Semiannual Groundwater Monitoring Report
Fourth Quarter 2012 and First Quarter 2013
Laborde Canyon (Lockheed Martin Beaumont Site 2)
Beaumont, California

Prepared for:

LOCKHEED MARTIN

Prepared by:

TETRA TECH
301 E. Vanderbilt, Suite 450
San Bernardino, California 92408
TC# 30079-B2GW.03/ May 2013

Lockheed Martin Enterprise Business 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

May 21, 2013

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

Subject: Submittal of the *Semiannual Groundwater Monitoring Report, Fourth Quarter 2012 and First Quarter 2013, Laborde Canyon (Lockheed Martin Beaumont Site 2), Beaumont, California*

Dear Mr. Zogaib:

Please find enclosed one hard copy of the body of the report and two compact disks with the report body and appendices of the *Semiannual Groundwater Monitoring Report, Fourth Quarter 2012 and First Quarter 2013, Laborde Canyon (Lockheed Martin Beaumont Site 2), Beaumont, California* for your review and approval or comment.

In the meantime, if you have any questions regarding this submittal, please contact me at 818-847-9901 or brian.thorne@lmco.com.

Sincerely,

Brian T. Thorne
Remediation Project Lead

Enclosure: *Semiannual Groundwater Monitoring Report, Fourth Quarter 2012 and First Quarter 2013, Laborde Canyon (Lockheed Martin Beaumont Site 2), Beaumont, California*

Copy: Gene Matsushita, LMC (electronic and hard copy)
Barbara Melcher, CDM Smith (electronic copy)
Tom Villeneuve, Tetra Tech (electronic copy)
Hans Kernkamp, Riverside County Waste Management (electronic copy)
Brian Beck, Western Riverside County Regional Conservation Authority (electronic copy)
Alan Bick, Gibson Dunn (electronic copy)

BUR108 Bmt 2 Q4 2012_Q1 2013 GWMR

Semiannual Groundwater Monitoring Report Fourth Quarter 2012 and First Quarter 2013 Laborde Canyon (Lockheed Martin Beaumont Site 2) Beaumont, California

Prepared for:

LOCKHEED MARTIN

Prepared by:

TETRA TECH

May 2013

Christopher Patrick
Environmental Scientist

Mark Feldman, CHG CEG
Project Manager

REGISTERED GEOLOGIST
MARK FELDMAN
No. HG 747
CERTIFIED
HYDROGEOLOGIST
Exp 1/31/15
STATE OF CALIFORNIA

TABLE OF CONTENTS

Section **Page**

LIST OF FIGURES

Page

LIST OF TABLES

APPENDICES

Appendix A - Recent Environmental Activities and Conceptual Site Model

Appendix B - Copies of the Field Data Sheets

Appendix C - Well Construction Table

Appendix D - Water Level Hydrographs and Precipitation Data

Appendix E - Summary of Calculated Horizontal and Vertical Groundwater Gradients

Appendix F - Validated Sample Results by Analytical Method

Appendix G - Laboratory Analytical Data Packages

Appendix H - Consolidated Data Summary Table

Appendix I - Chemicals of Potential Concern Time-Series Graphs

Acronyms

bgs	below ground surface
1,2-DCA	1,2-dichloroethane
1,1 -DCE	1,1-dichloroethene
DO	dissolved oxygen
DWNL	California Department of Public Health drinking water notification level
EC	electrical conductivity
f	This data validation qualifier means the duplicate relative percent difference was outside the control limit.
ft/ft	feet per foot
ft/day	feet per day
GMP	Groundwater Monitoring Program
GPS	global positioning system
HCP	Habitat Conservation Plan
J	This data validation qualifier means the analyte was positively identified, but the concentration is an estimated value.
LC	lower canyon
MW	monitoring well
MCL	California Department of Public Health maximum contaminant level
MEF	Mt. Eden formation
MS	matrix spike
MSD	matrix spike duplicate
msl	mean sea level

µg/L	micrograms per liter
NA	not applicable/not available
NTUs	nephelometric turbidity units
NWS	National Weather Service
ORP	oxidation/reduction potential
PQL	practical quantitation limit
q	This data validation qualifier means the analyte detected was below the PQL.
QAL	Quaternary alluvium
QA/QC	quality assurance/quality control
RDX	hexahydro-1,3,5-trinitro-1,3,5-triazine
RPD	relative percent difference
RWQCB	California Regional Water Quality Control Board
STF	San Timoteo formation
TCE	trichloroethene
U.S.	United States
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
VOC	volatile organic compound
WDA	waste discharge area
WS	former Wolfskill property
wMEF	weathered Mt. Eden formation
wSTF	weathered San Timoteo formation

Section 1 Introduction

On behalf of Lockheed Martin Corporation, Tetra Tech has prepared this Semiannual Groundwater Monitoring Report, which presents the results of the Fourth Quarter 2012 and First Quarter 2013 groundwater monitoring activities for the Laborde Canyon (Lockheed Martin Beaumont Site 2) Groundwater Monitoring Program. Laborde Canyon is located southwest of the City of Beaumont, Riverside County, California (Figure 1-1). Currently, the site is inactive with the exception of ongoing investigative activities performed under Consent Order HSA 88/89-034, amended January 1, 1991, with the California Department of Toxic Substances Control.

The objectives of this report are to accomplish the following:

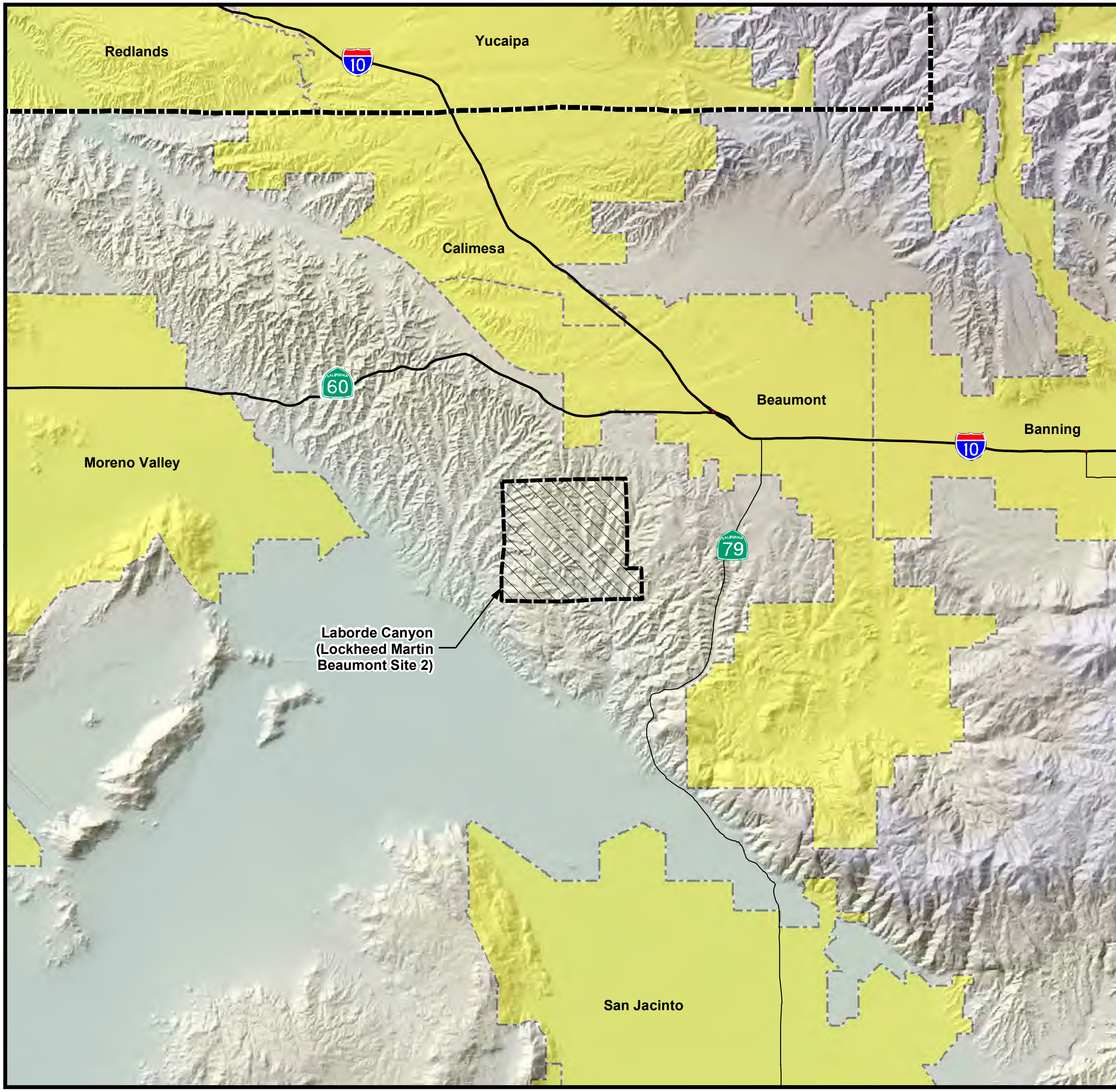
- Briefly summarize the site history
- Document the water quality monitoring procedures and results
- Analyze and evaluate the groundwater elevation and water quality monitoring data generated

This report is organized into the following sections: 1) Introduction, 2) Summary of Monitoring Activities, 3) Groundwater Monitoring Results, 4) Summary and Conclusions, and 5) References. Appendix A provides a brief description of the previous site environmental investigations and the current conceptual site model.

1.1 Site Background

The site is a 2,668-acre parcel southwest of Beaumont, California. The parcels that comprise the site were owned by individuals and the United States government before 1958. Between 1958 and 1960, portions of the site were purchased by the Grand Central Rocket Company and used as a remote test facility for early space and defense program efforts. In 1960, the Lockheed Aircraft Corporation purchased one-half interest in the Grand Central Rocket Company. The Grand Central Rocket Company became a wholly owned subsidiary of the Lockheed Aircraft Corporation in 1961. The remaining parcels of land that comprise the site were purchased from the United States government between 1961 and 1964. In 1963, the Lockheed Propulsion Company became an

P:\GIS\Lockheed S2 Q412Q113\Region.mxd



Adapted from:

U.S. Census Bureau TIGER line data, 2000.

LEGEND

- Interstate/Freeway
- State Highway
- County Boundary
- Laborde Canyon Property Boundary (Lockheed Martin Beaumont Site 2)
- City/Municipality

Laborde Canyon
(Lockheed Martin Beaumont Site 2)

Figure 1-1

Regional Location of Laborde Canyon

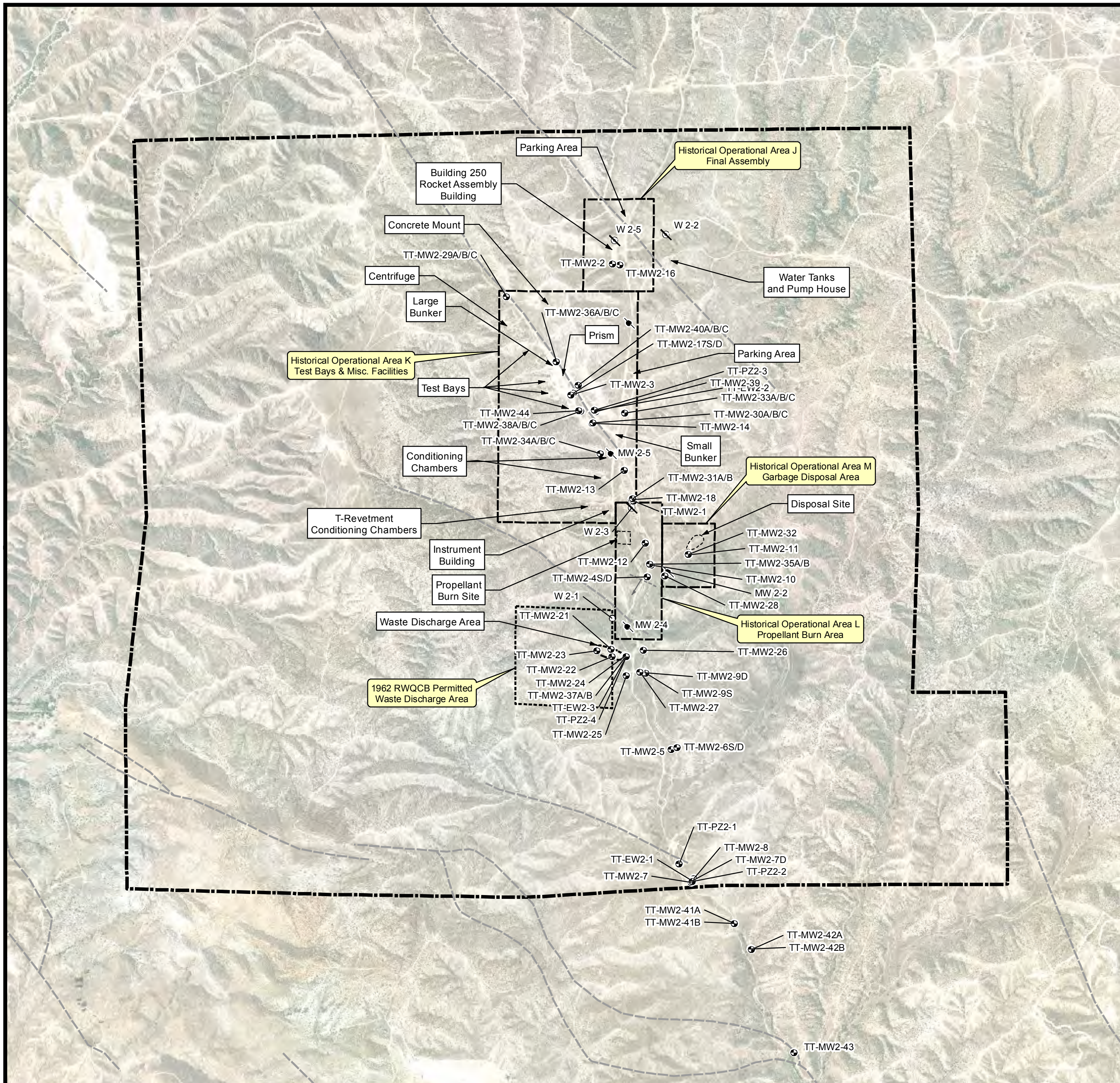
operating division of the Lockheed Aircraft Corporation and was responsible for the operation the site until its closure in 1974. The site was used by the Grand Central Rocket Company and the Lockheed Propulsion Company from 1958 to 1974 for small rocket motor assembly, testing operations, propellant incineration, and minor disposal activities. Ogden Labs is known to have leased portions of the site during the 1970s (Radian Corporation, 1986). In 2007 the property was sold to the County of Riverside, California, who remains the current owner.

In 1989, the California Department of Health Services issued a Consent Order requiring Lockheed Martin Corporation to clean up contamination at the site related to past testing activities (California Department of Health Services, 1989). After reviewing reports on investigative and cleanup activities performed at the site, the California Department of Toxic Substances Control, as a successor agency, issued a no further remedial action letter to Lockheed Martin Corporation in 1993.

Because of regulatory interest in perchlorate and 1,4-dioxane, a groundwater sample was collected from an inactive groundwater production well (identified as W2-3) at the site in January 2003. The sample was analyzed for volatile organic compounds, perchlorate, and 1,4-dioxane to determine the potential presence and concentration of those chemicals in groundwater. The analytical results indicated that volatile organic compounds and 1,4-dioxane were not present at or above their respective method detection limits. However, perchlorate was reported at a concentration of 4,080 micrograms per liter, which exceeded the then-current California Department of Public Health drinking water notification level of 4 micrograms per liter. In October 2007, the drinking water notification level was replaced by the California Department of Public Health maximum contaminant level of 6 micrograms per liter. Based on the detection of perchlorate in the groundwater sample collected, the California Department of Toxic Substances Control reopened the site for further assessment in August 2004.

Four primary historical operational areas have been identified at the site (Figure 1-2). Each operational area was used for various activities associated with rocket motor assembly, testing, and propellant incineration. In addition, a waste discharge area has been defined. A brief description of each area follows.

P:\GIS\Lockheed S2 Q412Q113\Op_Areas.mxd



0 1,000 2,000
Feet

Adapted from:

March 2007 aerial photograph.

Faults from the, *Site 2 Lineament Study, Tetra Tech, 2009.*

LEGEND

- Groundwater Monitoring Well Location
- Destroyed Production Well Location
- Destroyed Monitoring Well Location
- Reported Production Well Location
- Fault, Accurately Located Showing Dip
- Fault, Approximately Located
- Waste Discharge Area
- RWQCB Permitted Waste Discharge Area
- Historical Operational Area Boundary
- Laborde Canyon Property Boundary (Lockheed Martin Beaumont Site 2)

Note: Laborde Canyon property boundary (Lockheed Martin Beaumont Site 2) from Hillwig-Goodrow survey, May 2004.

Disposal and Propellent Burn Site perimeters are estimated (Radian, 1986).

Laborde Canyon
(Lockheed Martin Beaumont Site 2)

Figure 1-2
Historical Operational Areas and Site Features

Historical Operational Area J (Area J) –Final Assembly

Rocket motor casings with solid propellant were transported to Building 250, where final assembly of the rocket hardware was conducted. The building was used from 1970 to 1974 for final assembly and shipment of short-range attack missile rocket motors. Rocket motor assembly operations included installation of the nozzle and headcap, pressure check of the motor, installation of electrical systems, and preparations for shipment. During plant closure in 1974, all usable parts of this facility were dismantled, taken off the site, and sold (Radian Corporation, 1986).

