Appendix F
Memos and Analytical Data for Soil and Groundwater Investigation-Derived Waste

Soil

MEMO

Date: December 2, 2003

To: Karnig Ohannessian
cc.

From: Crispin Wanyoike

Re: IRP Site 24 Soils Investigation Derived Waste Disposal Plan

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1.0 INTRODUCTION

This document presents the soil sampling results and recommendations for disposal of soil investigation-derived waste (IDW) generated during drilling activity performed as part of the pre-design investigation (PDI) at Installation Restoration Program (IRP) Site 24, Former Marine Corps Air Station (MCAS) El Toro, California. The PDI is being performed under Contract Task Order (CTO) No. 0068 under the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract No. N62742-94-D-0048.

Regulatory Authority

After MCAS El Toro was placed on the list of military facilities scheduled for closure under the Base Realignment and Closure (BRAC) Act, a BRAC Cleanup Team (BCT) consisting of representatives from Southwest Division, Naval Facilities Engineering Command (SWDIV), United States Environmental Protection Agency (EPA), California Department of Toxic Substances Control (DTSC), and California Regional Water Quality Control Board (CRWQCB), was formed to oversee implementation of the Federal Facilities Agreement (FFA). Implementation of the FFA included the following investigations and studies at various sites: an air quality solid waste assessment test (Air SWAT), a Phase I Remedial Investigation (RI), a Phase II RI, and a feasibility study (FS).

Background

IRP Site 24 is located in the southwest quadrant of Former MCAS El Toro and encompasses approximately 200 acres. The site is highly industrialized, and contains two large aircraft hangars (Buildings 296 and 297) and several smaller buildings that were used for aircraft and vehicle maintenance and repair.

The previous Phase I RI, Phase II RI/FS, and various site-specific investigations and studies identified volatile organic compound (VOC) contamination at the former station boundary and in the agricultural wells west of the former station. The VOC contamination due to base operations migrated from the soil to the shallow groundwater unit and from there to the principal aquifer. The contaminated areas were divided into two regions; IRP Site 24, VOC Source Area, consists of the vadose zone source area and shallow groundwater unit (SGU), and IRP Site 18, Regional VOC Groundwater Plume, consists of the principal aquifer, mainly located off-station.

IRP Site 24, VOC source area, comprises two contaminated media: soil and groundwater. Contaminated soil at IRP Site 24 was addressed in an interim record of decision (ROD) (DoN 1997) that documented selection of soil-vapor extraction as the remedy. The remedy for soil has been implemented and a closure report (Earth Tech 2002) was reviewed and accepted by the BCT. The selected remedies for the contaminated groundwater at IRP Sites 24 and 18 are extraction, treatment, and institutional controls as documented in a final ROD (DoN 2002). Groundwater will be extracted from wells installed in the areas of highest reported trichloroethene (TCE) concentrations at IRP Site 24. At IRP Site 18, groundwater will be extracted from areas of the groundwater plume where TCE concentrations are equal to or greater than 5 micrograms per liter

(μg/L). This extraction procedure will help to prevent migration of VOCs from IRP Sites 18 and 24, and reduce concentrations of VOCs in groundwater at both sites to federal or state drinking water standards.

As part of this remedy design, a pre-design investigation was conducted to gather additional design input data including sustainable extraction rates and contaminant plume delineation through the installation, testing, sampling, and monitoring of 12 wells (Earth Tech 2003). The soil IDW was generated during installation of these wells.

2.0 WASTE GENERATION AND APPLICABLE REGULATORY REQUIREMENTS

The management of soil IDW will be conducted in accordance with the following guidance document:

- CLEAN SOP 22, IDW Management (BNI 1999).

3.0 INVESTIGATION DERIVED WASTE

Drilling and installation of the wells generated approximately 350 cubic yards of soil cuttings and drilling mud as IDW. The IDW was placed into twenty 20-cubic-yard roll off bins.

4.0 WASTE CHARACTERIZATION

Laboratory Analyses

Two sets of five composite soil samples and one drilling mud composite sample (for a total of six samples per set) were sent for analysis. Each sample was a composite of samples from bins containing soil or drilling mud from the same boreholes (as listed in the attached Tables 1-3). Analytical laboratory testing for pH, and VOCs and metals analyses by the federal Toxicity Characteristic Leachate Procedure (TCLP) and California Waste Extraction Test (WET) was then performed on one set of samples (LC635 – LC640). A summary of the analytical results versus the corresponding TCLP and WET concentration limits are presented in attached Tables 1 and 2, respectively. The second set of samples (LC720 – LC725) was submitted for total VOCs, petroleum hydrocarbons and metals concentration analyses. The results of these tests are presented in Table 3 along with the corresponding Former MCAS El Toro background concentrations and the EPA-derived residential preliminary remediation goals (PRG concentrations).

Results

None of the analytes exceeded the corresponding federal TCLP concentrations (Table 1) or the state WET concentrations (Table 2) used for classification of characteristic hazardous waste. None of the analytes exceeded the corresponding background concentrations or the residential PRG concentrations (Table 3) except:

- arsenic, which exceeded the corresponding residential PRG concentrations in samples LC720 – LC725. Arsenic also slightly exceeded the 95% quantile background concentration (6.86 mg/kg) in sample LC725 (drilling mud sample) with a concentration of 7.0 mg/kg. This concentration is within the range of values used to estimate the background concentrations for Former MCAS El Toro (BNI 1996),
- cadmium, which exceeded the corresponding residential PRG concentration in sample LC723 but not the corresponding background concentration,
- aluminum, cobalt, copper, manganese, nickel and selenium, which exceeded the corresponding background concentrations in sample LC725, but were below the corresponding residential PRG concentrations.

5.0 CONCLUSIONS AND RECOMMENDATIONS

None of the concentrations exceeded the regulatory thresholds (TCLP and WET criteria values) used to classify wastes as federal or state hazardous wastes. In addition, all the soil samples (LC720 – LC724) were at or below the station-wide background concentrations for metals and below the EPA residential PRGs for VOCs. In the drilling mud sample (LC725) only arsenic was above its residential PRG and again only slightly above its corresponding, station-wide background concentration, indicating that it is within the range of values used to estimate the station-wide background concentrations.

Based on these results, the soil IDW is classified as non-hazardous. Consistent with the Station-wide IDW Management Plan (CDM 1995), placement of the soil IDW at IRP Site 24 is recommended. It is further recommended that the soils be placed on the ground in the open areas along the west-end of the runways and disked into the ground during the regular station disking/weeding operations.

6.0 REFERENCES

Bechtel National, Inc. (BNI). 1996. *Final Technical Memorandum, Background and Reference Levels, Remedial Investigations, Marine Corps Air Station, El Toro, California.* San Diego, CA.

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ATTACHMENT – TABLES

TABLE 1: COMPARISON OF SOIL LEACHATE CONCENTRATIONS TO FEDERAL TCLP CONCENTRATIONS
IRP SITE 24 SHALLOW GROUNDWATER UNIT - PRE-DESIGN INVESTIGATION

Parameter	Analytical Method[1]	TCLP Concentration Limit (mg/L)	LC635 24EX10, -11, -14 (mg/L)	LC636 24EX12A, B, C (mg/L)	LC637 24EX13A, B, C and 24MW07 (mg/L)	LC638 24MW06 (mg/L)	LC639 24EX09 (mg/L)	LC640 Drilling Mud (mg/L)
Metals								
Arsenic	6010B	**5.0**	0.0058J	0.0122	0.0082J	0.0112	0.0126	0.0037J
Barium	6010B	**100.0**	0.442	0.297	0.375	0.146	0.193	0.533
Cadmium	6010B	**1.0**	0.0071	0.0071	0.0099	0.0116	0.0038J	0.0042
Chromium	6010B	**5.0**	0.0249	0.0102	0.0091J	0.0065J	0.0073J	0.0338
Mercury	7470A	**0.2**	0.000053	0.00011	0.00013	0.00012	0.000087	0.00011
Selenium	6010B	**1.0**	0.0053J	0.0034J	<0.020	<0.020	<0.020	<0.020
Silver	6010B	**5.0**	<0.020	<0.020	<0.020	<0.020	0.0017J	0.0052J
Volatile Organic Compounds								
Benzene	8260B	**0.5**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Carbon tetrachloride	8260B	**0.5**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Chlorobenzene	8260B	**100.0**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chloroform	8260B	**6.0**	<0.00016	<0.00016	<0.00016	<0.00016	<0.00016	0.0031
1,2-Dichloroethane	8260B	**0.5**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Methyl ethyl ketone	8260B	**200.0**	<0.1J	<0.1J	<0.1J	<0.1J	<0.1J	<0.1J
Tetrachloroethylene	8260B	**0.7**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Trichloroethylene	8260B	**0.5**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Vinyl chloride	8260B	**0.2**	<0.00052	<0.00052	<0.00052	<0.00052	<0.00052	<0.00052

Notes:
[1] Extraction by the federal TCLP method SW 1311
J = quanitiation estimated
mg/L = milligram per liter
TCLP = Toxicity Characteristic Leachate Procedure

TABLE 2: COMPARISON OF SOIL LEACHATE CONCENTRATIONS TO STATE STLC CONCENTRATIONS
IRP SITE 24 SHALLOW GROUNDWATER UNIT REMEDY - PRE-DESIGN INVESTIGATION

Parameter	Analytical Method[1]	STLC (mg/L)	LC635 24EX10, -11, -14 (mg/L)	LC636 24EX12A, B, C (mg/L)	LC637 24EX13A, B, C and 24MW07 (mg/L)	LC638 24MW06 (mg/L)	LC639 24EX09 (mg/L)	LC640 Drilling Mud (mg/L)
Metals								
Antimony and/or antimony compounds	6010B	**15**	<0.03	<0.03	<0.03	<0.03	<0.03	0.0175J
Arsenic and/or arsenic compounds	6010B	**5.0**	0.044	0.0576	0.0503	0.0415	0.0103J	0.343
Barium and/or barium compounds (excluding barier)	6010B	**100**	2.4	1.71	1.98	1.47	1.63	2.59
Berillium and/or beryllium compounds	6010B	**0.75**	0.0015J	0.0014J	0.0019J	0.0019J	0.00061J	0.0011J
Cadmium and/or cadmium compounds	6010B	**1.0**	0.0436	0.0688	0.0847	0.115	0.0397	0.0396
Chromium and/or chromium (III)	6010B	**5****	0.083	0.0673	0.103	0.0763	0.0449	0.176
Cobalt and/or cobalt compounds	6010B	**80**	0.090	0.113	0.138	0.165	0.0714	0.0643
Copper and/or copper compounds	6010B	**25**	0.169	0.167	0.107	0.102	0.057	0.413
Lead and/or lead compounds	6010B	**5.0**	0.0571	0.0962	0.0438	0.0425	0.0257	0.1440
Mercury and/or mercury compounds	7470A	**0.2**	<0.0002	<0.0002	0.00004J	<0.0002	<0.0002	<0.0002
Molybdenum and/or molybdenum	6010B	**350**	0.0448	0.0487	0.0675	0.0921	0.0312	0.0473
Nickel and/or nickel compounds	6010B	**20**	0.201	0.240	0.335	0.422	0.183J	0.170J
Selenium and/or selenium compounds	6010B	**1.0**	0.0262	0.011J	0.0292	0.0302	0.0138J	0.0316
Silver and/or silver compounds	6010B	**5**	<0.050	<0.050	<0.050	<0.050	<0.050	0.0117J
Thallium and/or thallium compounds	6010B	**7.0**	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Vanadium and/or vanadium compounds	6010B	**24**	0.212J	0.252	0.330	0.325	0.172J	0.300
Zinc and/or zinc compounds	6010B	**250**	0.191	0.182	0.100	0.0733J	0.109	0.457
Volatile Organic Compound								
Trichloroethylene	8260B	**204**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

Notes:
[1] Extraction by the California Waste Extraction Test (WET) method (California Code of Regulations Title 22)
J = quanitiation estimated
mg/L = milligram per liter
STLC = soluble threshold limit concentration

TABLE 3: COMPARISON OF SOIL TOTAL CONCENTRATIONS TO BACKGROUND AND RESIDENTIAL PRG CONCENTRATIONS

IRP SITE 24 SHALLOW GROUNDWATER UNIT REMEDY - PRE-DESIGN INVESTIGATION

Parameter	Analytical Method	Former MCAS El Toro Background concentrations (0.95 Quantile) (mg/kg)	Residential PRGs (mg/kg)	LC720 24EX10, -11, -14 (mg/kg)	LC721 24EX12A, B, C (mg/kg)	LC722 24EX13A, B, C and 24MW07 (mg/kg)	LC723 24MW06 (mg/kg)	LC724 24EX09 (mg/kg)	LC725 Drilling Mud (mg/kg)
Metals									
Aluminum	6010B	14,800	76,000	4,000	7,400	6,470	7,540	8,090	**16,900**
Antimony and/or antimony compounds	6010B	-	31	<3.5	<4.8	<3.6	<4.0	<4.0	<7.2
Arsenic and/or arsenic compounds	6010B	6.86	0.39	1.7	3.6	2.9	2.9	2.8	**7.0**
Barium and/or barium compounds (excluding barier)	6010B	173	5,400	66.7	76.1	90.5	70.8	94.8	170
Berillium and/or beryllium compounds	6010B	-	150	<0.23	<0.32	<0.24	<0.27	<0.26	<0.48
Cadmium and/or cadmium compounds "CAL-Modified PRG"	6010B	2	1.70	0.53	1.2	1.0	1.8	0.79	1.5
Calcium	6010B	46,000	-	2,960	6,270	4,130	3,470	4,330	16,800
Chromium compounds (total)	6010B	26.9	210	5.2	10.7	10.5	10.5	10	20.8
Cobalt and/or cobalt compounds	6010B	6.98	900	2.4	4.2	3.7	4.1	4.4	**8.2**
Copper and/or copper compounds	6010B	10.5	3,100	4.0	7.9	5.3	6.6	5.7	**14.4**
Lead and/or lead compounds "CAL-Modified PRG"	6010B	15.1	150	1.8	3.1	5.1	3.0	2.6	6.7
Magnesium	6010B	8,370	-	1,760	3,090	2,550	2,920	3,720	7,180
Manganese	6010B	291	1,800	103	172	164	189	173	**325**
Mercury and/or mercury compounds	7471A	0.22	-	0.035J	0.039J	0.028J	0.038J	0.036J	0.059J
Nickel and/or nickel compounds	6010B	15.3	1,600	4.1	9.9	8.1	11.4	7.7	**16.4**
Potassium	6010B	4,890	-	905	1,800	1,540	1,700	1,910	3,760
Selenium	6010B	0.32	390	0.14J	0.29J	0.32J	0.26J	0.30J	**0.68J**
Silver and/or silver compounds	6010B	0.539	390	0.031J	0.039J	<0.61	<0.66	<0.66	0.047J
Sodium	6010B	1,405	-	83.6J	509	151	269	98.7J	505
Thallium and/or thallium compounds	6010B	0.42	5	<0.47	<0.63	<0.49	<0.53	<0.53	0.18J
Vanadium and/or vanadium compounds	6010B	71.8	550	13.4	26.3	22.3	24.9	26.6	52.5
Zinc and/or zinc compounds	6010B	77.9	23,000	14.2	28.2	26.1	28.7	30.2	59.0
Petroleum Hydrocarbons									
TVPH as Gasoline	SW8015B	-	-	0.02J	0.06J	<11	0.02J	<14	0.1J
TEPH as Diesel	SW8015B	-	-	1J	2J	110	4J	2J	20J
TEPH as Motor Oil	SW8015B	-	-	<12	<16	160	<13	<13	27

TABLE 3: COMPARISON OF SOIL TOTAL CONCENTRATIONS TO BACKGROUND AND RESIDENTIAL PRG CONCENTRATIONS

IRP SITE 24 SHALLOW GROUNDWATER UNIT REMEDY - PRE-DESIGN INVESTIGATION

Parameter	Analytical Method	Former MCAS El Toro Background concentrations (0.95 Quantile) (µg/kg)	Residential PRGs (µg/kg)	LC720 24EX10, -11, -14 (µg/kg)	LC721 24EX12A, B, C (µg/kg)	LC722 24EX13A, B, C and 24MW07 (µg/kg)	LC723 24MW06 (µg/kg)	LC724 24EX09 (µg/kg)	LC725 Drilling Mud (µg/kg)
Volatile Organic Compounds									
Acetone	8260B	-	1,600,000	<110	<250	<110	<140	<140	<340
Benzene	8260B	-	600	<5.3	<13	<5.4	<7.1	<7.0	<17
Bromodichloromethane	8260B	-	-	<5.3	<13	<5.4	<7.1	<7.0	<17
Bromoform	8260B	-	62,000	<5.3	<13	<5.4	<7.1	<7.0	<17
Bromomethane	8260B	-	3,900	<5.3	<13	<5.4	<7.1	<7.0	<17
Methyl Ethyl Ketone	8260B	-	7,300,000	<110	<250	<110	<140	<140	<340
Carbon Disulfide	8260B	-	360,000	<5.3	<13	<5.4	<7.1	<7.0	<17
Carbon Tetrachloride	8260B	-	250	<5.3	<13	<5.4	<7.1	<7.0	<17
Chlorobenzene	8260B	-	150,000	<5.3	<13	<5.4	<7.1	<7.0	<17
Dibromochloromethane	8260B	-	1,100	<5.3	<13	<5.4	<7.1	<7.0	<17
Chloroethane	8260B	-	3,000	<5.3	<13	<5.4	<7.1	<7.0	<17
Chloroform "CAL-Modified PRG"	8260B	-	940	<5.3	10J	<5.4	<7.1	6J	190
Chloromethane	8260B	-	1,200	<5.3	<13	<5.4	<7.1	<7.0	<17
Dichlorodifluoromethane	8260B	-	9,400	<5.3	<13	<5.4	<7.1	<7.0	<17
1,1-Dichloroethane "CAL-Modified PRG"	8260B	-	2,800	<5.3	<13	<5.4	<7.1	<7.0	<17
1,2-Dichloroethane	8260B	-	280	<5.3	<13	<5.4	<7.1	<7.0	<17
1,1-Dichloroethene	8260B	-	120,000	<5.3	<13	<5.4	<7.1	<7.0	<17
Cis-1,2-Dichloroethene	8260B	-	43,000	<5.3	<13	<5.4	<7.1	<7.0	<17
Trans-1,2-Dichloroethene	8260B	-	69,000	<5.3	<13	<5.4	<7.1	<7.0	<17
1,2-Dichloropropane	8260B	-	340	<5.3	<13	<5.4	<7.1	<7.0	<17
Cis-1,3-Dichloropropene	8260B	-	780	<5.3	<13	<5.4	<7.1	<7.0	<17
Trans -1.3-Dichlopropene	8260B	-		<5.3	<13	<5.4	<7.1	<7.0	<17
Ethylbenzene	8260B	-	8,900	<5.3	<13	<5.4	<7.1	<7.0	<17
2-Hexanone	8260B	-	-	<53	<130	<54	<71	<70	<170
Methylene Chloride	8260B	-	9,100	1J	5J	1J	1J	2J	6J
4-Methyl-2-Pentanone (MIBK)	8260B	-	790,000	<53	<130	<54	<71	<70	<170
Methyl-Tert Butyl Ether (MTBE) "CAL-Modified PRG"	8260B	-	17,000	<5.3	<13	<5.4	<7.1	<7.0	<17
Styrene	8260B	-	1,700,000	<5.3	<13	<5.4	<7.1	<7.0	<17
1,1,1,2-Tetrachloroethane	8260B	-	3,200	<5.3	<13	<5.4	<7.1	<7.0	<17
1,1,2,2-Tetrachloroethane	8260B	-	410	<5.3	<13	<5.4	<7.1	<7.0	<17
Tetrachloroethene	8260B	-	1,500	<5.3	<13	<5.4	<7.1	<7.0	<17
Toluene	8260B	-	520,000	<5.3	<13	<5.4	<7.1	<7.0	<17
1,1,1-Trichloroethane	8260B	-	1,200,000	<5.3	<13	<5.4	<7.1	<7.0	<17
1,1,2-Trichloroethane	8260B	-	730	<5.3	<13	<5.4	<7.1	<7.0	<17
Trichloroethene	8260B	-	53	<5.3	<13	<5.4	<7.1	<7.0	<17
Trichlorofluoromethane	8260B	-	390,000	<5.3	<13	<5.4	<7.1	<7.0	<17
Vinyl Chloride	8260B	-	79	<5.3	<13	<5.4	<7.1	<7.0	<17
Xylenes (TOTAL)	8260B	-	270,000	<16	<38	<16	<21	<21	<52
T-Butyl Alcohol (TBA)	8260B	-	-	<21	<51	<22	<28	<28	<69

Notes:
Underline results = indicates exceedance of the EPA Residential PRG concentrations.
Bold results = indicates exceedance of the Former MCAS El Toro background concentrations .
< = concentrations were less than the corresponding reporting limit.
J = quanitiation estimated
mg/kg = milligram per kilogram
PRG = preliminary remediation goal
TVPH = total volatile petroleum hydrocarbons
TEPH = total extractable petroleum hydrocarbons

Table F-1: Validated Analytical Results for IDW Soil Samples - TCLP and WET

	Sample ID:	LC635	LC636	LC637	LC638	LC639	LC640
	Location ID:	IDW-SOIL	IDW-SOIL	IDW-SOIL	IDW-SOIL	IDW-SOIL	IDW-SOIL
	Sample Type:	REG	REG	REG	REG	REG	REG
	Sample Date:	8/21/2003	8/21/2003	8/21/2003	8/21/2003	8/21/2003	8/21/2003
Parameter	Analytical Method[3]						
TCLP METALS[1] (µg/L)							
Arsenic	6010B-TCLP	5.8 UJ	12.2 UJ	8.2 UJ	11.2 UJ	12.6 UJ	3.7 UJ
Barium	6010B-TCLP	442	297	375	146	193	533
Cadmium	6010B-TCLP	7.1	7.1	9.9	11.6	3.8 UJ	4.2 UJ
Chromium	6010B-TCLP	24.9	10.2	9.1	6.5	7.3	33.8
Lead	6010B-TCLP	6.6	2.8	10 U	10 U	4.4	6.5
Mercury	7470A-TCLP	0.053	0.11	0.13	0.12	0.087	0.11
Selenium	6010B-TCLP	5.3 UJ	3.4 UJ	20 U	20 U	20 U	20 U
Silver	6010B-TCLP	20 U	20 U	20 U	20 U	1.7 UJ	5.2 UJ
WET METALS[2] (µg/L)							
Antimony	6010B-WET	30 U	30 U	30 U	30 U	30 U	17.5 UJ
Arsenic	6010B-WET	44 UJ	57.6 UJ	50.3 UJ	41.5 UJ	10.3 UJ	343
Barium	6010B-WET	2400	1710	1980	1470	1630	2590
Beryllium	6010B-WET	1.5 UJ	1.4 UJ	1.9 UJ	1.9 UJ	0.61 UJ	1.1 UJ
Cadmium	6010B-WET	43.6	68.8	84.7	115	39.7	39.6
Chromium	6010B-WET	83	67.3	103	76.3	44.9	176
Cobalt	6010B-WET	90	113	138	165	71.4	84.3
Copper	6010B-WET	169	167	107 UJ	102 UJ	57 UJ	413
Lead	6010B-WET	57.1	96.2	43.8 J	42.5 J	25.7 J	144 J
Mercury	7470A-WET	0.2 U	0.2 U	0.04 UJ	0.2 U	0.2 U	0.2 U
Molybdenum	6010B-WET	44.8 UJ	48.7 UJ	67.5 UJ	92.1	31.2 UJ	47.3 UJ
Nickel	6010B-WET	201	240	335	422	183	170
Selenium	6010B-WET	26.2 UJ	11 UJ	29.2 UJ	30.2 UJ	13.8 UJ	31.6 UJ
Silver	6010B-WET	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ	11.7 J
Thallium	6010B-WET	10 U	10 U	10 U	10 U	10 U	10 U
Vanadium	6010B-WET	212	252	330	325	172	300
Zinc	6010B-WET	191	182	100	73.3	109	457
TCLP VOCs (µg/L)							
1,1,1,2-Tetrachloroethane	8260B-TCLP	1 U	1 U	1 U	1 U	1 U	1 UJ
1,1,1-Trichloroethane	8260B-TCLP	1 U	1 U	1 U	1 U	1 U	1 UJ
1,1,2,2-Tetrachloroethane	8260B-TCLP	1 U	1 U	1 U	1 U	1 U	1 UJ
1,1,2-Trichloro-1,2,2-Trifluoroethane	8260B-TCLP	5 U	5 U	5 U	5 U	5 U	5 UJ
1,1,2-Trichloroethane	8260B-TCLP	1 U	1 U	1 U	1 U	1 U	1 UJ
1,1-Dichloroethane	8260B-TCLP	1 U	1 U	1 U	1 U	1 U	1 UJ
1,1-Dichloroethene	8260B-TCLP	1 U	1 U	1 U	1 U	1 U	1 UJ
1,2,3-Trichloropropane	8260B-TCLP	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 UJ
1,2-Dichloroethane	8260B-TCLP	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ
1,2-Dichloropropane	8260B-TCLP	1 U	1 U	1 U	1 U	1 U	1 UJ
1,2-Dichlorotetrafluoroethane	8260B-TCLP	5 U	5 U	5 U	5 U	5 U	5 UJ
2-Butanone	8260B-TCLP	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ
2-Hexanone	8260B-TCLP	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
4-Methyl-2-Pentanone	8260B-TCLP	50 U	50 U	50 U	50 U	50 U	50 UJ
Acetone	8260B-TCLP	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ
Benzene	8260B-TCLP	1 U	1 U	1 U	1 U	1 U	1 UJ
Bromodichloromethane	8260B-TCLP	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 UJ
Bromoform	8260B-TCLP	1 U	1 U	1 U	1 U	1 U	1 UJ
Bromomethane	8260B-TCLP	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
Carbon Disulfide	8260B-TCLP	1 U	1 U	1 U	1 U	1 U	1 UJ
Carbon Tetrachloride	8260B-TCLP	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ
Chlorobenzene	8260B-TCLP	1 U	1 U	1 U	1 U	1 U	1 UJ
Chlorodibromomethane	8260B-TCLP	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 UJ
Chloroethane	8260B-TCLP	1 U	1 U	1 U	1 U	1 U	1 UJ
Chloroform	8260B-TCLP	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	3.1 J
Chloromethane	8260B-TCLP	1 U	1 U	1 U	1 U	1 U	1 UJ
cis-1,2-Dichloroethene	8260B-TCLP	1 U	1 U	1 U	1 U	1 U	1 UJ
cis-1,3-Dichloropropene	8260B-TCLP	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ
Dichlorodifluoromethane (F12)	8260B-TCLP	1 U	1 U	1 U	1 U	1 U	1 UJ
Diisopropyl Ether	8260B-TCLP	5 U	5 U	5 U	5 U	5 U	5 UJ
Ethylbenzene	8260B-TCLP	1 U	1 U	1 U	1 U	1 U	1 UJ
Ethyl-tert-butyl ether (ETBE)	8260B-TCLP	5 U	5 U	5 U	5 U	5 U	5 UJ
Methyl tert-butyl ether	8260B-TCLP	3 U	3 U	3 U	3 U	3 U	3 UJ
Methylene Chloride	8260B-TCLP	3 U	3 U	3 U	3 U	3 U	3 UJ
Styrene	8260B-TCLP	1 U	1 U	1 U	1 U	1 U	1 UJ
tert-Amyl methyl ether (TAME)	8260B-TCLP	5 U	5 U	5 U	5 U	5 U	5 UJ
Tert-Butyl Alcohol	8260B-TCLP	20 UJ	20 UJ	20 UJ	20 UJ	20 UJ	20 UJ
Tetrachloroethene	8260B-TCLP	1 U	1 U	1 U	1 U	1 U	1 UJ
Toluene	8260B-TCLP	1 U	1 U	1 U	1 U	0.6 J	1 UJ
Total xylenes	8260B-TCLP	1 U	1 U	1 U	1 U	1 U	1 UJ
trans-1,2-Dichloroethene	8260B-TCLP	1 U	1 U	1 U	1 U	1 U	1 UJ
trans-1,3-Dichloropropene	8260B-TCLP	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ
Trichloroethene	8260B-TCLP	1 U	1 U	1 U	1 U	1 U	1 UJ
Trichlorofluoromethane	8260B-TCLP	5 U	5 U	5 U	5 U	5 U	5 UJ
Vinyl chloride	8260B-TCLP	0.52 U	0.52 U	0.52 U	0.52 U	0.52 U	0.52 UJ
WET VOCs (µg/L)							
1,1,1,2-Tetrachloroethane	8260B-WET	1 U	1 U	1 U	1 U	1 U	1 U
1,1,1-Trichloroethane	8260B-WET	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane	8260B-WET	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	8260B-WET	5 U	5 U	5 U	5 U	5 U	5 U
1,1,2-Trichloroethane	8260B-WET	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethane	8260B-WET	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	8260B-WET	1 U	1 U	1 U	1 U	1 U	1 U
1,2,3-Trichloropropane	8260B-WET	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U
1,2-Dichloroethane	8260B-WET	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	8260B-WET	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichlorotetrafluoroethane	8260B-WET	5 U	5 U	5 U	5 U	5 U	5 U
2-Butanone	8260B-WET	100 UJ	100 U	100 U	100 U	100 U	100 U
2-Hexanone	8260B-WET	50 UJ	50 U	50 U	50 U	50 U	50 U
4-Methyl-2-Pentanone	8260B-WET	50 U	50 U	50 U	50 U	50 U	50 U
Acetone	8260B-WET	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ
Benzene	8260B-WET	1 U	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	8260B-WET	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Bromoform	8260B-WET	1 U	1 U	1 U	1 U	1 U	1 U
Bromomethane	8260B-WET	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
Carbon Disulfide	8260B-WET	1 U	1 U	1 U	1 U	1 U	1 U
Carbon Tetrachloride	8260B-WET	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chlorobenzene	8260B-WET	1 U	1 U	1 U	1 U	1 U	1 U
Chlorodibromomethane	8260B-WET	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U
Chloroethane	8260B-WET	1 U	1 U	1 U	1 U	1 U	1 U
Chloroform	8260B-WET	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	2.7
Chloromethane	8260B-WET	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	8260B-WET	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,3-Dichloropropene	8260B-WET	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dichlorodifluoromethane (F12)	8260B-WET	1 U	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
Diisopropyl Ether	8260B-WET	5 U	5 U	5 U	5 U	5 U	5 U
Ethylbenzene	8260B-WET	1 U	1 U	1 U	1 U	1 U	1 U
Ethyl-tert-butyl ether (ETBE)	8260B-WET	5 UJ	5 U	5 U	5 U	5 U	5 U
Methyl tert-butyl ether	8260B-WET	3 U	3 U	3 U	3 U	3 U	3 U
Methylene Chloride	8260B-WET	3 UJ	3 UJ	3 UJ	3 UJ	3 UJ	3 UJ
Styrene	8260B-WET	1 U	1 U	1 U	1 U	1 U	1 U
tert-Amyl methyl ether (TAME)	8260B-WET	5 U	5 U	5 U	5 U	5 U	5 U
Tert-Butyl Alcohol	8260B-WET	20 UJ	20 UJ	20 UJ	20 UJ	20 UJ	20 UJ
Tetrachloroethene	8260B-WET	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	8260B-WET	1 U	1 U	1 U	1 U	1 U	1 U
Total xylenes	8260B-WET	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	8260B-WET	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,3-Dichloropropene	8260B-WET	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethene	8260B-WET	1 U	1 U	1 U	1 U	1 U	1 U
Trichlorofluoromethane	8260B-WET	5 U	5 U	5 U	5 U	5 U	5 U
Vinyl chloride	8260B-WET	0.52 U	0.52 U	0.52 U	0.52 U	0.52 U	0.52 U
Others							
pH	9045	11.4	9.94	9.41	8.49	9.49	12

[1] Determined by the federal Toxicity Characteristic Leachate Procedure (TCLP)
[2] Determined by the California Waste Extraction Test (WET)
[3] Environmental Protection Agency method unless otherwise noted

J = quantitation estimated
REG = regular sample
U = indicates the analyte was not detected at or above the stated limit
µg/L = microgram per liter

