Lockheed Martin Corporation, Shared Services
Energy, Environment, Safety and Health
2950 North Hollywood Way, Suite 125 Burbank, CA 91505
Telephone: 818.847.0197 Facsimile: 818.847.0256

LOCKHEED MARTIN

October 25, 2010

Mr. Daniel Zogaib
Southern California Cleanup Operations
Department of Toxic Substances Control
5796 Corporate Avenue
Cypress, CA 90630

Subject: Submittal of the *Supplemental Soil Sampling for Risk Assessment, Lockheed Martin Corporation, Beaumont Site 2, Beaumont, California*

Dear Mr. Zogaib:

Please find enclosed one hard copy of the body of the report and two compact disks containing electronic copies of the report and appendices of the *Supplemental Soil Sampling for Risk Assessment, Lockheed Martin Corporation, Beaumont Site 2, Beaumont, California.* This report is a final version containing revisions responding to all of DTSC's comments, including providing electronics copies of historic reports as requested by DTSC.

If you have any questions regarding this submittal, please contact me at 408.756.9595 or denise.kato@lmco.com.

Sincerely,

Denise Kato
Remediation Analyst Senior Staff

Enclosures

Copy with Enc:
Gene Matsushita, LMC (1 electronic and 1 hard copy)
Ian Lo, Camp, Dresser, McKee (1 electronic copy)
Thomas J. Villeneuve, Tetra Tech, Inc. (1 electronic and 1 hard copy)
Alan Bick, Gibson Dunn (electronic copy)

TETRA TECH

October 25, 2010

Ms. Denise Kato
Lockheed Martin Corporation
2950 N. Hollywood Way, Suite 125
Burbank, CA 91505

Subject: Supplemental Soil Sampling for Risk Assessment
Lockheed Martin Corporation, Beaumont Site 2
Beaumont, California

Dear Ms. Kato:

Tetra Tech, Inc. (Tetra Tech) is pleased to provide you with this letter report summarizing the results of supplemental soil sampling conducted at Lockheed Martin Corporation (LMC) Beaumont Site 2, located in Beaumont, California (Figures 1 and 2). This work was conducted in accordance with Addendum #2 to the Dynamic Site Investigation Work Plan, dated March 4, 2010 (Tetra Tech, 2010b), as modified in response to comments provided by the California Department of Toxic Substances Control (DTSC) in a letter dated March 17, 2010 (DTSC, 2010) and subsequent email correspondence dated March 23, 2010. Final approval of the work plan was received from DTSC April 5, 2010. A copy of the work plan and related correspondence is provided in Attachment A.

Based on recent work at Site 2, including the Dynamic Site Investigation (DSI; Tetra Tech, 2010d) and groundwater monitoring conducted during the second and third quarters of 2009 (Tetra Tech, 2010c), as well as comments from the DTSC on the DSI (DTSC, 2009; Comment 7), several data gaps were identified at Site 2. The objective of this investigation is to obtain additional data to address the identified data gaps in support of the human health and ecological risk assessments for the site.

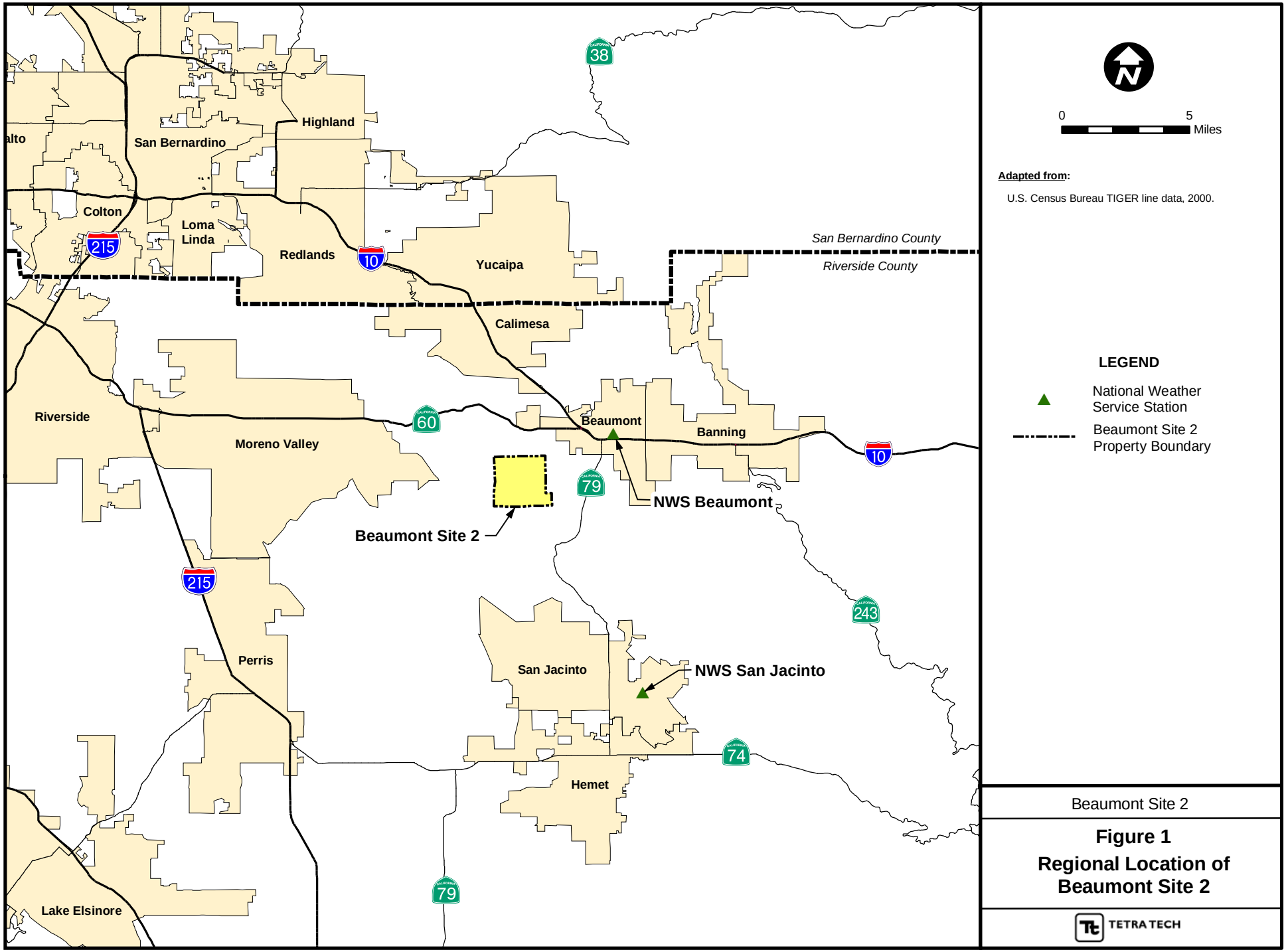
BACKGROUND INFORMATION

A review of the site history and previous work was previously provided in the DSI (Tetra Tech, 2010d). The following sections provide a brief overview of the data gaps addressed by this investigation.