Historical Operational Area K (Area K) – Test Bays and Miscellaneous Facilities

The primary features included a large earthen structure known as the "Prism," conditioning chambers, a centrifuge, and four test bays with two associated bunkers.

The Prism was reportedly built between 1984 and 1990, and was used by General Dynamics to test radar (Tetra Tech, 2007b). Details concerning construction of the Prism are not available, but it appears to have been constructed with soils from near the test bays.

The conditioning chambers were used to examine the effects of extreme temperatures on rocket motors and to meet specification requirements (Radian Corporation, 1986). A centrifuge was located in the northwestern portion of Area K, where rocket motors were tested to determine if the solid propellant would separate from its casing under increased gravitational forces.

Four test bays were present at the site. Initially, only three test bays were known; however, a former employee reported in an interview that a fourth test bay, north of the other three bays, was also used in Area K (Tetra Tech, 2009b). The initial testing activities had a history of explosions that destroyed complete test areas, especially during the period when the Grand Central Rocket Company operated at the site (Radian Corporation, 1986). Although vestiges from three test bays are currently visible at the site, the fourth was reportedly destroyed by such an explosion during testing. After a motor failure occurred, the area surrounding the test bay was reportedly inspected to recover any unburned propellant.

Historical Operational Area L (Area L) – Propellant Burn Area

Solid propellant was reportedly transported to the burn area and set directly on the ground surface for burning (Radian Corporation, 1986). No pits or trenches were dug as part of the burning process according to the Radian report. No evidence or physical features identify the precise location of burning activities, and previous site investigations (Tetra Tech, 2005 and 2010a) found no evidence of significant contamination in Area L, suggesting that propellant incineration may not have been conducted in this area of the site.

Historical Operational Area M (Area M) – Garbage Disposal Area

A garbage disposal area was located adjacent to a small creek at the site (Radian Corporation, 1986). Scrap metal, paper, wood, and concrete materials were discarded at the disposal site by the Lockheed Propulsion Company. Hazardous materials, including explosives and propellants, were never disposed of at the disposal site by the Lockheed Propulsion Company, according to employee interviews. However, Ogden Labs, a company that tested valves and explosive items, reportedly used this site for disposal of hazardous waste. In 1972, a Lockheed Safety Technician was exposed to toxic vapors of unsymmetrical dimethyl hydrazine from a pressurized gas container located in the disposal site. To avoid possible exposure risks to occupants, the Lockheed Propulsion Company safety group required Ogden Labs to take measures to remove any potentially hazardous materials at the disposal site. Shortly thereafter, a disposal company was contracted by Ogden Labs to clean up the disposal site (Radian Corporation, 1986).

Waste Discharge Area

In 2007, Lockheed Martin Corporation discovered the existence of Santa Ana River Basin Regional Water Pollution Control Board Resolution 62-24, dated September 14, 1962. Resolution 62-24 prescribed requirements for the "discharge of industrial wastes (rocket fuel residuum) to excavated pits." The discharge area was described as two shallow basins protected by two-foot berms, located in a small canyon on the western side of Laborde Canyon, in the SW quarter of the NW quarter of Section 19, Township 3 South, Range 1 West, San Bernardino Baseline and Meridian. Resolution 62-24 further described the wastes to be discharged as "residue remaining after the manufacturing refuse is burned," and indicated that the amount of material to be discharged was "approximately 5,000 gallons per year."

The exact nature of the waste proposed for discharge is not clear from Resolution 62-24. The description of the waste material suggests that the area may have been used for burning propellant; but the description of the quantity of material to be discharged suggests that the waste may have been liquid rather than solid. A 1961 aerial photograph shows the waste discharge area as a large cleared area with roads leading to two circular structures, suggesting that the waste discharge area was in use by 1961 (Tetra Tech, 2009b). Investigation of this area (Tetra Tech, 2007b and 2008) found evidence for perchlorate impacts in both soil and groundwater.

Features remaining at the waste discharge area include two roughly circular depressions surrounded by earthen berms, at the location of the circular structures identified in the 1961 aerial photograph.

Section 2 Summary of Monitoring Activities

Section 2 summarizes the Fourth Quarter 2012 and First Quarter 2013 groundwater monitoring activities conducted at the site. The results of these monitoring events are discussed in Section 3.

2.1 Groundwater Level Measurements

Groundwater level measurements are collected at the site on a quarterly basis from all available wells. Water level measurements were proposed for 72 wells and four piezometers for Fourth Quarter 2012 and First Quarter 2013. During Fourth Quarter 2012, groundwater level measurements were collected from 71 monitoring wells and four piezometers on 3 December 2012. During First Quarter 2013, groundwater level measurements were collected from 70 monitoring wells and four piezometers between 26 February 2013 and 27 February 2013. One monitoring well, TT-MW2-43, was found to be dry during Fourth Quarter 2012 and two wells, TT-MW2-29A and TT-MW2-43, were found to be dry during First Quarter 2013. Copies of the field data sheets from the water quality monitoring events are presented in Appendix B. A summary of well construction details is presented in Appendix C.

Precipitation data are collected from the local weather station in Beaumont to correlate observed changes in groundwater levels with local precipitation. During Fourth Quarter 2012, the Beaumont National Weather Service (NWS) station reported approximately 3.66 inches of precipitation. During First Quarter 2013, the Beaumont NWS station reported approximately 3.71 inches of precipitation.

2.2 Surface Water Flow and Sampling

The site is bisected by Laborde Canyon, a major north-south oriented canyon that represents the principal drainage for the site. Ephemeral storm-water drains to the south through Laborde Canyon toward the San Jacinto Valley. The 2,821-acre watershed for the site is dry when there is no rainfall. Consequently, no permanent streams, creeks, or other major surface water bodies, other than a spring on the former Wolfskill property, occur at the site.

Storm-water sampling locations SW-01 through SW-07 are located in ephemeral stream beds in Laborde Canyon and major side canyons. Storm-water runoff drains to the stream beds during periods of heavy precipitation and flows south through the site and the former Wolfskill property, eventually crossing beneath Gilman Hot Springs Road. Water is present in the stream beds only during periods of heavy, prolonged precipitation. Surface water sampling locations WS-1, WS-2, and WS-3 are located at a spring approximately three-quarters of a mile south of the southern site boundary on the former Wolfskill property. Surface water is generally present at one or more of these sampling locations throughout the year. Figure 2-1 shows the surface and storm-water sampling locations.

The areas in Laborde Canyon where surface water was observed were mapped during the Fourth Quarter 2012 and First Quarter 2013 groundwater monitoring events. If surface water were present, the locations where surface water was encountered would have been plotted and a determination made whether the water was flowing or stagnant.

If flowing water were present, the stream flow was estimated at two locations (SF-1, located at Gilman Hot Springs Road; and SF-2, located at the southern boundary of the property) using a modified version of the method presented in the *USEPA Volunteer Stream Monitoring: A Methods Manual* (USEPA, 1997).

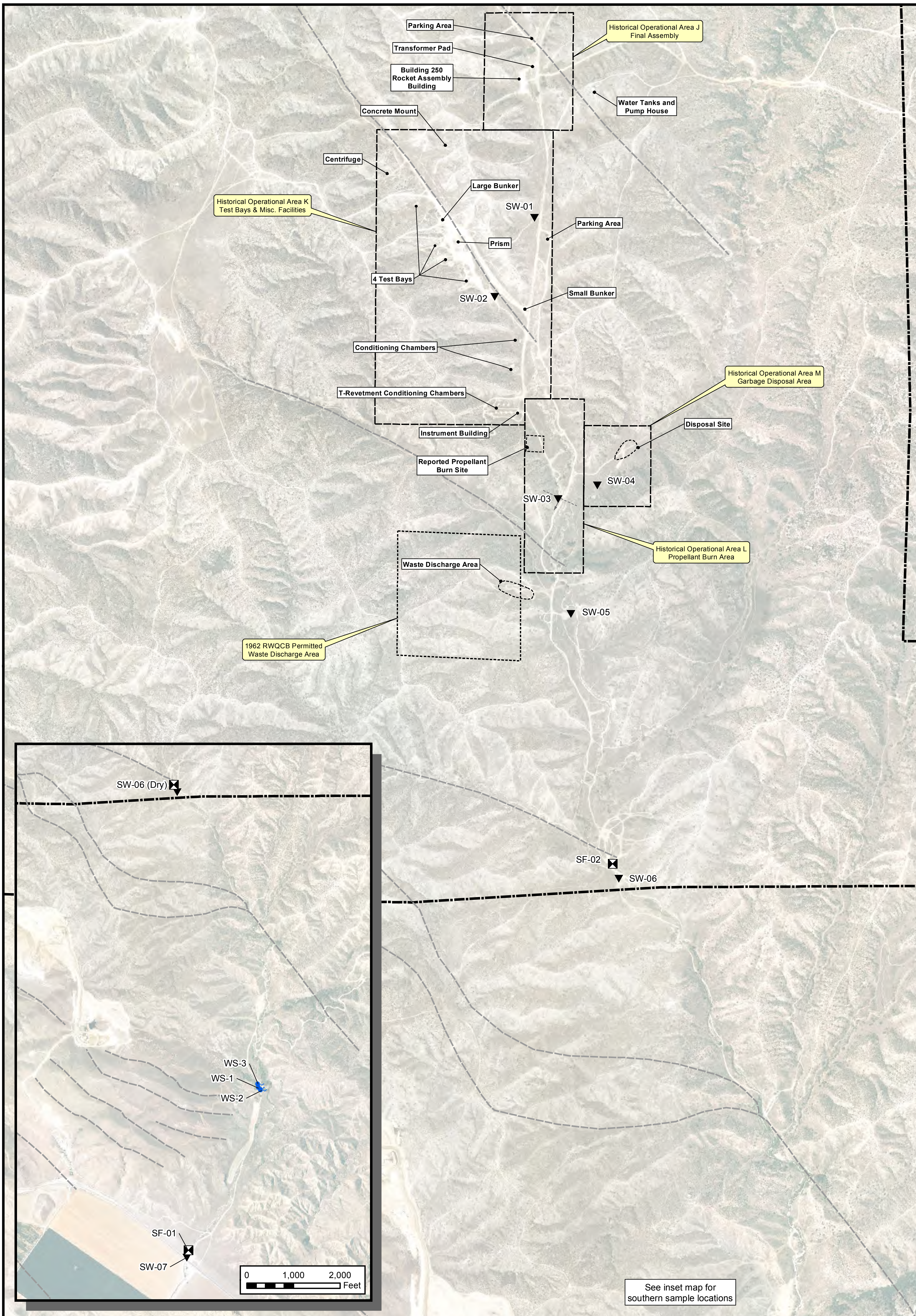
At each location, a section of the stream bed that is relatively straight for a distance of at least 20 feet would have been chosen for measurement. This 20-foot section would have been marked and width measurements taken at various points to determine the average width. Depth measurements would have been collected at five points along the width of the stream to determine the average depth of the stream. The average width and average depth measurements would then be multiplied together to estimate the channel cross-sectional area. Velocity would have been measured by releasing a float upstream and recording the time it took to traverse the 20-foot marked section.

At each section, three timed measurements would have been taken and averaged. The length of the measured section would be divided by the average time to obtain a velocity. This result would then be multiplied by a correction factor of 0.9 to account for friction between the water and stream bed. The average cross-sectional area would then have been multiplied by the corrected average surface velocity to obtain the average flow in cubic feet of water per second through that section of the stream. The two stream flow measurement locations are shown on Figure 2-1.

2.3 Groundwater Sampling

The Groundwater Monitoring Program (GMP) has a quarterly, semiannual, and annual frequency as shown in Appendix A, Table 1-1. Both groundwater and surface water are sampled as part of

P:\GIS\Lockheed S2 Q412Q113Surf_Storm_Water.mxd



LEGEND

- ▼ Surface Water Sampling Location
- Spring Sampling Location
- Stream Flow Sampling Point
- Fault, Accurately Located Showing Dip
- Fault, Approximately Located
- RWQCB Permitted Waste Discharge Area
- Historical Operational Area Boundary
- Laborde Canyon Property Boundary (Lockheed Martin Beaumont Site 2)

0 500 1,000 Feet

Adapted from: April 2007 aerial photograph

Note: Laborde Canyon property boundary (Lockheed Martin Beaumont Site 2) from Hillwig-Goodrow survey, May 2004

Faults from the, *Site 2 Lineament Study, Tetra Tech, 2009*

Laborde Canyon
(Lockheed Martin Beaumont Site 2)

Figure 2-1

Surface and Storm-Water Sampling Locations

the GMP. The annual event is the major monitoring event, and the quarterly and semiannual events are smaller, minor events. All new wells are sampled quarterly for one year, after which they are evaluated and reclassified. The semiannual event includes horizontal extent, vertical distribution, increasing contaminant, and guard wells, and occurs during the second and fourth quarters of each year. The annual monitoring event also includes background wells, and takes place during the second quarter of each year. The groundwater monitoring schedule is reviewed and modified as necessary annually following the second quarter groundwater monitoring event. Modifications to the sampling schedule are made in accordance with the approved Groundwater *Sampling and Analysis Plan* (Tetra Tech, 2007a). The Fourth Quarter 2012 and First Quarter 2013 sampling events followed the monitoring schedule proposed in the Second and Third Quarter 2011 monitoring report (Tetra Tech, 2011), which was submitted to the California Department of Toxic Substances Control in December 2011, and was approved with no comments to the proposed schedule.

2.4 Proposed and Actual Surface Water and Well Locations Sampled

During the Fourth Quarter 2012 monitoring event, 51 sampling locations (48 groundwater monitoring wells and three surface water sampling locations) were proposed for water quality monitoring. One surface water location, WS-2, was dry and could not be sampled. Therefore, water quality data were collected from 48 monitoring wells and two surface water sampling locations during this event. Table 2-1 lists the locations monitored for the Fourth Quarter 2012 monitoring event, analytical methods, sampling dates, and quality assurance/quality control (QA/QC) samples collected. Figure 2-2 illustrates the sampling locations for the Fourth Quarter 2012 monitoring event.

During the First Quarter 2013 monitoring event, storm water samples were scheduled to be collected from seven locations. Due to the limited precipitation and short duration of this rain event, six of the locations, SW-01 through SW-06, were dry and could not be sampled. No other water quality samples were scheduled to be collected during the First Quarter 2013 monitoring event. Table 2-2 lists the locations monitored for the First Quarter 2013 monitoring event, analytical methods, and sampling dates. Figure 2-3 illustrates the sampling locations for the First Quarter 2013 monitoring event.

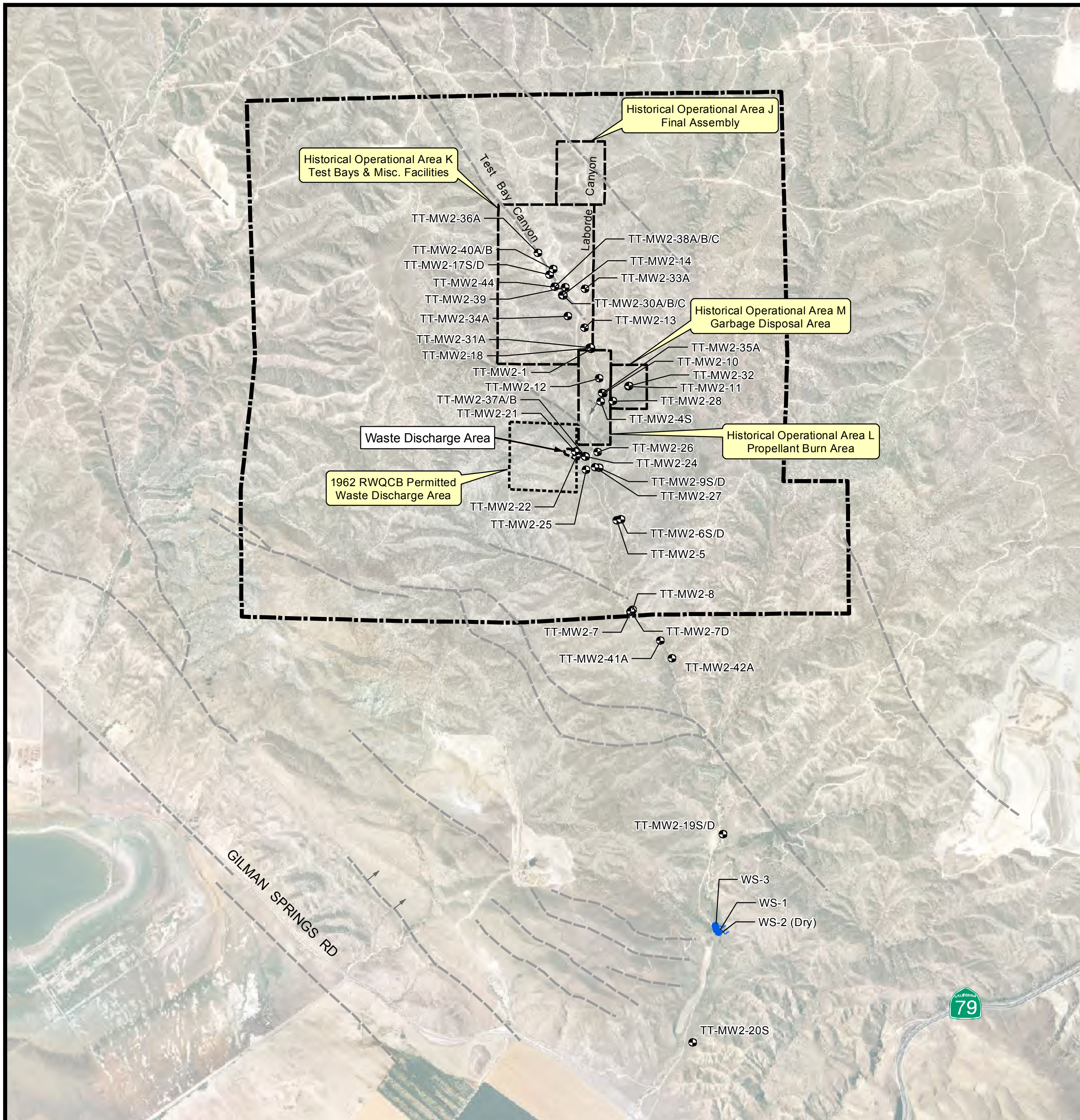
Table 2-1 Sampling Schedule and Analysis Method - Fourth Quarter 2012