Table F-2: Validated Analytical Results for IDW Soil Samples - Totals

		Sample ID:	LC720	LC721	LC722	LC723	LC724	LC725
		Location ID:	IDW-SOIL	IDW-SOIL	IDW-SOIL	IDW-SOIL	IDW-SOIL	IDW-SOIL
		Sample Type:	REG	REG	REG	REG	REG	REG
		Sample Date:	9/19/2003	9/19/2003	9/19/2003	9/19/2003	9/19/2003	9/19/2003
Parameter	**Unit**	**Analytical Method [1]**						
Metals								
Aluminum	mg/kg	6010B	4000	7400	6470	7540	8090	16900 J
Antimony	mg/kg	6010B	3.5 U	4.8 U	3.6 U	4 U	4 U	7.2 UJ
Arsenic	mg/kg	6010B	1.7	3.6	2.9	2.9	2.8	7 J
Barium	mg/kg	6010B	66.7	76.1	90.5	70.8	94.8	170 J
Beryllium	mg/kg	6010B	0.23 U	0.32 U	0.24 U	0.27 U	0.26 U	0.48 UJ
Cadmium	mg/kg	6010B	0.53	1.2	1	1.8	0.79	1.5 J
Calcium	mg/kg	6010B	2960	6270	4130	3470	4330	16800 J
Chromium	mg/kg	6010B	5.2	10.7	10.5	10.5	10	20.8 J
Cobalt	mg/kg	6010B	2.4	4.2	3.7	4.1	4.4	8.2 J
Copper	mg/kg	6010B	4 J	7.9 J	5.3 J	6.6 J	5.7 J	14.4 J
Iron	mg/kg	6010B	4910	9750	8910	9730	10200	19800 J
Lead	mg/kg	6010B	1.8	3.1	5.1	3	2.6	6.7 J
Magnesium	mg/kg	6010B	1760 J	3090 J	2550 J	2920 J	3720 J	7180 J
Manganese	mg/kg	6010B	103	172	164	189	173	325 J
Mercury	mg/kg	7471A	0.035	0.039	0.028	0.038	0.036	0.059 J
Nickel	mg/kg	6010B	4.1	9.9	8.1	11.4	7.7	16.4 J
Potassium	mg/kg	6010B	905	1800	1540	1700	1910	3760 J
Selenium	mg/kg	6010B	0.14 UJ	0.29 UJ	0.32 UJ	0.26 UJ	0.3 UJ	0.68 UJ
Silver	mg/kg	6010B	0.031 UJ	0.039 UJ	0.61 U	0.66 U	0.66 U	0.047 UJ
Sodium	mg/kg	6010B	83.6	509	151	269	98.7	505 J
Thallium	mg/kg	6010B	0.47 U	0.63 U	0.49 U	0.53 U	0.53 U	0.18 UJ
Vanadium	mg/kg	6010B	13.4	26.3	22.3	24.9	26.6	52.5 J
Zinc	mg/kg	6010B	14.2	28.2	26.1	28.7	30.2	59 J
Petroleum Hydrocarbons								
PHC As Diesel Fuel	mg/kg	8015B DRO	1 J	2 J	110	4 J	2 J	20 J
TPH as Motor Oil	mg/kg	8015B DRO	12 U	16 U	160	13 U	13 U	27 J
Gasoline	mg/kg	8015B DRO	11 U	37 U	11 U	14 U	14 U	45 UJ
Volatile Organic Compounds								
1,1,1,2-Tetrachloroethane	µg/kg	8260B	5.3 U	13 U	5.4 U	7.1 U	7 U	17 UJ
1,1,1-Trichloroethane	µg/kg	8260B	5.3 U	13 U	5.4 U	7.1 U	7 U	17 UJ
1,1,2,2-Tetrachloroethane	µg/kg	8260B	5.3 U	13 U	5.4 U	7.1 U	7 U	17 UJ
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/kg	8260B	5.3 U	13 U	5.4 U	7.1 U	7 U	17 UJ
1,1,2-Trichloroethane	µg/kg	8260B	5.3 U	13 U	5.4 U	7.1 U	7 U	17 UJ
1,1-Dichloroethane	µg/kg	8260B	5.3 U	13 U	5.4 U	7.1 U	7 U	17 UJ
1,1-Dichloroethene	µg/kg	8260B	5.3 U	13 U	5.4 U	7.1 U	7 U	17 UJ
1,2-Dichloroethane	µg/kg	8260B	5.3 U	13 U	5.4 U	7.1 U	7 U	17 UJ
1,2-Dichloropropane	µg/kg	8260B	5.3 U	13 U	5.4 U	7.1 U	7 U	17 UJ
1,2-Dichlorotetrafluoroethane	µg/kg	8260B	5.3 UJ	13 UJ	5.4 UJ	7.1 UJ	7 UJ	17 UJ
2-Butanone	µg/kg	8260B	110 U	250 U	110 U	140 U	140 U	340 UJ
2-Hexanone	µg/kg	8260B	53 U	130 U	54 U	71 U	70 U	170 UJ
4-Methyl-2-Pentanone	µg/kg	8260B	53 U	130 U	54 U	71 U	70 U	170 UJ
Acetone	µg/kg	8260B	110 U	250 U	110 U	140 U	140 U	340 UJ
Benzene	µg/kg	8260B	5.3 U	13 U	5.4 U	7.1 U	7 U	17 UJ
Bromodichloromethane	µg/kg	8260B	5.3 U	13 U	5.4 U	7.1 U	7 U	17 UJ
Bromoform	µg/kg	8260B	5.3 U	13 U	5.4 U	7.1 U	7 U	17 UJ
Bromomethane	µg/kg	8260B	5.3 U	13 U	5.4 U	7.1 U	7 U	17 UJ
Carbon Disulfide	µg/kg	8260B	5.3 U	13 U	5.4 U	7.1 U	7 U	17 UJ
Carbon Tetrachloride	µg/kg	8260B	5.3 U	13 U	5.4 U	7.1 U	7 U	17 UJ
Chlorobenzene	µg/kg	8260B	5.3 U	13 U	5.4 U	7.1 U	7 U	17 UJ
Chlorodibromomethane	µg/kg	8260B	5.3 U	13 U	5.4 U	7.1 U	7 U	17 UJ
Chloroethane	µg/kg	8260B	5.3 U	13 U	5.4 U	7.1 U	7 U	17 UJ
Chloroform	µg/kg	8260B	5.3 U	10 J	5.4 U	7.1 U	6 J	190 J
Chloromethane	µg/kg	8260B	5.3 UJ	13 UJ	5.4 UJ	7.1 UJ	7 UJ	17 UJ
cis-1,2-Dichloroethene	µg/kg	8260B	5.3 U	13 U	5.4 U	7.1 U	7 U	17 UJ
cis-1,3-Dichloropropene	µg/kg	8260B	5.3 U	13 U	5.4 U	7.1 U	7 U	17 UJ
Dichlorodifluoromethane (F12)	µg/kg	8260B	5.3 UJ	13 UJ	5.4 UJ	7.1 UJ	7 UJ	17 UJ
Diisopropyl Ether	µg/kg	8260B	5.3 U	13 U	5.4 U	7.1 U	7 U	17 UJ
Ethylbenzene	µg/kg	8260B	5.3 U	13 U	5.4 U	7.1 U	7 U	17 UJ
Ethyl-tert-butyl ether (ETBE)	µg/kg	8260B	5.3 U	13 U	5.4 U	7.1 U	7 U	17 UJ
Methyl tert-butyl ether	µg/kg	8260B	5.3 U	13 U	5.4 U	7.1 U	7 U	17 UJ
Methylene Chloride	µg/kg	8260B	5.3 U	13 U	5.4 U	7.1 U	7 U	17 UJ
Styrene	µg/kg	8260B	5.3 U	13 U	5.4 U	7.1 U	7 U	17 UJ
tert-Amyl methyl ether (TAME)	µg/kg	8260B	5.3 U	13 U	5.4 U	7.1 U	7 U	17 UJ
Tert-Butyl Alcohol	µg/kg	8260B	21 UJ	51 UJ	22 UJ	28 UJ	28 UJ	69 UJ
Tetrachloroethene	µg/kg	8260B	5.3 U	13 U	5.4 U	7.1 U	7 U	17 UJ
Toluene	µg/kg	8260B	5.3 U	13 U	5.4 U	7.1 U	7 U	17 UJ
Total xylenes	µg/kg	8260B	16 U	38 U	16 U	21 U	21 U	52 UJ
trans-1,2-Dichloroethene	µg/kg	8260B	5.3 U	13 U	5.4 U	7.1 U	7 U	17 UJ
trans-1,3-Dichloropropene	µg/kg	8260B	5.3 U	13 U	5.4 U	7.1 U	7 U	17 UJ
Trichloroethene	µg/kg	8260B	5.3 U	13 U	5.4 U	7.1 U	7 U	17 UJ
Trichlorofluoromethane	µg/kg	8260B	5.3 U	13 U	5.4 U	7.1 U	7 U	17 UJ
Vinyl chloride	µg/kg	8260B	5.3 U	13 U	5.4 U	7.1 U	7 U	17 UJ
Others								
Moisture	%	ASTM D 2216	14.7	36.9	17.6	24.8	24.2	58.5

ASTM = American Society for Testing and Materials
J = quantitation estimated
REG = regular sample
U = indicates the analyte was not detected at or above the stated limit

Groundwater

September 18, 2003

Karnig Ohannessian, P.E.
Remedial Project Manager
Southwest Division - Naval Facilities Engineering Command
BRAC Operations Office, Code 06CC.KHO
1230 Columbia Street, Suite 870
San Diego, CA 92101

Subject: **Pre-Design Investigation for SGU Remedy, Central Treatment System Treated Groundwater Sample Results.**

Dear Mr. Ohannessian:

Earth Tech respectfully presents the results of sampling of the central treatment system (CTS) treated groundwater generated during the on-going Site 24 Pre-Design Investigation activities.

Central Treatment System Batch Operation:
Batch samples were collected on July 31, 2003 and the results conveyed to the Navy on August 11, 2003. Sampling results show detections of some VOCs including trichloroethylene (TCE) and perchlorate in the influent samples that were reduced to concentrations meeting the corresponding discharge requirements in the effluent samples, thereby demonstrating the effectiveness of the CTS using liquid-phase granulated activated carbon.

Central Treatment System Continuous Operation:
Continuous treatment and discharge to ground for percolation (east of Hangar 296) was begun on August 29, 2003. Weekly effluent sampling started on September 2, 2003. Mid point samples were also collected weekly based on greater than 100,000 gallons of groundwater being processed weekly.

Sample results continued to show that the discharge met the requirements until the effluent sample result collected on September 11, 2003, which showed perchlorate concentration of 6.5 μg/L, exceeding the discharge criterion of 4 μg/L. Sample results were received at the close of business on Wednesday, September 17, 2003 and the treatment system shutdown on Thursday, September 18, 2003. In addition, the trichloroethylene results of the September 11, 2003 sampling showed concentrations of 37μg/L and 2.5μg/L at the mid point and effluent of the treatment system respectively. While the effluent sample has not exceeded the discharge criterion of 5μg/L, the mid point sample has exceeded that number and therefore change-out of the carbon is recommended.

A total of approximately 497,000 gallons were treated between September 11, 2003 and shutdown on September 18, 2003. A summary table (Table 1) of the discharge requirements for the CTS treated groundwater along with the CTS sample results is attached.

Central Treatment System Carbon Change-Out:
Change-out of the spent liquid phase granular activated carbon is scheduled for next Monday, September 22, 2003. In addition, it is proposed that two 500-lb vessels of perchlorate-specific ion exchange resin also be installed as part of the central treatment system.

Very truly yours,

Earth Tech, Inc.

Crispin Wanyoike
CTO Manager

cc: Scott Kehe – El Toro
Ron Johnson – El Toro

TABLE 1

Parameter/Method	Average Monthly Discharge Concentration Limit (µg/L) [a]	7/31/2003		9/2/2003			9/12/2003	9/11/2003
		Totalizer reading (gal.) = 2,120,940		Totalizer reading (gal.) = 2,227,000			Totalizer reading (gal.) = 2,485,200	
		Volume Treated since last sample (gal.) = 0		Volume Treated since last sample (gal.) = 106,060			Volume Treated since last sample (gal.) = 258,200	
		Influent Sample Results **LC624**	Effluent Sample Results **LC625**	Influent Sample Results **LC684**	Midpoint Sample Results **LC686**	Effluent Sample Results **LC688**	Midpoint Sample Results **LC705**	Effluent Sample Results **LC701**
Totalizer reading (gallons)		2120940		2227000			2485200	
Volume treated since last sample (gallons)		0		106060			258200	
pH	6–9 [b] pH units	7.32	8.64	7.33	7.44	7.57	NS	7.11
Total Petroleum Hydrocarbons	100 [b]	0.09	0.02 J	0.02 J	0.02 J	0.01 J	0.03 J	0.04 J
Benzene	1.0 [c]	2.2	<1	<1	<1	<1	<1	<1
Toluene	150 [c]	12	0.4 J	<1	<1	<1	<1	<1
Xylene	1750 [c]	14	0.7 J	<1	0.6 J	<1	<1	<1
Ethylbenzene	700 [c]	2	<1	<1	<1	<1	<1	<1
Carbon tetrachloride	0.5 [d]	<0.5	<0.5	<0.5	<0.5	<0.5	0.4 J	<0.5
Chloroform	80 [c]	1.89	<0.03	3.28	<0.03	<0.03	1	0.79
Dichlorobromomethane	80 [c]	<0.024	<0.024	0.32	<0.024	<0.024	<0.059	<0.024
Methyl ethyl ketone	120 [c]	<100	<100	<100	<100	<100	<100	<100
Methyl isobutyl ketone	120 [c]	<50	<50	<50	<50	<50	<50	<50
MTBE	5 [b]	<3	<3	<3	<3	<3	<3	<3
Naphthalene	10.0 [d]	<5	<5	<1	<1	<1	<1	<1
Tetrachloroethene (PCE)	5 [b]	<1	<1	0.6 J	<1	<1	0.7 J	<1
Trichloroethylene (TCE)	5 [b]	51	<1	61[(c)]	<1	<1	37	2.5
1,1-Dichlorethane (1,1-DCA)	5 [b]	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethylene (1,1-DCE)	6 [b]	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethylene (1,2-DCE)	5 [b]	<1	<1	<1	<1	<1	0.9 J	<1
cis-1,2-Dichloroethylene (cis-1,2-DCE)	6 [g]							
trans-1,2-Dichloroethylene (trans-1,2-DCE)	10 [g]							
1,1,1-Trichloroethane (1,1,1-TCA)	200 [b]	<1	<1	<1	<1	<1	<1	<1
1,2,3-Trichloropropane (1,2,3-TCP)	—	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TBA	12 [b]	<20	<20	<20	<20	<20	<20	<20
Nitrate	mg/L	11	0.59	NS	NS	NS	NS	NS
Nitrite	mg/L	<1	<0.5	NS	NS	NS	NS	NS
Sulfides	0.4 [d] mg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total Dissolved Solids (TDS)	—	811	751	988	1,170	1,080	1,170	1,060
Total Suspended Solids	75 [d] mg/L	NS	NS	71	3J	<4	15	7
Perchlorate	4 [e]	4.7	<4	5	2.7 J	<4	9.0	**6.5**
1,4-Dioxane	3 [e]	<3	<3	0.6 J	0.4 J	<3	<3	0.3 J
Fish Toxicity	LC_{50} (96 hours)[f]	>750	>750	NS	NS	NS	NS	NS
Total Selenium		8.8	<2	NS	NS	NS	NS	NS
Total Lead	50[b]	3.8	3.3	NS	NS	NS	NS	NS

Notes:

[a] The highest allowable average of daily pollutant discharges over a calendar month, calculated as the sum of all measuements over a calendar month divided by the number of measu

[b] General Waste Discharge Requirements per Order No. R8-2002-0033.

[c] California MCL, Title 22, California Code of Regulations Division 4. Environmental Health Chapter 15. Domestic Water Quality and Monitoring Article 4. Primary Standards-Inorganic (

[d] General Waste Discharge Requirements per Order No. 96-18.

[e] California Action Level, Article 17. Special Monitoring Requirements for Unregulated Organic Chemicals. (2002).

[f] According to Title 22, an LC50 value of ≤ 500 mg/L is deemed toxic.

J: Reported between Practical Quantitation Limit and Method Detection Limit

"-": No Discharge Requirement

NS- Not Sampled

[2] = Duplicate Sample

[1] = Used for TPH are mg/L

Table F-3: Summary of Validated Analytical Results for Central Treatment System Samples

		Sample ID:	LC624	LC625	LC626	LC631	LC632	LC684	LC685	LC686	LC687	LC688	LC696	LC701	LC704	LC705	LC707	LC710	LC711	LC712	LC713	LC726	LC727	LC728	LC729	LC737	LC739	LC740
		Location ID:	CTS-INFLUENT	CTS-EFFLUENT	FIELD QC	CTS-INFLUENT	CTS-EFFLUENT	CTS-INFLUENT	FIELD QC	CTS-MIDPOINT	FIELD QC	CTS-EFFLUENT	FIELD QC	CTS-EFFLUENT	FIELD QC	CTS-MIDPOINT	FIELD QC	FIELD QC	CTS-MIDPOINT	CTS-EFFLUENT	CTS-INFLUENT	FIELD QC	CTS-INFLUENT	CTS-MIDPOINT	CTS-EFFLUENT	FIELD QC	CTS-MIDPOINT	CTS-MIDPOINT
		Sample Type:	REG	REG	TB	REG	REG	REG	TB	REG	TB	REG	TB	REG	TB	REG	TB	TB	REG	REG	REG	TB	REG	REG	REG	TB	REG	FD
		Sample Date:	7/31/2003	7/31/2003	7/31/2003	8/7/2003	8/7/2003	9/2/2003	9/2/2003	9/2/2003	9/2/2003	9/2/2003	9/11/2003	9/11/2003	9/12/2003	9/12/2003	9/15/2003	9/16/2003	9/16/2003	9/16/2003	9/16/2003	9/23/2003	9/23/2003	9/23/2003	9/23/2003	9/29/2003	9/29/2003	9/29/2003
Parameter	**Unit**	**Analytical Method[1]**																										
Volatile Organic Compounds																												
1,1,1,2-Tetrachloroethane	µg/L	8260B	1 U	1 U	1 U	--	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	--	1 U	1 U	1 U	1 U	1 U	1 U	--
1,1,1-Trichloroethane	µg/L	8260B	1 U	1 U	1 U	--	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	--	1 U	1 U	1 U	1 U	1 U	1 U	--
1,1,2,2-Tetrachloroethane	µg/L	8260B	1 U	1 U	1 U	--	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 UJ	1 UJ	1 UJ	1 U	1 UJ	1 UJ	--	1 UJ	1 UJ	1 UJ	1 UJ	1 U	1 U	--
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	8260B	5 U	5 U	5 U	--	--	2 J	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	--	5 U	5 U	5 U	5 U	5 U	5 U	--
1,1,2-Trichloroethane	µg/L	8260B	1 U	1 U	1 U	--	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	--	1 U	1 U	1 U	1 U	1 U	1 U	--
1,1-Dichloroethane	µg/L	8260B	1 U	1 U	1 U	--	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	--	1 U	1 U	1 U	1 U	1 U	1 U	--
1,1-Dichloroethene	µg/L	8260B	1 U	1 U	1 U	--	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	--	1 U	1 U	1 U	1 U	1 U	1 U	--
1,2,3-Trichloropropane	µg/L	8260B	0.5 U	0.5 U	0.5 U	--	--	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	--	0.5 U	0.5 U	0.5 U	--	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	--
1,2-Dichloroethane	µg/L	8260B	0.5 U	0.5 U	0.5 U	--	--	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	--	0.5 U	0.5 U	0.9	0.5 U	0.5 U	0.5 U	--
1,2-Dichloropropane	µg/L	8260B	1 U	1 U	1 U	--	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	--	1 U	1 U	1 U	1 U	1 U	1 U	--
1,2-Dichlorotetrafluoroethane	µg/L	8260B	5 U	5 U	5 U	--	--	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	--	5 U	5 U	5 U	5 U	5 U	5 U	--
2-Butanone	µg/L	8260B	100 U	100 U	100 U	--	--	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	--	100 U	100 U	100 U	100 U	100 U	100 UJ	--
2-Chloroethyl Vinyl Ether	µg/L	8260B	50 UJ	50 UJ	50 UJ	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Hexanone	µg/L	8260B	50 U	50 U	50 U	--	--	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 UJ	50 UJ	--	50 U	50 U	50 U	50 U	50 U	50 UJ	--
4-Methyl-2-Pentanone	µg/L	8260B	50 U	50 U	50 U	--	--	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 UJ	50 UJ	50 U	50 U	50 UJ	50 UJ	--	50 U	50 U	50 U	50 U	50 U	50 U	--
Acetone	µg/L	8260B	100 UJ	100 UJ	100 UJ	--	--	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ	100 U	100 UJ	100 UJ	--	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ	--
ACROLEIN	µg/L	8260B	50 UJ	50 UJ	50 UJ	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ACRYLONITRILE	µg/L	8260B	50 U	50 U	50 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzene	µg/L	8260B	2.2	1 U	1 U	--	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	--	1 U	1 U	38	1 U	1 U	1	--
Bromodichloromethane	µg/L	8260B	0.024 U	0.024 U	0.024 U	--	--	0.32	0.024 U	0.024 U	0.024 U	0.024 U	0.024 U	0.024 U	0.059 U	0.059 U	0.059 U	0.059 U	0.059 U	0.059 U	--	0.059 U	0.059 U	0.059 U	0.059 U	0.024 U	0.024 U	--
Bromoform	µg/L	8260B	1 U	1 U	1 U	--	--	0.7 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	--	1 U	1 U	1 U	1 U	1 U	1 U	--
Bromomethane	µg/L	8260B	1 UJ	1 UJ	1 UJ	--	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 UJ	1 UJ	1 U	1 UJ	1 U	1 U	--	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	--
Carbon Disulfide	µg/L	8260B	1 U	1 U	1 U	--	--	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	--	1 U	1 U	1 U	1 U	1 UJ	1 U	--
Carbon Tetrachloride	µg/L	8260B	0.5 U	0.5 U	0.5 U	--	--	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.4 J	0.5 U	0.5 U	0.5 U	0.5 U	--	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	--
Chlorobenzene	µg/L	8260B	1 U	1 U	1 U	--	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	--	1 U	1 U	1 U	1 U	1 U	1 U	--
Chlorodibromomethane	µg/L	8260B	0.065 U	0.065 U	0.065 U	--	--	0.33	0.065 U	0.065 U	0.065 U	0.065 U	0.065 U	0.065 U	0.036 U	0.036 U	0.036 U	0.036 U	0.39	0.036 U	--	0.036 U	0.036 U	0.036 U	0.036 U	0.065 U	0.065 U	--
Chloroethane	µg/L	8260B	1 U	1 U	1 U	--	--	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 U	1 U	1 U	1 U	1 U	1 U	--	1 U	1 U	1 U	1 U	1 U	1 U	--
Chloroform	µg/L	8260B	1.89	0.03 U	0.03 U	--	--	3.28	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.79	0.053 U	1	0.053 U	0.053 U	1.6	0.79	--	0.053 U	0.97	0.053 U	0.053 U	0.03 U	0.03 U	--
Chloromethane	µg/L	8260B	1 UJ	1 UJ	1 UJ	--	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	--	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 U	--
Cis-1,2-Dichloroethene	µg/L	8260B	1 U	1 U	1 U	--	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.9 J	1 U	1 U	1 U	1 U	--	1 U	1 U	1 U	1 U	1 U	1 U	--
Cis-1,3-Dichloropropene	µg/L	8260B	0.5 U	0.5 U	0.5 U	--	--	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	--	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	--
Dichlorodifluoromethane (F12)	µg/L	8260B	1 U	1 U	1 U	--	--	1 U	1 U	1 U	1 U	1 U	1 UJ	1 UJ	1 U	1 U	1 U	1 U	1 U	1 U	--	1 U	1 U	1 U	1 U	1 U	1 U	--
Diisopropyl Ether	µg/L	8260B	5 U	5 U	5 U	--	--	5 U	5 U	5 U	5 U	5 U	5 UJ	5 UJ	5 U	5 U	5 U	5 U	5 U	5 U	--	5 U	5 U	5 U	5 U	5 U	5 U	--
Ethylbenzene	µg/L	8260B	2	1 U	1 U	--	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	--	1 U	1 U	1 U	1 U	1 U	1 U	--
Ethyl-tert-butyl ether (ETBE)	µg/L	8260B	5 U	5 U	5 U	--	--	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	--	5 U	5 U	5 U	5 U	5 U	5 U	--
Methyl Tert-Butyl Ether	µg/L	8260B	3 U	3 U	3 U	--	--	3 U	3 U	3 U	3 U	3 U	3 U	3 U	0.4 J	3 U	3 U	3 U	3 U	3 U	--	3 U	3 U	10	3 U	3 U	1 J	--
Methylene Chloride	µg/L	8260B	3 U	3 U	3 U	--	--	3 U	3 U	3 U	3 U	3 U	1 J	3 U	3 U	3 U	3 U	3 U	3 U	3 U	--	3 U	3 U	3 U	3 U	3 U	3 U	--
Naphthalene	µg/L	8260B	5 U	5 U	5 U	--	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	--	1 U	1 U	1 U	--	1 U	1 U	1 U	1 U	1 U	1 U	--
Styrene	µg/L	8260B	1 U	1 U	1 U	--	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	--	1 U	1 U	1 U	1 U	1 U	1 U	--
tert-Amyl methyl ether (TAME)	µg/L	8260B	5 U	5 U	5 U	--	--	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	--	5 U	5 U	5 U	5 U	5 U	5 U	--
Tert-Butyl Alcohol	µg/L	8260B	20 UJ	20 UJ	20 UJ	--	--	20 UJ	20 UJ	20 UJ	20 UJ	20 UJ	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	--	20 U	20 U	20 U	20 U	20 UJ	20 UJ	--
Tetrachloroethene	µg/L	8260B	1 U	1 U	1 U	--	--	0.6 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.7 J	1 U	1 U	0.4 J	1 U	--	1 U	2	1 U	1 U	1 U	1 U	--
Toluene	µg/L	8260B	12	0.4 J	1 U	--	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	--	1 U	1 U	14	1 U	1 U	1	--
Total Xylenes	µg/L	8260B	14	0.7 J	1 U	--	--	1 U	1 U	0.6 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	--	1 U	1 U	0.5 J	1 U	1 U	1 U	--
Trans-1,2-Dichloroethene	µg/L	8260B	1 U	1 U	1 U	--	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	--	1 U	1 U	1 U	1 U	1 U	1 U	--
Trans-1,3-Dichloropropene	µg/L	8260B	0.5 U	0.5 U	0.5 U	--	--	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	--	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	--
Trichloroethene	µg/L	8260B	51	1 U	1 U	--	--	61	1 U	1 U	1 U	1 U	1 U	2.5	1 U	37	1 U	1 U	8.5	2.7	--	1 U	48	1 U	1 U	1 U	1 U	--
Trichlorofluoromethane	µg/L	8260B	5 U	5 U	5 U	--	--	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	--	5 U	5 U	5 U	5 U	5 U	5 U	--
Vinyl Chloride	µg/L	8260B	0.5 U	0.5 U	0.5 U	--	--	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	--	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	--
Others																												
Hardness	mg/L	130.2	430	390	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Solids, Total Dissolved	mg/L	160.1	811	751	--	--	--	988	--	1170	--	1080	--	1060	--	1170	--	--	1010	985	--	--	1120	1080	1110	--	994	979
Solids, Total Suspended	mg/L	160.2	--	--	--	4 U	4 U	71	--	3	--	4 U	--	7	--	15	--	--	43	30	--	--	3	4 U	4 U	--	6	5
Nitrate	mg/L	300.0	11	0.59	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrite as Nitrogen	mg/L	300.0	1 U	0.5 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Perchlorate	µg/L	314.0	4.7 J	4 U	--	--	--	5 J	--	2.7 J	--	4 UJ	--	6.5 J	--	9 J	--	--	5.6	5.5	--	--	7.9	4 U	4 U	--	3.6 J	3.3 J
Sulfide	mg/L	376.2	0.2 U	0.2 U	--	--	--	0.2 U	--	0.2 U	--	0.2 U	--	0.2 U	--	0.2 U	--	--	0.2 U	0.2 U	--	--	0.2 U	0.2 U	0.2 U	--	0.2 U	0.2 U
Gasoline	mg/L	8015B GRO	0.09	0.05 U	0.05 U	--	--	0.05 U	--	0.05 U	--	0.05 U	--	0.05 U	--	0.05 U	--	--	0.05 U	0.06 UJ	--	--	0.05 U	0.15	0.05 U	--	0.05 U	0.05 U
1,4-Dioxane	µg/L	8270-SIM	3 U	3 U	--	--	--	0.6 J	--	0.4 J	--	3 U	--	0.3 J	--	3 U	--	--	0.8 J	3 U	--	--	3 U	2 J	3 U	--	0.4 J	0.4 J
pH	--	9040	7.32	8.64	--	--	--	7.33	--	7.44	--	7.57	--	7.11	--	--	--	--	--	7.17	7.36	--	7.53	7.17	7.33	--	7.07	7.2
Bioassay, 96 HR. LC50[2]	mg/L	CF&G/WPCL	750	750	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

[1] Environmental Protection Agency method unless otherwise noted
[2] 96-hour, 50% lethal concentration
-- = no data
FD = field duplicate
J = quantitation estimated
REG = regular sample
TB = trip blank
U = indicates the analyte was not detected at or above the stated limit

Table F-3: Summary of Validated Analytical Results for Central Treatment System Samples