Vicinity of Well TT-MW2-13

During screening for emerging groundwater contaminants conducted in the second quarter of 2006, hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) was detected in well TT-MW2-1 (Figure 2) at a concentration of 1.6 µg/L, above the California Drinking Water Notification Level (DWNL) of 0.3 µg/L. Additional groundwater sampling for RDX was conducted up- and downgradient of TT-MW2-1 during 2007 and 2008. The expanded sampling effort also found RDX at a concentration of 0.68 µg/L in well TT-MW2-13, which is located upgradient from TT-MW2-1.

Tetra Tech, Inc.
301 E. Vanderbilt Way, Suite 450, San Bernardino, CA 92408
Tel 909.381.1674 Fax 909.889.1391 www.tetratech.com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38
Highland
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Colton
Loma
Linda
215
Redlands
10
Yucaipa
San Bernardino County
Riverside County
Calimesa
Riverside
60
Moreno Valley
Beaumont
Banning
10
79
NWS Beaumont
Beaumont Site 2
215
243
Perris
San Jacinto
NWS San Jacinto
74
Hemet
79
Lake Elsinore
0
5
Miles
Adapted from:
U.S. Census Bureau TIGER line data, 2000.
LEGEND
National Weather Service Station
Beaumont Site 2 Property Boundary
Beaumont Site 2
Figure 1
Regional Location of Beaumont Site 2
TETRA TECH

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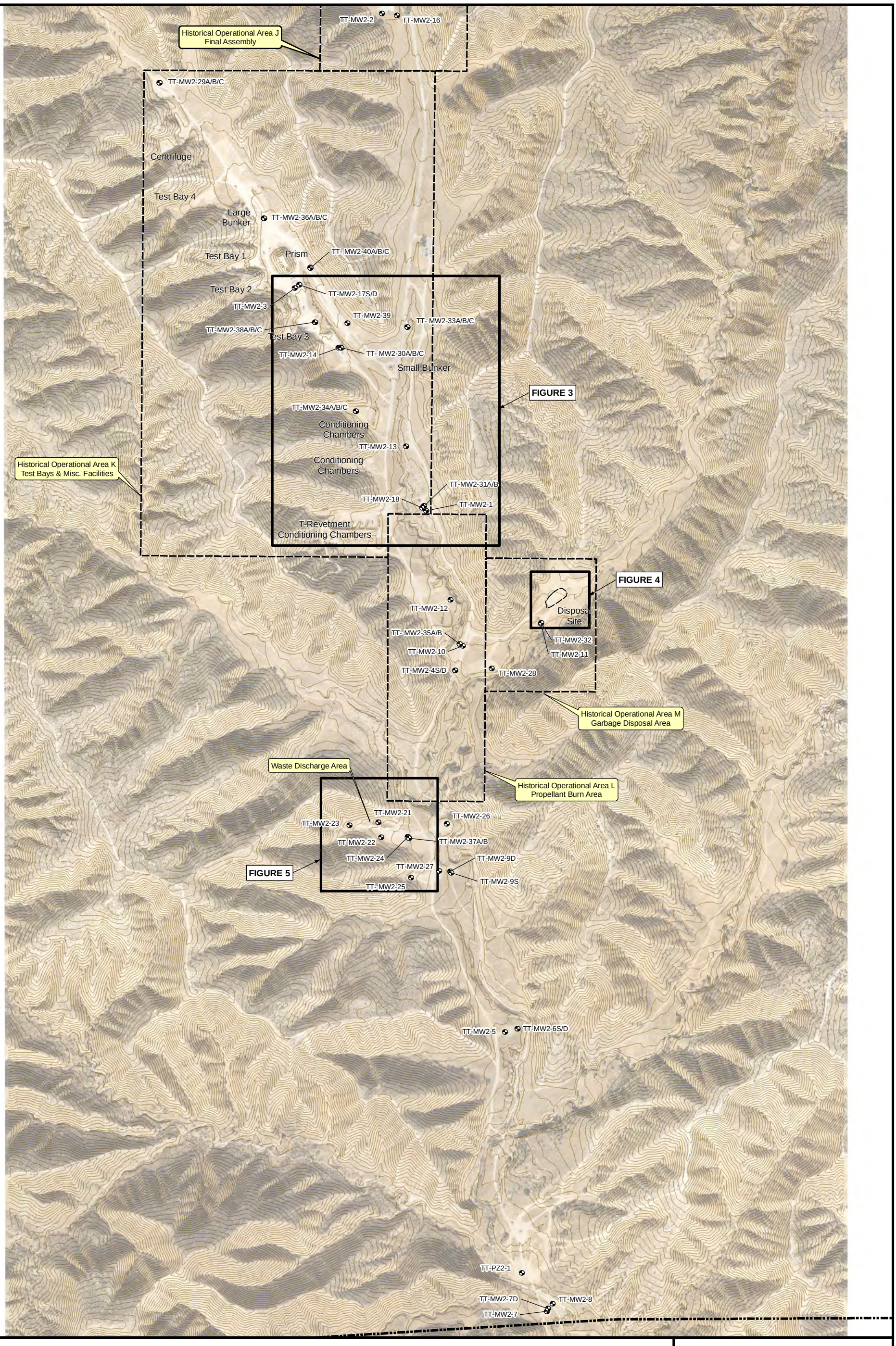

LEGEND

- Monitoring Well Location
- Ground Surface Elevation Contour (10-foot interval - feet msl)
- Historic Operational Area Boundary
- Figure Inset Locations

0 300 600 Feet

Beaumont Site 2

Figure 2

Historical Operational Areas and Features

TETRA TECH

During subsequent groundwater monitoring, RDX concentrations in TT-MW2-1 declined to non-detectable levels, but have remained relatively constant in TT-MW2-13.