Monitoring Well or Surface Water Location	Sample Date	VOCs (1)	1,4-dioxane (2)	Perchlorate (3)	Comments and QA /QC Samples
WS-1	12/6/2012	-	-	X	Spring Sample, MS/MSD
WS-2	NA	-	-	-	Spring Sample, Dry
WS-3	12/6/2012	-	-	X	Spring Sample
TT-MW2-1	12/10/2012	-	-	X	Sample with Dedicated Pump
TT-MW2-4S	12/4/2012	-	-	X	Sample with Dedicated Pump
TT-MW2-5	12/10/2012	-	X	X	Sample with Dedicated Pump
TT-MW2-6S	12/7/2012	-	X	X	Sample with Dedicated Pump
TT-MW2-6D	12/7/2012	-	-	X	Sample with Dedicated Pump
TT-MW2-7	12/6/2012	-	X	X	Sample with Dedicated Pump, Duplicate - TT-MW2-7-Dup
TT-MW2-7D	12/6/2012	-	-	X	Sample with Dedicated Pump, MS/MSD
TT-MW2-8	12/6/2012	-	X	X	Sample with Dedicated Pump, Duplicate - TT-MW2-8-Dup
TT-MW2-9S	12/10/2012	X	X	X	Sample with Dedicated Pump
TT-MW2-9D	12/5/2012	-	-	X	Sample with Dedicated Pump
TT-MW2-10	12/4/2012	-	-	X	Sample with Dedicated Pump
TT-MW2-11	12/5/2012	-	-	X	Sample with Dedicated Pump
TT-MW2-12	12/5/2012	-	-	X	Sample with Dedicated Pump
TT-MW2-13	12/10/2012	-	-	X	Sample with Dedicated Pump
TT-MW2-14	12/11/2012	-	-	X	Sample with Dedicated Pump
TT-MW2-17S	12/11/2012	-	-	X	Sample with Dedicated Pump
TT-MW2-17D	12/10/2012	-	-	X	Sample with Dedicated Pump
TT-MW2-18	12/10/2012	-	-	X	Sample with Dedicated Pump
TT-MW-19S	12/6/2012	-	-	X	Sample with Dedicated Pump
TT-MW-19D	12/6/2012	-	-	X	Sample with Dedicated Pump
TT-MW-20S	12/6/2012	-	-	X	Sample with Dedicated Pump
TT-MW2-21	12/5/2012	X	-	X	Sample with Dedicated Pump, Duplicate - TT-MW2-21-Dup
TT-MW2-22	12/7/2012	X	X	X	Sample with Dedicated Pump, MS/MSD
TT-MW2-24	12/10/2012	X	X	X	Sample with Dedicated Pump
TT-MW2-25	12/5/2012	-	-	X	Sample with Dedicated Pump
TT-MW2-26	12/5/2012	-	-	X	Sample with Dedicated Pump
TT-MW2-27	12/7/2012	-	-	X	Sample with Dedicated Pump
TT-MW2-28	12/5/2012	-	-	X	Sample with Dedicated Pump
TT-MW2-30A	12/11/2012	-	-	X	Sample with Dedicated Pump
TT-MW2-30B	12/11/2012	-	-	X	Sample with Dedicated Pump
TT-MW2-30C	12/4/2012	-	-	X	Sample with Dedicated Pump
TT-MW2-31A	12/4/2012	-	-	X	Sample with Dedicated Pump
TT-MW2-32	12/5/2012	-	-	X	Sample with Dedicated Pump
TT-MW2-33A	12/4/2012	-	-	X	Sample with Dedicated Pump
TT-MW2-34A	12/4/2012	-	-	X	Sample with Dedicated Pump
TT-MW2-35A	12/5/2012	-	-	X	Sample with Dedicated Pump
TT-MW2-36A	12/4/2012	-	-	X	Sample with Dedicated Pump
TT-MW2-37A	12/10/2012	X	X	X	Sample with Dedicated Pump
TT-MW2-37B	12/7/2012	-	-	X	Sample with Dedicated Pump
TT-MW2-38A	12/11/2012	-	-	X	Sample with Dedicated Pump
TT-MW2-38B	12/11/2012	-	-	X	Sample with Dedicated Pump
TT-MW2-38C	12/11/2012	-	-	X	Sample with Dedicated Pump
TT-MW2-39	12/11/2012	-	-	X	Sample with Dedicated Pump
TT-MW2-40A	12/4/2012	-	-	X	Sample with Dedicated Pump
TT-MW2-40B	12/4/2012	-	-	X	Sample with Dedicated Pump
TT-MW2-41A	12/6/2012	-	-	X	Sample with Dedicated Pump
TT-MW2-42A	12/6/2012	-	-	X	Sample with Portable Pump
TT-MW2-44	12/4/2012	-	-	X	Sample with Dedicated Pump, Duplicate - TT-MW2-44-Dup
	Total Sample Locations:	51			
	Total Samples Collected:	50			

Notes:

(shaded)	Well not sampled or surface water sample not collected
"-"	Not analyzed
EPA -	United States Environmental Protection Agency
QA/QC -	Quality assurance / quality control
MS / MSD -	Matrix spike / matrix spike duplicate
NA -	Not available
VOCs -	Volatile organic compounds
(1) -	Volatile organic compounds (VOCs) analyzed by EPA Method SW8260B
(2) -	1,4 - Dioxane analyzed by EPA Method SW8270C SIM
(3) -	Perchlorate analyzed by EPA Method E332.0

P:\GIS\Lockheed S2 Q412Q113\Samp_Points Q412.mxd



N

0 1,500 3,000 Feet

Adapted from:

April 2007 aerial photograph.

Faults from the, *Site 2 Lineament Study, Tetra Tech, 2009.*

LEGEND

- Groundwater Monitoring Well
- Spring
- Fault, Accurately Located Showing Dip
- Fault, Approximately Located
- 1962 RWQCB Permitted Waste Discharge Area
- Historical Operational Area Boundary
- Laborde Canyon Property Boundary (Lockheed Martin Beaumont Site 2)

Note: Beaumont Site 2 property boundary from Hillwig-Goodrow survey, May 2004.

Laborde Canyon
(Lockheed Martin Beaumont Site 2)

Figure 2-2

**Sampling Locations-
Fourth Quarter 2012**

Table 2-2 Sampling Schedule and Analysis Method - First Quarter 2013

Storm-Water Sample Location	Sample Date	Perchlorate (1)	Comments and QA /QC Samples
SW-01	NA	-	Dry - no sample collected
SW-02	NA	-	Dry - no sample collected
SW-03	NA	-	Dry - no sample collected
SW-04	NA	-	Dry - no sample collected
SW-05	NA	-	Dry - no sample collected
SW-06	NA	-	Dry - no sample collected
SW-07	03/08/13	X	
	Total Sample Locations:	7	
	Total Samples Collected:	1	

Notes:

(shaded)	Well not sampled or surface water sample not collected
"-"	Not analyzed
EPA -	United States Environmental Protection Agency.
QA/QC -	Quality assurance / quality control
NA -	Not available
(1) -	Perchlorate analyzed by EPA Method E332.0

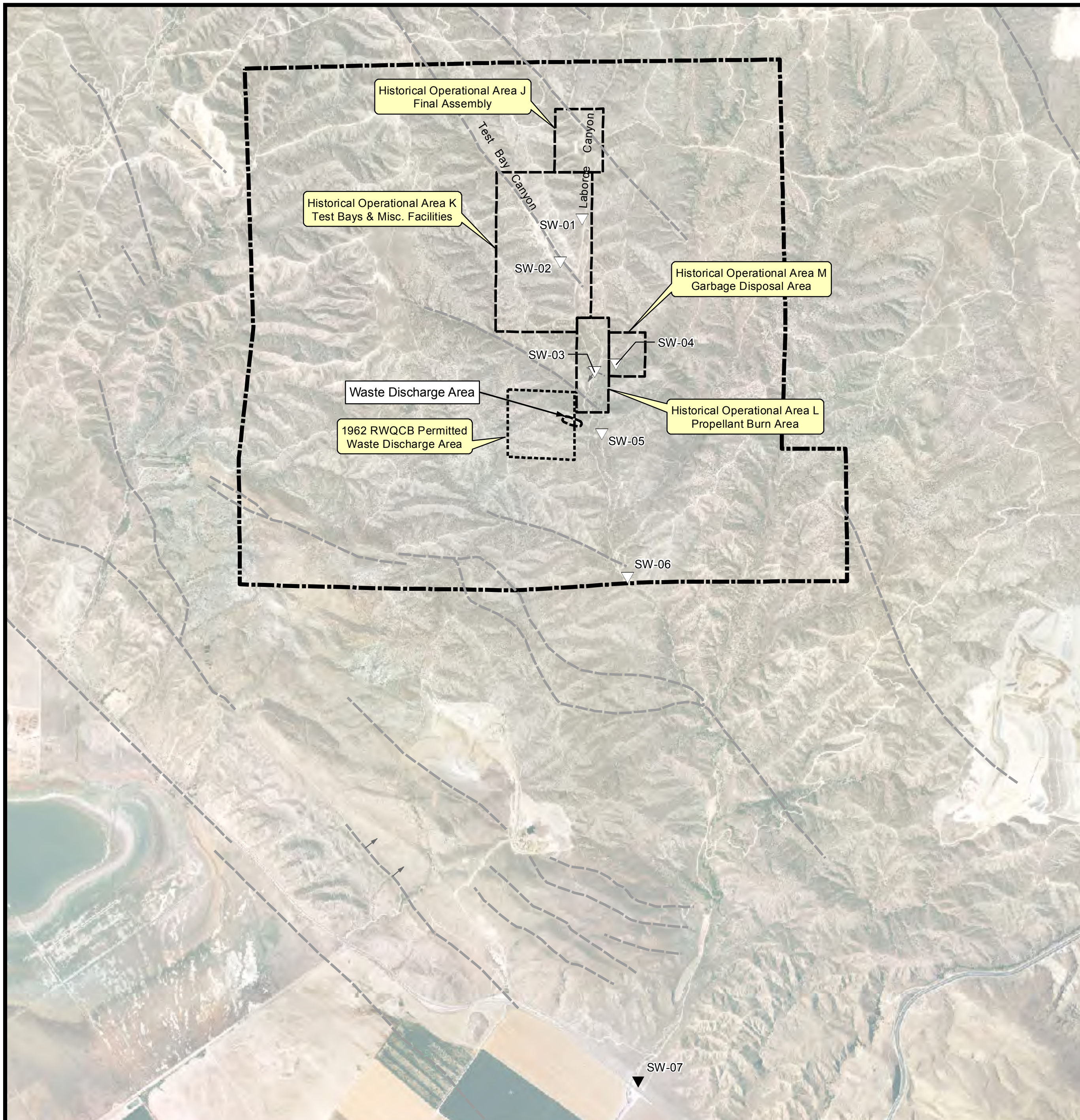
2.5 Field Sampling Procedures

The following water quality field parameters were measured and recorded on field data sheets (Appendix B) during well purging: water level, temperature, pH, electrical conductivity (EC), turbidity, oxidation-reduction potential (ORP), and dissolved oxygen (DO). Groundwater samples were collected from monitoring wells by low-flow purging and sampling through dedicated double-valve pumps, a portable bladder pump, or a peristaltic pump.

Collection of water quality parameters started when at least one discharge hose/pump volume had been removed, and purging was considered complete when the above parameters had stabilized, or the well was purged dry (evacuated). Stabilization of water quality parameters was used as an indication that representative formation water had entered the well and was being purged. The criteria for stabilization of these parameters are as follows: water level ± 0.1 foot, pH ± 0.1, EC ± three percent, turbidity < 10 nephelometric turbidity units (NTUs) (if > 10 NTUs ± 10%), DO ± 0.3 milligrams per liter, and ORP ± 10 millivolts. Sampling instruments and equipment were maintained, calibrated, and operated in accordance with the manufacturers' specifications, guidelines, and recommendations. If a well was purged dry, the well was sampled with a disposable bailer after sufficient recharge had taken place to allow sample collection.

Groundwater samples were collected in order of decreasing volatilization potential and placed in appropriate containers. A sample identification label was affixed to each container, and sample

P:\GIS\Lockheed S2 Q412Q113\Samp_Points Q113.mxd



Adapted from:

April 2007 aerial photograph.

Faults from the, *Site 2 Lineament Study, Tetra Tech, 2009.*

LEGEND

Surface Water Sampling Location

- ▼ Sampled
- ▽ Not Sampled (Dry)
- Fault, Accurately Located Showing Dip
- Fault, Approximately Located
- 1962 RWQCB Permitted Waste Discharge Area
- Historical Operational Area Boundary
- Laborde Canyon Property Boundary (Lockheed Martin Beaumont Site 2)

Note: Beaumont Site 2 property boundary from Hillwig-Goodrow survey, May 2004.

Laborde Canyon
(Lockheed Martin Beaumont Site 2)

Figure 2-3

Sampling Locations- First Quarter 2013

custody was maintained by chain-of-custody record. Samples collected were chilled and transported to E.S. Babcock & Sons, a state-accredited analytical laboratory, via courier, thus maintaining proper temperatures and sample integrity. Trip blanks were collected for the monitoring events to assess cross-contamination potential of water samples while in transit. Equipment blanks were collected when sampling with non-dedicated equipment to assess cross-contamination potential of water samples via sampling equipment.

Surface water sampling locations were previously located using a global positioning system (GPS) and had been marked in the field. Surface water samples were collected at these GPS-mapped locations either by using a disposable bailer with the sample transferred to the laboratory-supplied water sample containers, or by collecting the water sample directly in the laboratory-supplied water sample containers. Temperature, pH, EC, turbidity, ORP, and DO were measured and recorded on field data sheets at surface water sampling locations.

2.6 Analytical Data QA/QC

The samples were tested using approved USEPA methods. Since the analytical data were obtained by following USEPA-approved method criteria, the data were evaluated by using the USEPA-approved validation methods described in the National Functional Guidelines (USEPA, 2008 and 2010). The National Functional Guidelines contain instructions on method-required quality control parameters and on how to interpret these parameters to confer validation to environmental data results.

Quality control parameters used in validating data results included holding times, field blanks, laboratory control samples, method blanks, duplicate environmental samples, spiked samples, and surrogate and spike recovery data.

2.7 Habitat Conservation

All monitoring activities were performed in accordance with the United States Fish and Wildlife Service (USFWS) approved Habitat Conservation Plan (HCP) (USFWS, 2005) and subsequent clarifications (Lockheed Martin Corporation, 2006a and 2006b) to the HCP. Groundwater sampling activities were conducted with light duty vehicles and were supervised by a USFWS-approved biologist as specified in the Low Effect HCP.

Section 3 Groundwater Monitoring Results

The results of Fourth Quarter 2012 and First Quarter 2013 groundwater monitoring events are presented in the following subsections. These subsections include tabulated summaries of the groundwater elevation and water quality data, groundwater elevation maps, and figures showing analytical results.

3.1 Groundwater Elevation and Flow

Groundwater elevations during the Fourth Quarter 2012 and First Quarter 2013 monitoring events ranged from approximately 2,074 feet above mean sea level (msl) at TT-MW2-16, located in the northern portion of the site, to about 1,818 feet above msl at TT-MW2-8, located in the southern portion of the site. Seventy-two monitoring wells and four piezometers were identified for groundwater level measurements during the Fourth Quarter 2012 and First Quarter 2013 monitoring events. For these monitoring events, one well, MW-43, was dry during both quarters, and a second well, TT-MW2-29A, had 0.24 feet of water in the fourth quarter and was dry in the first quarter. Historically TT-MW2-29A has been dry so the small amount of water measured during the fourth quarter may be attributed to condensation within the well. Before First Quarter 2013, vandalism to monitoring wells TT-MW2-40A, TT-MW2-40B, and TT-MW2-40C resulted in a change in the top of casing elevation. The water level elevation data reflects this change.

Depth to first groundwater ranged from about 121 feet below ground surface (bgs) at TT-MW2-29B to about 19 feet bgs at TT-MW2-8. A tabulated summary of groundwater depths and elevations is presented in Table 3-1. Groundwater elevation contour maps for wells screened in first groundwater for the Fourth Quarter 2012 and First Quarter 2013 are presented in Figures 3-1 and 3-2 respectively. Hydrographs for individual wells are provided in Appendix D.

