	U	680	U	720
BENZO(A)ANTHRACENE	UG/KG	1800		670	U	680	U	720
ACENAPHTHENE	UG/KG	1200		670	U	680	U	720
PHENANTHRENE	UG/KG	14000		670	U	680	U	720
BENZYL BUTYL PHTHALATE	UG/KG	180	J	670	U	680	U	720
FLUORENE	UG/KG	1300		670	U	680	U	720
CARBAZOLE	UG/KG	2800		670	U	680	U	720
2-METHYLNAPHTHALENE	UG/KG	150	J	670	U	680	U	720
PESTICIDES AND PCBs								
ENDOSULFAN SULFATE	UG/KG	10.8		3.36	U	3.4	U	3.58
ENDOSULFAN II	UG/KG	8.27		3.36	U	3.4	U	3.58
4,4'-DDT	UG/KG	557	D	49.9	U	29	U	3.58
ALPHA-CHLORDANE	UG/KG	5.97		1.73	U	1.75	U	1.84
GAMMA-CHLORDANE	UG/KG	7.75		1.73	U	1.75	U	1.84
ENDRIN KETONE	UG/KG	4.87		3.36	U	3.4	U	3.58
BHC-GAMMA(LINDANE)	UG/KG	1.75	U	1.73	U	1.75	U	1.84
DIELDRIN	UG/KG	10.6		3.36	U	3.4	U	3.58
ENDRIN	UG/KG	22.3		3.36	U	3.4	U	3.58
METHOXYCHLOR	UG/KG	8.31		17.3	U	17.5	U	18.4
4,4'-DDD	UG/KG	109	D	2.08	U	1.13	U	3.58
4,4'-DDE	UG/KG	109	D	3.36	U	3.4	U	3.58
HERBICIDES								
DALAPON	UG/KG	-		707	U	370	U	609
2,4,5-T	UG/KG	-		25.4	U	25.8	U	27.2
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)								
TFH DIESEL	MG/KG	192		12.7	U	12.9	U	13.5
TFH GASOLINE	MG/KG	0.168		0.051	U	0.052	U	0.054
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)								
TRPH	MG/KG	180		20	U	20	U	20

Table B21-2

Site21 (OU- 3): Summary of Detected Chemicals in Sediments and Surface/Near-Surface Soil

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT,BGS) ANALYTE BY GROUP	UNITS	21_GN3 81484378 (4)	DVF(a)	21_UGS 81484388 (9)	DVF(a)	21_UGS 81484387 (2)	DVF(a)													
METALS																				
ALUMINUM	MG/KG	18800		3180		8120														
ARSENIC	MG/KG	4.8		3.8		1.8	b													
BARIUM	MG/KG	190		26.2	b	130														
BERYLLIUM	MG/KG	0.71	b	0.28	b	0.4	b													
CALCIUM	MG/KG	7120		1100		3370														
CADMIUM	MG/KG	1.8		0.49	b	0.97	b													
COBALT	MG/KG	7.8	b	4.8	b	4.9	b													
CHROMIUM	MG/KG	18.3		3		9														
COPPER	MG/KG	11.6		5.2	b	7.2														
IRON	MG/KG	20900		7850		12100														
MERCURY	MG/KG	0.03	U	0.03	U	0.03	U													
POTASSIUM	MG/KG	4890		570	b	3610														
MAGNESIUM	MG/KG	9040		1180		4500														
MANGANESE	MG/KG	328		95.7		247														
SODIUM	MG/KG	353	b	281	b	303	b													
NICKEL	MG/KG	13.7		4.7	b	7.2	b													
LEAD	MG/KG	4.4		4.9		2.1														
SELENIUM	MG/KG	0.12	U	0.1	U	0.11	U													
THALLIUM	MG/KG	0.41	b	0.15	U	0.2	b													
VANADIUM	MG/KG	53.2		18.2		27.9														
ZINC	MG/KG	63.5		18.8		39.8														
VOLATILE ORGANIC COMPOUNDS																				
TOLUENE	UG/KG	12	U	-		-														
ACETONE	UG/KG	26		-		-														
METHYLENE CHLORIDE	UG/KG	12	U	-		-														
SEMI-VOLATILE ORGANIC COMPOUNDS																				
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	780	U	-		-														
ANTHRACENE	UG/KG	780	U	-		-														
PYRENE	UG/KG	780	U	-		-														
DIBENZOFURAN	UG/KG	780	U	-		-														
BENZO(GH)PERYLENE	UG/KG	780	U	-		-														
INDENO(1,2,3-CD)PYRENE	UG/KG	780	U	-		-														
BENZO(B)FLUORANTHENE	UG/KG	780	U	-		-														
FLUORANTHENE	UG/KG	780	U	-		-														
BENZO(K)FLUORANTHENE	UG/KG	780	U	-		-														
ACENAPHTHYLENE	UG/KG	780	U	-		-														
CHRYSENE	UG/KG	780	U	-		-														
BENZO(A)PYRENE	UG/KG	780	U	-		-														
DIBENZO(A,H)ANTHRACENE	UG/KG	780	U	-		-														
BENZO(A)ANTHRACENE	UG/KG	780	U	-		-														
ACENAPHTHENE	UG/KG	780	U	-		-														
PHENANTHRENE	UG/KG	780	U	-		-														
BENZYL BUTYL PHTHALATE	UG/KG	780	U	-		-														
FLUORENE	UG/KG	780	U	-		-														
CARBAZOLE	UG/KG	780	U	-		-														
2-METHYLNAPHTHALENE	UG/KG	780	U	-		-														
PESTICIDES AND PCBs																				
ENDOSULFAN SULFATE	UG/KG	3.78	U	-		-														
ENDOSULFAN II	UG/KG	3.78	U	-		-														
4,4'-DDT	UG/KG	3.78	U	-		-														
ALPHA-CHLORDANE	UG/KG	1.95	U	-		-														
GAMMA-CHLORDANE	UG/KG	1.95	U	-		-														
ENDRIN KETONE	UG/KG	3.78	U	-		-														
BHC-GAMMA(LINDANE)	UG/KG	1.95	U	-		-														
DIELDRIN	UG/KG	3.78	U	-		-														
ENDRIN	UG/KG	3.78	U	-		-														
METHOXYCHLOR	UG/KG	19.5	U	-		-														
4,4'-DDD	UG/KG	3.78	U	-		-														
4,4'-DDE	UG/KG	3.78	U	-		-														
HERBICIDES																				
DALAPON	UG/KG	57.4	U	-		-														
2,4,5-T	UG/KG	28.7	U	-		-														
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																				
TFH DIESEL	MG/KG	14.4	U	34.8		14.1	U													
TFH GASOLINE	MG/KG	0.058	U	0.073		0.057	U													
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																				
TRPH	MG/KG	20	U	2558		58														

(a) A definition of each data validation flag (DVF) is provided in Table B-1.

Table B21-3

Site21 (OU- 3): Summary of Detected Chemicals in the Vadose Zone (Subsurface) Samples

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	21_DBMW56 S1457136 (5)	DVF(a)	21_DBMW56 S1457138 (5)	DVF(a)	21_DBMW56 S1457139 (10)	DVF(a)	21_DBMW56 S1457140 (10)	DVF(a)	21_DBMW56 S1456567 (15)	DVF(a)	21_DBMW56 S1456568 (20)	DVF(a)	21_DBMW56 S1456569 (25)	DVF(a)	21_DBMW56 S1456570 (50)	DVF(a)
GENERAL CHEMISTRY																	
TOTAL ORGANIC CARBON	MG/KGW	-		-		-		-		-		-		-		-	
TOTAL ORGANIC CARBON	MG/KG	-		-		-		-		-		-		-		-	
METALS																	
SILVER	MG/KG	2	b	2.4	b	2.2	b	2	b	1.9	b	2	b	2.3	b	2.1	b
ALUMINIUM	MG/KG	15400		22900		12900		16900		3490		2890		15200		9490	
ARSENIC	MG/KG	4.1		3.2		2.9		2	b	0.5	b	2.5		3.3		1.3	b
BARIUM	MG/KG	179		225		186		159		37.3	b	25.7	b	253		37.8	b
BERYLLIUM	MG/KG	1.2		1.4		1.3		1.2		0.72	b	0.83	b	1.2		0.96	b
CALCIUM	MG/KG	10300		14100		9640		8780		2150		929	b	12100		1280	
CADMIUM	MG/KG	1.8		1.8		8.1		1.2		0.77	b	0.43	b	1.6		0.26	b
COBALT	MG/KG	8.1	b	8.5	b	6.3	b	6.3	b	1.5	b	1.2	U	7.7	b	2.5	b
CHROMIUM	MG/KG	15.8		20.2		12.9		18.1		4.6		7.3		17.4		7.1	
COPPER	MG/KG	12.1		13.6		10.2		9.8		4.3	b	3.8	b	9.9		3.4	b
IRON	MG/KG	19900		26800		17900		20500		4930		4880		21200		8720	
MERCURY	MG/KG	0.04	b	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U	0.06	
POTASSIUM	MG/KG	4890		5910		5140		4810		1200		1170		4880		1090	b
MAGNESIUM	MG/KG	9700		13100		9130		9280		1900		1600		8040		1720	
MANGANESE	MG/KG	322		364		303		299		131		93		330		101	
SODIUM	MG/KG	442	b	587	b	900	b	784	b	449	b	275	b	588	b	452	b
NICKEL	MG/KG	9.7		11.8		8.9	b	7.8	b	2.2	b	2.9	b	11.2		4.2	b
LEAD	MG/KG	3.4		2.8		2.4		1.9		1.3		0.95		2.5		2.1	
SELENIUM	MG/KG	0.12	U	0.12	U	0.12	U	0.11	U	0.11	U	0.1	U	0.12	U	0.11	U
THALLIUM	MG/KG	0.31	b	0.24	b	0.43	b	0.27	b	0.15	U	0.15	U	0.35	b	0.15	U
VANADIUM	MG/KG	48.9		64.8		43.4		50.6		11.1		11.1		54.9		15	
ZINC	MG/KG	62		78.1		59.8		59.9		18.3		15.2		81.7		17.2	
VOLATILE ORGANIC COMPOUNDS																	
ACETONE	UG/KG	12	U	11	U	11	U	13	U	11	U	15	U	12	U	12	U
PESTICIDES AND PCBs																	
METHOXYCHLOR	UG/KG	18.4	U	18.7	U	18.7	U	21.3	U	18.3	U	17.1	U	18.1	U	17.7	
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																	
TFH GASOLINE	MG/KG	0.054	U	0.055	U	0.056	U	0.063	U	0.054	U	0.051	U	0.053	U	0.107	

