Remedial Investigation/Feasibility Study
Site-Specific Safety and Health Plan
Tourtelot Cleanup Project
Benicia, California

November 29, 1999

Prepared by:

EARTH TECH

A tyco INTERNATIONAL LTD. COMPANY

1461 East Cooley Drive, Suite 100, Colton, California 92324

Site Specific Safety and Health Plan

Tourtelot Cleanup Project

REVIEWED AND APPROVED BY:

Brian Weith
Project Manager

11/27/99
Date

Steven P. Clay, CIH, CSP
Project Manager/CWM Safety Specialist

11/27/99
Date

TABLE OF CONTENTS

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

APPENDICES

LIST OF TABLES

LIST OF FIGURES

LIST OF PLATES

ACRONYMS/ABBREVIATIONS

ACGIH	American Conference of Governmental Industrial Hygienists
AIHA	American Industrial Hygiene Association
AP	anti-personnel
ASR	Archives Search Report
ASTM	American Society of Testing and Materials
bgs	below ground surface
bpm	beats per minute
Cal/OSHA	California Occupational Safety and Health Administration
CAM	California Assessment Manual
CCR	California Code of Regulations
CFR	code of federal regulations
CNS	central nervous system
CPC	chemically protective clothing
CRZ	Contamination Reduction Zone
cy	cubic yards
°	degree
dBA	decibel, A-weighted scale
DOD	Department of Defense
DTSC	Department of Toxic Substances Control
EE/CA	Engineering Evaluation/Cost Analysis
EIR	Environmental Impact Report
EM	electromagnetic
EMR	electromagnetic radiation
EOD	explosive ordnance disposal
EPA	Environmental Protection Agency
F	Fahrenheit
FDEM	fixed domain electromagnetic
FS	Feasibility Study
FTL	Field Team Leader
GPR	ground-penetrating radar
HAZWOPER	Hazardous Waste Operations and Emergency Response
HE	high explosive
HEPA	high-efficiency particulate air
HERO	Hazards of Electromagnetic Radiation to Ordnance
HSA	hollow-stem auger
HSM	Health and Safety Manager
HTRW	hazardous, toxic, or radioactive waste
LUFT	Leaking Underground Fuel Tank
mg/kg	milligram per kilogram
mg/m^3	milligrams per cubic meter
mm	millimeter
MSDS	Material Safety Data Sheet
NIOSH	National Institute of Occupational Safety and Health
NORCAL	NORCAL Geophysical Consultants, Inc.
OE	ordnance and explosives
OESM	Ordnance and Explosives Safety Manager

OSHA	Occupation Safety and Health Administration
PAH	polyaromatic hydrocarbon
PAT	Proficiency Analytical Testing
PEL	Permissible Exposure Limit
PETN	pentaerythritol tetranitrate
PM	project manager
PPE	personal protective equipment
PRG	preliminary remediation goal
RAP	Remedial Action Plan
RDX	cyclonite
RI	Remedial Investigation
RRR	Records Research Report
SECOR	SECOR International
Sequoia Analytical	Sequoia Analytical Laboratory of Petaluma
SPF	sun protection factor
SSC	Site Safety Coordinator
SSD	safe separation distance
SSHP	Site-Specific Safety and Health Plan
SVOC	semivolatile organic compound
TDEM	Transient Domain Electromagnetic
TDS	total dissolved solids
TEPH	Total Extratable Petroleum Hydrocarbons
THA	task hazard analyses
TLV	Threshold Limit Value
TMF	total magnetic field
TNT	trinitrotoluene
TSS	total suspended solids
USA	Underground Services Alert
USACE	U.S. Army Corps of Engineers
UXO	unexploded ordnance
VOC	volatile organic compound
WBGT	wet bulb globe temperature
WDM	window defining mix

1.0 INTRODUCTION

1.1 GENERAL

The provisions of this Site-Specific Safety and Health Plan (SSHP) are mandatory for all Earth Tech personnel involved in the Remedial Investigation (RI)/Feasibility Study (FS) activities at the Project Site. This SSHP provides the specification for the minimum acceptable requirements for all subcontractor organizations, and notification of the chemical and physical hazards expected to be associated with the Earth Tech-managed activities addressed in this document.

Operational changes to this SSHP that could affect the health and/or safety of site personnel, the community, or the environment will not be made without prior approval of the Earth Tech Project Manager (PM), Earth Tech Health and Safety Manager (HSM), U.S. Army Corps of Engineers (USACE), and Department of Toxic Substances Control (DTSC). In the event of a conflict between this Plan and federal, state, or local regulations, the more stringent will apply.

1.2 POLICY STATEMENT

It is the policy of Earth Tech to provide a safe and healthful work environment for all of its employees. Earth Tech considers no phase of operations or administration to be of greater importance than injury and illness prevention. Safety takes precedence over expediency or shortcuts. At Earth Tech, we believe every accident and every injury is avoidable. We will take every reasonable step to reduce the possibility of injury, illness, or accident.

This SSHP presents procedures to be employed during all on-site work activities. The practices and procedures presented in this SSHP are mandatory for all Earth Tech employees (and subcontractors) while they are engaged in work operations at the Project Site. Earth Tech also requires that all visitors to areas under its control abide by these procedures.

1.3 APPLICABILITY

This SSHP addresses all applicable SSHP elements as presented in Title 8 of the California Code of Regulations (CCR) Section 5192 (b). The applicable elements include those items that are identified as part of the Scope of Work (Section 2.4) or as potential workplace hazards that may be encountered during the performance of planned work activities. Any elements not discussed in this SSHP have been determined to be inapplicable to planned work activities or to present no significant worker hazards, and have therefore been omitted for clarity. Specifically, elements addressed in 8 CCR Section 5192 (b) that are not addressed in this Plan include:

- Radiation - No radiation hazards will be associated with this project

- Lighting - No work will be conducted beyond normal daylight hours

- Confined Spaces - No confined space hazards are associated with this project.

- Spill Response - No hazardous materials in reportable quantities will be imported or produced during this project.

- Spill containment will be provided for purged water from wells. Water will be put into a steel drum for laboratory characterization. The drum will be placed into a plastic over pack drum capable of containing 110 percent of the drum contents. The drum and over pack containment system will be covered with polyethylene sheeting to protect from rain.

1.4 REFERENCES

This SSHP complies with applicable Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), and California Occupational Safety and Health Administration (Cal/OSHA) regulations, and standards developed for the Project Site. This SSHP follows the requirements found in the following documents:

- Title 29 of the Code of Federal Regulations (CFR), Part 1910 (1910), Occupational Safety and Health Standards (OSHA)

- 8 CCR, Chapter 4, Subchapter 4 (Construction Safety Orders) and Subchapter 7 (General Industry Safety Orders)

- USACE Engineers Engineering Manual 385-1-1, Safety and Health Requirements Manual, September 1996

- The state of California, Proposition 65, Community Right-to-Know.

2.0 PROJECT INFORMATION AND SCOPE OF WORK

2.1 PROJECT LOCATION

The Project Site is in the City of Benicia, Solano County, California, approximately 30 miles northeast of San Francisco (Figure 2-1). Consisting of approximately 220 acres, it is partially within the boundaries of the Former Benicia Arsenal (Figure 2-2). The site has rolling topography that includes areas referred to as the North Valley and the South Valley, and it is bordered by the Southampton residential development to the west and south, the Exxon refinery to the south, industrial and commercial facilities to the east and open space to the north and east (Earth Tech, 1999) (Figure 2-3).

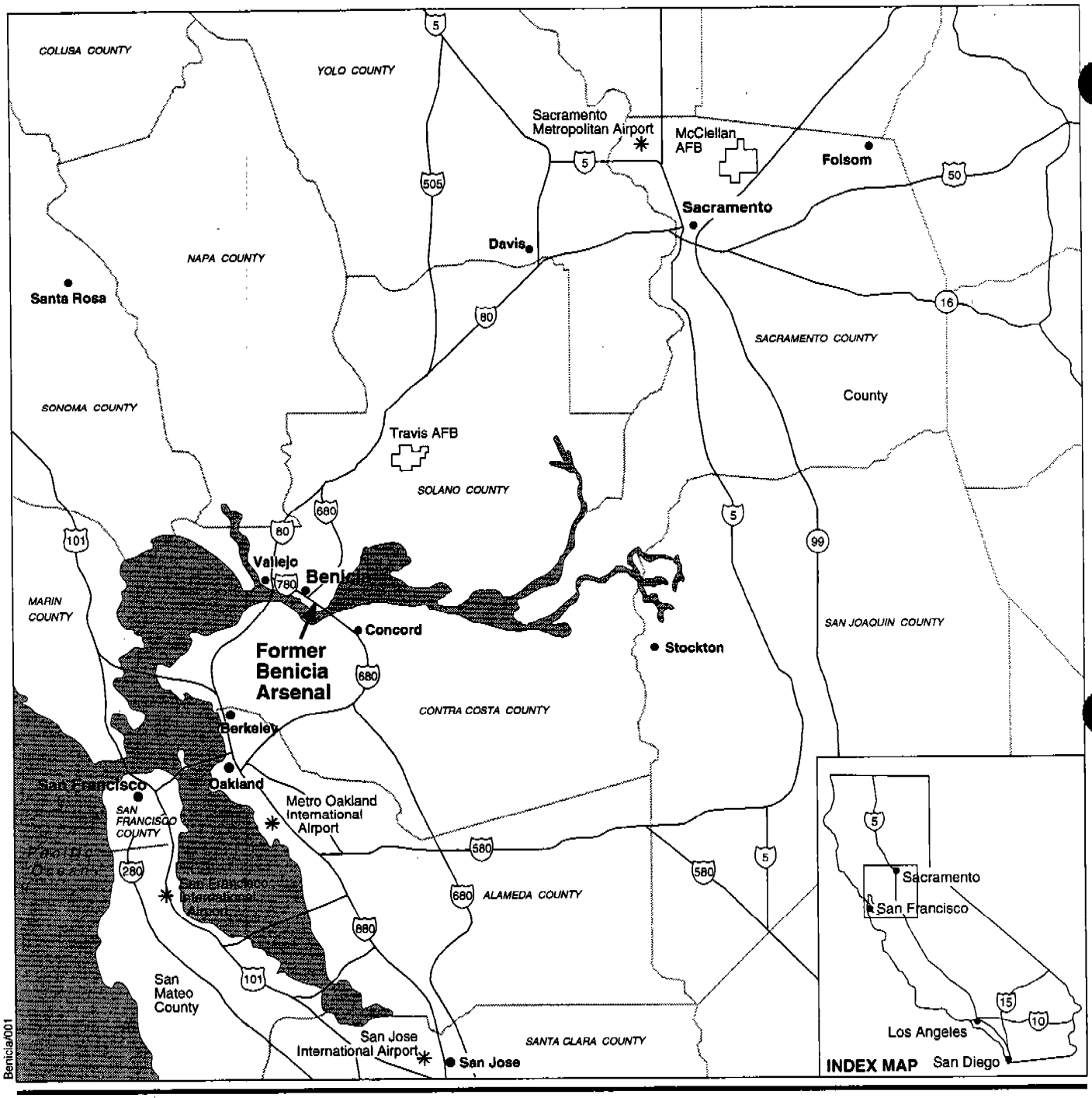
2.2 SITE HISTORY AND DESCRIPTION

2.2.1 Site History

Between 1849 and 1958, the U.S. Army acquired approximately 2,700 acres of land in Benicia and established the Benicia Arsenal for use as a depot for ordnance. In 1944, the Army leased a 200-acre piece of undeveloped ranchland known as the Tourtelot Property that was situated next to the Benicia Arsenal. Between 1945 and 1947, the Army began developing the Tourtelot Property for a number of different activities in both the North Valley and South Valley (see Figure 2-3). In 1955 and 1960, the Army's leases for the Tourtelot Property terminated, and in January 1962, the Department of Defense (DOD) declared the entire Benicia Arsenal excess.

Portions of the arsenal were developed in the late 1960s. The Tourtelot Property remained under private ownership and was not developed. In 1971, portions of the Tourtelot Property were acquired by developers from Mary Tourtelot, and the remaining 110-acre parcel was acquired from Mary Tourtelot in 1981 as part of the Southampton residential development. In 1989, the City of Benicia approved the Environmental Impact Report (EIR) for residential development of the land. In 1990, grading activities were conducted on the Tourtelot Property in support of off- and on-site residential development. The activities included using the Ridge as a borrow site for soils and construction of the McAllister Drive Land Bridge, which is a fill that crosses the South Valley and provides access to the Ridge from Rose Drive (see Figure 2-3). The sewer line along the south side of the South Valley was also installed at this time.

In mid-1996, during preliminary site preparation associated with development of the Tourtelot Property, concrete-filled howitzer shells were unearthed, and Granite promptly took several steps to make the Tourtelot Property safe, including stopping the preliminary construction activities, alerting officials about the shells' discovery, putting a fence around the site, and hiring a security service. Granite



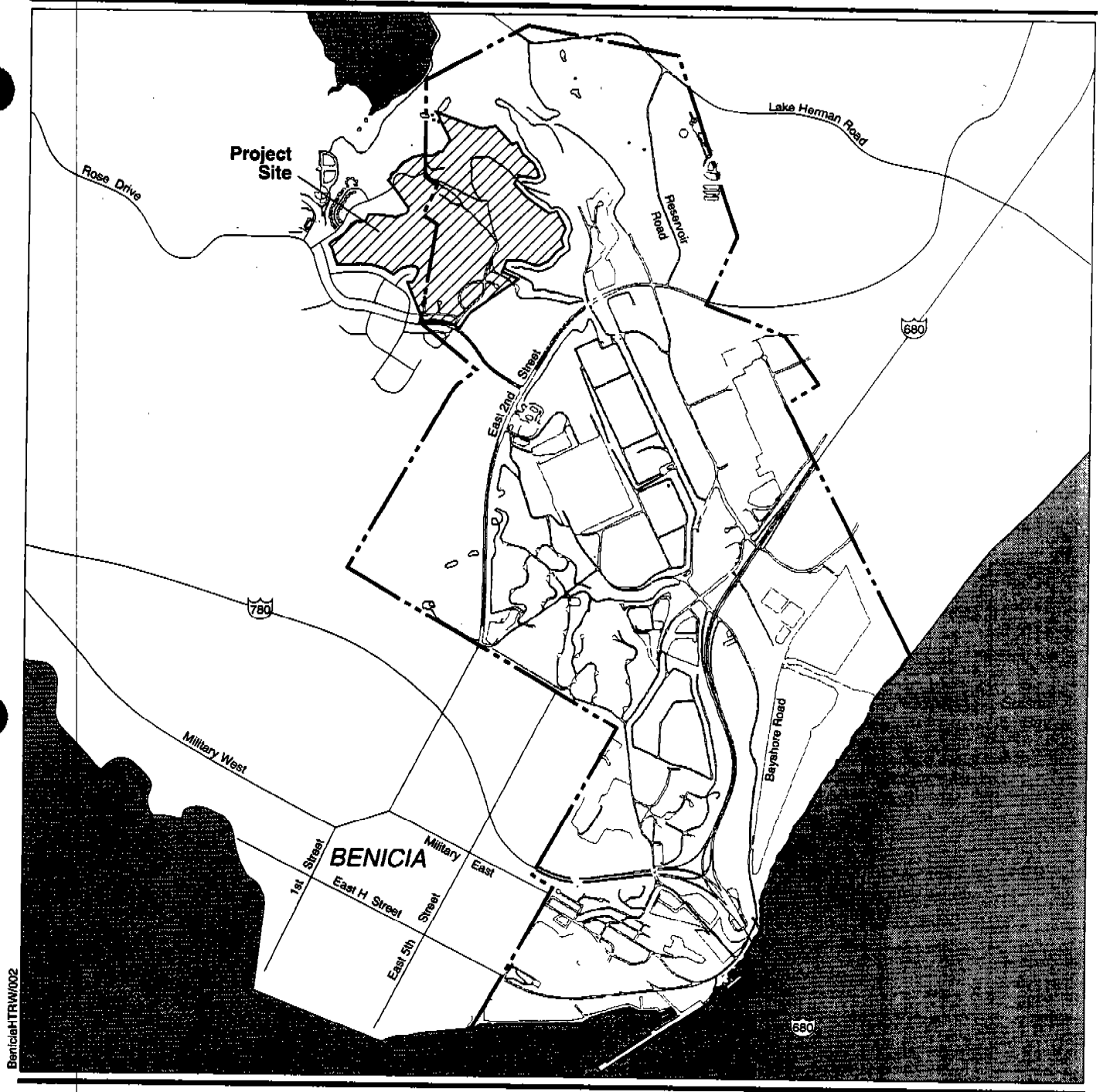
EXPLANATION

- Airports
- California State Highway
- U.S. Highway
- Interstate Highway
- County Boundary

0 3.5 7 14 Miles

Regional Map

Figure 2-1



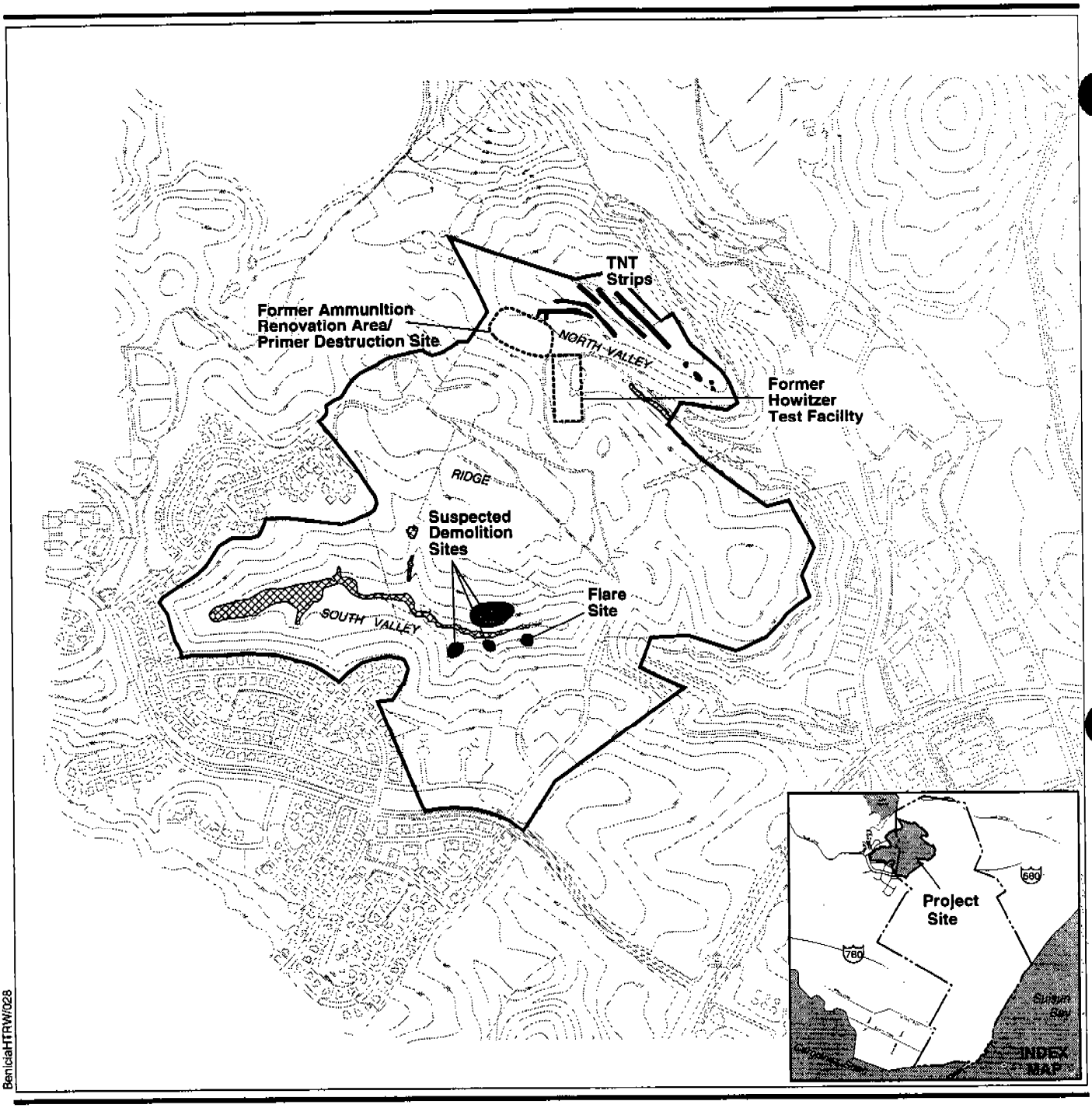
EXPLANATION

- 680 Interstate Highway
- Former Benicia Arsenal Boundary (estimated)
- Project Site

0 .125 .25 .5 Mile

Project Site Location Map

Figure 2-2



BeniciaHTRW/028

EXPLANATION

Project Site Boundary

Wetland

Investigation Areas

0 250 500 1000 Feet

Note: Contour interval equals 25 feet.

Figure 2-3

retained military-trained explosive specialists and initiated preliminary site investigations for affected soils and ordnance and explosives (OE). Part of the investigation included collection of geophysical data across the majority of the Project Site. Plate 1 depicts the results of the geophysical survey. In late fall 1996, live ordnance was first encountered and reported by Granite to local military personnel for handling. In 1998, the USACE began investigation of the Project Site as part of an arsenal investigation to characterize the area for OE/unexploded ordnance (UXO).

The Project Site remains undeveloped except for one structure that recently has been used as a construction office for the Southampton development. The Tourtelot Property is currently fenced and access is controlled. Adjoining land is also enclosed by fencing.

2.2.2 Department of Defense Activities at the Project Site

During the period when the Project Site was used by DOD, it accommodated a range of activities. Based on site inspection, data collected by the USACE for the Former Benicia Arsenal EE/CA report, review of historical aerial photographs, and review of geophysical data collected across the majority of the Project Site, several potential sites have been identified (see Plate 1). Approximately 6 acres in the North Valley were developed with roads and structures where the accuracy of locally manufactured howitzer gun barrels were checked, ordnance was inspected and renovated, and primers were destroyed in a "burn cage." In the South Valley there were at least two demolition sites and a flare site. Demolition activities generally consisted of placing various amounts of out-of-service munitions in a "pit" and placing a countercharge on top of the items and detonating them. Often these areas were used multiple times resulting in a deep pit or crater. The type of munitions placed in the demolition sites in the South Valley is unknown. Part of the Ridge was used to dispose of aged, out-of-service dynamite. The following subsections provide general information about each of the identified sites and the potential contaminants of concern associated with the activities that occurred at the site. Previous OE investigations and findings are presented in Section 2.3.2.

2.2.2.1 TNT Strips Site.

The trinitrotoluene (TNT) strips are on the hillside to the north of the North Valley. The Records Research Report (RRR) and the Archives Search Report (ASR) did not find anything in the available records stating what type of activities may have caused the scarring, now referred to as the TNT Strips. The strips are clearly visible in a 1947 aerial photograph. Today, the strips are still clearly visible as is evident by the pronounced lack of vegetation along the strips. There are five strips varying in length from 300 to 800 feet; each is approximately 6 feet wide. Exposed soil in the strips is characterized by a deep red color with crystalline materials observable in the dry season. In fall 1998, field screening samples were collected from the near-surface along the TNT Strips. TNT was detected in the soil samples from the strips. It has been assumed that the burning of explosives, similar to

what was reported for the Dynamite Burn Area, resulted in the TNT Strips on the hillside above the North Valley.

The only known activity to occur within the TNT Strips is the burning of TNT. Based on this information, there are two potential categories of contaminants that may have been generated from the burning of TNT: (1) TNT and its break-down products, and (2) polyaromatic hydrocarbons (PAHs) that can be generated by the burning of organic material.

2.2.2.2 Howitzer Test Facility Site.

The Howitzer Test Facility consisted of three permanent structures in the North Valley (see Plate 1). Building 181 consisted of two parallel tunnels; each had a 10-foot by 10-foot opening and extended approximately 100 feet into the hillside. The second structure contained the open firing butts, and a third building was a concrete powder loading room. A disposal area is believed to have been situated adjacent to the tunnels where shell casings, OE scrap, and debris were discarded. The facility was used to test howitzer barrels and propellant by firing various-sized howitzer projectiles filled with concrete or gravel. This was performed in order to determine if the barrels functioned correctly and whether the propellant was the right mixture. The facility was in operation from approximately 1945 to 1955.

In 1957 and 1958, a cement block test cell was built between the firing butts and the tunnels. Two buildings were constructed; one building pad was 12 feet by 20 feet, but there were no records of the size of the second building. Records do not clearly reveal what the test block was used for; however, a former employee interviewed for the RRR referred to this facility as the Calibration Facility (Jacobs Engineering, 1999). In mid-1996, during preliminary site preparation for development, all the facilities in this area were dismantled and most of the construction debris removed from the area. A large number of concrete-filled howitzer shells were unearthed during these activities. A small debris/waste dump was encountered during preliminary site preparation activities. The debris pile was situated on the east side of the facility adjacent to the current soils stockpiles in the area. The debris encountered was described mainly as parts of wooden crates and pallets. The soil that was mounded around the tunnels is currently stockpiled in the North Valley at the east end of the area.

Gravel and soil piles around the howitzer test tunnels were screened under the observation of a qualified UXO expert. Several howitzer shells were removed from the soils during this operation. An attempt was made to separate soils with a large amount of gravel and inert OE fragments from cleaner soils.

Based on the activities that occurred at the Howitzer Test Facility Site, the following potential contaminants of concern may have impacted the soils and groundwater (if present):

- Solvents may be present from cleaning and general maintenance activities associated with the facility

- Nitrogen from the black powder used as propellent for the howitzer rounds

- Diesel and motor oil from any vehicles parked at the facility or used for heating

- Kerosene from the adjacent Primer Destruction Area used to fuel the oil burners

- Explosives from the primers either burned at the adjacent facility or used in the fuze chain to ignite the propellent.

2.2.2.3 Ammunition Renovation/Primer Destruction Area.

The Ammunition Renovation/Primer Destruction Area is in the North Valley adjacent to the Howitzer Test Facility Site (see Plate 1). Typically, primers were destroyed by dumping them into a "squirrel cage" or metal tank. Primers for various munitions were pulled out and placed onto a conveyor belt, then dropped into a cage and burned. An oil burner usually was attached to the cage or tank and was left running in order to ignite the primers. The burned primers, now inert scrap metal, were removed from the cage and recycled. The Primer Destruction Facility was used from 1945 to 1947.

The Ammunition Renovation/Primer Destruction Area consisted of two wooden buildings and two canvas shelters (Jacobs Engineering, 1999), which were used to inspect and refurbish ordnance items stored at the arsenal. The RRR stated that a canvas structure in the middle of the area was used for breakdown operations, cleaning, and processing of ammunition casings in preparation for painting. The Ammunition Renovation/Primer Destruction Area was constructed in 1950. It is uncertain how long the area was in operation.

Both of these facilities were removed during preliminary site development in 1996. During the removal of the foundations for the various facilities, soils in the area were disturbed. Some of the soils disturbed during the demolition of structures associated with the Ammunition Renovation/Primer Destruction Area were also stockpiled in the North Valley.

Based on the activities that occurred at the Ammunition Renovation/Primer Destruction Area, the following potential contaminants of concern may have impacted the soils and groundwater (if present):

- Solvents may be present from the cleaning and general maintenance activities associated with the facility

- PAHs from the burning of primers
- Diesel and motor oil from any vehicles parked at the facility or used for heating
- Kerosene from the Primer Destruction Facility used to fuel the oil burners
- Explosives from the primers either burned at the facility or mishandled during ammunition renovation activities.

2.2.2.4 Flare Site.

The Flare Site is in the South Valley and is evident by the ash, OE scrap, and fragments recovered from the site (see Plate 1). The Flare Site was used to burn and dispose of flares. This usually consisted of placing flares on the ground in rows, adding an accelerant, and igniting flares. It is uncertain if the Flare Site was used to dispose of ordnance. A relatively large number of anomalies is evident in the geophysical data, and the site is clearly visible in a number of the historical aerial photographs reviewed. All sites within the Demolition and Flare Area have had soil samples collected from the periphery or near-surface (see Section 1.5 for results).

Based on the activities that occurred at the Flare Site, the following potential contaminants of concern may have impacted the soils and groundwater (if present):

- Various types of metals including phosphorous may be present
- PAHs from the burning of flares
- Explosives, if the site was used for demolition.

2.2.2.5 Demolition Site #1.

No live ordnance items have been recovered from this site (see Plate 1). However, OE scrap and fragmentation are visible in the side walls of the drainage containing the demolition site. This site is evident in the geophysical data and appears disturbed in the historical aerial photographs.

Based on the activities that occurred at Demolition Site #1, the following potential contaminants of concern may have impacted the soils and groundwater (if present):

- Various types of metals that may have been used in the body of the destroyed ordnance items

- PAHs from the burning of organic material that may have been present

- Explosives from the various OE items destroyed.

2.2.2.6 Demolition Site #2.

The suspected demolition site shows relatively little evidence of use. This site is on the south side of the South Valley between the Flare Site and the other demolition site (see Plate 1). The site is suspected because it appears disturbed or barren in several of the historical aerial photographs. Review of geophysical data does not indicate that the site has a high anomaly count similar to the two known demolition sites, and large amounts of OE scrap or fragments have not been observed during site visits.

Based on the activities which occurred at Demolition Site #2, the following potential contaminants of concern may have impacted the soils and groundwater (if present):

- Various types of metals that may have been used in the body of the destroyed ordnance items

- PAHs from the burning of organic material that may have been present

- Explosives from the various OE items destroyed.

2.2.2.7 Demolition Site #3.

Several ordnance items were recovered from this site both by Granite and the USACE (see Plate 1). Also, an armored personnel vehicle was removed from this site, hauled up the north slope of the South Valley, and sliced into pieces that were recycled at a local metal fabrication shop. The site is evident in the geophysical data.

Based on the activities which occurred at Demolition Site #3, the following potential contaminants of concern may have impacted the soils and groundwater (if present):

- Various types of metals that may have been used in the body of the destroyed ordnance items

- PAHs from the burning of organic material that may have been present

- Explosives from the various OE items destroyed.

2.2.2.8 Dynamite Burn Site.

On the Ridge, aged, out-of-service dynamite was reportedly disposed of through burning (see Plate 1). Aged dynamite was burned by placing multiple sticks of dynamite in rows up to 100 feet long on a piece of paper and igniting the paper. This area is believed to have been used from 1947 to 1948. The area used for burning of dynamite was approximately one-half the size of a football field. The ridge used for the Dynamite Burn Area was used as a borrow site for soils during grading activities associated with the Southampton development in 1990 (see Section 1.2.2 regarding grading activities). For this reason, no further work associated with the Dynamite Burn Site is presently anticipated.

Based on the activities that occurred at the Dynamite Burn Area, nitroglycerin may be a potential contaminant of concern. However, because of the mass excavation that occurred in this area, it is highly unlikely that any nitroglycerin will be present.

2.2.3 Past Grading Activities

Development of the area adjacent to the Project Site started in 1990. A review of rough grading plans, preliminary soils reports, testing and observation service reports, notes from the grading subcontractor, and historical aerial photographs provides a good insight as to where the material was placed as fill. The basic assumption used to determine where soils were placed is that standard grading techniques call for establishing the shortest haul routes between cut-and-fill areas. Based on this assumption, review of available documents, professional judgment, and understanding of standard mass grading techniques, soils within the affected area were most likely moved as follows:

- Rough grading for the Southampton development began in April 1990. Grading began in the area referred to as D-1 and D-2 on the grading plans (see Plate 1). The majority of D-1 was a cut area; the majority of D-2 was a fill area. Standard grading techniques and aerial photographs and grading observation records confirm that the initial cut materials from D-1 most likely were placed in the D-2 fill sites.

- The other major fill areas in the development are along the Rose Drive/Panorama Drive fill sites, south of Kearney Street (see Plate 1). Fill for this area was most likely derived from the adjacent cut area to the east. Cutting and filling for this area appear to have begun shortly after D-1/D-2. The D-1/D-2 area continued to be active after grading began in this area.

- There is an area referred to as the "East Crossing" in the final testing and observation reports for the Southampton development. Elevation of the compaction tests taken here, as well as the

geography of the development, suggest that the East Crossing was the "McAllister Drive Land Bridge." Based on this assumption, preparatory work for the land bridge began as early as June 1990. However, the majority of the fill was placed in mid- to late August 1990. During the August time frame, most of the other major fills in the development had little activity based on test results. After completion of the McAllister Drive land bridge, the major fills were once again active.

- The Ridge between the North and South Valleys was used as a soils borrow area (see Plate 1). An estimated 600,000 cubic yards (cy) of soil, resulting in approximately 40 to 50 feet in elevation loss, was removed. The May 13, 1990, aerial photograph indicates that the soils borrow area is relatively undisturbed. The September 1990 aerial photograph shows that the soils from the Ridge down to approximately the 260-foot contour line had been removed, approximately the eastern 2/3 of the aerial extent. It is evident from the aerial photographs that the removed soils were used to construct the McAllister Drive Land Bridge. According to construction drawings, the land bridge required approximately 200,000 cy of soil. The observation and test results report indicates that during the construction of the land bridge, most of the other fill areas received little or no fill. Once the land bridge was completed, the D-2 and Rose Drive/Panorama Drive/McCall Street fill sites became active again. The remaining cut from the Ridge soils borrow area may have been used in these areas. After February 1991, the maximum extent of the Ridge borrow site appears to have been reached.

- Grading activities along the Kearney Street lots were completed between June 21, 1991, and September 3, 1993, based on an aerial photography review.