During Fourth Quarter 2012, the Beaumont National Weather Service (NWS) station reported approximately 3.66 inches of precipitation, and the average site-wide groundwater elevation increased approximately 0.31 foot. During First Quarter 2013, the Beaumont NWS station reported approximately 3.71 inches of precipitation and the average site-wide groundwater elevation decreased approximately 0.05 feet. Table 3-2 presents the range and average change in

Table 3-1 Groundwater Elevation Data - Fourth Quarter 2012 and First Quarter 2013

Well ID	Measuring Point Elevation (feet msl)	Fourth Quarter 2012 Date Measured	Fourth Quarter 2012 Depth to Water (from Measuring Point, feet)	Fourth Quarter 2012 Groundwater Elevation (feet msl)	Fourth Quarter 2012 Groundwater Elevation Change from Third Quarter 2012 (feet)	First Quarter 2013 Date Measured	First Quarter 2013 Depth to Water (from Measuring Point, feet)	First Quarter 2013 Groundwater Elevation (feet msl)	First Quarter 2013 Groundwater Elevation Change from Fourth Quarter 2012 (feet)
TT-EW2-1	1840.24	12/03/12	22.96	1817.28	-0.11	2/27/2013	22.61	1817.63	-0.35
TT-EW2-2	2079.12	12/03/12	60.05	2019.07	0.56	2/26/2013	60.20	2018.92	0.15
TT-EW2-3	1962.82	12/03/12	53.25	1909.57	0.12	2/27/2013	53.29	1909.53	0.04
TT-MW2-1	2035.21	12/03/12	59.28	1975.93	0.44	2/26/2013	59.56	1975.65	0.28
TT-MW2-2	2137.75	12/03/12	71.18	2066.57	0.18	2/26/2013	71.19	2066.56	0.01
TT-MW2-3	2094.66	12/03/12	70.35	2024.31	0.41	2/26/2013	70.40	2024.26	0.05
TT-MW2-4S	1986.94	12/03/12	51.11	1935.83	0.22	2/27/2013	51.03	1935.91	-0.08
TT-MW2-4D	1987.17	12/03/12	59.04	1928.13	0.25	2/27/2013	58.89	1928.28	-0.15
TT-MW2-5	1911.31	12/03/12	40.83	1870.48	0.19	2/27/2013	40.91	1870.40	0.08
TT-MW2-6S	1908.00	12/03/12	37.49	1870.51	0.19	2/27/2013	37.61	1870.39	0.12
TT-MW2-6D	1908.07	12/03/12	38.45	1869.62	0.21	2/27/2013	38.57	1869.50	0.12
TT-MW2-7	1839.25	12/03/12	22.74	1816.51	0.42	2/27/2013	22.40	1816.85	-0.34
TT-MW2-7D	1838.96	12/03/12	19.88	1819.08	0.34	2/27/2013	19.46	1819.50	-0.42
TT-MW2-8	1836.32	12/03/12	18.79	1817.53	-0.02	2/27/2013	18.45	1817.87	-0.34
TT-MW2-9S	1938.38	12/03/12	41.27	1897.11	0.62	2/27/2013	41.59	1896.79	0.32
TT-MW2-9D	1938.78	12/03/12	44.65	1894.13	0.38	2/27/2013	44.86	1893.92	0.21
TT-MW2-10	2001.57	12/03/12	58.10	1943.47	0.10	2/26/2013	57.97	1943.60	-0.13
TT-MW2-11	2004.51	12/03/12	49.54	1954.97	-0.19	2/26/2013	49.28	1955.23	-0.26
TT-MW2-12	2016.26	12/03/12	51.64	1964.62	0.05	2/26/2013	51.65	1964.61	0.01
TT-MW2-13	2049.39	12/03/12	66.55	1982.84	0.26	2/26/2013	66.65	1982.74	0.10
TT-MW2-14	2074.78	12/03/12	66.21	2008.57	0.54	2/26/2013	66.40	2008.38	0.19
TT-MW2-16	2137.20	12/03/12	63.23	2073.97	0.62	2/26/2013	63.31	2073.89	0.08
TT-MW2-17S	2095.55	12/03/12	71.21	2024.34	0.30	2/26/2013	71.21	2024.34	0.00
TT-MW2-17D	2095.33	12/03/12	71.33	2024.00	0.40	2/26/2013	71.40	2023.93	0.07
TT-MW2-18	2035.32	12/03/12	59.15	1976.17	0.41	2/26/2013	59.41	1975.91	0.26
TT-MW2-19S	1698.18	12/03/12	45.71	1652.47	0.45	2/27/2013	45.44	1652.74	-0.27
TT-MW2-19D	1698.15	12/03/12	25.68	1672.47	0.42	2/27/2013	25.82	1672.33	0.14
TT-MW2-20S	1587.10	12/03/12	35.87	1551.23	0.83	2/27/2013	36.34	1550.76	0.47
TT-MW2-20D	1587.62	12/03/12	35.10	1552.52	0.83	2/27/2013	35.57	1552.05	0.47
TT-MW2-21	1978.45	12/03/12	66.95	1911.50	0.19	2/27/2013	67.03	1911.42	0.08
TT-MW2-22	1975.86	12/03/12	65.68	1910.18	0.10	2/27/2013	65.80	1910.06	0.12
TT-MW2-23	1995.17	12/03/12	83.62	1911.55	0.22	2/27/2013	83.69	1911.48	0.07
TT-MW2-24	1964.26	12/03/12	54.41	1909.85	0.09	2/27/2013	54.48	1909.78	0.07
TT-MW2-25	1966.96	12/03/12	64.45	1902.51	0.14	2/27/2013	64.58	1902.38	0.13
TT-MW2-26	1944.43	12/03/12	41.31	1903.12	1.43	2/27/2013	41.39	1903.04	0.08
TT-MW2-27	1948.27	12/03/12	52.15	1896.12	0.46	2/27/2013	52.37	1895.90	0.22
TT-MW2-28	1995.65	12/03/12	63.69	1931.96	0.41	2/26/2013	63.07	1932.58	-0.62
TT-MW2-29A	2147.77	12/03/12	107.68	2040.09	NA	2/26/2013	Dry	Dry	NA

Notes:
NA - Not applicable; msl - Mean sea level; #.## - Denotes an increase in groundwater elevation; - #.## - Denotes a decrease in groundwater elevation
First Quarter 2013 water level elevations for TT-MW2-40A, TT-MW2-40B, and TT-MW2-40C reflect a change in the top of casing elevation.

Table 3-1 Groundwater Elevation Data - Fourth Quarter 2012 and First Quarter 2013 (Continued)

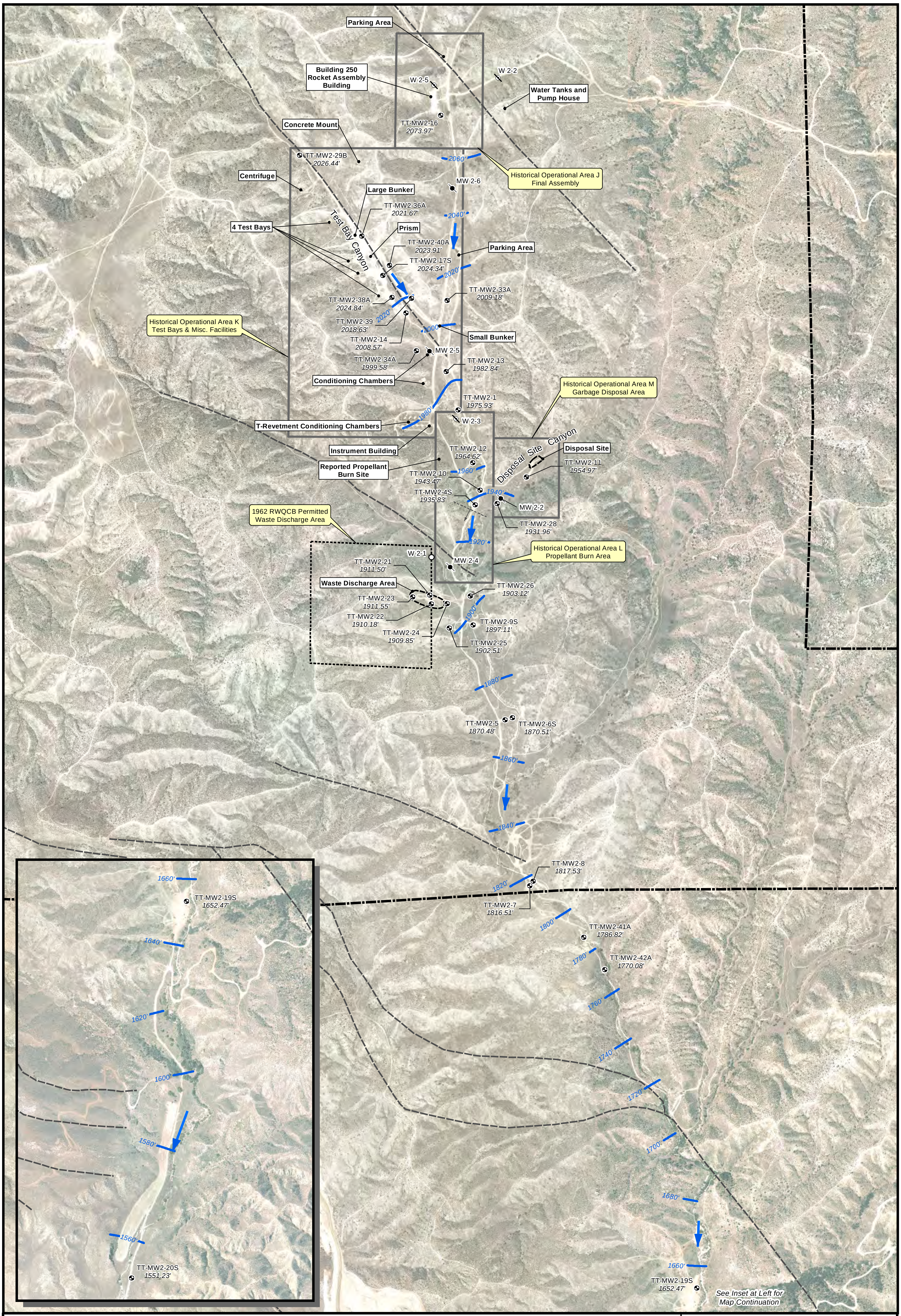
Well ID	Measuring Point Elevation (feet msl)	Fourth Quarter 2012				First Quarter 2013			
		Date Measured	Depth to Water (from Measuring Point, feet)	Groundwater Elevation (feet msl)	Groundwater Elevation Change from Third Quarter 2012 (feet)	Date Measured	Depth to Water (from Measuring Point, feet)	Groundwater Elevation (feet msl)	Groundwater Elevation Change from Fourth Quarter 2012 (feet)
TT-MW2-29B	2147.90	12/03/12	121.46	2026.44	0.25	2/26/2013	121.27	2026.63	-0.19
TT-MW2-29C	2147.83	12/03/12	127.87	2019.96	0.19	2/26/2013	127.75	2020.08	-0.12
TT-MW2-30A	2074.37	12/03/12	72.91	2001.46	0.19	2/26/2013	72.99	2001.38	0.08
TT-MW2-30B	2074.41	12/03/12	75.35	1999.06	0.17	2/26/2013	75.43	1998.98	0.08
TT-MW2-30C	2074.35	12/03/12	77.72	1996.63	0.17	2/26/2013	77.77	1996.58	0.05
TT-MW2-31A	2036.11	12/03/12	60.15	1975.96	0.37	2/26/2013	60.38	1975.73	0.23
TT-MW2-31B	2036.15	12/03/12	67.58	1968.57	0.25	2/26/2013	67.51	1968.64	-0.07
TT-MW2-32	2004.87	12/03/12	53.58	1951.29	-0.10	2/26/2013	53.18	1951.69	-0.40
TT-MW2-33A	2070.54	12/03/12	61.36	2009.18	0.13	2/26/2013	61.35	2009.19	-0.01
TT-MW2-33B	2070.54	12/03/12	66.02	2004.52	0.15	2/26/2013	66.03	2004.51	0.01
TT-MW2-33C	2070.54	12/03/12	64.23	2006.31	0.14	2/26/2013	64.23	2006.31	0.00
TT-MW2-34A	2066.84	12/03/12	67.26	1999.58	0.26	2/26/2013	67.28	1999.56	0.02
TT-MW2-34B	2066.85	12/03/12	73.45	1993.40	0.20	2/26/2013	73.51	1993.34	0.06
TT-MW2-34C	2066.84	12/03/12	75.28	1991.56	0.21	2/26/2013	75.29	1991.55	0.01
TT-MW2-35A	2003.20	12/03/12	50.61	1952.59	0.23	2/27/2013	50.58	1952.62	-0.03
TT-MW2-35B	2003.20	12/03/12	55.39	1947.81	0.29	2/27/2013	55.44	1947.76	0.05
TT-MW2-36A	2100.99	12/03/12	79.32	2021.67	0.33	2/26/2013	79.20	2021.79	-0.12
TT-MW2-36B	2101.04	12/03/12	80.00	2021.04	0.19	2/26/2013	79.95	2021.09	-0.05
TT-MW2-36C	2100.88	12/03/12	79.98	2020.90	0.29	2/26/2013	79.90	2020.98	-0.08
TT-MW2-37A	1963.62	12/03/12	64.24	1899.38	0.30	2/27/2013	64.33	1899.29	0.09
TT-MW2-37B	1963.67	12/03/12	72.37	1891.30	0.32	2/27/2013	72.44	1891.23	0.07
TT-MW2-38A	2084.56	12/03/12	59.72	2024.84	0.63	2/26/2013	59.86	2024.70	0.14
TT-MW2-38B	2084.42	12/03/12	81.43	2002.99	0.18	2/26/2013	81.50	2002.92	0.07
TT-MW2-38C	2084.63	12/03/12	89.33	1995.30	0.16	2/26/2013	89.35	1995.28	0.02
TT-MW2-39	2079.53	12/03/12	60.90	2018.63	0.59	2/26/2013	61.03	2018.50	0.13
TT-MW2-40A	2096.28	12/03/12	72.37	2023.91	0.45	2/26/2013	72.69	2023.99	-0.08
TT-MW2-40B	2096.24	12/03/12	83.88	2012.36	0.27	2/26/2013	84.20	2012.45	-0.09
TT-MW2-40C	2096.28	12/03/12	88.99	2007.29	0.23	2/26/2013	89.16	2007.47	-0.18
Tt-MW2-41A	1812.47	12/03/12	25.65	1786.82	0.65	2/27/2013	24.61	1787.86	-1.04
Tt-MW2-41B	1812.22	12/03/12	22.24	1789.98	0.40	2/27/2013	21.07	1791.15	-1.17
Tt-MW2-42A	1799.06	12/03/12	28.98	1770.08	0.36	2/27/2013	27.74	1771.32	-1.24
Tt-MW2-42B	1799.07	12/03/12	26.59	1772.48	0.53	2/27/2013	25.65	1773.42	-0.94
Tt-MW2-43	1771.44	12/03/12	Dry	Dry	NA	2/27/2013	Dry	Dry	NA
Tt-MW2-44	2085.22	12/03/12	60.42	2024.80	0.66	2/26/2013	60.88	2024.34	0.46
TT-PZ2-1	1847.06	12/03/12	20.91	1826.15	0.66	2/27/2013	20.61	1826.45	-0.30
TT-PZ2-2	1840.76	12/03/12	23.15	1817.61	-0.22	2/27/2013	22.78	1817.98	-0.37
TT-PZ2-3	2079.89	12/03/12	58.74	2021.15	0.49	2/26/2013	58.91	2020.98	0.17
TT-PZ2-4	1961.49	12/03/12	52.32	1909.17	0.17	2/27/2013	52.36	1909.13	0.04

Notes:

NA - Not applicable msl - Mean sea level #.## - Denotes an increase in groundwater elevation - #.## - Denotes a decrease in groundwater elevation

First Quarter 2013 water level elevations for TT-MW2-40A, TT-MW2-40B, and TT-MW2-40C reflect a change in the top of casing elevation.