Table B21-3

Site21 (OU- 3): Summary of Detected Chemicals in the Vadose Zone (Subsurface) Samples

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	21_DBMW56 S1456571 (60)	DVF(a)	21_DBMW56 S1456572 (60)	DVF(a)	21_DBMW56 S1456573 (65)	DVF(a)	21_DGMW90 S1457090 (80)	DVF(a)	21_DGMW90 S1457091 (120)	DVF(a)	21_DGMW90 S1457093 (120)	DVF(a)	21_UGMW37 S1456393 (90)	DVF(a)	21_UGMW37 S1456394 (100)	DVF(a)
GENERAL CHEMISTRY																	
TOTAL ORGANIC CARBON	MG/KGW	-		-		100	U	-		318		254		-		-	
TOTAL ORGANIC CARBON	MG/KG	-		-		-		-		-		-		-		100	J
METALS																	
SILVER	MG/KG	1.8	b	2.2	U	-		0.48	U	-		-		0.49	U	-	
ALUMINUM	MG/KG	1940		7070		-		2940		-		-		14000		-	
ARSENIC	MG/KG	1.4	b	3.2		-		1.9	b	-		-		5.2		-	
BARIUM	MG/KG	35	b	89.9		-		35	b	-		-		182		-	
BERYLLIUM	MG/KG	0.64	b	0.94	U	-		0.12	U	-		-		0.46	J	-	
CALCIUM	MG/KG	2350		3490		-		1910		-		-		3230		-	
CADMIUM	MG/KG	0.34	b	1.1	U	-		1	b	-		-		2.8		-	
COBALT	MG/KG	1.2	U	2.9	b	-		2.2	b	-		-		6.1	b	-	
CHROMIUM	MG/KG	2.6		14.5		-		5		-		-		14.8		-	
COPPER	MG/KG	2.2	b	5.7		-		2.9	b	-		-		9.5		-	
IRON	MG/KG	3280		11500		-		4880		-		-		18700		-	
MERCURY	MG/KG	0.03	U	0.03	U	-		1.5		-		-		0.03	U	-	
POTASSIUM	MG/KG	890	b	1680		-		1130	b	-		-		3380		-	
MAGNESIUM	MG/KG	1100		2620		-		1700		-		-		4130		-	
MANGANESE	MG/KG	78.8		181		-		132		-		-		828		-	
SODIUM	MG/KG	195	b	322	b	-		259	b	-		-		425	b	-	
NICKEL	MG/KG	2.7	b	8.2	b	-		6.1	b	-		-		12.3		-	
LEAD	MG/KG	0.92		2.7		-		1.5		-		-		5.5		-	
SELENIUM	MG/KG	0.1	U	0.11	U	-		0.13	b	-		-		0.12	U	-	
THALLIUM	MG/KG	0.15	U	0.22	b	-		0.16	U	-		-		0.16	U	-	
VANADIUM	MG/KG	9	b	23		-		11.9		-		-		45.8		-	
ZINC	MG/KG	12.5		39.2		-		18.1		-		-		61.7		-	
VOLATILE ORGANIC COMPOUNDS																	
ACETONE	UG/KG	11	U	20	U	-		12	U	12	U	12	U	7	J	12	U
PESTICIDES AND PCBs																	
METHOXYCHLOR	UG/KG	25.4		17.3	U	-		-	UJR	-		-		19.8	U	-	
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																	
TFH GASOLINE	MG/KG	0.055	U	0.051	U	-		0.059	U	-		-		0.059	U	-	

(a) A definition of each data validation flag (DVF) is provided in Table B-1.

Table B21-4
Site 21 (OU-3): Well Construction Details
MCAS El Toro Phase I RI Technical Memorandum

Sheet 1 of 1

Item	Station Identification		
	21_DBMW56	21_DGMW90	21_UGMW37
Survey Location--Northing	548331.35	548396.53	548348.25
Survey Location--Easting	1546527.44	1546430.33	1546722.73
Ground Surface Elevation (ft above MSL ^a)	256.32	255.48	419.43
Measuring Point Elevation (ft above MSL ^a)	256.06	255.35	419.67
Measuring Point Location	Top of casing	Top of casing	Top of casing
Type of Surface Completion	Below ground	Below ground	Below ground
Casing Diameter and Material	4-inch PVC	4-inch PVC	4-inch PVC
Screen Diameter and Material	4-inch stainless	4-inch stainless	4-inch stainless
Screen Interval (ft bgs ^b)	92-132	95-135	89-130
Length of Drop Pipe (ft bgs ^b)	130	125	125
Make and Model of Installed Pump	2-inch Grundfos Redi-flow	2-inch Grundfos Redi-flow	2-inch Grundfos Redi-flow
Date of Pumping Test	11-18-92	NA	NA
Date of Water Quality Sampling	11-18-92	11-20-92	11-13-92
^a Mean sea level ^b Below ground surface			

<p align="center">Table B21-5 Site 21 (OU-3): Summary of Hydraulic Parameters MCAS El Toro Phase I RI Technical Memorandum</p> <p align="right">Sheet 1 of 1</p>						
Well Identification	Type of Test	Analysis Method	Transmissivity (ft²/day)	Hydraulic Conductivity (ft/day)	Storage Coefficient^a	Leakance Factor^a
21_DBMW56	Pump	Theiss Recovery	720	19.6	NA	NA
21_DGMW90	NA	NA	NA	NA	NA	NA
21-UGMW37	NA	NA	NA	NA	NA	NA

^aNA = Not applicable.
 Source: Table F-2 (Appendix F)

Table B21-6

Site21 (OU- 3): Summary of Detected Chemicals in Groundwater Samples

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SCREEN INTERVAL ANALYTE BY GROUP	REG.CODE(b)	REG.LEVEL(c)	UNITS	21_DBMW56 S1452128 (92-132)	DVF(a)	21_DBMW56 S1452472 (92-132)	DVF(a)	21_DGMW90 S1452127 (95-135)	DVF(a)	21_DGMW90 S1452457 (95-135)	DVF(a)	21_UGMW37 S1452128 (90-130)	DVF(a)
GENERAL CHEMISTRY													
ALKALINITY AS CaCO3	NA	NA	MG/L	202		200		190		-		212	
CARBONATE	NA	NA	MG/L	-		-		-		-		-	
CYANIDE	NA	NA	UG/L	3	U	3	U	4	B	-		3	U
BICARBONATE	NA	NA	MG/L	246		243		231		-		259	
CHLORIDE	3	250	MG/L	188		188		467		-		180	
SULFATE	3	250	MG/L	230		228		568		-		191	
NITRATE/NITRITE-N	1	10	MG/L	22.7		22		23.5		-		19.3	
TOTAL DISSOLVED SOLIDS	3	500	MG/L	1080		1060		1120		-		964	
METALS													
ALUMINUM	3	50	UG/L	31	U	31	U	31	U	-		48.1	b
BARIUM	2	2000	UG/L	28.8	b	28.6	b	32.9	b	-		25.3	b
CALCIUM	NA	NA	UG/L	161000		161000		161000		-		144000	
CADMIUM	2	5	UG/L	1.2	U	1.2	U	1.8	b	-		2.2	U
IRON	3	300	UG/L	5.8	b	5.1	b	51.9	U	-		8.5	b
POTASSIUM	NA	NA	UG/L	2190	b	2110	b	2770	b	-		2550	b
MAGNESIUM	NA	NA	UG/L	45100		45300		46700		-		39400	
MANGANESE	3	50	UG/L	7.6	b	7.2	b	90.4		-		13.7	b
SODIUM	NA	NA	UG/L	78100		78300		80700		-		83100	
NICKEL	NA	NA	UG/L	10.6	b	13.3	b	113		-		102	
ANTIMONY	NA	NA	UG/L	12.1	U	12.1	U	17.6	J	-		12.1	U
SELENIUM	1	10	UG/L	11.6	b	7.4	b	13.5	J	-		9.5	
THALLIUM	NA	NA	UG/L	0.8	b	0.7	b	0.7	b	-		0.7	UJ
VANADIUM	NA	NA	UG/L	17.4	b	16.3	b	14.2	b	-		13.6	b
ZINC	2	5000	UG/L	16.5	b	11.4	b	9.2	U	-		5.1	b
VOLATILE ORGANIC COMPOUNDS													
TETRACHLOROETHENE	2	5	UG/L	1	U	1	U	-		0.8	J	7	
CHLOROFORM	2	100	UG/L	1	U	1	U	-		0.6	J	1	
CHLOROMETHANE (METHYL CHLORIDE)	NA	NA	UG/L	4		3		-		2	U	4	
METHYLENE CHLORIDE	4	40	UG/L	1	U	1	U	-		0.6	J	1	U
TRICHLOROETHYLENE	2	5	UG/L	1	U	1	U	-		1		11	

(a) A definition of each data validation flag (DVF) is provided in Table B-1.

(b) Regulatory Codes are:

- 1 = California MCL
- 2 = EPA primary MCL
- 3 = EPA secondary MCL
- 4 = California DTSC Action Level

(c) The given concentration represents the California MCL, the EPA primary MCL, the EPA secondary MCL, or the California DTSC Action Level, whichever is most stringent.