- In September 1993, stockpiled soils appear on the ridge borrow site. The stockpiled soil on the ridge borrow site appears to have been generated from development activities associated with the development of the Kearney Street lots.

- The structures in the North Valley were removed in 1996 during preliminary site construction activities. Recyclable material, such as the concrete, culverts, and rebar from the buildings, was temporarily stockpiled in the area and hauled away. Disturbed soils are currently stockpiled in the North Valley.

2.3 PREVIOUS INVESTIGATIONS

2.3.1 Remedial Investigation Activities

There have been several investigations of the Project Site for both ordnance and non-ordnance issues. A complete summary of past ordnance investigations will be presented in the Interim UXO Remedial Action Plan (RAP). The Interim RAP is scheduled for agency review in early December 1999. There have been two separate non-UXO investigations of the Project Site. The first was conducted in late 1998 by SECOR International (SECOR); the second by Earth Tech in June 1999.

SECOR conducted the initial investigations on portions of the Project Site in 1998. Eighty-four soil samples were collected from selected areas on the Project Site during this investigation. The majority of the samples were collected at approximately 2 to 5 inches below ground surface (bgs). Two sets of samples were collected: SS-series soil samples that were provided to a laboratory for analysis and FSS-series samples that were field screening samples for TNT. Most of the SS-series samples were analyzed for metals (EPA Method 6010A/7000 series), explosive compounds (EPA Method SW8330), phosphate (EPA Method 365.3), and nitrate and nitrate/nitrite as nitrogen (EPA Method 353.2) by California-certified Sequoia Analytical Laboratory of Petaluma (Sequoia Analytical). The FSS-Series samples were analyzed for TNT and cyclonite (RDX) using the Ensys® Soil Test System, a field testing method. Confirmation analyses for TNT and RDX were also performed in the laboratory for selected samples for which the field test method was utilized. In addition, two surface water samples were collected from the Wetlands. Water samples were analyzed for total and dissolved metals (EPA Method SW6010A), explosive compounds (EPA Method SW8330), and nitrate and nitrate/nitrite as nitrogen (EPA Method 353.2) by Sequoia Analytical.

Earth Tech performed follow-on environmental sampling in June 1999. Earth Tech reviewed the previous collected data and designed a sampling program to further identify contaminants of concern and to try to define the lateral extent of contaminants at known sites. A total of 120 soil samples were collected during this investigation. The samples were analyzed for metals (EPA Method SW6010B/7000), PAHs (EPA Method SW8310), explosive compounds (EPA Method SW8330), and, in some instances, for dioxins/furans (EPA Method SW8290) and semivolable organic compounds (SVOCs) (EPA Method 8270C). The samples were obtained at various depths: surface to 0.5 foot bgs; 0.5-1.0 foot bgs; 1.0-1.5 feet bgs; 2.0-2.5 feet bgs; 3.5-4.0 feet bgs; 3.75-4.25 feet bgs; and 4.0-4.5 feet bgs. The sampling was performed at the Demolition and Flare Area, the TNT Strips Area, the stockpiles in the North Valley, and at the Wetlands.

A summary of the previous investigation results by site is provided in Appendix A. The results from previous sampling indicate that explosives, metals, PAHs, and dioxins/furans exist at various sampling locations above the preliminary

remediation goal (PRGs) and estimated local background levels. The contaminants are listed by site in Table 2-1:

Table 2-1. Contaminants of Concern by Location and Concentration Range
Page 1 of 2

Contaminant	Site	State	Low	High
2,4,6-Trinitrotoluene	TNT Strips	Solid	2 mg/kg	380,000 mg/kg
Antimony	Flare Area	Solid	2.2 mg/kg	1,470 mg/kg
Arsenic	TNT Strips	Solid	13.6 mg/kg	23 mg/kg
	Howitzer Test Facility	Solid	13 mg/kg	17 mg/kg
	Ammunition Renovation/Primer Destruction Area	Solid	13 mg/kg	16 mg/kg
	Flare Area	Solid	9.9 mg/kg	18 mg/kg
	Demolition Area #1	Solid	14.7 mg/kg	18 mg/kg
	Demolition Area #2	Solid	13 mg/kg	17 mg/kg
	Demolition Area #3	Solid	11 mg/kg	19.1 mg/kg
	Wetlands	Dissolved Solid	15 mg/kg	15 mg/kg
Barium	Flare Area	Solid	190 mg/kg	76,600 mg/kg
Copper	Flare Area	Solid	67 mg/kg	24,200 mg/kg
Iron	TNT Strips	Solid	25,000 mg/kg	50,000 mg/kg
	Howitzer Test Facility	Solid	36,000 mg/kg	47,000 mg/kg
	Ammunition Renovation/Primer Destruction Area	Solid	38,000 mg/kg	44,000 mg/kg
	Flare Area	Solid	43,000 mg/kg	66,000 mg/kg

Table 2-1. Contaminants of Concern by Location and Concentration Range

Contaminant	Site	State	Low	High
	Demolition Area #1	Solid	42,000 mg/kg	48,000 mg/kg
	Demolition Area #2	Solid	36,000 mg/kg	47,500 mg/kg
	Demolition Area #3	Solid	40,000 mg/kg	48,000 ng/kg
	Wetlands	Dissolved Solid	44,000 mg/kg	44,000 mg/kg
Lead	Flare Area	Solid	11 mg/kg	46,000 mg/kg
Manganese	TNT Strips	Solid	290 mg/kg	1,900 mg/kg
benzo(a)pyrene	Ammunition Renovation/Primer Destruction Area	Solid	0.11 mg/kg	0.11 mg/kg
2,3,7,8-tetrachlorodibenzo-p-dioxin	Flare Area	Solid	1.5 pg/g	1.5 pg/g
total hexachlorinated dibenzo-p-dioxins	Flare Area	Solid	110 pg/g	110 pg/g

A detailed discussion of each site and the contaminants of concern is located in Section 1.5 of the RI/FS work plan.

2.3.2 Previous Unexploded Ordnance Investigations

DOD conducted OE clearance activities at the Demolition Area on the Project Site in 1955 (U.S. Army Corps of Engineers, St. Louis District, 1994a,b). However, during a later inspection of the area in 1955, several live OE items were found; it was recommended that a second clearance be performed in the area. No record of a possible second clearance could be found. The next reported OE clearance activity was initiated when a concrete-filled howitzer shell was encountered during preliminary site preparation activities associated with site development in mid-1996. The developer, Granite, retained OE experts and initiated OE investigations on the Tourtelot Property. The work included geophysical mapping and OE removal.

The initial geophysical surveys at the site were limited to the Howitzer Test Facility Area and limited random data collection areas across the Project Site. An EM61, a high resolution, time-domain electromagnetic (TDEM) metal detector, was used to collect data for the initial surveys. Data collection within the Howitzer Test Facility Area was performed prior to site preparation activities, which included the removal of the test tunnels and firing butts.

In 1997, NORCAL Geophysical Consultants, Inc. (NORCAL) performed a total magnetic field (TMF) vertical gradient survey over the majority of the Project Site in an effort to determine if any OE existed within the area. The survey consisted of the investigation of contiguous, 200-foot by 200-foot grids utilizing cesium vapor magnetometers arrayed to measure the vertical gradient of the total magnetic field. The magnetometer survey did not include borrow areas where surficial materials had been stripped and the ground surface regraded, nor wetlands in the North Valley or South Valley.

During the USACE OE site investigation for the arsenal, the magnetometry data were evaluated by direct comparison of EM61 data collected during the Former Benicia Arsenal Engineering Evaluation/Cost Analysis (EE/CA) investigation. To evaluate the comparative anomaly detection resolution of the survey parameters used to collect the magnetometer data, electromagnetic (EM) data were collected over OE sampling grids (100 feet by 100 feet) and processed to identify anomalies of interest. The EM data collected by Earth Tech and the magnetometer gradiometer data collected in 1997 were then compared to the data from OE sampling grids.

The conclusions of this comparison indicated that magnetometers did not perform as well as EM systems in detecting small, near-surface targets, and the line spacing (5 feet versus 2.5 feet to be used for the EM data) was too great to adequately resolve targets that are more distant from the traverse centerline. However, the magnetic data were sufficient to discriminate an adequate range of target types. Further detail regarding the evaluation of the geophysical data is available in the Former Benicia Arsenal EE/CA (Earth Tech, 1999).

In selected grids of the North Valley and South Valley, identified magnetic anomalies were investigated by excavating the location of the anomaly until an anomaly source was located. When OE was encountered, it was identified, removed, and disposed of by demolition. Six OE items were removed, including two 37-millimeter (mm) high-explosive (HE) rounds, two 40mm anti-aircraft HE rounds, one 60mm HE mortar shell, and one 76mm anti-personnel (AP) HE round. All of the items found during this portion of the investigation were found in grids around the demolition areas in the South Valley. The OE investigation was suspended pending further investigation of the arsenal by the USACE.

The USACE conducted an EE/CA investigation for the entire Former Benicia Arsenal, including portions of the Project Site. Portions of the property were geophysically mapped, and subsurface anomalies that were identified were sampled to determine the presence or absence of OE. Two OE items were

encountered at Demolition Site #1 (one 75mm unfuzed shrapnel projectile and one 37mm fuzed projectile) during the EE/CA investigation; these were disposed of by demolition (Earth Tech, 1999). The entire project site has not been geophysically mapped. Figure 2-4 indicates the areas that have been geophysically mapped and cleared.

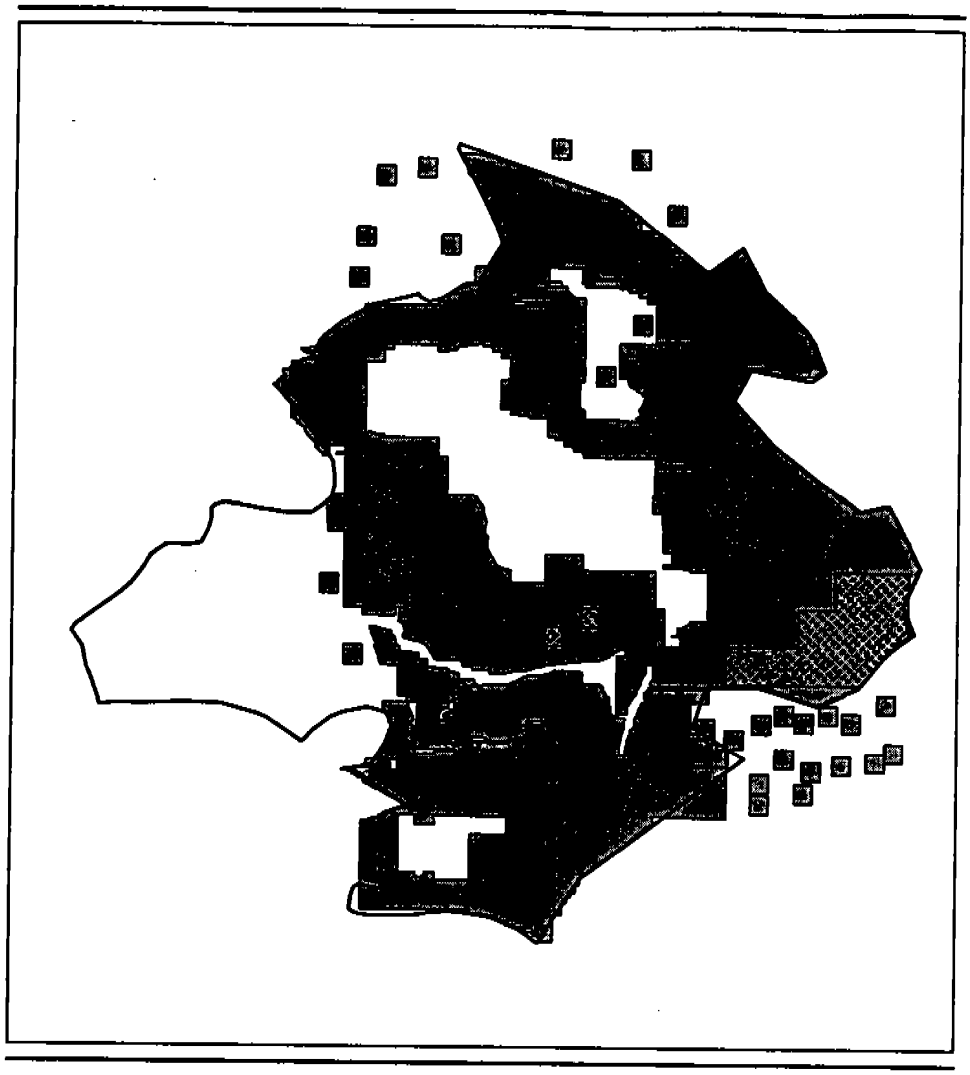
2.4 SCOPE OF WORK

Various types of samples (e.g., soil, sediment, surface water, groundwater) will be collected for chemical analysis. Soil/sediment and bedrock samples will also be logged in the field by the geologist supervising the sample collection activities. Immediately following sample collection, the samples will be handled and either shipped to an analytical laboratory for analysis or analyzed on site in a mobile laboratory.

To enhance safety before, during, and after sampling, vegetation removal may be required to gain access to sampling locations. Vegetation removal will be performed using a tractor-drawn bushhog (mechanical flailing machine) or hand-held, gas-powered tools. Prior to vegetation removal, the area to be cleared will be inspected for debris and OE by a UXO escort. The UXO escort will perform OE surface inspections using both visual and magnetometer-assisted inspection sweep methods, as specified in the OE Safety and Health Program (Appendix H). All areas proposed for sampling have either been disturbed by previous grading activities or have been surface swept including removal of vegetation as part of previous OE clearance activities. However, as an added safety measure, all sampling crews will be led by the UXO escort to assure OE avoidance.

The proposed scope of work for the field investigation activities at the Project Site will be conducted in accordance with the protocols and procedures presented in the Field Sampling Plan. The field sampling program is being conducted to better define the nature and extent of potential contamination in the following areas: five TNT Strips in the North Valley; the Ammunition Renovation/Primer Destruction Area in the North Valley; the Howitzer Test Facility in the North Valley; two demolition sites in the South Valley; and one Flare Site, also in the South Valley. Surface water and groundwater at the Project Site will also be investigated through the collection of surface water samples and surface seep/spring samples from the South Valley, and groundwater samples through the installation of temporary groundwater monitoring wells in the North Valley and South Valley. Additional sampling of two soil stockpile areas within the Ammunition Renovation/Primer Destruction Area in the North Valley, nine soil stockpile areas and shallow soil on the Ridge between the North Valley and South Valley (Former Dynamite Burn Area), and sediment in the Wetlands in the South Valley have also been included in the field sampling program.

In addition to the proposed field sampling program, existing site geology data will be supplemented through field geologic mapping of any outcrop areas within the Project Site.



EXPLANATION

- Previously Mapped Area
- Previously Cleared Area (Granite Management Corporation)
- Project Site Boundary

300 0 300 600 Feet

Previously Mapped and Cleared Areas

Figure 2-4

2.4.1 TNT Strips

Three of the TNT strips (TNT Strips #1, #4, and #5) have been chosen for additional investigation to further define the vertical and lateral extent of the contamination by advancing a series of step-out borings at a distance of 5 feet, 10 feet, and 20 feet from the center axis of the TNT Strips (see Plate 1). The TNT-1F-series step-out borings will be oriented along a firebreak, which is observed to cross TNT Strip #1 on historical aerial photographs. The TNT-4C-series step-out borings will be advanced beyond the end of TNT Strip #4 and across the strip in an upslope and downslope direction, intersecting previous boring location TNT-4C. The TNT-5A-series step-out borings will be advanced across TNT Strip #5 in an upslope and downslope direction, intersecting previous boring location TNT-5A.

The 5-feet and 10-feet step-out borings will be advanced to a maximum depth of 10 feet bgs or to competent bedrock, whichever is encountered first. Soil samples will be collected at the surface, and at 1 foot, 4 feet, 6 feet, 8 feet, and 10 feet bgs. Surface samples will be collected only from the 20-foot step-out borings. One additional boring will be advanced during the TNT-1F-series borings, on the center axis of the strip, since this location was not previously sampled. This boring will be advanced to a maximum depth of 10 feet bgs or to competent bedrock, whichever is encountered first. Soil samples will be collected at the surface, and at 1 foot, 2 feet, 4 feet, 6 feet, 8 feet, and 10 feet bgs.

The soil samples will be tested in the field for TNT using either a field soil test kit (see Section 2.8.1 of RI/FS Work Plan), which provides a quantitative result by EPA Method SW8515, or an on-site mobile laboratory utilizing EPA Method SW8330 (see Section 2.8.2 of RI/FS Work Plan). The soil samples will be tested in sequence in order to determine the extent of the step-out program (i.e., shallowest to deepest soil samples, starting with those borings nearest to the TNT strip center axis). Soil samples will be tested until TNT is nondetect. If the TNT nondetect field testing criterion is met, any remaining deeper samples from a particular boring will not be analyzed. If a surface sample meets the TNT nondetect field testing criterion, samples from further step-out borings will not be analyzed. Although not anticipated, if the surface sample from the 20-foot step-out boring exceeds the TNT nondetect field testing criterion, additional samples will be collected at 1 foot, 4 feet, and 6 feet bgs for analysis using a field soil test kit or an on-site mobile laboratory. Additional step-out borings (i.e., 40 feet) will also be advanced until the surface samples no longer exceed the TNT nondetect field testing criterion.

The highest concentration of TNT detected to date at the TNT Strips is at the southeastern end of TNT Strip #1, where 380,000 milligrams per kilogram (mg/kg) of TNT was detected at 1 foot bgs at boring location TNT-1C (see Figure 1.5-1 of RI/FS Work Plan). Given the high concentration of TNT detected, the potential for lateral and vertical migration of TNT was considered to be greatest at this location.

One boring (TNT-1C2) will be advanced adjacent to previous boring location TNT-1C at the southeastern end of TNT Strip #1 to confirm the elevated TNT levels detected at this location and to evaluate the maximum depth of contamination associated with the elevated contamination levels. This boring will be advanced to a maximum depth of 10 feet bgs or to competent bedrock, whichever is encountered first. Soil samples will be collected at the surface, and at 1 foot, 2 feet, 4 feet, 6 feet, 8 feet, and 10 feet bgs. The soil samples will be tested in the field for TNT using a field soil test kit or an on-site mobile laboratory. Samples will be analyzed sequentially using the field testing criterion previously described. If the TNT nondetect field testing criterion is exceeded, the sample will be submitted to the analytical laboratory and analyzed for the following compounds provided the concentration of explosives is less than 3 percent (30,000 mg/kg):

- PAHs by EPA Method SW8310
- California Assessment Manual (CAM) 17 metals (antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, molybdenum, nickel, selenium, silver, thallium, vanadium, and zinc) plus aluminum, calcium, iron, manganese, magnesium, potassium, and sodium by EPA Methods SW6010B, SW7470A, and SW7471A
- Explosives by EPA Method SW8330.

In addition, the sample collected at 1 foot bgs at boring TNT-1C2 will be analyzed for dioxins/furans by EPA Method SW8290.

The TNT-1C series step-out borings will be advanced at 5 feet, 10 feet, and 20 feet from the center axis of TNT Strip #1, as previously described. Soil samples from the 5-foot and 10-foot step-out borings will be collected at the surface, and at 1 foot, 4 feet, and 6 feet bgs. Surface samples will be collected only from the 20-foot step-out borings. Samples will be analyzed sequentially using the field testing criterion previously described. If the TNT nondetect field testing criterion is exceeded, the sample will be submitted to the analytical laboratory for analysis of PAHs, CAM 17 metals, plus aluminum, calcium, iron, manganese, magnesium, potassium, sodium, and explosives, by the test methods previously listed. Although not anticipated, if the surface sample from the 20-foot step-out boring exceeds the TNT nondetect field testing criterion, additional samples will be collected at 1 foot, 4 feet, and 6 feet bgs for analysis using a field soil test kit or an on-site mobile laboratory. Any sample exceeding the TNT nondetect field testing criterion will be submitted to the analytical laboratory for analysis of PAHs, CAM 17 metals, plus aluminum, calcium, iron, manganese, magnesium, potassium, sodium, and explosives by the test methods previously listed. Additional step-out borings (i.e., 40 feet) will also be advanced until the surface samples no longer exceed the TNT nondetect field testing criterion.

In addition, four borings (TNT-1D, TNT-1E, TND-1G, and TNT-1H) will be advanced along the suspected extension of TNT Strip #1 toward the southeast, and one boring (TNT-5F) will be advanced along the suspected downslope extension of TNT Strip #5. The borings will be advanced to a maximum depth of 6 feet bgs or to competent bedrock, whichever is encountered first. Soil samples will be collected at the surface, and at 1 foot, 4 feet, and 6 feet bgs, and will be tested in the field for TNT using a field soil test kit or an on-site mobile laboratory. Samples will be analyzed sequentially using the field testing criterion previously described.

The field sampling program for the TNT Strips is summarized in Tables 2.2-1 through 2.2-3 of the RI/FS Work Plan. Ten percent of the samples tested in the field using the soil test kit will be submitted to an analytical laboratory for confirmation analysis by EPA Method SW8330. The decision of which samples will be submitted for confirmatory analysis will be based on the soil test kit results, and will consist of a combination of nondetect results and a range of the detected results.

Additional samples may be collected during the TNT Strips sampling program at greater step-out distances and depths than indicated in the RI/FS Work Plan, should the analytical results obtained from either the field soil test kit or the on-site mobile laboratory indicate that additional samples need to be collected to further define the vertical and lateral extent of contamination in a particular area of investigation.

2.4.2 Howitzer Test Facility

Six borings will be advanced within and adjacent to the Howitzer Test Facility. Three borings (HF-1 through HF-3) will be advanced toward the northern end of the Howitzer Test Facility (see Figure 2.2-2 of the RI/FS Work Plan). Borings will be advanced to competent bedrock. Soil samples will be collected at 0.5 foot, 4 feet, 10 feet, 15 feet, 20 feet bgs, and at every 5 feet thereafter, until bedrock is encountered and analyzed for the following:

- PAHs by EPA Method SW8310
- CAM 17 metals, plus aluminum, calcium, iron, manganese, magnesium, potassium, and sodium, by EPA Methods SW6010B, SW7470A, and SW7471A
- Explosives, including nitroglycerin and pentaerythritol tetranitrate (PETN), by EPA Method SW8330
- Nitrate/nitrite as nitrogen by EPA Method 300.0

- Total Extractable Petroleum Hydrocarbons (TEPHs) as diesel and motor oil by California Leaking Underground Fuel Tank (LUFT) Modified EPA Method SW8015

- TEPHs as kerosene by California LUFT Modified EPA Method SW8015.

- Volatile organic compounds (VOCs) by EPA Method SW8260B

The remaining three borings (TW-4, TW-5, and TW-6) will be advanced to first encountered groundwater for possible temporary well installation (see Section 2.5 of the RI/FS Work Pan). Soil samples will be collected at 0.5 foot, 4 feet, 10 feet, 15 feet, 20 feet bgs, and at every 5 feet thereafter, until bedrock is encountered, and analyzed for the compounds previously listed.

2.4.3 Ammunition Renovation/Primer Destruction Area

There are two stockpiles (SP1 and SP2) within the Ammunition Renovation/Primer Destruction Area (see Figure 2.2-2 of the RI/FS Work Plan). Because these stockpiles have been previously sampled, only one additional soil sample will be collected from each of the stockpiles from 2 feet below the stockpile surface. This sample will be analyzed for the following compounds:

- PAHs by EPA Method SW8310

- CAM 17 metals, plus aluminum, calcium, iron, manganese, magnesium, potassium, and sodium, by EPA Methods SW6010B, SW7470A, and SW7471A.

- Explosives, including nitroglycerin and PETN, by EPA Method SW8330

- Nitrate/nitrite as nitrogen by EPA Method 300.0

- TEPHs as diesel and motor oil by California LUFT Modified EPA Method SW8015

- TEPHs as kerosene by California LUFT Modified EPA Method SW8015.

Six borings will be advanced within the Ammunition Renovation/Primer Destruction Area. Four of the borings (AR-1 through AR-4) will be advanced to competent bedrock. Soil samples will be collected at 0.5 foot, 4 feet, 10 feet, 15 feet, 20 feet bgs, and at every 5 feet thereafter, until bedrock is encountered, and analyzed for the compounds previously listed. The remaining two borings (TW-1 and TW-7) will be advanced to first encountered groundwater or to competent bedrock, whichever

is encountered first, for possible temporary monitoring well installation (see Section 2.5 of the RI/FS Work Plan). Soil samples will be collected at 0.5 foot, 4 feet, 10 feet, 15 feet, and 20 feet bgs and analyzed for the compounds previously listed. All soil samples collected from the six borings will also be analyzed for VOCs by EPA Method 8260B.

Stockpile samples will not be analyzed for VOCs, since it is assumed that any volatiles that may have been present in the stockpile soil will have long since volatilized.

2.4.4 North Valley Groundwater

Up to nine borings for possible temporary monitoring well installations (TW-1 through TW-9) will be advanced in the North Valley to first encountered groundwater or to competent bedrock, whichever is encountered first (see Figure 2.1-2 of the RI/FS Work Plan). First groundwater is anticipated to be encountered in the alluvium (if sufficient thickness is present) and/or the underlying weathered bedrock zone. A temporary monitoring well will be installed in those borings where groundwater is encountered.

For those wells to be installed in and around the Howitzer Test Facility (TW-4, TW-5, and TW-6), soil samples will be collected from the borings and analyzed as described in Section 2.2.2.2 of the RI/FS Work Plan. For those wells to be installed in the Ammunition Renovation/Primer Destruction Area (TW-1 and TW-7), soil samples will be collected from the borings and analyzed as described in Section 2.2.2.3 of the RI/FS Work Plan.

Bulk soil samples will also be collected of the major lithologies encountered during advancement of borings for possible temporary monitoring wells TW-1 and TW-2. Bulk soil samples will be analyzed for the following:

- Total organic carbon by EPA Method SW9060
- Grain size by American Society of Testing and Materials (ASTM) Standard D422.

Groundwater, if present, will be collected and analyzed using the following compounds:

- Dissolved CAM 17 metals, plus aluminum, calcium, iron, manganese, magnesium, potassium, and sodium, by EPA Methods SW6010B, SW7470A, and SW7471A
- Explosives, including nitroglycerin and PETN, by EPA Method SW8330

- VOCs by EPA Method SW8260B
- PAHs by EPA Method SW8310
- TEPHs as diesel and motor oil by California LUFT Modified EPA Method SW8015
- TEPHs as kerosene by California LUFT Modified EPA Method SW8015
- General water chemistry (chloride, nitrate/nitrite, sulphate, and orthophosphate by EPA Method 300.0; total phosphorous by EPA Method 365.2; total organic carbon by EPA Method 415.1; TDS by EPA Method 160.1; and total suspended solids [TSS] by EPA Method 160.2)
- Field parameters (temperature by EPA Method 170.1, pH by EPA Method 150.1, electrical conductivity by EPA Method 120.1, and turbidity by EPA Method 180.1).

2.4.5 Ridge Soil Stockpiles

Soil samples will be collected from nine stockpiles (RSP-1 through RSP-9) on the ridge between the North Valley and South Valley (see Figure 2.1-4 of the RI/FS Work Plan). Four soil samples will be collected from each of the larger stockpiles (RSP-1 through RSP-5). Two soil samples will be collected from each of the smaller stockpiles (RSP-6 through RSP-9). Soil samples will be collected from 2 feet below the stockpile surface. Soil samples from each stockpile will be composited into one sample by the analytical laboratory and analyzed for the following compounds:

- TEPHs as diesel and motor oil by California LUFT Modified EPA Method SW8015
- Explosives by EPA Method SW8330
- CAM 17 metals, plus aluminum, calcium, iron, manganese, magnesium, potassium, and sodium, by EPA Methods SW6010B, SW7470A, and SW7471A.

Prior to excavation, four near-surface soil/bedrock samples will also be collected from the Ridge in the area occupied by the Former Dynamite Burn Area. Ridge samples will be composited into one sample by the analytical laboratory and analyzed for nitroglycerin and PETN by EPA Method SW8330 and for nitrate/nitrite as nitrogen by EPA Method 300.0.

2.4.6 Flare Site

Three borings will be advanced at the Flare Site (see Figure 2.2-3 of the RI/FS Work Plan). One boring (FA-4) will be advanced toward the periphery of the Flare Site in an upslope direction. One boring (FA-5) will be advanced toward the periphery of the Flare Site in a downslope direction. The remaining boring (FA-6) will be advanced to as close to the center of the Flare Site as possible. If OE clearance permits, the borings will be advanced to a maximum depth of 10 feet bgs, or to competent bedrock, whichever is encountered first. Soil samples will be collected from the central boring location at 1 foot, 2 feet, 5 feet, and 10 feet bgs. Soil samples will be collected from the peripheral boring locations at the surface, and at 1 foot, 2 feet, 5 feet, and 10 feet bgs. Flare Site samples will be analyzed for the following compounds:

- CAM 17 metals, plus aluminum, calcium, iron, manganese, magnesium, potassium, and sodium, by EPA Methods SW6010B, SW7470A, and SW7471A.
- Total phosphorous by EPA Method 365.2.

In addition, the 1-foot sample from the central boring location will also be analyzed for PAHs by EPA Method SW8310, for explosives, including nitroglycerin and PETN, by EPA Method SW8330, nitrate/nitrite as nitrogen by EPA Method 300.0, and for dioxins/furans by EPA Method SW8290.

Location and maximum boring depths at the Flare Site may need to be modified in the field based on OE avoidance procedures.

2.4.7 Demolition Sites

Demolition Site #1. Two soil samples will be collected from the sidewall of the incised channel that passes through Demolition Site #1. (Additional samples and locations are being proposed. The final location and number of samples will be determined in the field.) Sidewall samples will be analyzed for the following compounds:

- PAHs by EPA Method SW8310
- CAM 17 metals, plus aluminum, calcium, iron, manganese, magnesium, potassium, and sodium, by EPA Methods SW6010B, SW7470A, AND SW7471A.
- Explosives including nitroglycerin and PETN by EPA Method SW8330
- Nitrate/nitrite as nitrogen by EPA Method 300.0.

Demolition Site #3. Four additional borings will be advanced at Demolition Site #3 (see Figure 2.2-3 of the RI/FS Work Plan). Two of the borings (DA3-3 and DA3-4) will be advanced toward the downslope periphery of the demolition area, through undisturbed soils. The remaining two borings (DA3-5 and DA3-6) will be advanced toward the center of the demolition area through previously disturbed soils (i.e., backfill material) into the underlying alluvium and/or weathered bedrock. The borings will be advanced to competent bedrock. Selected sample depths will be retained for chemical analysis at major changes in lithology or at a minimum of 5-foot intervals.

For the central borings, samples will be retained, at a minimum, from the disturbed fill material, immediately below the fill material, and immediately above the competent bedrock. Soil samples will be analyzed for PAHs, CAM 17 metals, plus aluminum, calcium, iron, manganese, magnesium, potassium, and sodium and explosives, by the test methods previously listed. The sample collected immediately below the fill material will also be analyzed for nitroglycerin and PETN by EPA Method SW8330, and nitrate/nitrite as nitrogen by EPA Method 300.0.

2.4.8 South Valley Wetlands Sediment and Surface Water

Sediment and surface water samples will be collected from several locations in the Wetlands (see Figure 2.1-3 of the RI/FS Work Plan). Sediment and surface water samples will be collected upgradient (WET-1 and SW-1) and downgradient (WET-2 and SW-2), respectively, of the Demolition Sites and the Flare Site.

Sediment samples will be analyzed for the following compounds:

- CAM 17 metals, plus aluminum, calcium, iron, manganese, magnesium, potassium, and sodium, by EPA Methods SW6010B, SW7470A, and SW7471A
- PAHs by EPA Method SW8310
- Explosives, including nitroglycerin and PETN, by EPA Method SW8330.
- Nitrate/nitrite as nitrogen by EPA Method 300.0
- Total phosphorous by EPA Method 365.2

The downgradient sediment sample will also be analyzed for dioxins/furans by EPA Method SW8290.

Surface water samples will be analyzed for the following compounds:

- Total and dissolved CAM 17 metals, plus aluminum, calcium, iron, manganese, magnesium, potassium, and sodium, by EPA Methods SW6010B, SW7470A, and SW7471A
- PAHs by EPA Method SW8310
- Explosives, including nitroglycerin and PETN, by EPA Method SW8330
- General water chemistry (chloride, nitrate/nitrite, sulphate, and orthophosphate by EPA Method 300.0; total phosphorous by EPA Method 365.2; total organic carbon by EPA Method 415.1; total dissolved solids (TDS) by EPA Method 160.1; and TSS by EPA Method 160.2)
- Field parameters (temperature by EPA Method 170.1, pH by EPA Method 150.1, electrical conductivity by EPA Method 120.1, and turbidity by EPA Method 180.1).

2.4.9 South Valley Groundwater and Seeps/Springs

Three borings for possible temporary monitoring well installations will be advanced in the South Valley, upgradient of the Demolition Sites and Flare Site (TW-10), immediately downgradient of the Flare Site (TW-11), and downgradient of the McAllister Drive Land Bridge (TW-12), respectively (see Figure 2.2-3 of RI/FS Work Plan). At these locations, groundwater is anticipated to be close to the ground surface due to the proximity of the Wetlands.