		Sample ID:	LC741	LC742	LC745	LC747	LC748	LC749	LC754	LC755	LC756	LC757	LC761	LC762	LC763	LC795	LC796	LC797	LC798	LC799	LC800	LC801
		Location ID:	CTS-EFFLUENT	CTS-EFFLUENT	FIELD QC	CTS-INFLUENT	CTS-MIDPOINT	CTS-EFFLUENT	FIELD QC	CTS-INFLUENT	CTS-MIDPOINT	CTS-EFFLUENT	FIELD QC	CTS-MIDPOINT	CTS-EFFLUENT	CTS-MIDPOINT	CTS-EFFLUENT	CTS-INFLUENT	FIELD QC	CTS-EFFLUENT	CTS-MIDPOINT	FIELD QC
		Sample Type:	REG	FD	TB	REG	REG	REG	TB	REG	REG	REG	TB	REG	REG	REG	REG	REG	TB	REG	REG	TB
		Sample Date:	9/29/2003	9/29/2003	10/2/2003	10/2/2003	10/2/2003	10/2/2003	10/6/2003	10/6/2003	10/6/2003	10/6/2003	10/8/2003	10/8/2003	10/8/2003	11/4/2003	11/4/2003	11/4/2003	11/4/2003	11/21/2003	11/21/2003	11/21/2003
Parameter	**Unit**	**Analytical Method[1]**																				
Volatile Organic Compounds																						
1,1,1,2-Tetrachloroethane	µg/L	8260B	1 U	--	1 U	--	1 U	1 U	1 U	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,1-Trichloroethane	µg/L	8260B	1 U	--	1 U	--	1 U	1 U	1 U	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane	µg/L	8260B	1 U	--	1 U	--	1 U	1 U	1 U	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	8260B	5 U	--	5 U	--	5 UJ	5 UJ	5 U	--	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,1,2-Trichloroethane	µg/L	8260B	1 U	--	1 U	--	1 U	1 U	1 U	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethane	µg/L	8260B	1 U	--	1 U	--	1 U	1 U	1 U	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	µg/L	8260B	1 U	--	1 U	--	1 U	1 U	1 U	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2,3-Trichloropropane	µg/L	8260B	0.5 U	--	0.5 U	--	0.5 U	0.5 U	0.5 U	--	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethane	µg/L	8260B	0.5 U	--	0.5 U	--	0.5 U	0.5 U	0.5 U	--	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	µg/L	8260B	1 U	--	1 U	--	1 U	1 U	1 U	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichlorotetrafluoroethane	µg/L	8260B	5 U	--	5 U	--	5 U	5 U	5 UJ	--	5 UJ	5 UJ	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2-Butanone	µg/L	8260B	100 UJ	--	100 UJ	--	100 U	100 U	100 U	--	100 U	100 U	2 J	100 U	100 U	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ	100 U
2-Chloroethyl Vinyl Ether	µg/L	8260B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Hexanone	µg/L	8260B	50 UJ	--	50 U	--	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
4-Methyl-2-Pentanone	µg/L	8260B	50 U	--	50 U	--	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 UJ
Acetone	µg/L	8260B	100 UJ	--	100 UJ	--	100 UJ	100 UJ	100 UJ	--	100 UJ	100 UJ	3 J	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ
ACROLEIN	µg/L	8260B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ACRYLONITRILE	µg/L	8260B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzene	µg/L	8260B	1 U	--	1 U	--	1 U	1 U	1 U	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.4 J	1 U
Bromodichloromethane	µg/L	8260B	0.024 U	--	0.024 U	--	0.024 U	0.024 U	0.024 U	--	0.024 U	0.024 U	0.024 U	0.024 U	0.024 U	0.024 U	0.024 U	0.024 U	0.024 U	0.024 U	0.024 U	0.024 U
Bromoform	µg/L	8260B	1 U	--	1 U	--	1 U	1 U	1 U	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromomethane	µg/L	8260B	1 UJ	--	1 UJ	--	1 UJ	1 UJ	1 UJ	--	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 U	1 U	1 U
Carbon Disulfide	µg/L	8260B	1 U	--	1 UJ	--	1 U	1 U	1 U	--	1 U	1 U	1 UJ	1 UJ	1 UJ	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon Tetrachloride	µg/L	8260B	0.5 U	--	0.5 UJ	--	0.5 U	0.5 U	0.5 U	--	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chlorobenzene	µg/L	8260B	1 U	--	1 U	--	1 U	1 U	1 U	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chlorodibromomethane	µg/L	8260B	0.065 U	--	0.065 U	--	0.065 U	0.065 U	0.065 U	--	0.065 U	0.065 U	0.065 U	0.065 U	0.065 U	0.065 U	0.065 U	0.065 U	0.065 U	0.065 U	0.065 U	0.065 U
Chloroethane	µg/L	8260B	1 U	--	1 U	--	1 U	1 U	1 U	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroform	µg/L	8260B	0.03 U	--	0.03 U	--	0.03 U	0.03 U	0.03 U	--	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.33	0.03 U
Chloromethane	µg/L	8260B	1 U	--	1 U	--	1 U	1 U	1 UJ	--	1 UJ	1 UJ	1 UJ	1 UJ	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Cis-1,2-Dichloroethene	µg/L	8260B	1 U	--	1 U	--	1 U	1 U	1 U	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Cis-1,3-Dichloropropene	µg/L	8260B	0.5 U	--	0.5 U	--	0.5 U	0.5 U	0.5 U	--	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dichlorodifluoromethane (F12)	µg/L	8260B	1 U	--	1 U	--	1 U	1 U	1 U	--	1 U	1 U	1 UJ	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Diisopropyl Ether	µg/L	8260B	5 U	--	5 U	--	5 U	5 U	5 U	--	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Ethylbenzene	µg/L	8260B	1 U	--	1 U	--	1 U	1 U	1 U	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Ethyl-tert-butyl ether (ETBE)	µg/L	8260B	5 U	--	5 U	--	5 U	5 U	5 U	--	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Methyl Tert-Butyl Ether	µg/L	8260B	3 U	--	3 U	--	3 U	0.4 J	3 U	--	3 U	0.3 J	3 U	3 U	0.4 J	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Methylene Chloride	µg/L	8260B	3 U	--	3 U	--	3 U	3 U	3 U	--	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	1 J
Naphthalene	µg/L	8260B	1 U	--	1 U	--	1 U	1 U	1 U	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1	1 U
Styrene	µg/L	8260B	1 U	--	1 U	--	1 U	1 U	1 U	--	1 U	1 U	1 U	1 U	1 U	1 U	0.8 J	1 U	1 U	1 U	1 U	1 U
tert-Amyl methyl ether (TAME)	µg/L	8260B	5 U	--	5 U	--	5 U	5 U	5 U	--	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Tert-Butyl Alcohol	µg/L	8260B	20 UJ	--	20 UJ	--	20 UJ	20 UJ	20 UJ	--	20 UJ	20 UJ	20 UJ	20 UJ	20 UJ	20 U	20 U	20 U	20 U	20 UJ	20 UJ	20 UJ
Tetrachloroethene	µg/L	8260B	1 U	--	1 U	--	1 U	1 U	1 U	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	µg/L	8260B	1 U	--	1 U	--	1 U	1 U	1 U	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1	1 U
Total Xylenes	µg/L	8260B	1 U	--	1 U	--	1 U	1 U	1 U	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	36	1 U
Trans-1,2-Dichloroethene	µg/L	8260B	1 U	--	1 U	--	1 U	1 U	1 U	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trans-1,3-Dichloropropene	µg/L	8260B	0.5 U	--	0.5 U	--	0.5 U	0.5 U	0.5 U	--	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethene	µg/L	8260B	1 U	--	1 U	--	1 U	1 U	1 U	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	6	1 U	1 U	1 U	1 U
Trichlorofluoromethane	µg/L	8260B	5 U	--	5 U	--	5 U	5 U	5 U	--	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Vinyl Chloride	µg/L	8260B	0.5 U	--	0.5 U	--	0.5 U	0.5 U	0.5 U	--	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Others																						
Hardness	mg/L	130.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Solids, Total Dissolved	mg/L	160.1	1050	1120	--	--	1300	1300	--	--	1230	1180	--	1250	1790	1200	1060	1030	--	1070	1100	--
Solids, Total Suspended	mg/L	160.2	5	4	--	--	4 U	4 U	--	--	43	14	--	9	4 U	79	4 U	9	--	9	27	--
Nitrate	mg/L	300.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrite as Nitrogen	mg/L	300.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Perchlorate	µg/L	314.0	2.9 J	1.9 J	--	--	6.3 J	5.4 J	--	--	7.2	7.2	--	11.1 J	4 U	10.3 J	4 U	8.9 J	--	4 U	7.4 J	--
Sulfide	mg/L	376.2	0.2 U	0.2 U	--	--	0.2 U	0.2 U	--	--	0.2 U	0.2 U	--	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	--	0.2 U	0.2 U	--
Gasoline	mg/L	8015B GRO	0.05 U	0.05 U	--	--	0.06	0.04 J	--	--	0.05 U	0.05 U	--	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.06 UJ	0.15	0.05 U
1,4-Dioxane	µg/L	8270-SIM	0.5 J	0.4 J	--	--	3 U	3 U	--	--	3 U	3 U	--	0.3 J	3 U	0.4 J	3 U	0.7 J	--	0.4 J	0.4 J	--
pH	--	9040	7.19	7.18	--	7.22	7.16	7.18	--	7.24	6.96	6.86	--	7.33	7.35	7.43	7.42	7.51	--	7.64	7.57	--
Bioassay, 96 HR. LC50[2]	mg/L	CF&G/WPCL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

[1] Environmental Protection Agency method unless otherwise

[2] 96-hour, 50% lethal concentration

-- = no data

FD = field duplicate

J = quantitation estimated

REG = regular sample

TB = trip blank

U = indicates the analyte was not detected at or above the sta

Table F-3: Summary of Validated Analytical Results for Central Treatment System Samples

	Sample ID:	LC624	LC625	LC626	LC631	LC632	LC684	LC685	LC686	LC687	LC688	LC696	LC701	LC704	LC705	LC707	LC710	LC711	LC712	LC713	LC726	LC727	LC728	LC729
	Location ID:	CTS-INFLUENT	CTS-EFFLUENT	FIELD QC	CTS-INFLUENT	CTS-EFFLUENT	CTS-INFLUENT	FIELD QC	CTS-MIDPOINT	FIELD QC	CTS-EFFLUENT	FIELD QC	CTS-EFFLUENT	FIELD QC	CTS-MIDPOINT	FIELD QC	FIELD QC	CTS-MIDPOINT	CTS-EFFLUENT	CTS-INFLUENT	FIELD QC	CTS-INFLUENT	CTS-MIDPOINT	CTS-EFFLUENT
	Sample Type:	REG	REG	TB	REG	REG	REG	TB	REG	TB	REG	TB	REG	TB	REG	TB	TB	REG	REG	REG	TB	REG	REG	REG
	Sample Date:	7/31/2003	7/31/2003	7/31/2003	8/7/2003	8/7/2003	9/2/2003	9/2/2003	9/2/2003	9/2/2003	9/2/2003	9/11/2003	9/11/2003	9/12/2003	9/12/2003	9/15/2003	9/16/2003	9/16/2003	9/16/2003	9/16/2003	9/23/2003	9/23/2003	9/23/2003	9/23/2003
Parameter	Analytical Method [1]																							
Metals (µg/L)																								
Aluminum	6010B	93.1 UJ	32.6 UJ	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Antimony	6010B	5 U	5 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic	6010B	3.9 UJ	263	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	6010B	67.6	155	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Beryllium	6010B	2 U	2 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium	6010B	2 U	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	6010B	117000	93500	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chromium	6010B	14.5	5 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cobalt	6010B	5 U	5 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	6010B	57.8	3 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Iron	6010B	477	50 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	6010B	3.8	3.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	6010B	31800	28900	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Manganese	6010B	209	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mercury	7470A	0.055	0.054	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Molybdenum	6010B	21.9	26.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	6010B	37.1	4.8 UJ	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	6010B	3660	3770	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Selenium	6010B	8.8 UJ	2 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Silver	6010B	10 U	10 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sodium	6010B	95900	101000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	6010B	3.5 UJ	2 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	6010B	7.3	4.9 UJ	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	6010B	394	41.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

[1] Environmental Protection Agency method
-- = no units or not analyzed
FD = field duplicate
J = quantitation estimated
REG = regular sample
TB = trip blank
U = indicates the analyte was not detected at or above the stated limit

Table F-3: Summary of Validated Analytical Results for Central Treatment System Samples

	Sample ID:	LC737	LC739	LC740	LC741	LC742	LC745	LC747	LC748	LC749	LC754	LC755	LC756	LC757	LC761	LC762	LC763	LC795	LC796	LC797	LC798	LC799	LC800	LC801
	Location ID:	FIELD QC	CTS-MIDPOINT	CTS-MIDPOINT	CTS-EFFLUENT	CTS-EFFLUENT	FIELD QC	CTS-INFLUENT	CTS-MIDPOINT	CTS-EFFLUENT	FIELD QC	CTS-INFLUENT	CTS-MIDPOINT	CTS-EFFLUENT	FIELD QC	CTS-MIDPOINT	CTS-EFFLUENT	CTS-MIDPOINT	CTS-EFFLUENT	CTS-INFLUENT	FIELD QC	CTS-EFFLUENT	CTS-MIDPOINT	FIELD QC
	Sample Type:	TB	REG	FD	REG	FD	TB	REG	REG	REG	TB	REG	REG	REG	TB	REG	REG	REG	REG	REG	TB	REG	REG	TB
	Sample Date:	9/29/2003	9/29/2003	9/29/2003	9/29/2003	9/29/2003	10/2/2003	10/2/2003	10/2/2003	10/2/2003	10/6/2003	10/6/2003	10/6/2003	10/6/2003	10/8/2003	10/8/2003	10/8/2003	11/4/2003	11/4/2003	11/4/2003	11/4/2003	11/21/2003	11/21/2003	11/21/2003
Parameter	**Analytical Method [1]**																							
Metals (µg/L)																								
Aluminum	6010B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Antimony	6010B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic	6010B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	6010B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Beryllium	6010B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium	6010B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	6010B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chromium	6010B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cobalt	6010B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	6010B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Iron	6010B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	6010B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	6010B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Manganese	6010B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mercury	7470A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Molybdenum	6010B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nickel	6010B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	6010B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Selenium	6010B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Silver	6010B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sodium	6010B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	6010B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium	6010B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	6010B	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

[1] Environmental Protection Agency method
-- = no units or not analyzed
FD = field duplicate
J = quantitation estimated
REG = regular sample
TB = trip blank
U = indicates the analyte was not detected at or above the stated limit

Spent Media

MEMO

Date: February 2, 2004

To: Karnig Ohannessian
cc.

From: Crispin Wanyoike

Re: IRP Site 24 Spent Media (Carbon and Resin) Investigation Derived Waste Disposal Plan

1 INTRODUCTION

This memorandum presents sampling results and recommendations for disposal of spent media investigation-derived waste (IDW) generated during the pre-design investigation (PDI) at Installation Restoration Program (IRP) Site 24, Former Marine Corps Air Station (MCAS) El Toro, California. The PDI is being performed under Contract Task Order (CTO) No. 0068 under the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract No. N62742-94-D-0048.

1.1 Background

IRP Site 24 (composed of the vadose zone and shallow groundwater unit) is located in the southwest quadrant of Former MCAS El Toro and the vadose zone portion encompasses approximately 200 acres. The site was a highly industrialized area, and contains two large aircraft hangars (Buildings 296 and 297) and several smaller buildings that were used for aircraft and vehicle maintenance and repair.

The Phase I Remedial Investigation, Phase II Remedial Investigation/Feasibility Study, and various site-specific investigations and studies identified volatile organic compound (VOC) contamination at the former station boundary and in the agricultural wells west of the former station. The VOC contamination due to base operations migrated from the soil to the shallow groundwater unit and from there to the principal aquifer. The contaminated areas were divided into two regions; IRP Site 24, VOC Source Area, consists of the vadose zone source area and shallow groundwater unit (SGU), and IRP Site 18, Regional VOC Groundwater Plume, consists of the principal aquifer, mainly located off-station.

The remedy for the vadose zone has been implemented and a closure report (Earth Tech 2002) was reviewed and accepted by the BCT. The selected remedies for the contaminated groundwater at IRP Sites 24 and 18 are extraction, treatment, and institutional controls as documented in a final ROD (DoN 2002).

As part of the remedy design, the PDI was conducted to gather additional design input data including sustainable extraction rates and contaminant plume delineation through the installation, testing, sampling, and monitoring of 12 wells (Earth Tech 2003). As part of the PDI, both groundwater and vapor treatment systems were rented from which the spent media IDW was generated as discussed below.

2 WASTE GENERATION AND APPLICABLE REGULATORY REQUIREMENTS

The spent media consists of spent vapor-phase and liquid-phase granular activated carbon (GAC) and spent perchlorate-specific, ion exchange (IX) resin, which are being handled as individual waste streams. Approximately 2,000 pounds of spent vapor-phase GAC, 4,000 pounds of spent liquid-phase GAC, and 3,000 pounds of spent IX resin were generated during the investigation.

Management of the spent media IDW (vapor and liquid-phase GAC and IX resin) is being conducted in accordance with the following guidance documents and regulations:

- CLEAN SOP 22, IDW Management (BNI 1999).
- United States Environmental Protection Agency (EPA) IDW Guidance (EPA 1992).
- EPA, Code of Federal Regulations, Hazardous Waste Regulations, 40 CFR 261, and
- California Code of Regulations (CCR), Hazardous Waste Regulations, Title 22 CCR 66261.

3 WASTE HANDLING AND DISPOSAL

Waste handling and disposal entails collection of composite samples of the spent media for laboratory analysis, characterization of the waste using the analytical results, completion of disposal facility waste acceptance profiles, transportation and disposal of the waste, and certification of disposal, treatment, or recycling. These procedures are further discussed below.

3.1 Storage Containers

The spent media are contained in their respective operations vessels at the former location of groundwater central treatment system used during the PDI on the east side of Building 296. The vessels are labeled appropriately to identify their content as either GAC or resin.

3.2 Sampling and Laboratory Analyses

Based on the regulatory requirements for determination of a hazardous waste pursuant to the characteristics of toxicity as listed in Title 22 CCR 66261.24, the spent samples were analyzed for total concentration values and where necessary as indicated by the total concentration values, analyzed for leachate concentrations. Analytical methods used are identified below. In addition, the spent resin sample was analyzed for fish toxicity using the Title 22 Fish Toxicity test pursuant to Title 22 CCR 66261.24(a)(6).

Composite samples of each media were collected and submitted for laboratory analysis as follows:

- The spent liquid-phase and vapor-phase GAC samples were analyzed for total VOCs using EPA Method 8260 to compare against the Total Threshold Limit Concentration (TTLC) limits for each regulated analyte.
- A second vapor-phase GAC sample was analyzed for total leachate VOCs using EPA Method 1311/8260, the federal Toxicity Characteristic Leachate Procedure (TCLP) to confirm whether the spent carbon was a Resource Conservation and Recovery Act (RCRA) hazardous waste.
- The spent IX resin was analyzed for total metals (including mercury) and the CCR Title 22 toxicity testing. No analysis for VOCs was conducted as the influent stream to the IX resin bed was demonstrated to be free of VOCs (below detection limits) after passage through the liquid-phase GAC. Additional testing for facility acceptance was performed for volatile bromides, chlorides, fluorides, and sulfur.

The analytical reports have been included as an attachment and are summarized below. Table 1 presents a summary of the detections along with the corresponding federal and state limits (if regulated).

<u>Spent Vapor-Phase GAC</u>

Analytes detected using EPA Method 8260 for VOCs were TCE (19.6 mg/kg, compared to the TTLC limit of 2040 mg/kg) and PCE (46.8 mg/kg, noTTLC). These levels indicated the possibility of a leachate sample exceeding the corresponding regulatory limits for RCRA hazardous waste and therefore a TCLP analysis was performed on a subsequent sample. Analytes detected using EPA Method 1311/8260 were chloroform (0.0057 mg/L, compared to the TCLP limit of 6 mg/L) and MTBE (0.017 mg/L, not regulated).

Spent Liquid-Phase GAC

The only analytes detected were chloroform (0.037 mg/kg, no TTLC) and TCE (0.045mg/kg, compared to the TTLC limit of 2,040 mg/kg).

Spent Perchlorate Removal Resin

Selenium was detected at 12.1 mg/kg, compared to the TTLC limit of 100 mg/kg, and the fish toxicity testing showed a 96-hour LC50 value of >750 mg/L, greater than the hazardous criteria of 500 mg/L. Other results, including additional disposal facility acceptance requirement results, are included in the attachment.

TABLE 1: Summary of Detection and Corresponding Hazardous Waste Limits

Compound	Result/TCLP[1] Limit (mg/L)	Result/TTLC[2] Limit (mg/kg)	Result/Acute Aquatic Limit (mg/L)
Spent Vapor-Phase GAC			
Chloroform	0.0057 / 6	–	–
MTBE	0.017 / NR	–	–
TCE	<0.001/ 0.5	19.6/ 2,040	
PCE	<0.001/ 0.7	46.8/ NR	
Spent Liquid-Phase GAC			
Chloroform	–	0.037/ NR	–
TCE	–	0.045/ 2,040	–
Spent Perchlorate Removal Resin			
Selenium	–	12.1/ 100	–
Fish Toxicity[3]	–	–	>750/ 500

NR = Not Regulated.
[1] Code of federal Regulations, 40 CFR 261.4
[2] California Code of Regulations, Title 22 CCR 66261
[3] A result greater than the regulatory limit (500 mg/L) is a pass.

3.3 Waste Characterization

Based on the analytical results presented above, all three spent media are classified as non-hazardous waste for the purposes of disposal.

3.4 Facility Acceptance, Transportation, and Disposal

Following receipt of the results, facility waste acceptance profiles were completed, signed by the generator, and submitted to the owners of the equipment (treatment systems) for review and acceptance by their disposal vendors. Spent carbon profiles were accepted by the disposal facilities as follows:

- The spent liquid-phase GAC profile was accepted by Barnebey Sutcliffe Corporation (Barnebey) for disposal by regeneration and assigned profile number 5083-L.
- The spent vapor-phase GAC profile was accepted by Barnebey for disposal by regeneration and assigned profile number 6033-V.

The spent IX resin profile was accepted by Clean Harbors Environmental Services, Inc. for disposal by incineration and assigned profile number CH212382.

All spent media will be transported off-site under either non-hazardous waste manifests or bill of ladings. The disposal companies, upon disposal of the wastes, will provide regeneration/disposal certificates or

incineration certificates for each waste. The PDI final technical memorandum will include documentation of the IDW disposal.

4 CONCLUSIONS AND RECOMMENDATIONS

Activities undertaken during the PDI at IRP Site 24, Former MCAS El Toro in support of the remedial design generated three types of solid media IDW: spent liquid-phase and vapor-phase GAC and spent ion-exchange resin. Management of this IDW is being performed according to the work plan and federal and state procedures. In preparation for disposal of the IDW, a sample of each medium was submitted to a certified laboratory for analysis. None of the concentrations exceeded the regulatory thresholds for RCRA hazardous waste classification. Based on these results, the spent carbon and resin IDW are classified as non-hazardous. It is therefore recommended that the spent GAC be disposed of by regeneration, and the spent resin be disposed of by incineration. Disposal certificates will be provided upon completion.

5 REFERENCES

Bechtel National, Inc. (BNI). 1996. *Final Technical Memorandum, Background and Reference Levels, Remedial Investigations, Marine Corps Air Station, El Toro, California.* San Diego, CA.

———. 1999. *CLEAN II Program Procedures Manual.* San Diego, CA.

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———. 2002. *Record of Decision for Operable Unit 1, Site 18 – Regional Volatile Organic Compound Groundwater Plume, Operable Unit 2A, Site 24 – VOC Source Area, Former Marine Corps Air Station, El Toro, California.* San Diego, California: SWDIV. January.

Earth Tech, Inc. 2002. *Draft Final Site Closure Report, Vadose Zone Remediation, IRP Site 24, Volatile Organic Compounds Source Area, Former Marine Corps Air Station, El Toro, California.* San Diego, California. June.

———. 2003. *Final Work Plan Pre-design Investigation for Shallow Groundwater Unit Remedy, IRP Site 24, VOC Source Area, Former Marine Corps Air Station, El Toro, California.* San Diego, California. May.

Environmental Protection Agency, United States (EPA). 1992. *Guide to Management of Investigation-Derived Wastes.* PB9345.3-03FS. Office of Solid Waste and Emergency Response. January.

ATTACHMENT – ANALYTICAL RESULTS

SPENT VAPOR-PHASE GAC

TOTAL VOC RESULTS

RCH Research and Environmental Laboratories, Inc.

2880-A Ana St. (PCT Building)
Rancho Dominguez, CA 90221
Tel.: (310) 763-5023
Fax.: (310) 763-4000

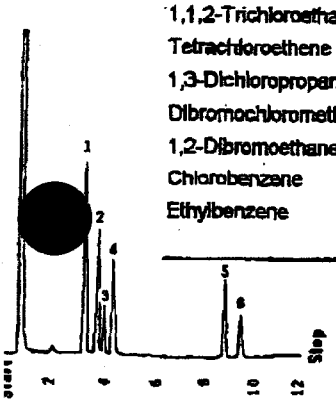
- Environmental Analysis (California State Certified)
- Contract Research
- Expert Witness in Court
- Industrial Wastewater Engineering
- Environmental/Site Assessment

CERTIFICATE OF ANALYSIS

CLIENT: ENVENT CORPORATION
2398 CALIFORNIA AVE.
SIGNAL HILL, CA. 90755
PROJECT CONTACT PERSON: STEVE SELLINGER
PROJECT NAME/NO.:
MATRIX: CARBON
SAMPLE I.D.: GAC-SVE

REPORTING DATE: 10/24/03
SAMPLE RECEIVED: 10/21/03
LABORATORY NO.: 03-2911
DATE SAMPLED : 10/21/03
LAB I.D. CODE : 10183
INVESTIGATION : SEE BELOW

Parameter	Result	Detection Limit	Method	Date Analyzed
Dichlorofluoromethane	ND	0.01 mg/kg	8260	10/22/03
Chloromethane	ND	0.01 mg/kg	8260	10/22/03
Vinyl Chloride	ND	0.01 mg/kg	8260	10/22/03
Bromoethane	ND	0.01 mg/kg	8260	10/22/03
Trichlorofluoromethane	ND	0.01 mg/kg	8260	10/22/03
1,1-Dichloroethene	ND	0.01 mg/kg	8260	10/22/03
Methylene Chloride	ND	0.02 mg/kg	8260	10/22/03
Trans-1,2-Dichloroethane	ND	0.01 mg/kg	8260	10/22/03
1,1-Dichloroethane	ND	0.01 mg/kg	8260	10/22/03
2,2-Dichloropropane	ND	0.01 mg/kg	8260	10/22/03
Cis-1,2-Dichloroethene	ND	0.01 mg/kg	8260	10/22/03
Bromochloromethane	ND	0.01 mg/kg	8260	10/22/03
Chloroform	ND	0.01 mg/kg	8260	10/22/03
1,1,1-Trichloroethane	ND	0.01 mg/kg	8260	10/22/03
Carbon Tetrachloride	ND	0.01 mg/kg	8260	10/22/03
1,1-Dichloropropene	ND	0.01 mg/kg	8260	10/22/03
Benzene	ND	0.01 mg/kg	8260	10/22/03
1,2-Dichloroethane	ND	0.01 mg/kg	8260	10/22/03
Trichloroethene	19.6 mg/kg	0.05 mg/kg	8260	10/22/03
1,2-Dichloropropane	ND	0.01 mg/kg	8260	10/22/03
Dibromoethane	ND	0.01 mg/kg	8260	10/22/03
Bromodichloromethane	ND	0.01 mg/kg	8260	10/22/03
Trans-1,3-Dichloropropene	ND	0.01 mg/kg	8260	10/22/03
Toluene	ND	0.01 mg/kg	8260	10/22/03
Cis-1,3-Dichloropropene	ND	0.01 mg/kg	8260	10/22/03
1,1,2-Trichloroethane	ND	0.01 mg/kg	8260	10/22/03
Tetrachloroethene	46.8 mg/kg	0.05 mg/kg	8260	10/22/03
1,3-Dichloropropane	ND	0.01 mg/kg	8260	10/22/03
Dibromochloromethane	ND	0.01 mg/kg	8260	10/22/03
1,2-Dibromoethane	ND	0.01 mg/kg	8260	10/22/03
Chlorobenzene	ND	0.01 mg/kg	8260	10/22/03
Ethylbenzene	ND	0.01 mg/kg	8260	10/22/03



RCH Research and Environmental Laboratories, Inc.

Parameter	Result	Detection Limit	Method	Date Analyzed
Isopropylbenzene	ND	0.01 mg/kg	8260	10/22/03
1,1,2,2-Tetrachloroethane	ND	0.01 mg/kg	8260	10/22/03
Bromobenzene	ND	0.01 mg/kg	8260	10/22/03
n-Propylbenzene	ND	0.01 mg/kg	8260	10/22/03
1,2,3-Trichloropropane	ND	0.01 mg/kg	8260	10/22/03
2-chlorotoluene	ND	0.01 mg/kg	8260	10/22/03
1,3,5-Trimethylbenzene	ND	0.01 mg/kg	8260	10/22/03
4-Chlorotoluene	ND	0.01 mg/kg	8260	10/22/03
Ter-Butylbenzene	ND	0.01 mg/kg	8260	10/22/03
1,2,4-Trimethylbenzene	ND	0.01 mg/kg	8260	10/22/03
Sec-Butylbenzene	ND	0.01 mg/kg	8260	10/22/03
4-Isopropyltoluene	ND	0.01 mg/kg	8260	10/22/03
1,3-Dichlorobenzene	ND	0.01 mg/kg	8260	10/22/03
1,4-Dichlorobenzene	ND	0.01 mg/kg	8260	10/22/03
n-Butylbenzene	ND	0.01 mg/kg	8260	10/22/03
1,2-Dichlorobenzene	ND	0.01 mg/kg	8260	10/22/03
1,2-Dibromo-3-chloropropane	ND	0.01 mg/kg	8260	10/22/03
1,2,4-Trichlorobenzene	ND	0.01 mg/kg	8260	10/22/03
Hexachlorobutadiene	ND	0.01 mg/kg	8260	10/22/03
Naphthalene	ND	0.01 mg/kg	8260	10/22/03
1,2,3-Trichlorobenzene	ND	0.01 mg/kg	8260	10/22/03
Acetone	ND	0.01 mg/kg	8260	10/22/03
2-Butanone (MEK)	ND	0.02 mg/kg	8260	10/22/03
4-Methyl-2-Pentanone	ND	0.01 mg/kg	8260	10/22/03
2-Hexanone	ND	0.01 mg/kg	8260	10/22/03
MTBE	ND	0.02 mg/kg	8260	10/22/03

ND = The concentration is below the detection limit or non-detected.

Respectfully Submitted,

Jina Ryu
Project Control Chemist

SPENT VAPOR-PHASE GAC

TCLP RESULTS

SIERRA ANALYTICAL

Barnebey Sutcliffe 13710 Carmenita Rd Santa Fe Springs Rd CA, 90670	Project: Carbon Project Number: LP 1971 Project Manager: Wendy Perales	Reported: 12/22/03 08:15

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Envent-El Toro	0312224-01	Solid	12/16/03 00:00	12/16/03 15:25

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

26052 MERIT CIRCLE SUITE 105, LAGUNA HILLS, CALIFORNIA 92653
TELEPHONE: (949) 348-9389 FAX: (949) 348-9115
E-MAIL: SIERRALABS @ SIERALABS.NET

SIERRA ANALYTICAL

Barnebey Sutcliffe 13710 Carmenita Rd Santa Fe Springs Rd CA, 90670	Project: Carbon Project Number: LP 1971 Project Manager: Wendy Perales	Reported: 12/22/03 08:15

ZHE-TCLP Volatile Organic Compounds by EPA Method 1311/8260B

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Eavent-El Toro (0312224-01) Solid Sampled: 12/16/03 00:00 Received: 12/16/03 15:25									
Benzene	ND	1.0	µg/L	1	B3L1944	12/19/03	12/19/03	EPA 8260B	
Bromobenzene	ND	1.0	"	"	"	"	"	"	
Bromochloromethane	ND	1.0	"	"	"	"	"	"	
Bromodichloromethane	ND	1.0	"	"	"	"	"	"	
Bromoform	ND	1.0	"	"	"	"	"	"	
Bromomethane	ND	5.0	"	"	"	"	"	"	
2-Butanone	ND	5.0	"	"	"	"	"	"	
n-Butylbenzene	ND	1.0	"	"	"	"	"	"	
sec-Butylbenzene	ND	1.0	"	"	"	"	"	"	
tert-Butylbenzene	ND	1.0	"	"	"	"	"	"	
Carbon tetrachloride	ND	1.0	"	"	"	"	"	"	
Chlorobenzene	ND	1.0	"	"	"	"	"	"	
Chloroethane	ND	5.0	"	"	"	"	"	"	
Chloroform	5.7	1.0	"	"	"	"	"	"	
Chloromethane	ND	5.0	"	"	"	"	"	"	
2-Chlorotoluene	ND	1.0	"	"	"	"	"	"	
4-Chlorotoluene	ND	1.0	"	"	"	"	"	"	
Dibromochloromethane	ND	1.0	"	"	"	"	"	"	
1,2-Dibromo-3-chloropropane	ND	5.0	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	1.0	"	"	"	"	"	"	
Dibromomethane	ND	1.0	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	1.0	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	1.0	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	1.0	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	5.0	"	"	"	"	"	"	
1,1-Dichloroethane	ND	1.0	"	"	"	"	"	"	
1,2-Dichloroethane	ND	1.0	"	"	"	"	"	"	
1,1-Dichloroethene	ND	1.0	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	1.0	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	1.0	"	"	"	"	"	"	
1,2-Dichloropropane	ND	1.0	"	"	"	"	"	"	
1,3-Dichloropropane	ND	1.0	"	"	"	"	"	"	
2,2-Dichloropropane	ND	1.0	"	"	"	"	"	"	
1,1-Dichloropropene	ND	1.0	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	1.0	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Hexachlorobutadiene	ND	1.0	"	"	"	"	"	"	
Isopropylbenzene	ND	1.0	"	"	"	"	"	"	
p-Isopropyltoluene	ND	1.0	"	"	"	"	"	"	
Methylene chloride	ND	1.0	"	"	"	"	"	"	

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E-Mail: sierralabs @ sieralabs.net

SIERRA ANALYTICAL

Barnebey Sutcliffe 13710 Carmenita Rd Santa Fe Springs Rd CA, 90670	Project: Carbon Project Number: LP 1971 Project Manager: Wendy Perales	Reported: 12/22/03 08:15

ZHE-TCLP Volatile Organic Compounds by EPA Method 1311/8260B

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Envent-El Toro (0312224-01) Solid Sampled: 12/16/03 00:00 Received: 12/16/03 15:25									
Methyl tert-butyl ether	17	1.0	µg/L	1	B3L1944	12/19/03	12/19/03	EPA 8260B	
Naphthalene	ND	1.0	"	"	"	"	"	"	
n-Propylbenzene	ND	1.0	"	"	"	"	"	"	
Styrene	ND	1.0	"	"	"	"	"	"	
1,1,1,2-Tetrachloroethane	ND	1.0	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	1.0	"	"	"	"	"	"	
Tetrachloroethene	ND	1.0	"	"	"	"	"	"	
Toluene	ND	1.0	"	"	"	"	"	"	
1,2,3-Trichlorobenzene	ND	1.0	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	1.0	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	1.0	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	1.0	"	"	"	"	"	"	
Trichloroethene	ND	1.0	"	"	"	"	"	"	
Trichlorofluoromethane	ND	5.0	"	"	"	"	"	"	
1,2,3-Trichloropropane	ND	5.0	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	1.0	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	1.0	"	"	"	"	"	"	
Vinyl chloride	ND	5.0	"	"	"	"	"	"	
m,p-Xylene	ND	1.0	"	"	"	"	"	"	
o-Xylene	ND	1.0	"	"	"	"	"	"	
Surrogate: Dibromofluoromethane		*109 %*		*86-118*	"	"	"	"	
Surrogate: Toluene-d8		*100 %*		*88-110*	"	"	"	"	
Surrogate: 4-Bromofluorobenzene		*108 %*		*86-115*	"	"	"	"	

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E-MAIL: SIERRALABS @ SIERALABS.NET