**Table B21-7
Site 21 (OU-3): Analyte Concentrations in Groundwater
Exceeding Regulatory Standards or DTSC^a Action Levels
MCAS El Toro Phase I RI Technical Memorandum**

Well Identification	SI (ft bgs) ^b	Analyte	Units	Concentration	Regulatory Level ^c	Regulatory Code ^d
21_UGMW37	(89-130)	Nitrate/Nitrite-N	mg/L	19.3	10	2
		Total Dissolved Solids	mg/L	964	500	3
		Tetrachloroethene	µg/L	7	5	1
		Trichloroethylene	µg/L	11	5	1
21_DBMW56	(92-132)	Nitrate/Nitrite-N	mg/L	22.7	10	2
		Total Dissolved Solids	mg/L	1,080	500	3
		Selenium	µg/L	11.6	10	2
21_DGMW90	(95-135)	Manganese	µg/L	90.4	50	3
		Selenium	µg/L	13.5	10	2
		Chloride	mg/L	467	250	3
		Nitrate/Nitrite-N	mg/L	23.5	10	2
		Sulfate	mg/L	568	250	3
		Total Dissolved Solids	mg/L	1,120	500	3

^aCalifornia Department of Toxic Substances Control

^bScreen interval (feet below ground surface)

^cThe most stringent federal/state drinking water standard was applied. In the presence of both an EPA MCL and a California MCL, the most stringent MCL is represented. If neither an EPA or California MCL is listed, the California DTSC action level was applied.

^dRegulatory Code:

- 1=EPA Primary MCL: Federally enforceable drinking water standard established for the health effects of contaminants
- 2=California MCL: Health-based drinking water standard enforceable at the state level
- 3=EPA Secondary MCL: Nonenforceable standard based on aesthetic qualities of taste, color, and odor (Includes chloride, iron, manganese, sulfate, and TDS)
- 4=DTSC Action Level: Nonenforceable levels at which DTSC strongly urges water purveyors to take corrective action to reduce the level of contamination in the water they supply (Action levels cease to exist when state MCLs are promulgated.)

Appendix B22

**Nature and Extent of Contamination:
Site 22 (OU-3) — Tactical Air Fuel Dispensing System**

Appendix B22

NATURE AND EXTENT OF SITE-SPECIFIC CONTAMINATION: SITE 22 (OU-3) - TACTICAL AIR FUEL DISPENSING SYSTEM

This discussion of Site 22 is supplemented by the figures and data tables listed below. The figures begin on page B22-3, and the tables are grouped at the end of this Appendix B22. Field headspace values for soils at this site are presented in Table BA1-22, in Attachment 1 to Appendix B (directly following Appendix B22).

Figure B22-1: (Site Map)

Figure B22-2: Geologic Cross Section

Table B22-1: Types of Samples and Chemical Analyses

Table B22-2: Summary of Detected Chemicals in Sediments and Surface/Near-Surface Soil

Table B22-3: Summary of Detected Chemicals in Vadose Zone (Subsurface) Samples

Table B22-4: Well Construction Details

Table B22-5: Summary of Hydraulic Parameters

Table B22-6: Summary of Detected Chemicals in Groundwater Samples

Table B22-7: Analyte Concentrations in Groundwater Exceeding Regulatory Standards or DTSC Action Levels

B22.1 Site Description

Site 22 (OU-3), the Tactical Air Fuel Dispensing System (TAFDS), was originally located at the eastern portion of the Petroleum Disposal Area (Site 10). It was first observed in the 1952 aerial photographs. By 1980, it had been relocated west of Site 10, south of Building 435, and east of Building 369. The site consists of two strata: Stratum 1, the (more recent) western fuel dispensing area and Stratum 2, the (older) eastern fuel dispensing area.

Heavy staining was observed at both TAFDS locations. Several fuel bladder revetments (FBRs), each containing a fuel bladder, were located at the TAFDS. Numerous stained areas surrounded these FBRs. Reportedly, the sites had a history of petroleum-based fuel spillages and leaks during routine operation. A particular spill was cited that

occurred in 1983 or 1984, during which an unknown quantity of fuel and soils was cleaned up (Brown and Caldwell, 1986).

B22.2 Suspected Waste Types and Contaminants

Suspected contaminants for Site 22 are VOCs, SVOCs, and petroleum products.

B22.3 Field Investigation

The field investigation at Site 22 consisted of:

- Drilling and sampling one deep boring in Stratum 1, and completion as a well
- Collecting surface and shallow soil samples from seven sampling stations
- Drilling and sampling a 25-foot boring in Stratum 2

Because of the volatile nature of potential contaminants and the lack of nearby drainage facilities to convey water, surface water is probably not a pathway of concern, so no surface water or sediment sampling was conducted.

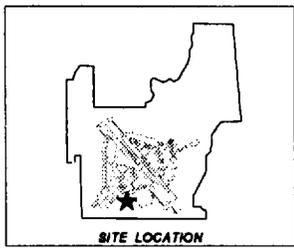
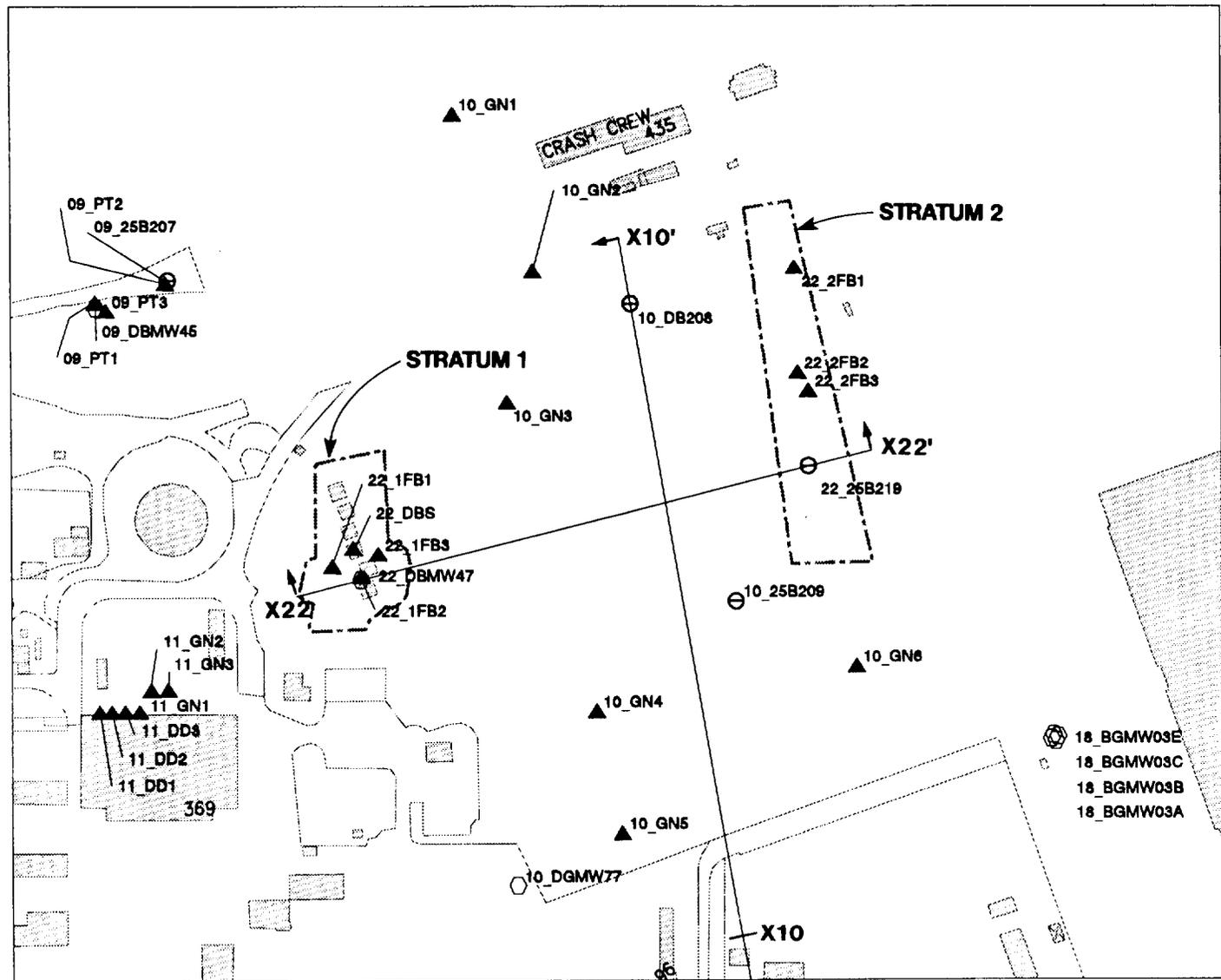
Changes were made in the site boundaries and the number and location of sampling stations and soil borings from the original *SAP*, as documented in the *SAP Amendment*. The main change was the addition of the (old) eastern TAFDS area to the site, and the resulting addition of a 25-foot boring and the allocation of three shallow soil borings to each stratum. Another change was the addition of a surface soil sample at the location of the deep soil boring/monitoring well in Stratum 1.

B22.3.1 Surface Water and Sediments

(Surface water and sediment samples were not collected at this site.)