Additional work conducted during the DSI to further characterize RDX in the vicinity of TT-MW2-13, including the following

- Installation of monitoring wells TT-MW2-33A, -33B, and -33C, and TT-MW2-34A, -34B, and -34C in the area of Laborde Canyon generally upgradient of TT-MW2-13. Groundwater samples from these wells, as well as from previous upgradient well TT-MW2-14, downgradient well TT-MW2-1, and TT-MW2-13 were analyzed for RDX. RDX was only detected in TT-MW2-13. Based on these results, the location of a potential soil source for the RDX detected in TT-MW2-13 was constrained to be in the area upgradient from TT-MW2-13 and downgradient from wells TT-MW2-33A/B/C, TT-MW2-34A/B/C, and TT-MW2-14 (i.e., in the general area of the intersection of Test Bay and Laborde Canyons).
- Drilling a total of six soil borings (K-54-SB134 to K-54-SB139) to a depth of 5 feet bgs at the two known former operational features located within the potential source area constrained by the groundwater data. The features investigated include a former conditioning chamber, and a former control bunker. Three borings were drilled at each feature; RDX was not detected in soil samples collected from the borings at depths of 0.5 and 5 feet bgs, indicating that RDX is apparently not associated with either of these features.

Based on comments received from DTSC on the DSI (DTSC, 2009), the work plan for this investigation proposed three additional soil borings (K-54-SB140 to K-54-SB142) to further characterize RDX in soil the area of monitoring well TT-MW2-13. Based on DTSC comments on the work plan and subsequent telephone communication and email correspondence with DTSC (Appendix A), a fourth boring (K-54-SB143) was added to the work scope.

Area M Garbage Disposal Trench

Previous soil sampling at Area M included three soil borings drilled during the 2004 soil investigation (Tetra Tech, 2005b), and eight additional soil borings drilled during the DSI (Tetra Tech, 2010d). Soil samples from the initial borings were analyzed for a comprehensive list of compounds, including perchlorate, metals, petroleum hydrocarbons, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and 1,4-dioxane; soil samples collected during the DSI were analyzed for perchlorate only.

Based on high-quality aerial photography and topographic mapping performed in late 2008, and a detailed review of previous work conducted during preparation of the DSI report (Tetra Tech, 2010d), it was found that the initial soil borings were drilled near, but not within, the former disposal area as described by Radian (1993). According to Radian (1993), the disposal area consisted of a trench which extended between two low mounds of soil which appear to be spoils from excavation of the trench. The disposal area and surrounding soils were excavated as part of a removal action conducted in 1993, but the soil mounds marking the approximate location of the original trench were not disturbed during the removal action due to the presence of animal

burrows (Radian, 1993). Based on the recent topographic mapping and field observations, the mounds are still present.

The lack of soil data within the footprint of the former disposal trench was considered a data gap. Additional work recommended to address this data gap included drilling two soil borings within the former disposal trench footprint, and analyzing soil samples from the borings for perchlorate, metals, petroleum hydrocarbons, VOCs, and SVOCs. The former disposal trench was also targeted for low-level N-nitrosodimethylamine (NDMA) analysis based on a 1972 report that a Lockheed safety technician was exposed to unsymmetrical dimethylhydrazine (uDMH) vapors from a pressurized gas cylinder disposed of in Area M by Ogden Labs (Radian, 1986). NDMA may be present as an impurity in uDMH. Based on the detection of chlorinated solvents in nearby monitoring well TT-MW2-10, the soil samples were also analyzed for 1,4-dioxane at the request of DTSC.

Waste Discharge Area

The Waste Discharge Area (WDA) was initially identified as a potential source area in 2007, when a copy of a permit for the discharge of industrial waste issued by the Santa Ana Regional Water Pollution Control Board (SARWPCB; predecessor agency of the Santa Ana Regional Water Quality Control Board) was discovered. Investigation of the area described in the permit (Tetra Tech, 2007; 2009) found perchlorate and chlorinated solvents in both soil and groundwater.

Because chlorinated solvents were detected in soil and groundwater at the WDA, the WDA was targeted for 1,4-dioxane sampling during the second quarter 2009 groundwater monitoring event (Tetra Tech, 2010c). 1,4-dioxane was detected in wells TT-MW2-24 and TT-MW2-22, both of which are located within the WDA, at concentrations of 270 and 35 µg/L, respectively. For comparison, the DWNL for 1,4-dioxane is 3 µg/L. 1,4-Dioxane was also detected at concentrations ranging from 6.8 to 1.2 µg/L in downgradient wells TT-MW2-26, TT-MW2-9S, and TT-MW2-6S. All of these 1,4-dioxane detections were replicated during the third quarter 2009 groundwater monitoring event (Tetra Tech, 2010c). The lateral and vertical extent of 1,4-dioxane in groundwater is considered to be adequately characterized by the existing data.

As part of the DSI (Tetra Tech, 2010d), monitoring well TT-MW2-24 was targeted for RDX analysis because the language in the SARWPCB permit suggested that the WDA may have been used as a burn area. RDX was detected in TT-MW2-24 at a concentration of 4.7 µg/L. For comparison, the California drinking water notification level for RDX is 0.3 µg/L. Expanded groundwater sampling for RDX was subsequently conducted within and downgradient from the WDA during the second quarter 2009 groundwater monitoring event (Tetra Tech, 2010c). These results indicated that RDX in groundwater at the WDA is limited to well TT-MW2-24. The lateral and vertical extent of RDX in groundwater is considered to be adequately characterized by the existing data.

The initial soil sampling conducted in the WDA did not include 1,4-dioxane or RDX. Because both of these compounds were subsequently detected in groundwater, the lack of soil analyses for 1,4-dioxane and RDX was identified as a data gap. Additional work recommended to address this data gap included drilling three soil borings in the WDA, at the locations where the highest

concentrations of other contaminants were detected in soil and groundwater during the previous investigations, and analyzing the soil samples for 1,4-dioxane and RDX. Because the WDA was apparently used for the disposal of wastes, NDMA was also included in the analytical program to assess the potential presence of NDMA in soil.