P:\GIS\Lockheed S2 Q412Q113\GW_Elev_Q412.mxd



LEGEND

- Monitoring Well Location with Groundwater Elevation (feet msl)
- Destroyed Production Well Location
- Destroyed Monitoring Well Location
- Reported Production Well Location
- Groundwater Elevation Contour
- Groundwater Flow Direction
- Fault, Accurately Located Showing Dip
- Fault, Approximately Located
- RWQCB Permitted Waste Discharge Area
- Historical Operational Area Boundary
- Laborde Canyon Property Boundary (Lockheed Martin Beaumont Site 2)

0 500 1,000 Feet

Adapted from: April 2007 aerial photograph

Notes: Laborde Canyon property boundary (Lockheed Martin Beaumont Site 2) from Hillwig-Goodrow survey, May 2004

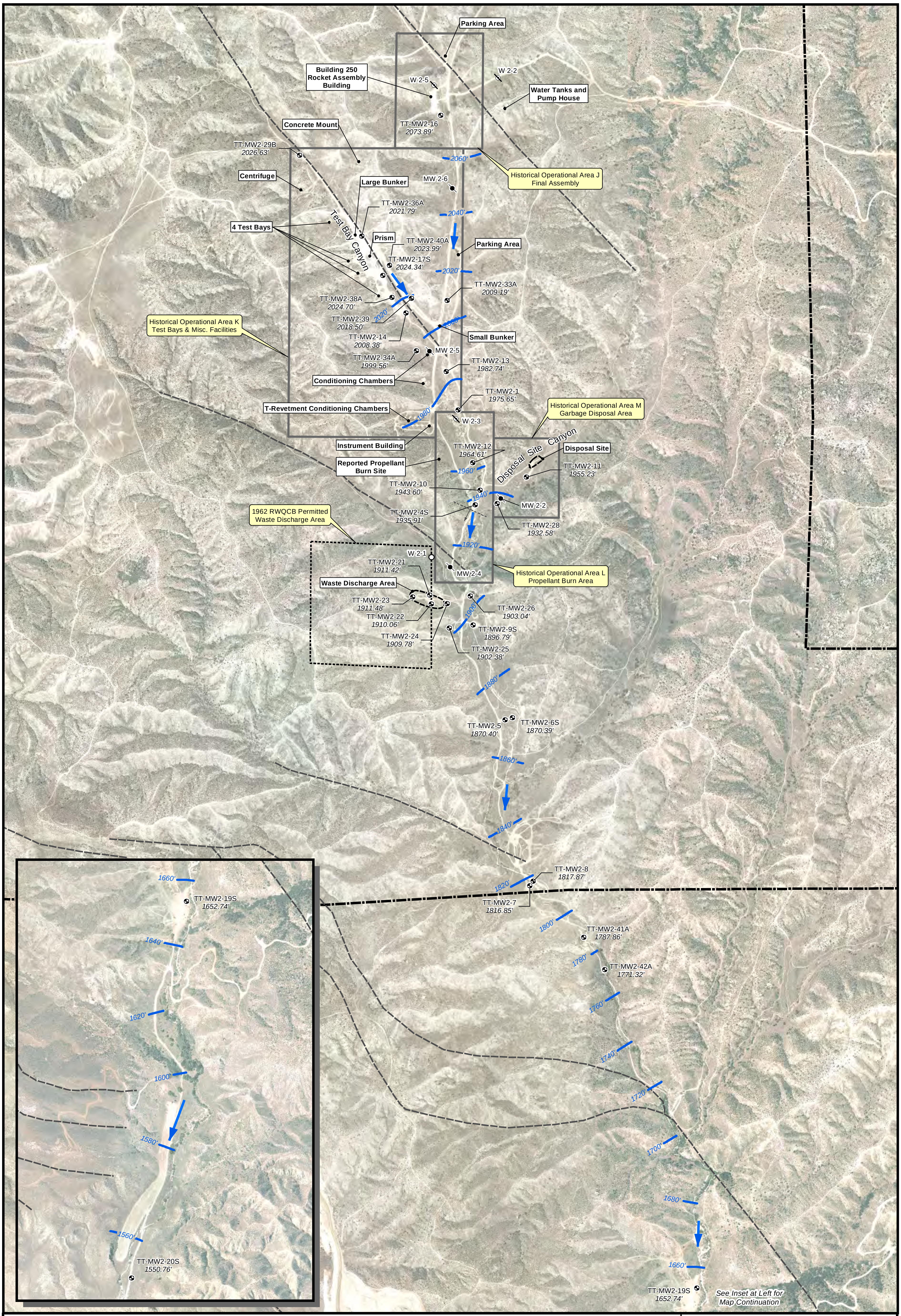
Laborde Canyon
(Lockheed Martin Beaumont Site 2)

Figure 3-1

Groundwater Contours for First Groundwater-Fourth Quarter 2012

TETRA TECH

P:\GIS\Lockheed S2 Q412Q113\GW_Elev_Q113.mxd



LEGEND

- Monitoring Well Location with Groundwater Elevation (feet msl)
- Destroyed Production Well Location
- Destroyed Monitoring Well Location
- Reported Production Well Location
- Groundwater Elevation Contour
- Groundwater Flow Direction
- Fault, Accurately Located Showing Dip
- Fault, Approximately Located
- RWQCB Permitted Waste Discharge Area
- Historical Operational Area Boundary
- Laborde Canyon Property Boundary (Lockheed Martin Beaumont Site 2)

0 500 1,000 Feet

Adapted from: April 2007 aerial photograph

Notes: Laborde Canyon property boundary (Lockheed Martin Beaumont Site 2) from Hillwig-Goodrow survey, May 2004

Laborde Canyon
(Lockheed Martin Beaumont Site 2)

Figure 3-2

Groundwater Contours for First Groundwater- First Quarter 2013

TETRA TECH

Table 3-2 Groundwater Elevation Change - Fourth Quarter 2012 and First Quarter 2013

Site Area	Range of Groundwater Elevation Change - Fourth Quarter 2012 (feet)		Average Change By Area (feet)	Range of Groundwater Elevation Change - First Quarter 2013 (feet)		Average Change By Area (feet)
J	0.18	0.62	0.40	0.01	0.08	0.05
K	0.13	0.66	0.32	-0.19	0.46	0.05
L	0.05	0.29	0.19	-0.15	0.05	-0.05
M	-0.19	0.41	0.04	-0.62	-0.26	-0.43
WDA	0.09	0.32	0.19	0.04	0.12	0.07
LC	-0.22	1.43	0.37	-1.24	0.32	-0.29
WS	0.42	0.83	0.63	-0.27	0.47	0.20

Notes:

J - Final Assembly Area
K - Former Test Bay Area
L - Former Burn Area
M - Garbage Disposal Area
WDA - Waste discharge area
LC - Lower Canyon
WS - Former Wolfskill property

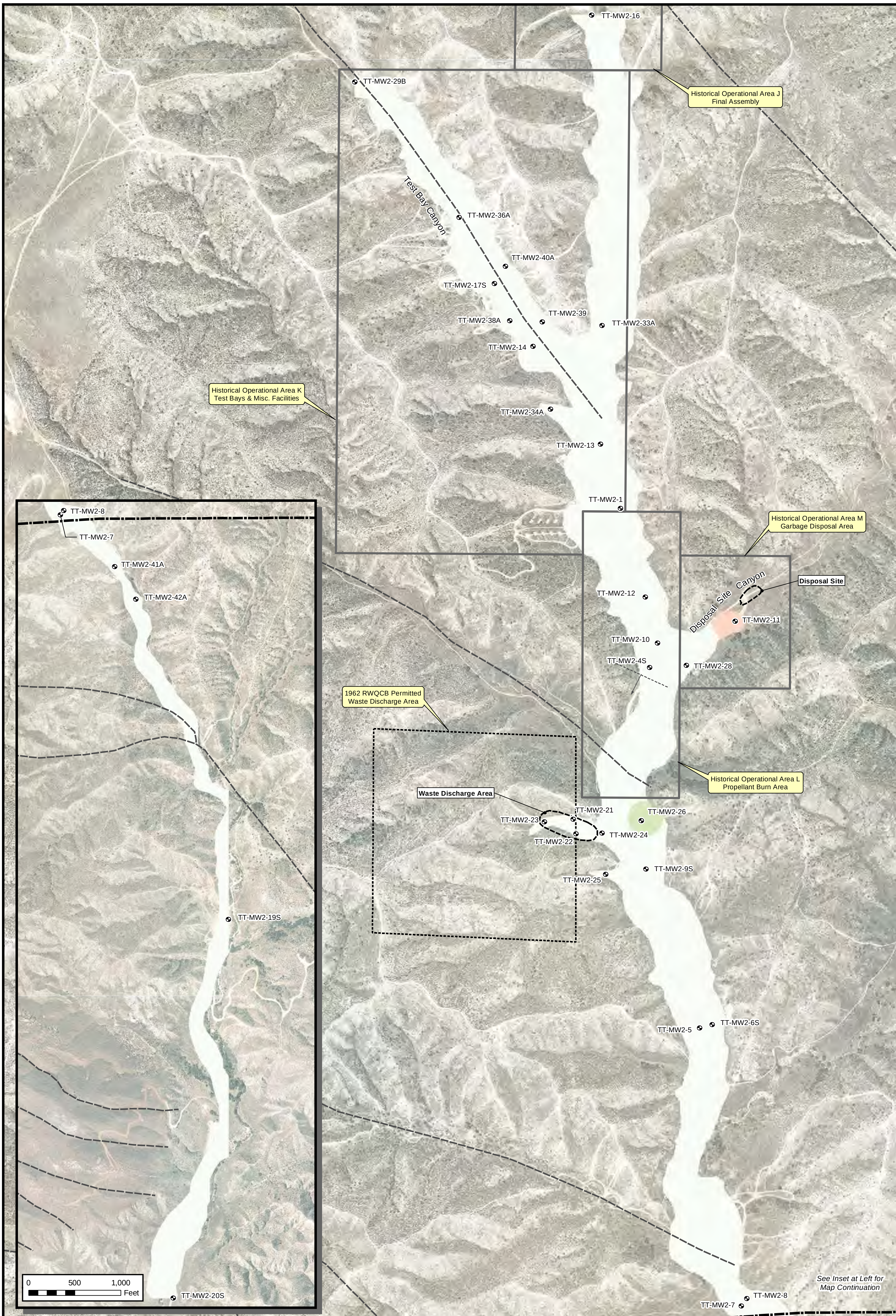
groundwater elevation by area. Figures 3-3 and 3-4, respectively, present elevation differences between the Third Quarter 2012 and Fourth Quarter 2012, and between the Fourth Quarter 2012 and First Quarter 2013 groundwater monitoring events.

During Fourth Quarter 2012, the Beaumont National Weather Service (NWS) station reported approximately 3.66 inches of precipitation, and the average site-wide groundwater elevation increased approximately 0.31 foot. During First Quarter 2013, the Beaumont NWS station reported approximately 3.71 inches of precipitation and the average site-wide groundwater elevation decreased approximately 0.05 feet. Table 3-2 presents the range and average change in groundwater elevation by area. Figures 3-3 and 3-4, respectively, present elevation differences between the Third Quarter 2012 and Fourth Quarter 2012, and between the Fourth Quarter 2012 and First Quarter 2013 groundwater monitoring events.

3.2 Groundwater Gradients

Horizontal groundwater gradients are calculated using a segmented path from well to well that approximates the overall site flowline. The horizontal gradient is a measure of the change in the hydraulic head divided by the distance between wells (i.e., the slope of the water table). The average horizontal groundwater gradient calculated between TT-MW2-16 and TT-MW2-6S from the Fourth Quarter 2012 and First Quarter 2013 groundwater monitoring events for the shallow wells screened in the weathered San Timoteo formation (wSTF) was 0.030 feet per foot. The horizontal groundwater gradient calculated between TT-MW2-2 and TT-MW2-6D for deeper

P:\GIS\Lockheed S2 Q412\0113\GW_Chg_Q412.mxd



LEGEND

- Monitoring Well Location
- Fault, Accurately Located Showing Dip
- Fault, Approximately Located
- RWQCB Permitted Waste Discharge Area
- Historical Operational Area Boundary
- Laborde Canyon Property Boundary (Lockheed Martin Beaumont Site 2)

Groundwater Elevation Change in Feet
(from previous quarter)

- 1.01 — 2
- 0 — 1
- -0.99 — 0

0 300 600
Feet

Adapted from: April 2007 aerial photograph

Faults from the, *Site 2 Lineament Study, Tetra Tech, 2009*

Notes: Laborde Canyon property boundary (Lockheed Martin Beaumont Site 2) from Hillwig-Goodrow survey, May 2004

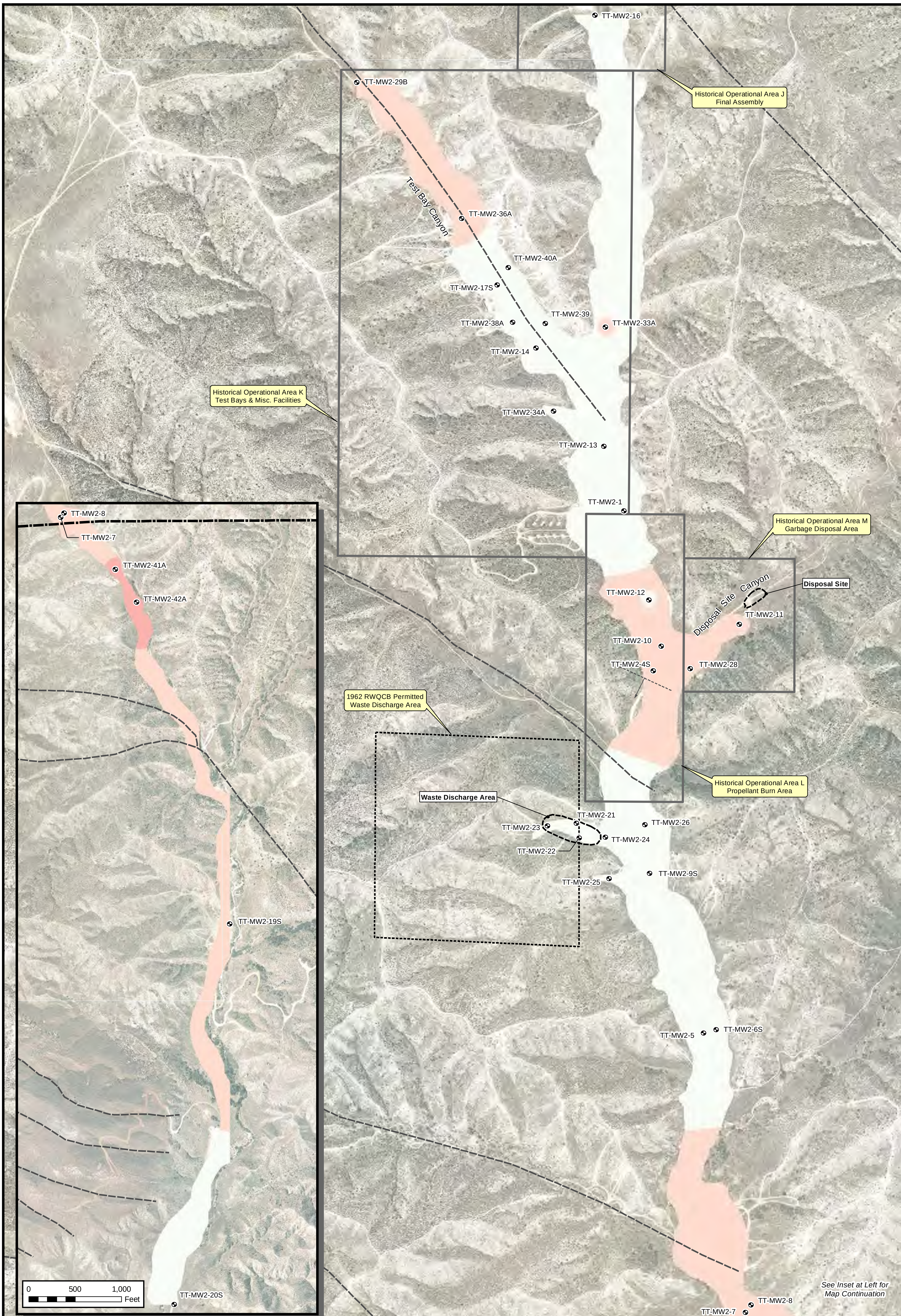
Laborde Canyon
(Lockheed Martin Beaumont Site 2)

Figure 3-3

Changes in Groundwater Elevation - Fourth Quarter 2012

TETRA TECH

P:\GIS\Lockheed S2 Q412Q113\GW_Chg_Q113.mxd



LEGEND

- Monitoring Well Location
- Fault, Accurately Located Showing Dip
- Fault, Approximately Located
- RWQCB Permitted Waste Discharge Area
- Historical Operational Area Boundary
- Laborde Canyon Property Boundary (Lockheed Martin Beaumont Site 2)

Groundwater Elevation Change in Feet (from previous quarter)

- 0 — 1
- -0.99 — 0
- -1.99 — -1

0 300 600 Feet

Adapted from: April 2007 aerial photograph

Faults from the, *Site 2 Lineament Study, Tetra Tech, 2009*

Notes: Laborde Canyon property boundary (Lockheed Martin Beaumont Site 2) from Hillwig-Goodrow survey, May 2004

Laborde Canyon
(Lockheed Martin Beaumont Site 2)

Figure 3-4

Changes in Groundwater Elevation - First Quarter 2013

TETRA TECH

wells screened in the San Timoteo formation (STF) was 0.029 feet/foot during the Fourth Quarter 2012 and First Quarter 2013 groundwater monitoring events.

Vertical groundwater gradients are calculated from individual clusters of wells. Well clusters measure the differences in static water level at different depths in the aquifer. Vertical gradients are calculated by taking the difference in the static water level measurements between wells and dividing by the vertical distance between the wetted screen midpoints. The vertical gradient is an indication of the vertical head difference (downward - negative gradient, upward - positive gradient) of groundwater. Vertical groundwater gradients at the site are generally downward. The vertical gradients range from -0.31 ft/ft at well cluster TT-MW2-4S and 4D located in Area L, to +0.18 ft/ft at well cluster TT-MW2-19S and 19D located on the former Wolfskill property. A summary of calculated horizontal and vertical groundwater gradients is presented in Table 3-3. A complete listing of historical horizontal and vertical groundwater gradients and associated calculations is presented in Appendix E.

3.3 Surface Water Flow

During the Fourth Quarter 2012 and First Quarter 2013, Tetra Tech field personnel walked the Laborde Canyon drainage channel to determine the presence, nature, and quantity of surface water in the creek bed. Surface water was not present in the creek bed during either monitoring event. During the First Quarter 2013, flowing surface water was present at location SF-01 (Figure 2-1) during storm water sampling, so stream flow measurements were taken at that time. The flow rate for this location was calculated to be 3.48 cubic feet per second.

3.4 Analytical Data Summary

Groundwater and surface water samples collected during the Fourth Quarter 2012 monitoring event were analyzed for perchlorate. Select wells were also sampled for VOCs and 1,4-dioxane. Storm water samples were scheduled to be collected from seven locations during the First Quarter 2013 monitoring event and analyzed for perchlorate. However, only one location, SW-07, had sufficient water for sampling, given the lack of sufficient precipitation. No other samples were scheduled to be collected during the First Quarter 2013 monitoring event.