B22.3.2 Surface and Near-Surface Soils

Within Stratum 1, the Western Area, three shallow soil stations (22_1FB1, 22_1FB2, and 22_1FB3) were sampled at the surface (0 feet) and at 2 feet. A



- FEATURES:**
- BUILDING OR PAD
 - MONITORING WELL
 - DEEP, 25-FOOT, OR ANGLE BORING
 - SEDIMENT SAMPLE
 - SURFACE WATER AND SEDIMENT SAMPLE
 - SURFACE AND NEAR-SURFACE SOIL SAMPLE
 - ROAD
 - STRATUM BOUNDARY
 - WASH OR STREAM
 - LINE OF GEOLOGIC CROSS-SECTION
 - END OF LINE OF CROSS-SECTION
 - LINE OF CROSS-SECTION EXTENDS BEYOND AREA SHOWN

- 18_BGMW03E
- 18_BGMW03C
- 18_BGMW03B
- 18_BGMW03A



FIGURE B22-1
SITE 22 (OU-3): TACTICAL AIR FUEL DISPENSING SYSTEM
 MCAS EL TORO PHASE I RI TECHNICAL MEMORANDUM

PAGE NUMBER B22-4

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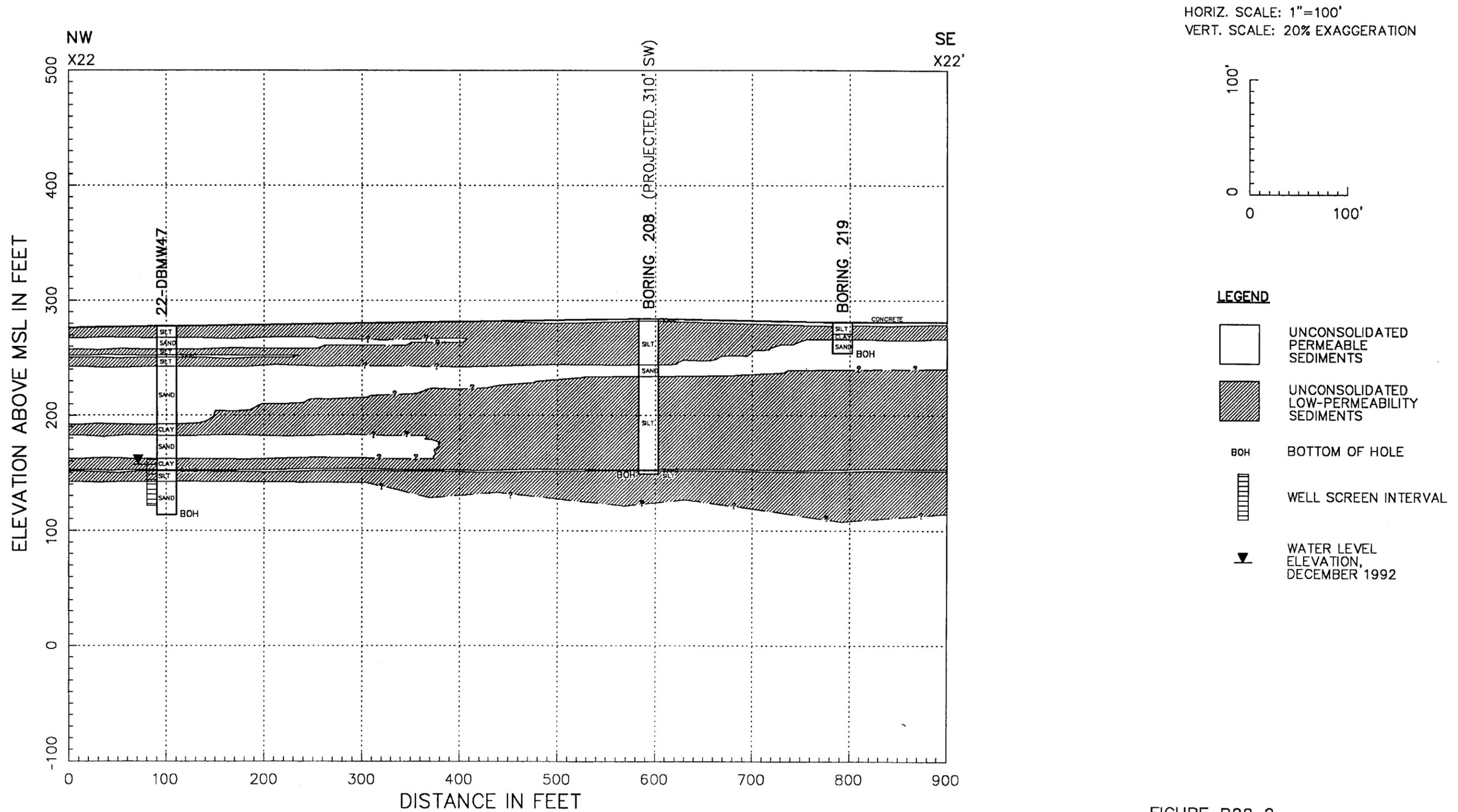


FIGURE B22-2
 SITE 22 (OU-3)
 GEOLOGIC CROSS SECTION X22-X22'
 MCAS EL TORO PHASE I RI
 TECHNICAL MEMORANDUM

PAGE NUMBER B32-6

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duplicate sample was collected at 2 feet at 22_1FB3. In addition, a surface sample at 22_DBS was collected adjacent to Deep Boring/Monitoring Well (22_DBMW47). A total of eight samples were collected.

Within Stratum 2, the Eastern Area, three other shallow soil stations (22_2FB1, 22_2FB2, and 22_2FB3) were sampled. Station 22_2FB1 was sampled at the surface (0 foot) and at 2 feet. Stations 22_2FB2 and 22_2FB3 were each sampled at depths of 0, 2, and 4 feet. A total number of eight shallow soil samples were collected.

B22.3.3 Vadose Zone Soils (Soil Borings)

The 25-foot boring (22_25B219) was drilled and sampled in Stratum 2. It was sampled for lithologic logging and chemical analyses at 5, 10, 15, 20, and 25 feet. No duplicate samples were collected. A total of five samples was collected.

B22.3.4 Groundwater Monitoring Wells

One soil boring was drilled and sampled, completed as a Well (22_DBMW47), and subsequently sampled for groundwater (Stratum 1). Nine soil samples were collected for analyses during drilling at depths of 5, 10, 15, 20, 25, 35, 55, 95, and 135 feet.

Well 22_DBMW47 is inside the Stratum 1 boundary; its depth to groundwater for well is approximately 120 feet. An aquifer test was performed on this well, and it was sampled once for groundwater during the pumping test.

B22.4 Surface Water and Sediments

(Surface water and sediment samples were not collected at this site.)

B22.5 Surface and Near-Surface Soils

B22.5.1 Description of Surface and Near-Surface Soil Samples

The soils of Site 22 are Omni Series, Section 206 - Sorrento loam, 0 to 2 percent slopes. The Omni Series is characterized by poorly drained soils on floodplains and in basins. These soils form in mixed alluvium. About 10 percent of the mapping unit includes areas of Sorrento clay loam; 3 percent Sorrento sandy loam; 5 percent soils that are noncalcareous throughout but are otherwise similar to this Sorrento soils; 5 percent Mocho loam, 0 to 2 percent slopes; and 3 percent Bolsa silt loam (Wachtell, 1978).

At depths of 0 to 12 inches, the soils have a permeability of 0.6 to 2.0 in/hr, an available water capacity of 0.16 to 0.21 in/hr, and a pH of 6.1 to 8.4 (Wachtell, 1978).

B22.5.2 Analytical Results and Soil Vapor Headspace Values

A summary of detected compounds is provided in Table B22-2, and includes hydrocarbons, VOCs, SVOCs, and metals. In general, the soil samples with the largest VOC and/or hydrocarbon concentrations correspond with the soil samples for which the maximum OVA headspace concentrations were recorded in the field (65 ppmv, 22_2FB2 at 4 feet).

B22.5.2.1 Upgradient Area

(Upgradient soil samples were not collected at this site.)

B22.5.2.2 Stratum 1: Western Area

Detected compounds include hydrocarbons, 3 VOCs, 11 SVOCs, and metals.

Hydrocarbons (TRPH, TFH). TFH-diesel was detected in the Stratum 1 shallow borings at the following concentrations: 0.2 mg/kg at 2 feet in 22_1FB1; 32 mg/kg at 2 feet in 22_1FB2; 30, 22, and 14 mg/kg at depths of 0, 2, and 2 feet in 22_1FB3. TFH-gasoline was detected at all stations at concentrations less than 1 mg/kg. TRPH was detected at Stations 22_1FB2 and 22_1FB3 at depths of 0 and 2 feet; concentrations are as follows: 105 and 125 mg/kg at depths of 0 and 2 feet; at 22_1FB2, 213, 261, and 393 mg/kg at depths of 0, 2 and 2 feet, respectively, at 22_1FB2. TRPH was 87 mg/kg in the surface soil sample at 22_DBS; TFH was not detected at 22_DBS.

Volatile Organic Compounds (VOC)s. VOCs detected were acetone and toluene at all sampling stations and 2-hexanone at 22_1FB3. Acetone concentrations range from 12 to 31 $\mu\text{g}/\text{kg}$, and toluene, from 2 to 4 $\mu\text{g}/\text{kg}$. 2-Hexanone was detected at 4 $\mu\text{g}/\text{kg}$, estimated, in the 22_1FB3 sample at 2 feet. Acetone is a demonstrated laboratory contaminant. The maximum detected concentration of acetone in the trip blanks was 37 $\mu\text{g}/\text{L}$.

Semivolatile Organic Compound (SVOCs). SVOCs were detected in the 22_1FB3 sample only and include:

- Benzo(a)anthracene at 390 $\mu\text{g}/\text{kg}$ (estimated) at 2 feet
- Benzo(a)pyrene at 320 $\mu\text{g}/\text{kg}$ (estimated) at 2 feet
- Benzo(b)fluoranthene at 370 $\mu\text{g}/\text{kg}$ (estimated) at 2 feet
- Benzo(k)fluoranthene at 240 $\mu\text{g}/\text{kg}$ (estimated) at 2 feet
- Bis(2-ethylhexyl) phthalate at 150 $\mu\text{g}/\text{kg}$ at 0 feet in 22_1FB2
- Carbazole at 170 $\mu\text{g}/\text{kg}$ (estimated) at 2 feet
- Chrysene at 400 $\mu\text{g}/\text{kg}$ (estimated) at 2 feet
- Fluoranthene at 140 and 1,200 $\mu\text{g}/\text{kg}$ at 0 feet and 2 feet, respectively
- Indeno(1,2,3-CD)pyrene at 200 $\mu\text{g}/\text{kg}$ at 2 feet
- Phenanthrene at 1,000 $\mu\text{g}/\text{kg}$ at 2 feet and 140 $\mu\text{g}/\text{kg}$ at 0 feet
- Pyrene at 140 and 850 $\mu\text{g}/\text{kg}$ at 0 feet and 2 feet, respectively

Pesticides and Polychlorinated Biphenyls (PCBs). Pesticides and polychlorinated biphenyls were not detected.

Metals. Table 22-2 presents results of the detected metals.