SIERRA ANALYTICAL

Barnebey Sutcliffe 13710 Carmenita Rd Santa Fe Springs Rd CA, 90670	Project: Carbon Project Number: LP 1971 Project Manager: Wendy Perales	Reported: 12/22/03 08:15

ZHE-TCLP Volatile Organic Compounds by EPA Method 1311/8260B - Quality Control

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B3L1944 - EPA 5035 P & T										
Blank (B3L1944-BLK1)				Prepared & Analyzed: 12/18/03						
Benzene	ND	1.0	µg/L							
Bromobenzene	ND	1.0	"							
Bromochloromethane	ND	1.0	"							
Bromodichloromethane	ND	1.0	"							
Bromoform	ND	1.0	"							
Bromomethane	ND	5.0	"							
2-Butanone	ND	5.0	"							
n-Butylbenzene	ND	1.0	"							
sec-Butylbenzene	ND	1.0	"							
tert-Butylbenzene	ND	1.0	"							
Carbon tetrachloride	ND	1.0	"							
Chlorobenzene	ND	1.0	"							
Chloroethane	ND	5.0	"							
Chloroform	ND	1.0	"							
Chloromethane	ND	5.0	"							
2-Chlorotoluene	ND	1.0	"							
4-Chlorotoluene	ND	1.0	"							
Dibromochloromethane	ND	1.0	"							
1,2-Dibromo-3-chloropropane	ND	5.0	"							
1,2-Dibromoethane (EDB)	ND	1.0	"							
Dibromomethane	ND	1.0	"							
1,2-Dichlorobenzene	ND	1.0	"							
1,3-Dichlorobenzene	ND	1.0	"							
1,4-Dichlorobenzene	ND	1.0	"							
Dichlorodifluoromethane	ND	5.0	"							
1,1-Dichloroethane	ND	1.0	"							
1,2-Dichloroethane	ND	1.0	"							
1,1-Dichloroethene	ND	1.0	"							
cis-1,2-Dichloroethene	ND	1.0	"							
trans-1,2-Dichloroethene	ND	1.0	"							
1,2-Dichloropropane	ND	1.0	"							
1,3-Dichloropropane	ND	1.0	"							
2,2-Dichloropropane	ND	1.0	"							
1,1-Dichloropropene	ND	1.0	"							
cis-1,3-Dichloropropene	ND	1.0	"							
trans-1,3-Dichloropropene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SIERRA ANALYTICAL

Barnebey Sutcliffe	Project: Carbon	
13710 Carmenita Rd	Project Number: LP 1971	Reported:
Santa Fe Springs Rd CA, 90670	Project Manager: Wendy Perales	12/22/03 08:15

ZHE-TCLP Volatile Organic Compounds by EPA Method 1311/8260B - Quality Control

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B3L1944 - EPA 5035 P & T										
Blank (B3L1944-BLK1)				Prepared & Analyzed: 12/18/03						
Hexachlorobutadiene	ND	1.0	µg/L							
Isopropylbenzene	ND	1.0	"							
p-Isopropyltoluene	ND	1.0	"							
Methylene chloride	ND	1.0	"							
Methyl tert-butyl ether	ND	1.0	"							
Naphthalene	ND	1.0	"							
n-Propylbenzene	ND	1.0	"							
Styrene	ND	1.0	"							
1,1,1,2-Tetrachloroethane	ND	1.0	"							
1,1,2,2-Tetrachloroethane	ND	1.0	"							
Tetrachloroethene	ND	1.0	"							
Toluene	ND	1.0	"							
1,2,3-Trichlorobenzene	ND	1.0	"							
1,2,4-Trichlorobenzene	ND	1.0	"							
1,1,1-Trichloroethane	ND	1.0	"							
1,1,2-Trichloroethane	ND	1.0	"							
Trichloroethene	ND	1.0	"							
Trichlorofluoromethane	ND	5.0	"							
1,2,3-Trichloropropane	ND	5.0	"							
1,2,4-Trimethylbenzene	ND	1.0	"							
1,3,5-Trimethylbenzene	ND	1.0	"							
Vinyl chloride	ND	5.0	"							
m,p-Xylene	ND	1.0	"							
o-Xylene	ND	1.0	"							
Surrogate: Dibromofluoromethane	*44.2*		"	*50.0*		*88.4*	*86-118*			
Surrogate: Toluene-d8	*47.5*		"	*50.0*		*95.0*	*88-110*			
Surrogate: 4-Bromofluorobenzene	*45.6*		"	*50.0*		*91.2*	*86-115*			

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

26052 MERIT CIRCLE SUITE 105, LAGUNA HILLS, CALIFORNIA 92653
TELEPHONE: (949) 348-9389 FAX: (949) 348-9115
E-MAIL: SIERRALABS @ SIERALABS.NET

SIERRA ANALYTICAL

Barnebey Sutcliffe	Project: Carbon	
13710 Carmenita Rd	Project Number: LP 1971	Reported:
Santa Fe Springs Rd CA, 90670	Project Manager: Wendy Perales	12/22/03 08:15

ZHE-TCLP Volatile Organic Compounds by EPA Method 1311/8260B - Quality Control

Sierra Analytical Labs, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B3L1944 - EPA 5035 P & T										
LCS (B3L1944-BS1)				Prepared & Analyzed: 12/18/03						
Benzene	41.4	1.0	µg/L	50.0		82.8	80-120			
Chlorobenzene	51.9	1.0	"	50.0		104	80-120			
1,1-Dichloroethene	48.0	1.0	"	50.0		96.0	80-120			
Toluene	48.2	1.0	"	50.0		96.4	80-120			
Trichloroethene	50.2	1.0	"	50.0		100	80-120			
Matrix Spike (B3L1944-MS1)		Source: 0312205-07		Prepared & Analyzed: 12/18/03						
Benzene	35.8	1.0	µg/L	50.0	ND	71.6	37-151			
Chlorobenzene	47.9	1.0	"	50.0	ND	95.8	37-160			
1,1-Dichloroethene	36.4	1.0	"	50.0	ND	72.8	50-150			
Toluene	42.5	1.0	"	50.0	ND	85.0	47-150			
Trichloroethane	43.3	1.0	"	50.0	ND	86.6	71-157			
Matrix Spike Dup (B3L1944-MSD1)		Source: 0312205-07		Prepared: 12/18/03 Analyzed: 12/19/03						
[illegible]nzene	38.9	1.0	µg/L	50.0	ND	77.8	37-151	8.30	30	
[illegible]orobenzene	48.8	1.0	"	50.0	ND	97.6	37-160	1.86	30	
1,1-Dichloroethene	39.1	1.0	"	50.0	ND	78.2	50-150	7.15	30	
Toluene	43.3	1.0	"	50.0	ND	86.6	47-150	1.86	30	
Trichloroethene	44.3	1.0	"	50.0	ND	88.6	71-157	2.28	30	

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TELEPHONE: (949) 348-9389 FAX: (949) 348-9115
E-MAIL: SIERRALABS @ SIERALABS.NET

SIERRA ANALYTICAL

Barnebey Sutcliffe 13710 Carmenita Rd Santa Fe Springs Rd CA, 90670	Project: Carbon Project Number: LP 1971 Project Manager: Wendy Perales	Reported: 12/22/03 08:15

Notes and Definitions

DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

26052 MERIT CIRCLE SUITE 105, LAGUNA HILLS, CALIFORNIA 92653
TELEPHONE: (949) 348-9389 FAX: (949) 348-9115
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SPENT LIQUID-PHASE GAC

TOTAL VOC RESULTS

Calscience Environmental Laboratories, Inc.

ANALYTICAL REPORT

ENVENT Corporation
2398 California Avenue
Signal Hill, CA 90755-3288

Date Received:	09/26/03
Work Order No:	03-09-1532
Preparation:	EPA 5030B
Method:	EPA 8260B

Project: El Toro CTS

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
PRI - GAC	03-09-1532-1	09/25/03	Solid	N/A	09/27/03	030926L01

Parameter	Result	RL	DF	Qual	Units	Parameter	Result	RL	DF	Qual	Units
Acetone	ND	50	1		ug/kg	1,3-Dichloropropane	ND	5.0	1		ug/kg
Benzene	ND	5.0	1		ug/kg	2,2-Dichloropropane	ND	5.0	1		ug/kg
Bromobenzene	ND	5.0	1		ug/kg	1,1-Dichloropropene	ND	5.0	1		ug/kg
Bromochloromethane	ND	5.0	1		ug/kg	c-1,3-Dichloropropene	ND	5.0	1		ug/kg
Bromodichloromethane	ND	5.0	1		ug/kg	t-1,3-Dichloropropene	ND	5.0	1		ug/kg
Bromoform	ND	5.0	1		ug/kg	Ethylbenzene	ND	5.0	1		ug/kg
Bromomethane	ND	25	1		ug/kg	2-Hexanone	ND	50	1		ug/kg
2-Butanone	ND	50	1		ug/kg	Isopropylbenzene	ND	5.0	1		ug/kg
n-Butylbenzene	ND	5.0	1		ug/kg	p-Isopropyltoluene	ND	5.0	1		ug/kg
sec-Butylbenzene	ND	5.0	1		ug/kg	Methylene Chloride	ND	50	1		ug/kg
tert-Butylbenzene	ND	5.0	1		ug/kg	4-Methyl-2-Pentanone	ND	50	1		ug/kg
Carbon Disulfide	ND	50	1		ug/kg	Naphthalene	ND	50	1		ug/kg
Carbon Tetrachloride	ND	5.0	1		ug/kg	n-Propylbenzene	ND	5.0	1		ug/kg
Chlorobenzene	ND	5.0	1		ug/kg	Styrene	ND	5.0	1		ug/kg
Chloroethane	ND	5.0	1		ug/kg	1,1,1,2-Tetrachloroethane	ND	5.0	1		ug/kg
Chloroform	37	5	1		ug/kg	1,1,2,2-Tetrachloroethane	ND	5.0	1		ug/kg
Chloromethane	ND	25	1		ug/kg	Tetrachloroethene	ND	5.0	1		ug/kg
2-Chlorotoluene	ND	5.0	1		ug/kg	Toluene	ND	5.0	1		ug/kg
4-Chlorotoluene	ND	5.0	1		ug/kg	1,2,3-Trichlorobenzene	ND	10	1		ug/kg
Dibromochloromethane	ND	5.0	1		ug/kg	1,2,4-Trichlorobenzene	ND	5.0	1		ug/kg
1,2-Dibromo-3-Chloropropane	ND	10	1		ug/kg	1,1,1-Trichloroethane	ND	5.0	1		ug/kg
1,2-Dibromoethane	ND	5.0	1		ug/kg	1,1,2-Trichloroethane	ND	5.0	1		ug/kg
Dibromomethane	ND	5.0	1		ug/kg	Trichloroethene	45	5	1		ug/kg
1,2-Dichlorobenzene	ND	5.0	1		ug/kg	Trichlorofluoromethane	ND	50	1		ug/kg
1,3-Dichlorobenzene	ND	5.0	1		ug/kg	1,2,3-Trichloropropane	ND	5.0	1		ug/kg
1,4-Dichlorobenzene	ND	5.0	1		ug/kg	1,2,4-Trimethylbenzene	ND	5.0	1		ug/kg
Dichlorodifluoromethane	ND	5.0	1		ug/kg	1,3,5-Trimethylbenzene	ND	5.0	1		ug/kg
1,1-Dichloroethane	ND	5.0	1		ug/kg	Vinyl Acetate	ND	50	1		ug/kg
1,2-Dichloroethane	ND	5.0	1		ug/kg	Vinyl Chloride	ND	5.0	1		ug/kg
1,1-Dichloroethene	ND	5.0	1		ug/kg	p/m-Xylene	ND	5.0	1		ug/kg
c-1,2-Dichloroethene	ND	5.0	1		ug/kg	o-Xylene	ND	5.0	1		ug/kg
t-1,2-Dichloroethene	ND	5.0	1		ug/kg	Methyl-t-Butyl Ether (MTBE)	ND	5.0	1		ug/kg
1,2-Dichloropropane	ND	5.0	1		ug/kg						

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control	Qual
Dibromofluoromethane	116	79-127		Toluene-d8	100	84-114	
1,4-Bromofluorobenzene	88	68-116					

RL - Reporting Limit . DF - Dilution Factor . Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

ANALYTICAL REPORT

ENVENT Corporation
2398 California Avenue
Signal Hill, CA 90755-3288

Date Received:	09/26/03
Work Order No:	03-09-1532
Preparation:	EPA 5030B
Method:	EPA 8260B

Project: El Toro CTS

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
Method Blank	**099-10-005-6,576**	**N/A**	**Solid**	**N/A**	**09/26/03**	**030926L01**

Parameter	Result	RL	DF	Qual	Units	Parameter	Result	RL	DF	Qual	Units
Acetone	ND	50	1		ug/kg	1,3-Dichloropropane	ND	5.0	1		ug/kg
Benzene	ND	5.0	1		ug/kg	2,2-Dichloropropane	ND	5.0	1		ug/kg
Bromobenzene	ND	5.0	1		ug/kg	1,1-Dichloropropene	ND	5.0	1		ug/kg
Bromochloromethane	ND	5.0	1		ug/kg	c-1,3-Dichloropropene	ND	5.0	1		ug/kg
Bromodichloromethane	ND	5.0	1		ug/kg	t-1,3-Dichloropropene	ND	5.0	1		ug/kg
Bromoform	ND	5.0	1		ug/kg	Ethylbenzene	ND	5.0	1		ug/kg
Bromomethane	ND	25	1		ug/kg	2-Hexanone	ND	50	1		ug/kg
2-Butanone	ND	50	1		ug/kg	Isopropylbenzene	ND	5.0	1		ug/kg
n-Butylbenzene	ND	5.0	1		ug/kg	p-Isopropyltoluene	ND	5.0	1		ug/kg
sec-Butylbenzene	ND	5.0	1		ug/kg	Methylene Chloride	ND	50	1		ug/kg
tert-Butylbenzene	ND	5.0	1		ug/kg	4-Methyl-2-Pentanone	ND	50	1		ug/kg
Carbon Disulfide	ND	50	1		ug/kg	Naphthalene	ND	50	1		ug/kg
Carbon Tetrachloride	ND	5.0	1		ug/kg	n-Propylbenzene	ND	5.0	1		ug/kg
Chlorobenzene	ND	5.0	1		ug/kg	Styrene	ND	5.0	1		ug/kg
Chloroethane	ND	5.0	1		ug/kg	1,1,1,2-Tetrachloroethane	ND	5.0	1		ug/kg
Chloroform	ND	5.0	1		ug/kg	1,1,2,2-Tetrachloroethane	ND	5.0	1		ug/kg
Chloromethane	ND	25	1		ug/kg	Tetrachloroethene	ND	5.0	1		ug/kg
2-Chlorotoluene	ND	5.0	1		ug/kg	Toluene	ND	5.0	1		ug/kg
4-Chlorotoluene	ND	5.0	1		ug/kg	1,2,3-Trichlorobenzene	ND	10	1		ug/kg
Dibromochloromethane	ND	5.0	1		ug/kg	1,2,4-Trichlorobenzene	ND	5.0	1		ug/kg
1,2-Dibromo-3-Chloropropane	ND	10	1		ug/kg	1,1,1-Trichloroethane	ND	5.0	1		ug/kg
1,2-Dibromoethane	ND	5.0	1		ug/kg	1,1,2-Trichloroethane	ND	5.0	1		ug/kg
Dibromomethane	ND	5.0	1		ug/kg	Trichloroethene	ND	5.0	1		ug/kg
1,2-Dichlorobenzene	ND	5.0	1		ug/kg	Trichlorofluoromethane	ND	50	1		ug/kg
1,3-Dichlorobenzene	ND	5.0	1		ug/kg	1,2,3-Trichloropropane	ND	5.0	1		ug/kg
1,4-Dichlorobenzene	ND	5.0	1		ug/kg	1,2,4-Trimethylbenzene	ND	5.0	1		ug/kg
Dichlorodifluoromethane	ND	5.0	1		ug/kg	1,3,5-Trimethylbenzene	ND	5.0	1		ug/kg
1,1-Dichloroethane	ND	5.0	1		ug/kg	Vinyl Acetate	ND	50	1		ug/kg
1,2-Dichloroethane	ND	5.0	1		ug/kg	Vinyl Chloride	ND	5.0	1		ug/kg
1,1-Dichloroethene	ND	5.0	1		ug/kg	p/m-Xylene	ND	5.0	1		ug/kg
c-1,2-Dichloroethene	ND	5.0	1		ug/kg	o-Xylene	ND	5.0	1		ug/kg
t-1,2-Dichloroethene	ND	5.0	1		ug/kg	Methyl-t-Butyl Ether (MTBE)	ND	5.0	1		ug/kg
1,2-Dichloropropane	ND	5.0	1		ug/kg						

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control	Qual
Dibromofluoromethane	108	79-127		Toluene-d8	99	84-114	
1,4-Bromofluorobenzene	92	68-116					

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

ENVENT Corporation
2398 California Avenue
Signal Hill, CA 90755-3288

Project: El Toro CTS

Date Received: 09/26/03
Work Order No: 03-09-1532
Preparation: EPA 5030B
Method: EPA 8260B

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
03-09-1459-1	Solid	GC/MS S	N/A	09/27/03	030926S01

Parameter	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Benzene	104	105	72-127	1	0-25	
Carbon Tetrachloride	97	98	70-130	1	0-25	
Chlorobenzene	102	105	72-131	3	0-25	
1,2-Dichlorobenzene	98	102	70-130	3	0-25	
1,1-Dichloroethene	111	111	69-127	0	0-25	
Toluene	103	103	75-124	1	0-25	
Trichloroethene	101	103	60-137	2	0-25	
Vinyl Chloride	108	109	70-130	1	0-25	
Methyl-t-Butyl Ether (MTBE)	96	96	80-120	0	0-25	
Tert-Butyl Alcohol (TBA)	92	92	60-140	1	0-25	
Diisopropyl Ether (DIPE)	97	97	60-140	0	0-25	
Ethyl-t-Butyl Ether (ETBE)	95	94	60-140	0	0-25	
Tert-Amyl-Methyl Ether (TAME)	96	97	60-140	0	0-25	
Ethanol	86	84	60-140	2	0-25	

Calscience Environmental Laboratories, Inc.

Quality Control - Laboratory Control Sample

ENVENT Corporation
2398 California Avenue
Signal Hill, CA 90755-3288

Project: El Toro CTS

Date Received: 09/26/03
Work Order No: 03-09-1532
Preparation: EPA 5030B
Method: EPA 8260B

Quality Control Sample ID	Matrix	Instrument	Date Analyzed	Lab File ID	LCS Batch Number
699-10-005-6,576	Solid	GC/MS S	09/26/03	26SEP003	030926L01

Parameter	Conc Added	Conc Recovered	%Rec	%Rec CL	Qualifiers
Benzene	250	270	107	72-127	
Carbon Tetrachloride	250	270	107	70-130	
Chlorobenzene	250	270	108	72-131	
1,2-Dichlorobenzene	250	260	105	70-130	
1,1-Dichloroethene	250	290	115	69-127	
Toluene	250	260	106	75-124	
Trichloroethene	250	260	104	60-137	
Vinyl Chloride	250	280	111	79-118	
Methyl-t-Butyl Ether (MTBE)	250	250	98	80-120	
Tert-Butyl Alcohol (TBA)	1300	1100	92	60-140	
Diisopropyl Ether (DIPE)	250	250	101	60-140	
Ethyl-t-Butyl Ether (ETBE)	250	250	100	60-140	
Tert-Amyl-Methyl Ether (TAME)	250	250	98	60-140	
Ethanol	2500	2200	88	60-140	

Calscience Environmental Laboratories, Inc.

GLOSSARY OF TERMS AND QUALIFIERS

Work Order Number: 03-09-1532

Qualifier	Definition
ND	Not detected at indicated reporting limit.

7440 Lincoln Way, Garden Grove, CA 92841-1432 • TEL: (714) 895-5494 • FAX: (714) 894-7501

SPENT ION EXCHANGE RESIN

TOTAL METALS AND FISH TOXICITY RESULTS

CALGON

CALGON CARBON CORPORATION

Reactivation Acceptance Testing

TSR Number: 20031239
Customer: El Toro AFB
City, State: ,

Applications Engineer:
Sales Person:

Container: Plastic Bottle - Quart

Platform: Service

Sent to Testing: 12/22/2003
Completed: 12/26/2003

Total Samples: 1

Tests	Test Method	Results			Units	Analyst
Sample Numbers:		**CA - 3433 - 1**				
Contact pH	TM-62	7.7	-	-	-	Kotyk
ICP Metals	SW 846 - Method 6010	Attached	-	-	mg/kg	Severn Trent
Ignitability	RTM-10	No	-	-	-	Kotyk
Nitrate	EPA Method 300M	5.6	-	-	%	Kotyk
Toxicity Testing	Cailf. Dept Fish & Game	Attached	-	-	-	Sequoia
Volatile Bromide	RTM-8	<0.1	-	-	%	Kotyk
Volatile Chloride	RTM-8	2.7	-	-	%	Kotyk
Volatile Fluoride	RTM-8	BDL	-	-	%	Kotyk
Volatile Sulfur	RTM-8, TM-30	3.1	-	-	%	Kotyk

Particle Size Distribution:

Samples:

CA - 3433 - 1 Spent Resin Sample

Comments:

CA - 3433 - 1 20031239.1
CA - 3433 - 1 20031239.2

SEVERN TRENT STL

STL Pittsburgh
450 William Pitt Way
Pittsburgh, PA 15238

Tel: 412 820 8380 Fax: 412 820 2080
www.stl-inc.com

ANALYTICAL REPORT

PROJECT NO. 20031239.1

Calgon Carbon

Lot #: C3L230126

Pat Reiser

Calgon Carbon Corporation

SEVERN TRENT LABORATORIES, INC.

Dave Dunlap
Project Manager

January 8, 2004

METHODS SUMMARY

C3L230126

PARAMETER	ANALYTICAL METHOD	PREPARATION METHOD
Mercury in Solid Waste (Manual Cold-Vapor)	SW846 7471A	SW846 7471A
Total Residue as Percent Solids	MCAWW 160.3 MOD	MCAWW 160.3 MOD
Trace Inductively Coupled Plasma (ICP) Metals	SW846 6010B	SW846 3050B

References:

MCAWW "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1983 and subsequent revisions.

SW846 "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 and its updates.

SAMPLE SUMMARY

C3L230126

WO #	SAMPLE#	CLIENT SAMPLE ID	SAMPLED DATE	SAMP TIME
F69AP	001	20031239.1	12/22/03	

NOTE(S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

CALGON CARBON CORPORATION

Client Sample ID: 20031239.1

TOTAL Metals

Lot-Sample #...: C3L230126-001 Matrix.....: SOLID
Date Sampled...: 12/22/03 Date Received..: 12/23/03
% Moisture.....: 48

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 3363096						
Mercury	0.033 B,J	0.064	mg/kg	SW846 7471A	12/29/03	F69AP1AA
		Dilution Factor: 1		Analysis Time..: 08:13	MS Run #.....: 3363007	
		MDL.....: 0.0081				
Prep Batch #...: 3363131						
Silver	0.11 B	0.97	mg/kg	SW846 6010B	01/02-01/06/04	F69AP1AQ
		Dilution Factor: 1		Analysis Time..: 18:27	MS Run #.....: 3363033	
		MDL.....: 0.11				
Arsenic	0.74 B	1.9	mg/kg	SW846 6010B	01/02-01/06/04	F69AP1AF
		Dilution Factor: 1		Analysis Time..: 18:27	MS Run #.....: 3363033	
		MDL.....: 0.46				
Barium	13.0 B	38.8	mg/kg	SW846 6010B	01/02-01/06/04	F69AP1A[illegible]
		Dilution Factor: 1		Analysis Time..: 18:27	MS Run #.....: 3363033	
		MDL.....: 0.061				
Beryllium	0.29 B,J	0.97	mg/kg	SW846 6010B	01/02-01/06/04	F69AP1AH
		Dilution Factor: 1		Analysis Time..: 18:27	MS Run #.....: 3363033	
		MDL.....: 0.056				
Calcium	866 B	970	mg/kg	SW846 6010B	01/02-01/06/04	F69AP1DC
		Dilution Factor: 1		Analysis Time..: 18:27	MS Run #.....: 3363033	
		MDL.....: 2.7				
Cadmium	0.12 B	0.97	mg/kg	SW846 6010B	01/02-01/06/04	F69AP1AJ
		Dilution Factor: 1		Analysis Time..: 18:27	MS Run #.....: 3363033	
		MDL.....: 0.076				
Cobalt	1.3 B	9.7	mg/kg	SW846 6010B	01/02-01/06/04	F69AP1AD
		Dilution Factor: 1		Analysis Time..: 18:27	MS Run #.....: 3363033	
		MDL.....: 0.11				
Chromium	14.5 J	0.97	mg/kg	SW846 6010B	01/02-01/06/04	F69AP1AT
		Dilution Factor: 1		Analysis Time..: 18:27	MS Run #.....: 3363033	
		MDL.....: 0.12				

(Continued on next page)

CALGON CARBON CORPORATION

Client Sample ID: 20031239.1

TOTAL Metals

Lot-Sample #...: C3L230126-001 Matrix.....: SOLID

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Copper	6.1	4.9	mg/kg	SW846 6010B	01/02-01/06/04	F69AP1AK
		Dilution Factor: 1		Analysis Time..: 18:27	MS Run #.....: 3363033	
		MDL.....: 0.21				
Iron	2540	19.4	mg/kg	SW846 6010B	01/02-01/06/04	F69AP1DD
		Dilution Factor: 1		Analysis Time..: 18:27	MS Run #.....: 3363033	
		MDL.....: 3.3				
Manganese	31.3	2.9	mg/kg	SW846 6010B	01/02-01/06/04	F69AP1AM
		Dilution Factor: 1		Analysis Time..: 18:27	MS Run #.....: 3363033	
		MDL.....: 0.032				
Nickel	3.1 B	7.8	mg/kg	SW846 6010B	01/02-01/06/04	F69AP1AN
		Dilution Factor: 1		Analysis Time..: 18:27	MS Run #.....: 3363033	
		MDL.....: 0.16				
Lead	1.1	0.58	mg/kg	SW846 6010B	01/02-01/06/04	F69AP1AL
		Dilution Factor: 1		Analysis Time..: 18:27	MS Run #.....: 3363033	
		MDL.....: 0.51				
Antimony	ND	1.9	mg/kg	SW846 6010B	01/02-01/06/04	F69AP1AE
		Dilution Factor: 1		Analysis Time..: 18:27	MS Run #.....: 3363033	
		MDL.....: 0.62				
Selenium	12.1	0.97	mg/kg	SW846 6010B	01/02-01/06/04	F69AP1AP
		Dilution Factor: 1		Analysis Time..: 18:27	MS Run #.....: 3363033	
		MDL.....: 0.45				
Thallium	ND	1.9	mg/kg	SW846 6010B	01/02-01/06/04	F69AP1DE
		Dilution Factor: 1		Analysis Time..: 18:27	MS Run #.....: 3363033	
		MDL.....: 0.77				
Zinc	24.2	3.9	mg/kg	SW846 6010B	01/02-01/06/04	F69AP1AR
		Dilution Factor: 1		Analysis Time..: 18:27	MS Run #.....: 3363033	
		MDL.....: 0.24				

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

B Estimated result. Result is less than RL.

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

CALGON CARBON CORPORATION

Client Sample ID: 20031239.1

General Chemistry

Lot-Sample #...: C3L230126-001 Work Order #...: F69AP Matrix.....: SOLID
Date Sampled...: 12/22/03 Date Received..: 12/23/03
% Moisture.....: 48

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Percent Solids	51.5	1.0	%	MCAWW 160.3 MOD	01/06-01/07/04	4006091

Dilution Factor: 1 Analysis Time..: 05:00 MS Run #.....: 4006002
MDL.....: 0.0

METHOD BLANK REPORT

TOTAL Metals

Client Lot #...: C3L230126 Matrix.....: SOLID

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MB Lot-Sample #: C3L290000-096 Prep Batch #...: 3363096						
Mercury	0.0048 B	0.033	mg/kg	SW846 7471A	12/29/03	F7DND1AA
		Dilution Factor: 1				
		Analysis Time..: 08:07				
MB Lot-Sample #: C3L290000-131 Prep Batch #...: 3363131						
Antimony	0.50 B	1.0	mg/kg	SW846 6010B	01/02-01/06/04	F7DRH1AD
		Dilution Factor: 1				
		Analysis Time..: 18:16				
Arsenic	ND	1.0	mg/kg	SW846 6010B	01/02-01/06/04	F7DRH1AE
		Dilution Factor: 1				
		Analysis Time..: 18:16				
Barium	ND	20.0	mg/kg	SW846 6010B	01/02-01/06/04	F7DRH1AF
		Dilution Factor: 1				
		Analysis Time..: 18:16				
Beryllium	0.094 B	0.50	mg/kg	SW846 6010B	01/02-01/06/04	F7DRH1AG
		Dilution Factor: 1				
		Analysis Time..: 18:16				
Cadmium	ND	0.50	mg/kg	SW846 6010B	01/02-01/06/04	F7DRH1AH
		Dilution Factor: 1				
		Analysis Time..: 18:16				
Calcium	ND	500	mg/kg	SW846 6010B	01/02-01/06/04	F7DRH1CA
		Dilution Factor: 1				
		Analysis Time..: 18:16				
Chromium	0.081 B	0.50	mg/kg	SW846 6010B	01/02-01/06/04	F7DRH1AR
		Dilution Factor: 1				
		Analysis Time..: 18:16				
Cobalt	ND	5.0	mg/kg	SW846 6010B	01/02-01/06/04	F7DRH1AC
		Dilution Factor: 1				
		Analysis Time..: 18:16				
Copper	ND	2.5	mg/kg	SW846 6010B	01/02-01/06/04	F7DRH1AJ
		Dilution Factor: 1				
		Analysis Time..: 18:16				

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METHOD BLANK REPORT

TOTAL Metals

Client Lot #...: C3L230126 Matrix.....: SOLID

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Iron	ND	10.0	mg/kg	SW846 6010B	01/02-01/06/04	F7DRH1CC
		Dilution Factor: 1				
		Analysis Time..: 18:16				
Lead	ND	0.30	mg/kg	SW846 6010B	01/02-01/06/04	F7DRH1AK
		Dilution Factor: 1				
		Analysis Time..: 18:16				
Manganese	ND	1.5	mg/kg	SW846 6010B	01/02-01/06/04	F7DRH1AL
		Dilution Factor: 1				
		Analysis Time..: 18:16				
Nickel	ND	4.0	mg/kg	SW846 6010B	01/02-01/06/04	F7DRH1AM
		Dilution Factor: 1				
		Analysis Time..: 18:16				
Selenium	ND	0.50	mg/kg	SW846 6010B	01/02-01/06/04	F7DRH1AN
		Dilution Factor: 1				
		Analysis Time..: 18:16				
Silver	ND	0.50	mg/kg	SW846 6010B	01/02-01/06/04	F7DRH1AP
		Dilution Factor: 1				
		Analysis Time..: 18:16				
Thallium	ND	1.0	mg/kg	SW846 6010B	01/02-01/06/04	F7DRH1CD
		Dilution Factor: 1				
		Analysis Time..: 18:16				
Zinc	ND	2.0	mg/kg	SW846 6010B	01/02-01/06/04	F7DRH1AQ
		Dilution Factor: 1				
		Analysis Time..: 18:16				

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

B Estimated result. Result is less than RL.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: C3L230126 Matrix.....: SOLID

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
LCS Lot-Sample#: C3L290000-096 Prep Batch #...: 3363096					
Mercury	106	(80 - 120)	SW846 7471A	12/29/03	F7DND1AC
		Dilution Factor: 1	Analysis Time..: 08:08		
LCS Lot-Sample#: C3L290000-131 Prep Batch #...: 3363131					
Cobalt	94	(80 - 120)	SW846 6010B	01/02-01/06/04	F7DRH1AU
		Dilution Factor: 1	Analysis Time..: 18:21		
Antimony	94	(80 - 120)	SW846 6010B	01/02-01/06/04	F7DRH1AV
		Dilution Factor: 1	Analysis Time..: 18:21		
Arsenic	94	(80 - 120)	SW846 6010B	01/02-01/06/04	F7DRH1AW
		Dilution Factor: 1	Analysis Time..: 18:21		
Barium	99	(80 - 120)	SW846 6010B	01/02-01/06/04	F7DRH1AX
		Dilution Factor: 1	Analysis Time..: 18:21		
Beryllium	102	(80 - 120)	SW846 6010B	01/02-01/06/04	F7DRH1A0
		Dilution Factor: 1	Analysis Time..: 18:21		
Cadmium	96	(80 - 120)	SW846 6010B	01/02-01/06/04	F7DRH1A1
		Dilution Factor: 1	Analysis Time..: 18:21		
Copper	102	(80 - 120)	SW846 6010B	01/02-01/06/04	F7DRH1A2
		Dilution Factor: 1	Analysis Time..: 18:21		
Lead	94	(80 - 120)	SW846 6010B	01/02-01/06/04	F7DRH1A3
		Dilution Factor: 1	Analysis Time..: 18:21		
Manganese	98	(80 - 120)	SW846 6010B	01/02-01/06/04	F7DRH1A4
		Dilution Factor: 1	Analysis Time..: 18:21		
Nickel	97	(80 - 120)	SW846 6010B	01/02-01/06/04	F7DRH1A5
		Dilution Factor: 1	Analysis Time..: 18:21		
Selenium	93	(80 - 120)	SW846 6010B	01/02-01/06/04	F7DRH1A6
		Dilution Factor: 1	Analysis Time..: 18:21		
Silver	98	(80 - 120)	SW846 6010B	01/02-01/06/04	F7DRH1A7
		Dilution Factor: 1	Analysis Time..: 18:21		

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LABORATORY CONTROL SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: C3L230126 Matrix.....: SOLID

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Zinc	95	(80 - 120)	SW846 6010B	01/02-01/06/04	F7DRH1A8
		Dilution Factor: 1	Analysis Time..: 18:21		
Chromium	100	(80 - 120)	SW846 6010B	01/02-01/06/04	F7DRH1A9
		Dilution Factor: 1	Analysis Time..: 18:21		
Calcium	98	(80 - 120)	SW846 6010B	01/02-01/06/04	F7DRH1CE
		Dilution Factor: 1	Analysis Time..: 18:21		
Iron	98	(80 - 120)	SW846 6010B	01/02-01/06/04	F7DRH1CF
		Dilution Factor: 1	Analysis Time..: 18:21		
Thallium	96	(80 - 120)	SW846 6010B	01/02-01/06/04	F7DRH1CG
		Dilution Factor: 1	Analysis Time..: 18:21		

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: C3L230126 Matrix.....: SOLID
Date Sampled...: 12/11/03 Date Received..: 12/23/03

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: C3L230131-001 Prep Batch #...: 3363096						% Moisture.....: 1.6	
Mercury	109	(75 - 125)			SW846 7471A	12/29/03	F69A61AD
	97	(75 - 125)	8.5	(0-20)	SW846 7471A	12/29/03	F69A61AE

Dilution Factor: 1
Analysis Time..: 08:18
MS Run #.....: 3363007

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Results and reporting limits have been adjusted for dry weight.