METHODOLOGY

This investigation is one of a series of investigations that have been conducted at the Site since 2003. As a result, there are existing DTSC-approved work plans that detail the procedures to be followed when conducting soil and groundwater investigations. Unless otherwise stated, field activities were conducted in accordance with the previously-approved Soil Investigation Work Plan (Tetra Tech, 2003) and the DSI Work Plan (Tetra Tech, 2008), as well as the Draft Programmatic Sampling and Analytical Plan for Beaumont Sites 1 and 2 (Tetra Tech, 2010a).

The field investigation was conducted on April 12, 2010. A total of 9 soil borings were drilled to a depth of 11 feet below ground surface (bgs) using a direct-push drill rig. Drilling was conducted by Interphase Environmental, Inc., a California C-57 licensed drilling contractor. Unconsolidated soils were logged for lithology by a California-licensed Professional Geologist in general accordance with the Unified Soil Classification System (USCS; ASTM Standard D 2488-06). The soil boring locations are shown on Figures 3, 4, and 5. Copies of the soil boring logs are provided in Attachment B.

Soil sampling was conducted using the Geoprobe dual-tube system. Samples were collected by advancing a four-foot long, 2¼ -inch diameter hollow drill rod containing a four-foot long, 1⅛-inch diameter plastic sample liner into the subsurface. When the rods were advanced to a depth of 4 feet bgs, the liner containing the soil sample was retrieved to the surface and replaced with an unused liner. An additional four-foot section of rod was added to the drill string and advanced from four to eight feet bgs. The second sample liner was then retrieved, and the process repeated until the desired depth was achieved.

Upon retrieval to the surface, the sample liners were cut open lengthwise. Soil samples for analysis of volatile constituents (i.e., VOCs and gasoline-range organics [GRO] were collected from the liners using Encore sampling devices, consistent with EPA Method 5035 sample preservation protocols. Soil samples for analysis of semivolatile and inorganic constituents were collected from the liners and placed in 8-ounce glass jars with Teflon-lined screw caps. The samples were immediately labeled and placed in a cooler chilled with water ice pending delivery to the laboratory under chain-of-custody protocols.

Field QA/QC samples included field duplicates, matrix spike/matrix spike duplicate (MS/MSD) samples, equipment blanks, and trip blanks. Field duplicates were collected at a rate of one for every ten samples (three duplicates total). MS/MSDs were collected at a rate of one for every 20 samples (two MS/MSDs total). Equipment blanks were collected by rinsing the decontaminated direct-push sampling tool with water provided by the laboratory; the equipment blanks were analyzed for all compounds analyzed in the samples. A trip blank was placed in the cooler containing the VOC samples, and was analyzed for VOCs only.

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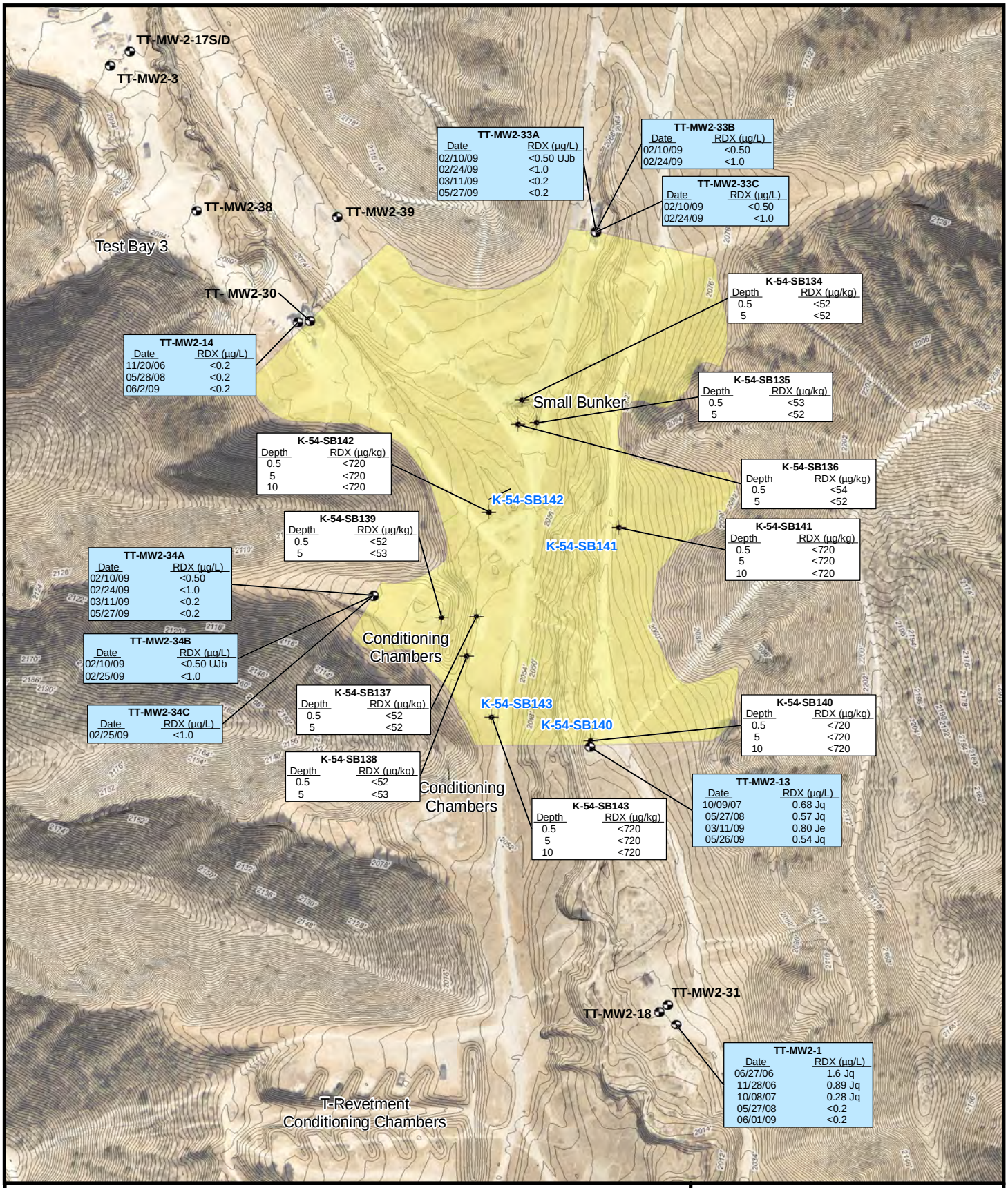

LEGEND

- Soil Boring Location
- Monitoring Well Location
- Potential RDX Source Area
- Ground Surface Elevation Contour (2-foot interval - feet msl)

Note:

- # RDX Soil results in µg/kg.
- # RDX Groundwater results in µg/L.