In summary, TFH-diesel was detected at all sampling stations at up to 32 mg/kg (2 feet at 22_1FB2) and TFH-gasoline was detected at all stations at less than 1 mg/kg. TRPH was detected at 22_1FB2 and 22_1FB3 at a maximum concentration of 393 mg/kg (2 feet at 22_1FB2). VOCs detected were acetone, toluene, and 2-butanone, to a maximum concentration of 31 $\mu\text{g}/\text{kg}$ (2 feet at 22_1FB3). Various SVOCs were detected to a maximum of 1,200 $\mu\text{g}/\text{kg}$ (fluoranthene at 0 feet, 22_1FB3). Pesticides and PCBs were not detected.

B22.5.2.3 Stratum 2: Eastern Area

Hydrocarbons, three VOCs, three SVOCs, and metals were detected.

Hydrocarbons (TRPH, TFH). At Station 22_2FB3, TFH-diesel increases in concentration from 28 mg/kg at 0 feet, to 3,610 mg/kg at 2 feet, to 9,140 mg/kg at 4 feet. TFH-diesel was also detected at 22_2FB2 at 40 mg/kg at the 0-foot depth. TFH-gasoline also shows an increase with concentration with depth at 22_2FB3; 0.1 mg/kg at 0 feet, 309 mg/kg at 2 feet, and 916 mg/kg at 4 feet. TFH-gasoline at 22_2FB2 (0 feet) is 0.2 mg/kg. As in the cases of TFH-diesel and TFH-gasoline, TRPH increases in concentration with depth at 22_2FB3; 261 at 0 feet, 2,016 mg/kg at 2 feet, and 4,666 mg/kg at 4 feet.

Volatile Organic Compounds (VOCs). VOCs were detected only at 22_2FB1 at 2 feet and consist of 2-butanone at 4 $\mu\text{g}/\text{kg}$, toluene at 9 $\mu\text{g}/\text{kg}$, and 2-hexanone at 4 $\mu\text{g}/\text{L}$. VOCs detected are below CRDLs. 2-Butanone is a demonstrated laboratory contaminant; the maximum detected concentration in the trip blanks was 33 $\mu\text{g}/\text{L}$.

Semivolatile Organic Compounds (SVOCs). SVOCs were detected only at 22_2FB3 and consist of 2-methylnaphthalene (8,300 $\mu\text{g}/\text{kg}$ at 4 feet and 24,000 $\mu\text{g}/\text{kg}$ at 4 feet), isophorone (7,100 $\mu\text{g}/\text{kg}$ at 4 feet), and naphthalene (5,400 $\mu\text{g}/\text{kg}$ at 4 feet). The concentrations of SVOCs detected at 2 feet are below CRDLs.

Pesticides and Polychlorinated Biphenyls (PCBs). Pesticides and PCBs were not detected.

Metals. Table B22-2 presents results of the detected metals.

In Stratum 2 (Eastern Area), TFH-diesel (up to 9,140 mg/kg), TFH-gasoline (up to 916 mg/kg), and TRPH (up to 4,666 mg/kg) concentrations are highest and increase with depth at location 22_2FB3. SVOCs appear to show a similar trend (up to 22,000 $\mu\text{g}/\text{kg}$). VOCs were detected at 22_2FB1 only (up to 9 $\mu\text{g}/\text{kg}$). In Stratum 1, TFH-diesel and TFH-gasoline were detected at all stations, but a spatial trend, similar to that of Stratum 2, is not apparent. In general, hydrocarbon concentrations at Stratum 1 are lower than at Stratum 2.

B22.6 Vadose Zone Soils

B22.6.1 Description of Subsurface Soil Samples

One monitoring well and one 25-foot boring were drilled and soil was sampled from both.

B22.6.2 Subsurface Geology

Site 22 overlies approximately 350 feet of unconsolidated Quaternary sediments, which in turn overlie the semiconsolidated bedrock of the Irvine Area Groundwater Basin. Figure B22-2 is an east-west geologic cross section through the site.

Alluvium encountered during drilling consists of layered sequences dominated by variable mixtures of sands, silts, and clays (e.g., sandy clay, clayey silt). Thus, well-defined permeable units such as well-sorted coarse sands are infrequent. More detailed descriptions are provided in the soil boring logs (Appendix K).

B22.6.3 Analytical Results

Nine subsurface soil samples were collected from Well 22_DBMW47; five samples were collected from Boring 22_25B219. Chemicals detected (summarized in Table B22-3) were fuel hydrocarbons, five VOCs, two SVOCs, three pesticides, and metals.

Hydrocarbons (TRPH, TFH). TFH-diesel and TRPH were not detected. TFH-gasoline concentrations increase slightly with depth in 22_25B219, but are less than 1 $\mu\text{g}/\text{kg}$. TFH-gasoline was detected in 22_DBMW47 at 0.4 mg/kg at 5 feet.

Volatile Organic Compounds (VOCs). In 22_25B219, VOCs detected were 2-butanone (2 to 3 $\mu\text{g}/\text{kg}$ at depths of 5 to 25 feet) at concentrations below the CRDLs, and methylene chloride at 39 $\mu\text{g}/\text{kg}$ at 20 feet. 2-Butanone and methylene chloride are demonstrated laboratory contaminants; their maximum detected concentrations were 33 $\mu\text{g}/\text{L}$ and 42 $\mu\text{g}/\text{L}$, respectively.

In 22_DBMW47, VOCs detected include acetone at 20 to 73 $\mu\text{g}/\text{kg}$ at depths between 5 and 25 feet; there is no apparent correlation between depth and concentration. Also detected (at concentrations below the CRDLs) were methylene chloride at 8 $\mu\text{g}/\text{kg}$ (95 and 135 feet), toluene at 3 to 5 $\mu\text{g}/\text{kg}$ (5 to 135 feet), and TCE at 6 $\mu\text{g}/\text{kg}$ (135 feet). The sample that contained TCE was collected below the water table in the well screen interval of Well 22_DBMW47.

Semivolatile Organic Compounds (SVOCs). SVOCs detected in 22_DBMW47 are benzyl butyl phthalate at 710 $\mu\text{g}/\text{kg}$, estimated (95 feet), and bis(2-ethylhexyl)phthalate at 1,100 and 1,800 $\mu\text{g}/\text{kg}$ at depths of 5 and 10 feet, respectively.

Pesticides, Polychlorinated Biphenyls (PCBs). Pesticides detected were 4,4'-DDD at 5.71 $\mu\text{g}/\text{kg}$, 4,4'-DDE at 7.46 $\mu\text{g}/\text{kg}$, and 4,4'-DDT at 4.37 $\mu\text{g}/\text{kg}$ in 22_DBMW47 at 10 feet.

Metals. Table 22-3 presents results of the detected metals.

Total Organic Carbon (TOC). TOC was not detected.

In summary, hydrocarbons (TFH-gasoline) were detected at concentrations below the California LUFT action levels. TFH-diesel and TRPH values were measured below detection limits. Two VOCs (2-butanone and methylene chloride) were detected at 22_25B219 and four VOCs (acetone, toluene, methylene chloride, and TCE) were detected at 22_DBMW47. Acetone, methylene chloride, and 2-butanone are demonstrated laboratory contaminants. Of these, only acetone was detected above the maximum detected concentration in trip blanks.

No depth-to-concentration correlation was apparent for the VOCs detected. All the detected VOC values for the vadose zone are below CRDLS. SVOC concentrations were measured below detection limits in Stratum 2. However, benzyl butyl phthalate and bis(2-ethylhexyl)phthalate had maximum concentrations of 710 and 1,800 $\mu\text{g}/\text{kg}$, respectively, in 22_DBMW47. Pesticides detected were 4,4'-DDD at 5.71 $\mu\text{g}/\text{kg}$, 4,4'-DDE at 7.46 $\mu\text{g}/\text{kg}$, and 4,4'-DDT at 4.37 $\mu\text{g}/\text{kg}$ in 22_DBMW47 at 10 feet.

B22.6.3 Soil Vapor Headspace Concentrations

Organic vapor analysis (OVA) results are presented in Attachment 1 to Appendix B. In general, the OVA data and the laboratory data both indicate the presence of subsurface VOCs. The maximum OVA concentrations were recorded within the coarser-grained units (the sand lenses identified during drilling).

B22.7 Groundwater

B22.7.1 Site-Specific Hydrogeology

Well construction details are presented in Table B22-4. The static water level recorded in Well 22_DBMW47 at Site 22 is indicated in Figure B22-2. Depth to water is approximately 120 feet bgs. Based on December 1992 static water levels for Site 22 and surrounding monitoring wells, the horizontal hydraulic gradient is 0.007 to the northwest.

Vertical hydraulic gradients are expected to be down at Site 22 in response to regional pumping of underlying aquifers, as seen in Well Cluster 3, located approximately one-third of a mile southeast of the site. Slug test and pumping test data are discussed and evaluated in Appendix F. Table F-2 in Appendix F shows aquifer parameters for all wells for which aquifer tests were performed, and Table B22-5 gives hydraulic parameters for Site 22.

The hydraulic conductivity and transmissivity (40-foot screen) for Well 22_DBMW47 are approximately 7 ft/day and 250 ft²/day, respectively (Table B22-5). Based on the above hydraulic conductivity and a gradient of 0.007, and assuming an effective porosity of 20 percent, the average linear groundwater velocity is about 0.2 ft/day.

B22.7.2 Analytical Results

A summary of detected chemicals in groundwater is presented in Table B22-6. Detected compounds include hydrocarbons, six VOCs, metals, and gross alpha and beta particle activity.

General Chemistry. One groundwater sample was collected from Well 22_DBMW47. The field pH was 6.95, the field EC was 1,500, and the field water temperature was 22.8°C. In general, the groundwater is a calcium chloride to calcium sulphate type of water. The alkalinity of the sample (as CaCO₃) is

190 mg/L. The bicarbonate concentration is 232 mg/L. The sample contained 1,130 mg/L of total dissolved solids (TDS). The chloride, sulfate, and nitrate/nitrite-N levels are 228 mg/L, 263 mg/L, and 18.7 mg/L, respectively.