MATRIX SPIKE SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: C3L230126 Matrix.....: SOLID
Date Sampled...: 12/22/03 Date Received..: 12/23/03

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: C3L230126-001 Prep Batch #...: 3363131						% Moisture.....: 48	
Antimony	78	(75 - 125)			SW846 6010B	01/02-01/06/04	F69AP1A1
	81	(75 - 125)	3.4	(0-20)	SW846 6010B	01/02-01/06/04	F69AP1A2
		Dilution Factor: 1					
		Analysis Time..: 18:38					
		MS Run #.....: 3363033					
Arsenic	92	(75 - 125)			SW846 6010B	01/02-01/06/04	F69AP1A3
	94	(75 - 125)	2.5	(0-20)	SW846 6010B	01/02-01/06/04	F69AP1A4
		Dilution Factor: 1					
		Analysis Time..: 18:38					
		MS Run #.....: 3363033					
Barium	98	(75 - 125)			SW846 6010B	01/02-01/06/04	F69AP1A5
	100	(75 - 125)	2.5	(0-20)	SW846 6010B	01/02-01/06/04	F69AP1A6
		Dilution Factor: 1					
		Analysis Time..: 18:38					
		MS Run #.....: 3363033					
Beryllium	97	(75 - 125)			SW846 6010B	01/02-01/06/04	F69AP1A7
	100	(75 - 125)	2.4	(0-20)	SW846 6010B	01/02-01/06/04	F69AP1A8
		Dilution Factor: 1					
		Analysis Time..: 18:38					
		MS Run #.....: 3363033					
Cadmium	87	(75 - 125)			SW846 6010B	01/02-01/06/04	F69AP1A9
	88	(75 - 125)	1.2	(0-20)	SW846 6010B	01/02-01/06/04	F69AP1CA
		Dilution Factor: 1					
		Analysis Time..: 18:38					
		MS Run #.....: 3363033					
Calcium	96	(75 - 125)			SW846 6010B	01/02-01/06/04	F69AP1DF
	98	(75 - 125)	2.2	(0-20)	SW846 6010B	01/02-01/06/04	F69AP1DG
		Dilution Factor: 1					
		Analysis Time..: 18:38					
		MS Run #.....: 3363033					
Chromium	101	(75 - 125)			SW846 6010B	01/02-01/06/04	F69AP1CT
	106	(75 - 125)	4.1	(0-20)	SW846 6010B	01/02-01/06/04	F69AP1CU
		Dilution Factor: 1					
		Analysis Time..: 18:38					
		MS Run #.....: 3363033					

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MATRIX SPIKE SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: C3L230126 Matrix.....: SOLID
Date Sampled...: 12/22/03 Date Received..: 12/23/03

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Cobalt	93	(75 - 125)			SW846 6010B	01/02-01/06/04	F69AP1AX
	95	(75 - 125)	2.5	(0-20)	SW846 6010B	01/02-01/06/04	F69AP1A0
		Dilution Factor: 1					
		Analysis Time..: 18:38					
		MS Run #.....: 3363033					
Copper	103	(75 - 125)			SW846 6010B	01/02-01/06/04	F69AP1CC
	106	(75 - 125)	2.8	(0-20)	SW846 6010B	01/02-01/06/04	F69AP1CD
		Dilution Factor: 1					
		Analysis Time..: 18:38					
		MS Run #.....: 3363033					
Iron	NC	(75 - 125)			SW846 6010B	01/02-01/06/04	F69AP1DH
	NC	(75 - 125)		(0-20)	SW846 6010B	01/02-01/06/04	F69AP1DJ
		Dilution Factor: 1					
		Analysis Time..: 18:38					
		MS Run #.....: 3363033					
ad	90	(75 - 125)			SW846 6010B	01/02-01/06/04	F69AP1CE
	93	(75 - 125)	2.8	(0-20)	SW846 6010B	01/02-01/06/04	F69AP1CF
		Dilution Factor: 1					
		Analysis Time..: 18:38					
		MS Run #.....: 3363033					
Manganese	99	(75 - 125)			SW846 6010B	01/02-01/06/04	F69AP1CG
	103	(75 - 125)	3.0	(0-20)	SW846 6010B	01/02-01/06/04	F69AP1CH
		Dilution Factor: 1					
		Analysis Time..: 18:38					
		MS Run #.....: 3363033					
Nickel	95	(75 - 125)			SW846 6010B	01/02-01/06/04	F69AP1CJ
	97	(75 - 125)	2.9	(0-20)	SW846 6010B	01/02-01/06/04	F69AP1CK
		Dilution Factor: 1					
		Analysis Time..: 18:38					
		MS Run #.....: 3363033					
Selenium	91	(75 - 125)			SW846 6010B	01/02-01/06/04	F69AP1CL
	93	(75 - 125)	2.7	(0-20)	SW846 6010B	01/02-01/06/04	F69AP1CM
		Dilution Factor: 1					
		Analysis Time..: 18:38					
		MS Run #.....: 3363033					

(Continued on next page)

MATRIX SPIKE SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: C3L230126 Matrix.....: SOLID
Date Sampled...: 12/22/03 Date Received..: 12/23/03

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Silver	94	(75 - 125)			SW846 6010B	01/02-01/06/04	F69AP1CN
	95	(75 - 125)	1.7	(0-20)	SW846 6010B	01/02-01/06/04	F69AP1CP
		Dilution Factor: 1					
		Analysis Time..: 18:38					
		MS Run #.....: 3363033					
Thallium	65 N	(75 - 125)			SW846 6010B	01/02-01/06/04	F69AP1DK
	67 N	(75 - 125)	3.7	(0-20)	SW846 6010B	01/02-01/06/04	F69AP1DL
		Dilution Factor: 1					
		Analysis Time..: 18:38					
		MS Run #.....: 3363033					
Zinc	89	(75 - 125)			SW846 6010B	01/02-01/06/04	F69AP1CQ
	92	(75 - 125)	2.8	(0-20)	SW846 6010B	01/02-01/06/04	F69AP1CR
		Dilution Factor: 1					
		Analysis Time..: 18:38					
		MS Run #.....: 3363033					

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Results and reporting limits have been adjusted for dry weight.

NC The recovery and/or RPD were not calculated.

N Spiked analyte recovery is outside stated control limits.

SAMPLE DUPLICATE EVALUATION REPORT

General Chemistry

Client Lot #...: C3L230126 Work Order #...: F6893-SMP Matrix.....: SOLID
F6893-DUP

Date Sampled...: 12/22/03 Date Received..: 12/23/03

% Moisture.....: 38

PARAM	RESULT	DUPLICATE RESULT	UNITS	RPD	RPD LIMIT	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Percent Solids						SD Lot-Sample #:	C3L230117-001	
	61.7	60.4	%	2.3	(0-20)	MCAWW 160.3 MOD	01/06-01/07/04	4006091

Dilution Factor: 1 Analysis Time..: 05:00 MS Run Number..: 4006002

STL Pittsburgh

STL

CHAIN OF CUSTODY RECORD

Customer Name: CCC Project 20031239.1	Carbon Acceptance No.
Site Description	Sampler: (Signature)
City & State	Sampling Information: Date: Time:

ANALYSES: TAL Metals + Hg

Sample No./ Identification	Date	Time	Lab Sample Number	Type of Sample	TAL Metals + Hg						REMARKS
20031239.1					X						10 days

Relinquished by: (Signature) [signature]	Date 12/22/03	Time 4:00	Received by: (Signature) [signature]	Date 12-22-03	Time 1600
Relinquished by: (Signature) [signature]	Date 12-22-03	Time 1600	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received for Laboratory: (Signature) [signature]	Date 12/23/03	Time 0920
Sample Disposal Method:	Disposed of by: (Signature)			Date	Time

Calgon Carbon Corporation
P.O. Box 717
Pittsburgh, PA 15230-0717

ANALYTICAL LABORATORY

8725

166-F 01/94

White, Yellow - Lab

Sequoia
Analytical

1455 McDowell Blvd. North, Ste. D
Petaluma, CA 94954
(707) 792-1865
FAX (707) 792-0342
www.sequoialabs.com

January 07 , 2004

Pat Reiser
Calgon Carbon Corporation- Pittsburgh
P.O. Box 717
Pittsburgh, PA 15230-0717

RE: Spent Anion Exchange Resin
Work Order: P312612

Enclosed are the results of analyses for samples received by the laboratory on 12/23/03. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Mark Shipman
Project Manager

CA ELAP Certificate Number 2374

Sequoia Analytical

1455 McDowell Blvd. North, Ste. D
Petaluma, CA 94954
(707) 792-1865
FAX (707) 792-0342
www.sequoialabs.com

Calgon Carbon Corporation- Pittsburgh P.O. Box 717 Pittsburgh PA, 15230-0717	Project: Spent Anion Exchange Resin Project Number: [none] Project Manager: Pat Reiser	P312612 **Reported:** 01/07/04 08:23

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
20031239.2	P312612-01	Other (W)	12/22/03 00:00	12/23/03 11:00

The results in this report apply to the samples analyzed in accordance with the chain of custody document. Unless otherwise stated, results are reported on a wet weight basis. This analytical report must be reproduced in its entirety.

BES

BLOCK ENVIRONMENTAL SERVICES

2451 Estand Way
Pleasant Hill, CA 94523-3911
(925) 682-7200 FAX 686-0399

Hazardous Waste Aquatic Toxicity Screening Test Results for One Solid Sample (Project # P312612)

Prepared For:
Mark Shipman
Sequoia Analytical
1455 N McDowell Blvd. Suite D
Petaluma, CA 94954

BES Sample #20958

Prepared By:
Block Environmental Services, Inc.
2451 Estand Way
Pleasant Hill, CA 94523-3911
(925) 682-7200

January 5, 2004

Nanette M. Lake

Nanette Malan Lake
Laboratory Manager

Carol Promessi

Carol Promessi
Laboratory Scientist

1. INTRODUCTION

The California Department of Substances Control has adopted regulations (R-45-78) which define criteria for the identification of hazardous wastes. These criteria are codified in Chapter 11, Article 3 of Title 22 of the California Code of Regulations. Toxicity to aquatic life, specifically fish, is one of the criteria used to gauge the hazardous potential of a waste. An acute 96-hour bioassay is used to determine the LC50 as defined in Section 66261.24(a)(6) of these regulations. This 96-hour LC50 value serves as the numerical indicator of the toxicity of a waste to aquatic life. The sample is deemed hazardous if the LC50 is less than 500 mg/L.

This report describes the procedures used and the results obtained for the hazardous waste aquatic toxicity screening test(s) performed by Block Environmental Services (BES) for Sequoia Analytical.

BES is an Environmental Laboratory Accreditation Program certified laboratory (#1812).

2. MATERIALS AND METHODS

2.1 TEST ORGANISMS

- Fathead minnow, *Pimephales promelas*, obtained from a commercial supplier or in-house culture.

2.2 TEST PROCEDURES

A detailed procedure for this test is outlined in laboratory standard operating procedures (SOPs) kept at the BES laboratory. These SOPs are based upon the following references:

- California's Title 22 Code, Section #66261.24(a)(6); *Static Acute Bioassay Procedures for Hazardous Waste Samples*, Polisini and Miller, 1988, California Department of Fish and Game
- *Guidelines for Performing Static Acute Toxicity Fish Bioassays in Municipal and Industrial Wastewaters*, Kopperdahl, 1976, California Department of Fish and Game
- *Standard Methods for the Examination of Water and Wastewater*, 19th Edition, American Public Health Association, 1995.

2.3 DATA ANALYSIS

All toxicity testing results will be analyzed using an appropriate statistical method to determine a LC50 and the corresponding 95% confidence limits.

3. RESULTS

3.1 Sample Identification	3.2 BES Sample #	3.3 Sample Collection Date	3.4 Date Received	3.5 Testing Period
P312612-01	20958	12/22/03	12/24/03	12/29/03-01/02/04

3.6 *P. promelas* TEST RESULTS

Sample Identification	Sample 96-Hour Percent Survival			
	Control	250 mg/L	500 mg/L	750 mg/L
P312612-01	100	100	100	100

3.7 STATISTICAL ANALYSIS

Sample Identification	Sample 96-Hour Statistics		
	LC50 (mg/L)	95% Upper Confidence Limit (mg/L)	95% Lower Confidence Limit (mg/L)
P312612-01	>750	NA	NA

NA – Not Applicable

3.8 NOTES

The photocopied data sheets and chain-of-custody for testing, are attached. If you have any questions concerning this report please contact the BES laboratory, (925) 682 – 7200.

Due Date:_____

BLOCK ENVIRONMENTAL SERVICES

Hazardous Waste Screening Test Data Sheet

Client: Sequoia
Sample Matrix: [X] Solid [ ] Liquid
Species: P promelas
Avg. Fish Length (mm): 13.6

Client ID #: P31212-01
Batch Date: 12/23/03
Common Name: Fathead
Avg. Fish Weight (g): 0.00638

BES Sample #: 20958
Control Water: CFW/DI
Stock Date: 11-16-03
Max. > 1.5 times Min. [ ] L. [X] W.

Concentration (mg/L)	Survival		D.O.		pH		Temperature		Technician
	A	B	A	B	A	B	A	B	
Control	10	10	10.1	10.1	8.0	8.0	19.0	19.0	Tech: SS KE
250	10	10	10.3	10.3	7.9	7.9	19.0	19.0	Date: 12/29/03
500	10	10	10.3	10.3	7.9	7.9	19.0	19.0	Time: 1145
750	10	10	10.3	10.3	7.9	7.9	19.0	19.0	
Control	10	10	8.6	8.6	7.8	7.8	19.5	19.5	Tech: SC
250	10	10	8.4	8.7	7.8	7.8	19.5	19.5	Date: 12/30/03
500	10	10	8.6	8.6	7.7	7.7	19.5	19.5	Time: 1245
750	10	10	8.6	8.6	7.7	7.7	19.5	19.5	
Control	10	10	8.3	8.0	7.9	7.8	19.9	19.9	Tech: SC
250	10	10	8.0	8.2	7.8	7.8	19.9	19.9	Date: 12/31/03
500	10	10	8.2	8.3	7.7	7.7	19.9	19.9	Time: 1100
750	10	10	8.3	8.2	7.7	7.7	20.0	20.0	
Control	10	10	7.7	7.7	8.1	8.1	19.6	19.6	Tech: KE
250	10	10	7.8	7.9	8.1	8.1	19.6	19.6	Date: 1-1-04
500	10	10	7.8	7.9	8.0	8.0	19.6	19.6	Time: 1115
750	10	10	7.9	8.0	8.0	8.0	19.6	19.6	
Control	10	10	8.3	8.0	7.9	7.9	20.4	20.4	Tech: VZ KE
250	10	10	8.0	8.2	7.8	7.8	20.4	20.4	Date: 1/2/04 NM
500	10	10	8.2	8.4	7.7	7.7	20.4	20.4	Time: 1:00
750	10	10	8.3	8.3	7.7	7.7	20.4	20.4	

Chemistries:

	Initial Control	Initial 750 mg/L	Final Control	Final 750 mg/L
Hardness (mg/L as $CaCO_3$)	48	48	44	44
Alkalinity (mg/L as $CaCO_3$)	46	52	36	54
Conductivity (µS/cm)	202	202	213	204

INITIAL SUB SAMPLES TAKEN LE

FINAL SUB SAMPLES TAKEN LE

Notes:

96 hour LC50: >750 mg/L
95% Upper Confidence Limit: NA

LC50 Method: NA
95% Lower Confidence Limit: NA

Test Supervisor: Nanette Lake

QA/QC Check: Carol Romano

SUBCONTRACT ORDER 20958 Printed: 12/23/03 3:54:02PM

Sequoia Analytical - Petaluma

P312612

SENDING LABORATORY:

Sequoia Analytical - Petaluma
1455 N. McDowell Blvd. Suite D
Petaluma, CA 94954
Phone: (707) 792-1865
Fax: (707) 792-0342
Project Manager: Mark Shipman
Sending lab received date: 12/23/03 11:0

RECEIVING LABORATORY:

Block Environmental
2455 Estand Way
Pleasant Hill, CA 94523
Phone: 800-682-7255
Fax: 925-686-0399

- ☐ Drinking Water
- ☐ Waste Water
- ☐ Other

Please use standard TAT unless specific due date is requested -> Due date:_____ Initials:_____

Analysis	SLD Date	Expires	Laboratory ID	Comments
Sample ID: P312612-01 (Other (W) sampled on 12/22/03 00:00)				
Bioassay-HWScrn SUB	01/12/04 15:00	01/05/04 00:00		minnow

Containers Supplied:

Other (A)

Released By	Date	Time	Received By	Date	Time
[illegible]	12-23-03		Nanette Lake	12/24/03	9:00
Released By	Date	Time	Received By	Date	Time

U

CHAIN OF CUSTODY RECORD

Customer Name: CCC Project 20031239-2

Carbon Acceptance No.

Site Description

Sampler: *(Signature)*

City & State

Sampling Information:
Date: Time:

ANALYSES

Sample No./ Identification	Date	Time	Lab Sample Number	Type of Sample	Toxicity Testing Abbreviated Screen Bioassay						REMARKS
20031239.2					X	P3/2612-01					10 days

COOLER CUSTODY SEALS INTACT ☐
NOT INTACT ☐
COOLER TEMPERATURE 17.4 °C

Relinquished by: *(Signature)*	Date	Time	Received by: *(Signature)*	Date	Time
Rene Kobzik	12/22/03	4:00	W Wiemann	12-22-03	1625
W Wiemann	12-22-03	1625	Alo Ruz	12-23-03	11[illegible]
			Received for Laboratory: *(Signature)*	Date	Time

Sample Disposal Method:

Disposed of by: *(Signature)* Date Time

Calgon Carbon Corporation
P.O. Box 717
Pittsburgh, PA 15230-0717

ANALYTICAL LABORATORY

8726

166-F 01/94

White, Yellow - La

Appendix G
Aquifer Test Analysis Methods and Results

In cases where observation well data are not available, pumping well time-drawdown and recovery data can be used to estimate aquifer properties.

Time-Drawdown Method

The coefficient of transmissivity can be calculated from the pumping rate and the slope of the time-drawdown graphs by using the following relationship when u is sufficiently small (Cooper and Jacob 1946):

$$T = \frac{264Q}{\Delta s}$$

where T is the coefficient of transmissivity in gpd/feet; Q is the pumping rate in gpm; and Δs is the slope of the time-drawdown graph expressed as the change in drawdown between any two times on the log scale whose ratio is 10 (one log cycle).

Theis & Jacob Recovery Method

According to Theis (1935), the residual drawdown, after pumping has ceased, is

$$s' = \frac{Q}{4\pi T} W(u) - W(u')$$

where

$$u = \frac{r^2 S}{4Tt}, \qquad u' = \frac{r^2 S'}{4Tt'}$$

S and S′ are the storativity values during pumping and recovery, respectively, and

t and t′ are the elapsed times from the start and ending of pumping, respectively.

Using the approximation for the well function, W(u),

$$W(u) = -0.5772 - \ln(u) + u - \frac{u^2}{2 \cdot 2!} + \frac{u^3}{3 \cdot 3!} - \cdots$$

when u is small, S and S′ are constant and equal, and T is constant, this equation can be reduced to

$$s' = \frac{2.3Q}{4\pi T} \log\left(\frac{t}{t'}\right)$$

To analyze this data, s′ is plotted on the logarithmic y-axis and time is plotted on the linear x-axis as the ratio of t/t′ (total time since pumping began divided by the time since the pumping ceased).

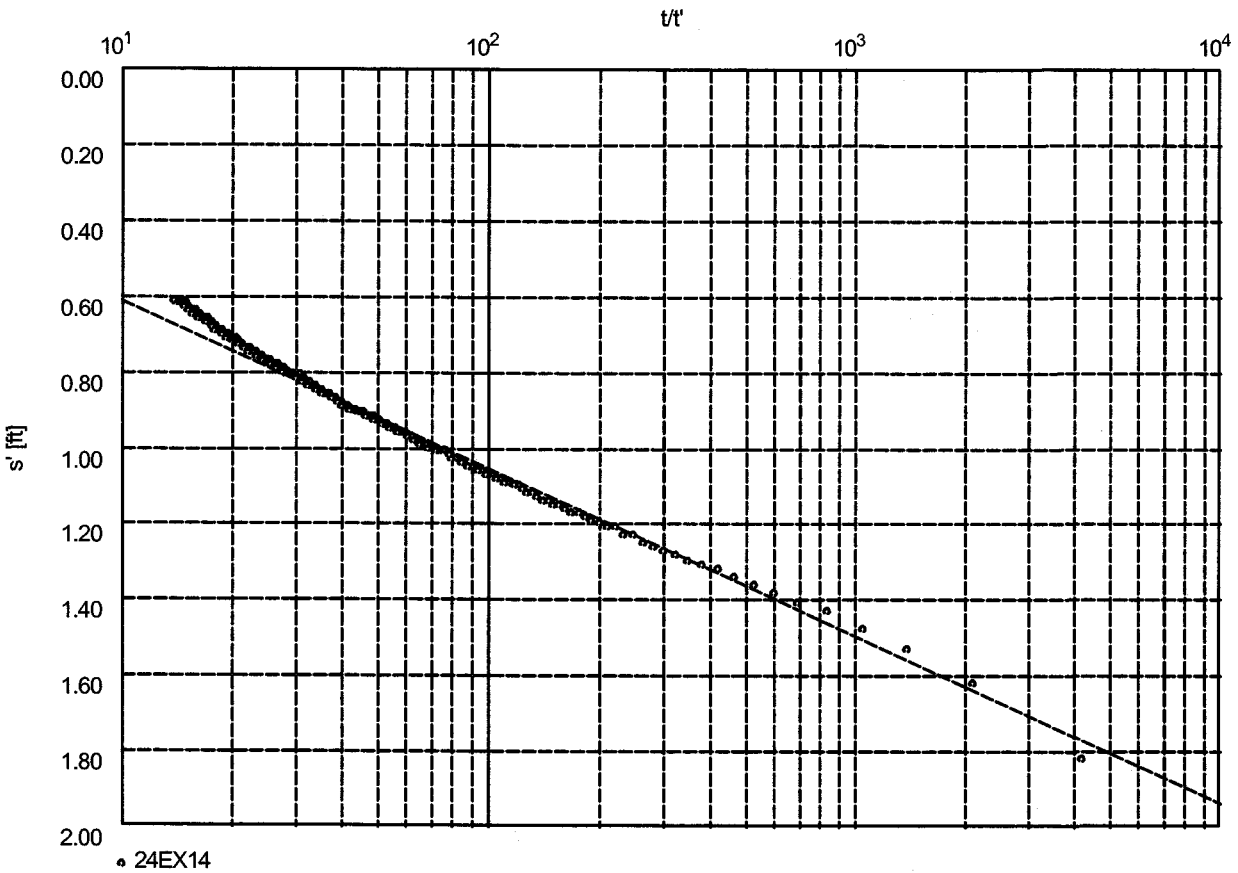
The assumptions for this method are as follows:

- The aquifer is confined and has "apparent" infinite extent.
- The aquifer is homogeneous, isotropic, and of uniform thickness over the area influenced by pumping.

- The aquifer potentiometric surface is initially horizontal.
- The pumping well is fully penetrating.
- Flow to the pumping well is horizontal.
- Water is released instantaneously from storage with the decline of hydraulic head.
- The diameter of the pumping well is very small so that storage in the well can be neglected.

Earth Tech. Inc. 100 W. Broadway Suite 240 Long Beach,California Project No. 29307	Pumping test analysis Recovery method after THEIS & JACOB Confined aquifer	Date: 09/23/03	Page 1
		Project: Pre-Design Investigation, Site24	
		Evaluated by: Earth Tech	

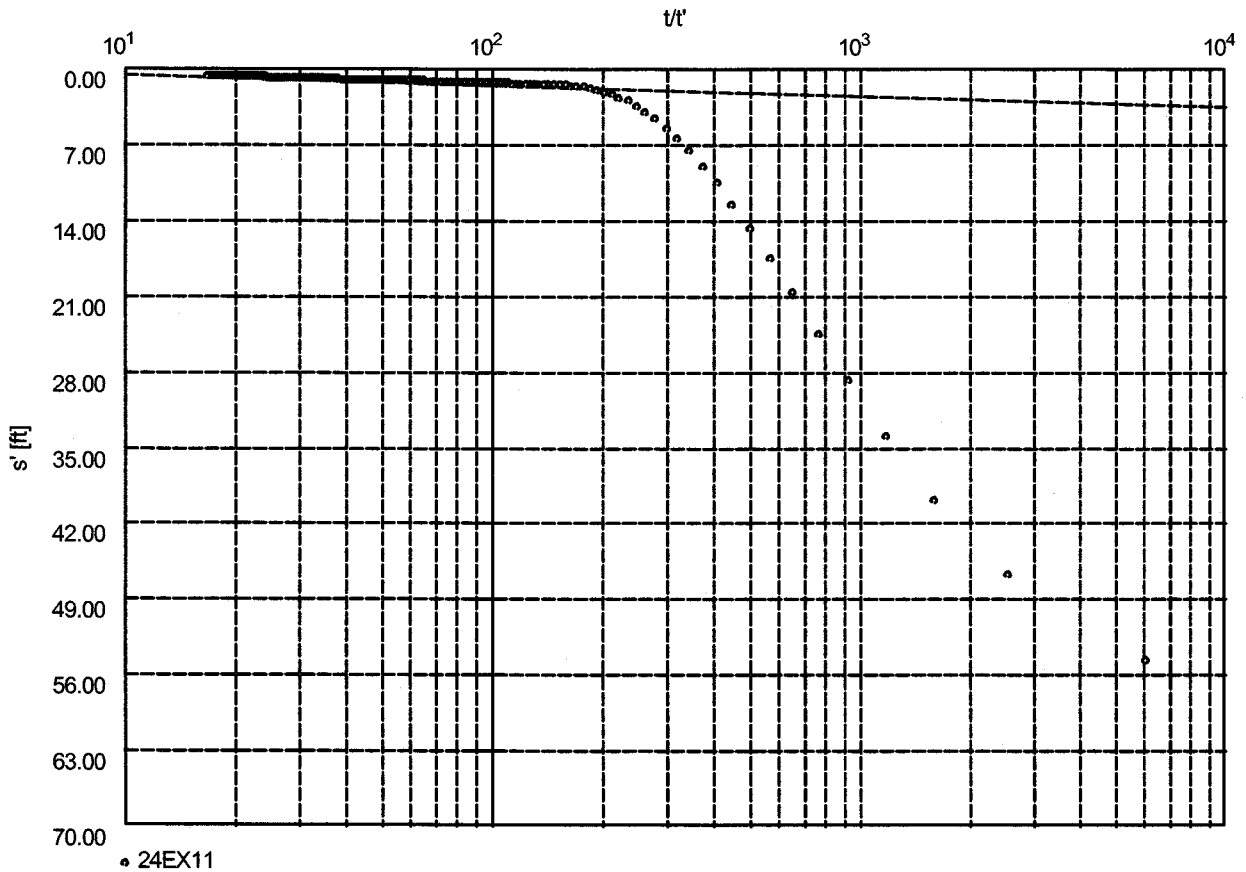
Pumping Test No. 24EX14	Test conducted on: 09/08/03
Discharge 36.00 U.S.gal/min	
	Pumping test duration: 2.90467 d



Transmissivity [ft²/d]: 2.87×10^3

Earth Tech. Inc. 100 W. Broadway Suite 240 Long Beach,California Project No. 29307	Pumping test analysis Recovery method after THEIS & JACOB Confined aquifer	Date: 10/13/2003	Page 1
		Project: Pre-Design Investigation, Site24	
		Evaluated by: Earth Tech	

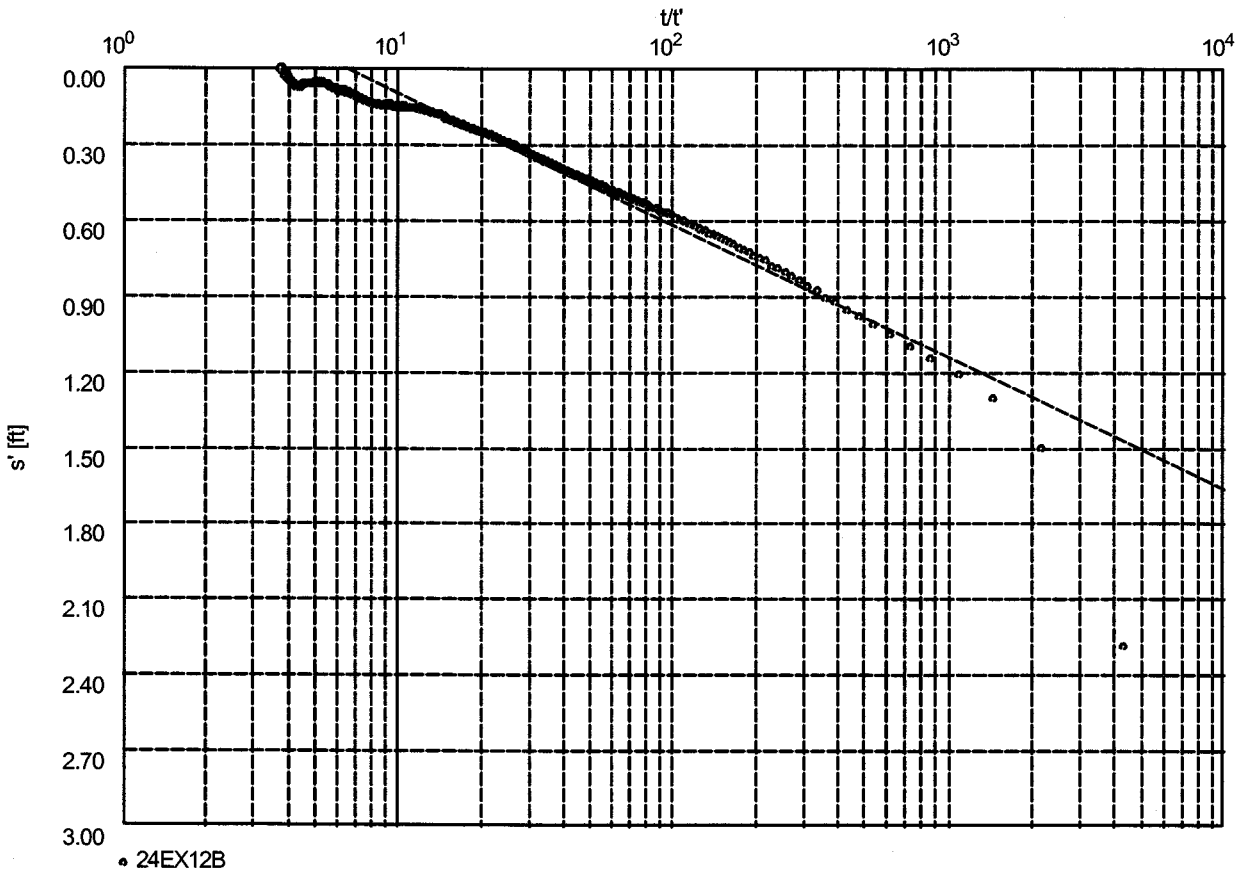
Pumping Test No. 24EX11	Test conducted on: 10/7/03
Discharge 15.00 U.S.gal/min	
	Pumping test duration: 3.02847 d