Groundwater samples will be analyzed for the following compounds:

- VOCs by EPA Method SW8260B
- PAHs by EPA Method SW8310
- Dissolved CAM 17 metals, plus aluminum, calcium, iron, manganese, magnesium, potassium, and sodium, by EPA Methods SW6010B, SW7470A, and SW7471A
- Explosives, including nitroglycerin and PETN, by EPA Method SW8330

- General water chemistry (chloride, nitrate/nitrite, sulphate, and orthophosphate by EPA Method 300.0; total phosphorous by EPA Method 365.2; total organic carbon by EPA Method 415.1; TDS by EPA Method 160.1; and TSS by EPA Method 160.2)

- Field parameters (temperature by EPA Method 170.1, pH by EPA Method 150.1, electrical conductivity by EPA Method 120.1, and turbidity by EPA Method 180.1).

Three potential seeps/springs (SPS-1 through SPS-3), situated along the north sideslope of the South Valley, will be inspected to see if there is any seep water present from which a surface seep sample can be collected (see Figure 2.1-3 of the RI/FS Work Plan). Surface seep samples will be analyzed for the compounds previously listed.

2.4.10 Field Mapping

To supplement existing geological data, the Project Site will be walked to identify any outcrops and, in particular, any exposures in the graded ridge area between the North Valley and South Valley. The outcrops will be mapped, including but not limited to lithology, and if bedrock is exposed, preferential bedding planes or fracture patterns. Field mapping will be conducted by a California state-certified geologist.

3.0 HEALTH AND SAFETY RESPONSIBILITIES

Site activities will be performed by Earth Tech and subcontractor personnel. The following assignments of health and safety-related responsibilities have been designated accordingly. Resumes of the project health and safety organization have been included in Appendix B.

3.1 ALL EARTH TECH PERSONNEL

Each person is responsible for his/her own health and safety, for completing tasks in a safe manner, and for reporting any unsafe acts or conditions to his/her supervisor and/or the Field Team Leader (FTL). All personnel are responsible for continuous adherence to these health and safety procedures during the performance of their work. No person may work in a manner that conflicts with the letter or intent of safety and environmental precautions expressed in these procedures. After due warnings, Earth Tech will dismiss from the site any person who violates safety procedures. Earth Tech employees are subject to progressive discipline and may be terminated for blatant or continued violations. All on-site personnel will be trained in accordance with requirements specified in this document.

3.2 PROJECT MANAGER (MR. BRIAN WEITH)

The PM has overall management authority for ensuring that all project activities are completed in accordance with requirements set forth in this plan. The PM will confer with the designated HSM on all matters affecting health and safety. Other health and safety-related duties of the PM include:

- Reading and becoming familiar with this SSHP
- Requiring a prompt and thorough investigation of all accidents
- Scheduling an Accident Review Board within 10 days of an injury involving a workers' compensation claim or OSHA recordability, or any accident with more than a $500 loss
- Providing day-to-day management of site work activities.

The PM is responsible for notifying all federal, state and local government and community organizations as specified in the RI/FS Work Plan. The Exxon plant is a minimum of 1,125 feet from the project site boundaries. The PM will notify the Exxon Health & Safety Department prior to initiating site activities and provide contact numbers for Exxon to use in the event of an accident at the refinery site.

3.3 HEALTH AND SAFETY MANAGER (MR. STEVEN CLAY)

The designated HSM is responsible for overseeing all aspects of the site safety program and for preparing the SSHP, site-specific safety guidance documents, or addenda to this plan. The HSM does not report to the PM and is separately accountable to Earth Tech senior management for site health and safety. The HSM will act as the sole contact to all regulatory agencies on matters of safety and health. The HSM's other responsibilities include:

- General health and safety program administration
- Conducting daily project health and safety inspections
- Developing site-specific employee/community emergency response plans, as required, based on expected hazards
- Determining the level of personal protection required
- Updating equipment or procedures based on information obtained during site operations
- Establishing air monitoring parameters, as required, based on expected contaminants.

3.4 FIELD TEAM LEADER/SITE SAFETY COORDINATOR (MR. RICHARD BURZINSKI)

The FTL will also serve as the Site Safety Coordinator (SSC) and is responsible for performing the routine duties for health and safety, and will coordinate any necessary assistance from the designated HSM. The SSC will administer this SSHP and the applicable site-specific safety guidance document. Additional SSC responsibilities include:

- Reading and becoming familiar with this SSHP
- Enforcing the requirements of this SSHP and other applicable safety requirements
- Stopping work, if necessary, to prevent injury or illness and ensure personal and environmental health and safety
- Determining evacuation routes, and establishing/posting local emergency contact telephone numbers

- Ensuring that all applicable site personnel and visitors have received the proper training and medical monitoring before entering any controlled areas
- Presenting any tailgate safety meeting and maintaining appropriate training documentation/attendance records
- Implementing air monitoring according to directives in this SSHP
- Implementing changes in health and safety procedures as directed by the HSM and/or approved addenda to this SSHP.

3.5 ORDNANCE AND EXPLOSIVES SAFETY MANAGER (MR. GREG PETERSON)

The Ordnance and Explosives Safety Manager (OESM) will be appointed by the PM to be principally responsible for execution of all OE operations for field activities. The OESM will have knowledge of all requirements mandated by OSHA, the USACE, EPA, 8 CCR, and Earth Tech's Corporate Environmental, Health and Safety Program. The OESM will be directly responsible to the PM.

The OESM is responsible for the implementation of the SSHP and will provide overall direction of the project OE escort and avoidance functions for field activities. The OESM, or his/her designee, will interface with the FTL on OE safety functions of the project and will coordinate activities with the PM. In addition, the OESM will, as necessary, perform audits, surveillance, document reviews, and other OE safety functions as required to determine the continued effectiveness of the SSHP. The OESM will, as necessary, audit compliance with the SSHP and will perform OE safety reviews of selected project tasks. Other responsibilities will include, but will not be limited to:

- Developing and implementing corrective action plans to eliminate or mitigate hazards associated with OE
- Providing the OE safety portions of training sessions or briefings for site and visitor personnel
- Ensuring the proper use of personal protective equipment (PPE)
- Ensuring that all OE-related site operations are conducted in accordance with this document and with other relevant safety and health regulations and standards

3.6 SUBCONTRACTORS

Each subcontractor's management will provide qualified employees and allocate sufficient time, materials, and equipment to safely complete assigned tasks. In particular, each subcontractor is responsible for equipping its personnel with any

required PPE. All on-site employees of each subcontractor must meet the training and medical monitoring requirements set forth in this SSHP. Work operations performed by these subcontractors will be under the control of Earth Tech, who is responsible for oversight of work activities to ensure that all requirements specified in this SSHP are observed. Each subcontractor is expected to operate in accordance with its own unique safety policies and procedures, to ensure that hazards associated with the performance of the work activities are properly controlled.

Hazards not listed in this SSHP but known to any subcontractor, or known to be associated with a subcontractor's services, must be identified and addressed to the Earth Tech PM or SSC prior to commencement of work operations. The SSC or authorized representative has the authority to halt any subcontractor operations, and to remove any subcontractor or subcontractor employee from the site for failure to comply with established health and safety procedures or for operating in an unsafe manner. Procedures to mitigate hazards not listed must be approved by Earth Tech, USACE, and DTSC.

Appendix C provides Earth Tech's *General Safety Rules for Contractors*, which will be observed by all subcontractor organizations.

3.7 ON-SITE PERSONNEL AND VISITORS

All personnel working for Earth Tech or its subcontractors are required to read and acknowledge their understanding of this SSHP. All visitors to controlled areas of the site must also read and acknowledge their understanding of this SSHP. All personnel are expected to abide by its requirements and cooperate with site supervision to ensure a safe and healthful work site. Personnel must immediately report any of the following to the PM:

- Accidents and injuries, no matter how minor
- Unexpected or uncontrolled releases of any hazardous substances
- Any symptoms of exposure to a hazardous substance
- Any unsafe or malfunctioning equipment
- Any changes in site conditions that may affect the health or safety of project personnel.

4.0 GENERAL HEALTH AND SAFETY PROGRAMS

All Earth Tech and subcontractor personnel performing work in controlled areas of the Project Site will be qualified as Hazardous Waste Operations and Emergency Response (HAZWOPER) workers. Accordingly, the requirements outlined in the following subsections will apply for all personnel performing any controlled-area work operations.

4.1 MEDICAL SCREENING AND HEALTH SURVEILLANCE

All Earth Tech and subcontractor personnel will have completed an HAZWOPER physical exam in accordance with the requirements of Earth Tech Health and Safety Procedure HS601, Medical Surveillance (Appendix D), which conforms to the requirements of 8 CCR Section 5192(f). Each person's most current exam will have been completed within the previous 365 days, and based on those exam results, each person will be medically authorized to perform HAZWOPER activities and wear approved respiratory protection by an occupational physician. The minimum medical screening will include a complete physical examination by the Medical Services Physician and may also include CBS with Differential, Chem Panel, EKG, Liver Function Test, Pulmonary Function Testing, Chest X-rays, and any other tests as deemed necessary by the physician.

4.2 TRAINING REQUIREMENTS

All personnel on site will meet the following training requirements.

4.2.1 General Training Requirements

All field personnel and visitors involved with site activities will have completed the necessary HAZWOPER training requirements as specified in Earth Tech Health and Safety Procedure HS301, HAZWOPER Training and Refresher (Appendix E), which conforms to the provisions established in 8 CCR Section 5192(e)(2) and (e)(3) (40-hour or 24-hour initial training), 8 CCR Section 5192(e)(8) (annual refresher training), and 8 CCR Section 5192(e)(4) (supervisor training). General and daily site workers engaged in hazardous substance removal or other activities which expose or potentially expose workers to hazardous substances and health hazards shall receive a minimum of 40 hours of off-site instruction, and a minimum of 3 days actual field experience under the direct supervision of a trained, experienced supervisor.

Workers on site only occasionally for a specific limited task (such as, but not limited to, groundwater monitoring, land surveying, or geophysical surveying) and who are unlikely to be exposed over Permissible Exposure Limit (PELs) and published exposure levels shall receive a minimum of 24 hours of off-site instruction, and the minimum of 1 day actual field experience under the direct

supervision of a trained, experienced supervisor. Proof of training will be maintained on site for all personnel. Outlines of 40-hour Hazardous Waste Operations, CPR/First Aid, and Explosive Ordnance Disposal (EOD) (UXO) Training are included in Appendix K.

4.2.2 Initial Orientation Training

Prior to the start of on-site activities, all Earth Tech and subcontractor personnel will attend a site safety/orientation briefing, to be conducted by the SSC. This training will address all elements of the site health and safety program (as presented in this SSHP and referenced Earth Tech and regulatory health and safety requirements). This training will also include instruction in:

- Toxic and physical hazards associated with identified environmental contaminants of concern
- Anticipated exposure hazards (as determined based on analysis of work operations and site contaminant concentrations)
- Requirements and rationale used in the selection of safety equipment
- On-site monitoring procedures
- Decontamination procedures
- Care and use of selected PPE
- Emergency Notification and Response Procedures.

The training content and a list of all attendees will be documented and maintained with the project files.

Worker personnel initially assigned to the site after work operations have commenced will be provided with orientation training by the SSC that will address the above requirements. All visitors to the site (personnel not assigned to work on site) will be provided with an abbreviated version of this training, along with specific orientation as to the hazards present on site at the time of the visit and any applicable safety requirements (e.g., escorts).

4.2.3 Tailgate Safety Briefings

A tailgate safety briefing will be conducted at the start of each work day. The SSC will conduct the tailgate safety briefings and will review and discuss the health and safety issues associated with the day's planned work activities, problems encountered, and modifications to existing procedures. Documentation of the

tailgate safety briefings will be accomplished by using the Tailgate Safety Briefing Sign-in Log, a copy of which is included in Appendix F. The SSC will maintain copies of all tailgate safety briefing sign-in logs in the project files. All field personnel associated with each day's project activities are required to attend these meetings.

4.2.4 Hazard Communication Training

Section 5.2 provides information concerning environmental contaminants that could be expected to be encountered during the planned work operations. In addition, any organization wishing to bring any hazardous material onto any Earth Tech-controlled work site must first provide a copy of the item's Material Safety Data Sheet (MSDS) to the SSC for approval and filing (the SSC will maintain copies of all MSDSs on site). In accordance with the requirements of 8 CCR Section 5194, all personnel will be briefed on the hazards of any chemical product they use and will be aware of and have access to all MSDSs.

4.3 GENERAL SITE SAFETY RULES

The following general requirements apply to all on-site activities (including work occurring outside controlled work areas).

4.3.1 Smoking, Eating, and Drinking

Smoking, eating, and drinking will not be permitted except in specifically designated areas of the site, which shall be outside any designated exclusion zones or other designated work areas. Field workers will perform proper decontamination procedures when leaving an exclusion zone prior to eating or drinking. Consumption of alcoholic beverages is prohibited anywhere on the Project Site.

4.3.2 Site Awareness

Site personnel will be familiar with the physical characteristics and requirements of the work site, including ongoing activities of other personnel at the Project Site, that may affect the Earth Tech work area. Personnel will also be aware of:

- Emergency procedures and evacuation assembly points
- Locations of protective and emergency equipment and relevant first-aid procedures.

The number of personnel and equipment in work areas should be minimized, consistent with site operations.

4.3.3 Buddy System

All on-site personnel will operate using the two-man concept (buddy system). All personnel will operate in teams of two or more (a single-man entry into any controlled work area is prohibited); team members will maintain visual contact with each other at all times. Team members must observe each other and should be alert for signs of heat stress or toxic exposure.

4.3.4 Housekeeping

During site activities, work areas will be continuously policed for identification of excess trash and unnecessary debris. Excess debris and trash will be collected and stored in an appropriate container (e.g., plastic trash bags, garbage can, roll-off bin) prior to disposal. At no time will debris or trash be intermingled with waste PPE or contaminated materials. Anyone observed throwing contaminated material or PPE away with municipal wastes will be removed from the site.

4.3.5 Personal Hygiene

At a minimum, an adequate supply of personal hygiene equipment will be available for use by site personnel. Personal hygiene items will include the following:

Water Supply

A water supply meeting the following requirements will be utilized:

Potable Water. An adequate supply of potable water will be available for field personnel consumption. Potable water can be provided in the form of water bottles, canteens, water coolers, or drinking fountains. Where drinking fountains are not available, individual-use cups will be provided as well as adequate disposal containers. Potable water containers will be properly identified in order to distinguish them from nonpotable water sources.

Nonpotable Water. Nonpotable water may be used for handwashing and cleaning activities but will not be used for drinking purposes.

Toilet Facilities

A toilet facility will be provided for use by site personnel. If access is available, existing site toilet facilities will meet this requirement. If access to the toilet facilities is not available, portable toilet facilities will be provided by a subcontractor. The subcontractor will be responsible for maintenance and cleaning of portable toilets on a regular schedule. A minimum of two portable toilets will be provided on site. Total site personnel will not exceed 20 persons.

Washing Facilities

Employees will be provided with washing facilities (e.g., buckets with water and Alconox) at each work location. Water and hand soap (or a similar substance) will be used by each employee upon exiting any controlled work area, prior to breaks, and at the end of daily work activities.

4.3.6 Drum Handling

Where containers of a capacity greater than 10 gallons are used for containerizing chemical products or waste materials, their handling will be accomplished in accordance with the following:

- When not in use, drums/containers will be covered with a tight-fitting lid.

- At the conclusion of each work shift, all drums/containers will be placed in the designated waste storage area. This area will be identified prior to the start of work activities and properly indicated on site plans/diagrams. Information pertaining to the location of storage areas and their contents will be properly conveyed to all personnel and appropriately annotated in the site logs.

- Mechanical or powered drum handling equipment will be used to move drums/containers. Manual handling of the drums leads to musculo-skeletal injuries and will be avoided to the extent possible.

4.3.7 Vegetation Removal

Prior to field sampling activities, it may be necessary to remove surface vegetation across the site. This will be accomplished using both manual methods (hand-held, gas-powered tools) and by mechanical means (dozer-towed flailing machine). Use of this equipment presents some danger to the operators due to the sharp cutting surfaces, and some power equipment may present a noise exposure hazard. Only experienced operators shall be permitted to operate powered equipment. Use of leather work gloves and eye protection (and hearing protection where necessary) will be required of personnel performing vegetation removal activities. An OE escort will lead the vegetation removal operation in accordance with the OE Safety and Health Program (Appendix H).

4.3.8 Heat Stress Prevention

Heat stress can be a significant field site hazard, especially for workers wearing protective clothing. Depending on the ambient conditions and the work being performed, heat stress can occur very rapidly, within as little as 15 minutes. Site

personnel will be instructed in the identification of a heat stress victim, the first-aid treatment procedures for the victim, and the prevention of heat stress casualties.

Workers will immediately report any difficulties or heat-related problems that they may experience or observe in fellow workers. Supervisors will use such information to alter the work-break schedule to accommodate such problems. During breaks, workers will drink plenty of water or other liquids to replace lost fluids and to help cool off. Should any worker exhibit signs of severe heat distress, such as profuse sweating, extreme confusion and irritability, or pale, clammy skin, that worker will be relieved of all duties at once and made to rest in a cool location and drink plenty of water. Anyone exhibiting symptoms of heat stroke (red, dry skin, or unconsciousness) is to be taken immediately to the nearest medical facility. Steps should be taken to cool the person during transportation (e.g., removing clothing, wetting the skin, air conditioning). Severe heat stress (heat stroke) is a life-threatening condition that must be treated by a competent medical authority.

Heat-Related Illnesses

The following guidance can be used in the identification and treatment of heat-related illness.

- **Heat Stress.** The mildest form of heat-related illness. Victims exhibit irritability, lethargy, and significant sweating. The victim may complain of headache or nausea. This is the initial stage of overheating, and prompt action at this point may prevent more severe heat-related illness from occurring.

  First Aid: Provide the victim with a work break during which he/she may relax, remove any excess protective clothing, and drink cool fluids. An air conditioned spot is an ideal break location, if available. Once the victim shows improvement, he/she may resume working; however, the work pace should be moderated to prevent recurrence of the symptoms.

- **Heat Exhaustion.** Usually begins with muscular weakness, dizziness, nausea, and a staggering gait. Vomiting is frequent. The bowels may move involuntarily. The victim is very pale, with clammy skin, and he or she may perspire profusely. The pulse is weak and fast; breathing is shallow. Fainting may occur unless the victim lies down.

  First Aid: Immediately remove the victim from the work area to a shady or cool area with good air circulation (avoid drafts or sudden chilling). Remove all protective outer wear. Call a physician. Treat the victim for shock. (Make the victim lie down, raise feet 6-12 inches

and keep victim warm but loosen all clothing.) If the victim is conscious, it may be helpful to give him or her sips of water. Transport victim to a medical facility as soon as possible.

- **Heat Stroke.** This is the most serious of heat illness and represents the collapse of the body's cooling mechanisms. As a result, body temperatures often rise to between 105 degrees (°) and 110° Fahrenheit (F). As the victim progresses toward heat stroke, symptoms such as headache, dizziness, nausea, and oppression can be noted, and the skin is observed to be dry, red, and hot. Sudden collapse and loss of consciousness follows quickly, and death is imminent if exposure continues. Heat stroke can occur suddenly.

  First Aid: Immediately move the victim to a cool and shady area. Remove all protective outer wear and all personal clothing. Lay the victim on his or her back with the head and shoulders slightly elevated. Apply cold wet towels or ice bags to the head, armpits, and thighs. Sponge off the bare skin with cool water or rubbing alcohol, if available, or even place the victim in a tub of cool water. The objective is to cool without chilling the victim. Give no stimulants or hot drinks. Since heat stroke is a severe medical condition requiring professional medical attention, emergency medical help should be summoned immediately to provide on-site treatment of the victim and proper transport to a medical facility.

Skin Hazards

Sunburn and prickly heat are both symptoms of skin irritation/damage produced through exposure to sunlight and operating in hot work environments. Protect exposed skin with an appropriate sun-screen. A sun-screen with a sun protection factor (SPF) of 15 or greater is recommended for a full day in the sun. Heat rash, also known as "prickly heat," can be prevented by the application of a hydrophobic, water-repellent barrier cream such as Kerodex 71.

4.4 LIGHTING

At a minimum, all portions of each work location will be sufficiently lit so that all surfaces are illuminated at 10-foot candle strength or greater. Since work activities are expected to be conducted exclusively outdoors and during daylight hours, the need for supplemental lighting is not anticipated.

4.5 ACCIDENT OR INCIDENT REPORTS

Any accident/incident involving Earth Tech or subcontractor personnel that occurs on the Project Site will be promptly reported to the SSC or the PM, who will notify the HSM. The supervisor of the injured employee or work crew where the accident

occurred will initiate a written report. The *Supervisor's Report of Incident* form, found in Appendix F, will be used, and must be fully completed to ensure that all relevant information is recorded. The PM or SSC must complete the "Manager" section of the report(s) and forward it to the HSM, who will review the documentation and assist in the performance of any necessary accident investigation or other follow-up. The PM will ensure that the recommendations resulting from any investigation are implemented without delay.

4.6 VISITOR CLEARANCES

Visitors will not be allowed within any controlled work area unless they comply with the health and safety requirements of this SSHP and can demonstrate an acceptable need for entry into the work area. All visitors (including the site owner or the owner's representative, regulatory agency representatives, or Earth Tech clients) desiring to enter any controlled work area must observe the following procedures:

- A written confirmation must be received by Earth Tech documenting that each of the visitors has received the proper training and medical monitoring required by this SSHP. Verbal confirmation is acceptable provided such confirmation is made by an officer or other authorized representative of the visitor's organization.

- Each visitor will be briefed on the hazards associated with the site activities being performed and must acknowledge receipt of this briefing by signing the appropriate tailgate safety briefing form.

If the site visitor requires entry to any exclusion zone, but does not comply with the above requirements, all work activities within the exclusion zone must be suspended, and monitoring using direct reading instruments must indicate that no airborne contaminant concentrations are present that exceed the established background levels. Until these requirements have been met, entry will not be permitted.

5.0 HAZARD ASSESSMENT

Planned activities will involve disturbance (e.g., drilling and soil sampling) of soils within the site. Potential hazards associated with this work include, but are not limited to:

- Explosive hazards due to OE.
- Explosive hazards due to soils containing explosive compounds in excess of 10 percent.
- Exposure to environmental contaminants (metals, PAHs, and dioxins/furans). Table 2-1 provides the contaminants of concern by location and concentration range. Volatile chemicals are not anticipated to be found on this site.
- Hazardous noise (from heavy equipment).
- Slip, trip, and fall hazards.
- Heat stress, especially when wearing chemically protective clothing.
- Biological hazards from animals, insects, and plants.
- Cleaning and decontamination of equipment.

Note: Soil containing TNT in excess of 10 percent is considered to be OE in accordance with ER-1110-1-8153. Personnel should avoid contact with soils in excess of 10 percent TNT. Spark, flame, and heat-producing items and activities are not permitted in areas these areas. Sampling boring or drilling in the TNT Strips will not be performed until the soil has been wetted with distilled water.

Note: Personnel using the medication "Viagra" will not be permitted to handle materials containing explosive constituents. Health hazards due to dermal absorption of explosives, while taking Viagra, can cause severe illness and death.

Note: Soil containing TNT in excess of 10 percent cannot be shipped. Laboratory analysis of soil in excess of 10 percent must be performed on site or performed after remediation activities to eliminate or reduce TNT content.

5.1 TASK HAZARD ANALYSES

The following is a description of the hazards determined to be associated with each identified work task to be performed. In evaluating the site conditions (on-site contamination) and the potential impact on personnel performing this work, it was determined that of the possible related exposure modes, skin contact and skin absorption is of primary concern, ingestion and inhalation are determined to be of only secondary concern. To prevent inhalation hazards, dust control measures will be used as necessary for all sampling activities.

In evaluating the task hazards, it is anticipated that site personnel, wearing the required PPE, will not come into direct contact with significant amounts of contaminated soil or water that would present a skin contact hazard. Task hazard analyses (THAs) designed to meet USACE and DTSC requirements are presented in Appendix G.

Soil and water sampling, well boring or drilling will be performed with a UXO escort leading the field team. Vegetation removal will be conducted under the direction of a UXO escort, or by a UXO qualified individual.

In the event of inclement weather (rain or snow), the SSC will determine when field operations must cease. In the event of an electrical storm within 5 miles of the project site, all activities will cease and all field personnel will report to the Command Post for further instruction.

5.1.1 Site Reconnaissance

This work includes delineation and staking of work area boundaries, identification of subsurface structure locations, and similar work. Because site reconnaissance is a nonintrusive activity, it provides little potential for the release of soil gases or contact with contaminated materials, and OE. The primary hazards associated with this work are the potential for encountering OE, and slip, trip, and fall hazards due to the presence of unprepared walking surfaces. Other hazards that may be encountered include heat stress and sunburn. To protect against these hazards, the following requirements should be met:

- Do not touch, move, or disturb any material or equipment that is unidentifiable.
- Watch carefully where you walk. Do not step in shadows until you are sure of your footing. Shadows may hide pits, holes, or other areas of unstable footing.
- Carefully choose your footholds when crossing rocky, vegetation-covered, uneven, or loose ground surfaces.

- Stay within site of your buddy.

5.1.2 Geophysical Detection

The primary hazards of the nonintrusive geophysical detection are associated with the possible presence of OE, and detonation of OE items due to the interaction of electronic fusing devices with electromagnetic fields produced by geophysical instruments. To prevent this, all use of geophysical instrumentation will be in accordance with Section 6.7.1 guidelines and Appendix H.

In addition, there is the potential for slip, trip, and fall hazards due to the presence of unprepared walking surfaces (e.g., mud, cleared vegetation, protruding objects). Other hazards that may be encountered include eye hazards (from tree limbs), pests (e.g., bees, wasps), and heat stress and sunburn. No significant hazards are expected due to the presence of site surface contaminants. The following requirements will be observed:

- Watch carefully where you walk. Do not step in shadows until you are sure of your footing. Shadows may hide pits, holes, or other areas of unstable footing.
- Carefully choose your footholds when crossing vegetation-covered, uneven, or loose ground surfaces.
- Stay within site of your buddy.

5.1.3 Borehole Drilling

HSA drilling will be used for the installation of boreholes and groundwater monitoring wells. The use of these drilling techniques presents several potential hazards to personnel. There is the potential for personnel to be exposed to any of the potential site contaminants via skin contact and/or inhalation (concentrations of contaminants may exceed the applicable Permissible Exposure Limits). To protect against exposure, personnel will utilize PPE as specified in the following paragraphs, and will conduct monitoring for airborne contaminant concentrations.

Drilling operations produce hazardous noise levels (in excess of 85 A-weighted sound level [dBA]), and personnel are required to utilize hearing protection inside any controlled work area whenever drilling occurs. Spinning augers can catch loose clothing. Lifting of heavy equipment and materials (e.g., bentonite bags) can cause severe injury unless proper lifting practices are used. Elevated drill rig masts present the potential for overhead hazards, requiring that hardhats be worn at all times.

Additional requirements for drilling equipment setup and operation are presented in Appendix I and will be complied with at all times during the performance of drilling activities.

5.1.4 Groundwater Monitoring Well Installation and Development

During well casing installation, there is the potential for some contact with contaminated groundwater, which can present potential skin contact and inhalation hazards.

During groundwater monitoring well development, personnel will be required to handle significant quantities of potentially contaminated groundwater. This presents potential skin contact and inhalation hazards. Personnel will be required to wear the PPE specified in the following paragraphs to protect against this hazard. In addition, sealed monitoring wells can accumulate vapors. Upon opening any monitoring well that has been sealed for more than 24 hours, personnel will allow the well to vent for at least 5 minutes prior to performing any work. To provide further protection, personnel will use the Level D ensemble (Section 8.1), modified by the use of a face shield and leather working gloves.

5.1.5 Surface and Groundwater Sampling

During surface and groundwater sample collection, personnel will be required to handle potentially contaminated groundwater. This presents potential skin contact hazards. Personnel will be required to wear the PPE specified as follows to protect against this hazard. To provide further protection, personnel will use the Level D ensemble (Section 8.1), modified by the use of a face shield and chemically protective gloves.

5.1.6 Equipment Decontamination

Equipment used in the installation of borings and groundwater monitoring wells will require decontamination prior to leaving the Project Site. Only portions of the equipment contacting subsurface soils (e.g., augers, tires) will require cleaning, which can be accomplished using physical removal methods including brush removal, wiping, and/or use of a steam cleaner unit.

Since no significant contamination is expected in the topmost soils, this task presents no significant inhalation or skin exposure hazards. However, personnel should be trained in the use of the steam cleaner, which has exposed, hot surfaces during use. The pressurized hot water stream can cause significant physical and thermal injury if sprayed on exposed skin; consequently, personnel not involved in clean-up should not be present in any work area where a steam cleaner is in use.

To provide further protection, personnel will use the Level D ensemble (Section 8.1), modified by the use of a face shield and leather working gloves.

5.1.7 Management/Handling of Derived Wastes

Work activities will generate decontamination fluids, waste PPE and decontamination materials, and excess sediment. Wastes will be containerized and placed into drums. Handling of wastes presents a minimal potential for skin contact; inhalation is not expected to present a hazard.

5.1.8 Unanticipated Work Activities

Where work activities are identified that are not addressed in this SSHP, appropriate safety documentation and procedures will be implemented. Prior to initiation of work activities, any subcontractor organization tasked with performance of such work will submit a work procedure document that presents appropriate safety procedures applicable to the specific work activities to be undertaken. Submitted safety procedures will be reviewed for adequacy and compliance with applicable regulatory requirements and the requirements presented in this SSHP. Work will not be initiated until this review is completed and any identified deficiencies corrected.

5.2 ENVIRONMENTAL CONTAMINANT HAZARDS

As identified in existing site documentation, there are four distinct classes of environmental contaminants at the Project Site:

- PAHs
- Heavy metals (primarily)
- Explosive compounds (TNT)
- Dioxins.

There is very limited potential for encountering significantly contaminated soils during this work while wearing the required PPE. The known COC's are:

- TNT
- Antimony (Flare Area only)
- Arsenic
- Barium (Flare Area only)
- Copper (Flare Area only)
- Iron
- Lead (Flare Area only)
- Manganese
- benzo(a)pyrene (Ammunition Renovation/Primer Destruction Area)
- 2,3,7,8-tetrachlorodibenzo-p-dioxin (Flare Area only)
- Total hexachlorinated dibenzo-p-dioxins (Flare Area only).

The following is a discussion of the site-specific conditions and corresponding hazards associated with the identified contaminant types. MSDS are included for the contaminants of concern in Appendix L.

5.2.1 Polyaromatic Hydrocarbons

- Anthracene
- Benzo(a)anthracene
- Benzo(b)fluoranthene
- Benzo(k)fluoranthene
- Benzo(g,h,i)perylene
- Benzo(d,e,f)phenanthrene
- Benzo(a)pyrene
- Chrysene
- Fluoranthene
- Fluorene
- Indeno(1,2,3-cd)pyrene
- Phenanthrene.

These are PAHs, and in the pure state, they are yellowish, crystalline solids. These chemicals are found in coal tar and in products of incomplete combustion. They have varying degrees of potency for causing cancer, with benzo(a)pyrene being among the most potent. These PAHs are evaluated collectively as coal tar pitch volatiles. Coal tar pitch volatiles may cause photosensitization and a rash where sunlight strikes the skin. Exposure may also cause cancer of lungs, skin, bladder, or kidneys. Benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, chrysene, and indeno(1,2,3-cd)pyrene have been identified as carcinogenic. Polyaromatic compounds are formed when petroleum fuels are burned in a smoky flame.

5.2.2 Heavy Metals

As a group, the heavy metals (which at the Project Site can include antimony, arsenic, barium, copper, iron, lead, and manganese) are toxic to a number of organs and organ systems in the body including the liver, kidneys, blood-forming organs (which are primarily in the bones), and the central nervous system (CNS). Acute exposure to metals can produce symptoms such as stomach distress and vomiting, mental confusion and sluggishness, heart palpitations, breathing difficulties, and renal (kidney) failure. Chronic exposure can be characterized by deterioration in function of the liver and kidneys, CNS degradation, and abnormal changes in blood cell counts (especially in white blood cells).

It is not anticipated that significant metals contamination will be encountered in this project. If metals are present, the primary routes of exposure will be through contact with contaminated soils and groundwater (i.e., entry through open wounds or ingestion). Preventing this route of exposure necessitates the use of dust control measures and appropriate protective clothing and decontamination procedures. Inhalation is of secondary concern, since required dust control measures should adequately control any potential exposures.

5.2.3 Explosive Compounds

TNT is the only explosive on site above the PRG. TNT is an explosive compound that exhibits relatively stable properties when handled correctly. It has a low sensitivity to impact and friction; therefore, it is commonly used as a military and industrial explosive. TNT has similar effects of other nitro-compounds. Long-term exposure to TNT may result in irritation to the gastrointestinal tract. Other indications of exposure to TNT include toxic jaundice, aplastic anemia, methaemoglobaimea (effects of oxygen deficiency), and cataract formation. Exposure routes for TNT are absorption, inhalation, and ingestion, with skin absorption being the primary cause for concern. Dermatitis is not a common illness associated with TNT exposure; however, indications are evident by orange staining of the hands, arms, and face. Papular eruption and reddening of exposed skin has also been observed as a symptom of prolonged skin exposure. The Threshold Limit Value (TLV) is 0.1 milligram per cubic meter (mg/m^3) by the American Conference of Governmental Industrial Hygienists (ACGIH), while federal OSHA has established the PEL for TNT at 0.5 mg/m^3. Both agencies have applied a "skin" notation to the exposure limits, indicating that dermal exposure is a significant potential hazard.

Protection against skin exposure can be provided by the use of chemically protective gloves and other clothing.