Stiff and Piper diagrams for Site 22 are found in Appendix J.

Hydrocarbons (TRPH, TFH). TRPH and TFH-diesel were not detected and TFH-gasoline was less than 1 mg/L in Well B22_DBMW47.

Volatile Organic Compounds (VOCs). VOCs detected were:

- Carbon disulfide at 1 $\mu\text{g/L}$ (below the CRDL)
- Chloroform at 3 $\mu\text{g/L}$
- Carbon tetrachloride at 5 $\mu\text{g/L}$
- PCE at 7 $\mu\text{g/L}$
- TCE at 1,000 $\mu\text{g/L}$

Semivolatile Organic Compounds (SVOCs). SVOCs were not detected.

Pesticides, Polychlorinated Biphenyls (PCBs), and Herbicides. Pesticides and PCBs were not detected. (Herbicide analysis was not requested).

Metals and Cyanide. Detected metal concentrations are presented in Table B22-6. Selenium is the only metal detected above the MCL.

Gross Alpha and Beta Particle Activity. For Well 22_DBMW47, gross alpha activity is 9.0 pCi/L and gross beta activity is 5.8 pCi/L.

In summary, TRPH and TFH-diesel concentrations were not detected and TFH-gasoline was detected (60 $\mu\text{g/L}$) below California LUFT limits. Six VOCs were detected above detection limits and three of these (carbon tetrachloride at 5 $\mu\text{g/L}$, PCE at 7 $\mu\text{g/L}$, and TCE at 1,000 $\mu\text{g/L}$) are above MCL values. SVOCs, pesticides, and PCB concentrations were measured below detection limits. Selenium at 28.9 $\mu\text{g/L}$ is the only metal measured above its MCL value.

B22.7.3 Comparison with Drinking Water Standards

As shown in Table B22-7, analytical results were compared to the most stringent of three drinking water criteria: EPA MCLs, California MCLs, and California action levels. Well 10_DGMW77 groundwater exceeds the state or federal MCL for TCE, PCE, carbon tetrachloride, selenium, and TDS.

B22.8 Potential Contaminant Migration Pathways

Surface water runoff does not appear to be a significant migration pathway because the site topography is relatively flat and no discrete surface water drainage courses are near the site.

Contaminant migration via infiltration and groundwater transport is not believed to represent a significant migration pathway for the concrete apron (southern portion of Stratum 2, Eastern Area), because infiltration through this area is probably minimal. Prior to the placement of the aircraft matting (northern portion of Stratum 2), the surface soil was mixed with cement and wetted. Therefore, this surface probably greatly reduces the infiltration of water and potential migration of contaminants to groundwater.

Contaminant migration via infiltration and groundwater transport may be a pathway at Stratum 1, the Western Area, whose surface consists of bare soil covered with gravel.

B9.9 Summary and Conclusions

Contaminants have been observed at Site 22 in all sampled media: surface and near-surface soils, vadose soils, and groundwater. Compounds detected in all media include hydrocarbons, VOCs, and metals. Additional detected compounds include SVOCs (surface and near-surface soils, vadose soils), pesticides (vadose soils), and gross alpha and beta particle activity (groundwater).

VOCs have been detected in the groundwater sample collected from Well 22_DBMW47. However, there is no evidence to suggest that Site 22 itself is contributing to the

regional groundwater VOC contamination (OU-1). Another source or multiple sources may exist that are upgradient of Site 22.

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**Table B22-1
Site 22 (OU-3): Types of Samples and Chemical Analyses
MCAS El Toro Phase I RI Technical Memorandum**

Location/ Stratum ^c	Station Identi- fication	Sample Identi- fication	Sample Depth (ft)	Groups of Analytes Requested ^a											
				VOCs	Semi- VOCs	Pesti- cides/ PCBs	Herbi- cides	TPH	TFH	Metals	CN	Genl. Chem- istry	TOC	Dioxins/ Furans	Gross Alpha/ Beta
Surface Water and Sediments (Not sampled)															
Surface and Near-Surface Soils															
1	22_1FB1	S1454383	0	X	X	X		X	X	X					
		S1454382	2	X	X	X		X	X	X					
1	22_1FB2	S1454390	0	X	X	X		X	X	X					
		S1454385	2	X	X	X		X	X	X					
1	22_1FB3	S1454381	0	X	X	X		X	X	X					
		S1454386	2	X	X	X		X	X	X					
		S1454514 ^b	2	X	X	X		X	X	X					
1	22_DBS	S145432801	0	X	X	X		X	X	X					
2	22_2FB1	S1454389	0	X	X	X		X	X	X					
		S1454388	2	X	X	X		X	X	X					
2	22_2FB2	S145433501	0	X	X			X	X						
		S145433701	2	X	X			X	X						
		S1454376	4	X	X	X		X	X	X					
2	22_2FB3	S1454377	0	X	X	X		X	X	X					
		S1454380	2	X	X	X		X	X	X					
		S1454448	4	X	X	X		X	X	X					
Vadose Zone Soils															
2	22_25B219	S1456530	5	X	X	X		X	X	X					
		S1456529	10	X	X	X		X	X	X					
		S1456531	15	X	X	X		X	X	X					
		S1456527	20	X	X	X		X	X	X					
		S1456528	25	X	x	X		X	X	X					
1	22_DBMW47	S1456185	5	X	X	X		X	X	X					
		S1456188	10	X	X	X		X	X	X					
		S1456187	15	X	X	X		X	X	X					
		S1456174	20	X	X	X		X	X	X					
		S1456173	25	X	X	X		X	X	X					
		S1456172	35	X	X	X		X	X	X					
		S1456177	55	X	X	X		X	X	X					
		S1456186	95	X	X	X		X	X	X					
S1456387	135	X									X				
Groundwater															
1	22_DBMW47	S1452068	116-156	X	X	X		X	X	X	X	X			X
^a VOCs = Volatile Organic Compounds; Semi-VOCs = Semivolatile Organic Compounds; PCBs = Polychlorinated Biphenyls; TPH = Total Recoverable Petroleum Hydrocarbons; TFH = Total Fuel Hydrocarbons; CN = Total Cyanide; TOC = Total Organic Carbon.															
^b Duplicate															
^c Stratum 1 = Western TAFDS; Stratum 2 = Eastern TAFDS.															

Table B22-2

Site22 (OU- 3): Summary of Detected Chemicals in Sediments and Surface/Near-Surface Soil

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	22_1FB1 S1464383 (0)	DVF(a)	22_1FB1 S1464382 (2)	DVF(a)	22_1FB2 S1464390 (0)	DVF(a)	22_1FB2 S1464385 (2)	DVF(a)	22_1FB3 S1464381 (0)	DVF(a)	22_1FB3 S1464386 (2)	DVF(a)	22_1FB3 S1464514 (2)	DVF(a)	22_2FB1 S1464389 (0)	DVF(a)
METALS																	
ALUMINUM	MG/KG	8030		7600		11200		8130		13100		9780		10700		6340	
ARSENIC	MG/KG	3.8		2.7		5		3.7		3.9		4.7		2.4		4.4	
BARIIUM	MG/KG	78.7		83.6		91.1		170		109		82.6		111		77	
BERYLLIUM	MG/KG	0.41	U	0.33	U	0.53	U	0.37	U	0.4	U	0.44	U	0.43	U	0.24	b
CALCIUM	MG/KG	13200		5500		30200		35500		48200		10500		7630		3470	
CADMIUM	MG/KG	0.9	b	0.95	b	0.83	b	1.4		0.77	b	1.4		1.3		0.48	b
COBALT	MG/KG	3.8	b	3.5	b	4.3	b	3.1	b	4.7	b	3.7	b	4.9	b	3.5	b
CHROMIUM	MG/KG	10.8		7.8		10.5		9.2		12.9		11.8		11		10.1	
COPPER	MG/KG	6.8		5.9		8.7		7.1		9.7		8		9		3.5	b
IRON	MG/KG	12200		9660		14500		11500		14500		11700		13300		11800	
MERCURY	MG/KG	0.03	U	0.05	U	0.03	U	0.03	U								
POTASSIUM	MG/KG	2330		2350		2360		2550		2950		2800		3040		2480	
MAGNESIUM	MG/KG	3150		3380		4670		15200		5050		4440		5300		2580	
MANGANESE	MG/KG	152		171		272		797		221		184		200		143	
SODIUM	MG/KG	530	b	323	b	728	b	419	b	822	b	418	b	394	b	254	b
NICKEL	MG/KG	5	b	7.9	b	6.5	b	9.1		7.2	b	7.5	b	8.9	b	8.1	b
LEAD	MG/KG	38.8		7.6		17.9		8.9		15.6		11.7		9.1		3.1	
ANTIMONY	MG/KG	2.5	U	2.7	U	2.5	U	3	U	2.8	U	2.7	U	2.7	U	2.6	U
SELENIUM	MG/KG	0.1	U	0.11	U	0.11	U	0.11	U	0.1	U	0.19	b	0.11	U	0.11	U
THALLIUM	MG/KG	0.15	U	0.18	U	0.15	U	0.18	U	0.15	U	0.18	U	0.16	U	0.15	U
VANADIUM	MG/KG	28.8		23.4		30		32.4		34.3		31.2		33.2		27.9	
ZINC	MG/KG	32.4		35.9		45.8		37.7		38.8		43.1		41.3		32.2	
VOLATILE ORGANIC COMPOUNDS																	
TOLUENE	UG/KG	2	J	4	J	10	U	4	J	10	U	4	J	4	J	11	U
2-HEXANONE	UG/KG	10	U	11	U	10	U	11	U	10	U	4	J	11	U	11	U
ACETONE	UG/KG	15		22		14		11	U	27		23		31		36	U
2-BUTANONE	UG/KG	10	U	11	U	10	U	11	U	10	U	11	U	11	U	11	U
SEMI-VOLATILE ORGANIC COMPOUNDS																	
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	680	U	720	U	150	J	720	U	680	U	730	U	720	U	690	U
PYRENE	UG/KG	680	U	720	U	690	U	720	U	140	J	850	U	720	U	690	U
INDENO(1,2,3-CD)PYRENE	UG/KG	680	U	720	U	690	U	720	U	680	U	200	J	720	U	690	U
BENZO(B)FLUORANTHENE	UG/KG	680	U	720	U	690	U	720	U	680	U	370	J	720	U	690	U
FLUORANTHENE	UG/KG	680	U	720	U	690	U	720	U	140	J	1200	U	720	U	690	U
BENZO(K)FLUORANTHENE	UG/KG	680	U	720	U	690	U	720	U	680	U	240	J	720	U	690	U
CHRYSENE	UG/KG	680	U	720	U	690	U	720	U	680	U	400	J	720	U	690	U
BENZO(A)PYRENE	UG/KG	680	U	720	U	690	U	720	U	680	U	320	J	720	U	690	U
BENZO(A)ANTHRACENE	UG/KG	680	U	720	U	690	U	720	U	680	U	390	J	720	U	690	U
ISOPHORONE	UG/KG	680	U	720	U	690	U	720	U	680	U	730	U	720	U	690	U
PHENANTHRENE	UG/KG	680	U	720	U	690	U	720	U	680	U	1000	U	720	U	690	U
CARBAZOLE	UG/KG	680	U	720	U	690	U	720	U	680	U	170	J	720	U	690	U
NAPHTHALENE	UG/KG	680	U	720	U	690	U	720	U	680	U	730	U	720	U	690	U
2-METHYLNAPHTHALENE	UG/KG	680	U	720	U	690	U	720	U	680	U	730	U	720	U	690	U
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																	
TFH DIESEL	MG/KG	12.9	U	0.182		13	U	32.2		29.6		22		14.4		13.2	U
TFH GASOLINE	MG/KG	0.052	U	0.068		0.052	U	0.07		0.11		0.065		0.126		0.053	U
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)																	
TRPH	MG/KG	20	U	20	U	105		125		213		261		393		20	U