Transmissivity [ft²/d]: 5.70×10^2

Earth Tech. Inc. 100 W. Broadway Suite 240 Long Beach,California Project No. 29307	Pumping test analysis Recovery method after THEIS & JACOB Confined aquifer	Date: 09/23/03	Page 1
		Project: Pre-Design Investigation	
		Evaluated by: Earth Tech	

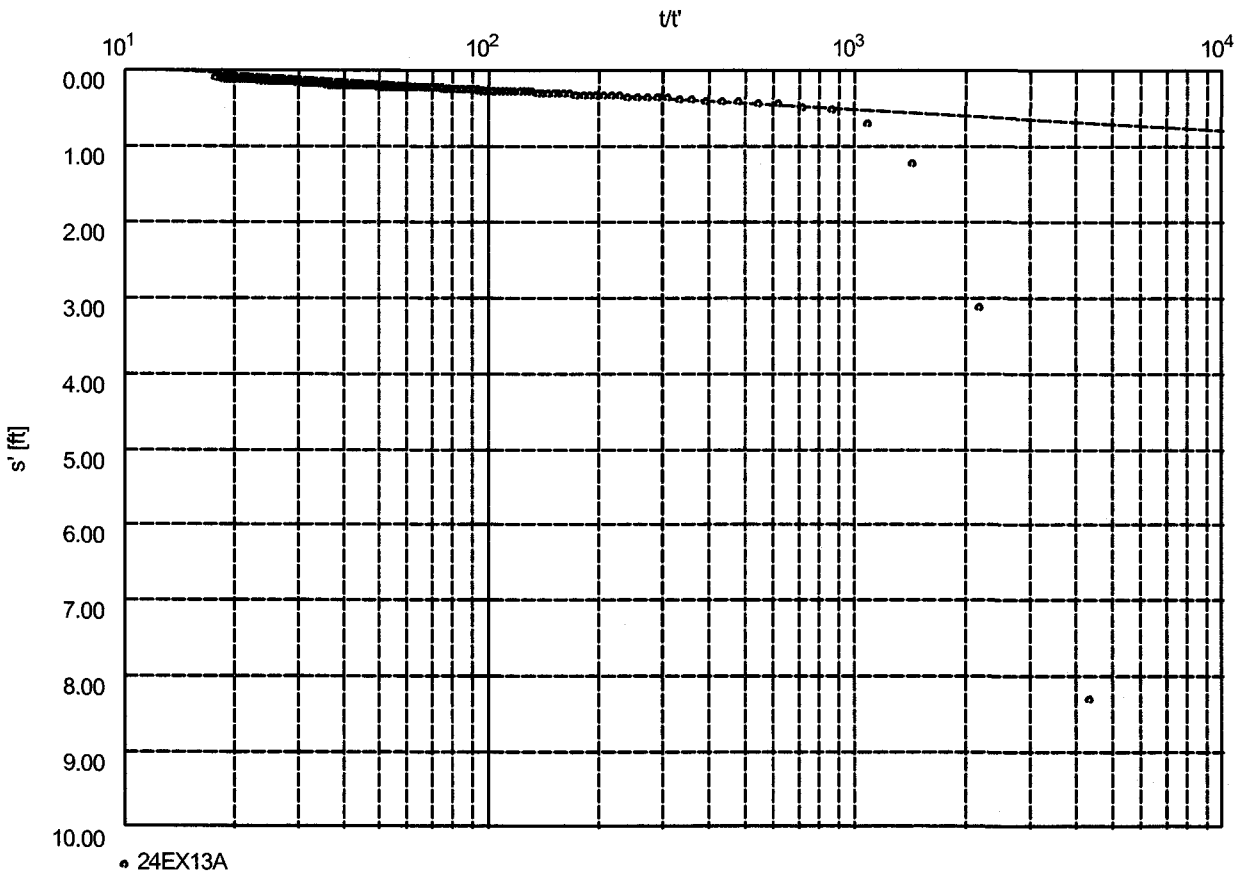
Pumping Test No. 24EX12B	Test conducted on: 09/15/03
Discharge 40.00 U.S.gal/min	
	Pumping test duration: 3.01231 d



Transmissivity [ft²/d]: 2.69×10^3

Earth Tech. Inc. 100 W. Broadway Suite 240 Long Beach,California Project No. 29307	Pumping test analysis Recovery method after THEIS & JACOB Confined aquifer	Date: 10/15/03	Page 1
		Project: Pre-Design Investigation, Site24	
		Evaluated by: Earth Tech	

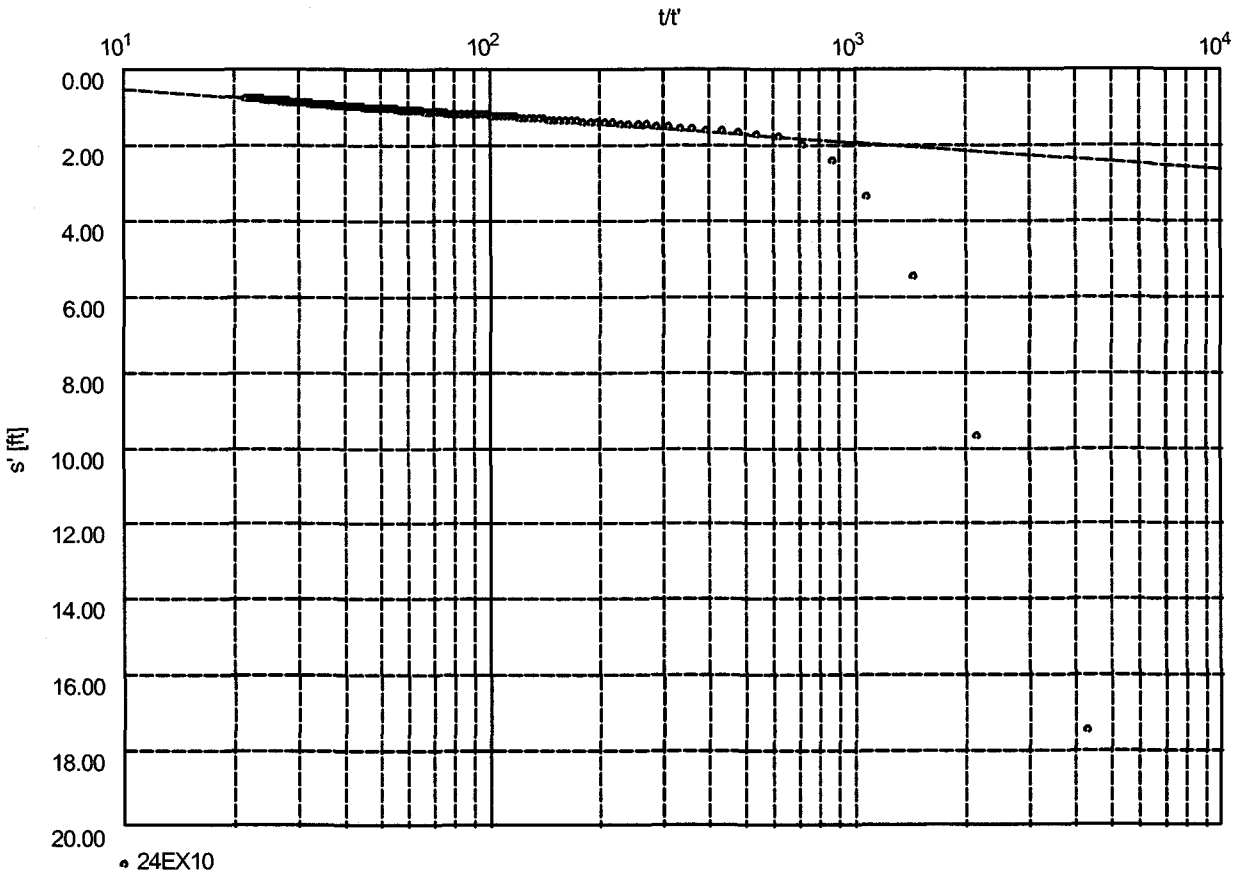
Pumping Test No. 24EX13A	Test conducted on: 09/29/03
Discharge 40.00 U.S.gal/min	
	Pumping test duration: 3.01439 d



Transmissivity [ft²/d]: 5.08×10^3

Earth Tech. Inc. 100 W. Broadway Suite 240 Long Beach,California Project No. 29307	Pumping test analysis Recovery method after THEIS & JACOB Confined aquifer	Date: 10/13/2003	Page 1
		Project: Pre-Design Investigation, Site24	
		Evaluated by: Earth Tech	

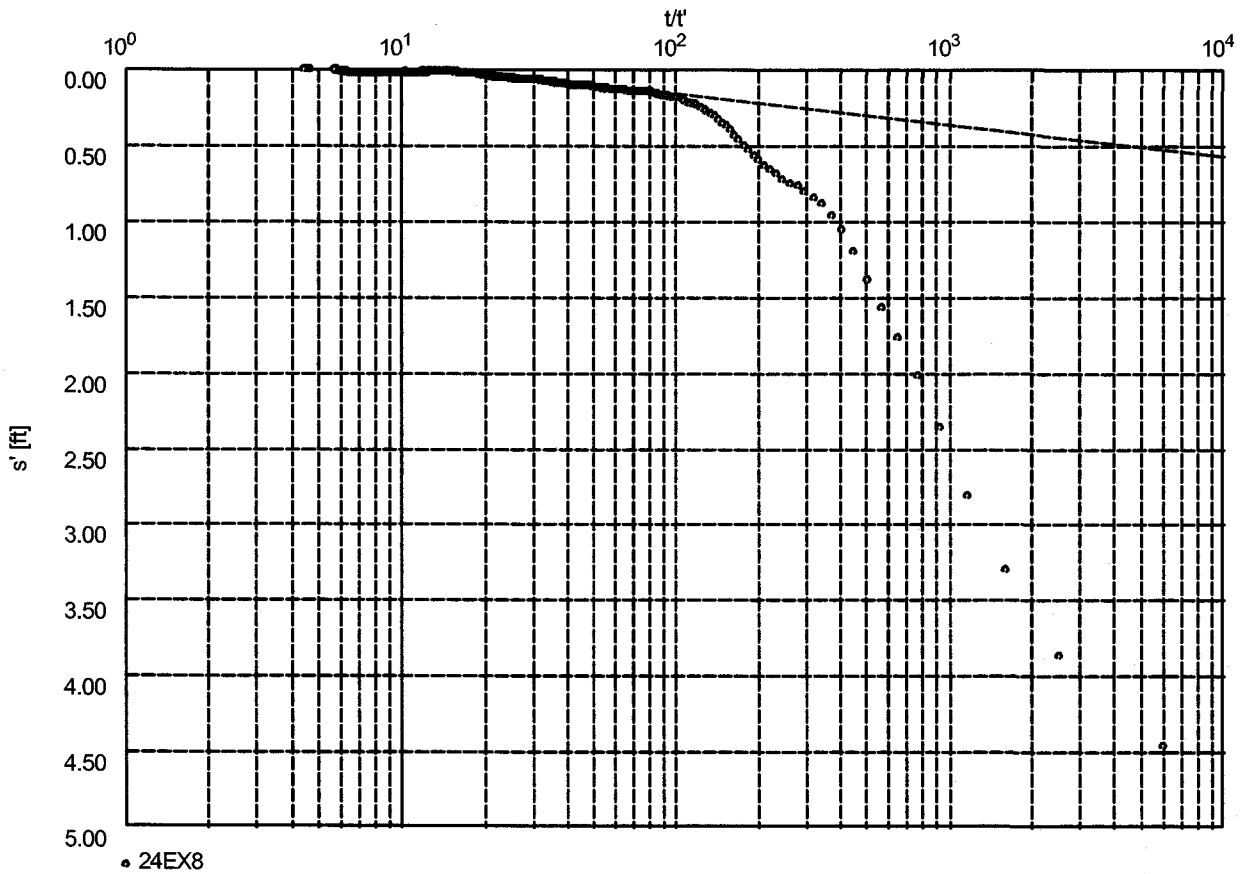
Pumping Test No. 24EX10	Test conducted on: 10/7/03
Discharge 25.00 U.S.gal/min	
	Pumping test duration: 3.00397 d



Transmissivity [ft²/d]: 1.22×10^3

Earth Tech. Inc. 100 W. Broadway Suite 240 Long Beach,California Project No. 29307	Pumping test analysis Recovery method after THEIS & JACOB Confined aquifer	Date: 09/23/03	Page 1
		Project: Pre-Design Investigation, Site24	
		Evaluated by: Earth Tech	

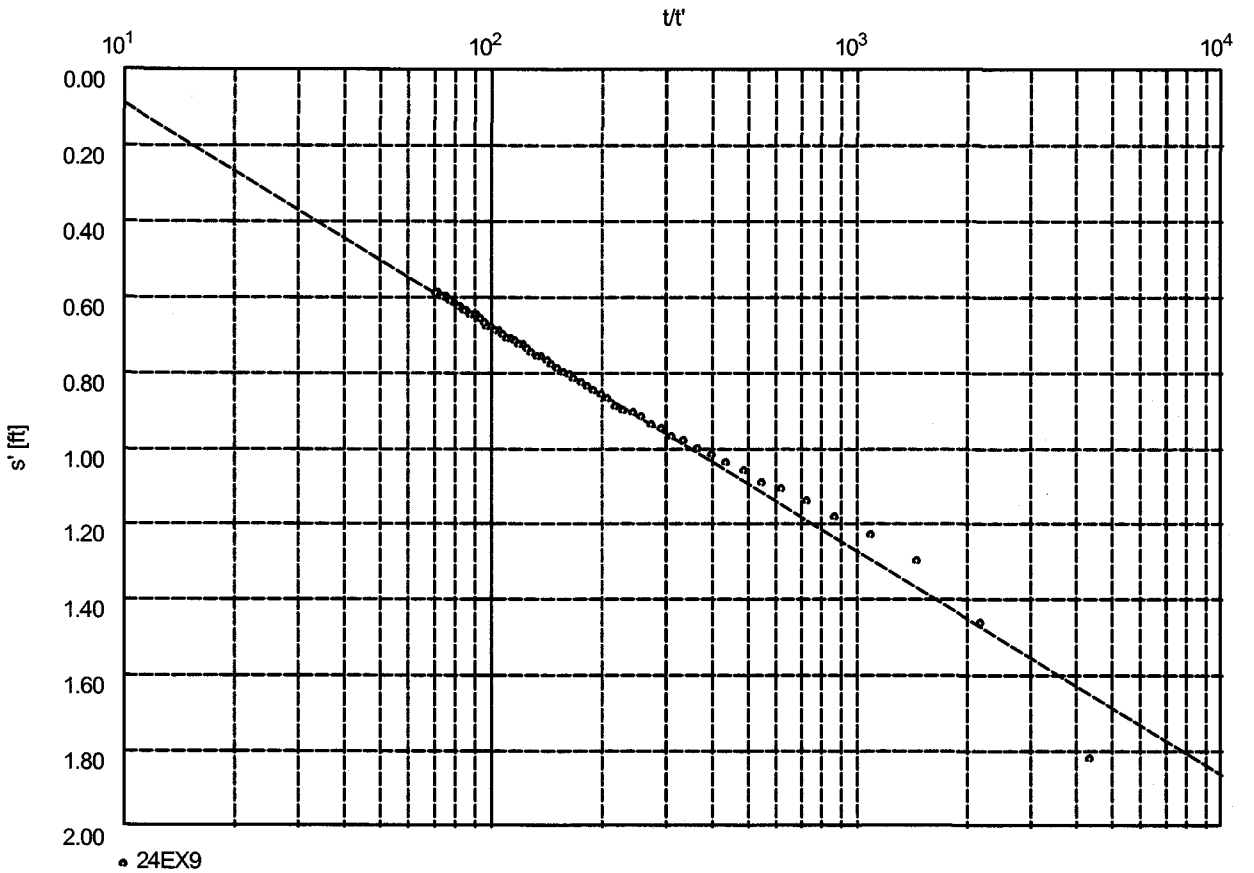
Pumping Test No. 24EX8	Test conducted on: 09/02/03
Discharge 6.50 U.S.gal/min	
Pumping test duration: 3.02986 d	



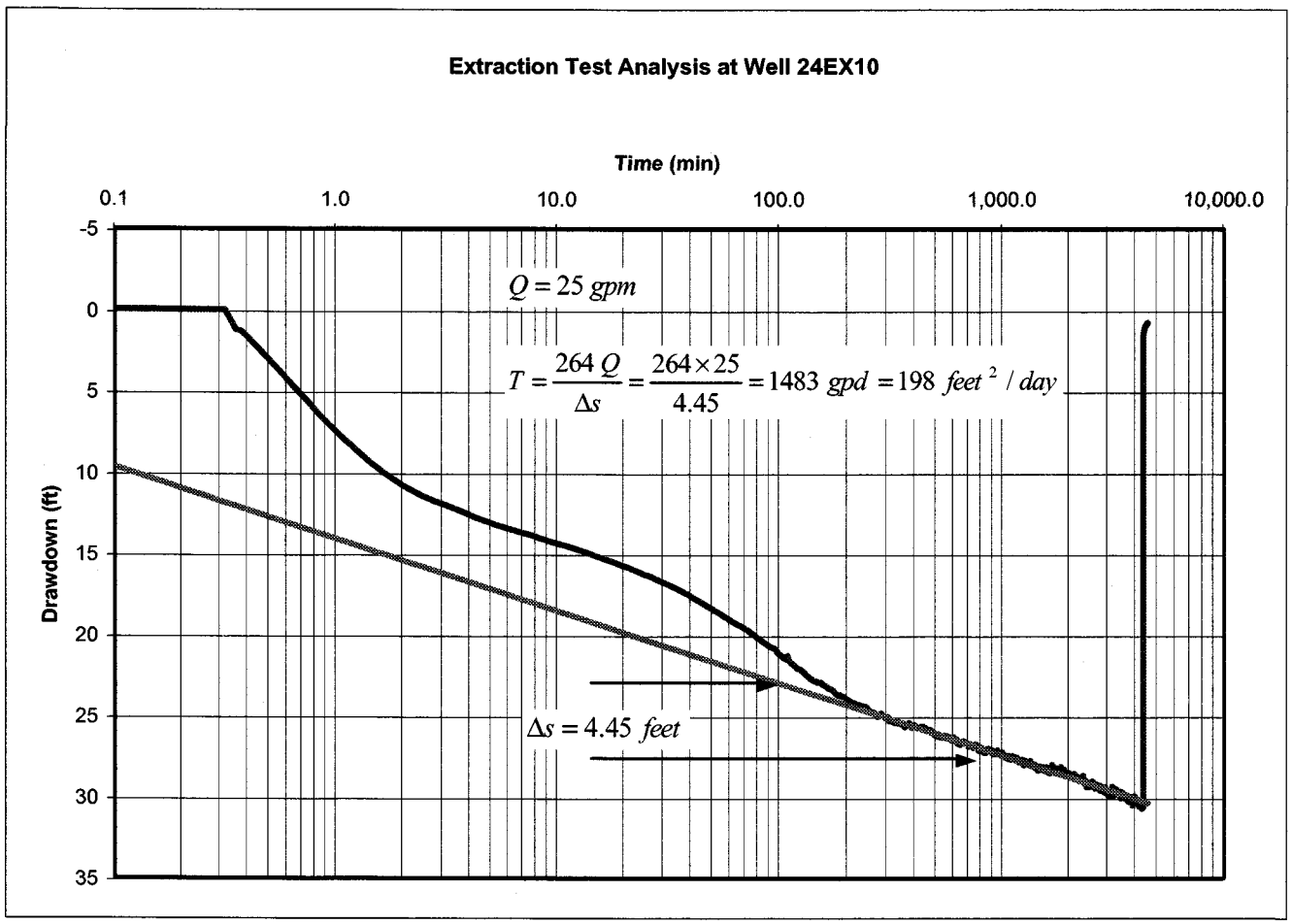
Transmissivity [ft²/d]: 1.10×10^3

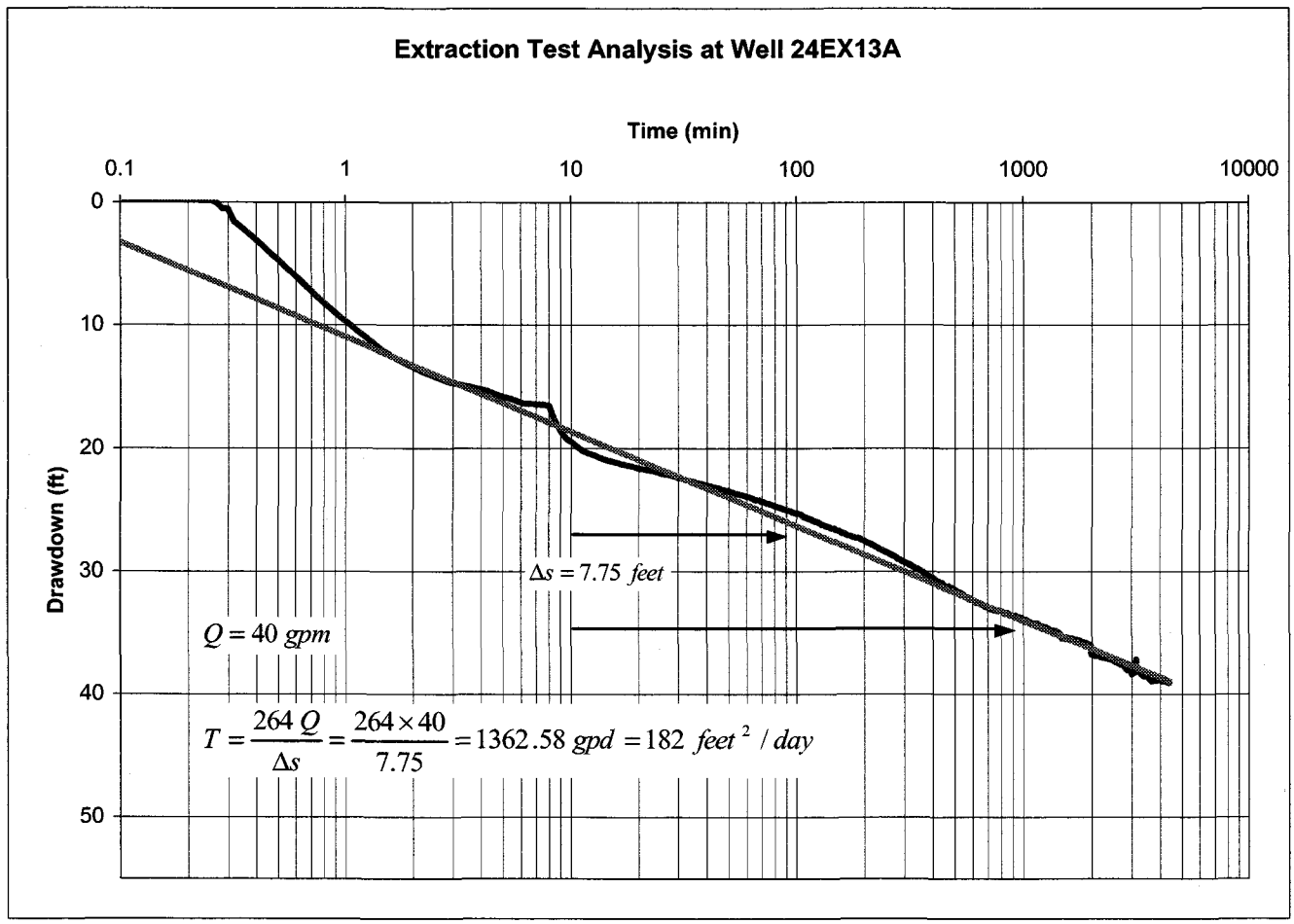
Earth Tech. Inc. 100 W. Broadway Suite 240 Long Beach,California Project No. 29307	Pumping test analysis Recovery method after THEIS & JACOB Confined aquifer	Date: 09/23/03	Page 1
		Project: Pre-Design Investigation, Site24	
		Evaluated by: Earth Tech	

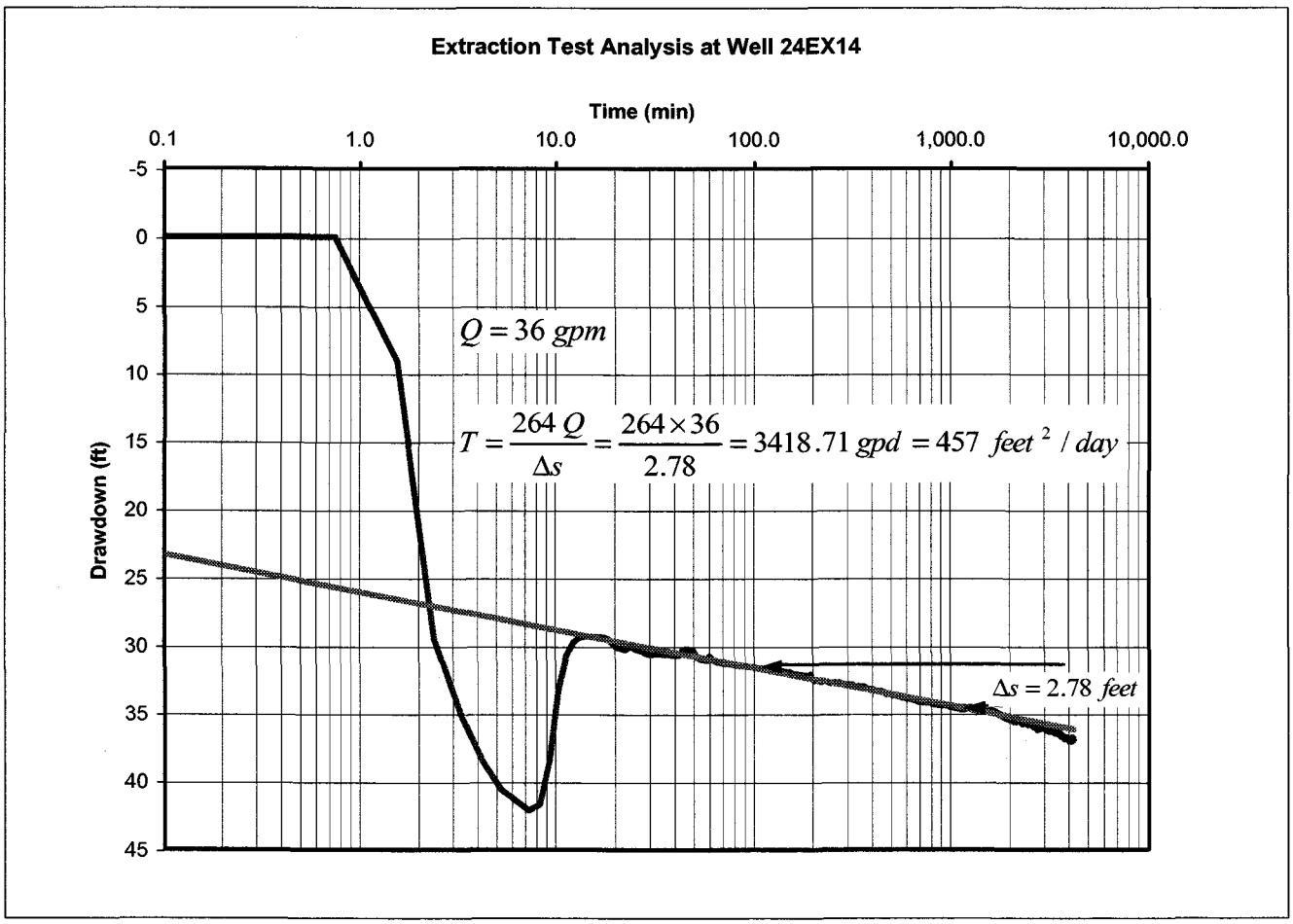
Pumping Test No. 24EX9	Test conducted on: 08/26/03
Discharge 27.00 U.S.gal/min	
	Pumping test duration: 3.02550 d



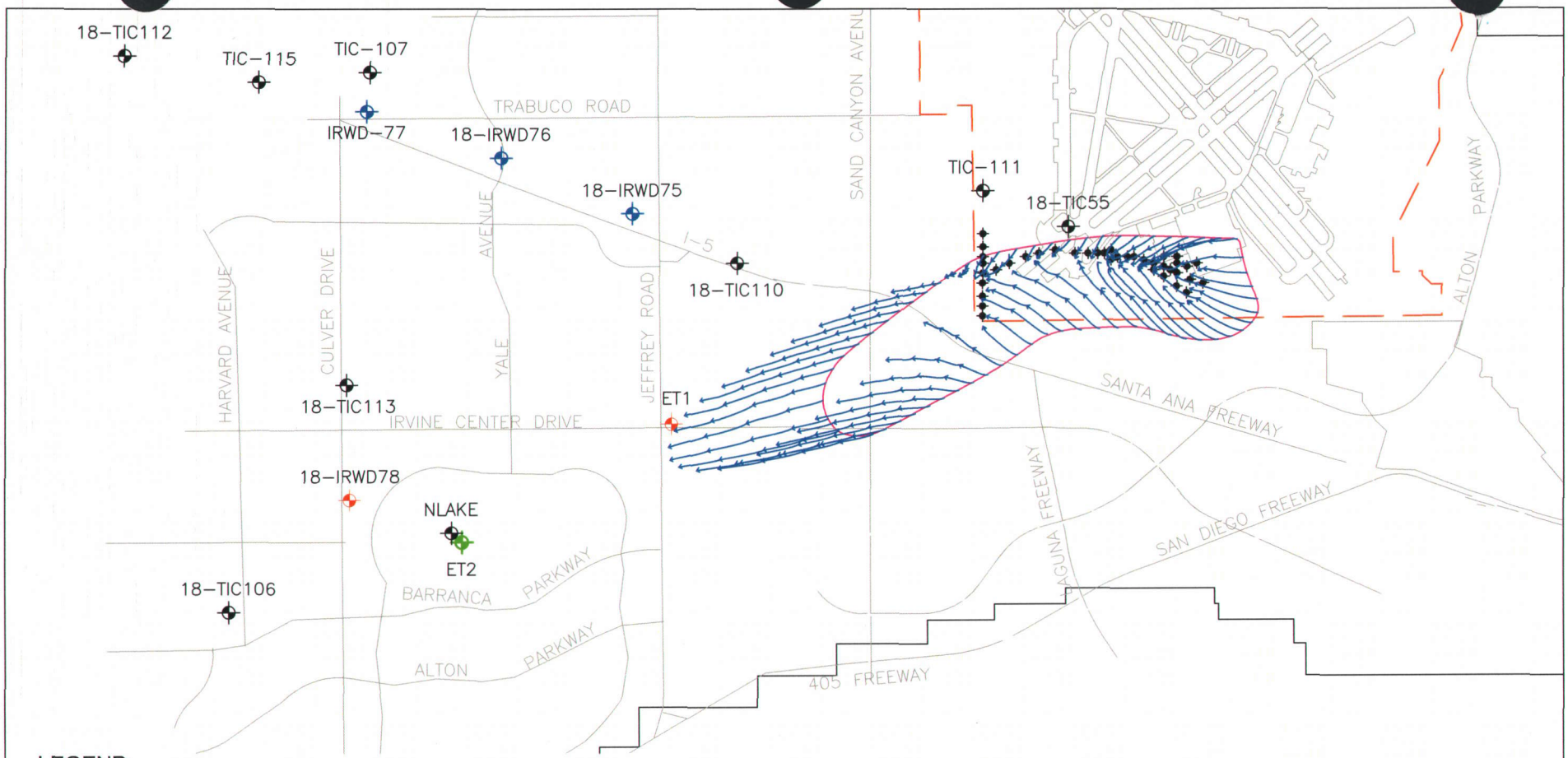
Transmissivity [ft²/d]: 1.60×10^3


Extraction Test Analysis at Well 24EX10
Time (min)
0.1
1.0
10.0
100.0
1,000.0
10,000.0
Drawdown (ft)
-5
0
5
10
15
20
25
30
35
$Q = 25\ gpm$
$T = \frac{264\,Q}{\Delta s} = \frac{264 \times 25}{4.45} = 1483\ gpd = 198\ feet^2 / day$
$\Delta s = 4.45\ feet$