0 100 200 Feet

Beaumont Site 2

Figure 3
Boring Locations and RDX Concentrations Vicinity of TT-MW2-13

TETRA TECH

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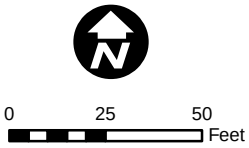

LEGEND

- Soil Boring Location
- Monitoring Well Location
- Soil Boring/Soil Gas Location
- Cross Section Line
- Ground Surface Elevation Contour (2-foot interval - feet msl)
- Boundary of Disposal Site Excavation

Beaumont Site 2

Figure 4

Soil Boring and Cross Section Locations Historical Operational Area M

TETRA TECH

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0 50 100 Feet

LEGEND

- Soil Boring Location
- Monitoring Well Location
- Soil Gas Location
- Ground Surface Elevation Contour (2-foot interval - feet msl)

Beaumont Site 2

Figure 5

Boring Locations
Waste Discharge Area

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Investigation-Derived Waste

Investigation derived waste (IDW) generated during field activities included a small quantity of soil cuttings from drilling and water used for equipment decontamination. The wastes were placed in a labeled 55-gallon drum and stored on a paved surface. The wastes will be consolidated with other wastes generated at the site and disposed in conjunction with the second quarter 2010 groundwater monitoring event.

Habitat Conservation

Consistent with the USFWS approved Low Effect Habitat Conservation Plan (Tetra Tech, 2005a) and describing low effect activities for environmental remediation at the Site, biological surveys were conducted in the areas surrounding proposed drilling locations prior to initiating field activities. The surveys were conducted to evaluate the potential for impacts to sensitive species/habitats, including Stephens kangaroo rat (SKR), during field activities. The surveys were performed by a Section 10A permitted or sub-permitted biologist.

As part of the biological surveys, the biologist identified and marked potential or suspected SKR burrows that were located in the vicinity of proposed drilling locations to avoid the "take" (i.e., harm, harassment, death, and/or disturbance of habitat) of SKR. The biologist clearly marked ingress and egress routes to each drilling location in an effort to minimize the overall footprint of field activities and impacts to SKR habitat. As needed, the biologist remained on Site during field activities to implement the requirements of the Low Effect Habitat Conservation Plan.

RESULTS

Geology

Soils encountered during drilling include silty sand, clayey sand, sandy silt, and sandy clay. In general, the soil types observed during drilling are consistent with those observed during previous investigations at the site (e.g., Tetra Tech, 2010d).

Analytical Results

Data Quality Review

The data for the soil samples were provided in analytical data reports generated by E.S. Babcock and Sons, Inc. These data were reviewed as described in the Programmatic Sampling and Analysis Plan (Tetra Tech, 2010a), using the latest versions of the National Functional Guidelines for Inorganic and Organic Data Review from the EPA (EPA, 2008 and 2010a). Preservation criteria, holding times, field blanks, laboratory control samples (LCS), method blanks, duplicate environmental samples, spiked samples, and surrogate and spike recovery data were reviewed. For each environmental sample, the sample-specific quality control spike recoveries were examined. These data examinations include comparing statistically calculated control limits to percent recoveries of all spiked analytes and duplicate spiked analytes. Relative percent difference (RPD) control limits were compared to actual matrix spike/matrix spike duplicate

(MS/MSD) RPD results. Surrogate recoveries were examined for all organic compound analyses and compared with their control limits.

Environmental samples were analyzed by one or more of the following methods: Method SW8330A for RDX, Method SW8270C-SIM for 1,4-dioxane, Method E521 for low-level NDMA, Method E332.0 for perchlorate, Methods SW6020 and SW7471A for metals, Method SW8015B for GRO and diesel range organics (DRO), Method SW8260B for VOCs, and Method SW8270C for SVOCs. Unless otherwise noted below, all data results met the required criteria, are of known precision and accuracy, did not require qualification, and may be used as reported.

- Method E521 for low-level NDMA had surrogate control limit errors that qualified 5.9 percent of the total E521 data as estimated. The errors in the E521 data were minor since the magnitude of the control limit exceedence was small. The data qualified as estimated is usable for the intended purpose.
- Method SW6020 for metals had field duplicate RPD errors that qualified 7.1 percent of the total SW6020 data as estimated. The data qualified as estimated is usable for the intended purpose.
- Method SW8260B for VOCs had blank contamination for 2-butanone and methylene chloride that caused 4.8 percent of the total SW8260B data to be qualified for blank contamination. The data qualified as estimated is usable for the intended purpose. The blank qualified results should be considered not detected.

Analytical results are summarized in Table 1. Complete results for all methods are provided in Attachment C and the laboratory reports (Attachment D). It should be noted that several compounds were analyzed by multiple methods. These include 1,4-dioxane (Methods SW8270C SIM, SW8270C, and SW8260B), NDMA (Methods E521 and 8270C), and 1,2-dichlorobenzene, 1,3-dichlorobenzene, and 1,4-dichlorobenzene (Methods SW 8260B and SW8270C). None of these compounds were detected in the environmental samples, and only the results for the method with the lowest method detection limit are presented in Table 1.

Vicinity of Well TT-MW2-13

Four soil borings (K-54-SB140 to K-54-SB143) were advanced in the vicinity of well TT-MW2-13; soil samples collected at depths of 0.5, 5, and 10 feet were analyzed for RDX only. The boring locations are shown in Figure 3; analytical results are summarized in Table 1 and on Figure 3. RDX was not detected in any of the soil samples analyzed.