Table B22-2

Site22 (OU- 3): Summary of Detected Chemicals in Sediments and Surface/Near-Surface Soil

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT,BGS)	22_2FB1 S1464388 (2)	22_2FB2 S146433601 (0)	22_2FB2 S146433701 (2)	22_2FB2 S1464376 (4)	22_2FB3 S1464377 (0)	22_2FB3 S1464380 (2)	22_2FB3 S1464448 (4)	22_DBS S146432801 (0)
ANALYTE BY GROUP	UNITS	DVF(a)	DVF(a)	DVF(a)	DVF(a)	DVF(a)	DVF(a)	DVF(a)
METALS								
ALUMINUM	MG/KG	12400	-	-	12300	5170	18000	7390
ARSENIC	MG/KG	3.2	-	-	3.4	1.8	2.8	3.9
BARIUM	MG/KG	171	-	-	178	57	129	103
BERYLLIUM	MG/KG	0.82	b	-	0.53	b	0.86	0.41
CALCIUM	MG/KG	8150	-	-	10000	27800	6530	14700
CADMIUM	MG/KG	1.7	-	-	1.2	0.48	1.7	1
COBALT	MG/KG	7.5	b	-	6.9	b	7.3	4.8
CHROMIUM	MG/KG	12.5	-	-	12.1	4.4	15.7	11.9
COPPER	MG/KG	11.7	-	-	9.2	4.9	10.5	7.9
IRON	MG/KG	18800	-	-	18700	5700	18800	11400
MERCURY	MG/KG	0.11	-	-	0.03	U	0.03	0.03
POTASSIUM	MG/KG	4790	-	-	4510	1150	4390	2680
MAGNESIUM	MG/KG	7310	-	-	8900	2270	8270	3890
MANGANESE	MG/KG	297	-	-	319	94.5	299	202
SODIUM	MG/KG	393	b	-	659	b	404	502
NICKEL	MG/KG	10.7	-	-	9.2	4.2	10.9	7.6
LEAD	MG/KG	2.7	-	-	2.6	7.8	2.7	31.1
ANTIMONY	MG/KG	2.8	U	-	2.8	U	2.9	2.5
SELENIUM	MG/KG	0.12	U	-	0.11	U	0.12	0.1
THALLIUM	MG/KG	0.35	U	-	0.18	b	0.38	0.14
VANADIUM	MG/KG	39.9	-	-	42	12.7	47.8	25.2
ZINC	MG/KG	57.1	-	-	58	17.7	58.2	42.8
VOLATILE ORGANIC COMPOUNDS								
TOLUENE	UG/KG	9	J	11	U	11	U	3
2-HEXANONE	UG/KG	4	J	11	U	11	U	10
ACETONE	UG/KG	46	U	16	U	18	U	12
2-BUTANONE	UG/KG	5	J	11	U	11	U	10
SEMI-VOLATILE ORGANIC COMPOUNDS								
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	760	U	730	U	740	U	680
PYRENE	UG/KG	760	U	730	U	740	U	680
INDENO(1,2,3-CD)PYRENE	UG/KG	760	U	730	U	740	U	680
BENZO(B)FLUORANTHENE	UG/KG	760	U	730	U	740	U	680
FLUORANTHENE	UG/KG	760	U	730	U	740	U	680
BENZO(K)FLUORANTHENE	UG/KG	760	U	730	U	740	U	680
CHRYSENE	UG/KG	760	U	730	U	740	U	680
BENZO(A)PYRENE	UG/KG	760	U	730	U	740	U	680
BENZO(A)ANTHRACENE	UG/KG	760	U	730	U	740	U	680
ISOPHORONE	UG/KG	760	U	730	U	740	U	680
PHENANTHRENE	UG/KG	760	U	730	U	740	U	680
CARBAZOLE	UG/KG	760	U	730	U	740	U	680
NAPHTHALENE	UG/KG	760	U	730	U	740	U	680
2-METHYLNAPHTHALENE	UG/KG	760	U	730	U	740	U	680
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)								
TFH DIESEL	MG/KG	14.4	U	40	U	14.1	U	12.9
TFH GASOLINE	MG/KG	0.058	U	0.192	U	0.056	U	0.052
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH)								
TRPH	MG/KG	20	U	484	U	20	U	87

(a) A definition of each data validation flag (DVF) is provided in Table B-1.

Table B22-3

Site22 (OU- 3): Summary of Detected Chemicals in the Vadose Zone (Subsurface) Samples

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS) ANALYTE BY GROUP	UNITS	22_25B219 S1456530 (5)	DVF(a)	22_25B219 S1456529 (10)	DVF(a)	22_25B219 S1456531 (15)	DVF(a)	22_25B219 S1456527 (20)	DVF(a)	22_25B219 S1456528 (25)	DVF(a)	22_DBMW47 S1456185 (5)	DVF(a)	22_DBMW47 S1456188 (10)	DVF(a)	22_DBMW47 S1456187 (15)	DVF(a)
METALS																	
ALUMINUM	MG/KG	16800		5850		11100		3120		14700		10400		6650		6700	
ARSENIC	MG/KG	2.9	U	1.3	U	2.7	U	1.1	U	1.4	U	3.3		1.4	b	1.4	b
BARIUM	MG/KG	165		105		174		43		50.9		138		79.7		138	
BERYLLIUM	MG/KG	0.92	U	0.43	b	0.63	U	0.28	U	0.63	U	0.46	b	0.17	U	0.17	b
CALCIUM	MG/KG	12700		7500		12400		4630		2180		8500		3010		7040	
CADMILUM	MG/KG	1.4		0.43	b	1.2	b	0.26	U	0.58	b	1.4		0.59	b	0.65	b
COBALT	MG/KG	8.6	b	4	b	6.7	b	2	b	2.4	b	5.3	b	3.7	b	3.4	b
CHROMIUM	MG/KG	16.3		7.1		14.3		6.3		12.1		10.7		6.8		6	
COPPER	MG/KG	10.7		4.2	b	9.6		3.4	b	4.1	b	11.4		4.7	b	4.3	b
IRON	MG/KG	21200		9350		16000		4330		11500		14300		9720		10100	
MERCURY	MG/KG	0.39		0.03	U	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U
POTASSIUM	MG/KG	5000		2870		4860		701	b	2240		5190		2920		2880	
MAGNESIUM	MG/KG	10100		4320		8050		1380		3350		8560		4170		4590	
MANGANESE	MG/KG	315		199		298		139		78.9		216		188		207	
SODIUM	MG/KG	793	b	339	b	1080	b	606	b	1050	b	341	b	227	b	340	b
NICKEL	MG/KG	13.4		4.2	b	8.5	b	5.9	b	6.6	b	10		4.6	b	4.1	b
LEAD	MG/KG	2.2		0.93		2		1.3		2.4		5.1		1.5		1.8	
ANTIMONY	MG/KG	4	b	2.6	U	2.9	U	2.8	U	2.7	U	2.8	UJ	2.3	U	2.3	UJ
THALLIUM	MG/KG	0.18	b	0.19	b	0.4	b	0.21	b	0.18	U	0.24	b	0.17	U	0.17	U
VANADIUM	MG/KG	52.8		24		38.1		9.7	b	26.5		31.8		22.7		26.9	
ZINC	MG/KG	63.5		29.1		58.9		12.6		27.5		52.9		30.1		28.8	
VOLATILE ORGANIC COMPOUNDS																	
2-BUTANONE	UG/KG	3	J	3	J	3	J	2	J	2	J	12	U	11	U	11	U
METHYLENE CHLORIDE	UG/KG	12	U	12	U	12	U	39	B	24	U	12	U	11	U	11	U
TRICHLOROETHYLENE	UG/KG	12	U	12	U	11	U	11	U	11	U	12	U	11	U	11	U
ACETONE	UG/KG	14	U	12	U	11	U	17	U	21	U	44		11	U	20	
TOLUENE	UG/KG	12	U	12	U	11	U	11	U	11	U	3	J	11	U	11	U
SEMIVOLATILE ORGANIC COMPOUNDS																	
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	770	U	780	U	740	U	700	U	710	U	1100		1800		720	U
BENZYL BUTYL PHTHALATE	UG/KG	770	U	780	U	740	U	700	U	710	U	760	U	730	U	720	U
PESTICIDES AND PCBs																	
4,4'-DDE	UG/KG	3.84	UJ	3.83	UJ	3.73	UJ	3.5	UJ	3.57	UJ	3.8	U	7.46		3.62	U
4,4'-DDD	UG/KG	3.84	UJ	3.83	UJ	3.73	UJ	3.5	UJ	3.57	UJ	3.8	U	5.71		3.62	U
4,4'-DDT	UG/KG	3.84	UJ	3.83	UJ	3.73	UJ	3.5	UJ	3.57	UJ	3.8	U	4.37		3.62	U
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																	
TFH GASOLINE	MG/KG	0.059		0.068		0.08		0.053	U	0.054	U	0.386		0.056	U	0.055	U