A summary of validated laboratory analytical results for analytes detected above their respective method detection limits during the Fourth Quarter 2012 monitoring event is presented in Table 3-4. Analytes with sample results above the published maximum contaminant level (MCL) or

Table 3-3 Summary of Horizontal and Vertical Groundwater Gradients

Horizontal Groundwater Gradients (feet / foot), approximating a flowline perpendicular to groundwater contours

- - -	**Overall** STF **TT-MW2-2** to **TT-MW2-6D**	**Overall** QAL/wSTF **TT-MW2-16** to **TT-MW2-6S**
Third Quarter (August 2012)	0.029	0.030
Fourth Quarter (December 2012)	0.029	0.030
First Quarter (February 2013)	0.029	0.030

Vertical Groundwater Gradients (feet / foot)

- -	**Area J**	**Area K**	**Area K**	**Area L**	**Southern portion of Site 2**	**Southern portion of Site 2**	**Southern portion of Site 2**	**Former Wolfskill Property**	**Former Wolfskill Property**
deep screen	**TT-MW2-2** (STF)	**TT-MW2-17D** (wWSTF)	**TT-MW2-18** (STF)	**TT-MW2-4D** (STF)	**TT-MW2-9D** (STF)	**TT-MW2-6D** (STF)	**TT-MW2-7D** (STF)	**TT-MW2-19D** (MEF)	**TT-MW2-20D** (MEF)
shallow screen	**TT-MW2-16** (wSTF)	**TT-MW2-17S** (wSTF)	**TT-MW2-1** (wSTF)	**TT-MW2-4S** (STF)	**TT-MW2-9S** (wWSTF)	**TT-MW2-6S** (wWSTF)	**TT-MW2-7** (wWSTF)	**TT-MW2-19S** (wMEF)	**TT-MW2-20S** (wMEF)
Third Quarter (August 2012)	-0.17	-0.01	0.01	-0.31	-0.13	-0.05	0.06	0.18	0.01
Fourth Quarter (December 2012)	-0.16	-0.01	0.01	-0.31	-0.12	-0.05	0.06	0.18	0.03
First Quarter (February 2013)	-0.16	-0.02	0.01	-0.31	-0.11	-0.05	0.07	0.18	0.03

Notes:

QAL - Quaternary alluvium
STF - San Timoteo formation
MEF - Mt. Eden formation
wSTF - Weathered San Timoteo formation
wMEF - Weathered Mt. Eden formation

Table 3-4 Summary of Validated Detected Organic and Inorganic Analytes - Fourth Quarter 2012

Sample Location	Sample Date	Perchlorate	1,4-Dioxane	Acetone	2-Butanone	Benzene	Chloroform	1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	c-1,2-Dichloroethene	t-1,2-Dichloroethene	2-Hexanone	Methylene Chloride	Toluene	1,1,2-Trichloroethane	Trichloroethene
All results reported in µg/L unless otherwise stated																	
TT-MW2-1	12/10/12	**11,000**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-4S	12/04/12	0.89	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-5	12/10/12	**1,000**	0.77	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-6S	12/07/12	**280**	0.14 Jq	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-6D	12/07/12	<0.071	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-7	12/06/12	**360**	0.21	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-7D	12/06/12	<0.071	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-8	12/06/12	**310**	0.17 Jq	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-9S	12/10/12	**17,000**	**19**	<5.0	<1.2	<0.14	<0.46	<0.098	<0.21	<0.12	<0.18	<0.10	<1.2	<0.15	<0.22	<0.31	1.8
TT-MW2-9D	12/05/12	0.092 Jq	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-10	12/04/12	0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-11	12/05/12	**230**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-12	12/05/12	0.22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-13	12/10/12	**5,500**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-14	12/11/12	**36,000**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-17S	12/11/12	**1,900**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-17D	12/10/12	**30,000**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-18	12/10/12	**15,000**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW-19S	12/06/12	**6.1**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-19D	12/06/12	<0.071	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-20S	12/06/12	<0.071	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-21	12/05/12	**29**	-	<5.0	<1.2	<0.14	<0.46	<0.098	<0.21	0.13 Jq	<0.18	<0.10	<1.2	3.2	<0.22	<0.31	3.9
TT-MW2-22	12/07/12	<0.071	**67**	<5.0	<1.2	0.99	<0.46	3.1	**0.93**	**17**	**7.0**	0.72	<1.2	1.2 Jq	<0.22	<0.31	**410**
TT-MW2-24	12/10/12	**130,000**	**170**	<5.0	<1.2	0.22 Jq	2.3	0.6	0.47 Jq	2.7	<0.18	<0.10	<1.2	0.41 Jq	<0.22	0.37 Jq	**86**
TT-MW2-25	12/05/12	0.071 Jq	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-26	12/05/12	**100**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-27	12/07/12	**500**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-28	12/05/12	0.98	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-30A	12/11/12	**290**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-30B	12/11/12	**6,600**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-30C	12/04/12	<0.071	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-31A	12/04/12	<0.071	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-32	12/05/12	<0.071	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-33A	12/04/12	0.59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-34A	12/04/12	**9.7**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-35A	12/05/12	<0.071	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-36A	12/04/12	<0.071	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-37A	12/10/12	**16,000**	**14**	41	7.2	0.45 Jq	<0.46	<0.098	<0.21	0.23 Jq	<0.18	<0.10	1.2 Jq	<0.15	0.26 Jq	<0.31	3.5
TT-MW2-37B	12/07/12	**100**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-38A	12/11/12	**95,000**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-38B	12/11/12	**7,400**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-38C	12/11/12	**62,000**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-39	12/11/12	**97,000**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-40A	12/04/12	4.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-40B	12/04/12	0.22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-41A	12/06/12	<0.071	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-42A	12/06/12	<0.071	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TT-MW2-44	12/04/12	**3,100 Jf**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WS-1	12/06/12	<0.071	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WS-3	12/06/12	<0.071	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Method Detection Limit		0.071	0.10	5.0	1.2	0.14	0.46	0.098	0.21	0.12	0.18	0.10	1.2	0.15	0.22	0.31	0.25
MCL (unless noted) / DWNL		6	1 (1)	NA	NA	1	NA	5	0.5	6	6	10	NA	5	150	5	5

Notes: Only analytes positively detected in samples are presented in this table. For a complete list of constituents analyzed, refer to the laboratory data packages in Appendix G.

µg/L - Micrograms per liter
MCL - California Department of Public Health Services maximum contaminant level
DWNL - California Department of Public Health Services drinking water notification level
NA - Not available (MCL/DWNL not established)
(1) - DWNL
Bold - MCL or DWNL exceeded

" - " Not analyzed
< # - Analyte not detected; method detection limit concentration is shown.
J - The analyte was positively identified, but the concentration is an estimated value.
f - The duplicate relative percent difference (RPD) was outside the control limit.
q - The analyte detection was below the practical quantitation limit (PQL).

drinking water notification level (DWNL) are indicated by bold type in Table 3-4. Table 3-5 presents summary statistics for validated organic and inorganic analytes detected during the monitoring event. A complete list of the analytes tested, along with validated sample results by analytical method, is provided in Appendix F. Laboratory analytical data packages, which include all environmental, field quality control (QC), and laboratory QC results, are provided in Appendix G. A consolidated laboratory data summary table is presented in Appendix H.

3.4.1 Data Quality Review

The quality control samples were reviewed as described in the *Programmatic Sampling and Analysis Plan, Beaumont Sites 1 and 2* (Tetra Tech, 2010b). The data for the groundwater sampling activities were contained in analytical data packages generated by E.S. Babcock & Sons, Inc. and EMAX Laboratories Inc. These data packages were reviewed using the latest versions of the United States Environmental Protection Agency Contract Laboratory Program National Functional Guidelines for Organic and Inorganic Superfund Data Review (USEPA, 2008 and 2010).

Preservation criteria, holding times, field blanks, laboratory control samples, method blanks, duplicate environmental samples, spiked samples, and surrogate and spike recovery data were reviewed. Within each environmental sample, the sample-specific quality control spike recoveries were examined. These data examinations included 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 spiked (matrix spike/matrix spike duplicate) RPD results. Surrogate recoveries were examined for all organic compound analyses and compared to their control limits.

Environmental samples were analyzed by the following methods: Method E332.0 for perchlorate, Methods SW8270C SIM for 1,4-dioxane, and Method SW8260B for VOCs. Unless otherwise noted below, all data results met required criteria, are of known precision and accuracy, did not require qualification, and may be used as reported.

Method E332.0 for perchlorate had one field duplicate RPD error to report. Sample TT-MW2-44 and TT-MW2-44-DUP perchlorate results had an RPD value of 34%. The control limit RPD is 30%. Therefore, the sample and the duplicate were qualified as estimated and denoted with a "J" qualifier. There were two qualified results out of 54 total results, which equates to a 3.7% error rate.

Table 3-5 Summary Statistics for Validated Detected Organic and Inorganic Analytes - Fourth Quarter 2012

Organic Analytes Detected	Total Number of Samples Analyzed	Total Number of Detections (1)	Number of Detections Exceeding MCL or DWNL (1)	MCL/DWNL		Minimum Concentration Detected		Maximum Concentration Detected	
1,4-Dioxane	8	8	4	1 (2)	µg/L	0.14	µg/L	170	µg/L
Acetone	5	1	0	-	µg/L	41	µg/L	41	µg/L
2-Butanone	5	1	0	-	µg/L	7.2	µg/L	7.2	µg/L
Benzene	5	3	0	1	µg/L	0.22	µg/L	0.99	µg/L
Chloroform	5	1	0	-	µg/L	2.3	µg/L	2.3	µg/L
1, 1-Dichloroethane	5	2	0	5	µg/L	0.60	µg/L	3.1	µg/L
1, 2-Dichloroethane	5	2	1	0.5	µg/L	0.47	µg/L	0.93	µg/L
1, 1-Dichloroethene	5	4	1	6	µg/L	0.13	µg/L	17	µg/L
cis-1, 2-Dichloroethene	5	1	1	6	µg/L	7.0	µg/L	7.0	µg/L
trans-1, 2-Dichloroethene	5	1	0	10	µg/L	0.72	µg/L	0.72	µg/L
2-Hexanone	5	1	0	-	µg/L	1.2	µg/L	1.2	µg/L
Methylene Chloride	5	3	0	5	µg/L	0.41	µg/L	3.2	µg/L
Toluene	5	1	0	150	µg/L	0.26	µg/L	0.26	µg/L
1, 1, 2-Trichloroethane	5	1	0	5	µg/L	0.37	µg/L	0.37	µg/L
Trichloroethene	5	5	2	5	µg/L	1.8	µg/L	410	µg/L
Inorganic Analytes Detected	**Total Number of Samples Analyzed**	**Total Number of Detections (1)**	**Number of Detections Exceeding MCL or DWNL (1)**	**MCL/DWNL**		**Minimum Concentration Detected**		**Maximum Concentration Detected**	
Perchlorate	50	36	27	6	µg/L	0.071	µg/L	130,000	µg/L

Notes: Only analytes positively detected in groundwater or surface water samples are presented in this table. For a complete list of constituents analyzed, refer to the laboratory data package.

MCL - California Department of Public Health Services maximum contaminate level

DWNL - California Department of Public Health Services state drinking water notification level

" - " MCL/DWNL not established

(1) - Number of detections exclude sample duplicates, trip blanks, and equipment blanks

(2) - DWNL

µg/L - Micrograms per liter

3.5 Chemicals of Potential Concern

The identification of chemicals of potential concern is an ongoing process that takes place annually as part of the second quarter sampling event, and is reported in the Second and Third Quarter Semiannual Groundwater Monitoring Report. The purpose of identifying chemicals of potential concern is twofold: to establish a list of analytes that best represents the extent and magnitude of affected groundwater, and to focus more detailed analysis on those analytes. The analytes were organized and evaluated in two groups, organic and inorganic, and divided into primary and secondary chemicals of potential concern. Data that are “B” qualified because of their association with either laboratory blank or field cross contamination are not included in this evaluation.

The identification process for chemicals of potential concern does not eliminate analytes from testing, but does reduce the number of analytes that are evaluated and discussed during reporting.

All of the secondary chemicals of potential concern will continue to be tested during future monitoring events because of their association with other analytes that are listed as primary chemicals of potential concern. However, they are not discussed further because they are detected on a more limited or inconsistent basis, and/or are detected at concentrations below a regulatory threshold. The standard list of analytes for each method will continue to be tested for and screened annually to ensure that the appropriate chemicals of potential concern are being identified and evaluated. Table 3-6 presents a summary of the Laborde Canyon chemicals of potential concern. Time-series graphs of perchlorate and trichloroethene (TCE) concentrations are provided in Appendix I.

Table 3-6 Groundwater Chemicals of Potential Concern

Analyte	Classification
Perchlorate	Primary
Trichloroethene	Primary
1,4-Dioxane	Primary
Benzene	Secondary
1, 2-Dichloroethane	Secondary
1, 1-Dichloroethene	Secondary
RDX	Secondary
Notes:	
RDX - Hexahydro-1,3,5-trinitro-1,3,5-triazine	

3.5.1 Organic Analytes

Five organic analytes (1,4-dioxane, 1,2-dichloroethane [1,2-DCA], 1,1-dichloroethene [1,1-DCE], cis-1,2- dichloroethene, and TCE) were detected above their respective MCL or DWNL during the Fourth Quarter 2012 monitoring event. Table 3-5 presents a summary of validated organic analyte concentrations reported in groundwater samples collected during the Fourth Quarter 2012 groundwater monitoring event.

1,4-Dioxane was reported in groundwater samples collected from eight monitoring wells (TT-MW2-5, TT-MW2-6S, TT-MW2-7, TT-MW2-8, TT-MW2-9S, TT-MW2-22, TT-MW2-24, and TT-MW2-37A) during the Fourth Quarter 2012 monitoring event at concentrations ranging from 0.14 micrograms per liter (µg/L) to 170 µg/L. All wells are located in or just downgradient from the former waste discharge area (WDA). The DWNL for 1,4-dioxane is 1 µg/L.

1,2-DCA was reported in groundwater samples collected from two monitoring wells (TT-MW2-22 and TT-MW2-24) located in the former WDA during the Fourth Quarter 2012 monitoring event at concentrations of 0.93 µg/L and 0.47 µg/L respectively. The MCL for 1,2-DCA is 0.5 µg/L.

1,1-DCE was reported in groundwater samples collected from four monitoring wells (TT-MW2-21, TT-MW2-22, TT-MW2-24, and TT-MW2-37A) located in the former WDA during the Fourth Quarter 2012 monitoring event at concentrations ranging from 0.13 µg/L to 27 µg/L. The MCL for 1,1-DCE is 6 µg/L.

cis-1,2-Dichloroethene was reported in groundwater samples collected from monitoring well TT-MW2-22 located in the former WDA during the Fourth Quarter 2012 monitoring event at a concentration of 7.0 µg/L. The MCL for cis-1,2-dichloroethene is 6 µg/L.

TCE was reported in groundwater samples collected from five monitoring wells (TT-MW2-9S, TT-MW2-21, TT-MW2-22, TT-MW2-24, and TT-MW2-37A) located in, or just downgradient from, the former WDA during the Fourth Quarter 2012 monitoring event at concentrations ranging from 1.8 µg/L to 410 µg/L. The MCL for TCE is 5 µg/L. Time-series graphs of TCE are provided in Appendix I.

Benzene was reported below the MCL in groundwater samples collected from three monitoring wells (TT-MW2-22, TT-MW2-24, and TT-MW2-37A) located in the former WDA at concentrations of 0.99 µg/L, 0.22 µg/L, and 0.45 µg/L respectively during the Fourth Quarter 2012 monitoring event. The MCL for benzene is 1 µg/L.

Other organic analytes detected at low levels during the Fourth Quarter 2012 groundwater monitoring event were acetone, 2-butanone, chloroform, 1,1-dichloroethane, trans-1,2-dichloroethene, 2-hexanone, methylene chloride, toluene, and 1,1,2-trichloroethane. None of these compounds exceeded their MCL or DWNL, and generally they are not detected consistently from event to event.

3.5.2 Organic Chemicals of Potential Concern

Given the analysis above and the concentrations detected during previous groundwater monitoring events, TCE and 1,4-dioxane are identified as primary organic chemicals of potential concern, and benzene, 1,2-DCA, 1,1-DCE, and hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) are identified as secondary chemicals of potential concern at the site. The remaining nine organic analytes were detected below their respective MCL or DWNL. Their distribution and concentrations in groundwater will continue to be monitored and the results evaluated. Figure 3-5 presents sampling results for the primary organic chemicals of potential concern for groundwater samples collected during the Fourth Quarter 2012 monitoring event.

3.5.3 Inorganic Analytes

One inorganic analyte (perchlorate) was detected in groundwater above a published MCL or DWNL. Table 3-5 presents a summary of validated inorganic analyte concentrations reported in groundwater samples collected during the Fourth Quarter 2012 groundwater monitoring event.

Perchlorate was reported in groundwater samples collected from 36 of 50 locations sampled during the Fourth Quarter 2012 at concentrations up to 130,000 µg/L. The California MCL for perchlorate is 6 µg/L. Time-series graphs of perchlorate are provided in Appendix I.