Historical Operational Area M

Two soil borings (M-58-SB109 and M-58-SB110) were advanced within the approximate footprint of the former disposal trench in Area M. Soil samples collected at depths of 0.5, 5, and 10 feet bgs were analyzed for 1,4-dioxane, NDMA, perchlorate, metals, GRO, DRO, VOCs, and SVOCs. The boring locations are shown in Figure 4; analytical results are summarized in Table 1. Analytical results were as follows:

- 1,4-Dioxane, NDMA, perchlorate, DRO, and SVOCs were not detected in any of the soil samples analyzed.

TABLE 1
SUMMARY OF VALIDATED ANALYTICAL RESULTS

Sample Identification				Emerging Compounds (µg/kg)				Metals[5] (mg/kg)															Hydrocarbons[6] (mg/kg)		VOCs[7] (µg/kg)		SVOCs[8] (µg/kg)
Boring ID	Sample ID	Depth (feet)	Date Sampled	RDX[1]	1,4-Dioxane[2]	NDMA[3]	Perchlorate[4] (µg/kg)	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Silver	Selenium	Thallium	Vanadium	Zinc	Gasoline Range	Diesel Range	Acetone	Chloromethane	
Residential CHHSL:				-	18,000	-	-	30	0.07	5,200	16	1.7	100,000	660	3,000	80	18	380	1,600	380	380	5	530	23,000	-	-	-	-	-
Commercial/Industrial CHHSL:				-	64,000	-	-	380	0.24	63,000	190	7.5	100,000	3,200	38,000	320	180	4,800	16,000	4,800	4,800	63	6,700	100,000	-	-	-	-	-
Residential RSL:				5,500	44,000	2	55,000	31	0.39	15,000	160	70	120,000	23	3,100	400	23	390	1,500	390	390	-	390	23,000	-	-	61,000,000	120,000	-
Commercial/Industrial RSL:				24,000	160,000	34	720,000	410	1.6	190,000	2,000	800	1,500,000	300	41,000	800	310	5,100	20,000	5,100	5,100	-	5,200	310,000	-	-	630,000,000	500,000	-
K-54SB140	K-54SB140-0.5	0.5	04/12/10	<720	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	K-54SB140-5	5	04/12/10	<720	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	K-54SB140-10	10	04/12/10	<720	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
K-54-SB141	K-54-SB141-0.5	0.5	04/12/10	<720	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	K-54-SB141-5	5	04/12/10	<720	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	K-54-SB141-10	10	04/12/10	<720	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
K-54-SB142	K-54-SB142-0.5	0.5	04/12/10	<720	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	K-54-SB142-5	5	04/12/10	<720	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	K-54-SB142-10	10	04/12/10	<720	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
K-54-SB143	K-54-SB143-0.5	0.5	04/12/10	<720	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	K-54-SB143-5	5	04/12/10	<720	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	K-54-SB143-10	10	04/12/10	<720	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
M-58-SB109	M-58-SB109-0.5	0.5	04/12/10	-	<21	<0.110	<4.2	<0.20	2.9 Jq	110	0.37 Jq	0.060 Jq	20	8.2 Jq	17	6.4 Jq	<0.025	<0.27	15	<0.71	<0.36	<0.25	39	53	<2.3	<5.3	13 Jq	3.3 Jq	All ND
	M-58-SB109-5	5	04/12/10	-	<21	<0.100	<4.1	<0.20	4.8 Jq	140	0.30 Jq	<0.038	10	3.7 Jq	7.4 Jq	2.8 Jq	<0.025	0.29 Jq	6.5 Jq	<0.69	<0.35	<0.24	51	21	2.8 Jq	<5.2	10 Jq	2.2 Jq	All ND
	M-58-SB109-10	10	04/12/10	-	<21	<0.110 UJb	<4.2	<0.20	4.6 Jq	130	0.30 Jq	<0.038	15	4.2 Jq	7.9 Jq	2.3 Jq	<0.025	2.0 Jq	7.3 Jq	<0.70	<0.35	<0.24	52	23	<2.6	<5.3	17 Jq	2.9 Jq	All ND
M-58-SB110	M-58-SB110-0.5	0.5	04/12/10	-	<22	<0.110	<4.3	0.27 Jq	3.3 Jq	120	0.41 Jq	0.13 Jq	21	9.6 Jq	20	9.9 Jq	<0.026	<0.27	17	<0.73	<0.36	<0.25	43	59	<2.4	<5.4	18 Jq	2.5 Jq	All ND
	M-58-SB110-5	5	04/12/10	-	<22	<0.110	<4.4	<0.21	2.1 Jq	96	0.29 Jq	<0.040	15	6.2 Jq	11 Jf	3.7 Jq	<0.026	0.29 Jq	11 Jf	<0.73	<0.37	<0.26	28 Jf	31 Jf	<2.3	<5.5	12 Jq	<1.7	All ND
	M-58-SB110-10	10	04/12/10	-	<21	<0.100	<4.1	<0.20	2.3 Jq	64	0.21 Jq	<0.038	14	5.3 Jq	9.9 Jq	3.8 Jq	<0.025	<0.26	10	<0.69	<0.35	<0.24	30	26	2.7 Jq	<5.2	20 Jq	2.9 Jq	All ND
WDA-SB101	WDA-SB101-0.5	0.5	04/12/10	<720	<22	<0.110	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	WDA-SB101-5	5	04/12/10	<720	<22	<0.110	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	WDA-SB101-10	10	04/12/10	<720	<22	<0.110	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WDA-SB102	WDA-SB102-0.5	0.5	04/12/10	<720	<23	<0.110	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	WDA-SB102-5	5	04/12/10	<720	<22	<0.110	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	WDA-SB102-10	10	04/12/10	<720	<23	<0.110	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WDA-SB103	WDA-SB103-0.5	0.5	04/12/10	<720	<21	<0.100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	WDA-SB103-5	5	04/12/10	<720	<22	<0.110	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	WDA-SB103-10	10	04/12/10	<720	<22	<0.110	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:
µg/kg: concentration in micrograms per kilogram.
mg/kg: concentration in milligrams per kilogram.
Depth is in feet below ground surface.
All ND: All analyzed compounds not detected (MDLs vary by compound).
1. Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) , analyzed by Method SW8330A.
2. 1,4-Dioxane, analyzed by Method SW8270C SIM.
3. N-nitrosodimethylamine, analyzed by Method E521.
4. Perchlorate, analyzed by Method E332.0.
5. California Title 22 Metals, analyzed by Methods SW6020 and SW7471A (mercury).
6. Petroleum hydrocarbons, analyzed by Method 8015B.
7. Volatile organic compounds, analyzed by Method SW8260B.
8. Semivolatile organic compounds, analyzed by Method SW8270C.