5.2.4 Dioxins

Dioxin or TCDD is an abbreviation for 2,3,7,8-tetrachlorodibenzo-p-dioxin. It is one member of a "family" of chemical compounds with an identical carbon-oxygen framework. Therefore the term dioxin will be used in this document to describe all isomers.

Dioxin was discovered as a by-product in the manufacture of trichlrophenol, an intermediate chemical in the manufacturing process for some pesticides. It does not occur in a pure form in nature. Dioxin displays high toxicity to some experimental animals. Toxicology studies of the effects of dioxins on test animals indicate that the toxicity is not the same for each possible isomer. Those isomers that contain chlorine in the 2,3,7, and/or 8 positions are more toxic than when hydrogen is attached to those positions.

Pure 2,3,7,8-TCDD (isolated in a laboratory) is a white, micro-crystalline solid which looks like table salt and is insoluble in water and very slight soluble in some organic solvents. It has been proven that there is a natural background level of dioxins in the environment due to low temperature combustion events of materials containing carbon and chlorine.

Protection against skin exposure can be provided by the use of chemically protective gloves and other clothing.

6.0 ACTIVITY-SPECIFIC HEALTH AND SAFETY PROCEDURES

The following safety procedures will apply to work operations as specified in the task hazard analyses presented in Section 5.1.

6.1 SLIPS, TRIPS, AND FALLS, AND PROTRUDING OBJECTS

Hazards from protruding objects, careless movements, or placement of materials on paths or in foot traffic areas present a problem with regard to slips, trips, and falls, and puncture wounds. Personnel will use a reasonable amount of effort to ensure the prevention of such injuries.

6.2 HAZARDOUS NOISE SAFETY

Working around large equipment often creates excessive noise. The adverse effects of noise can include physical damage to the ear, pain, and temporary and/or permanent hearing loss. Workers can also be startled, annoyed, or distracted by noise during critical activities.

Earth Tech has compiled noise monitoring data indicating that work locations within 25 feet of operating heavy equipment (e.g., drill rigs, earthworking equipment) can result in exposure to hazardous levels of noise (levels greater than 85 decibel, A-weighted scale [dBA]). Accordingly, all personnel are required to use hearing protection (i.e., ear plugs or ear muffs) within 25 feet of any operating piece of heavy equipment.

The HSM may also choose to monitor employee exposure to hazardous noise levels as part of Earth Tech's Hearing Conservation Program.

6.3 HEAVY MACHINERY

The use of heavy machinery (i.e., drilling equipment) in areas where unprotected personnel are operating warrants special attention on the part of all personnel. Operators should ensure that equipment is working properly and is being run in a safe manner and should be aware of the location of unprotected personnel at all times while operating this machinery to avoid serious accidents.

6.4 UNDERGROUND AND OVERHEAD UTILITIES

Various forms of underground utility lines or pipes may be encountered during intrusive work activities. Underground Service Alert (USA) will be contacted at least 48 hours prior to the start of intrusive operations.

Should intrusive operations cause equipment to come into contact with utility lines, the SSC and the HSM will be notified immediately, and a Supervisor's Report of Incident (see Appendix F) will be completed. Work will be suspended until the appropriate actions can be taken for the particular situations assessed.

There are no overhead lines at the site that will affect the activities to be performed; therefore, overhead lines are not addressed in this SSHP.

6.5 DUST SUPPRESSION

In order to minimize potential releases of dust during site activities, it may be necessary to employ positive dust suppression techniques. In general, this will require the use of water to keep exposed soil surfaces wet and to prevent blowing dust. Water can be applied using hoses or portable sprayers. Specific procedures can be determined based upon the amount of dust being generated, results of air monitoring in the work area (where performed), and site conditions. If mitigation measures are found to be inadequate, the SSC will halt on-site operations until effective control can be achieved.

6.6 ELECTROMAGNETIC EMISSIONS SAFETY

Electronic fusing devices used in many types of ordnance devices are sensitive to emissions of electromagnetic radiation (EMR). Since many of the communication devices and investigation equipment employed on site emit or generate EMR, there is the potential for use of these devices to cause accidental detonation of OE, which may be present on site. To prevent this, the following procedures will be followed:

- An assessment of the safe separation distance (SSD) associated with each transmitter unit (e.g., radios, cellular telephones) will be conducted using the Hazards of Electromagnetic Radiation to Ordnance (HERO) methodology found in Appendix H.

- Any device with an SSD greater than 4 feet will not be permitted for use on site until a complete characterization of on-site OE has been permitted. Once characterization has been completed, devices with SSDs exceeding 4 feet can be used at distances greater than the calculated SSD from any identified OE items/areas. **No device will be operated at a distance closer than its SSD from any identified OE.**

- SSD calculations will be performed on site by the SSC for all emission sources. All use of geophysical instrumentation on the site will be in accordance with Section 6.7.1 guidelines.

Note: There is no indication or evidence from site records or sub-surface sampling activities that HERO sensitive OE were ever stored, fired, or disposed of by detonation on the Tourtelot Property. These findings are consistent for the time period that the arsenal was operating.

6.7 ORDNANCE AND EXPLOSIVES SAFETY FOR SITE INVESTIGATION ACTIVITIES

OE items present hazards if encountered in subsurface areas during drilling and soil sampling. The fundamental policy to be observed regarding OE is: ***DO NOT TOUCH, HANDLE, OR OTHERWISE DISTURB ANY OE ITEM.***

In addition, use the following information to minimize the hazards to personnel from OE.

6.7.1 Ordnance and Explosives Safety for Geophysical Investigation

Many types of geophysical instrumentation emit or produce EMR, which can interact with electronic fuses found on OE and cause accidental detonation. Accordingly, all use of geophysics devices on site must conform to the following requirements:

- Use of ground-penetrating radar (GPR) devices is prohibited in areas where OE is suspected.
- The use of TDEM and fixed domain electromagnetic (FDEM) devices is prohibited for identified trash piles and similar structures where the presence of OE is suspected.
- An analysis of the SSD required for the EMR emissions associated with each allowable device will be accomplished using the HERO methodology found in Appendix H.
- Approved geophysical equipment (the instrument, its electronics, data processor, and battery pack) will not be placed on the ground during operation. The minimum aboveground height at which any device can be operated is the device's calculated SSD, or 3 feet, if no SSD is available.

6.7.2 OE in Surface Areas

All personnel must be briefed concerning the potential for OE in surface areas and any known identifying characteristics of OE items. When moving about the site, personnel should remain alert for any OE items that might be present. Each work site should be thoroughly checked for the presence of OE before any other activities commence. In the event that any OE item is observed or expected, the following requirements will be observed:

- Personnel should note the location of the OE item and alert all other personnel in the area to its presence.

- Any work operations occurring within 20 feet of the item will cease. All Earth Tech and subcontractor employees will evacuate this area.

- Under no circumstances will any Earth Tech or subcontractor employee attempt to move or otherwise handle any OE/suspected OE item. COLLECTION OF "SOUVENIRS" IS PROHIBITED.

- The FTL will be alerted to the location of the suspected item.

6.7.3 Drilling Activities

All drilling activities will be performed with a UXO escort providing UXO avoidance support. Prior to beginning drilling operations, the specific drilling location will be checked with a magnetometer for anomalies by the UXO escort. If an anomaly is detected the drilling location will be moved a minimum of 1 meter from the anomaly location. When no anomaly is detected, the drilling may begin. Drilling will be performed in 1 foot increments. After each foot of drilling, the drill will be withdrawn and the UXO escort will perform down hole magnetometer testing. Provided no anomalies are detected, the drilling may continue for another foot and the process will be repeated. Once the drilling exceeds 4 feet, UXO detection will be discontinued. It is expected that the weight of the soil overburden will provide sufficient protection from injury at depth below 4 feet. In the event that any OE item is encountered during drilling, the following procedures will be observed.

6.7.3.1 OE Item Encountered Downhole and Detonation Occurs.

- The work operation will cease **immediately**.

- If injuries have occurred, the Emergency Contingency Plan will be activated (see Chapter 11.0).

- Once any necessary immediate response actions have been completed, the drilling auger will be blocked in place and disconnected from the drill rig. The drill rig will then be withdrawn from the site and the area will be delineated using yellow CAUTION tape.

- The FTL will be alerted to the situation.

- The drill rig will be thoroughly inspected for damage before being put back into service (see Appendix I).

- The FTL will be alerted to the situation.

- The drill rig will be thoroughly inspected for damage before being put back into service (see Appendix I).

6.7.3.2 OE Item Believed to be Encountered Downhole But No Detonation Occurs.

- The work operation will cease **immediately**.

- If drilling, the drilling auger will be blocked in place and disconnected from the drill rig. The equipment (e.g., drill rig, backhoe) will be withdrawn from the site and the area will be delineated using yellow "CAUTION" tape.

- The FTL will be alerted to the situation.

6.7.3.3 OE Item Observed in the Spoils.

- The work operation will cease immediately and all personnel will evacuate the area. The equipment (e.g., drill rig, backhoe) will be left in place.

- Any work operations occurring within 20 feet of the item will cease. All Earth Tech and subcontractor employees will evacuate this area.

- Under no circumstances will any Earth Tech or subcontractor employee attempt to move or otherwise handle any OE/suspected OE item. COLLECTION OF "SOUVENIRS" IS PROHIBITED.

- The FTL will be alerted to the location of the suspected item.

6.8 TICKS

When work is being conducted in undeveloped areas, biting insects, particularly ticks, will likely be encountered. Workers should take care to inspect themselves for insects and take appropriate action if any are found.

Several precautions can minimize the chances of being bitten by a tick.

- Tuck pant legs into socks. Tuck shirt into your pants. Ticks grab onto feet and legs and then climb up. This precaution will keep them outside of clothing, where they can be spotted and picked off.

- Wear light-colored clothing. Dark ticks can most easily be spotted against a light background.

- Inspect clothing for ticks often while in tick habitat. Have a companion inspect your back.

- Wear repellents, applied according to label instructions. Application to shoes, socks, cuffs, and pant legs are most effective against ticks.

- Inspect head and body thoroughly following fieldwork. Have a companion check your back, or use a mirror.

- When working in tick habitat on a regular basis, do not wear work clothing home. This will reduce the chances of bringing ticks home and exposing family members.

What to do if Bitten by a Tick

Remove the tick as soon as possible. The easiest method is to grasp the tick with fine tweezers, as near to the skin as you can, and to gently pull it out. You may want to save the tick in a small jar for later identification. Check to see whether the mouthparts broke off in the wound. If they did, seek medical attention to get them removed.

7.0 AIR MONITORING PROCEDURES

Airborne particulate monitoring will be performed to assess the concentrations of fugitive dusts that may be released during site activities. Air monitoring will be accomplished both in worker breathing zones and at the boundaries of the established controlled work areas.

Monitoring will be conducted using an MIE mini-RAM aerosol monitor that is specifically designed for the monitoring of airborne dusts (e.g., metals and other particulates).

Calibration of the mini-RAM instrument will be performed daily in accordance with the manufacturers' instructions. Daily calibration results will be recorded in Earth Tech's log books.

7.1 WORK AREA (BREATHING ZONE) MONITORING

Measurements of worker breathing zone concentrations of the specified contaminants will be accomplished continuously.

Initially, air monitoring results will be used to determine if there is a need for use of respiratory protection (i.e., monitoring results show dust concentrations above the Table 7-1 limits). Table 7-1 specifies the criteria to be used to assess the appropriateness of elected protection measures.

7.2 WORK SPACE BOUNDARY MONITORING

Release of contaminants to the community will be monitored through determination of airborne levels of dust present at the boundary of the controlled area(s). Table 7-1 specifies the criteria to be used for evaluation of these monitoring results.

7.3 PERSONAL SAMPLING

Measurement of employee exposure to chemical contaminants will be performed at the discretion of the HSM. Monitoring techniques will also be determined by the HSM and will conform with applicable OSHA and National Institute of Occupational Safety and Health (NIOSH) sampling methods. No personnel sampling is intended or expected with the exception of dust monitoring.

Samples will be collected by, or under the direction of, a member of the Earth Tech Health and Safety Department. Any analytical laboratory performing analysis of personal samples will be accredited by the American Industrial Hygiene Association (AIHA) and must be a participant in the AIHA Proficiency Analytical Testing (PAT) program.

Table 7-1. Exposure Monitoring Program Action Levels

Parameter	Location and Interval	Measured Concentration	Response
Airborne Dusts (mini-RAM)	Breathing Zone, Continuously during all drilling activities.	< 5 mg/m^3 5-15mg/m^3 (Sustained for more than 5 minutes)	No respiratory protection required. Air-purifying respirators (w/N99 cartridges) required.
		or > 15 mg/m^3 (Instantaneous)	If Level C has been discontinued, contact the HSM, implement mitigation measures, and upgrade PPE to Level C before continuing work.
		>15mg/m^3 (Sustained for more than 5 minutes)	Cease work, exit, and contact the HSM. Air purifying respirators required for continued work.
		or > 25 mg/m^3 (Instantaneous)	

HSM = Health and Safety Manager
mg/m^3 = milligrams per cubic meter
PPE = personal protective equipment

7.4 HEAT STRESS MONITORING

The prevention of heat stress-related accidents/illnesses is best performed through continuous observation of employees and routine heat stress awareness training activities. Heat stress monitoring can be accomplished using one of the techniques discussed in the following paragraphs.

Any results obtained from monitoring techniques should be used as guidance only. To properly mitigate the effects of heat stress, it is necessary to establish a work routine that incorporates adequate rest periods to allow workers to remove protective clothing, drink fluids (vital when extreme sweating is occurring), rest, and recover. The frequency and length of such work breaks must be determined by the individual work location supervisor based upon factors such as the ambient temperature and sunshine, the amount of physical labor being performed, the physical condition of the workers, and the protective clothing being used. While heat stress measurement techniques provide guidance in optimizing this routine, breaks must always be sufficient to prevent workers from manifesting symptoms of heat stress, regardless of monitoring results.

To determine appropriate work/rest cycles, evaluation of heat stress will be performed whenever fieldwork activities are occurring. The Basic Instrument Measurements Method shown in the following section must be used for personnel using Level D protective equipment only. Where any type of chemically protective clothing (CPC) is in use, the Modified Instrument Measurements Method will be used together with the Direct Observation Method to provide guidance in appropriate work/rest cycles.

7.4.1 Basic Instrument Measurements Method

This method will be used only to monitor heat stress where workers are not using CPC. The Wet Bulb Globe Temperature (WBGT) value will be determined using a WBGT meter (Reuter-Stokes 214 DL or equivalent) and compared with the values shown in Table 7-2 to determine appropriate work/rest cycles.

Table 7-2. WBGT Values for Level D Work/Rest Cycles

	°F –WBGT		
Work-Rest Regimen	Light Work	Moderate Work	Heavy Work
Continuous Work	86	80	77
75% Work – 25% Rest	87	82	78
50% Work – 50% Rest	89	85	82
25% Work – 75% Rest	90	88	86

°F = degrees Fahrenheit
WBGT = Wet Bulb Globe Thermometer

Source: Reprinted from ACGIH's 1999 Threshold Limit Values for Chemical Substances and Physical Agents.

7.4.2 Modified Instrument Measurements Method

This method will be used whenever personnel use CPC. The WBGT value will be determined as above. The measured value will then be compared to the values shown in Table 7-3 to determine the appropriate work/rest cycle.

Table 7-3. WBGT Values for CPC Work/Rest Cycles

	°F –WBGT		
Work-Rest Regimen	Light Work	Moderate Work	Heavy Work
Continuous Work	75	69	66
75% Work – 25% Rest	76	71	67
50% Work – 50% Rest	78	74	71
25% Work – 75% Rest	79	77	75

°F = degrees Fahrenheit
WBGT = Wet Bulb Globe Thermometer

Source: Modified from ACGIH's 1999 Threshold Limit Values for Chemical Substances and Physical Agents.

7.4.3 Direct Observation

This method will also be used whenever personnel use CPC. At the start of the work day, each worker's baseline pulse rate will be determined in beats per minute (bpm). Worker pulse rates will then be measured at the beginning and end of each break period. As recommended by the ACGIH, each worker's maximum heart rate at the start of any break should be less than (180 minus worker's age) bpm. If this value is exceeded for any worker, the duration of the following work period will be decreased by at least 10 minutes. At the end of each work period, all workers' heart rates must have returned to within ±10 percent of the baseline pulse rate. If any worker's pulse rate exceeds this value, the break period will be extended for at least 5 minutes, at the end of which pulse rates will be re-measured and the end-of-break criteria again applied.

7.5 NOISE MONITORING

Since high noise sources may be present at the Project Site, the SSC will perform sound level monitoring during high noise activities. The SSC will require all personnel working in areas above 85 dBA to wear hearing protection.

The SSC will also determine the distance from the noise-producing operations at which the sound level is below 50 dBA. The community noise standard for the exterior of residences, schools, and businesses is 50 dBA. If noise levels exceed 50 dBA at residences, schools, or businesses, the SSC will stop the activity and procedures will be developed to reduce the noise level below 50 dBA.

7.6 VOLATILE ORGANIC COMPOUND MONITORING

All samples will be check for Volatile Organic Compounds (VOCs) at the time the sample is obtained. The VOCs will be monitored with a Photoionic Detecter (PID). If VOCs are detected, the sample will be immediately sealed in an air tight container and transported to the on-site laboratory for VOC analysis and characterization. All work will be discontinued at the sampling location until the HSM, DTSC, and the USACE have reviewed the laboratory results and appropriate PPE and permissible exposure levels have been determined. The HSM will develop and implement the use of all necessary PPE and sample handing methods.

8.0 PROTECTIVE EQUIPMENT ENSEMBLES

The use of protective equipment ensembles specified in the individual task hazard analyses (Appendix G) will conform to the following requirements.

8.1 LEVEL D

Level D PPE will be the minimum acceptable protective clothing/equipment to be used during site work activities. The Level D ensemble provides limited physical protection from abrasion but no significant skin contact protection for chemical exposure. Level D will be used for all vegetation removal and site reconnaissance activities.

Level D Equipment List

- Long pants and shirt with sleeves
- Hard hat
- Safety glasses
- Safety-toe boots (leather boots are acceptable for this project)
- Full-face air purifying respirator (available for emergency use) equipped with high-efficiency particulate air (HEPA) cartridges.

Where there is a desire to provide limited skin protection from chemical hazards, the use of chemically protective gloves can be specified. In such cases, the inner glove will be made of nitrile rubber (N-DEX model gloves or equivalent), and outer gloves will be made from nitrile rubber (Solvex or equivalent gloves).

8.2 MODIFIED LEVEL D

The Modified Level D ensemble provides moderate skin protection against chemical contact, but no respiratory protection. Modified Level D PPE will be used for all field sampling activities.

Modified Level D Equipment List

- Tyvek® disposable outer coveralls, hoods optional
- Nitrile outer gloves (Solvex® or equivalent), taped to outer coveralls

- Nitrile inner gloves (N-DEX only)
- Hard hat
- Safety glasses/faceshield
- Safety-toe boots (leather boots are acceptable for this project)
- Full-face air purifying respirator (available for emergency use) equipped with high-efficiency particulate air (HEPA) cartridges.

8.3 LEVEL C

The Level C ensemble provides moderate skin protection against chemical contact, as well as respiratory protection from low to moderate concentrations of airborne contaminants.

Level C Equipment List

- Polyethylene-coated Tyvek disposable outer coveralls with hood (hood taped-sealed to respirator)
- Nitrile outer gloves (Solvex or equivalent), taped to outer coveralls
- Nitrile inner gloves (N-DEX only)
- Safety-toe boots (leather boots are acceptable for this project)
- Boot covers (taped to coveralls)
- Full-face air purifying respirator, equipped with high-efficiency particulate air (HEPA) cartridges.

8.4 LEVEL B AND LEVEL A

The use of Level B or Level A protective equipment will not be required for this project.

8.5 RESPIRATORY PROTECTION

The use of respiratory protection is not anticipated for project-related activities based on specific work conditions. Where the use of respirators is required, personnel will inspect their respirators prior to and after each use. Additionally, all filter cartridges will be discarded at the end of each day.

9.0 SITE AND CONTAMINATION CONTROL

9.1 OVERALL SITE CONTROL

Overall control of the Project Site is the responsibility of Earth Tech. Access to the site will be secured through an entrance gate to the Project Site and will be limited to authorized personnel only.

9.2 WORK AREA CONTROL

Earth Tech is responsible for properly controlling its work locations to prevent injury to other personnel operating at the site. To ensure that conflicts do not occur, Earth Tech will coordinate daily work activities with the other organizations performing work at the site (if any), and will inform each organization of the hazards and clearance requirements for each work activity so that they can inform/manage their personnel accordingly.

9.2.1 Exclusion Zones

Exclusion zone boundaries will be set such that all physical, noise, and chemical contaminant hazards are fully contained within. Unless otherwise indicated (by specific site or work conditions or by perimeter monitoring results), an area of 35 feet in all directions from each work location will be considered as the boundaries of each exclusion zone. Where feasible, boundaries of each exclusion zone will be designated using cones, yellow "CAUTION" tape, and/or other positive physical/visual barriers. However, it is recognized that during some work operations (i.e., hand augering), the work pace will preclude use of this equipment. In such instances, visual control of the work area should be adequate due to the limited potential for unexpected entry.

Within each exclusion zone, Earth Tech will have complete control of all operations and personnel. Only Earth Tech-authorized personnel, who must meet the training and medical monitoring requirements specified in Sections 4.1 and 4.2, will be permitted within any exclusion zone. Once an exclusion zone is established, access will be limited to qualified personnel equipped with the proper PPE. Access will be through a designated entry control point.

9.2.2 Contamination Reduction Zone

Since it is considered unlikely that significant soil contamination will be encountered, there is limited need for establishment of a specific contamination reduction zone (CRZ) around each exclusion zone. Instead, Earth Tech will establish designated entry/exit areas that will serve as decontamination locations.

10.0 DECONTAMINATION

All personnel and equipment that comes into contact with contaminated materials must be adequately decontaminated prior to exiting the area.

10.1 PERSONNEL DECONTAMINATION

Decontamination procedures must be carried out on all personnel who have been in contact with contaminated materials. Under no circumstances (except emergency evacuations) will personnel be allowed to leave a controlled work area where contaminants are exposed without performing decontamination. Decontamination of personnel will be performed at a Personnel Decontamination Station on the site and will consist primarily of soap and water washing and water rinse of exterior protective gear to remove contaminants, followed by doffing of the gear. Coveralls will be removed by turning the clothing inside out. A procedure appropriate to the degree of contamination will be established. The extent of washing required, or modifications to the sequence, may be specified as appropriate.

Level D Personnel Decontamination: Where activities are performed in Level D PPE, personnel will perform decontamination using the following guidelines:

- Place tools, instruments, samples, and trash at an appropriate location. The equipment drop area will be clean and dry, and at a minimum, plastic bags will be available for trash. Waste PPE will not be placed in the same containers as general trash.

- Inspect equipment, samples, and if applicable, tools for signs of residual amounts of contamination or excessive soil buildup. If present, soils and contamination must be completely cleaned from equipment, samples, and tools prior to their removal from the exclusion zone areas.

- Personnel will visually check themselves for signs of excessive soils and possible contamination. If observed, soils and contamination will be completely removed before further decontamination is performed.

- Prior to exiting the exclusion zone areas, personnel will wash their hands with soap and water in order to minimize the potential for contaminant exposure.

Modified Level D Personnel Decontamination: Where activities are performed in Modified Level D PPE, personnel will perform decontamination using the following guidelines:

- Place tools, instruments, samples, and trash at an appropriate location. The equipment drop area will be clean and dry, and at a minimum, plastic bags will be available for trash. Waste PPE will not be placed in the same containers as general trash.

- Inspect equipment, samples, and if applicable, tools for signs of residual amounts of contamination or excessive soil buildup. If present, soils and contamination must be completely cleaned from equipment, samples, and tools prior to their removal from the exclusion zone areas.

- Personnel will visually check themselves for signs of excessive soils and possible contamination. If observed, soils and contamination will be completely removed before further decontamination is performed.

- Wash and rinse outer work gloves and boots (boot covers) with soap and water.

- Wash/brush off outer protective coverall (Tyvek®).

- Untaped wrists and ankles.

- Remove outer work gloves and place them in an appropriate container specified for waste PPE.

- Remove outer Tyvek® coveralls and place them in an appropriate container specified for waste PPE.

- Wash, rinse, and remove inner protective gloves and place them in an appropriate container specified for waste PPE.

- Wash hands using soap and water (separate from other decontamination cleaners/solutions).

Level C Personnel Decontamination: Where activities are performed in Level C PPE, personnel will perform decontamination using the following guidelines:

- Place tools, instruments, samples, and trash at an appropriate location. These areas will be clean and dry, and at a minimum will contain plastic bags for trash. Waste PPE will not be placed in the same containers as general trash.

- Inspect equipment, samples, and if applicable, tools for signs of residual amounts of contamination or excessive soil buildup. If present, soils and contamination must be completely cleaned from

equipment, samples, and tools prior to removal from the exclusion zone areas. Personnel will visually check themselves for signs of excessive soils and possible contamination. If observed, soils and contamination will be completely removed before further decontamination is performed.

- Wash and rinse outer work gloves and boots (boot covers) with soap and water.
- Wash/brush off outer protective coverall (Tyvek®).
- Untaped wrists and ankles.
- Remove outer work gloves and place them in an appropriate container specified for waste PPE.
- Remove outer Tyvek® coveralls and place them in an appropriate container specified for waste PPE.
- Remove respirator mask (also goggles if worn).
- Wash, rinse and remove inner protective gloves and place them in an appropriate container specified for waste PPE.
- Wash hands using soap and water (separate from other decontamination cleaners/solutions).

Respirator Decontamination: If worn, respirators will be decontaminated each day. Taken from the drop area, the masks will be disassembled, the cartridges disposed of, and the rest of the mask will be placed in a cleansing solution. Personnel will inspect their own masks to be sure of proper strap readjustment for correct fit.

Certain parts of contaminated respirators, such as the harness assembly or cloth components, are difficult to decontaminate. If grossly contaminated, they may have to be discarded and replaced.

In addition to being decontaminated, all respirators, protective clothing, and other personal articles must be sanitized before they can be used again. The insides of masks and clothing become soiled from exhalation, body oils, and perspiration. The manufacturer's instructions will be followed in sanitizing the respirator mask. If practical, protective clothing will be machine washed after a thorough decontamination. Otherwise, it will be cleaned by hand.

10.2 EQUIPMENT DECONTAMINATION

Equipment that might require decontamination includes heavy equipment, tools, monitoring equipment, sampling equipment, and sample containers; trucks and trailers; and the decontamination equipment itself when the decontamination is closed down. Before entering the site, all equipment will be cleaned to remove grease, oil, encrusted dirt, or other potential contaminants. The following is general guidance for use in determining equipment decontamination procedures:

Tools: Tools will be dropped into a plastic pail, tub, or other container in the exclusion zone. They will be brushed off, rinsed, and transferred into a second pail to be carried to the decontamination station. Generally, tools will be washed with a detergent solution and then rinsed with clean water.

Avoid using wooden tools; they cannot be adequately decontaminated due to their absorptive properties. If used, wooden tools cannot be removed from the exclusion zone until the end of the project, and then only to be disposed of as hazardous waste.

Sampling Equipment: Sampling equipment will be decontaminated before and between sampling activities to prevent cross-contamination, and when the equipment leaves the exclusion zone. Sampling equipment may include trowels, shovels, bailers, submersible pumps, geotechnical samplers, sleeves, and backhoe buckets.

All sampling equipment will be decontaminated using an Alconox wash, or equivalent, followed by two clean-water rinses. The sampling tool will then be rinsed with deionized or distilled water and air dried.

Heavy Equipment: Where significant amounts of site soils accumulate on site equipment, cleaning will be accomplished with high-pressure water or a portable high-pressure steam spray followed by a soap and water wash and rinse. Loose material will be removed by brush.

All cleaning water and debris will be collected and sampled to determine proper disposal options.

Monitoring Instruments: Monitoring equipment will be protected as much as possible from contamination. Drape, mask, or otherwise cover as much of the instruments as possible with plastic without hindering the operation of the unit. Many instruments can be placed in a clear plastic bag that allows reading of the scale and operation of the knobs.

Contaminated instruments will be taken from the drop area, and their protective coverings removed and disposed of in appropriate containers. Any remaining dirt or obvious contamination will be brushed or wiped with a damp, disposable paper

wipe. The units can then be placed in a clean plastic tub, taken inside, wiped with damp, disposable wipes, and dried.

Be aware that many instrument manufacturers and rental companies will not accept contaminated equipment for repair, and that a heavily contaminated piece of equipment, if improperly handled, may have to be disposed of as hazardous waste.

10.3 DISPOSAL OF DECONTAMINATION WASTES

Solid and liquid decontamination waste will be containerized. Solids may be double bagged or placed in a sealed drum or similar container. Liquids will be collected during decontamination and placed in sealed containers or pumped into holding tanks for future testing and disposal. Containers must be clearly labeled for content, the operation from which they were filled, and the dates.

10.4 DECONTAMINATION DURING EMERGENCIES

In an emergency situation, the need to respond quickly to an accident or injury must be weighed against the risk to the injured party from chemical exposure. In some cases, the quick removal of contaminated clothing would be less harmful to the individual than expending the time and effort required to properly decontaminate the victim.

An additional consideration when bypassing decontamination of injured personnel is the acceptance of contaminated personnel at emergency medical facilities. Many facilities will not accept contaminated personnel. Site response personnel will accompany contaminated victims to the medical facility to advise medical personnel on matters involving decontamination.

11.0 EMERGENCY CONTINGENCY PLAN

11.1 GENERAL

There are three types of emergencies that could occur during performance of this project:

- Illness and physical injury
- Catastrophic event at the work site (fire, explosion, earthquake, or chemical)
- Catastrophic event involving site personnel and/or equipment.

Although a catastrophic event or severe medical emergency is unlikely to occur during work activities, an emergency contingency plan has been prepared for this project should such a critical situation arise.

11.2 RESPONSIBILITIES

11.2.1 Field Team Leader/Site Safety Coordinator

The FTL/SSC will be the primary contact individual and coordinator of all emergency activities. Responsibilities include:

- Evaluating the severity of the emergency
- Implementing appropriate response action
- Summoning appropriate emergency services (e.g., fire department, ambulance)
- Notifying all site personnel, the HSM, and concerned authorities of the emergency situation.

11.2.2 Other On-site Personnel

It will be the obligation of the field personnel to inform the SSC of all emergency situations and to abide by their issued response actions. Special medical problems of field personnel (e.g., allergies to insects, plants, prescription medication) will be reported to the SSC.

11.3 EMERGENCY EQUIPMENT

Provisions will be made to have appropriate emergency equipment available and in proper working condition.

11.3.1 First Aid Kits

Each work team will have access to a first-aid kit meeting the following requirements:

- First-aid kits in weatherproof containers, approved by Earth Tech's Occupational Physician and meeting all regulatory requirements, will be present at all locations where Earth Tech employees will be working.
- First-aid kits will be available at the job site at all times.
- Use of any item from the first-aid kit will necessitate completion of an Accident/Injury Report. The report will be submitted to the HSM within 1 working day of the incident.
- First-aid kits will be inspected and restocked weekly. An inventory of first-aid supplies sufficient to restock kits on a weekly basis will be maintained.
- Personnel permitted to use first-aid kits will possess a current first-aid provider card.

11.3.2 Eyewash Units

Each work team will have access to an eyewash unit meeting the requirements of ANSI Standard Z358.1-1990, capable of supplying hands-free irrigation for both eyes for at least 15 minutes at a flow rate of at least 0.4 gallon per minute. This unit will be within 50 feet of any work location.

11.3.3 Fire Extinguisher

A fire extinguisher with a minimum rating of 1A:10B:C will be available to each work team, and within 50 feet of any work location. Personnel will be made aware of the location of the nearest fire extinguisher at all times.

11.4 NOTIFICATION AND RECORDKEEPING

Any injury or illness will be immediately reported to the PM, who will implement any immediate corrective actions and report the incident to the HSM. OSHA

requires notification within 24 hours, and preferably during the same work shift, in the event of a fatality or severe injury requiring hospitalization. The HSM will make such notifications to OSHA and consequently must receive the information in time to make the notification without penalty.

11.5 RESPONSE ACTIONS - SAFETY EQUIPMENT PROBLEMS

An emergency may develop due to malfunction or other problems associated with use of health and safety equipment by field personnel. These equipment problems must be corrected before field activities can be continued. Health and safety problems that may occur include:

- Leaks or tears in protective clothing
- Failure of respiratory protective devices
- Encountering contaminants for which prescribed protective equipment may not be suitable.

11.6 RESPONSE ACTIONS - MEDICAL EMERGENCIES

Medical emergencies can be described as situations that present a significant threat to the health of personnel. These can result from chemical exposures, heat stress, cold stress, and poisonous insect or snake bites. Medical emergencies must be dealt with immediately, and proper care should be administered. This may be in the form of first aid and emergency hospitalization.

Telephone numbers and locations for the local fire department, hospitals, ambulance service, and other emergency services will be maintained by the SSC. Information regarding nonemergency medical treatment for on-site injury, on-site illness, or on-site exposure to chemical contaminants will be provided to the hospital by the SSC. Communication methods available on site will be a hard-line telephone in the Command Post, cellular telephones (carried by Site Safety Officer, PM, and FTL), and hand-held radios.