Extraction Test Analysis at Well 24EX13A
Time (min)
0.1
1
10
100
1000
10000
Drawdown (ft)
0
10
20
30
40
50
$\Delta s = 7.75\ feet$
$Q = 40\ gpm$
$T = \frac{264\,Q}{\Delta s} = \frac{264 \times 40}{7.75} = 1362.58\ gpd = 182\ feet^2\ /\ day$


Extraction Test Analysis at Well 24EX14
Time (min)
0.1
1.0
10.0
100.0
1,000.0
10,000.0
Drawdown (ft)
-5
0
5
10
15
20
25
30
35
40
45
$Q = 36\ gpm$
$T = \frac{264\,Q}{\Delta s} = \frac{264 \times 36}{2.78} = 3418.71\ gpd = 457\ feet^2 / day$
$\Delta s = 2.78\ feet$

Appendix H
Updated Groundwater Model Simulation Results



LEGEND:

- Domain Boundary
- Proposed IDP Principal Aquifer Extraction Well (Potable)
- Existing Production Well
- Proposed IDP Principal Aquifer Extraction Well (Non-Potable)
- Proposed SGU Extraction Well
- Existing IDP Principal Aquifer Extraction Well (Non-Potable)
- Initial TCE Plume (5μg/L), March 2002
- Station Boundary
- Groundwater Pathlines in the SGU (Model Layer 1 & 2) Arrow Represents 10 Simulation Years

NORTH

0 2,000 4,000 FEET

SCALE: 1"=4,000'

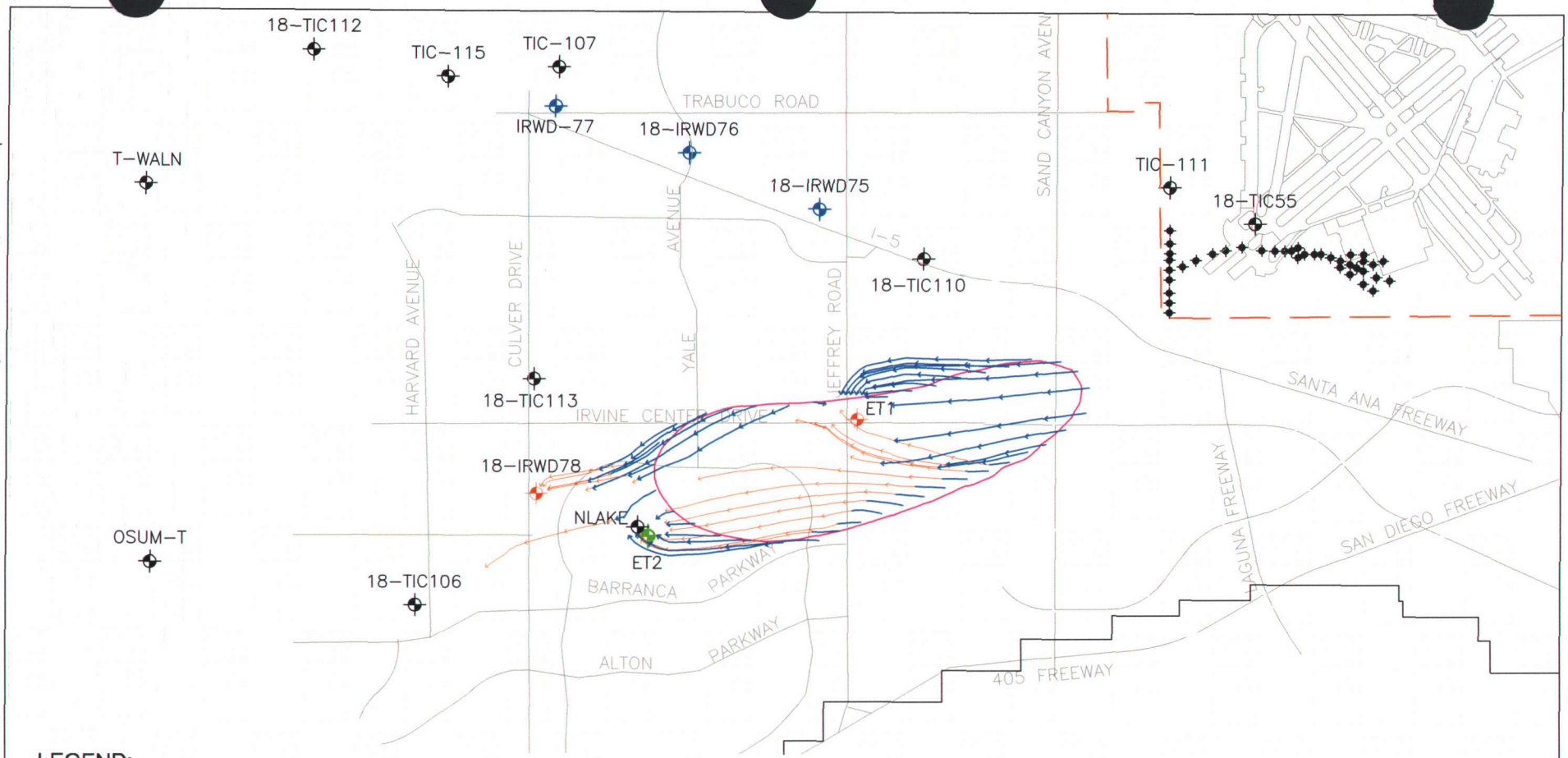
Technical Memorandum — Final

Computed Groundwater Flow Pathlines in the SGU

Pre-Design Investigation for SGU Remedy
IRP Site 24 VOC Source Area

Date: 11-04	Former MCAS El Toro	Figure
Project No. 29307	EARTH TECH — A tyco INTERNATIONAL LTD. COMPANY	H-1

File: G:\us\LongBeachCA\work\Remediation\Projects\29307 (CTO-68)\Site 24\CAD\PDI\TM Final\Appendix H\Figure H-1.dwg Time: Nov 10, 2004 - 4:31pm



LEGEND:

- Domain Boundary
- Proposed IDP Principal Aquifer Extraction Well (Potable)
- Existing Production Well
- Proposed IDP Principal Aquifer Extraction Well (Non-Potable)
- Proposed SGU Extraction Well
- Existing IDP Principal Aquifer Extraction Well (Non-Potable)
- Initial TCE Plume (5μg/L), March 2002
- Station Boundary
- Groundwater Pathlines in thePrincipal Aquifer (Model Layer 4) Arrow Represents 10 Simulation Years
- Groundwater Pathlines in the Principal Aquifer (Model Layer 5) Arrow Represents 10 Simulation Years

NORTH

0 2,000 4,000 FEET

SCALE: 1"=4,000'

Technical Memorandum — Final

Computed Groundwater Flow Pathlines in the Principal Aquifer

Pre-Design Investigation for SGU Remedy
IRP Site 24 VOC Source Area

Date: 11-04	Former MCAS El Toro	Figure H-2
Project No. 29307	EARTH TECH — A tyco INTERNATIONAL LTD. COMPANY	

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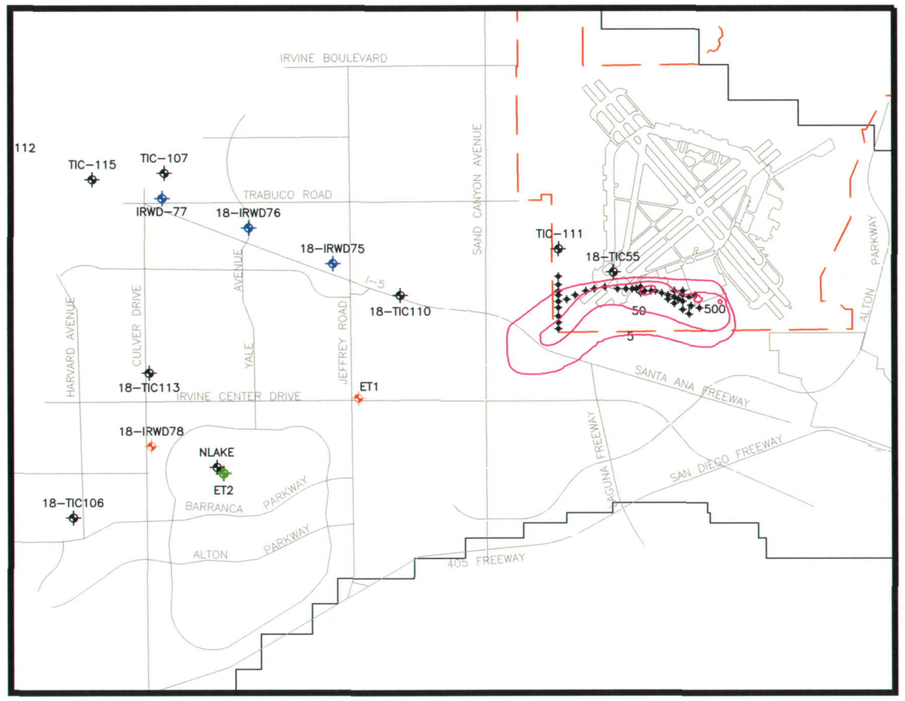
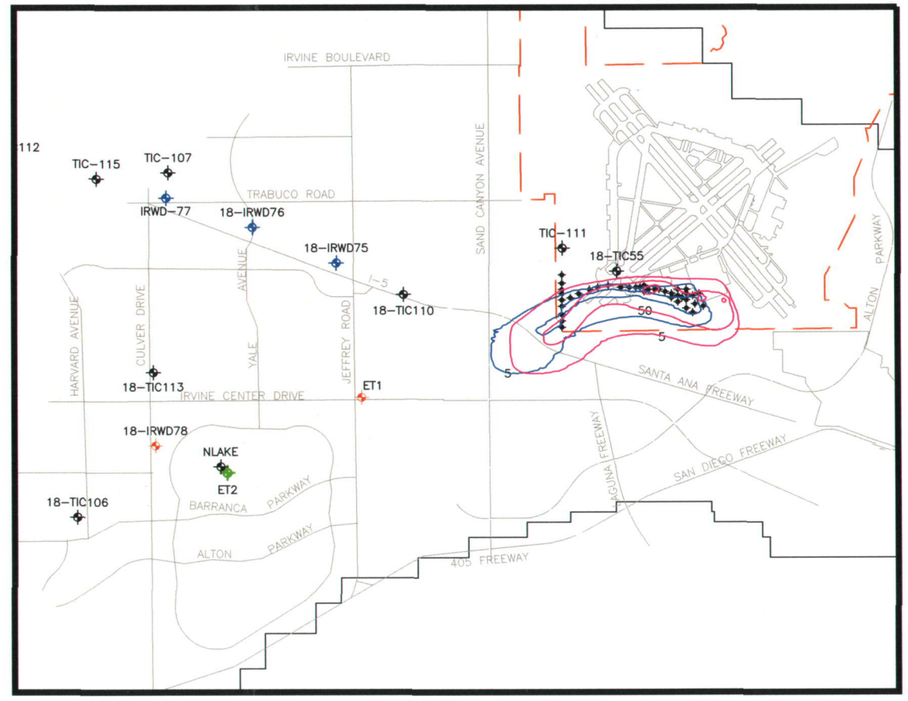
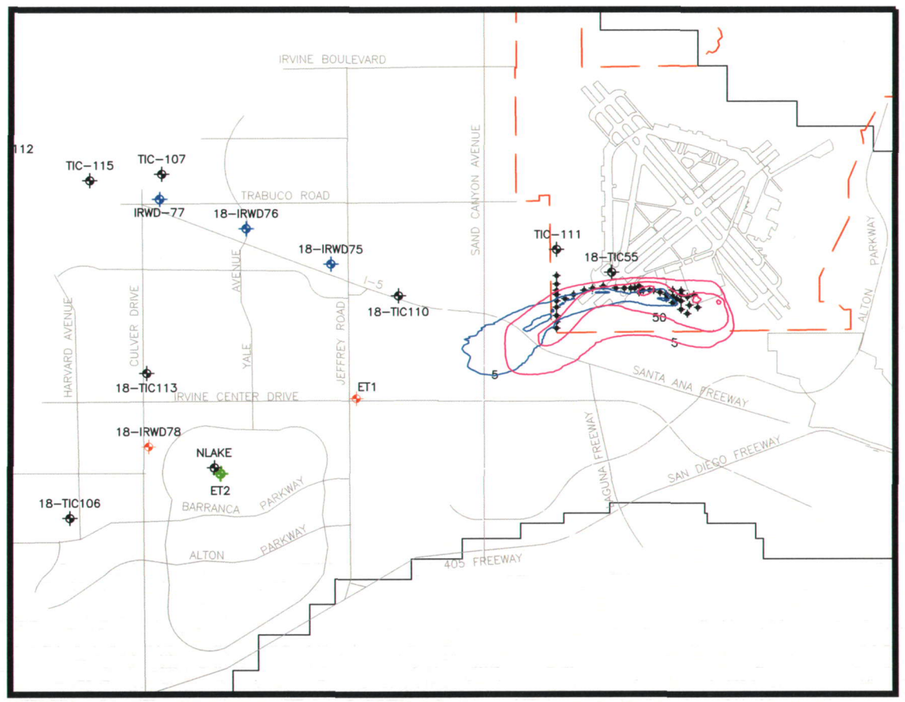


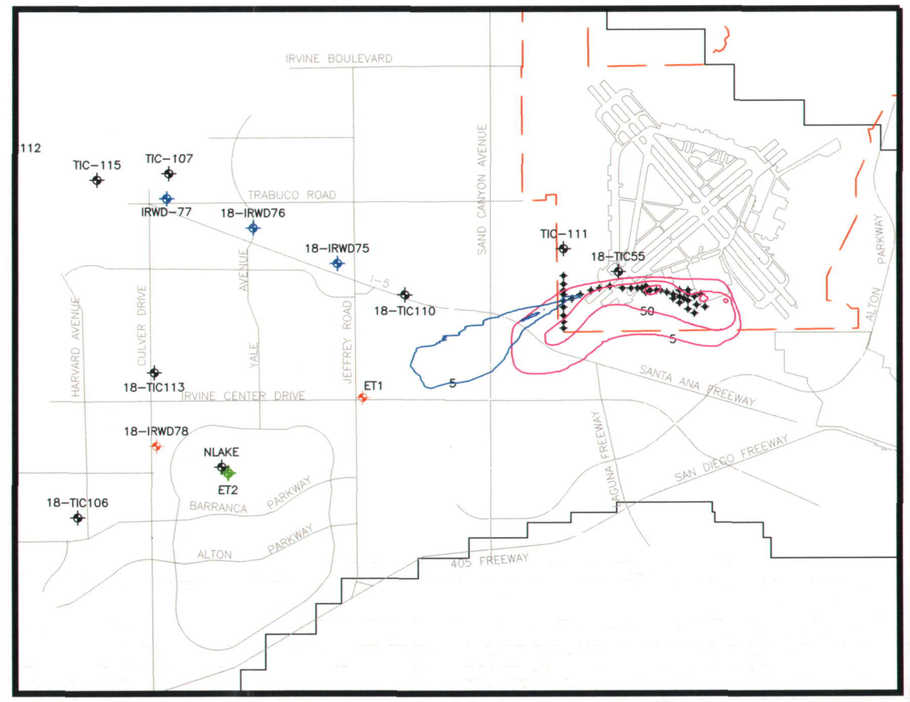
Initial TCE Concentrations



10 Years



20 Years



40 Years

LEGEND:

- Domain Boundary
- Proposed IDP Principal Aquifer Extraction Well (Potable)
- Existing Production Well
- Proposed IDP Principal Aquifer Extraction Well (Non-Potable)
- Proposed SGU Extraction Well
- Existing IDP Principal Aquifer Extraction Well
- 5 — Computed TCE Concentration (μg/L) in Model Layer 1
- 5 — Initial TCE Concentration (μg/L) in Model Layer 1 (March 2002)
- Station Boundary

NORTH

0 3,000 6,000 FEET

SCALE: 1"=6,000'

Technical Memorandum — Final

Computed Groundwater Flow Pathlines in Model Layer 1

Pre-Design Investigation for SGU Remedy
IRP Site 24 VOC Source Area

Date: 11-04	Former MCAS El Toro	Figure H-3
Project No. 29307	EARTH TECH — A tyco INTERNATIONAL LTD. COMPANY	

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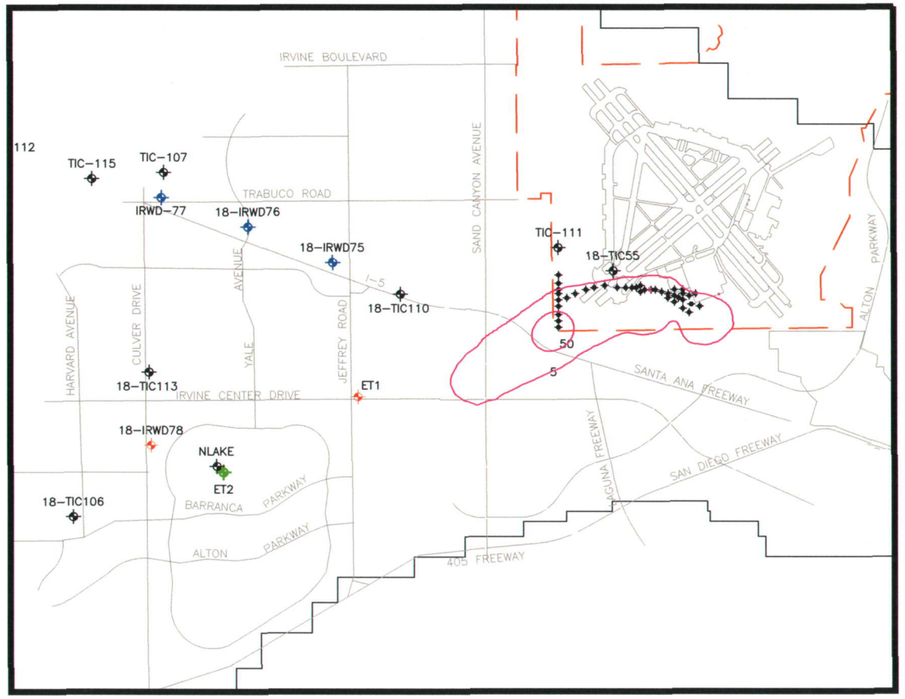
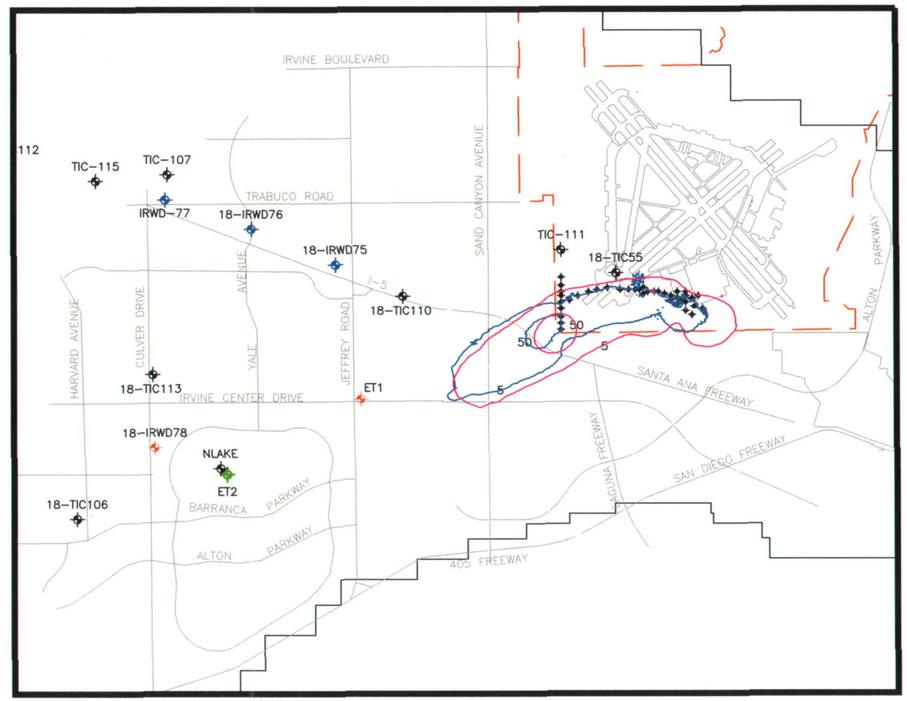
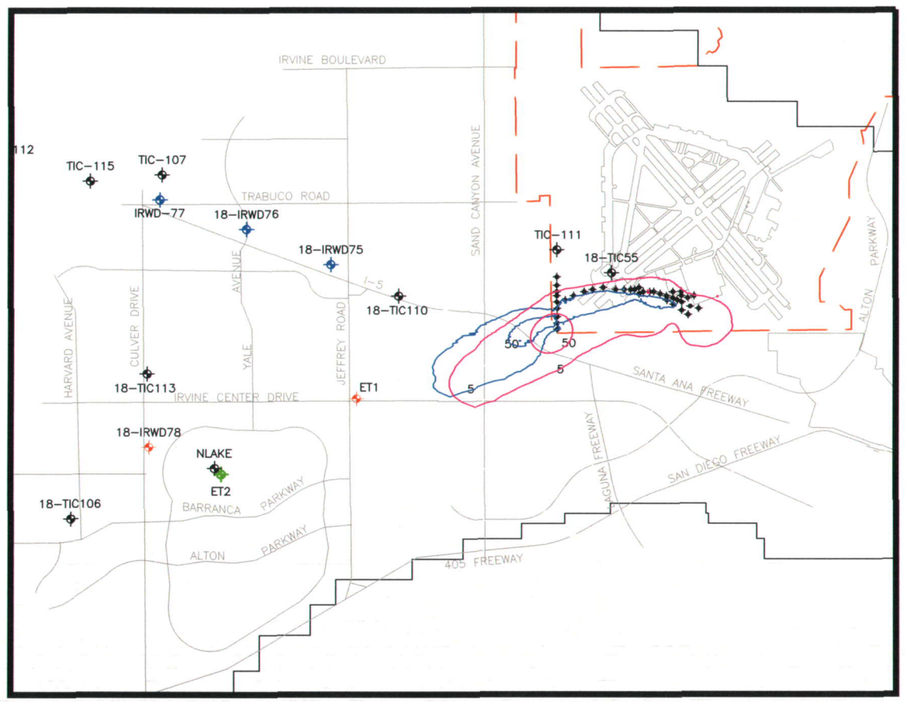


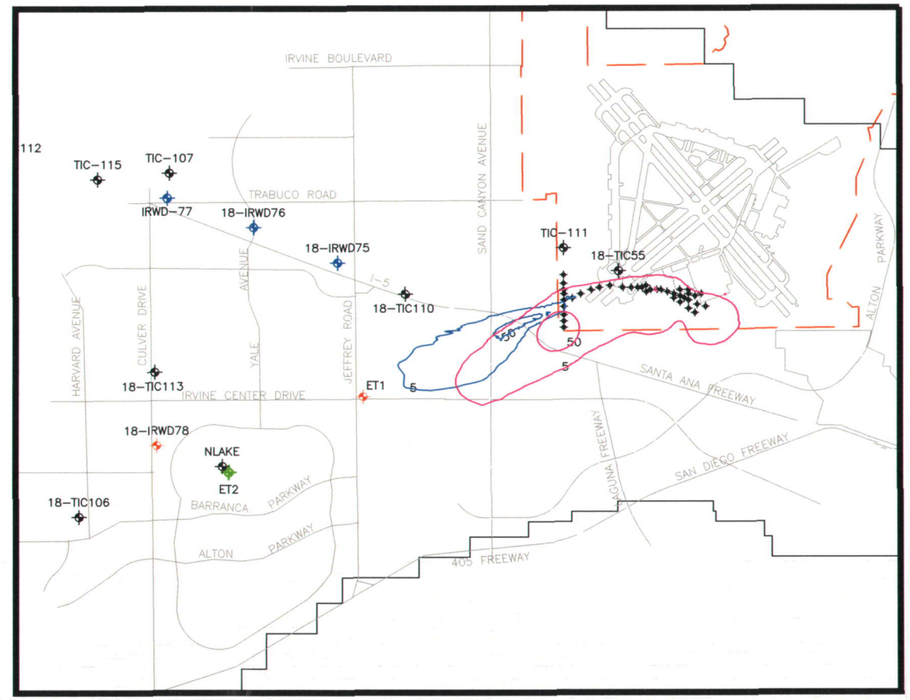
Initial TCE Concentrations



10 Years



20 Years



40 Years

LEGEND:

- Domain Boundary
- Proposed IDP Principal Aquifer Extraction Well (Potable)
- Existing Production Well
- Proposed IDP Principal Aquifer Extraction Well (Non-Potable)
- Proposed SGU Extraction Well
- Existing IDP Principal Aquifer Extraction Well (Non-Potable)
- 5 — Computed TCE Concentration (μg/L) in Model Layer 2
- 5 — Initial TCE Concentration (μg/L) in Model Layer 2 (March 2002)
- Station Boundary

NORTH

0 3,000 6,000 FEET

SCALE: 1"=6,000'

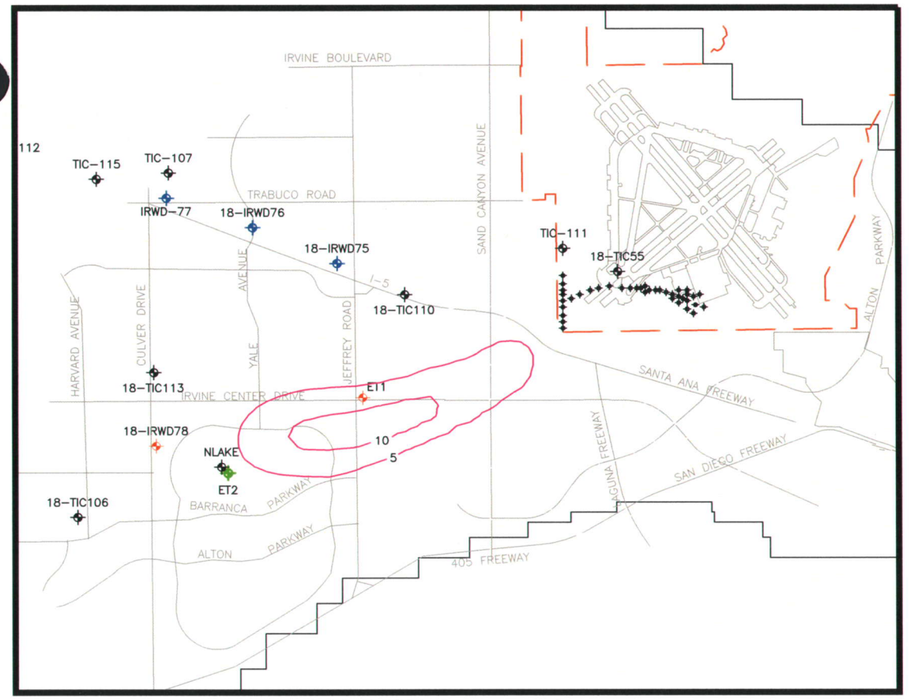
Technical Memorandum — Final

Computed Groundwater Flow Pathlines in Model Layer 2

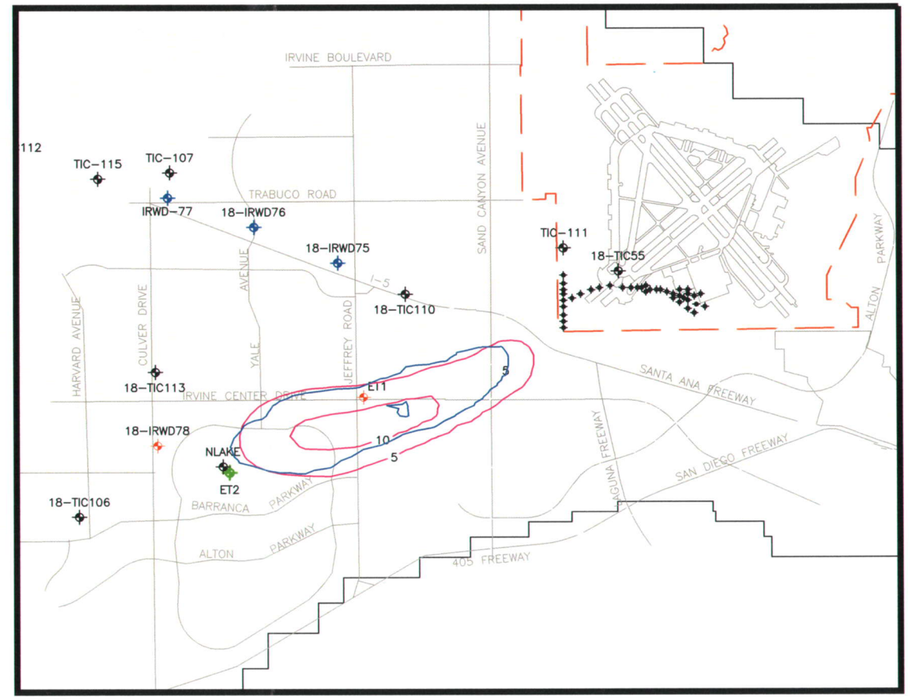
Pre-Design Investigation for SGU Remedy
IRP Site 24 VOC Source Area

Date: 11-04	Former MCAS El Toro	Figure
Project No. 29307	EARTH TECH — A tyco INTERNATIONAL LTD. COMPANY	H-4

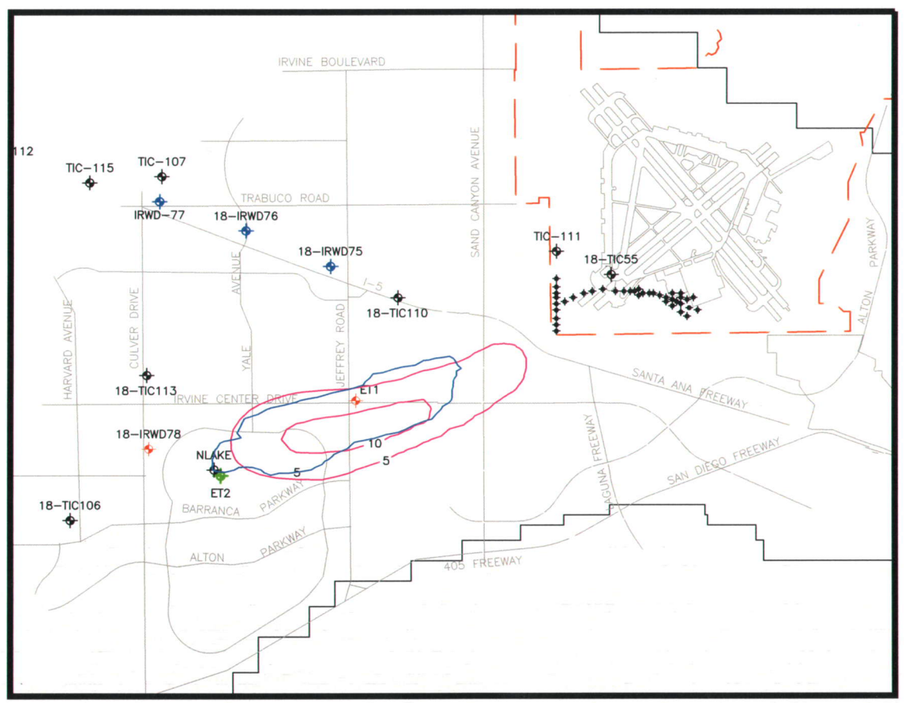
File: G:\us\LocnCA\work\Remediation\Projects\29307 (CTO-68)\Site 24\CAD\PD\TM Final\App H\Figure H-4.dwg Time: Nov 10, 2004 - 4:32pm



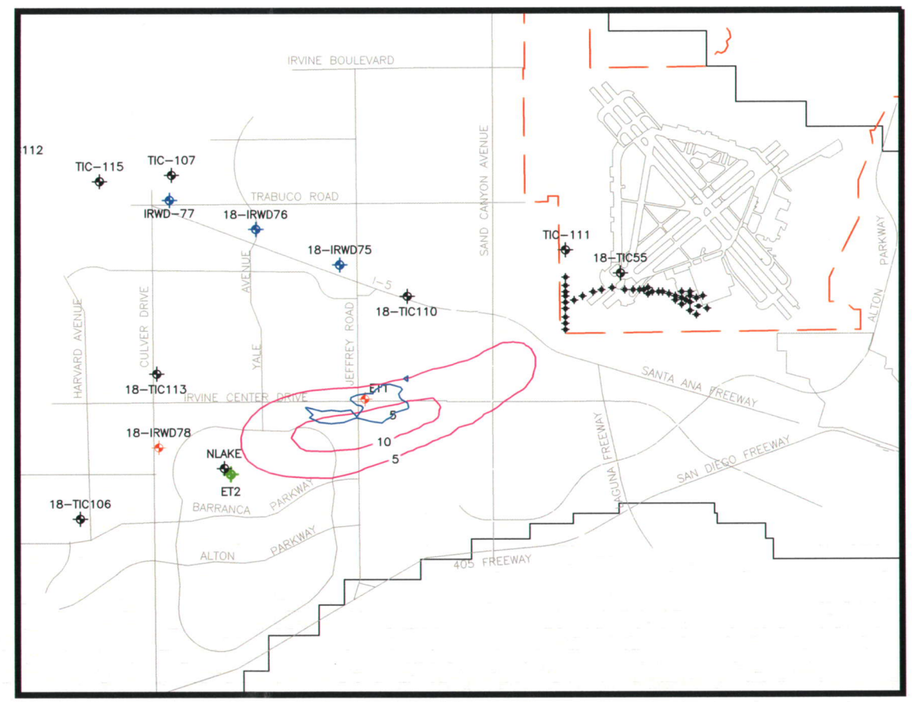
Initial TCE Concentrations



10 Years



20 Years



40 Years

LEGEND:

- Domain Boundary
- Proposed IDP Principal Aquifer Extraction Well (Potable)
- Existing Production Well
- Proposed IDP Principal Aquifer Extraction Well (Non-Potable)
- Proposed SGU Extraction Well
- Existing IDP Principal Aquifer Extraction Well (Non-Potable)
- 5 — Computed TCE Concentration (μg/L) in Model Layer 4
- 5 — Initial TCE Concentration (μg/L) in Model Layer 4 (March 2002)
- Station Boundary

NORTH

0 3,000 6,000 FEET

SCALE: 1"=6,000'

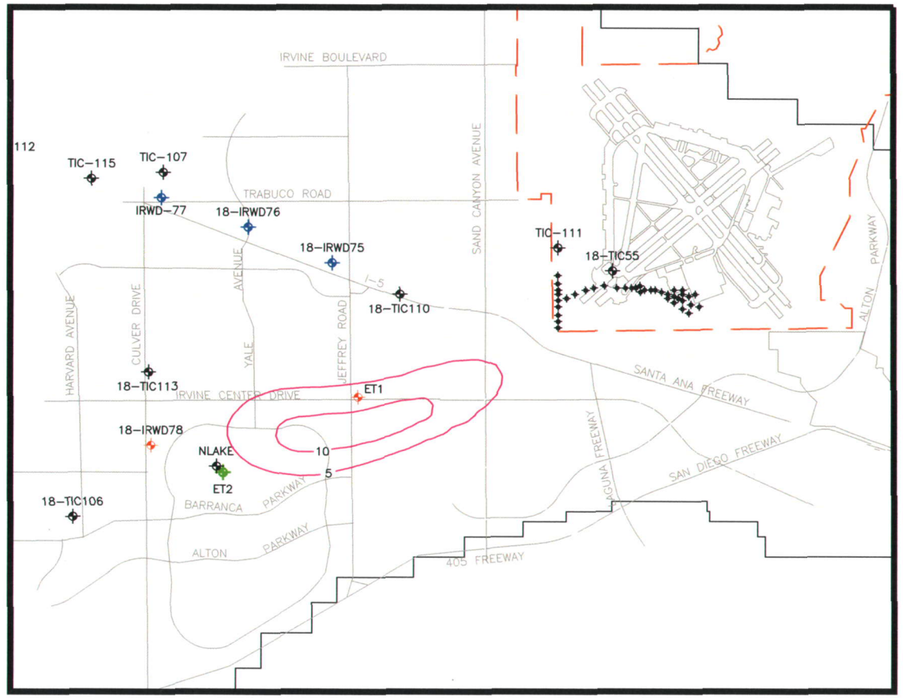
Technical Memorandum — Final

Computed Groundwater Flow Pathlines in Model Layer 4

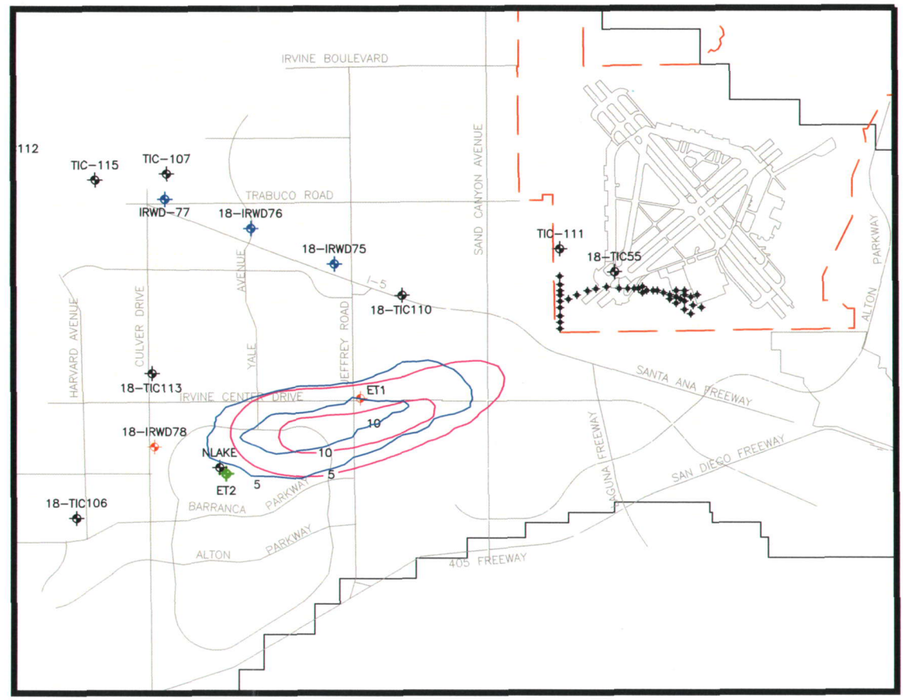
Pre-Design Investigation for SGU Remedy
IRP Site 24 VOC Source Area

Date: 11-04	Former MCAS El Toro	Figure H-5
Project No. 29307	EARTH TECH — A tyco INTERNATIONAL LTD. COMPANY	

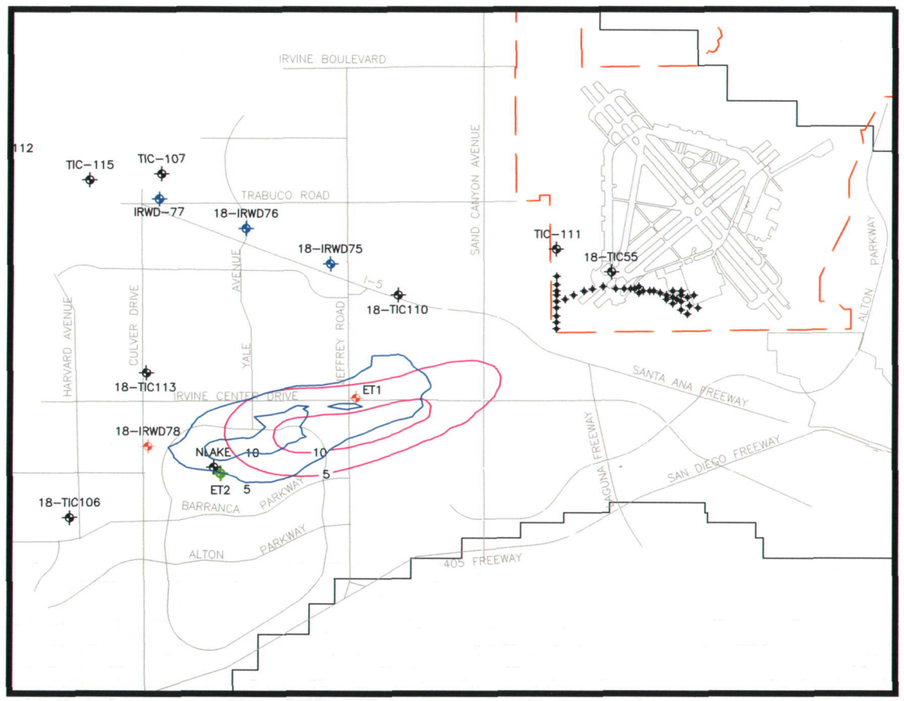
File: G:\us\Long\work\Remediation\Projects\29307 (CTO-68)\Site 24\CAD\PDI\TM Final\Appe Figure H-5.dwg Time: Nov 10, 2004 - 4:33pm



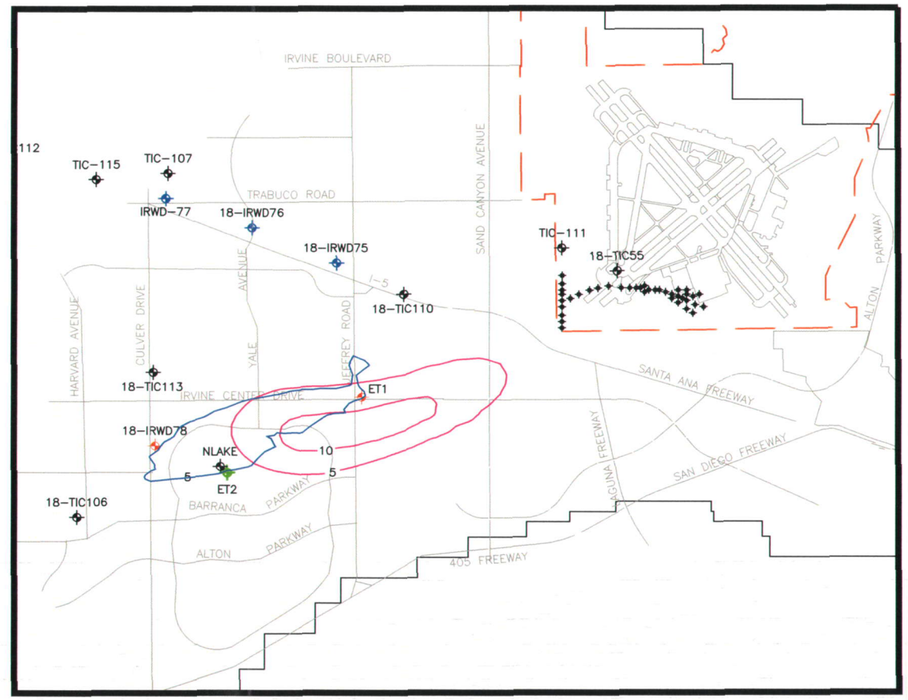
Initial TCE Concentrations



10 Years



20 Years



40 Years

LEGEND:

- Domain Boundary
- Proposed IDP Principal Aquifer Extraction Well (Potable)
- Existing Production Well
- Proposed IDP Principal Aquifer Extraction Well (Non-Potable)
- Proposed SGU Extraction Well
- Existing IDP Principal Aquifer Extraction Well
- 5 — Computed TCE Concentration (μg/L) in Model Layer 5
- 5 — Initial TCE Concentration (μg/L) in Model Layer 5 (March 2002)
- Station Boundary

NORTH

0 3,000 6,000 FEET

SCALE: 1"=6,000'

Technical Memorandum — Final

Computed Groundwater Flow Pathlines in Model Layer 5

Pre-Design Investigation for SGU Remedy
IRP Site 24 VOC Source Area

Date: 11-04	Former MCAS El Toro	Figure
Project No. 29307	EARTH TECH — A tyco INTERNATIONAL LTD. COMPANY	H-6

File: G:\us\LocnCA\work\Remediation\Projects\29307 (CTO-68)\Site 24\CAD\PDI\TM Final\Appendix H\Figure H-6.dwg Time: Nov 10, 2004 - 4:33pm

Appendix I
Comments and Responses to Comments on Draft Technical Memorandum

Document Title:

(1) Draft Technical Memorandum, Pre-Design Investigation for Shallow Groundwater Unit Remedy, IRP Site 24, Former MCAS El Toro, January 2004.

Reviewer: *Nicole Moutoux, Project Manager, Federal Facilities Cleanup Branch, United States Environmental Protection Agency, San Francisco Office, comments dated March 16, 2004.*

Comment No.	Section/ Page No.	Comment	Response
COMMENT ON PRE-DESIGN INVESTIGATION TECHNICAL MEMORANDUM			
1.	General	As we indicated on the teleconference on March 3rd, we do not concur with the Navy's conclusions that SVE is not a cost-effective remedial enhancement option. The Navy concludes that there is an insufficient concentration of volatile organic compounds (VOCs) in the dewatered region of the Site 24 aquifer to make Soil Vapor Extraction (SVE) in this zone worthwhile. The concentration of VOC in the soil gas in the dewatered zones varied between 4 and 30 µg/L whereas the concentration of TCE alone in the air above groundwater impacted at a concentration of 500 µg/L (aqueous) should be in the vicinity of 200 µg/L (vapor). Even at the extremely low flow rate induced at well 24EX60B2 (73 standard cubic feet per minute) for the vacuum (10.5 inches of mercury vacuum) and the low VOC concentrations, a single SVE well at 24EX6OB2 would still be removing about the same amount of VOC mass from the site that the entire shallow groundwater unit (SGU) groundwater extraction system will be (35 wells)[1] at considerably lower cost. In addition, cleaning up the dewatered zone in the aquifer cannot be accomplished by groundwater extraction. Hence, when the groundwater pumps are turned off and the groundwater table returns to its previous level, the groundwater will be reimpacted by the residual VOCs in the dewatered zone and may require further groundwater extraction. We recommended that the Navy reconsider the use of SVE as a groundwater cleanup system enhancement once the SGU groundwater extraction system is installed and operating, at least in the three known hot spots. [1] At 400 gpm and 100 µg/L TCE, the SGU system will extract about 80 kilograms of TCE per year. At 73 scfm and 28 µg/L TCE, an SVE system at 24EX6OB2 would remove about 30 kilograms of TCE per year. However, we expect that the vapor flow rates would be much higher once the residual water in the dewatered zone is extracted and the air permeability of the soils increases. In addition, we expect the concentration of TCE in the dewatered zone to be higher than 28 µg/L.	Consistent with the OU1 and OU2A final ROD, and the recommendation provided in the comment, the Navy will utilize SVE for mass removal enhancement during implementation of the SGU remedy. SVE will be performed in the VOC source area hot spots after sufficient dewatering has occurred as a result of groundwater extraction. Text in Sections 4.4.2 and 6.2 has been revised to reflect this change.

Document Title:

(1) *Draft Technical Memorandum, Pre-Design Investigation for Shallow Groundwater Unit Remedy, IRP Site 24, Former MCAS El Toro, January 2004.*
Reviewer: *David Murchison, Engineering Geologist, Cypress Geological Services Unit, Department of Toxic Substances, Cypress, CA Comments dated March 22, 2004.*
Reviewer: *Theodore Johnson, Senior Engineering Geologist, Cypress Geological Services Unit, Department of Toxic Substances, Cypress, CA Informal Comments dated July 6, 2004.*

Comment No.	Section/ Page No.	Comment	Response
COMMENT ON PRE-DESIGN INVESTIGATION TECHNICAL MEMORANDUM			
GENERAL COMMENTS			
1		The sampling experiment using passive diffusion bags produced extremely interesting data, but that data does not support the conclusions drawn in the Memorandum. With one exception (24EX13B) all the PDB samples in a single well screen returned the same concentration of TCE within the normal range of laboratory precision. For example, screen 24EX4 returned, from top to bottom: 34, 33, 30, 42, 37, 34, and 38 µg/L TCE from 7 locations over a 90 foot screened interval. The immediately adjacent and overlapping shorter screen at 24EX4OB1 returned: 204, 209 and 201 µg/L in 3 PDBs in the top half of a 50 foot screen. This data demonstrates mixing in the well, not homogeneity in the aquifer. Based on this, and similar data gathered for the Memorandum GSU does not concur that the plume is homogeneous, with little vertical stratification. GSU does not concur that the data demonstrate that the highest concentrations of TCE are in the upper 80 feet of the shallow zone. <u>GSU comment on initial Navy response:</u> The response does not address GSU's concerns regarding dilution across the wells 90 foot screen length. The adjacent and overlapping well, 24EX4OB1, with a 50 foot screened interval, was sampled in the upper half detecting an order of magnitude difference (higher) in contaminant concentrations. As stated in GSU's original comment, data collected and reported in the Tech Memo does not support the conclusion that the plume is homogeneous with little vertical stratification. The response prepared by Earth Tech is based on the original conceptual model that considered a homogenous plume	The results of the sampling performed during the pre-design investigation (PDI), including the samples collected using the PDBs, are very consistent with the Site 24 conceptual model, which is based upon the results of comprehensive investigations dating back to the establishment of the IRP at MCAS El Toro in 1992. As stated in the CERCLA Groundwater Monitoring Plan (BNI, 1999), "VOCs are uniformly present throughout the upper 40 feet of the SGU in the Site 24 source area, but migrate toward the bottom of the SGU (about 160 to 220 feet bgs) near the western Station boundary and the off-Station area further west." <u>Navy response to GSU comment on initial Navy response:</u> Following technical discussions with the Base Realignment and Closure (BRAC) Cleanup Team (BCT), the Navy agreed to propose shorter screen lengths for groundwater sampling during remedy implementation and assessment. The Navy will propose a remediation performance monitoring plan to evaluate vertical stratification, assess hydraulic containment and aquifer restoration, optimize remedial system performance, and evaluate compliance with remedial action objectives. The proposed wells and monitoring plan will be included in the forthcoming draft 100 percent design submittal (due December 2004) for Site 24, and expanded further in the Site 24 Operation and Maintenance Plan (due March 2005) for the groundwater remedial action. Ten new multi-level monitoring wells will be proposed to eliminate data gaps, allow for accurate assessment of

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Reviewer: *David Murchison, Engineering Geologist, Cypress Geological Services Unit, Department of Toxic Substances, Cypress, CA*
Comments dated March 22, 2004.
Reviewer: *Theodore Johnson, Senior Engineering Geologist, Cypress Geological Services Unit, Department of Toxic Substances, Cypress, CA*
Informal Comments dated July 6, 2004.

Comment No.	Section/ Page No.	Comment	Response
		[Groundwater Monitoring Plan (BNI 1999)]. More recent data reported in the Tech Memo (2003/2004) demonstrates that plume stratification is likely. Therefore, the Earth Tech response should incorporate recent groundwater data and modify the conceptual site model accordingly. Additionally, shorter screen lengths should be used for groundwater sampling.	remedy performance, and provide data for remedy optimization. Each screen/port will be 10 feet or less in length, and each monitoring well location will consist of approximately 4 to 6 screens/ports for accurate vertical resolution of VOC concentrations and hydraulic heads. The wells will be completed primarily within the SGU, although several wells will extend into the principal aquifer for deeper vertical assessment. The Navy also agreed to incorporate recent groundwater data into the site model. The updated plume distribution was incorporated into the OU1 and OU2A groundwater model, and additional simulations were run to evaluate whether proposed extraction locations were still optimally placed, as described in Section 4.3.3 of the Final PDI Technical Memorandum. The updated simulation results are similar to the results presented in the Final Groundwater Modeling Technical Memorandum (October 2003), and did not result in revisions to the proposed extraction well locations, extraction rates, or proposed screened intervals. Note that although the evaluation of vertical stratification is an important component of the monitoring plan, it is not as relevant to the extraction well design. The vertical extent of contamination has been defined and the proposed SGU extraction wells have been designed to extract groundwater from the entire vertical zone of contamination. Although the majority of water will be produced from the coarse-grained units, contaminants from the fine-grained units will be removed as they diffuse into the coarse-grained units.
2		Based on the PDB and conventional groundwater sampling data, GSU recommends that the contractor revise the method by which monitoring well screened intervals are chosen to include a strong component of field decision-making. Short screens	As a result of the detailed investigations, pilot testing, and ongoing monitoring of the VOC plume, a comprehensive network of monitoring wells is currently in place. However, additional wells for monitoring the

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Reviewer: *Theodore Johnson, Senior Engineering Geologist, Cypress Geological Services Unit, Department of Toxic Substances, Cypress, CA Informal Comments dated July 6, 2004.*

Comment No.	Section/ Page No.	Comment	Response
		should be placed intersecting the tops of fine-grained units, and additional wells or discrete sampling ports should be installed at the tops of progressively deeper fine-grained units until at least one screen demonstrates non-detect conditions for TCE. Each of the three hot spots discussed in the Memorandum should be monitored at multiple levels within the maximum concentration axis of the plume to provide adequate vertical control on contaminant extent.	effectiveness of the remedial action will be considered based on the recommendations provided in the comment.
3		The vertical velocity data retrieved and then rejected by the Memorandum probably explains the PDB data, providing a mechanism that drives the mixing of contaminants in the well screens. The vertical velocity data from 4 wells shows vertical currents in every tested well, with varying velocity, but uniform upward transport direction. This means that all the water in the well casing is from a single horizon near the base of the screen in each case, or that it is fully mixed during residence in the casing before being discharged to shallower zones of the aquifer. The contractor should accept the vertical velocity data in the well screens, and plan future monitoring wells with short screened intervals more suitable for PDB monitoring. <u>GSU comment on initial Navy response:</u> Zones of varying hydraulic conductivity adjacent to the well screen may be the cause of the variable vertical velocities detected in the well. These variable hydraulic conductivities and the resultant vertical flow detected in the wells may be important to contaminant fate and transport and remedy design. As mentioned in GSU's Comment No. 3, dated March 22, 2004, and affirmed in the response to GSU's comment, smaller screen lengths should be considered for groundwater sampling. If the velocity data previously collected is "unclear," another method should be selected to further evaluate the vertical gradients indicated by the original study. If variable hydraulic	Design of future monitoring wells will consider the use of shorter screens as recommended. As stated in the PDI Tech Memo, the large range of values within the same screens, the excessive values that are non-representative of hydrogeologic conditions at Site 24, and the lack of consistency with historical vertical gradients computed using groundwater elevation data (both direction and magnitude), render the results of the heat-pulse method uncertain. Please note that considerable time and effort were expended in the attempt at vertical velocity quantification using the heat-pulse method. However, the considerable uncertainty does not allow for confidence in the heat-pulse method results. Navy response to GSU comment on initial Navy response: The Navy agreed to propose shorter screen lengths in a remediation performance monitoring plan (to be included as part of the draft 100 percent design submittal for Site 24) for groundwater sampling during remedy implementation and assessment. Please see the response to comment 1. In addition, the remediation performance monitoring plan will propose alternate methods for hydraulic evaluation, as recommended by

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Reviewer: *David Murchison, Engineering Geologist, Cypress Geological Services Unit, Department of Toxic Substances, Cypress, CA*
Comments dated March 22, 2004.
Reviewer: *Theodore Johnson, Senior Engineering Geologist, Cypress Geological Services Unit, Department of Toxic Substances, Cypress, CA*
Informal Comments dated July 6, 2004.

Comment No.	Section/ Page No.	Comment	Response
		conductivities exist in the formations, it will impact contaminant transport. Intervals of higher and lower conductivity should be identified and included in the fate and transport evaluation and the remediation system design process.	DTSC. During remedial action, groundwater elevations will be measured in order to determine the flow regime induced by groundwater extraction. The steady-state elevations will be mapped and used to generate flow nets. In accordance with EPA guidance on "Methods for Monitoring Pump-and-Treat Performance" (EPA 1994), the flow nets will be used to evaluate hydraulic gradients, groundwater flow directions, and capture zones of individual wells and the cumulative area of on-station hydraulic containment. Vertical gradients will also be evaluated using differential heads measured from nested monitoring wells screened at varying depths.
4		GSU does not concur with the rejection of heat-pulse vertical flow logging data and the adoption of calculated vertical velocities. While there may be questions about the precision of heat-pulse logging at very high and very low flow rates, GSU judges that the heat pulse logging was carefully performed using calibrated instruments, and that the data should be accepted as reasonably representative of flow in the well screens. The contractor should accept the heat-pulse data or propose to use a better method of field measurement of vertical flows.	As described in the response to comment 3, the considerable uncertainty does not allow for confidence in the heat-pulse method results. However, remedy design is based upon a well established conceptual site model, and a very robust three-dimensional groundwater flow and contaminant transport model. Efficient remedy design and implementation is not dependent upon quantification of vertical flow, nor would the current design likely change if vertical flow gradients were accurately established based on direct measurement. The PDI sampling results have been incorporated into the groundwater flow and transport model, and the updated simulation results are presented in Section 4.3.3 and Appendix H of the Final PDI Technical Memorandum. The updated simulations did not result in revisions to proposed extraction well locations or screened intervals.
5		GSU does not concur that pumping from agricultural well 18_TIC55 and other principal aquifer wells has not resulted in	Although it is well known that agricultural pumping influences the groundwater flow regime within the Irvine

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Reviewer: *David Murchison, Engineering Geologist, Cypress Geological Services Unit, Department of Toxic Substances, Cypress, CA*
Comments dated March 22, 2004.
Reviewer: *Theodore Johnson, Senior Engineering Geologist, Cypress Geological Services Unit, Department of Toxic Substances, Cypress, CA*
Informal Comments dated July 6, 2004.

Comment No.	Section/ Page No.	Comment	Response
		northward or downward migration of TCE in excess of the MCL. The available data is insufficient to make that determination, especially in light of the persistent presence of dissolved TCE at a depth of 450 feet in screen 18_DW450, and at trace concentrations intermittently at 540 feet bgs in screen 18_DW540. These monitoring points are very deep compared to the base of the shallow zone, and not within the footprint of the mapped shallow plume. The persistence of TCE to these well screens strongly suggests that the plume has penetrated below the currently mapped extent. <u>GSU comment on initial Navy response:</u> Well 18_TIC 55 has a 197 foot long screen and is considered susceptible to dilution and mixing of measured parameters and chemicals. Appropriately screened (either Westbay or shorter screen lengths) should be installed to evaluate the detected chlorinated solvents in well 18_TIC 55 at depths of 450 and 540 feet. The long screen length may enhance mixing and plume migration to deeper intervals.	Subbasin, the PDI results confirmed that the currently mapped northward and downward extent of VOC concentrations in excess of MCLs is representative of site conditions. The PDI results showed that TCE was not detected in 18_TIC55 above the reporting limit of 1 µg/L at three depths across the well screen interval. In well 24MW07, which was installed to delineate the northern extent of the TCE MCL and evaluate the pumping effect of 18_TIC55, TCE was detected below its MCL at concentrations ranging from 1 to 2.8 µg/L. TCE was detected at concentrations of 4 µg/L, <1 µg/L, <1 µg/L, 2 µg/L, and <1 µg/L in 18_DW135, 18_DW250, 18_DW350, 18_DW450, and 18_DW540, respectively, none of which exceed the MCL for TCE. Additionally, the results are consistent with the distribution of VOCs in the SGU, which generally decrease with depth as expected with a release originating at ground surface. Furthermore, monitoring of 18_TIC55 by OCWD has not resulted in VOC detections in excess of MCLs. <u>Navy response to GSU comment on initial Navy response:</u> The Navy agrees to propose short screen wells in a remediation performance monitoring plan (to be included as part of the draft 100 percent design submittal for Site 24) to eliminate data gaps, allow for accurate assessment of remedy performance, and provide data for remedy optimization. The wells will be completed primarily within the SGU, although several wells will extend into the principal aquifer for deeper vertical assessment. Please see the response to comment 1.
6		GSU thanks the Navy and the contractor for providing the additional cross section B-B' across the plume. This display assists the BCT in understanding a portion of the plume in the	Comment noted.

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Reviewer: *David Murchison, Engineering Geologist, Cypress Geological Services Unit, Department of Toxic Substances, Cypress, CA Comments dated March 22, 2004.*
Reviewer: *Theodore Johnson, Senior Engineering Geologist, Cypress Geological Services Unit, Department of Toxic Substances, Cypress, CA Informal Comments dated July 6, 2004.*

Comment No.	Section/ Page No.	Comment	Response
		3rd dimension.	
7		GSU notes that a large quantity of lithologic and groundwater contamination data has been gathered at the site over a decade or more of investigation. A large number of wells and other borings have been drilled and logged. A large number of well screens have been monitored and still more are available for monitoring should the need arise. The current conceptual model of the plume is based on mapping the data in 2 dimensions in plan view, and in 2 dimensions along a few cross-sections drawn through the plume. Well data is projected to these cross sections over substantial horizontal distances, often exceeding the vertical thickness of the aquifers. GSU strongly recommends that the contractor create a 3-dimensional stratigraphic model of the volume of aquifer potentially affected by the plume, and plot the plume concentrations in 3 dimensions. This will provide a tool that displays the strengths and weaknesses of the dataset in 3 dimensions, and that will assist the Navy in tracking the plume, planning future actions, and assisting in early detection of changes in plume behavior. <u>GSU comment on initial Navy response:</u> GSU suggests presentation of the three dimensional data for review and evaluation.	The Navy concurs that a three-dimensional groundwater model provides a useful tool in monitoring the plume and planning future actions. Please note that the proposed extraction well locations and screen intervals were selected based upon a comprehensive groundwater modeling effort performed for the SGU and Principal Aquifer. The modeling effort included simulation of three-dimensional groundwater flow and three-dimensional contaminant (TCE) transport. The three-dimensional model is also useful in developing the groundwater remedy performance monitoring plan. The Navy is using this three-dimensional understanding of VOC concentrations to develop an approach for performance monitoring and remedy optimization. The PDI sampling results were incorporated into the groundwater flow and transport model, and the updated simulation results are presented in Section 4.3.3 and Appendix H of the Final PDI Technical Memorandum. The updated simulations did not result in revisions to proposed extraction well locations or screened intervals. <u>Navy response to GSU comment on initial Navy response:</u> Three dimensional groundwater data have been presented in cross-section profile and multiple-depth planar view in the Final PDI Technical Memorandum and the Final Groundwater Modeling Technical Memorandum (October 2003). The Navy will consider additional three dimensional data presentation in the Site 24 Operation and Maintenance Plan (due March 2005) for the groundwater remedial action
8		GSU recommends that soil vapor extraction remain in	Consistent with the OU1 and OU2A final ROD, and the

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Reviewer: *David Murchison, Engineering Geologist, Cypress Geological Services Unit, Department of Toxic Substances, Cypress, CA Comments dated March 22, 2004.*

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Comment No.	Section/ Page No.	Comment	Response
		consideration as a supplemental remedial method once the proposed main remedy is implemented.	recommendation provided in the comment, the Navy will utilize soil vapor extraction (SVE) for mass removal enhancement during implementation of the SGU remedy. SVE will be performed in the VOC source area hot spots after sufficient dewatering has occurred as a result of groundwater extraction. Text in Sections 4.4.2 and 6.2 has been revised to reflect this change.

Document Title:

(1) *Draft Technical Memorandum, Pre-Design Investigation for Shallow Groundwater Unit Remedy, IRP Site 24, Former MCAS El Toro, January 2004.*

Reviewer: *John Broderick, Regional Water Quality Control Board, Santa Ana Region*
Comments dated March 10, 2004.

Comment No.	Section/ Page No.	Comment	Response
COMMENT ON PRE-DESIGN INVESTIGATION TECHNICAL MEMORANDUM			
GENERAL COMMENTS			
1	Continuous operation of Central Treatment System, Page 5-2, first paragraph	This section incorrectly states that the BRAC Cleanup Team (BCT) granted approval for the discharge of treated groundwater (now in progress) for on-site percolation. As the Remedial Project Manager for the Regional Board, and a member of the BCT, I do not have the authority to authorize, and did not, in fact, authorize a discharge that would be regulated under the Porter-Cologne Water Quality Control Act of 1998 and the Water Quality Control Plan (basin Plan) for the Santa Ana Regional Board. Therefore, please correct this section to identify the Navy as unilaterally authorizing the on-site discharge of treated groundwater via percolation, not members of the BCT. I am certain that the BCT discussed federal (U.S. EPA's National Pollutant Discharge Elimination System – NPDES) and State (Regional Board) permitting requirements for the discharge of treated groundwater. Based on our past discussions regarding similar discharges of treated groundwater, the Navy is familiar with the substantive requirements that can be identified and implemented in lieu of discharge permits, when appropriate. The regional Board's Executive Officer and legal counsel must make the final determination regarding the need for a discharge permit at this site. The Navy has long held the position that it is exempt from obtaining waste discharge requirements (WDRs) and NPDES permits. In the past, however, the Navy has agreed that the substantive requirements contained in WDRs and NPDES permits are relevant, applicable or appropriate, and has agreed to comply with these substantive requirements, and we request that it comply with those requirements with respect to the subject discharge.	The first 2 paragraphs of Section 5.2.1.2 have been modified as follows: "Continuous treatment and discharge to the ground for percolation (east of Building 296) began on 29 August 2003. The work plan specified discharge to either the storm drain or the sanitary sewer. However, discharge to ground for percolation commenced after the DON notified the BCT that the treatment system was performing as required by the WDR for percolation of treated groundwater. The discharge was performed in accordance with the substantive requirements of WDR Order No. R8-2003-0085 as specified in Section 3.4. Weekly effluent sampling started on 2 September 2003. Midpoint samples were also collected at least once a week. Sampling results confirmed that the CTS discharge stream met the average monthly concentration limits (summarized in Table 5-5) per WDR Order No. R8-2003-0085."