Data Qualifiers:
J: The analyte was positively identified, but the analyte concentration is an estimated value.
UJ: The analyte was not detected above the MDL. However, the MDL may be elevated above the reported detection limit.
f: The duplicate relative percent difference (RPD) was outside the control limit.
q: The analyte detection was below the Practical Quantitation Limit (PQL).

- With the exception of arsenic, metals concentrations were below human health-based screening levels (California Human Health Screening Levels [CHHSLs; Cal/EPA, 2005and 2009] and USEPA Region 9 Regional Screening Levels [RSLs; USEPA, 2010b] for residential and commercial industrial land use). Arsenic concentrations were below the site-specific background threshold value of 6.06 mg/kg for alluvial soils (Tetra Tech, 2010d).
- GRO was detected in two samples (M-58-SB109-5' and M-58-SB110-10', at concentrations of 2.8 and 2.7 mg/kg, respectively. Petroleum-related VOCs (for example, benzene, toluene, ethylbenzene, and xylenes) were not detected in either sample.
- Acetone (a common laboratory contaminant) was detected in all six soil samples, at concentrations ranging from 10 to 20 µg/kg. Chloromethane was detected in five of the six soil samples, at concentrations ranging from 2.2 to 3.3 µg/kg. Neither of these compounds was detected in field or laboratory blank samples. The detected acetone and chloromethane concentrations are very low (i.e., several orders of magnitude below their respective RSLs).

Waste Discharge Area

Three soil borings (WDA-SB101, WDA-SB102, and WDA-SB103) were advanced in the WDA, adjacent to existing soil borings and monitoring wells TT-MW2-21/SB1/Pond4, TT-MW2-22/SB2/Pond3, and TT-MW2-24/SB6/Pond2, respectively. Soil samples collected at depths of 0.5, 5, and 10 feet were analyzed for 1,4-dioxane, RDX, and NDMA. The boring locations are shown in Figure 5; analytical results are summarized in Table 1. 1,4-Dioxane, RDX, and NDMA were not detected in any of the soil samples analyzed.

DISCUSSION OF RESULTS

Vicinity of Well TT-MW2-13

The available groundwater monitoring results provide several constraints on the location of a possible soil source of RDX. An RDX source in soil, if still present, is most likely located downgradient from wells TT-MW2-14 and TT-MW2-33A/B/C, where RDX was not detected; downgradient to crossgradient from wells TT-MW2-34A/B/C, where RDX was not detected; and upgradient from well TT-MW2-13, the only well in the area where RDX was detected. Furthermore, the hillsides adjacent to the relatively flat canyon floor are very steep, and it is considered unlikely that RDX disposal or other activities that could result in a release would be conducted in these areas. These constraints limit the possible area of a soil source of RDX to the shaded area shown on Figure 3.

At present, 10 soil borings have been drilled within the possible source area, including six borings at the only known former operational features within this area, and RDX has not been detected in any soil samples from these borings. Based on these results, it is concluded that a soil source of RDX, if one still exists, is either of very limited extent or has attenuated over time to non-detectable concentrations in soils at depths of 5 to 10 feet bgs or less.

Historical Operational Area M

Cross-section A-A' through the former disposal trench area is shown in Figure 6; the cross-section location is shown on Figure 4. Two generations of artificial fill are shown on Figure 6: fill generated during initial excavation of the disposal trench, which comprises the North and South Mounds (F1); and dark-colored sandy clay soils encountered from the surface to a depth of approximately 5.5 feet bgs in borings M-58-SB109 and M-58-SB110 (F2). The F2 sandy clay soils are underlain by light-colored silty sands with well-preserved small-scale bedding, which are interpreted as undisturbed alluvium.

In the Removal Action Report, Radian (1993) observed that debris in the disposal area extended to a maximum depth of approximately 5 feet bgs, which suggests that the original disposal trench was approximately 5 feet deep. The historical observations by Radian (1993) are in agreement with the lithologies observed during this investigation, and suggest that borings M-58-SB109 and M-58-SB110 were drilled within the footprint of the former trench.

The analytical results for borings M-58-SB109 and M-58-SB110 (Table 1) show that 1,4-dioxane, NDMA, perchlorate, DRO, and SVOCs were not detected, and that concentrations of metals, GRO, VOCs in soils beneath the former disposal trench and in soils used by Radian (1993) to backfill the excavation are below levels considered to be protective of human health. Based on these results, it is concluded that the former disposal trench does not represent a source of contamination.

Waste Discharge Area

Soil borings WDA-SB101 to WDA-SB-103 were drilled at the locations considered most likely to represent potential 1,4-dioxane, RDX, and NDMA source areas in the WDA. Soil boring WDA-SB101 (Figure 5) was drilled in a former discharge basin adjacent to previous borings Pond4 and SB1/TT-MW2-21, which had the highest perchlorate concentrations previously detected in soil within the WDA. Soil boring WDA-SB102 (Figure 5) was drilled in a shallow depression adjacent to previous borings Pond3 and SB2/TT-MW2-22, which had the highest chlorinated solvent concentrations previously detected in soil within the WDA. Boring WDA-SB103 (Figure 5) was drilled adjacent to monitoring well TT-MW2-24/SB6, which has the highest concentrations of 1,4-dioxane and RDX detected in groundwater within the WDA. 1,4-Dioxane, RDX, and NDMA were not detected in any of the soil samples analyzed. Based on these results, it appears likely that a soil source for 1,4-dioxane, RDX, and NDMA, if present at the WDA, has attenuated over time to non-detectable concentrations in soils at depths of 10 feet bgs or less.