11.7 RESPONSE ACTIONS – WORKSITE CATASTROPHIC EVENTS

In the event of a catastrophic incident at the worksite:

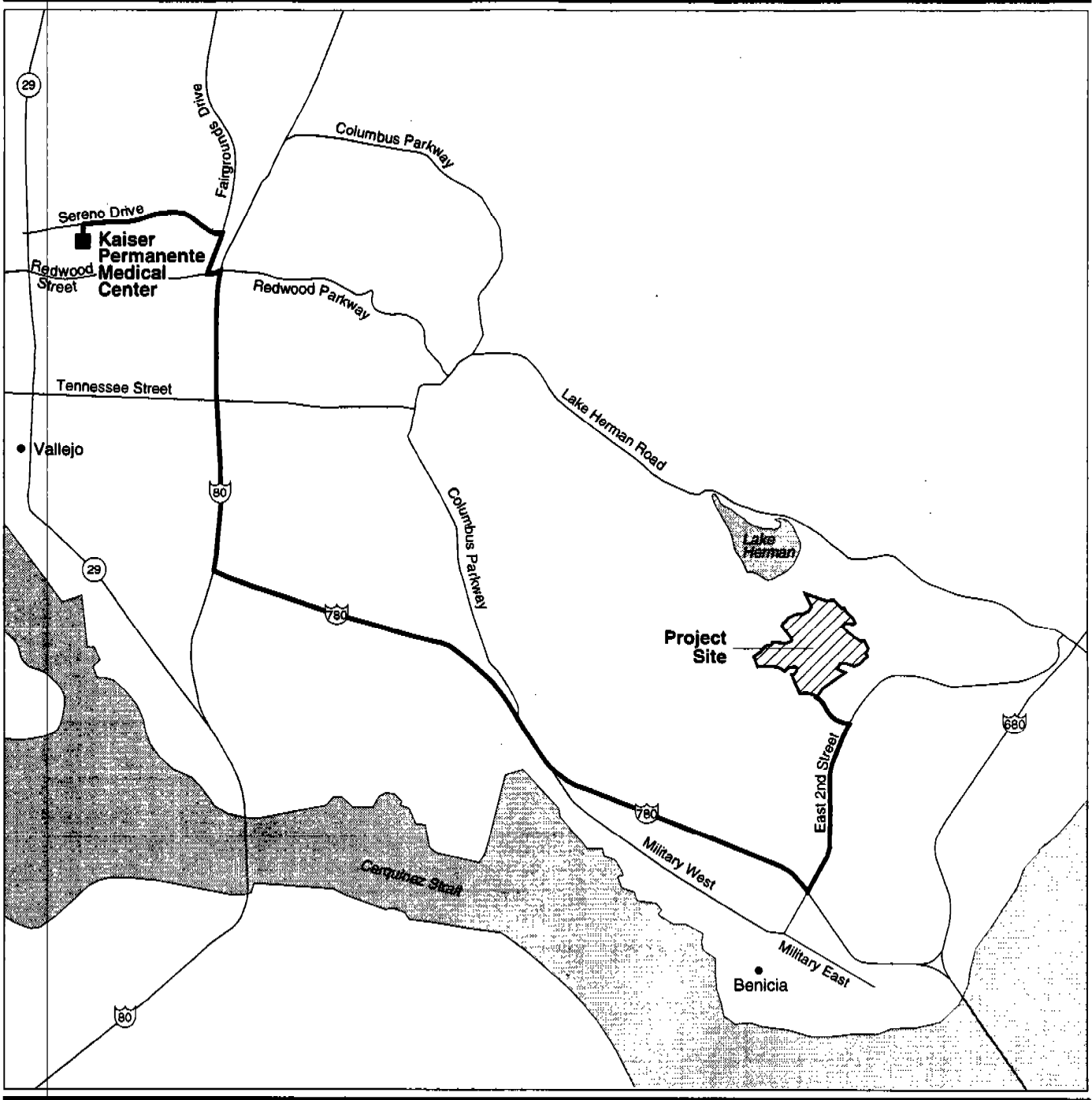
- Work activities will cease and all project personnel will be evacuated from the work location. The evacuation will proceed in a direction opposite of the critically affected area with all personnel assembling in a predesignated location outside of the job site proper.

Table 11-1. Emergency Contacts and Telephone Numbers

Fire Department	911
Fire Department - Non-emergency	745-2424
Ambulance	911
Ambulance - Non-emergency	552-1187
Police	911
Police - Non-emergency	745-3411
Information and Response Organizations	
California Dept. of Health Services (Sacramento)	(916) 445-4171
California Dept. of Fish and Game (Sacramento)	(916) 445-4171
EPA Region IX (San Francisco)	(415) 974-8071
Earth Tech Personnel	
Health and Safety Manager	
Steven Clay	(909) 424-1919
Project Manager	
Brian Weith	(909) 424-1919
	Pager: (909) 433-8488
Site Safety Coordinator/Field Team Leader	
Richard Burzinski	(408) 232-2800
OE Safety Manager	
Greg Peterson	(909) 424-1919
	Pager: (909) 872-9839

Directions to Hospital

From the site, head south on east 2nd Street to Interstate 780. Proceed west on I-780 to Highway 80. Head north on 80 and exit at Redwood Street. Head west on Redwood and make a right onto Fairgrounds Drive. Proceed north on Fairgrounds Drive to Serrano Drive. Make a left onto Serrano and the hospital will be on the left-hand-side of the street.



EXPLANATION

- (11) State Highway
- (84) Interstate Highway
- Hospital Route

0 .25 .5 1 Mile

Hospital Location Map

Kaiser Permanente Medical Center
975 Sereno Drive
Vallejo, CA 94589
(707) 648-6200

Figure 11-1

SIGNATURE PAGE

I have read and reviewed the SSHP for the Tourtelot Cleanup Project Site. I have been instructed in the contents of this document and understand the information presented. I will comply with the provisions contained therein.

PRINT NAME	SIGNATURE	ORGANIZATION	DATE

- A headcount will be taken of the assembled employees, and any injured individuals will be administered first aid.

- If not present at the work location, the SSC will be contacted immediately. Immediate notification of the event will be provided to the PM or HSM by the SSC.

12.0 REFERENCES

California Department of Health Services, California Code of Regulations, Title 8.

Earth Tech, 1999. Engineering Evaluation/Cost Analysis, Former Benicia Arsenal, Benicia, California prepared for U.S. Army Corps of Engineers, Huntsville Division, Ordnance and Explosive Design Center, November.

Jacobs Engineering, 1999. Final Benicia Arsenal Records Research Report, April.

National Institute for Occupational Safety and Health, 1985. Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities 85-115.

U.S. Army Corps of Engineers, 1996. Safety and Health Requirements Manual EM 385-1-1.

U.S. Army Corps of Engineers, St Louis District, 1994a. Archives Search Report Findings, Benicia Arsenal, Benicia, Solano County, California March.

U.S. Army Corps of Engineers, St. Louis District, 1994b. Archives Search Report Conclusions and Recommendations, Benicia Arsenal, Benicia, Solano County, California March.

29 Code of Federal Regulations Part 1910, Occupational Safety and Health Standards.

APPENDIX A

SUMMARY OF SAMPLE ANALYSIS RESULTS

Table A-1 Background Concentrations of Metals in Soil (mg/kg)

Location	Minimum Depth (ft)	Maximum Depth (ft)	Sample Date	Antimony	Arsenic	Barium	Beryllium	Cadmium	Total Chromium	Cobalt	Copper
B1	0	0.5	9-Nov-92	<2	3	150	<0.1	<0.2	43	20	53
BG1	0	0.5	12-Jan-93	<2	12	110	<0.2	2.4	20	8.2	49
BG2	0	0.5	12-Jan-93	<2	12	140	<0.2	1.5	29	14	42
BG3	0	0.5	12-Jan-93	<2	12	150	<0.2	0.8	28	13	40
BG4	0	0.5	12-Jan-93	<2	12	180	<0.2	1.1	31	16	58
BG4 (Dup)	0	0.5	12-Jan-93	<2	11	170	<0.2	0.9	30	15	54
BG5	0	0.5	12-Jan-93	<2	10	170	<0.2	0.3	34	19	47
BG6	0	2.5	23-Jul-96	<1	3.9	88	0.1	<0.2	68	15	92
BG7	0	2.5	23-Jul-96	<1	8.7	210	0.3	<0.2	30	17	50
BG8	0	1.5	23-Jul-96	<1	1.1	120	<0.1	<0.2	64	17	28
BG9	0	2.5	24-Jul-96	<1	7.1	150	0.3	<0.2	27	18	48
BG10	0	2.5	24-Jul-96	<1	3.6	170	0.4	<0.2	29	19	58
FE-13	0.5	1	24-Mar-94	<1	6	170	0.2	0.2	31	14	43
FE-14	0.5	1	24-Mar-94	NA	12.4	151	1.07	1.56	48.5	20.6	51
SS-AI-01	0.5	1	9-Oct-91	NA	NA	NA	NA	NA	35.5	NA	NA
SS-CI-01	0.5	1	9-Oct-91	NA	NA	NA	NA	NA	75.1	NA	NA
SS-CI-02	0.5	1	9-Oct-91	NA	NA	NA	NA	NA	40.4	NA	NA
		Background Site Range		<1 - <2	3 - 12.4	88 - 210	<0.1 - <1.07	<0.2 - 2.4	20 - 75.1	8.2 - 20.6	28 - 92
		Average		0.8	8.2	152.1	0.2	0.7	39.0	16.1	50.9
		Maximum		<2	12.4	210.0	1.07	2.4	75.1	20.6	92.0
	Western United States Background[1]			<1.0 - 2.6	<1 - 97	70 - 5,000	<1.0 - 15	ND - 11	3.0 - 2,000	<3 - 50	32 - 300

NA = Not analyzed

(1) Source: Dragun and Chiasson, 1991, and Shacklette and Boerngen, 1984

Table A-1. Background Concentrations of Metals in Soil (mg/kg)

Location	Minimum Depth (ft)	Maximum Depth (ft)	Sample Date	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
B1	0	0.5	9-Nov-92	<2	<0.2	31	<2	<0.2	<3	110	84
BG1	0	0.5	12-Jan-93	250	0.7	21	<2	1.4	<3	44	140
BG2	0	0.5	12-Jan-93	94	<0.2	25	<2	0.5	<3	71	100
BG3	0	0.5	12-Jan-93	57	<0.2	23	2	0.3	<3	72	83
BG4	0	0.5	12-Jan-93	68	<0.2	27	<2	0.3	<3	74	110
BG4 (Dup)	0	0.5	12-Jan-93	58	<0.2	26	<2	0.3	<3	71	99
BG5	0	0.5	12-Jan-93	10	<0.2	29	<2	<0.2	7	83	81
BG6	0	2.5	23-Jul-96	6	<0.06	83	<1	0.2	24	72	94
BG7	0	2.5	23-Jul-96	35	<0.06	32	<1	0.3	32	61	71
BG8	0	1.5	23-Jul-96	5	<0.06	56	<1	0.2	26	75	50
BG9	0	2.5	24-Jul-96	8	<0.06	28	<1	0.2	40	69	64
BG10	0	2.5	24-Jul-96	9	<0.06	36	<1	0.2	35	46	73
FE-13	0.5	1	24-Mar-94	26	<0.06	21	<2	0.3	14	87	56
FE-14	0.5	1	24-Mar-94	35.7	NA	46.4	<7.5	NA	<15	76.1	88.8
SS-AI-01	0.5	1	9-Oct-91	33.8	NA	NA	NA	NA	NA	NA	NA
SS-CI-01	0.5	1	9-Oct-91	90.6	NA	NA	NA	NA	NA	NA	NA
SS-CI-02	0.5	1	9-Oct-91	51.6	NA	NA	NA	NA	NA	NA	NA
		Background Site Range		<2 - 250	<0.06 - 0.7	21 - 83	<1 - 2	<0.2 - 1.4	<3 - 40	44 - 110	50 - 140
		Average		49.3	0.1	34.5	1.1	0.3	13.9	72.2	85.3
		Maximum		250	0.7	83.0	2	1.4	40	110	140
		Western United States Background[1]		<10 - 700	<0.01 - 4.6	<5 - 700	<0.1 - 4.3	<0.5 - 5	<0.25 - 10	7.0 - 500	10 - 2,100

NA = Not analyzed

(1) Source: Dragun and Chiasson, 1991, and Shacklette and Boemgen, 1984

Table A-2. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

Other Samples	Field Sample ID	SS-7		SS-8		SS-9		SS-10	
	Sample Date	11/20/98		11/20/98		11/20/98		11/20/98	
Parameter	**Units**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**
Metals									
Antimony	mg/kg	ND	6.00	ND	6.00	ND	6.00	ND	6.00
Manganese	mg/kg	651	0.500	907	0.500	1,240	1.00	1,050	1.00
Potassium	mg/kg	1,110	500	1,930	500	2,370	500	1,760	500
Arsenic	mg/kg	17.7	10.0	19.7	10.0	18.6	10.0	20.5	10.0
Barium	mg/kg	253	0.400	250	0.400	307	0.400	319	0.400
Beryllium	mg/kg	0.791	0.100	0.756	0.100	0.888	0.100	0.838	0.100
Cadmium	mg/kg	ND	1.00	ND	1.00	ND	1.00	ND	1.00
Chromium	mg/kg	39.7	1.00	38.6	1.00	49.2	1.00	38.3	1.00
Cobalt	mg/kg	13.1	0.700	14.9	0.700	17.4	0.700	16.2	0.700
Copper	mg/kg	37.7	1.00	49.1	1.00	57.7	1.00	42.9	1.00
Lead	mg/kg	8.84	7.50	31.8	7.50	23.6	7.50	34.0	7.50
Molybdenum	mg/kg	ND	2.00	ND	2.00	ND	2.00	ND	2.00
Nickel	mg/kg	30.8	3.00	41.0	3.00	53.4	3.00	36.0	3.00
Selenium	mg/kg	ND	10.0	ND	10.0	ND	10.0	ND	10.0
Silver	mg/kg	ND	0.700	ND	0.700	ND	0.700	ND	0.700
Thallium	mg/kg	ND	10.0	ND	10.0	ND	10.0	ND	10.0
Vanadium	mg/kg	96.7	1.00	70.2	1.00	74.7	1.00	83.9	1.00
Zinc	mg/kg	57.8	2.00	71.0	2.00	79.0	2.00	63.0	2.00
Nitrate as Nitrogen	mg/kg	1.53	1.00	ND	1.00	1.53	1.00	1.70	1.00
Nitrate/Nitrite as Nitrogen	mg/kg	1.53	1.00	ND	1.00	1.53	1.00	1.70	1.00
Mercury	mg/kg	ND	0.050	0.12	0.050	0.096	0.050	0.11	0.050
Explosive Compounds									
PETN	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
HMX	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
Cyclonite (RDX)	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
1,3,5-Trinitrobenzene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
1,3-Dinitrobenzene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
Tetryl	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
Nitrobenzene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
2,4,6-Trinitrotoluene (TNT)	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
4-Amino-2,6-Dinitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
2-Amino-4,6-Dinitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
2,4-Dinitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
2,6-Dinitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
4-Nitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
3-Nitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
2-Nitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
Phosphate	mg/kg	11.3	0.500	241	2.50	283	2.50	174	2.50

Notes:

This data was collected by SECOR International, Inc. and has not been verified or validated by Earth Tech.

- = not analyzed

mg/kg = milligrams per kilogram

MDL = Method Detection Limit

ND = not detected above the method reporting limit

Notes regarding SS samples:

SS = soil sample

Samples collected from depths ranging from 2 to 5 inches below the ground surface.

Metals were analyzed for using EPA Method 6000 series.

Explosive compounds were analyzed for using EPA Method 8330.

**Sample analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

Notes regarding FSS samples:

FSS = field screening soil sample

Soil samples not air dried

FSS analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

Source: SECOR International, Inc.

Table A-2. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

Other Samples	Field Sample ID	SS-11		SS-12		SS-13		SS-14	
	Sample Date	11/20/98		11/20/98		11/20/98		11/20/98	
Parameter	**Units**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**
Metals									
Antimony	mg/kg	ND	6.00	ND	6.00	ND	6.00	ND	6.00
Manganese	mg/kg	834	0.500	1,070	1.00	558	0.500	1,180	1.00
Potassium	mg/kg	2,330	500	2,210	500	987	500	2,170	500
Arsenic	mg/kg	13.0	10.0	21.9	10.0	13.5	10.0	18.7	10.0
Barium	mg/kg	599	0.400	305	0.400	338	0.400	262	0.400
Beryllium	mg/kg	0.769	0.100	0.765	0.100	0.601	0.100	0.953	0.100
Cadmium	mg/kg	ND	1.00	ND	1.00	ND	1.00	ND	1.00
Chromium	mg/kg	41.3	1.00	39.5	1.00	31.1	1.00	50.1	1.00
Cobalt	mg/kg	13.8	0.700	21.6	0.700	13.7	0.700	16.3	0.700
Copper	mg/kg	46.8	1.00	57.6	1.00	44.9	1.00	53.7	1.00
Lead	mg/kg	10.8	7.50	17.7	7.50	ND	7.50	26.5	7.50
Molybdenum	mg/kg	ND	2.00	ND	2.00	ND	2.00	ND	2.00
Nickel	mg/kg	46.7	3.00	47.4	3.00	34.7	3.00	48.4	3.00
Selenium	mg/kg	ND	10.0	ND	10.0	ND	10.0	ND	10.0
Silver	mg/kg	ND	0.700	ND	0.700	ND	0.700	ND	0.700
Thallium	mg/kg	ND	10.0	ND	10.0	ND	10.0	ND	10.0
Vanadium	mg/kg	57.1	1.00	67.6	1.00	64.1	1.00	74.9	1.00
Zinc	mg/kg	67.4	2.00	83.4	2.00	65.5	2.00	71.4	2.00
Nitrate as Nitrogen	mg/kg	6.20	1.00	ND	1.00	ND	1.00	3.14	1.00
Nitrate/Nitrite as Nitrogen	mg/kg	6.20	1.00	ND	1.00	ND	1.00	3.14	1.00
Mercury	mg/kg	ND	0.050	0.064	0.050	ND	0.050	0.075	0.050
Explosive Compounds									
PETN	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
HMX	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
Cyclonite (RDX)	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
1,3,5-Trinitrobenzene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
1,3-Dinitrobenzene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
Tetryl	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
Nitrobenzene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
2,4,6-Trinitrotoluene (TNT)	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
4-Amino-2,6-Dinitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
2-Amino-4,6-Dinitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
2,4-Dinitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
2,6-Dinitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
4-Nitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
3-Nitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
2-Nitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
Phosphate	mg/kg	394	5.00	21.0	0.500	56.1	0.500	223	2.50

Notes:

This data was collected by SECOR International, Inc. and has not been verified or validated by Earth Tech.

- = not analyzed

mg/kg = milligrams per kilogram

MDL = Method Detection Limit

ND = not detected above the method reporting limit

Notes regarding SS samples:

SS = soil sample

Samples collected from depths ranging from 2 to 5 inches below the ground surface.

Metals were analyzed for using EPA Method 6000 series.

Explosive compounds were analyzed for using EPA Method 8330.

**Sample analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

Notes regarding FSS samples:

FSS = field screening soil sample

Soil samples not air dried

FSS analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

Source: SECOR International, Inc.

Table A-2. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

Other Samples	Field Sample ID	SS-15		SS-16		SS-17		SS-18	
	Sample Date	11/20/98		11/20/98		11/20/98		11/20/98	
Parameter	**Units**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**
Metals									
Antimony	mg/kg	ND	6.00	ND	6.00	ND	6.00	ND	6.00
Manganese	mg/kg	840	0.500	820	0.500	513	0.500	832	0.500
Potassium	mg/kg	1,500	500	2,590	500	1,330	500	2,500	500
Arsenic	mg/kg	18.4	10.0	48.1	10.0	14.0	10.0	13.1	10.0
Barium	mg/kg	182	0.400	163	0.400	176	0.400	286	0.400
Beryllium	mg/kg	0.712	0.100	0.723	0.100	0.696	0.100	0.905	0.100
Cadmium	mg/kg	ND	1.00	1.67	1.00	ND	1.00	ND	1.00
Chromium	mg/kg	34.8	1.00	38.2	1.00	27.6	1.00	47.1	1.00
Cobalt	mg/kg	15.1	0.700	14.0	0.700	11.6	0.700	13.5	0.700
Copper	mg/kg	40.7	1.00	48.2	1.00	38.3	1.00	48.6	1.00
Lead	mg/kg	25.6	7.50	76.3	7.50	28.6	7.50	16.1	7.50
Molybdenum	mg/kg	ND	2.00	ND	2.00	ND	2.00	ND	2.00
Nickel	mg/kg	32.0	3.00	43.0	3.00	27.0	3.00	41.8	3.00
Selenium	mg/kg	ND	10.0	ND	10.0	ND	10.0	ND	10.0
Silver	mg/kg	ND	0.700	ND	0.700	ND	0.700	ND	0.700
Thallium	mg/kg	ND	10.0	ND	10.0	ND	10.0	ND	10.0
Vanadium	mg/kg	77.6	1.00	59.9	1.00	61.9	1.00	72.0	1.00
Zinc	mg/kg	64.0	2.00	83.9	2.00	56.7	2.00	63.3	2.00
Nitrate as Nitrogen	mg/kg	2.19	1.00	9.84	1.00	4.15	1.00	2.00	1.00
Nitrate/Nitrite as Nitrogen	mg/kg	2.73	1.00	10.4	1.00	4.15	1.00	2.00	1.00
Mercury	mg/kg	0.093	0.050	1.9	0.043	0.11	0.042	0.092	0.050
Explosive Compounds									
PETN	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
HMX	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
Cyclonite (RDX)	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
1,3,5-Trinitrobenzene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
1,3-Dinitrobenzene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
Tetryl	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
Nitrobenzene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
2,4,6-Trinitrotoluene (TNT)	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
4-Amino-2,6-Dinitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
2-Amino-4,6-Dinitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
2,4-Dinitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
2,6-Dinitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
4-Nitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
3-Nitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
2-Nitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
Phosphate	mg/kg	94.5	0.500	375	2.50	13.2	0.500	108	1.00

Notes:

This data was collected by SECOR International, Inc. and has not been verified or validated by Earth Tech.

- = not analyzed

mg/kg = milligrams per kilogram

MDL = Method Detection Limit

ND = not detected above the method reporting limit

Notes regarding SS samples:

SS = soil sample

Samples collected from depths ranging from 2 to 5 inches below the ground surface.

Metals were analyzed for using EPA Method 6000 series.

Explosive compounds were analyzed for using EPA Method 8330.

**Sample analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

Notes regarding FSS samples:

FSS = field screening soil sample

Soil samples not air dried

FSS analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

Source: SECOR International, Inc.

Table A-2. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

Other Samples	Field Sample ID	SS-20		SS-21		SS-30		SS-30**	
	Sample Date	11/20/98		11/20/98		11/20/98		12/01/98	
Parameter	**Units**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**
Metals									
Antimony	mg/kg	ND	6.00	ND	6.00	ND	6.00	-	-
Manganese	mg/kg	545	0.500	922	0.500	886	0.500	-	-
Potassium	mg/kg	2,240	500	2,150	500	1,660	500	-	-
Arsenic	mg/kg	13.7	10.0	16.5	10.0	16.8	10.0	-	-
Barium	mg/kg	331	0.400	212	0.400	258	0.400	-	-
Beryllium	mg/kg	0.805	0.100	0.793	0.100	0.699	0.100	-	-
Cadmium	mg/kg	ND	1.00	ND	1.00	ND	1.00	-	-
Chromium	mg/kg	41.2	1.00	39.5	1.00	31.5	1.00	-	-
Cobalt	mg/kg	12.3	0.700	15.2	0.700	15.1	0.700	-	-
Copper	mg/kg	47.1	1.00	45.4	1.00	39.3	1.00	-	-
Lead	mg/kg	21.4	7.50	20.0	7.50	34.4	7.50	-	-
Molybdenum	mg/kg	ND	2.00	ND	2.00	ND	2.00	-	-
Nickel	mg/kg	36.5	3.00	41.5	3.00	30.8	3.00	-	-
Selenium	mg/kg	ND	10.0	ND	10.0	ND	10.0	-	-
Silver	mg/kg	ND	0.700	ND	0.700	ND	0.700	-	-
Thallium	mg/kg	ND	10.0	ND	10.0	ND	10.0	-	-
Vanadium	mg/kg	70.5	1.00	68.3	1.00	75.9	1.00	-	-
Zinc	mg/kg	65.9	2.00	70.4	2.00	59.6	2.00	-	-
Nitrate as Nitrogen	mg/kg	1.82	1.00	2.76	1.00	4.63	1.00	-	-
Nitrate/Nitrite as Nitrogen	mg/kg	1.82	1.00	2.76	1.00	4.63	1.00	-	-
Mercury	mg/kg	0.11	0.043	0.11	0.050	0.121	0.0500	-	-
Explosive Compounds									
PETN	mg/kg	ND	0.30	ND	0.30	ND	0.30	-	-
HMX	mg/kg	ND	0.30	ND	0.30	ND	0.30	-	-
Cyclonite (RDX)	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	1.0
1,3,5-Trinitrobenzene	mg/kg	ND	0.30	ND	0.30	ND	0.30	-	-
1,3-Dinitrobenzene	mg/kg	ND	0.30	ND	0.30	ND	0.30	-	-
Tetryl	mg/kg	ND	0.30	ND	0.30	ND	0.30	-	-
Nitrobenzene	mg/kg	ND	0.30	ND	0.30	ND	0.30	-	-
2,4,6-Trinitrotoluene (TNT)	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	1.0
4-Amino-2,6-Dinitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	-	-
2-Amino-4,6-Dinitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	-	-
2,4-Dinitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	-	-
2,6-Dinitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	-	-
4-Nitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	-	-
3-Nitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	-	-
2-Nitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	-	-
Phosphate	mg/kg	296	2.50	311	2.50	4.39	0.500	-	-

Notes:

This data was collected by SECOR International, Inc. and has not been verified or validated by Earth Tech.

- = not analyzed

mg/kg = milligrams per kilogram

MDL = Method Detection Limit

ND = not detected above the method reporting limit

Notes regarding SS samples:

SS = soil sample

Samples collected from depths ranging from 2 to 5 inches below the ground surface.

Metals were analyzed for using EPA Method 6000 series.

Explosive compounds were analyzed for using EPA Method 8330.

**Sample analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

Notes regarding FSS samples:

FSS = field screening soil sample

Soil samples not air dried

FSS analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

Source: SECOR International, Inc.

Table A-2. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

Other Samples	Field Sample ID	SS-31		SS-32		SS-33		SS-33*	
	Sample Date	11/20/98		11/20/98		11/20/98		12/01/98	
Parameter	**Units**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**
Metals									
Antimony	mg/kg	ND	6.00	ND	6.00	ND	6.00	-	-
Manganese	mg/kg	791	0.500	712	0.500	805	0.500	-	-
Potassium	mg/kg	1,660	500	1,670	500	1,630	500	-	-
Arsenic	mg/kg	15.9	10.0	16.6	10.0	21.1	10.0	-	-
Barium	mg/kg	237	0.400	221	0.400	331	0.400	-	-
Beryllium	mg/kg	0.673	0.100	0.621	0.100	0.933	0.100	-	-
Cadmium	mg/kg	1.18	1.00	1.23	1.00	ND	1.00	-	-
Chromium	mg/kg	30.5	1.00	27.7	1.00	45.8	1.00	-	-
Cobalt	mg/kg	16.0	0.700	15.5	0.700	17.0	0.700	-	-
Copper	mg/kg	46.6	1.00	40.8	1.00	57.1	1.00	-	-
Lead	mg/kg	89.0	7.50	49.2	7.50	12.8	7.50	-	-
Molybdenum	mg/kg	ND	2.00	ND	2.00	ND	2.00	-	-
Nickel	mg/kg	32.3	3.00	28.1	3.00	45.2	3.00	-	-
Selenium	mg/kg	ND	10.0	ND	10.0	ND	10.0	-	-
Silver	mg/kg	ND	0.700	ND	0.700	ND	0.700	-	-
Thallium	mg/kg	ND	10.0	ND	10.0	ND	10.0	-	-
Vanadium	mg/kg	66.3	1.00	69.1	1.00	91.1	1.00	-	-
Zinc	mg/kg	70.1	2.00	71.9	2.00	74.0	2.00	-	-
Nitrate as Nitrogen	mg/kg	1.70	1.00	5.34	1.00	1.44	1.00	-	-
Nitrate/Nitrite as Nitrogen	mg/kg	1.70	1.00	5.34	1.00	1.44	1.00	-	-
Mercury	mg/kg	0.679	0.0500	0.570	0.0500	0.330	0.0500	-	-
Explosive Compounds									
PETN	mg/kg	ND	0.30	ND	0.30	ND	0.30	-	-
HMX	mg/kg	ND	0.30	ND	0.30	ND	0.30	-	-
Cyclonite (RDX)	mg/kg	ND	0.30	ND	0.30	ND	0.30	-	-
1,3,5-Trinitrobenzene	mg/kg	ND	0.30	ND	0.30	ND	0.30	-	-
1,3-Dinitrobenzene	mg/kg	ND	0.30	ND	0.30	ND	0.30	-	-
Tetryl	mg/kg	ND	0.30	ND	0.30	ND	0.30	-	-
Nitrobenzene	mg/kg	ND	0.30	ND	0.30	ND	0.30	-	-
2,4,6-Trinitrotoluene (TNT)	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	1.0
4-Amino-2,6-Dinitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	-	-
2-Amino-4,6-Dinitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	-	-
2,4-Dinitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	-	-
2,6-Dinitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	-	-
4-Nitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	-	-
3-Nitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	-	-
2-Nitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	-	-
Phosphate	mg/kg	191	2.50	287	2.50	18.6	0.500	-	-

Notes:

This data was collected by SECOR International, Inc. and has not been verified or validated by Earth Tech.

- = not analyzed

mg/kg = milligrams per kilogram

MDL = Method Detection Limit

ND = not detected above the method reporting limit

Notes regarding SS samples:

SS = soil sample

Samples collected from depths ranging from 2 to 5 inches below the ground surface.

Metals were analyzed for using EPA Method 6000 series.

Explosive compounds were analyzed for using EPA Method 8330.

**Sample analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

Notes regarding FSS samples:

FSS = field screening soil sample

Soil samples not air dried

FSS analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

Source: SECOR International, Inc.

Table A-2. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

Other Samples	Field Sample ID	SS-35		SS-36		SS-39		SS-40	
	Sample Date	11/20/98		11/20/98		11/20/98		11/20/98	
Parameter	**Units**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**
Metals									
Antimony	mg/kg	ND	6.00	ND	6.00	ND	6.00	ND	6.00
Manganese	mg/kg	517	0.500	629	0.500	1,320	1.00	599	0.500
Potassium	mg/kg	1,130	500	1,740	500	2,700	500	1,910	500
Arsenic	mg/kg	16.6	10.0	18.1	10.0	20.0	10.0	19.7	10.0
Barium	mg/kg	152	0.400	176	0.400	183	0.400	223	0.400
Beryllium	mg/kg	0.676	0.100	0.759	0.100	0.778	0.100	0.599	0.100
Cadmium	mg/kg	ND	1.00	ND	1.00	ND	1.00	ND	1.00
Chromium	mg/kg	33.8	1.00	35.9	1.00	39.6	1.00	26.3	1.00
Cobalt	mg/kg	11.2	0.700	14.3	0.700	16.7	0.700	12.3	0.700
Copper	mg/kg	42.7	1.00	49.5	1.00	52.6	1.00	38.1	1.00
Lead	mg/kg	58.7	7.50	37.3	7.50	51.1	7.50	56.3	7.50
Molybdenum	mg/kg	ND	2.00	ND	2.00	ND	2.00	ND	2.00
Nickel	mg/kg	34.8	3.00	40.5	3.00	44.9	3.00	26.5	3.00
Selenium	mg/kg	ND	10.0	ND	10.0	ND	10.0	ND	10.0
Silver	mg/kg	ND	0.700	ND	0.700	ND	0.700	ND	0.700
Thallium	mg/kg	ND	10.0	ND	10.0	ND	10.0	ND	10.0
Vanadium	mg/kg	70.4	1.00	58.7	1.00	59.2	1.00	65.3	1.00
Zinc	mg/kg	58.3	2.00	76.8	2.00	85.4	2.00	71.5	2.00
Nitrate as Nitrogen	mg/kg	1.91	1.00	7.92	1.00	5.22	1.00	3.65	1.00
Nitrate/Nitrite as Nitrogen	mg/kg	1.91	1.00	8.62	1.00	5.22	1.00	3.65	1.00
Mercury	mg/kg	0.0537	0.0500	0.102	0.0500	0.127	0.0500	0.216	0.0500
Explosive Compounds									
PETN	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
HMX	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
Cyclonite (RDX)	mg/kg	ND	0.30	ND	0.30	1.73	0.30	ND	0.30
1,3,5-Trinitrobenzene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
1,3-Dinitrobenzene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
Tetryl	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
Nitrobenzene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
2,4,6-Trinitrotoluene (TNT)	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
4-Amino-2,6-Dinitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
2-Amino-4,6-Dinitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
2,4-Dinitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
2,6-Dinitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
4-Nitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
3-Nitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
2-Nitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
Phosphate	mg/kg	1.70	0.500	26.2	0.500	283	2.50	7.82	0.500

Notes:

This data was collected by SECOR International, Inc. and has not been verified or validated by Earth Tech.

- = not analyzed

mg/kg = milligrams per kilogram

MDL = Method Detection Limit

ND = not detected above the method reporting limit

Notes regarding SS samples:

SS = soil sample

Samples collected from depths ranging from 2 to 5 inches below the ground surface.

Metals were analyzed for using EPA Method 6000 series.

Explosive compounds were analyzed for using EPA Method 8330.