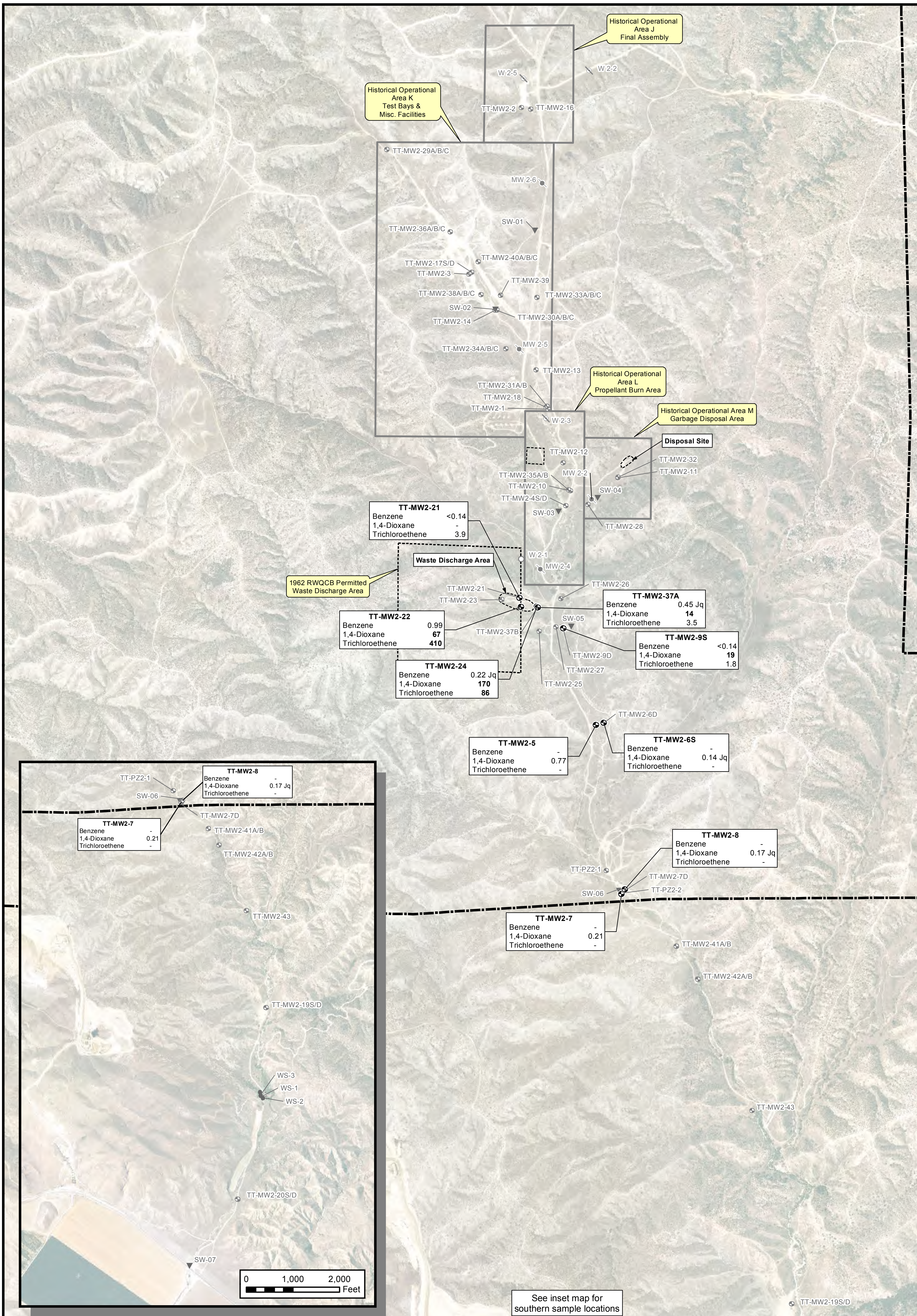
3.5.4 Inorganic Chemicals of Potential Concern

Given the analysis above and the concentrations detected during previous groundwater monitoring events, perchlorate is the only inorganic chemical of potential concern identified at the site. No inorganic secondary chemicals of potential concern were identified. Figure 3-6 presents a perchlorate isoconcentration map for groundwater samples collected during the Fourth Quarter 2012.

3.6 Surface Water and Storm-Water Sampling Results

Surface water samples were collected for perchlorate at two locations, WS-1 and WS-3, from a spring on the former Wolfskill property during the Fourth Quarter 2012 (Figure 2-1). WS-2 was not sampled because it was dry. Perchlorate was not detected in samples from either location above the method detection limit of 0.71 µg/L. The California MCL for perchlorate is 6 µg/L. One additional surface water sample was collected during a storm event on 8 March 2013 from surface water location SW-07 located at the southern end of the former Wolfskill property at Gilman Springs Road. Perchlorate was detected at a concentration of 1.1 µg/L in this sample. Due to the limited precipitation and short duration of this rain event, the remaining storm-water locations had insufficient water for sampling when the sampling crew arrived back on the northern portion of the site. No other surface water samples were collected during this reporting period.

P:\GIS\Lockheed S2 Q412\Q113\COPC_Q412.mxd



LEGEND

- Monitoring Well Location
- Surface Water Sampling Location
- Spring
- Destroyed Production Well Location
- Destroyed Monitoring Well Location
- Reported Production Well Location
- 1962 RWQCB Permitted Waste Discharge Area
- Historical Operational Area Boundary
- Laborde Canyon Property Boundary (Lockheed Martin Beaumont Site 2)

Notes: Bold indicates corresponding MCL or DWNL exceeded.

Concentrations shown are in micrograms per liter (µg/L).

Gray symbols indicate sample not available.

MCL - Maximum Contaminant Level

DWNL - Drinking Water Notification Limit

0 500 1,000 Feet

Adapted from: April 2007 aerial photograph

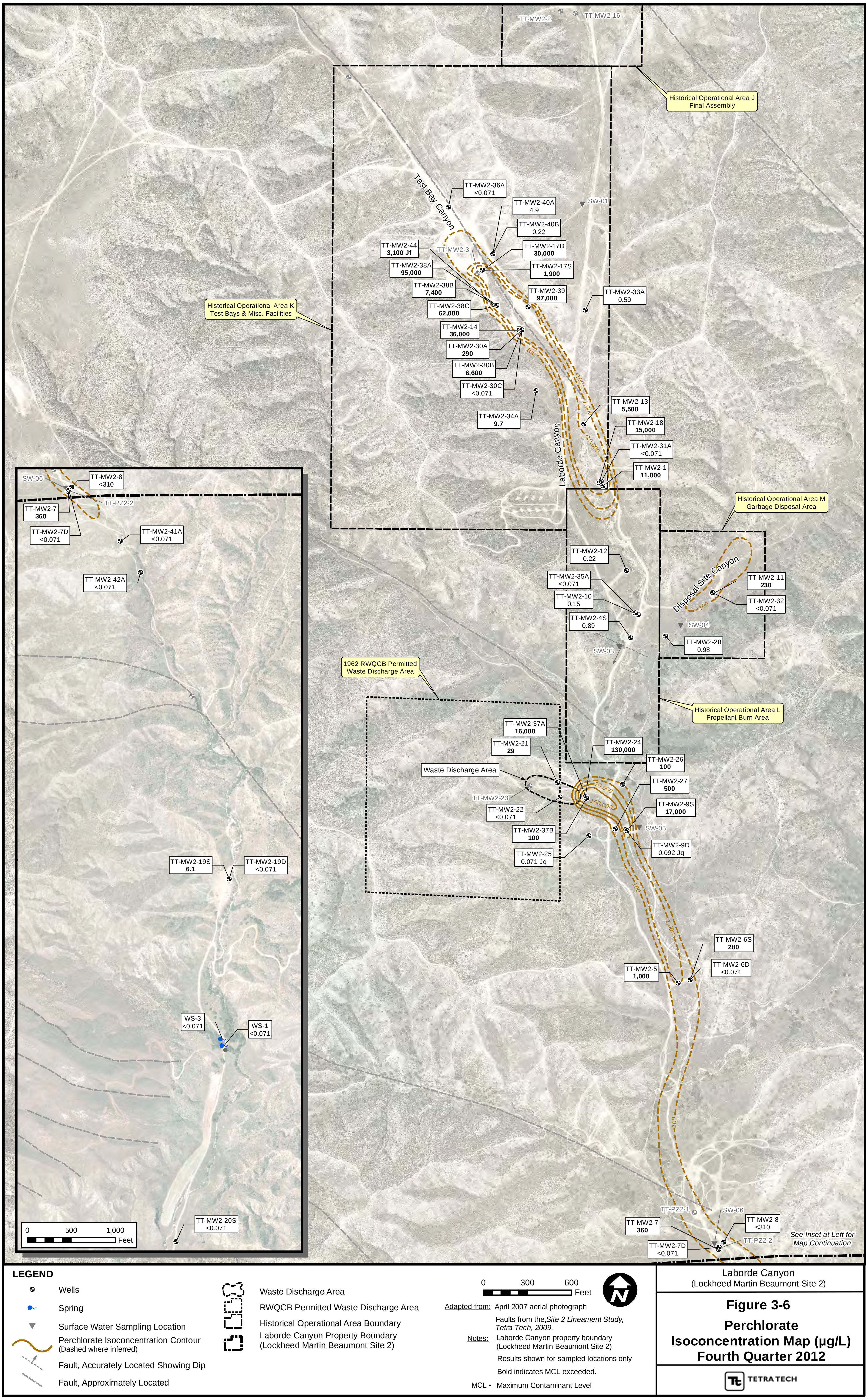
Note: Laborde Canyon property boundary (Lockheed Martin Beaumont Site 2) from Hillwig-Goodrow survey, May 2004

Laborde Canyon
(Lockheed Martin Beaumont Site 2)

Figure 3-5

Primary Organic Chemicals of Potential Concern Sampling Results - Fourth Quarter 2012

Path: P:\GIS\Lockheed S2 Q412\Q113\Perc_Isocon Q412.mxd



3.7 Temporal Trends in Groundwater Chemical Concentrations

During the Second Quarter 2011 statistical trend analysis (Tetra Tech, 2011), 16 monitoring wells were designated as having increasing or probably increasing concentration trends. The portion of the site where the increasing trend wells are located, the well or location identification, and the chemical of potential concern that has the increasing trend are listed below:

Six wells located in Area K:

- TT-MW2-1: perchlorate
- TT-MW2-17S: TCE
- TT-MW2-17D: perchlorate
- TT-MW2-34A: perchlorate
- TT-MW2-38A: perchlorate
- TT-MW2-38C: perchlorate

One well located in Area L:

- TT-MW2-4S: perchlorate

One well located in Area M:

- TT-MW2-11: TCE

Four wells located in the former WDA:

- TT-MW2-21: perchlorate, TCE, and methylene chloride
- TT-MW2-22: TCE
- TT-MW2-24: perchlorate
- TT-MW2-37A: 1,4-dioxane, and TCE

Three wells located just downgradient or cross gradient of the former WDA:

- TT-MW2-9S: 1,4-dioxane, perchlorate, and TCE
- TT-MW2-26: perchlorate

- TT-MW2-27: perchlorate

One well located on the former Wolfskill property:

- TT-MW2-19S: perchlorate

These increasing trend wells were chosen based on the Second Quarter 2011 trend analyses, and they may change with regulatory approval of the *Semiannual Groundwater Monitoring Report Second Quarter and Third Quarter 2012* (Tetra Tech, 2012). Table 3-7 presents a summary of the detected chemicals of potential concern in the increasing trend well samples collected during the Fourth Quarter 2012 and previous monitoring events.

3.8 Habitat Conservation

Consistent with the United States Fish and Wildlife Service (USFWS) approved Habitat Conservation Plan (HCP) (USFWS, 2005) and subsequent clarifications (Lockheed Martin Corporation, 2006a and 2006b) to the HCP describing activities for environmental remediation at the site, field activities were performed under the supervision of a USFWS-approved biologist. No impact to the Stephens' Kangaroo rat occurred during the performance of field activities related to the Fourth Quarter 2012 and First Quarter 2013 monitoring events.

Table 3-7 Summary of Detected Chemicals of Potential Concern in Increasing Trend Wells

Sample Location	Sample Date	1,4-Dioxane	Perchlorate	Trichloroethene	RDX
All results reported in µg/L unless otherwise stated					
TT-MW2-1	06/27/11	NA	**6,500**	NA	NA
	12/14/11	NA	**5,900**	NA	NA
	06/29/12	NA	**7,000**	NA	NA
	12/10/12	NA	**11,000**	NA	NA
TT-MW2-4S	06/30/11	NA	0.62	NA	NA
	12/16/11	NA	0.63	NA	NA
	06/26/12	NA	0.98 Jf	NA	NA
	12/04/12	NA	0.89	NA	NA
TT-MW2-9S	06/28/11	**15**	**9,200**	1.6	NA
	12/22/11	**17**	**11,000**	1.8	NA
	06/28/12	**20**	**11,000**	2.0	NA
	12/10/12	**19**	**17,000**	1.8	NA
TT-MW2-11	06/24/11	NA	**210**	**5.9**	NA
	12/16/11	NA	**180**	**6.8**	NA
	06/26/12	NA	**160**	**6.0**	NA
	12/05/12	NA	**230**	NA	NA
TT-MW2-17S	06/24/11	NA	**1,300**	0.35 Jq	NA
	12/19/11	NA	**1,600**	NA	NA
	06/29/12	NA	**1,600**	0.40 Jq	NA
	12/11/12	NA	**1,900**	NA	NA
TT-MW2-17D	06/23/11	NA	**90,000**	**6.0**	NA
	12/19/11	NA	**55,000**	NA	NA
	06/28/12	NA	**53,000**	**5.2**	NA
	12/10/12	NA	**30,000**	NA	NA
TT-MW2-19S	06/22/11	NA	4.7	NA	NA
	12/13/11	NA	4.7	NA	NA
	06/18/12	NA	4.7	NA	NA
	12/06/12	NA	**6.1**	NA	NA
TT-MW2-21	06/27/11	<0.10	**17**	4.3	NA
	12/22/11	NA	**20**	**5.5**	NA
	06/27/12	<0.10	**24**	2.9	NA
	12/05/12	NA	**29**	3.9	NA
Method Detection Limit		0.043	0.071	0.17	0.2
MCL (unless noted) / DWNL		1 (1)	6	5.0	0.3 (1)

Notes: Only analytes positively detected in samples are presented in this table.
For a complete list of constituents analyzed, refer to the laboratory data packages in Appendix G.

RDX - Hexahydro-1,3,5-trinitro-1,3,5-triazine
µg/L - Micrograms per liter
MCL - California Department of Public Health Services maximum contaminant level
DWNL - California Department of Public Health Services drinking water notification level
(1) - DWNL
Bold - MCL or DWNL exceeded
< # - Analyte not detected. Method detection limit concentration is shown.
NA - Not analyzed
J - The analyte was positively identified, but the concentration is an estimated value.
c - The Matrix Spike (MS) and/or Matrix Spike Duplicate (MSD) recoveries were outside control limits.
q - The analyte detected was below the Practical Quantitation Limit (PQL).

Table 3-7 Summary of Detected Chemicals of Potential Concern in Increasing Trend Wells (continued)

Sample Location	Sample Date	1,4-Dioxane	Perchlorate	Trichloroethene	RDX
All results reported in µg/L unless otherwise stated					
TT-MW2-22	06/27/11	**53**	<0.071	**420**	NA
	12/22/11	**57**	<0.071	**460**	NA
	06/27/12	**72**	<0.071	**340**	NA
	12/07/12	**67**	<0.071	**410**	NA
TT-MW2-24	06/27/11	**320**	**160,000**	**92**	**2.1**
	12/19/11	**210**	**96,000**	**84**	NA
	06/28/12	**200**	**96,000**	**70**	**0.36 Jq**
	12/10/12	**170**	**130,000**	**86**	NA
TT-MW2-26	06/27/11	<0.10	**100**	<0.25	NA
	12/21/11	NA	**87**	NA	NA
	06/26/12	<0.10	**81**	<0.25	NA
	12/05/12	NA	**100**	NA	NA
TT-MW2-27	06/28/11	0.66	**260**	<0.25	NA
	12/21/11	NA	**240**	NA	NA
	06/27/12	0.58	**330**	<0.25	NA
	12/07/12	NA	**500**	NA	NA
TT-MW2-34A	06/30/11	NA	5.0	NA	NA
	12/22/11	NA	5.2	NA	NA
	06/27/12	NA	**6.3**	NA	NA
	12/04/12	NA	**9.7**	NA	NA
TT-MW2-37A	06/29/11	**18**	1.2	3.5	NA
	12/16/11	**14**	**12,000**	4.9 Jc	NA
	06/28/12	**14**	**11,000**	2.8	NA
	12/10/12	**14**	**16,000**	3.5	NA
TT-MW2-38A	01/25/12	NA	**23,000**	NA	NA
	04/04/12	NA	**80,000**	NA	NA
	06/28/12	NA	**61,000**	NA	NA
	12/11/12	NA	**95,000**	NA	NA
TT-MW2-38C	06/23/11	NA	**160,000**	NA	NA
	12/19/11	NA	**87,000**	NA	NA
	06/29/12	NA	**57,000**	NA	NA
	12/11/12	NA	**62,000**	NA	NA
	Method Detection Limit	0.043	0.071	0.17	0.2
	MCL (unless noted) / DWNL	1 (1)	6	5.0	0.3 (1)

Notes: Only analytes positively detected in samples are presented in this table.
For a complete list of constituents analyzed, refer to the laboratory data packages in Appendix G.

RDX - Hexahydro-1,3,5-trinitro-1,3,5-triazine
µg/L - Micrograms per liter
MCL - California Department of Public Health Services maximum contaminant level
DWNL - California Department of Public Health Services drinking water notification level
(1) - DWNL
Bold - MCL or DWNL exceeded
< # - Analyte not detected. Method detection limit concentration is shown.
NA - Not analyzed
J - The analyte was positively identified, but the concentration is an estimated value.
c - The Matrix Spike (MS) and/or Matrix Spike Duplicate (MSD) recoveries were outside control limits.
q - The analyte detected was below the Practical Quantitation Limit (PQL).