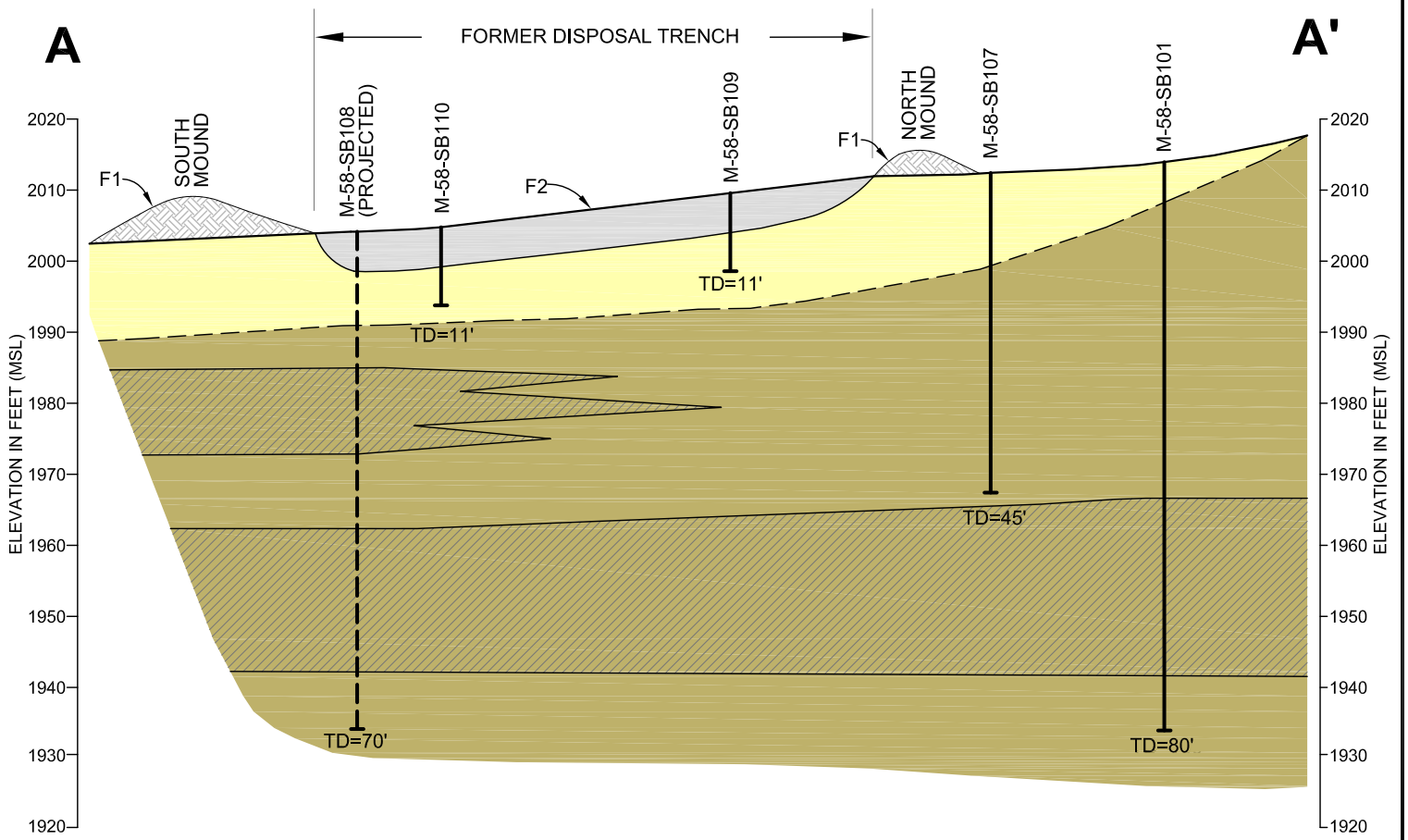
CONCLUSIONS AND RECOMMENDATIONS

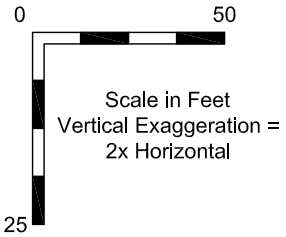
Conclusions

The conclusions of this investigation are as follows:

- A soil source for the RDX detected in monitoring well TT-MW2-13, if still present, is either of very limited extent or has attenuated over time to non-detectable concentrations in shallow soils.

X:\GIS\LOCKHEED 22289-090403\X-SECT A-A.DWG





LEGEND

Contact
(dashed where inferred)

TD = Total Depth
(in feet below ground surface)

M-58-SB103 — Soil Boring

ARTIFICIAL FILL

F1: Spoils from original trench excavation

F2: Backfill from 1993 remedial action

ALLUVIUM

Silty Sand

SAN TIMOTEO FORMATION

Sandstone

Mudstone

Beaumont Site 2

Figure 6

Cross Section A-A'

TETRA TECH

- There is no indication of hazardous materials releases related to the former disposal trench in Area M.
- Soil sources for 1,4-dioxane, RDX, and NDMA, if still present at the WDA, have attenuated over time to non-detectable concentrations in shallow soils.

Recommendations

Based on the conclusions summarized above, the following recommendations are made:

- No further investigation for RDX is recommended in the vicinity of monitoring well TT-MW2-13.
- No further investigation is recommended for the former disposal trench in Area M.
- No further investigation of 1,4-dioxane, RDX, or NDMA is recommended for soils in the WDA.
- The data collected during this investigation, in conjunction with previously collected data, is sufficient to estimate exposure point concentrations for the purposes of human health and ecological risk assessments.

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If you have any questions regarding this report, please call either of the undersigned at 909.381.1674.

Sincerely,

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Attachments: A – Work Plan and Related Correspondence
B – Boring Logs
C – Validated Analytical Results
D – Laboratory Report

cc: Gene Matsushita, LMC
John Eisenbeis, CDM
Mike Smith, CDM

ATTACHMENT A WORK PLAN AND RELATED CORRESPONDENCE

ATTACHMENT B BORING LOGS

ATTACHMENT C VALIDATED ANALYTICAL RESULTS

ATTACHMENT D LABORATORY REPORT

ATTACHMENT E: HISTORIC DELIVERABLES