Table B22-3

Site22 (OU- 3): Summary of Detected Chemicals in the Vadose Zone (Subsurface) Samples

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SAMPLE DEPTH(FT.BGS)	UNITS	22_DBMW47 S1456174 (20)	DVF(a)	22_DBMW47 S1456173 (25)	DVF(a)	22_DBMW47 S1456172 (35)	DVF(a)	22_DBMW47 S1456177 (55)	DVF(a)	22_DBMW47 S1456185 (95)	DVF(a)	22_DBMW47 S1456387 (135)	DVF(a)				
ANALYTE BY GROUP																	
METALS																	
ALUMINUM	MG/KG	6550		6590		6920		4930		7550		-					
ARSENIC	MG/KG	2.5		3		1.3	b	1.5	b	1.6	b	-					
BARIUM	MG/KG	203		122		72.9		60.9		92.8		-					
BERYLLIUM	MG/KG	0.31	b	0.45	b	0.4	b	0.2	b	0.18	b	-					
CALCIUM	MG/KG	8280		4780		2270		2520		3170		-					
CADMIUM	MG/KG	0.92	b	1.9		0.73	b	1	b	1.6		-					
COBALT	MG/KG	5.1	b	4.8	b	3.1	b	2.6	b	4.8	b	-					
CHROMIUM	MG/KG	8.4		10.7		8.9		6.5		8.8		-					
COPPER	MG/KG	6.8		8.9		3.6	b	5.1	b	7.8		-					
IRON	MG/KG	11900		12900		8250		7340		10500		-					
MERCURY	MG/KG	0.03	U	-													
POTASSIUM	MG/KG	3470		3000		1160		1830		2820		-					
MAGNESIUM	MG/KG	6370		5010		2720		2400		3630		-					
MANGANESE	MG/KG	238		238		64.8		131		210		-					
SODIUM	MG/KG	649	b	1200		898	b	541	b	451	b	-					
NICKEL	MG/KG	7.4	b	10		4.8	b	5.5	b	9.3		-					
LEAD	MG/KG	2.3		3.3		2.3		1.5		2.1		-					
ANTIMONY	MG/KG	2.5	UJ	2.6	UJ	2.5	UJ	2.4	UJ	2.5	U	-					
THALLIUM	MG/KG	0.23	b	0.24	b	0.18	U	0.19	b	0.18	U	-					
VANADIUM	MG/KG	30.5		32.2		17.9		18.6		28.4		-					
ZINC	MG/KG	38.3		39.2		19.4		21.3		29.3		-					
VOLATILE ORGANIC COMPOUNDS																	
2-BUTANONE	UG/KG	12	U	12	U	11	U	11	U	11	U	11	U				
METHYLENE CHLORIDE	UG/KG	15	U	22	U	11	U	11	U	8	J	8	J				
TRICHLOROETHYLENE	UG/KG	12	U	12	U	11	U	11	U	11	U	6	J				
ACETONE	UG/KG	73		72		25		24		11	U	11	U				
TOLUENE	UG/KG	5	J	3	J	11	U	11	U	11	U	4	J				
SEMIVOLATILE ORGANIC COMPOUNDS																	
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	800	U	790	U	710	U	720	U	730	U	-					
BENZYL BUTYL PHTHALATE	UG/KG	800	U	790	U	710	U	720	U	710	J	-					
PESTICIDES AND PCBs																	
4,4'-DDE	UG/KG	3.98	U	3.97	U	3.56	U	3.59	U	3.67	U	-					
4,4'-DDD	UG/KG	3.98	U	3.97	U	3.56	U	3.59	U	3.67	U	-					
4,4'-DDT	UG/KG	3.98	U	3.97	U	3.56	U	3.59	U	3.67	U	-					
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)																	
TFH GASOLINE	MG/KG	0.08	U	0.08	U	0.054	U	0.054	U	0.056	U	-					

(a) A definition of each data validation flag (DVF) is provided in Table B-1.

**Table B22-4
Site 22 (OU-3): Well Construction Details
MCAS El Toro Phase I RI Technical Memorandum**

Item	Station Identification
	22_DBMW47
Survey Location--Northing	N549278.2
Survey Location--Easting	E1547434.82
Ground Surface Elevation (ft above MSL ^a)	277.25
Measuring Point Elevation (ft above MSL ^a)	277.83
Measuring Point Location	Top of sounding tube
Type of Surface Completion	Above ground
Casing Diameter and Material	4" Schedule 40 PVC
Screen Diameter and Material	4" 20-slot Stainless Steel
Screen Interval (ft bgs ^b)	116-156
Length of Drop Pipe (ft bgs ^b)	147
Make and Model of Installed Pump	Grundfos Rediflow 2, 2"-diameter submersible
Date of Pumping Test	29 October 1992
Date of Water Quality Sampling	29 October 1992
^a Mean sea level ^b Below ground surface	

<p align="center">Table B22-5 Site 22 (OU-3): Summary of Hydraulic Parameters MCAS El Toro Phase I RI Technical Memorandum</p>						
Well Identification	Type of Test	Analysis Method	Transmissivity (ft²/day)	Hydraulic Conductivity (ft/day)	Storage Coefficient^a	Leakance Factor^a
22_DGMW47	Pumping	Cooper-Jacob (1946)	260	7.1	NA	NA
<p>^aNA = Not applicable. Source: Table F-2 (Appendix F)</p>						

Table B22-6

Site22 (OU- 3): Summary of Detected Chemicals in Groundwater Samples

MCAS El Toro Phase I RI Technical Memorandum

STATION ID SAMPLE NUMBER SCREEN INTERVAL ANALYTE BY GROUP	REG.CODE(b)	REG.LEVEL(c)	UNITS	22_DBMW47 S1452068 (116-156)	DVF(a)
GENERAL CHEMISTRY					
ALKALINITY AS CaCO3	NA	NA	MG/L	190	
CARBONATE	NA	NA	MG/L	-	
BICARBONATE	NA	NA	MG/L	232	
CHLORIDE	3	250	MG/L	228	
SULFATE	3	250	MG/L	263	
NITRATE/NITRITE-N	1	10	MG/L	18.7	
TOTAL DISSOLVED SOLIDS	3	500	MG/L	1130	
METALS					
ARSENIC	2	50	UG/L	1.7	b
BARIUM	2	2000	UG/L	32.2	b
CALCIUM	NA	NA	UG/L	187000	
POTASSIUM	NA	NA	UG/L	2460	b
MAGNESIUM	NA	NA	UG/L	50500	
MANGANESE	3	50	UG/L	5.4	b
SODIUM	NA	NA	UG/L	82800	
ANTIMONY	NA	NA	UG/L	16.6	b
SELENIUM	1	10	UG/L	28.9	
VANADIUM	NA	NA	UG/L	17.2	b
VOLATILE ORGANIC COMPOUNDS					
TETRACHLOROETHENE	2	5	UG/L	7	
CARBON TETRACHLORIDE	1	0.5	UG/L	5	
CHLOROFORM	2	100	UG/L	3	
CARBON DISULFIDE	NA	NA	UG/L	1	J
TRICHLOROETHYLENE	2	5	UG/L	1000	D
TOTAL FUEL HYDROCARBONS (DIESEL AND GASOLINE)					
TFH GASOLINE	NA	NA	UG/L	58.9	
GROSS ALPHA AND BETA					
GROSS ALPHA	2	15	PCI/L	5.8	

(a) A definition of each data validation flag (DVF) is provided in Table B-1.

(b) Regulatory Codes are:

- 1 = California MCL
- 2 = EPA primary MCL
- 3 = EPA secondary MCL
- 4 = California DTSC Action Level

(c) The given concentration represents the California MCL, the EPA primary MCL, the EPA secondary MCL, or the California DTSC Action Level, whichever is most stringent.

**Table B22-7
Site 22 (OU-3): Analyte Concentrations in Groundwater
Exceeding Regulatory Standards or DTSC^a Action Levels
MCAS El Toro Phase I RI Technical Memorandum**

Well Identification	SI (ft bgs) ^b	Analyte	Units	Concentration	Regulatory Level ^c	Regulatory Code ^d
22_DBMW47	(116-156)	Selenium	µg/L	28.9	10	2
		Nitrate/Nitrite-N	mg/L	18.7	10	2
		Sulfate	mg/L	263	250	1
		Total Dissolved Solids	mg/L	1130	500	1
		Carbon Tetrachloride	µg/L	5	0.5	2
		Tetrachloroethylene	µg/L	7	5	1
		Trichloroethylene	µg/L	1000	5	1

^aCalifornia Department of Toxic Substances Control

^bScreen interval (feet below ground surface)

^cThe most stringent federal/state drinking water standard was applied. In the presence of both an EPA MCL and a California MCL, the most stringent MCL is represented. If neither an EPA or California MCL is listed, the California DTSC action level was applied.

^dRegulatory Code:

- 1=EPA Primary MCL: Federally enforceable drinking water standard established for the health effects of contaminants
- 2=California MCL: Health-based drinking water standard enforceable at the state level
- 3=EPA Secondary MCL: Nonenforceable standard based on aesthetic qualities of taste, color, and odor (Includes chloride, iron, manganese, sulfate, and TDS)
- 4=DTSC Action Level: Nonenforceable levels at which DTSC strongly urges water purveyors to take corrective action to reduce the level of contamination in the water they supply (Action levels cease to exist when state MCLs are promulgated.)