**Sample analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

Notes regarding FSS samples:

FSS = field screening soil sample

Soil samples not air dried

FSS analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

Source: SECOR International, Inc.

Table A-2. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

Other Samples	Field Sample ID	SS-41		SS-42		SS-43		SS-44	
	Sample Date	11/20/98		11/20/98		11/20/98		11/20/98	
Parameter	**Units**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**
Metals									
Antimony	mg/kg	ND	6.00	ND	6.00	ND	6.00	ND	6.00
Manganese	mg/kg	904	0.500	943	0.500	1,070	1.00	1,160	1.00
Potassium	mg/kg	1,440	500	1,190	500	1,830	500	1,400	500
Arsenic	mg/kg	11.4	10.0	17.5	10.0	18.3	10.0	13.2	10.0
Barium	mg/kg	307	0.400	372	0.400	245	0.400	183	0.400
Beryllium	mg/kg	0.510	0.100	0.669	0.100	0.766	0.100	0.549	0.100
Cadmium	mg/kg	ND	1.00	ND	1.00	1.21	1.00	1.07	1.00
Chromium	mg/kg	23.7	1.00	28.1	1.00	35.3	1.00	25.1	1.00
Cobalt	mg/kg	13.0	0.700	14.8	0.700	20.4	0.700	19.5	0.700
Copper	mg/kg	29.7	1.00	37.4	1.00	49.1	1.00	31.2	1.00
Lead	mg/kg	26.6	7.50	27.6	7.50	40.1	7.50	37.1	7.50
Molybdenum	mg/kg	ND	2.00	ND	2.00	ND	2.00	ND	2.00
Nickel	mg/kg	23.1	3.00	25.3	3.00	39.0	3.00	22.8	3.00
Selenium	mg/kg	ND	10.0	ND	10.0	ND	10.0	ND	10.0
Silver	mg/kg	ND	0.700	ND	0.700	ND	0.700	ND	0.700
Thallium	mg/kg	ND	10.0	ND	10.0	ND	10.0	ND	10.0
Vanadium	mg/kg	57.6	1.00	87.1	1.00	66.4	1.00	56.1	1.00
Zinc	mg/kg	49.5	2.00	63.6	2.00	68.2	2.00	52.9	2.00
Nitrate as Nitrogen	mg/kg	5.63	1.00	3.40	1.00	1.01	1.00	18.4	1.00
Nitrate/Nitrite as Nitrogen	mg/kg	5.63	1.00	3.40	1.00	1.01	1.00	18.4	1.00
Mercury	mg/kg	0.0831	0.0500	0.0982	0.0500	0.238	0.0500	0.151	0.0500
Explosive Compounds									
PETN	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
HMX	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
Cyclonite (RDX)	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
1,3,5-Trinitrobenzene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
1,3-Dinitrobenzene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
Tetryl	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
Nitrobenzene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
2,4,6-Trinitrotoluene (TNT)	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
4-Amino-2,6-Dinitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
2-Amino-4,6-Dinitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
2,4-Dinitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
2,6-Dinitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
4-Nitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
3-Nitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
2-Nitrotoluene	mg/kg	ND	0.30	ND	0.30	ND	0.30	ND	0.30
Phosphate	mg/kg	15.7	0.500	ND	0.500	204	2.50	11.0	0.500

Notes:

This data was collected by SECOR International, Inc. and has not been verified or validated by Earth Tech.

- = not analyzed

mg/kg = milligrams per kilogram

MDL = Method Detection Limit

ND = not detected above the method reporting limit

Notes regarding SS samples:

SS = soil sample

Samples collected from depths ranging from 2 to 5 inches below the ground surface.

Metals were analyzed for using EPA Method 6000 series.

Explosive compounds were analyzed for using EPA Method 8330.

**Sample analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

Notes regarding FSS samples:

FSS = field screening soil sample

Soil samples not air dried

FSS analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

Source: SECOR International, Inc.

Table A-2. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

Other Samples	Field Sample ID	FSS-1		FSS-2		FSS-4		FSS-5	
	Sample Date	12/02/98		12/02/98		12/02/98		12/02/98	
Parameter	**Units**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**
Metals									
Antimony	mg/kg	-	-	-	-	-	-	-	-
Manganese	mg/kg	-	-	-	-	-	-	-	-
Potassium	mg/kg	-	-	-	-	-	-	-	-
Arsenic	mg/kg	-	-	-	-	-	-	-	-
Barium	mg/kg	-	-	-	-	-	-	-	-
Beryllium	mg/kg	-	-	-	-	-	-	-	-
Cadmium	mg/kg	-	-	-	-	-	-	-	-
Chromium	mg/kg	-	-	-	-	-	-	-	-
Cobalt	mg/kg	-	-	-	-	-	-	-	-
Copper	mg/kg	-	-	-	-	-	-	-	-
Lead	mg/kg	-	-	-	-	-	-	-	-
Molybdenum	mg/kg	-	-	-	-	-	-	-	-
Nickel	mg/kg	-	-	-	-	-	-	-	-
Selenium	mg/kg	-	-	-	-	-	-	-	-
Silver	mg/kg	-	-	-	-	-	-	-	-
Thallium	mg/kg	-	-	-	-	-	-	-	-
Vanadium	mg/kg	-	-	-	-	-	-	-	-
Zinc	mg/kg	-	-	-	-	-	-	-	-
Nitrate as Nitrogen	mg/kg	-	-	-	-	-	-	-	-
Nitrate/Nitrite as Nitrogen	mg/kg	-	-	-	-	-	-	-	-
Mercury	mg/kg	-	-	-	-	-	-	-	-
Explosive Compounds									
PETN	mg/kg	-	-	-	-	-	-	-	-
HMX	mg/kg	-	-	-	-	-	-	-	-
Cyclonite (RDX)	mg/kg	-	-	-	-	-	-	-	-
1,3,5-Trinitrobenzene	mg/kg	-	-	-	-	-	-	-	-
1,3-Dinitrobenzene	mg/kg	-	-	-	-	-	-	-	-
Tetryl	mg/kg	-	-	-	-	-	-	-	-
Nitrobenzene	mg/kg	-	-	-	-	-	-	-	-
2,4,6-Trinitrotoluene (TNT)	mg/kg	ND	1.0	ND	1.0	ND	1.0	ND	1.0
4-Amino-2,6-Dinitrotoluene	mg/kg	-	-	-	-	-	-	-	-
2-Amino-4,6-Dinitrotoluene	mg/kg	-	-	-	-	-	-	-	-
2,4-Dinitrotoluene	mg/kg	-	-	-	-	-	-	-	-
2,6-Dinitrotoluene	mg/kg	-	-	-	-	-	-	-	-
4-Nitrotoluene	mg/kg	-	-	-	-	-	-	-	-
3-Nitrotoluene	mg/kg	-	-	-	-	-	-	-	-
2-Nitrotoluene	mg/kg	-	-	-	-	-	-	-	-
Phosphate	mg/kg	-	-	-	-	-	-	-	-

Notes:

This data was collected by SECOR International, Inc. and has not been verified or validated by Earth Tech.

- = not analyzed

mg/kg = milligrams per kilogram

MDL = Method Detection Limit

ND = not detected above the method reporting limit

Notes regarding SS samples:

SS = soil sample

Samples collected from depths ranging from 2 to 5 inches below the ground surface.

Metals were analyzed for using EPA Method 6000 series.

Explosive compounds were analyzed for using EPA Method 8330.

**Sample analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

Notes regarding FSS samples:

FSS = field screening soil sample

Soil samples not air dried

FSS analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

Source: SECOR International, Inc.

Table A-2. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

Other Samples	Field Sample ID	FSS-6		FSS-7		FSS-8		FSS-9	
	Sample Date	12/02/98		12/02/98		12/02/98		12/01/98	
Parameter	**Units**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**
Metals									
Antimony	mg/kg	-	-	-	-	-	-	-	-
Manganese	mg/kg	-	-	-	-	-	-	-	-
Potassium	mg/kg	-	-	-	-	-	-	-	-
Arsenic	mg/kg	-	-	-	-	-	-	-	-
Barium	mg/kg	-	-	-	-	-	-	-	-
Beryllium	mg/kg	-	-	-	-	-	-	-	-
Cadmium	mg/kg	-	-	-	-	-	-	-	-
Chromium	mg/kg	-	-	-	-	-	-	-	-
Cobalt	mg/kg	-	-	-	-	-	-	-	-
Copper	mg/kg	-	-	-	-	-	-	-	-
Lead	mg/kg	-	-	-	-	-	-	-	-
Molybdenum	mg/kg	-	-	-	-	-	-	-	-
Nickel	mg/kg	-	-	-	-	-	-	-	-
Selenium	mg/kg	-	-	-	-	-	-	-	-
Silver	mg/kg	-	-	-	-	-	-	-	-
Thallium	mg/kg	-	-	-	-	-	-	-	-
Vanadium	mg/kg	-	-	-	-	-	-	-	-
Zinc	mg/kg	-	-	-	-	-	-	-	-
Nitrate as Nitrogen	mg/kg	-	-	-	-	-	-	-	-
Nitrate/Nitrite as Nitrogen	mg/kg	-	-	-	-	-	-	-	-
Mercury	mg/kg	-	-	-	-	-	-	-	-
Explosive Compounds									
PETN	mg/kg	-	-	-	-	-	-	-	-
HMX	mg/kg	-	-	-	-	-	-	-	-
Cyclonite (RDX)	mg/kg	-	-	-	-	ND	1.0	-	-
1,3,5-Trinitrobenzene	mg/kg	-	-	-	-	-	-	-	-
1,3-Dinitrobenzene	mg/kg	-	-	-	-	-	-	-	-
Tetryl	mg/kg	-	-	-	-	-	-	-	-
Nitrobenzene	mg/kg	-	-	-	-	-	-	-	-
2,4,6-Trinitrotoluene (TNT)	mg/kg	ND	1.0	ND	1.0	ND	1.0	ND	1.0
4-Amino-2,6-Dinitrotoluene	mg/kg	-	-	-	-	-	-	-	-
2-Amino-4,6-Dinitrotoluene	mg/kg	-	-	-	-	-	-	-	-
2,4-Dinitrotoluene	mg/kg	-	-	-	-	-	-	-	-
2,6-Dinitrotoluene	mg/kg	-	-	-	-	-	-	-	-
4-Nitrotoluene	mg/kg	-	-	-	-	-	-	-	-
3-Nitrotoluene	mg/kg	-	-	-	-	-	-	-	-
2-Nitrotoluene	mg/kg	-	-	-	-	-	-	-	-
Phosphate	mg/kg	-	-	-	-	-	-	-	-

Notes:

This data was collected by SECOR International, Inc. and has not been verified or validated by Earth Tech.

- = not analyzed

mg/kg = milligrams per kilogram

MDL = Method Detection Limit

ND = not detected above the method reporting limit

Notes regarding SS samples:

SS = soil sample

Samples collected from depths ranging from 2 to 5 inches below the ground surface.

Metals were analyzed for using EPA Method 6000 series.

Explosive compounds were analyzed for using EPA Method 8330.

**Sample analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

Notes regarding FSS samples:

FSS = field screening soil sample

Soil samples not air dried

FSS analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

Source: SECOR International, Inc.

Table A-2. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

Other Samples	Field Sample ID	FSS-12		FSS-13		FSS-14		FSS-15	
	Sample Date	12/02/98		12/02/98		12/02/98		12/02/98	
Parameter	**Units**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**
Metals									
Antimony	mg/kg	-	-	-	-	-	-	-	-
Manganese	mg/kg	-	-	-	-	-	-	-	-
Potassium	mg/kg	-	-	-	-	-	-	-	-
Arsenic	mg/kg	-	-	-	-	-	-	-	-
Barium	mg/kg	-	-	-	-	-	-	-	-
Beryllium	mg/kg	-	-	-	-	-	-	-	-
Cadmium	mg/kg	-	-	-	-	-	-	-	-
Chromium	mg/kg	-	-	-	-	-	-	-	-
Cobalt	mg/kg	-	-	-	-	-	-	-	-
Copper	mg/kg	-	-	-	-	-	-	-	-
Lead	mg/kg	-	-	-	-	-	-	-	-
Molybdenum	mg/kg	-	-	-	-	-	-	-	-
Nickel	mg/kg	-	-	-	-	-	-	-	-
Selenium	mg/kg	-	-	-	-	-	-	-	-
Silver	mg/kg	-	-	-	-	-	-	-	-
Thallium	mg/kg	-	-	-	-	-	-	-	-
Vanadium	mg/kg	-	-	-	-	-	-	-	-
Zinc	mg/kg	-	-	-	-	-	-	-	-
Nitrate as Nitrogen	mg/kg	-	-	-	-	-	-	-	-
Nitrate/Nitrite as Nitrogen	mg/kg	-	-	-	-	-	-	-	-
Mercury	mg/kg	-	-	-	-	-	-	-	-
Explosive Compounds									
PETN	mg/kg	-	-	-	-	-	-	-	-
HMX	mg/kg	-	-	-	-	-	-	-	-
Cyclonite (RDX)	mg/kg	-	-	-	-	-	-	-	-
1,3,5-Trinitrobenzene	mg/kg	-	-	-	-	-	-	-	-
1,3-Dinitrobenzene	mg/kg	-	-	-	-	-	-	-	-
Tetryl	mg/kg	-	-	-	-	-	-	-	-
Nitrobenzene	mg/kg	-	-	-	-	-	-	-	-
2,4,6-Trinitrotoluene (TNT)	mg/kg	ND	1.0	ND	1.0	ND	1.0	ND	1.0
4-Amino-2,6-Dinitrotoluene	mg/kg	-	-	-	-	-	-	-	-
2-Amino-4,6-Dinitrotoluene	mg/kg	-	-	-	-	-	-	-	-
2,4-Dinitrotoluene	mg/kg	-	-	-	-	-	-	-	-
2,6-Dinitrotoluene	mg/kg	-	-	-	-	-	-	-	-
4-Nitrotoluene	mg/kg	-	-	-	-	-	-	-	-
3-Nitrotoluene	mg/kg	-	-	-	-	-	-	-	-
2-Nitrotoluene	mg/kg	-	-	-	-	-	-	-	-
Phosphate	mg/kg	-	-	-	-	-	-	-	-

Notes:

This data was collected by SECOR International, Inc. and has not been verified or validated by Earth Tech.

- = not analyzed

mg/kg = milligrams per kilogram

MDL = Method Detection Limit

ND = not detected above the method reporting limit

Notes regarding SS samples:

SS = soil sample

Samples collected from depths ranging from 2 to 5 inches below the ground surface.

Metals were analyzed for using EPA Method 6000 series.

Explosive compounds were analyzed for using EPA Method 8330.

**Sample analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

Notes regarding FSS samples:

FSS = field screening soil sample

Soil samples not air dried

FSS analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

Source: SECOR International, Inc.

Table A-2. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

Other Samples	Field Sample ID	FSS-16		FSS-17		FSS-18		FSS-19	
	Sample Date	12/02/98		12/02/98		12/02/98		12/02/98	
Parameter	**Units**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**
Metals									
Antimony	mg/kg	-	-	-	-	-	-	-	-
Manganese	mg/kg	-	-	-	-	-	-	-	-
Potassium	mg/kg	-	-	-	-	-	-	-	-
Arsenic	mg/kg	-	-	-	-	-	-	-	-
Barium	mg/kg	-	-	-	-	-	-	-	-
Beryllium	mg/kg	-	-	-	-	-	-	-	-
Cadmium	mg/kg	-	-	-	-	-	-	-	-
Chromium	mg/kg	-	-	-	-	-	-	-	-
Cobalt	mg/kg	-	-	-	-	-	-	-	-
Copper	mg/kg	-	-	-	-	-	-	-	-
Lead	mg/kg	-	-	-	-	-	-	-	-
Molybdenum	mg/kg	-	-	-	-	-	-	-	-
Nickel	mg/kg	-	-	-	-	-	-	-	-
Selenium	mg/kg	-	-	-	-	-	-	-	-
Silver	mg/kg	-	-	-	-	-	-	-	-
Thallium	mg/kg	-	-	-	-	-	-	-	-
Vanadium	mg/kg	-	-	-	-	-	-	-	-
Zinc	mg/kg	-	-	-	-	-	-	-	-
Nitrate as Nitrogen	mg/kg	-	-	-	-	-	-	-	-
Nitrate/Nitrite as Nitrogen	mg/kg	-	-	-	-	-	-	-	-
Mercury	mg/kg	-	-	-	-	-	-	-	-
Explosive Compounds									
PETN	mg/kg	-	-	-	-	-	-	-	-
HMX	mg/kg	-	-	-	-	-	-	-	-
Cyclonite (RDX)	mg/kg	-	-	-	-	-	-	-	-
1,3,5-Trinitrobenzene	mg/kg	-	-	-	-	-	-	-	-
1,3-Dinitrobenzene	mg/kg	-	-	-	-	-	-	-	-
Tetryl	mg/kg	-	-	-	-	-	-	-	-
Nitrobenzene	mg/kg	-	-	-	-	-	-	-	-
2,4,6-Trinitrotoluene (TNT)	mg/kg	ND	1.0	ND	1.0	ND	1.0	ND	1.0
4-Amino-2,6-Dinitrotoluene	mg/kg	-	-	-	-	-	-	-	-
2-Amino-4,6-Dinitrotoluene	mg/kg	-	-	-	-	-	-	-	-
2,4-Dinitrotoluene	mg/kg	-	-	-	-	-	-	-	-
2,6-Dinitrotoluene	mg/kg	-	-	-	-	-	-	-	-
4-Nitrotoluene	mg/kg	-	-	-	-	-	-	-	-
3-Nitrotoluene	mg/kg	-	-	-	-	-	-	-	-
2-Nitrotoluene	mg/kg	-	-	-	-	-	-	-	-
Phosphate	mg/kg	-	-	-	-	-	-	-	-

Notes:

This data was collected by SECOR International, Inc. and has not been verified or validated by Earth Tech.

- = not analyzed

mg/kg = milligrams per kilogram

MDL = Method Detection Limit

ND = not detected above the method reporting limit

Notes regarding SS samples:

SS = soil sample

Samples collected from depths ranging from 2 to 5 inches below the ground surface.

Metals were analyzed for using EPA Method 6000 series.

Explosive compounds were analyzed for using EPA Method 8330.

**Sample analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

Notes regarding FSS samples:

FSS = field screening soil sample

Soil samples not air dried

FSS analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

Source: SECOR International, Inc.

Table A-2. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

Other Samples	Field Sample ID		FSS-20		FSS-30	
	Sample Date		12/02/98		12/02/98	
Parameter		**Units**	**Result**	**MDL**	**Result**	**MDL**
Metals						
Antimony		mg/kg	-	-	-	-
Manganese		mg/kg	-	-	-	-
Potassium		mg/kg	-	-	-	-
Arsenic		mg/kg	-	-	-	-
Barium		mg/kg	-	-	-	-
Beryllium		mg/kg	-	-	-	-
Cadmium		mg/kg	-	-	-	-
Chromium		mg/kg	-	-	-	-
Cobalt		mg/kg	-	-	-	-
Copper		mg/kg	-	-	-	-
Lead		mg/kg	-	-	-	-
Molybdenum		mg/kg	-	-	-	-
Nickel		mg/kg	-	-	-	-
Selenium		mg/kg	-	-	-	-
Silver		mg/kg	-	-	-	-
Thallium		mg/kg	-	-	-	-
Vanadium		mg/kg	-	-	-	-
Zinc		mg/kg	-	-	-	-
Nitrate as Nitrogen		mg/kg	-	-	-	-
Nitrate/Nitrite as Nitrogen		mg/kg	-	-	-	-
Mercury		mg/kg	-	-	-	-
Explosive Compounds						
PETN		mg/kg	-	-	-	-
HMX		mg/kg	-	-	-	-
Cyclonite (RDX)		mg/kg	-	-	-	-
1,3,5-Trinitrobenzene		mg/kg	-	-	-	-
1,3-Dinitrobenzene		mg/kg	-	-	-	-
Tetryl		mg/kg	-	-	-	-
Nitrobenzene		mg/kg	-	-	-	-
2,4,6-Trinitrotoluene (TNT)		mg/kg	ND	1.0	ND	1.0
4-Amino-2,6-Dinitrotoluene		mg/kg	-	-	-	-
2-Amino-4,6-Dinitrotoluene		mg/kg	-	-	-	-
2,4-Dinitrotoluene		mg/kg	-	-	-	-
2,6-Dinitrotoluene		mg/kg	-	-	-	-
4-Nitrotoluene		mg/kg	-	-	-	-
3-Nitrotoluene		mg/kg	-	-	-	-
2-Nitrotoluene		mg/kg	-	-	-	-
Phosphate		mg/kg	-	-	-	-

Notes:

This data was collected by SECOR International, Inc. and has not been verified or validated by Earth Tech.

- = not analyzed

mg/kg = milligrams per kilogram

MDL = Method Detection Limit

ND = not detected above the method reporting limit

Notes regarding SS samples:

SS = soil sample

Samples collected from depths ranging from 2 to 5 inches below the ground surface.

Metals were analyzed for using EPA Method 6000 series.

Explosive compounds were analyzed for using EPA Method 8330.

**Sample analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

Notes regarding FSS samples:

FSS = field screening soil sample

Soil samples not air dried

FSS analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

Source: SECOR International, Inc.

Table A-3. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

TNT Strips	Field Sample ID	SS-1		SS-2		SS-3		SS-4	
	Sample Date	09/09/98		09/09/98		09/09/98		09/09/98	
Parameter	**Units**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**
Metals									
Antimony	mg/kg	ND	5.0	ND	5.0	ND	5.0	ND	5.0
Manganese	mg/kg	1,200	5.0	1,500	5.0	690	5.0	890	5.0
Potassium	mg/kg	1,500	10	1,400	10	1,500	10	1,300	10
Arsenic	mg/kg	ND	5.0	ND	5.0	ND	5.0	ND	5.0
Barium	mg/kg	220	0.5	250	0.5	180	0.5	160	0.5
Beryllium	mg/kg	0.89	0.5	1.0	0.5	0.84	0.5	0.85	0.5
Cadmium	mg/kg	ND	0.5	ND	0.5	ND	0.5	ND	0.5
Chromium	mg/kg	41	0.5	44	0.5	34	0.5	37	0.5
Cobalt	mg/kg	12	0.5	15	0.5	11	0.5	7.2	0.5
Copper	mg/kg	54	0.5	54	0.5	37	0.5	35	0.5
Lead	mg/kg	9.1	1.0	9.2	1.0	ND	1.0	ND	1.0
Molybdenum	mg/kg	ND	0.5	ND	0.5	ND	0.5	ND	0.5
Nickel	mg/kg	50	1.0	50	1.0	25	1.0	28	1.0
Selenium	mg/kg	ND	5.0	ND	5.0	ND	5.0	ND	5.0
Silver	mg/kg	ND	0.5	ND	0.5	ND	0.5	ND	0.5
Thallium	mg/kg	ND	5.0	ND	5.0	ND	5.0	ND	5.0
Vanadium	mg/kg	53	0.5	63	0.5	84	0.5	88	0.5
Zinc	mg/kg	79	1.0	65	1.0	62	1.0	60	1.0
Nitrate as Nitrogen	mg/kg	-	-	-	-	-	-	-	-
Nitrate/Nitrite as Nitrogen	mg/kg	-	-	-	-	-	-	-	-
Mercury	mg/kg	0.044	0.010	0.041	0.010	0.030	0.010	0.039	0.010
Explosive Compounds									
PETN	mg/kg	-	-	-	-	-	-	-	-
HMX	mg/kg	ND	3,000	ND	300	ND	300	ND	3000
Cyclonite (RDX)	mg/kg	ND	3,000	ND	300	ND	300	ND	3000
1,3,5-Trinitrobenzene	mg/kg	ND	3,000	ND	300	ND	300	ND	3000
1,3-Dinitrobenzene	mg/kg	ND	3,000	ND	300	ND	300	ND	3000
Tetryl	mg/kg	ND	3,000	ND	300	ND	300	ND	3000
Nitrobenzene	mg/kg	ND	3,000	ND	300	ND	300	ND	3000
2,4,6-Trinitrotoluene (TNT)	mg/kg	72,400	3,000	12,200	300	4,990	300	49,000	3000
4-Amino-2,6-Dinitrotoluene	mg/kg	ND	3,000	ND	300	ND	300	ND	3000
2-Amino-4,6-Dinitrotoluene	mg/kg	ND	3,000	ND	300	ND	300	ND	3000
2,4-Dinitrotoluene	mg/kg	ND	3,000	ND	300	ND	300	ND	3000
2,6-Dinitrotoluene	mg/kg	ND	3,000	ND	300	ND	300	ND	3000
4-Nitrotoluene	mg/kg	ND	3,000	ND	300	ND	300	ND	3000
3-Nitrotoluene	mg/kg	ND	3,000	ND	300	ND	300	ND	3000
2-Nitrotoluene	mg/kg	ND	3,000	ND	300	ND	300	ND	3000
Phosphate	mg/kg	-	-	-	-	-	-	-	-

Notes:

This data was collected by SECOR International, Inc. and has not been verified or validated by Earth Tech.

- = not analyzed

mg/kg = milligrams per kilogram

MDL = Method Detection Limit

ND = not detected above the method reporting limit

Notes regarding SS samples:

SS = soil sample

Samples collected from depths ranging from 2 to 5 inches below the ground surface.

Metals were analyzed for using EPA Method 6000 series.

Explosive compounds were analyzed for using EPA Method 8330.

Notes regarding FSS samples:

FSS = field screening soil sample

Soil samples not air dried

FSS analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

* Analysis of FSS-10 and FSS-40 using EPA Method 8330.

** = sample concentration was out of the range of the test method (1 to 30 mg/kg), therefore the sample was re-extracted, diluted and the concentration was re-reported.

Source: SECOR International, Inc.

Table A-3. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

TNT Strips	Field Sample ID	SS-5		SS-6		SS-37		SS-38	
	Sample Date	09/09/98		09/09/98		11/20/98		11/20/98	
Parameter	**Units**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**
Metals									
Antimony	mg/kg	ND	5.0	ND	5.0	ND	6.00	ND	6.00
Manganese	mg/kg	2100	5.0	1700	5.0	1,090	1.00	1,130	1.00
Potassium	mg/kg	1,800	10	2,400	10	1,780	500	2,110	500
Arsenic	mg/kg	ND	5.0	ND	5.0	13.6	10.00	15.7	10.00
Barium	mg/kg	300	0.5	180	0.5	219	0.400	227	0.400
Beryllium	mg/kg	1.3	0.5	0.90	0.5	0.786	0.100	0.898	0.100
Cadmium	mg/kg	ND	0.5	0.95	0.5	ND	1.00	ND	1.00
Chromium	mg/kg	71	0.5	47	0.5	36.9	1.00	44.1	1.00
Cobalt	mg/kg	27	0.5	15	0.5	15.2	0.700	16.2	0.700
Copper	mg/kg	71	0.5	61	0.5	48.6	1.00	55.3	1.00
Lead	mg/kg	ND	1.0	30	1.0	20.4	7.50	24.8	7.50
Molybdenum	mg/kg	ND	0.5	ND	0.5	ND	2.00	ND	2.00
Nickel	mg/kg	64	1.0	52	1.0	46.2	3.00	51.9	3.00
Selenium	mg/kg	ND	5.0	ND	5.0	ND	10.0	ND	10.0
Silver	mg/kg	ND	0.5	ND	0.5	ND	0.700	ND	0.700
Thallium	mg/kg	ND	5.0	ND	5.0	ND	10.0	ND	10.0
Vanadium	mg/kg	90	0.5	66	0.5	59.2	1.00	68.2	1.00
Zinc	mg/kg	79	1.0	91	1.0	61.3	2.00	69.7	2.00
Nitrate as Nitrogen	mg/kg	-	-	-	-	1.98	1.00	2.66	1.00
Nitrate/Nitrite as Nitrogen	mg/kg	-	-	-	-	1.98	2.00	2.66	2.00
Mercury	mg/kg	0.024	0.010	0.14	0.010	0.0615	0.0500	0.0630	0.0500
Explosive Compounds									
PETN	mg/kg	-	-	-	-	ND	0.30	ND	0.30
HMX	mg/kg	ND	30	ND	30	ND	0.30	ND	0.30
Cyclonite (RDX)	mg/kg	ND	30	ND	30	ND	0.30	ND	0.30
1,3,5-Trinitrobenzene	mg/kg	ND	30	ND	30	ND	0.30	ND	0.30
1,3-Dinitrobenzene	mg/kg	ND	30	ND	30	ND	0.30	ND	0.30
Tetryl	mg/kg	ND	30	ND	30	ND	0.30	ND	0.30
Nitrobenzene	mg/kg	ND	30	ND	30	ND	0.30	ND	0.30
2,4,6-Trinitrotoluene (TNT)	mg/kg	738	30	200	30	ND	0.30	ND	0.30
4-Amino-2,6-Dinitrotoluene	mg/kg	ND	30	ND	30	ND	0.30	ND	0.30
2-Amino-4,6-Dinitrotoluene	mg/kg	ND	30	ND	30	ND	0.30	ND	0.30
2,4-Dinitrotoluene	mg/kg	ND	30	ND	30	ND	0.30	ND	0.30
2,6-Dinitrotoluene	mg/kg	ND	30	ND	30	ND	0.30	ND	0.30
4-Nitrotoluene	mg/kg	ND	30	ND	30	ND	0.30	ND	0.30
3-Nitrotoluene	mg/kg	ND	30	ND	30	ND	0.30	ND	0.30
2-Nitrotoluene	mg/kg	ND	30	ND	30	ND	0.30	ND	0.30
Phosphate	mg/kg	-	-	-	-	181	2.50	258	2.50

Notes:

This data was collected by SECOR International, Inc. and has not been verified or validated by Earth Tech.

- = not analyzed

mg/kg = milligrams per kilogram

MDL = Method Detection Limit

ND = not detected above the method reporting limit

Notes regarding SS samples:

SS = soil sample

Samples collected from depths ranging from 2 to 5 inches below the ground surface.

Metals were analyzed for using EPA Method 6000 series.

Explosive compounds were analyzed for using EPA Method 8330.

Notes regarding FSS samples:

FSS = field screening soil sample

Soil samples not air dried

FSS analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

* Analysis of FSS-10 and FSS-40 using EPA Method 8330.

** = sample concentration was out of the range of the test method (1 to 30 mg/kg), therefore the sample was re-extracted, diluted and the concentration was re-reported.

Source: SECOR International, Inc.

Table A-3. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

TNT Strips	Field Sample ID	FSS-10*		FSS-10		FSS-31		FSS-33	
	Sample Date	12/01/98		12/02/98**/12/08/98		12/02/98		12/02/98	
Parameter	**Units**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**
Metals									
Antimony	mg/kg	-	-	-	-	-	-	-	-
Manganese	mg/kg	-	-	-	-	-	-	-	-
Potassium	mg/kg	-	-	-	-	-	-	-	-
Arsenic	mg/kg	-	-	-	-	-	-	-	-
Barium	mg/kg	-	-	-	-	-	-	-	-
Beryllium	mg/kg	-	-	-	-	-	-	-	-
Cadmium	mg/kg	-	-	-	-	-	-	-	-
Chromium	mg/kg	-	-	-	-	-	-	-	-
Cobalt	mg/kg	-	-	-	-	-	-	-	-
Copper	mg/kg	-	-	-	-	-	-	-	-
Lead	mg/kg	-	-	-	-	-	-	-	-
Molybdenum	mg/kg	-	-	-	-	-	-	-	-
Nickel	mg/kg	-	-	-	-	-	-	-	-
Selenium	mg/kg	-	-	-	-	-	-	-	-
Silver	mg/kg	-	-	-	-	-	-	-	-
Thallium	mg/kg	-	-	-	-	-	-	-	-
Vanadium	mg/kg	-	-	-	-	-	-	-	-
Zinc	mg/kg	-	-	-	-	-	-	-	-
Nitrate as Nitrogen	mg/kg	-	-	-	-	-	-	-	-
Nitrate/Nitrite as Nitrogen	mg/kg	-	-	-	-	-	-	-	-
Mercury	mg/kg	-	-	-	-	-	-	-	-
Explosive Compounds									
PETN	mg/kg	ND	250	-	-	-	-	-	-
HMX	mg/kg	ND	250	-	-	-	-	-	-
Cyclonite (RDX)	mg/kg	ND	250	3.1	1.0	-	-	ND	1.0
1,3,5-Trinitrobenzene	mg/kg	ND	250	-	-	-	-	-	-
1,3-Dinitrobenzene	mg/kg	ND	250	-	-	-	-	-	-
Tetryl	mg/kg	ND	250	-	-	-	-	-	-
Nitrobenzene	mg/kg	ND	250	-	-	-	-	-	-
2,4,6-Trinitrotoluene (TNT)	mg/kg	5400	250	81.55**/2074.35	1.0	ND	1.0	ND	1.0
4-Amino-2,6-Dinitrotoluene	mg/kg	ND	250		-	-	-	-	-
2-Amino-4,6-Dinitrotoluene	mg/kg	ND	250	-	-	-	-	-	-
2,4-Dinitrotoluene	mg/kg	ND	250	-	-	-	-	-	-
2,6-Dinitrotoluene	mg/kg	ND	250	-	-	-	-	-	-
4-Nitrotoluene	mg/kg	ND	250	-	-	-	-	-	-
3-Nitrotoluene	mg/kg	ND	250	-	-	-	-	-	-
2-Nitrotoluene	mg/kg	ND	250	-	-	-	-	-	-
Phosphate	mg/kg	-	-	-	-	-	-	-	-

Notes:

This data was collected by SECOR International, Inc. and has not been verified or validated by Earth Tech.