Section 4 Summary and Conclusions

This section summarizes the results of the Fourth Quarter 2012 and First Quarter 2013 groundwater monitoring events. During the Fourth Quarter 2012 monitoring event, 71 monitoring well locations and four piezometers were measured for groundwater levels and 48 monitoring wells and two surface water locations were sampled for groundwater quality. One monitoring well, TT-MW2-43, was dry during the Fourth Quarter 2012 monitoring event. One surface water location, WS-2, was dry during the Fourth Quarter 2012 monitoring event. During the First Quarter 2013 monitoring event, 70 monitoring well locations and four piezometers were measured for groundwater levels. Storm water samples were scheduled to be collected during the First Quarter 2013 monitoring event, but due to the low quantity of precipitation, only one location had sufficient water for sampling. No other samples were scheduled to be collected during the First Quarter 2012 monitoring event. Two monitoring wells, TT-MW2-29A and TT-MW2-43, were found to be dry during the First Quarter 2013 monitoring event.

4.1 Groundwater Elevation and Flow

The Beaumont National Weather Service station reported approximately 3.66 inches of rain during Fourth Quarter 2012 and approximately 3.71 inches of precipitation during First Quarter 2013. During this period, groundwater elevations generally increased across the site. During Fourth Quarter 2012, groundwater elevation increases were seen in all areas of the site. During First Quarter 2013, groundwater elevation increases were seen in in the northern portion of the site, Areas J and K, in the waste discharge area, and on the former Wolfskill property. Groundwater elevation decreases were seen in the central portion of the site, Areas L and M, and in the lower canyon area.

Groundwater elevations during the Fourth Quarter 2012 monitoring event ranged from approximately 2,074 feet above mean sea level in the northern portion of the site, to about 1,817 feet above mean sea level in the southern portion of the site. Depth to groundwater ranged from about 121 feet below ground surface to about 19 feet below ground surface. Groundwater elevations during the First Quarter 2013 monitoring event ranged from approximately 2,074 feet above mean sea level in the northern portion of the site, to about 1,818 feet above mean sea level in the southern portion of the site. Depth to groundwater ranged from about 121 feet below ground surface to about 18 feet below ground surface.

Taking into account the measured groundwater elevations, the current conceptual site model, and the southward sloping topography at the site, groundwater flow is to the south, generally following the topography of Laborde Canyon. The overall groundwater elevation at the site has decreased four to six feet since Fourth Quarter 2005, with the greatest decrease over time seen in monitoring well TT-MW2-1 (6.9 feet). Limited seasonal fluctuations can be seen to varying degrees following periods of precipitation.

Generally, the seasonal fluctuations in the northern portion of the site are less pronounced and have a three- to four-month delay before a change in groundwater elevation is noticeable. The wells in test bay canyon, however, appear to respond faster and have a greater change in elevation compared with wells in the main portion of Laborde Canyon.

In the southern portion of the site between the waste discharge area and the southern site boundary, seasonal fluctuations tend to be more pronounced and have a shorter response time. This is most noticeable in the shallow wells located near the southern property boundary and in the riparian area just south of the property boundary.

On the former Wolfskill property, groundwater elevations have remained relatively stable with noticeable seasonal fluctuations.

Although the data are limited in many of the newer wells, the overall long-term decreasing trend in groundwater elevation appears to generally correspond to long-term precipitation patterns.

4.1.1 Groundwater Gradients

Horizontal groundwater gradients across the site are relatively constant. The horizontal groundwater gradients calculated between TT-MW2-16 and TT-MW2-6S from the Fourth Quarter 2012 and First Quarter 2013 groundwater monitoring events for the weathered San Timoteo formation-screened wells averaged 0.030 feet/foot. The horizontal groundwater gradients calculated between TT-MW2-2 and TT-MW2-6D for the Fourth Quarter 2012 and First Quarter 2013 groundwater monitoring events for the deeper San Timoteo formation-screened wells averaged 0.029 feet/foot.

Generally the vertical gradients are downward on-site and upward from the site boundary south. The vertical gradients range from -0.31 feet/foot to +0.18 feet/foot. A summary of calculated horizontal and vertical groundwater gradients is presented in Table 3-3 and in Appendix E.

4.2 Surface Water Flow

During the Fourth Quarter 2012 and First Quarter 2013, the Laborde Canyon drainage channel was walked to determine the presence, nature, and quantity of surface water in the creek beds. Surface water was not present in the creek beds during either monitoring event, so stream flow measurements were not taken. Flowing water was present during the First Quarter 2013 storm-water sampling event at location SF-01, near Gilman Hot Springs Road. The flow rate was calculated to be 3.48 cubic feet per second.

4.3 Water Quality Monitoring

Both groundwater and surface water samples are collected as part of the Groundwater Monitoring Program. The Groundwater Monitoring Program has a quarterly/semiannual/annual frequency. The annual events are larger major monitoring events, and the quarterly and semiannual events are smaller minor events. All new wells are sampled quarterly for one year. The semiannual wells are sampled second and fourth quarter of each year, and the annual wells are sampled second quarter of each year.

Groundwater samples collected during the Fourth Quarter 2012 monitoring event were analyzed for perchlorate. Select locations were also analyzed for volatile organic compounds and 1,4-dioxane. Perchlorate, trichloroethene, and 1,4-dioxane were identified as primary chemicals of potential concern at the site, based on the historical operations and groundwater monitoring results. Benzene, 1,2-dichloroethane, 1,1-dichloroethene, and hexahydro-1,3,5-trinitro-1,3,5-triazine were identified as secondary chemicals of potential concern.

4.3.1 Surface Water and Storm Water

Surface water samples are collected from seven storm-water sampling locations in the Laborde Canyon stream bed, and at three locations at a spring located on the former Wolfskill property. Water is generally present in the Laborde Canyon creek bed only during periods of heavy, prolonged precipitation.

During the Fourth Quarter 2012 sampling event, surface water samples were collected from two of the spring locations. The samples were analyzed for perchlorate. The remaining spring sample and seven storm-water sampling locations in Laborde Canyon were dry at the time of sampling. Perchlorate was not detected in surface water samples during the Fourth Quarter 2012 monitoring event. During First Quarter 2013 a storm water sample was collected from surface water location SW-07. Perchlorate was detected at a concentration of 1.1 microgram per liter (µg/L). The remaining storm-water sampling locations in Laborde Canyon were dry at the time of sampling.

4.3.2 Groundwater

Area J – Final Assembly

Area J wells were not scheduled to be sampled during Fourth Quarter 2012. Site chemicals of potential concern have not been detected above their respective maximum contaminant level or drinking water notification level in Area J.

Area K – Test Bays and Miscellaneous Facilities

Perchlorate, trichloroethene, and hexahydro-1,3,5-trinitro-1,3,5-triazine have been detected in Area K. Previously, perchlorate has been detected as high as 190,000 µg/L in Area K. During Fourth Quarter 2012, perchlorate was detected at concentrations ranging from below the method detection limit to 97,000 µg/L. Area K has been identified as a source of perchlorate in groundwater.

Samples for volatile organic compounds and hexahydro-1,3,5-trinitro-1,3,5-triazine were not scheduled for collection in Area K during Fourth Quarter 2012.

Area L – Propellant Burn Area

Perchlorate is the only site chemical of potential concern to be detected in Area L. Area L is located downgradient of Area K, a known perchlorate source area. Previously, perchlorate was detected at concentrations up to 9.98 µg/L in Area L. During Fourth Quarter 2012, perchlorate was detected in monitoring wells TT-MW2-4S, TT-MW2-10, and TT-MW2-12 at concentrations of 0.89 µg/L, 0.15 µg/L, and 0.22 µg/L, respectively. There is currently no indication that a perchlorate source is present in Area L; the perchlorate detected in Area L groundwater appears to have originated upgradient in Area K.

Area M - Garbage Disposal Area

Perchlorate and trichloroethene have been detected in Area M. Previously, perchlorate was detected at concentrations up to 469 µg/L in monitoring well TT-MW2-11. During the Fourth Quarter 2012, perchlorate was detected at concentrations ranging from below the method detection limit to 230 µg/L. Area M has been identified as a source of perchlorate in groundwater.

Samples for volatile organic compounds samples were not scheduled for collection in Area M during Fourth Quarter 2012.

Waste Discharge Area

Perchlorate, trichloroethene, 1,4-dioxane, and hexahydro-1,3,5-trinitro-1,3,5-triazine have been detected in the waste discharge area. This area is located downgradient of operational areas J, K, L, and M, but they do not appear to be contributing to the impacts observed at the waste discharge area in a material way.

Previously, perchlorate was detected at concentrations as high as 190,000 µg/L. Perchlorate was detected in groundwater at concentrations ranging from below the method detection limit to 130,000 µg/L during the Fourth Quarter 2012. The former waste discharge area has been identified as a source of perchlorate in groundwater.

Previously, trichloroethene was detected at concentrations as high as 460 µg/L in monitoring wells located in the waste discharge area. During the Fourth Quarter 2012, trichloroethene was detected in groundwater at concentrations ranging from below the method detection limit to 410 µg/L. The waste discharge area has been identified as a source of trichloroethene in groundwater. Trichloroethene has not been detected consistently, or above the maximum contaminant level, in monitoring wells downgradient of the waste discharge area.

Previously, 1,4-dioxane was detected as high as 420 µg/L in monitoring wells located in the former waste discharge area. 1,4-Dioxane was detected in groundwater at concentrations ranging from below the method detection limit to 170 µg/L during the Fourth Quarter 2012. The waste discharge area has been identified as a source of 1,4-dioxane in groundwater, and this constituent has been detected in downgradient monitoring wells. The 1,4-dioxane drinking water notification level is 1 µg/L.

Samples for hexahydro-1,3,5-trinitro-1,3,5-triazine samples were not scheduled for collection in the waste discharge area during Fourth Quarter 2012.

Lower Canyon and Riparian Corridor

Perchlorate, trichloroethene, and 1,4-dioxane have been detected in the lower portion of Laborde Canyon downgradient from the waste discharge area. Perchlorate has also been detected in the riparian corridor south of the property boundary. In the lower section of Laborde Canyon, perchlorate was detected at concentrations up to 10,000 µg/L, up to 519 µg/L at the southern site boundary, and up to 0.18 µg/L in the riparian corridor south of the southern site boundary. During the Fourth Quarter 2012, perchlorate was detected in groundwater at concentrations ranging from 17,000 µg/L in the northern portion of the lower Laborde Canyon to below the method detection limit in the riparian corridor. No source of perchlorate has been identified in the lower canyon or at the southern site boundary. The perchlorate appears to have originated in the former waste discharge area.

Trichloroethene was detected in monitoring well TT-MW2-9S located in the northern portion of the lower Laborde Canyon at a concentration of 1.8 µg/L during the Fourth Quarter 2012 monitoring event. Trichloroethene has not been detected in other wells located in the lower canyon or riparian corridor area. The source of the trichloroethene appears to be the waste discharge area.

During the Fourth Quarter 2012 monitoring event, 1,4-dioxane was detected in groundwater at concentrations ranging from 19 µg/L in the northern portion of the lower Laborde Canyon to below the method detection limit in the riparian corridor. No source of 1,4-dioxane has been identified in the lower canyon or at the southern site boundary. The 1,4-dioxane appears to have originated in the former waste discharge area.

Former Wolfskill Property

On the former Wolfskill property, south of the southern site boundary, perchlorate was detected in monitoring well TT-MW1-19S during Fourth Quarter 2012 at a concentration of 6.1 µg/L. These results are consistent with historic results. Perchlorate has not been detected in monitoring wells TT-MW2-20S or TT-MW2-20D, located approximately one-half mile south of TT-MW2-19S.

Summary

Given the data available at this time, the trichloroethene and hexahydro-1,3,5-trinitro-1,3,5-triazine plumes in groundwater appear to be small and isolated. These plumes do not extend off-site. The 1,4-dioxane plume is limited to the waste discharge area and lower Laborde Canyon, and does not appear to extend off-site. The perchlorate plume does appear to extend off-site, but terminates in the riparian corridor south of the southern site boundary. The perchlorate detected in monitoring well TT-MW2-19S located on the former Wolfskill property appears to be an isolated impacted area that may have resulted from preferential flow in higher-conductivity alluvium during a prolonged period of heavy precipitation in the past.

4.4 Groundwater Monitoring Program and the Groundwater Quality Monitoring Network

Quarterly groundwater monitoring has been conducted continuously at the site since the September 2004 well installation activities. Groundwater samples have been routinely analyzed for volatile organic compounds and perchlorate. Selected testing for California Assessment Manual 17 Metals, general minerals, 1,4-dioxane, hexahydro-1,3,5-trinitro-1,3,5-triazine, N-nitrosodimethylamine, 1,2,3-trichloropropane, and hexavalent chromium has also been performed. In accordance with the site *Groundwater Sampling and Analysis Plan* (Tetra Tech, 2007a), the analytical scheme, the classifications of the wells in the network, and the corresponding sampling frequency are evaluated annually during the second quarter of each year, and changes may be proposed to accommodate expanded site knowledge or changing site conditions.

4.4.1 Groundwater Sampling Frequency

The primary criterion used in determining the sampling frequency of a monitoring well is the well classification (i.e., function of each well) (Tetra Tech, 2007a). Classification of groundwater monitoring wells is based on the evaluation of the temporal trends, spatial distribution analyses, and other qualitative criteria. During the current reporting period, horizontal extent wells, vertical distribution wells, increasing contaminant trend wells, background wells, guard wells, and new wells were sampled. Table 4-1 presents a summary of the current frequency of groundwater sampling by well classification.

Table 4-1 Well Classification and Sampling Frequency

Well Classification	Frequency
Horizontal Extent Wells	Annual
Vertical Distribution Wells	Annual
Increasing Contaminant Trend Wells	Semiannual
Background Wells	Biennial
Remedial Monitoring Wells	Varies, based on remedial action proposed
Guard Wells	Semiannual
New Wells	4 quarters then reclassify
Redundant Wells	Suspend (no sampling)

4.4.2 Proposed Changes

The analytical scheme is evaluated annually during the second quarter of each year, and changes may be proposed to accommodate expanded site knowledge or changing site conditions. The classification of the wells in the network and the corresponding sampling frequency are also evaluated annually during the second quarter of each year and modified as needed. No unusual events or observations occurred during this reporting period that require modification of the monitoring program.

Section 5 References

1. California Department of Health Services, 1989. *Lockheed Beaumont Consent Order*, June 16, 1989.

2. Hillwig – Goodrow, LLC, 2008. *Lockheed Site 2 Topographic Survey, Lockheed Martin Corporation, Beaumont Site 2, Beaumont, California*, December 2008.

3. Lockheed Martin Corporation, 2006a. *Clarification of Effects on Stephens' Kangaroo Rat from Characterization Activities at Beaumont Site 1 (Potrero Creek) and Site 2 (Laborde Canyon)*, August 3, 2006.

4. Lockheed Martin Corporation, 2006b. *Clarification of Mapping Activities Proposed under the Low-Effect Habitat Conservation Plan for the Federally-Endangered Stephens' Kangaroo Rat at Beaumont Site 1 (Potrero Creek) and Site 2 (Laborde Canyon) Riverside County, California (mapping methodology included)*, December 8, 2006.

5. Radian Corporation, 1986. *Lockheed Propulsion Company Beaumont Test Facilities Historical Report*, September 1986.

6. Tetra Tech, 2005. *Lockheed Martin Third Quarter 2005 Groundwater Monitoring Report Beaumont Site 2, Beaumont, California*, December 2005.

7. Tetra Tech, 2007a. *Groundwater Sampling and Analysis Plan, Lockheed Martin Corporation, Beaumont Site 2, Beaumont, California*, May 2007.

8. Tetra Tech, 2007b. *Site Investigation Report for Soil Investigations at the Earthen Prism Shaped Structure and Possible Liquid Waste Discharge Ponds at Lockheed Martin Beaumont Site 2*, October 2007.

9. Tetra Tech, 2008. *Supplemental Site Characterization Report, Former Waste Discharge Ponds and Southern Property Boundary, Beaumont Site 2, Beaumont, California*, July 2008.

10. Tetra Tech, 2009a. *Structural Analysis Laborde Canyon (Lineament Study) Appendix L Semiannual Groundwater Monitoring Report Second Quarter and Third Quarter 2009, Beaumont Site 2, Beaumont, California*, July 2010.

11. Tetra Tech, 2009b. *Historical Research Summary Report, Potential Munitions and Explosives of Concern (MEC) Issues, Lockheed Martin Corporation, Beaumont Site 2 and the Gateway Property, Beaumont, California*, January 2009.

12. Tetra Tech, 2010a. *Dynamic Site Investigation and Summary Remedial Investigation Report, Beaumont Site 2, Beaumont, California*, April 2010.

13. Tetra Tech, 2010b. *Programmatic Sampling and Analysis Plan, Lockheed Martin Corporation, Beaumont Sites 1 & 2, Beaumont, California*, September 2010.

14. Tetra Tech, 2011. *Semiannual Groundwater Monitoring Report Second Quarter and Third Quarter 2011, Laborde Canyon (Lockheed Martin Beaumont Site 2), Beaumont, California*, December 2011.

15. Tetra Tech, 2012. *Semiannual Groundwater Monitoring Report Second Quarter and Third Quarter 2012, Laborde Canyon (Lockheed Martin Beaumont Site 2), Beaumont, California*, December 2011.

16. United States Fish and Wildlife Service (USFWS), 2005. *Endangered Species Act Incidental Take Permit for Potrero Creek and Laborde Canyon Properties Habitat Conservation Plan*, October 14, 2005.

17. United States Environmental Protection Agency (USEPA), 1997. USEPA Volunteer Stream Monitoring: A Methods Manual, EPA 841-B-97-003, November 1997.

18. United States Environmental Protection Agency (USEPA), 2008. Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, OSWER 9240.1-48, EPA-540-R-08-01, June 2008.

19. United States Environmental Protection Agency, 2010. USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review, OSWER 9240.1-51, EPA-540-R-10-011, January 2010.

APPENDIX A-I ON CD ON BACK COVER