- = not analyzed

mg/kg = milligrams per kilogram

MDL = Method Detection Limit

ND = not detected above the method reporting limit

Notes regarding SS samples:

SS = soil sample

Samples collected from depths ranging from 2 to 5 inches below the ground surface.

Metals were analyzed for using EPA Method 6000 series.

Explosive compounds were analyzed for using EPA Method 8330.

Notes regarding FSS samples:

FSS = field screening soil sample

Soil samples not air dried

FSS analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

* Analysis of FSS-10 and FSS-40 using EPA Method 8330.

** = sample concentration was out of the range of the test method (1 to 30 mg/kg), therefore the sample was re-extracted, diluted and the concentration was re-reported.

Source: SECOR International, Inc.

Table A-3. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

TNT Strips	Field Sample ID	FSS-34		FSS-35		FSS-36		FSS-37	
	Sample Date	12/02/98		12/02/98		12/02/98		12/02/98	
Parameter	**Units**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**
Metals									
Antimony	mg/kg	-	-	-	-	-	-	-	-
Manganese	mg/kg	-	-	-	-	-	-	-	-
Potassium	mg/kg	-	-	-	-	-	-	-	-
Arsenic	mg/kg	-	-	-	-	-	-	-	-
Barium	mg/kg	-	-	-	-	-	-	-	-
Beryllium	mg/kg	-	-	-	-	-	-	-	-
Cadmium	mg/kg	-	-	-	-	-	-	-	-
Chromium	mg/kg	-	-	-	-	-	-	-	-
Cobalt	mg/kg	-	-	-	-	-	-	-	-
Copper	mg/kg	-	-	-	-	-	-	-	-
Lead	mg/kg	-	-	-	-	-	-	-	-
Molybdenum	mg/kg	-	-	-	-	-	-	-	-
Nickel	mg/kg	-	-	-	-	-	-	-	-
Selenium	mg/kg	-	-	-	-	-	-	-	-
Silver	mg/kg	-	-	-	-	-	-	-	-
Thallium	mg/kg	-	-	-	-	-	-	-	-
Vanadium	mg/kg	-	-	-	-	-	-	-	-
Zinc	mg/kg	-	-	-	-	-	-	-	-
Nitrate as Nitrogen	mg/kg	-	-	-	-	-	-	-	-
Nitrate/Nitrite as Nitrogen	mg/kg	-	-	-	-	-	-	-	-
Mercury	mg/kg	-	-	-	-	-	-	-	-
Explosive Compounds									
PETN	mg/kg	-	-	-	-	-	-	-	-
HMX	mg/kg	-	-	-	-	-	-	-	-
Cyclonite (RDX)	mg/kg	ND	1.0	ND	1.0	ND	1.0	-	-
1,3,5-Trinitrobenzene	mg/kg	-	-	-	-	-	-	-	-
1,3-Dinitrobenzene	mg/kg	-	-	-	-	-	-	-	-
Tetryl	mg/kg	-	-	-	-	-	-	-	-
Nitrobenzene	mg/kg	-	-	-	-	-	-	-	-
2,4,6-Trinitrotoluene (TNT)	mg/kg	ND	1.0	ND	1.0	ND	1.0	ND	1.0
4-Amino-2,6-Dinitrotoluene	mg/kg	-	-	-	-	-	-	-	-
2-Amino-4,6-Dinitrotoluene	mg/kg	-	-	-	-	-	-	-	-
2,4-Dinitrotoluene	mg/kg	-	-	-	-	-	-	-	-
2,6-Dinitrotoluene	mg/kg	-	-	-	-	-	-	-	-
4-Nitrotoluene	mg/kg	-	-	-	-	-	-	-	-
3-Nitrotoluene	mg/kg	-	-	-	-	-	-	-	-
2-Nitrotoluene	mg/kg	-	-	-	-	-	-	-	-
Phosphate	mg/kg	-	-	-	-	-	-	-	-

Notes:

This data was collected by SECOR International, Inc. and has not been verified or validated by Earth Tech.

- = not analyzed

mg/kg = milligrams per kilogram

MDL = Method Detection Limit

ND = not detected above the method reporting limit

Notes regarding SS samples:

SS = soil sample

Samples collected from depths ranging from 2 to 5 inches below the ground surface.

Metals were analyzed for using EPA Method 6000 series.

Explosive compounds were analyzed for using EPA Method 8330.

Notes regarding FSS samples:

FSS = field screening soil sample

Soil samples not air dried

FSS analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

* Analysis of FSS-10 and FSS-40 using EPA Method 8330.

** = sample concentration was out of the range of the test method (1 to 30 mg/kg), therefore the sample was re-extracted, diluted and the concentration was re-reported.

Source: SECOR International, Inc.

Table A-3. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

TNT Strips	Field Sample ID	FSS-38		FSS-39		FSS-40*		FSS-40	
	Sample Date	12/02/98		12/02/98		12/01/98		12/03/98	
Parameter	**Units**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**
Metals									
Antimony	mg/kg	-	-	-	-	-	-	-	-
Manganese	mg/kg	-	-	-	-	-	-	-	-
Potassium	mg/kg	-	-	-	-	-	-	-	-
Arsenic	mg/kg	-	-	-	-	-	-	-	-
Barium	mg/kg	-	-	-	-	-	-	-	-
Beryllium	mg/kg	-	-	-	-	-	-	-	-
Cadmium	mg/kg	-	-	-	-	-	-	-	-
Chromium	mg/kg	-	-	-	-	-	-	-	-
Cobalt	mg/kg	-	-	-	-	-	-	-	-
Copper	mg/kg	-	-	-	-	-	-	-	-
Lead	mg/kg	-	-	-	-	-	-	-	-
Molybdenum	mg/kg	-	-	-	-	-	-	-	-
Nickel	mg/kg	-	-	-	-	-	-	-	-
Selenium	mg/kg	-	-	-	-	-	-	-	-
Silver	mg/kg	-	-	-	-	-	-	-	-
Thallium	mg/kg	-	-	-	-	-	-	-	-
Vanadium	mg/kg	-	-	-	-	-	-	-	-
Zinc	mg/kg	-	-	-	-	-	-	-	-
Nitrate as Nitrogen	mg/kg	-	-	-	-	-	-	-	-
Nitrate/Nitrite as Nitrogen	mg/kg	-	-	-	-	-	-	-	-
Mercury	mg/kg	-	-	-	-	-	-	-	-
Explosive Compounds									
PETN	mg/kg	-	-	-	-	ND	0.25	-	-
HMX	mg/kg	-	-	-	-	ND	0.25	-	-
Cyclonite (RDX)	mg/kg	-	-	-	-	ND	0.25	-	-
1,3,5-Trinitrobenzene	mg/kg	-	-	-	-	ND	0.25	-	-
1,3-Dinitrobenzene	mg/kg	-	-	-	-	ND	0.25	-	-
Tetryl	mg/kg	-	-	-	-	ND	0.25	-	-
Nitrobenzene	mg/kg	-	-	-	-	ND	0.25	-	-
2,4,6-Trinitrotoluene (TNT)	mg/kg	ND	1.0	ND	1.0	ND	0.25	ND	1.0
4-Amino-2,6-Dinitrotoluene	mg/kg	-	-	-	-	ND	0.25	-	-
2-Amino-4,6-Dinitrotoluene	mg/kg	-	-	-	-	ND	0.25	-	-
2,4-Dinitrotoluene	mg/kg	-	-	-	-	ND	0.25	-	-
2,6-Dinitrotoluene	mg/kg	-	-	-	-	ND	0.25	-	-
4-Nitrotoluene	mg/kg	-	-	-	-	ND	0.25	-	-
3-Nitrotoluene	mg/kg	-	-	-	-	ND	0.25	-	-
2-Nitrotoluene	mg/kg	-	-	-	-	ND	0.25	-	-
Phosphate	mg/kg	-	-	-	-	-	-	-	-

Notes:

This data was collected by SECOR International, Inc. and has not been verified or validated by Earth Tech.

- = not analyzed

mg/kg = milligrams per kilogram

MDL = Method Detection Limit

ND = not detected above the method reporting limit

Notes regarding SS samples:

SS = soil sample

Samples collected from depths ranging from 2 to 5 inches below the ground surface.

Metals were analyzed for using EPA Method 6000 series.

Explosive compounds were analyzed for using EPA Method 8330.

Notes regarding FSS samples:

FSS = field screening soil sample

Soil samples not air dried

FSS analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

* Analysis of FSS-10 and FSS-40 using EPA Method 8330.

** = sample concentration was out of the range of the test method (1 to 30 mg/kg), therefore the sample was re-extracted, diluted and the concentration was re-reported.

Source: SECOR International, Inc.

Table A-3. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

TNT Strips	Field Sample ID	FSS-41	
	Sample Date	12/03/1998**/12/08/98	
Parameter	**Units**	**Result**	**MDL**
Metals			
Antimony	mg/kg	-	-
Manganese	mg/kg	-	-
Potassium	mg/kg	-	-
Arsenic	mg/kg	-	-
Barium	mg/kg	-	-
Beryllium	mg/kg	-	-
Cadmium	mg/kg	-	-
Chromium	mg/kg	-	-
Cobalt	mg/kg	-	-
Copper	mg/kg	-	-
Lead	mg/kg	-	-
Molybdenum	mg/kg	-	-
Nickel	mg/kg	-	-
Selenium	mg/kg	-	-
Silver	mg/kg	-	-
Thallium	mg/kg	-	-
Vanadium	mg/kg	-	-
Zinc	mg/kg	-	-
Nitrate as Nitrogen	mg/kg	-	-
Nitrate/Nitrite as Nitrogen	mg/kg	-	-
Mercury	mg/kg	-	-
Explosive Compounds			
PETN	mg/kg	-	-
HMX	mg/kg	-	-
Cyclonite (RDX)	mg/kg	3.4	1.0
1,3,5-Trinitrobenzene	mg/kg	-	-
1,3-Dinitrobenzene	mg/kg	-	-
Tetryl	mg/kg	-	-
Nitrobenzene	mg/kg	-	-
2,4,6-Trinitrotoluene (TNT)	mg/kg	79.566**/789.5	1.0
4-Amino-2,6-Dinitrotoluene	mg/kg	-	-
2-Amino-4,6-Dinitrotoluene	mg/kg	-	-
2,4-Dinitrotoluene	mg/kg	-	-
2,6-Dinitrotoluene	mg/kg	-	-
4-Nitrotoluene	mg/kg	-	-
3-Nitrotoluene	mg/kg	-	-
2-Nitrotoluene	mg/kg	-	-
Phosphate	mg/kg	-	-

Notes:

This data was collected by SECOR International, Inc. and has not been verified or validated by Earth Tech.

- = not analyzed

mg/kg = milligrams per kilogram

MDL = Method Detection Limit

ND = not detected above the method reporting limit

Notes regarding SS samples:

SS = soil sample

Samples collected from depths ranging from 2 to 5 inches below the ground surface.

Metals were analyzed for using EPA Method 6000 series.

Explosive compounds were analyzed for using EPA Method 8330.

Notes regarding FSS samples:

FSS = field screening soil sample

Soil samples not air dried

FSS analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

* Analysis of FSS-10 and FSS-40 using EPA Method 8330.

** = sample concentration was out of the range of the test method (1 to 30 mg/kg), therefore the sample was re-extracted, diluted and the concentration was re-reported.

Source: SECOR International, Inc.

Table A-4. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

TNT Strip #1	Field Sample ID			TNT-1A-.5		TNT-1A-1	TNT-1A-1.5	TNT-1A-2	TNT-1B-.5	TNT-1B-1	TNT-1B-1.5	TNT-1B-2
	Sample Date			7/19/99		7/19/99	7/19/99	7/19/99	7/19/99	7/19/99	7/19/99	7/19/99
	Depth			0.5 - 1.0		1.0 - 1.5	1.5 - 2.0	2.0 - 2.5	0.5 - 1.0	1.0 - 1.5	1.5 - 2.0	2.0 - 2.5
Parameter	**Method**	**Units**	**MDL**									
ALUMINUM	SW6010B	mg/kg	2.91	-		21,000	-	15,000	22,000	21,000	-	17,000
ANTIMONY	SW6010B	mg/kg	0.502	-		ND	-	ND	ND	ND	-	ND
ARSENIC	SW6010B	mg/kg	0.559	-		17	-	13	15	14	-	12
BARIUM	SW6010B	mg/kg	0.590	-		330	-	170	220	220	-	200
BERYLLIUM	SW6010B	mg/kg	0.130	-		0.66	-	0.43	0.74	0.62	-	0.49
CADMIUM	SW6010B	mg/kg	0.057	-		0.4	-	0.2	0.12	0.24	-	0.24
CALCIUM	SW6010B	mg/kg	6.41	-		5,100	-	26,000	5,900	6,200	-	30,000
CHROMIUM, TOTAL	SW6010B	mg/kg	0.162	-		61	-	44	54	52	-	45
COBALT	SW6010B	mg/kg	0.112	-		21	-	13	20	21	-	22
COPPER	SW6010B	mg/kg	0.445	-		74	-	58	71	71	-	72
IRON	SW6010B	mg/kg	1.82	-		50,000	-	38,000	43,000	49,000	-	41,000
LEAD	SW6010B	mg/kg	0.437	-		20	-	9.5	12	11	-	10
MAGNESIUM	SW6010B	mg/kg	7.00	-		6,600	-	7,600	7,200	7,000	-	7,900
MANGANESE	SW6010B	mg/kg	0.164	-		1,200	-	700	1,200	1,700	-	1,800
MERCURY	SW7471A	mg/kg	0.0099	-		0.04	-	0.054	0.025	0.037	-	0.049
MOLYBDENUM	SW6010B	mg/kg	0.142	-		0.69	-	0.42	0.74	0.59	-	0.77
NICKEL	SW6010B	mg/kg	0.591	-		66	-	54	65	64	-	66
POTASSIUM	SW6010B	mg/kg	9.91	-		1,800	-	760	1,700	1,500	-	1,100
SELENIUM	SW6010B	mg/kg	0.464	-		0.9	-	0.69	0.98	0.75	-	ND
SILVER	SW6010B	mg/kg	0.099	-		ND	-	ND	0.12	ND	-	ND
SODIUM	SW6010B	mg/kg	23.96	-		79	-	54	86	62	-	49
THALLIUM	SW6010B	mg/kg	0.741	-		ND	-	ND	ND	ND	-	ND
VANADIUM	SW6010B	mg/kg	0.156	-		88	-	55	80	77	-	63
ZINC	SW6010B	mg/kg	0.622	-		94	-	80	88	92	-	95
ACENAPHTHENE	SW8310	mg/kg	0.01	-		ND	-	ND	ND	ND	-	ND
ACENAPHTHYLENE	SW8310	mg/kg	0.01	-		ND	-	ND	ND	ND	-	ND
ANTHRACENE	SW8310	mg/kg	0.004	-		ND	-	ND	ND	ND	-	ND
BENZO(a)ANTHRACENE	SW8310	mg/kg	0.004	-		ND	-	ND	0.0074	ND	-	ND
BENZO(a)PYRENE	SW8310	mg/kg	0.005	-		ND	-	ND	ND	ND	-	ND
BENZO(b)FLUORANTHENE	SW8310	mg/kg	0.005	-		ND	-	ND	ND	ND	-	ND
BENZO(g,h,i)PERYLENE	SW8310	mg/kg	0.004	-		ND	-	ND	ND	ND	-	ND
BENZO(k)FLUORANTHENE	SW8310	mg/kg	0.003	-		ND	-	ND	ND	ND	-	ND
CHRYSENE	SW8310	mg/kg	0.003	-		ND	-	ND	0.0074	ND	-	ND
DIBENZ(a,h)ANTHRACENE	SW8310	mg/kg	0.002	-		ND	-	ND	ND	ND	-	ND
FLUORANTHENE	SW8310	mg/kg	0.005	-		ND	-	ND	0.049	ND	-	ND
FLUORENE	SW8310	mg/kg	0.008	-		ND	-	ND	ND	ND	-	ND
INDENO(1,2,3-c,d)PYRENE	SW8310	mg/kg	0.003	-		ND	-	ND	ND	ND	-	ND
NAPHTHALENE	SW8310	mg/kg	0.008	-		ND	-	ND	0.013	ND	-	ND
PHENANTHRENE	SW8310	mg/kg	0.005	-		ND	-	ND	0.061	ND	-	ND
PYRENE	SW8310	mg/kg	0.004	-		ND	-	ND	0.049	ND	-	ND
1,3,5-TRINITROBENZENE	SW8330	mg/kg	0.083	-		87	-	79	74	110	-	68
1,3-DINITROBENZENE	SW8330	mg/kg	0.041	-		ND	-	ND	ND	ND	-	ND
2,4,6-TRINITROTOLUENE	SW8330	mg/kg	0.090	-		8,300	-	1,600	750	360	-	8.9
2,4-DINITROTOLUENE	SW8330	mg/kg	0.064	-		5	-	ND	ND	ND	-	ND

Table A-4. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

TNT Strip #1	Field Sample ID			TNT-1A-.5	TNT-1A-1	TNT-1A-1.5	TNT-1A-2	TNT-1B-.5	TNT-1B-1	TNT-1B-1.5	TNT-1B-2
	Sample Date			7/19/99	7/19/99	7/19/99	7/19/99	7/19/99	7/19/99	7/19/99	7/19/99
	Depth			0.5 - 1.0	1.0 - 1.5	1.5 - 2.0	2.0 - 2.5	0.5 - 1.0	1.0 - 1.5	1.5 - 2.0	2.0 - 2.5
Parameter	**Method**	**Units**	**MDL**								
2,6-DINITROTOLUENE	SW8330	mg/kg	0.044	-	ND	-	ND	ND	ND	-	ND
2-AMINO-4,6-DINITROTOLUENE	SW8330	mg/kg	0.023	-	ND	-	ND	3.2	2.4	-	1.2
2-NITROTOLUENE	SW8330	mg/kg	0.028	-	ND	-	ND	ND	ND	-	ND
3-NITROTOLUENE	SW8330	mg/kg	0.043	-	ND	-	ND	ND	ND	-	ND
4-AMINO-2,6-DINITROTOLUENE	SW8330	mg/kg	0.022	-	ND	-	ND	ND	ND	-	ND
4-NITROTOLUENE	SW8330	mg/kg	0.044	-	ND	-	ND	ND	ND	-	ND
HEXAHYDRO-1,3,5-TRINITRO-1,3,5,7-TETRAZOCINE	SW8330	mg/kg	0.036	-	ND	-	ND	ND	ND	-	ND
NITROBENZENE	SW8330	mg/kg	0.029	-	ND	-	ND	ND	ND	-	ND
NITROGLYCERIN	SW8330	mg/kg	0.070	ND	-	ND	-	ND	-	ND	-
OCTAHYDRO-1,3,5,7-TETRANITRO-1,3,5,7-TETRAZOCINE	SW8330	mg/kg	0.129	-	ND	-	ND	ND	ND	-	ND
PENTAERYTHRITOL TETRANITRATE	SW8330	mg/kg	0.15	ND	-	ND	-	ND	-	ND	-
TETRYL	SW8330	mg/kg	0.237	-	ND	-	ND	ND	ND	-	ND

Notes:

Sample results reported on a dry weight basis.

MDL = Method Detection Limit

mg/kg = milligrams per kilogram

ND= not detected above MDL

This data is preliminary, as received from the analytical laboratory, and has not been verified or validated by Earth Tech. This data will be validated and verified for presentation in the final remedial investigation report.

Table A-4. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

TNT Strip #1	Field Sample ID		TNT-1C-.5		TNT-1C-1	TNT-1C-1.5		TNT-1C-2	TNT-1C-3.5		TNT-1C-4
	Sample Date		7/19/99		7/19/99	7/19/99		7/19/99	7/19/99		7/19/99
	Depth		0.5 - 1.0		1.0 - 1.5	1.5 - 2.0		2.0 - 2.5	3.5 - 4.0		4.0 - 4.5
Parameter	**Method**	**Units**									
ALUMINUM	SW6010B	mg/kg	-		11,000	-		19,000	-		16,000
ANTIMONY	SW6010B	mg/kg	-		ND	-		ND	-		ND
ARSENIC	SW6010B	mg/kg	-		7.9	-		14	-		14
BARIUM	SW6010B	mg/kg	-		130	-		220	-		190
BERYLLIUM	SW6010B	mg/kg	-		0.29	-		0.55	-		0.34
CADMIUM	SW6010B	mg/kg	-		ND	-		0.15	-		0.34
CALCIUM	SW6010B	mg/kg	-		3,100	-		5,900	-		16,000
CHROMIUM, TOTAL	SW6010B	mg/kg	-		31	-		59	-		48
COBALT	SW6010B	mg/kg	-		11	-		20	-		27
COPPER	SW6010B	mg/kg	-		36	-		68	-		73
IRON	SW6010B	mg/kg	-		25,000	-		45,000	-		45,000
LEAD	SW6010B	mg/kg	-		9.8	-		12	-		13
MAGNESIUM	SW6010B	mg/kg	-		3,600	-		7,100	-		8,000
MANGANESE	SW6010B	mg/kg	-		660	-		1,100	-		3,800
MERCURY	SW7471A	mg/kg	-		0.058	-		0.068	-		0.08
MOLYBDENUM	SW6010B	mg/kg	-		0.26	-		0.61	-		0.51
NICKEL	SW6010B	mg/kg	-		38	-		68	-		110
POTASSIUM	SW6010B	mg/kg	-		1,000	-		1,600	-		800
SELENIUM	SW6010B	mg/kg	-		0.74	-		ND	-		ND
SILVER	SW6010B	mg/kg	-		ND	-		ND	-		ND
SODIUM	SW6010B	mg/kg	-		ND	-		68	-		57
THALLIUM	SW6010B	mg/kg	-		ND	-		ND	-		ND
VANADIUM	SW6010B	mg/kg	-		41	-		72	-		58
ZINC	SW6010B	mg/kg	-		49	-		87	-		94
ACENAPHTHENE	SW8310	mg/kg	-		ND	-		ND	-		ND
ACENAPHTHYLENE	SW8310	mg/kg	-		ND	-		ND	-		ND
ANTHRACENE	SW8310	mg/kg	-		ND	-		ND	-		ND
BENZO(a)ANTHRACENE	SW8310	mg/kg	-		ND	-		ND	-		ND
BENZO(a)PYRENE	SW8310	mg/kg	-		ND	-		ND	-		ND
BENZO(b)FLUORANTHENE	SW8310	mg/kg	-		ND	-		ND	-		ND
BENZO(g,h,i)PERYLENE	SW8310	mg/kg	-		ND	-		ND	-		ND
BENZO(k)FLUORANTHENE	SW8310	mg/kg	-		ND	-		ND	-		ND
CHRYSENE	SW8310	mg/kg	-		ND	-		ND	-		ND
DIBENZ(a,h)ANTHRACENE	SW8310	mg/kg	-		ND	-		ND	-		ND
FLUORANTHENE	SW8310	mg/kg	-		0.01	-		0.015	-		ND
FLUORENE	SW8310	mg/kg	-		ND	-		ND	-		ND
INDENO(1,2,3-c,d)PYRENE	SW8310	mg/kg	-		ND	-		ND	-		ND
NAPHTHALENE	SW8310	mg/kg	-		ND	-		ND	-		ND
PHENANTHRENE	SW8310	mg/kg	-		0.025	-		0.027	-		ND
PYRENE	SW8310	mg/kg	-		ND	-		ND	-		ND
1,3,5-TRINITROBENZENE	SW8330	mg/kg	-		42	-		150	-		32
1,3-DINITROBENZENE	SW8330	mg/kg	-		ND	-		ND	-		ND
2,4,6-TRINITROTOLUENE	SW8330	mg/kg	-		380,000	-		110,000	-		11
2,4-DINITROTOLUENE	SW8330	mg/kg	-		ND	-		110	-		ND

Table A-4. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

TNT Strip #1	Field Sample ID		TNT-1C-.5	TNT-1C-1	TNT-1C-1.5	TNT-1C-2	TNT-1C-3.5	TNT-1C-4
	Sample Date		7/19/99	7/19/99	7/19/99	7/19/99	7/19/99	7/19/99
	Depth		0.5 - 1.0	1.0 - 1.5	1.5 - 2.0	2.0 - 2.5	3.5 - 4.0	4.0 - 4.5
Parameter	**Method**	**Units**						
2,6-DINITROTOLUENE	SW8330	mg/kg	-	ND	-	ND	-	ND
2-AMINO-4,6-DINITROTOLUENE	SW8330	mg/kg	-	ND	-	ND	-	0.61
2-NITROTOLUENE	SW8330	mg/kg	-	ND	-	ND	-	ND
3-NITROTOLUENE	SW8330	mg/kg	-	ND	-	ND	-	ND
4-AMINO-2,6-DINITROTOLUENE	SW8330	mg/kg	-	ND	-	ND	-	ND
4-NITROTOLUENE	SW8330	mg/kg	-	ND	-	ND	-	ND
HEXAHYDRO-1,3,5-TRINITRO-1,3,5,7-TETRAZOCINE	SW8330	mg/kg	-	ND	-	ND	-	ND
NITROBENZENE	SW8330	mg/kg	-	ND	-	ND	-	ND
NITROGLYCERIN	SW8330	mg/kg	ND	-	ND	-	ND	-
OCTAHYDRO-1,3,5,7-TETRANITRO-1,3,5,7-TETRAZOCINE	SW8330	mg/kg	-	ND	-	ND	-	ND
PENTAERYTHRITOL TETRANITRATE	SW8330	mg/kg	ND	-	ND	-	ND	-
TETRYL	SW8330	mg/kg	-	ND	-	ND	-	ND

Notes:

Sample results reported on a dry weight basis.

MDL = Method Detection Limit

mg/kg = milligrams per kilogram

ND= not detected above MDL

This data is preliminary, as received from the analytical laboratory, and has not been verified or validated by Earth Tech. This data will be validated and verified for presentation in the final remedial investigation report.

Table A-5. Benicia Tourtelot Analytical Results for Soil
(Unvalidated Data)

TNT Strip #2	Field Sample ID			TNT-2A-.5	TNT-2A-1	TNT-2A-1.5	TNT-2A-2	TNT-2B-.5	TNT-2B-1	TNT-2B-1.5	TNT-2B-2
	Sample Date			7/19/99	7/19/99	7/19/99	7/19/99	7/19/99	7/19/99	7/19/99	7/19/99
	Depth			0.5 - 1.0	1.0 - 1.5	1.5 - 2.0	2.0 - 2.5	0.5 - 1.0	1.0 - 1.5	1.5 - 2.0	2.0 - 2.5
Parameter	**Method**	**Units**	**MDL**								
ALUMINUM	SW6010B	mg/kg	2.91	-	17,000	-	17,000	20,000	19,000	-	16,000
ANTIMONY	SW6010B	mg/kg	0.502	-	ND	-	ND	ND	ND	-	ND
ARSENIC	SW6010B	mg/kg	0.559	-	15	-	16	15	15	-	12
BARIUM	SW6010B	mg/kg	0.590	-	230	-	270	220	240	-	160
BERYLLIUM	SW6010B	mg/kg	0.130	-	0.49	-	0.49	0.75	0.62	-	0.35
CADMIUM	SW6010B	mg/kg	0.057	-	0.24	-	0.18	0.37	0.37	-	0.2
CALCIUM	SW6010B	mg/kg	6.41	-	4,500	-	5,100	5,000	5,500	-	19,000
CHROMIUM, TOTAL	SW6010B	mg/kg	0.162	-	53	-	53	54	55	-	48
COBALT	SW6010B	mg/kg	0.112	-	20	-	21	19	21	-	18
COPPER	SW6010B	mg/kg	0.445	-	61	-	65	66	66	-	60
IRON	SW6010B	mg/kg	1.82	-	48,000	-	46,000	44,000	46,000	-	39,000
LEAD	SW6010B	mg/kg	0.437	-	11	-	11	17	12	-	9.5
MAGNESIUM	SW6010B	mg/kg	7.00	-	5,700	-	6,400	5,900	6,200	-	7,500
MANGANESE	SW6010B	mg/kg	0.164	-	1,100	-	1,800	1,100	1,200	-	620
MERCURY	SW7471A	mg/kg	0.0099	-	0.037	-	0.037	0.05	0.025	-	0.071
MOLYBDENUM	SW6010B	mg/kg	0.142	-	0.66	-	0.55	0.75	0.5	-	0.35
NICKEL	SW6010B	mg/kg	0.591	-	60	-	65	62	64	-	55
POTASSIUM	SW6010B	mg/kg	9.91	-	1,600	-	1,200	1,600	1,400	-	1,100
SELENIUM	SW6010B	mg/kg	0.464	-	0.77	-	0.65	0.87	ND	-	ND
SILVER	SW6010B	mg/kg	0.099	-	ND	-	ND	ND	ND	-	ND
SODIUM	SW6010B	mg/kg	23.96	-	85	-	74	75	75	-	94
THALLIUM	SW6010B	mg/kg	0.741	-	ND	-	ND	ND	ND	-	ND
VANADIUM	SW6010B	mg/kg	0.156	-	76	-	75	81	81	-	60
ZINC	SW6010B	mg/kg	0.622	-	78	-	79	75	80	-	78
ACENAPHTHENE	SW8310	mg/kg	0.01	-	ND	-	ND	ND	ND	-	ND
ACENAPHTHYLENE	SW8310	mg/kg	0.01	-	ND	-	ND	ND	ND	-	ND
ANTHRACENE	SW8310	mg/kg	0.004	-	ND	-	ND	ND	ND	-	ND
BENZO(a)ANTHRACENE	SW8310	mg/kg	0.004	-	ND	-	ND	ND	ND	-	ND
BENZO(a)PYRENE	SW8310	mg/kg	0.005	-	ND	-	ND	ND	ND	-	ND
BENZO(b)FLUORANTHENE	SW8310	mg/kg	0.005	-	ND	-	ND	ND	ND	-	ND
BENZO(g,h,i)PERYLENE	SW8310	mg/kg	0.004	-	ND	-	ND	ND	ND	-	ND
BENZO(k)FLUORANTHENE	SW8310	mg/kg	0.003	-	ND	-	ND	ND	ND	-	ND
CHRYSENE	SW8310	mg/kg	0.003	-	ND	-	ND	ND	ND	-	ND
DIBENZ(a,h)ANTHRACENE	SW8310	mg/kg	0.002	-	ND	-	ND	ND	ND	-	ND
FLUORANTHENE	SW8310	mg/kg	0.005	-	ND	-	ND	ND	ND	-	ND
FLUORENE	SW8310	mg/kg	0.008	-	ND	-	ND	ND	ND	-	ND
INDENO(1,2,3-c,d)PYRENE	SW8310	mg/kg	0.003	-	ND	-	ND	ND	ND	-	ND
NAPHTHALENE	SW8310	mg/kg	0.008	-	ND	-	ND	ND	ND	-	ND
PHENANTHRENE	SW8310	mg/kg	0.005	-	0.0061	-	0.011	ND	ND	-	ND
PYRENE	SW8310	mg/kg	0.004	-	ND	-	ND	ND	ND	-	ND
1,3,5-TRINITROBENZENE	SW8330	mg/kg	0.083	-	230	-	210	70	140	-	130
1,3-DINITROBENZENE	SW8330	mg/kg	0.041	-	ND	-	ND	ND	ND	-	ND
2,4,6-TRINITROTOLUENE	SW8330	mg/kg	0.090	-	13,000	-	25,000	190	92,000	-	24
2,4-DINITROTOLUENE	SW8330	mg/kg	0.064	-	ND	-	20	ND	64	-	ND
2,6-DINITROTOLUENE	SW8330	mg/kg	0.044	-	ND	-	ND	ND	ND	-	ND

Table A-5. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

TNT Strip #2	Field Sample ID			TNT-2A-.5	TNT-2A-1	TNT-2A-1.5	TNT-2A-2	TNT-2B-.5	TNT-2B-1	TNT-2B-1.5	TNT-2B-2
	Sample Date			7/19/99	7/19/99	7/19/99	7/19/99	7/19/99	7/19/99	7/19/99	7/19/99
	Depth			0.5 - 1.0	1.0 - 1.5	1.5 - 2.0	2.0 - 2.5	0.5 - 1.0	1.0 - 1.5	1.5 - 2.0	2.0 - 2.5
Parameter	**Method**	**Units**	**MDL**								
2-AMINO-4,6-DINITROTOLUENE	SW8330	mg/kg	0.023	-	ND	-	ND	1.4	ND	-	ND
2-NITROTOLUENE	SW8330	mg/kg	0.028	-	ND	-	ND	ND	ND	-	ND
3-NITROTOLUENE	SW8330	mg/kg	0.043	-	ND	-	ND	ND	ND	-	ND
4-AMINO-2,6-DINITROTOLUENE	SW8330	mg/kg	0.022	-	ND	-	ND	ND	ND	-	ND
4-NITROTOLUENE	SW8330	mg/kg	0.044	-	ND	-	ND	ND	ND	-	ND
HEXAHYDRO-1,3,5-TRINITRO-1,3,5,7-TETRAZOCINE	SW8330	mg/kg	0.036	-	ND	-	ND	ND	ND	-	ND
NITROBENZENE	SW8330	mg/kg	0.029	-	ND	-	ND	ND	ND	-	ND
NITROGLYCERIN	SW8330	mg/kg	0.070	ND	-	ND	-	0.48	-	ND	-
OCTAHYDRO-1,3,5,7-TETRANITRO-1,3,5,7-TETRAZOCINE	SW8330	mg/kg	0.129	-	ND	-	ND	ND	ND	-	ND
PENTAERYTHRITOL TETRANITRATE	SW8330	mg/kg	0.15	ND	-	ND	-	ND	-	ND	-
TETRYL	SW8330	mg/kg	0.237	-	ND	-	ND	ND	ND	-	ND

Notes:

Sample results reported on a dry weight basis.

- = not analyzed

MDL = Method Detection Limit

mg/kg = milligrams per kilogram

ND= not detected above MDL

This data is preliminary, as received from the analytical laboratory, and has not been verified or validated by Earth Tech. This data will be validated and verified for presentation in the final remedial investigation report.

Table A-5. Benicia Tourtelot Analytical Results for Soil
(Unvalidated Data)

TNT Strip #2	Field Sample ID		TNT-2B-3.5		TNT-2B-4		TNT-2C-.5		TNT-2C-1.0		TNT-2C-1.5		TNT-2C-2.0		TNT-2D-.5		TNT-2D-1		TNT-2D-1.5	
	Sample Date		7/19/99		7/19/99		7/20/99		7/20/99		7/20/99		7/20/99		7/19/99		7/19/99		7/19/99	
	Depth		3.5 - 4.0		4.0 - 4.5		0.5 - 1.0		1.0 - 1.5		1.5 - 2.0		2.0 - 2.5		0.5 - 1.0		1.0 - 1.5		1.5 - 2.0	
Parameter	**Method**	**Units**																		
ALUMINUM	SW6010B	mg/kg	-		16,000		-		20,000		-		22,000		-		17,000		-	
ANTIMONY	SW6010B	mg/kg	-		ND		-		1.1		-		ND		-		ND		-	
ARSENIC	SW6010B	mg/kg	-		13		-		16		-		16		-		14		-	
BARIUM	SW6010B	mg/kg	-		140		-		240		-		270		-		290		-	
BERYLLIUM	SW6010B	mg/kg	-		0.34		-		0.61		-		0.62		-		0.72		-	
CADMIUM	SW6010B	mg/kg	-		0.22		-		ND		-		ND		-		0.18		-	
CALCIUM	SW6010B	mg/kg	-		17,000		-		6,000		-		9,800		-		5,400		-	
CHROMIUM, TOTAL	SW6010B	mg/kg	-		53		-		51		-		55		-		52		-	
COBALT	SW6010B	mg/kg	-		22		-		20		-		21		-		22		-	
COPPER	SW6010B	mg/kg	-		69		-		66		-		67		-		64		-	
IRON	SW6010B	mg/kg	-		45,000		-		43,000		-		45,000		-		44,000		-	
LEAD	SW6010B	mg/kg	-		10		-		12		-		12		-		11		-	
MAGNESIUM	SW6010B	mg/kg	-		8,900		-		7,200		-		7,700		-		5,600		-	
MANGANESE	SW6010B	mg/kg	-		820		-		1,200		-		1,500		-		1,000		-	
MERCURY	SW7471A	mg/kg	-		0.092		-		0.024		-		0.025		-		0.02		-	
MOLYBDENUM	SW6010B	mg/kg	-		0.29		-		0.91		-		0.73		-		0.53		-	
NICKEL	SW6010B	mg/kg	-		62		-		62		-		65		-		56		-	
POTASSIUM	SW6010B	mg/kg	-		920		-		1,800		-		2,100		-		1,200		-	
SELENIUM	SW6010B	mg/kg	-		0.62		-		1.2		-		1.4		-		0.86		-	
SILVER	SW6010B	mg/kg	-		ND		-		ND		-		ND		-		ND		-	
SODIUM	SW6010B	mg/kg	-		100		-		94		-		110		-		120		-	
THALLIUM	SW6010B	mg/kg	-		ND		-		ND		-		ND		-		ND		-	
VANADIUM	SW6010B	mg/kg	-		58		-		76		-		78		-		79		-	
ZINC	SW6010B	mg/kg	-		95		-		84		-		86		-		77		-	
ACENAPHTHENE	SW8310	mg/kg	-		ND		-		ND		-		ND		-		ND		-	
ACENAPHTHYLENE	SW8310	mg/kg	-		ND		-		ND		-		ND		-		ND		-	
ANTHRACENE	SW8310	mg/kg	-		ND		-		ND		-		ND		-		ND		-	
BENZO(a)ANTHRACENE	SW8310	mg/kg	-		ND		-		ND		-		ND		-		ND		-	
BENZO(a)PYRENE	SW8310	mg/kg	-		ND		-		ND		-		ND		-		ND		-	
BENZO(b)FLUORANTHENE	SW8310	mg/kg	-		ND		-		ND		-		ND		-		ND		-	
BENZO(g,h,i)PERYLENE	SW8310	mg/kg	-		ND		-		ND		-		ND		-		ND		-	
BENZO(k)FLUORANTHENE	SW8310	mg/kg	-		ND		-		ND		-		ND		-		ND		-	
CHRYSENE	SW8310	mg/kg	-		ND		-		ND		-		ND		-		ND		-	
DIBENZ(a,h)ANTHRACENE	SW8310	mg/kg	-		ND		-		ND		-		ND		-		ND		-	
FLUORANTHENE	SW8310	mg/kg	-		ND		-		0.012		-		ND		-		ND		-	
FLUORENE	SW8310	mg/kg	-		ND		-		ND		-		ND		-		ND		-	
INDENO(1,2,3-c,d)PYRENE	SW8310	mg/kg	-		ND		-		ND		-		ND		-		ND		-	
NAPHTHALENE	SW8310	mg/kg	-		ND		-		ND		-		ND		-		ND		-	
PHENANTHRENE	SW8310	mg/kg	-		ND		-		0.018		-		ND		-		ND		-	
PYRENE	SW8310	mg/kg	-		ND		-		ND		-		ND		-		ND		-	
1,3,5-TRINITROBENZENE	SW8330	mg/kg	-		71		-		180		-		210		-		4.1		-	
1,3-DINITROBENZENE	SW8330	mg/kg	-		ND		-		ND		-		ND		-		ND		-	
2,4,6-TRINITROTOLUENE	SW8330	mg/kg	-		180		-		42		-		9,500		-		37		-	
2,4-DINITROTOLUENE	SW8330	mg/kg	-		ND		-		3.3		-		ND		-		ND		-	
2,6-DINITROTOLUENE	SW8330	mg/kg	-		ND		-		0.4		-		ND		-		ND		-	

Table A-5. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

TNT Strip #2	Field Sample ID		TNT-2B-3.5	TNT-2B-4	TNT-2C-.5	TNT-2C-1.0	TNT-2C-1.5	TNT-2C-2.0	TNT-2D-.5	TNT-2D-1	TNT-2D-1.5
	Sample Date		7/19/99	7/19/99	7/20/99	7/20/99	7/20/99	7/20/99	7/19/99	7/19/99	7/19/99
	Depth		3.5 - 4.0	4.0 - 4.5	0.5 - 1.0	1.0 - 1.5	1.5 - 2.0	2.0 - 2.5	0.5 - 1.0	1.0 - 1.5	1.5 - 2.0
Parameter	**Method**	**Units**									
2-AMINO-4,6-DINITROTOLUENE	SW8330	mg/kg	-	ND	-	1.3	-	ND	-	9.1	-
2-NITROTOLUENE	SW8330	mg/kg	-	ND	-	ND	-	ND	-	ND	-
3-NITROTOLUENE	SW8330	mg/kg	-	ND	-	ND	-	ND	-	ND	-
4-AMINO-2,6-DINITROTOLUENE	SW8330	mg/kg	-	ND	-	ND	-	ND	-	5.2	-
4-NITROTOLUENE	SW8330	mg/kg	-	ND	-	ND	-	ND	-	ND	-
HEXAHYDRO-1,3,5-TRINITRO-1,3,5,7-TETRAZOCINE	SW8330	mg/kg	-	ND	-	ND	-	ND	-	ND	-
NITROBENZENE	SW8330	mg/kg	-	ND	-	ND	-	ND	-	ND	-
NITROGLYCERIN	SW8330	mg/kg	0.33	-	ND	-	ND	-	ND	-	0.39
OCTAHYDRO-1,3,5,7-TETRANITRO-1,3,5,7-TETRAZOCINE	SW8330	mg/kg		ND	-	ND	-	ND	-	ND	-
PENTAERYTHRITOL TETRANITRATE	SW8330	mg/kg	ND	-	ND	-	ND	-	ND	-	ND
TETRYL	SW8330	mg/kg		ND	-	ND	-	ND	-	ND	-

Notes:

Sample results reported on a dry weight basis.

- = not analyzed

MDL = Method Detection Limit

mg/kg = milligrams per kilogram

ND= not detected above MDL

This data is preliminary, as received from the analytical laboratory, and has not been verified or validated by Earth Tech. This data will be validated and verified for presentation in the final remedial investigation report.

Table A-5. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

TNT Strip #2	Field Sample ID		TNT-2D-2	TNT-2E-1	TNT-2E-1.5	TNT-2E-2
	Sample Date		7/19/99	7/19/99	7/19/99	7/19/99
	Depth		2.0 - 2.5	1.0 - 1.5	1.5 - 2.0	2.0 - 2.5
Parameter	**Method**	**Units**				
ALUMINUM	SW6010B	mg/kg	19,000	19,000	-	19,000
ANTIMONY	SW6010B	mg/kg	ND	ND	-	ND
ARSENIC	SW6010B	mg/kg	13	14	-	14
BARIUM	SW6010B	mg/kg	290	250	-	240
BERYLLIUM	SW6010B	mg/kg	0.7	0.59	-	0.6
CADMIUM	SW6010B	mg/kg	0.35	0.35	-	0.24
CALCIUM	SW6010B	mg/kg	5,300	4,600	-	5,500
CHROMIUM, TOTAL	SW6010B	mg/kg	54	53	-	58
COBALT	SW6010B	mg/kg	21	21	-	22
COPPER	SW6010B	mg/kg	63	62	-	67
IRON	SW6010B	mg/kg	51,000	44,000	-	46,000
LEAD	SW6010B	mg/kg	12	18	-	12
MAGNESIUM	SW6010B	mg/kg	6,000	5,600	-	6,900
MANGANESE	SW6010B	mg/kg	1,100	1,500	-	1,400
MERCURY	SW7471A	mg/kg	0.035	0.071	-	0.024
MOLYBDENUM	SW6010B	mg/kg	0.49	0.47	-	0.4
NICKEL	SW6010B	mg/kg	57	62	-	67
POTASSIUM	SW6010B	mg/kg	1,300	1,300	-	1,200
SELENIUM	SW6010B	mg/kg	0.81	ND	-	1.1
SILVER	SW6010B	mg/kg	ND	ND	-	ND
SODIUM	SW6010B	mg/kg	120	59	-	48
THALLIUM	SW6010B	mg/kg	ND	ND	-	ND
VANADIUM	SW6010B	mg/kg	81	79	-	81
ZINC	SW6010B	mg/kg	78	78	-	84
ACENAPHTHENE	SW8310	mg/kg	ND	ND	-	ND
ACENAPHTHYLENE	SW8310	mg/kg	ND	ND	-	ND
ANTHRACENE	SW8310	mg/kg	ND	ND	-	ND
BENZO(a)ANTHRACENE	SW8310	mg/kg	ND	ND	-	ND
BENZO(a)PYRENE	SW8310	mg/kg	ND	ND	-	ND
BENZO(b)FLUORANTHENE	SW8310	mg/kg	ND	ND	-	ND
BENZO(g,h,i)PERYLENE	SW8310	mg/kg	ND	ND	-	ND
BENZO(k)FLUORANTHENE	SW8310	mg/kg	ND	ND	-	ND
CHRYSENE	SW8310	mg/kg	ND	ND	-	ND
DIBENZ(a,h)ANTHRACENE	SW8310	mg/kg	ND	ND	-	ND
FLUORANTHENE	SW8310	mg/kg	ND	ND	-	ND
FLUORENE	SW8310	mg/kg	ND	ND	-	ND
INDENO(1,2,3-c,d)PYRENE	SW8310	mg/kg	ND	ND	-	ND
NAPHTHALENE	SW8310	mg/kg	ND	ND	-	ND
PHENANTHRENE	SW8310	mg/kg	0.0082	0.0094	-	ND
PYRENE	SW8310	mg/kg	ND	ND	-	ND
1,3,5-TRINITROBENZENE	SW8330	mg/kg	6.8	0.41	-	1.3
1,3-DINITROBENZENE	SW8330	mg/kg	ND	ND	-	ND
2,4,6-TRINITROTOLUENE	SW8330	mg/kg	210	11	-	2.5
2,4-DINITROTOLUENE	SW8330	mg/kg	ND	ND	-	ND
2,6-DINITROTOLUENE	SW8330	mg/kg	ND	ND	-	ND

Table A-5. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

TNT Strip #2	Field Sample ID		TNT-2D-2	TNT-2E-1	TNT-2E-1.5	TNT-2E-2
	Sample Date		7/19/99	7/19/99	7/19/99	7/19/99
	Depth		2.0 - 2.5	1.0 - 1.5	1.5 - 2.0	2.0 - 2.5
Parameter	**Method**	**Units**				
2-AMINO-4,6-DINITROTOLUENE	SW8330	mg/kg	6	3.1	-	1.7
2-NITROTOLUENE	SW8330	mg/kg	ND	ND	-	ND
3-NITROTOLUENE	SW8330	mg/kg	ND	ND	-	ND
4-AMINO-2,6-DINITROTOLUENE	SW8330	mg/kg	3.7	8.7	-	3.1
4-NITROTOLUENE	SW8330	mg/kg	ND	ND	-	ND
HEXAHYDRO-1,3,5-TRINITRO-1,3,5,7-TETRAZOCINE	SW8330	mg/kg	ND	ND	-	ND
NITROBENZENE	SW8330	mg/kg	ND	ND	-	ND
NITROGLYCERIN	SW8330	mg/kg	-	-	0.24	-
OCTAHYDRO-1,3,5,7-TETRANITRO-1,3,5,7-TETRAZOCINE	SW8330	mg/kg	ND	ND	-	ND
PENTAERYTHRITOL TETRANITRATE	SW8330	mg/kg	-	-	ND	-
TETRYL	SW8330	mg/kg	ND	ND	-	ND

Notes:

Sample results reported on a dry weight basis.

- = not analyzed

MDL = Method Detection Limit

mg/kg = milligrams per kilogram

ND= not detected above MDL

This data is preliminary, as received from the analytical laboratory, and has not been verified or validated by Earth Tech. This data will be validated and verified for presentation in the final remedial investigation report.

Table A-6. Benicia Tourtelot Analytical Results for Soil
(Unvalidated Data)

TNT Strip #3	Field Sample ID			TNT-3A-.5	TNT-3A-1.0	TNT-3A-1.5	TNT-3A-2	TNT-3B-.5	TNT-3B-1	TNT-3B-1.5	TNT-3B-1DUP	TNT-3B-2
	Sample Date			7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99
	Depth			0.5 - 1.0	1.0 - 1.5	1.5 - 2.0	2.0 - 2.5	0.5 - 1.0	1.0 - 1.5	1.5 - 2.0	1.0 - 1.5	2.0 - 2.5
Parameter	**Method**	**Units**	**MDL**									
ALUMINUM	SW6010B	mg/kg	2.91	-	19,000	-	20,000	-	21,000	-	20,000	21,000
ANTIMONY	SW6010B	mg/kg	0.502	-	ND	-	0.71	-	ND	-	0.68	0.69
ARSENIC	SW6010B	mg/kg	0.559	-	17	-	15	-	15	-	15	14
BARIUM	SW6010B	mg/kg	0.590	-	240	-	280	-	310	-	260	330
BERYLLIUM	SW6010B	mg/kg	0.130	-	0.36	-	0.49	-	0.49	-	0.5	0.5
CADMIUM	SW6010B	mg/kg	0.057	-	ND	-	ND	-	ND	-	ND	ND
CALCIUM	SW6010B	mg/kg	6.41	-	3,600	-	4,300	-	4,300	-	4,100	5,300
CHROMIUM, TOTAL	SW6010B	mg/kg	0.162	-	44	-	45	-	47	-	45	46
COBALT	SW6010B	mg/kg	0.112	-	17	-	18	-	20	-	19	21
COPPER	SW6010B	mg/kg	0.445	-	51	-	55	-	55	-	54	54
IRON	SW6010B	mg/kg	1.82	-	39,000	-	42,000	-	39,000	-	44,000	46,000
LEAD	SW6010B	mg/kg	0.437	-	26	-	9.3	-	10	-	11	11
MAGNESIUM	SW6010B	mg/kg	7.00	-	6,100	-	6,400	-	7,100	-	6,800	7,100
MANGANESE	SW6010B	mg/kg	0.164	-	1,100	-	1,200	-	1,200	-	1,100	1,900
MERCURY	SW7471A	mg/kg	0.0099	-	0.06	-	0.037	-	0.02	-	0.075	0.014
MOLYBDENUM	SW6010B	mg/kg	0.142	-	1.2	-	1.2	-	0.79	-	0.85	0.85
NICKEL	SW6010B	mg/kg	0.591	-	47	-	55	-	55	-	53	63
POTASSIUM	SW6010B	mg/kg	9.91	-	3,200	-	2,600	-	2,800	-	2,600	2,800
SELENIUM	SW6010B	mg/kg	0.464	-	1.3	-	1.2	-	1.2	-	0.89	1.1
SILVER	SW6010B	mg/kg	0.099	-	ND	-	ND	-	ND	-	ND	ND
SODIUM	SW6010B	mg/kg	23.96	-	78	-	110	-	140	-	130	160
THALLIUM	SW6010B	mg/kg	0.741	-	ND	-	ND	-	ND	-	ND	ND
VANADIUM	SW6010B	mg/kg	0.156	-	84	-	81	-	77	-	75	78
ZINC	SW6010B	mg/kg	0.622	-	79	-	75	-	74	-	75	75
ACENAPHTHENE	SW8310	mg/kg	0.01	-	ND	-	ND	-	ND	-	ND	ND
ACENAPHTHYLENE	SW8310	mg/kg	0.01	-	ND	-	ND	-	ND	-	ND	ND
ANTHRACENE	SW8310	mg/kg	0.004	-	ND	-	ND	-	ND	-	ND	ND
BENZO(a)ANTHRACENE	SW8310	mg/kg	0.004	-	ND	-	ND	-	ND	-	ND	ND
BENZO(a)PYRENE	SW8310	mg/kg	0.005	-	ND	-	ND	-	ND	-	ND	ND
BENZO(b)FLUORANTHENE	SW8310	mg/kg	0.005	-	ND	-	ND	-	ND	-	ND	ND
BENZO(g,h,i)PERYLENE	SW8310	mg/kg	0.004	-	ND	-	ND	-	ND	-	ND	ND
BENZO(k)FLUORANTHENE	SW8310	mg/kg	0.003	-	ND	-	ND	-	ND	-	ND	ND
CHRYSENE	SW8310	mg/kg	0.003	-	ND	-	ND	-	ND	-	ND	ND
DIBENZ(a,h)ANTHRACENE	SW8310	mg/kg	0.002	-	ND	-	ND	-	ND	-	ND	ND
FLUORANTHENE	SW8310	mg/kg	0.005	-	ND	-	0.012	-	ND	-	ND	ND
FLUORENE	SW8310	mg/kg	0.008	-	ND	-	ND	-	ND	-	ND	ND
INDENO(1,2,3-c,d)PYRENE	SW8310	mg/kg	0.003	-	ND	-	ND	-	ND	-	ND	ND
NAPHTHALENE	SW8310	mg/kg	0.008	-	ND	-	ND	-	ND	-	ND	ND
PHENANTHRENE	SW8310	mg/kg	0.005	-	ND	-	0.025	-	ND	-	ND	ND
PYRENE	SW8310	mg/kg	0.004	-	ND	-	ND	-	ND	-	ND	ND
1,3,5-TRINITROBENZENE	SW8330	mg/kg	0.083	-	96	-	120	-	200	-	200	190
1,3-DINITROBENZENE	SW8330	mg/kg	0.041	-	ND	-	ND	-	ND	-	ND	ND
2,4,6-TRINITROTOLUENE	SW8330	mg/kg	0.090	-	51,000	-	28,000	-	8.2	-	2.5	83
2,4-DINITROTOLUENE	SW8330	mg/kg	0.064	-	ND	-	12	-	1.1	-	1.4	0.25

Table A-6. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

TNT Strip #3	Field Sample ID			TNT-3A-.5	TNT-3A-1.0	TNT-3A-1.5	TNT-3A-2	TNT-3B-.5	TNT-3B-1	TNT-3B-1.5	TNT-3B-1DUP	TNT-3B-2
	Sample Date			7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99
	Depth			0.5 - 1.0	1.0 - 1.5	1.5 - 2.0	2.0 - 2.5	0.5 - 1.0	1.0 - 1.5	1.5 - 2.0	1.0 - 1.5	2.0 - 2.5
Parameter	**Method**	**Units**	**MDL**									
2,6-DINITROTOLUENE	SW8330	mg/kg	0.044	-	ND	-	ND	-	ND	-	ND	ND
2-AMINO-4,6-DINITROTOLUENE	SW8330	mg/kg	0.023	-	ND	-	ND	-	0.98	-	1.3	0.75
2-NITROTOLUENE	SW8330	mg/kg	0.028	-	ND	-	ND	-	ND	-	ND	ND
3-NITROTOLUENE	SW8330	mg/kg	0.043	-	ND	-	ND	-	ND	-	ND	ND
4-AMINO-2,6-DINITROTOLUENE	SW8330	mg/kg	0.022	-	ND	-	ND	-	ND	-	ND	ND
4-NITROTOLUENE	SW8330	mg/kg	0.044	-	ND	-	ND	-	ND	-	ND	ND
HEXAHYDRO-1,3,5-TRINITRO-1,3,5,7-TETRAZOCINE	SW8330	mg/kg	0.036	-	ND	-	ND	-	ND	-	ND	ND
NITROBENZENE	SW8330	mg/kg	0.029	-	ND	-	ND	-	ND	-	ND	ND
NITROGLYCERIN	SW8330	mg/kg	0.070	ND	-	ND	-	ND	-	ND	-	-
OCTAHYDRO-1,3,5,7-TETRANITRO-1,3,5,7-TETRAZOCINE	SW8330	mg/kg	0.129	-	ND	-	ND	-	ND	-	ND	ND
PENTAERYTHRITOL TETRANITRATE	SW8330	mg/kg	0.15	ND	-	ND	-	ND	-	ND	-	-
TETRYL	SW8330	mg/kg	0.237	-	ND	-	ND	-	ND	-	ND	ND

Notes:

Sample results reported on a dry weight basis.

- = not analyzed

MDL = Method Detection Limit

mg/kg = milligrams per kilogram

ND= not detected above MDL

This data is preliminary, as received from the analytical laboratory, and has not been verified or validated by Earth Tech. This data will be validated and verified for presentation in the final remedial investigation report.

Table A-6. Benicia Tourtelot Analytical Results for Soil
(Unvalidated Data)

TNT Strip #3	Field Sample ID		TNT-3B-3.5	TNT-3B-4	TNT-3C-.5	TNT-3C-1	TNT-3C-1.5	TNT-3C-2
	Sample Date		7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99
	Depth		3.5 - 4.0	4.0 - 4.5	0.5 - 1.0	1.0 - 1.5	1.5 - 2.0	2.0 - 2.5
Parameter	**Method**	**Units**						
ALUMINUM	SW6010B	mg/kg	-	20,000	21,000	21,000	-	21,000
ANTIMONY	SW6010B	mg/kg	-	ND	ND	ND	-	ND
ARSENIC	SW6010B	mg/kg	-	14	16	15	-	15
BARIUM	SW6010B	mg/kg	-	300	270	300	-	370
BERYLLIUM	SW6010B	mg/kg	-	0.37	0.62	0.63	-	0.62
CADMIUM	SW6010B	mg/kg	-	ND	0.074	ND	-	ND
CALCIUM	SW6010B	mg/kg	-	22,000	3,300	3,900	-	4,500
CHROMIUM, TOTAL	SW6010B	mg/kg	-	43	59	58	-	57
COBALT	SW6010B	mg/kg	-	17	21	23	-	22
COPPER	SW6010B	mg/kg	-	51	68	67	-	65
IRON	SW6010B	mg/kg	-	36,000	46,000	45,000	-	46,000
LEAD	SW6010B	mg/kg	-	9.9	16	11	-	11
MAGNESIUM	SW6010B	mg/kg	-	8,600	7,500	7,200	-	7,100
MANGANESE	SW6010B	mg/kg	-	1,100	1,500	1,400	-	1,500
MERCURY	SW7471A	mg/kg	-	0.099	0.012	0.019	-	0.02
MOLYBDENUM	SW6010B	mg/kg	-	0.86	0.49	0.63	-	0.63
NICKEL	SW6010B	mg/kg	-	52	67	65	-	66
POTASSIUM	SW6010B	mg/kg	-	3,000	1,700	2,000	-	2,000
SELENIUM	SW6010B	mg/kg	-	0.94	0.87	1.2	-	0.71
SILVER	SW6010B	mg/kg	-	ND	ND	ND	-	ND
SODIUM	SW6010B	mg/kg	-	250	87	110	-	160
THALLIUM	SW6010B	mg/kg	-	ND	ND	ND	-	ND
VANADIUM	SW6010B	mg/kg	-	60	87	88	-	87
ZINC	SW6010B	mg/kg	-	75	75	78	-	81
ACENAPHTHENE	SW8310	mg/kg	-	ND	ND	ND	-	ND
ACENAPHTHYLENE	SW8310	mg/kg	-	ND	ND	ND	-	ND
ANTHRACENE	SW8310	mg/kg	-	ND	ND	ND	-	ND
BENZO(a)ANTHRACENE	SW8310	mg/kg	-	ND	ND	ND	-	ND
BENZO(a)PYRENE	SW8310	mg/kg	-	ND	ND	ND	-	ND
BENZO(b)FLUORANTHENE	SW8310	mg/kg	-	ND	ND	ND	-	ND
BENZO(g,h,i)PERYLENE	SW8310	mg/kg	-	ND	ND	ND	-	ND
BENZO(k)FLUORANTHENE	SW8310	mg/kg	-	ND	ND	ND	-	ND
CHRYSENE	SW8310	mg/kg	-	ND	ND	ND	-	ND
DIBENZ(a,h)ANTHRACENE	SW8310	mg/kg	-	ND	ND	ND	-	ND
FLUORANTHENE	SW8310	mg/kg	-	ND	ND	ND	-	ND
FLUORENE	SW8310	mg/kg	-	ND	ND	ND	-	ND
INDENO(1,2,3-c,d)PYRENE	SW8310	mg/kg	-	ND	ND	ND	-	ND
NAPHTHALENE	SW8310	mg/kg	-	ND	ND	ND	-	ND
PHENANTHRENE	SW8310	mg/kg	-	ND	ND	ND	-	ND
PYRENE	SW8310	mg/kg	-	ND	ND	ND	-	ND
1,3,5-TRINITROBENZENE	SW8330	mg/kg	-	150	ND	180	-	210
1,3-DINITROBENZENE	SW8330	mg/kg	-	ND	ND	ND	-	ND
2,4,6-TRINITROTOLUENE	SW8330	mg/kg	-	10	16,000	31	-	15
2,4-DINITROTOLUENE	SW8330	mg/kg	-	ND	11	ND	-	ND

Table A-6. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

TNT Strip #3	Field Sample ID		TNT-3B-3.5	TNT-3B-4	TNT-3C-.5	TNT-3C-1	TNT-3C-1.5	TNT-3C-2
	Sample Date		7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99
	Depth		3.5 - 4.0	4.0 - 4.5	0.5 - 1.0	1.0 - 1.5	1.5 - 2.0	2.0 - 2.5
Parameter	**Method**	**Units**						
2,6-DINITROTOLUENE	SW8330	mg/kg	-	ND	ND	ND	-	ND
2-AMINO-4,6-DINITROTOLUENE	SW8330	mg/kg	-	0.21	12	1.2	-	ND
2-NITROTOLUENE	SW8330	mg/kg	-	ND	ND	ND	-	ND
3-NITROTOLUENE	SW8330	mg/kg	-	ND	ND	ND	-	ND
4-AMINO-2,6-DINITROTOLUENE	SW8330	mg/kg	-	ND	9.9	ND	-	ND
4-NITROTOLUENE	SW8330	mg/kg	-	ND	ND	ND	-	ND
HEXAHYDRO-1,3,5-TRINITRO-1,3,5,7-TETRAZOCINE	SW8330	mg/kg	-	ND	ND	ND	-	ND
NITROBENZENE	SW8330	mg/kg	-	ND	ND	ND	-	ND
NITROGLYCERIN	SW8330	mg/kg	0.24	-	ND	-	ND	-
OCTAHYDRO-1,3,5,7-TETRANITRO-1,3,5,7-TETRAZOCINE	SW8330	mg/kg	-	ND	ND	ND	-	ND
PENTAERYTHRITOL TETRANITRATE	SW8330	mg/kg	ND	-	ND	-	ND	-
TETRYL	SW8330	mg/kg	-	ND	ND	ND	-	ND

Notes:

Sample results reported on a dry weight basis.

- = not analyzed

MDL = Method Detection Limit

mg/kg = milligrams per kilogram

ND= not detected above MDL

This data is preliminary, as received from the analytical laboratory, and has not been verified or validated by Earth Tech. This data will be validated and verified for presentation in the final remedial investigation report.

Table A-7. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

TNT Strip #4	Field Sample ID			TNT-4A-.5	TNT-4A-1	TNT-4A-2	TNT-4B-.5	TNT-4B-1	TNT-4B-1.5	TNT-4B-2	TNT-4B-3.5	TNT-4B-4
	Sample Date			7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99
	Depth			0.5 - 1.0	1.0 - 1.5	2.0 - 2.5	0.5 - 1.0	1.0 - 1.5	1.5 - 2.0	2.0 - 2.5	3.5 - 4.0	4.0 - 4.5
Parameter	**Method**	**Units**	**MDL**									
ALUMINUM	SW6010B	mg/kg	2.91	-	18,000	18,000	19,000	20,000	-	18,000	-	17,000
ANTIMONY	SW6010B	mg/kg	0.502	-	ND	ND	ND	ND	-	ND	-	ND
ARSENIC	SW6010B	mg/kg	0.559	-	15	13	14	14	-	13	-	11
BARIUM	SW6010B	mg/kg	0.590	-	210	190	340	270	-	250	-	230
BERYLLIUM	SW6010B	mg/kg	0.130	-	0.47	0.48	0.62	0.62	-	0.63	-	0.49
CADMIUM	SW6010B	mg/kg	0.057	-	ND	ND	0.1	ND	-	ND	-	ND
CALCIUM	SW6010B	mg/kg	6.41	-	3,200	3,200	3,500	3,600	-	3,900	-	5,500
CHROMIUM, TOTAL	SW6010B	mg/kg	0.162	-	51	51	50	51	-	49	-	47
COBALT	SW6010B	mg/kg	0.112	-	25	17	22	21	-	20	-	18
COPPER	SW6010B	mg/kg	0.445	-	54	52	61	57	-	56	-	51
IRON	SW6010B	mg/kg	1.82	-	46,000	45,000	41,000	40,000	-	39,000	-	35,000
LEAD	SW6010B	mg/kg	0.437	-	10	8.7	12	11	-	11	-	11
MAGNESIUM	SW6010B	mg/kg	7.00	-	5,200	5,500	5,400	5,600	-	5,600	-	5,600
MANGANESE	SW6010B	mg/kg	0.164	-	1,300	830	1,500	1,500	-	1,200	-	1,100
MERCURY	SW7471A	mg/kg	0.0099	-	0.036	0.048	0.015	ND	-	ND	-	0.022
MOLYBDENUM	SW6010B	mg/kg	0.142	-	0.9	0.95	0.5	0.74	-	0.55	-	0.61
NICKEL	SW6010B	mg/kg	0.591	-	50	49	59	57	-	56	-	54
POTASSIUM	SW6010B	mg/kg	9.91	-	1,400	1,400	1,600	2,000	-	1,800	-	1,700
SELENIUM	SW6010B	mg/kg	0.464	-	1.7	0.93	0.75	1.2	-	1.1	-	1
SILVER	SW6010B	mg/kg	0.099	-	ND	ND	ND	ND	-	ND	-	ND
SODIUM	SW6010B	mg/kg	23.96	-	100	180	120	200	-	240	-	240
THALLIUM	SW6010B	mg/kg	0.741	-	ND	ND	ND	ND	-	ND	-	ND
VANADIUM	SW6010B	mg/kg	0.156	-	97	87	81	79	-	78	-	66
ZINC	SW6010B	mg/kg	0.622	-	70	69	65	68	-	66	-	65
ACENAPHTHENE	SW8310	mg/kg	0.01	-	ND	ND	ND	ND	-	ND	-	ND
ACENAPHTHYLENE	SW8310	mg/kg	0.01	-	ND	ND	ND	ND	-	ND	-	ND
ANTHRACENE	SW8310	mg/kg	0.004	-	ND	ND	ND	ND	-	ND	-	ND
BENZO(a)ANTHRACENE	SW8310	mg/kg	0.004	-	ND	ND	ND	ND	-	ND	-	ND
BENZO(a)PYRENE	SW8310	mg/kg	0.005	-	ND	ND	ND	ND	-	ND	-	ND
BENZO(b)FLUORANTHENE	SW8310	mg/kg	0.005	-	ND	ND	ND	ND	-	ND	-	ND
BENZO(g,h,I)PERYLENE	SW8310	mg/kg	0.004	-	ND	ND	ND	ND	-	ND	-	ND
BENZO(k)FLUORANTHENE	SW8310	mg/kg	0.003	-	ND	ND	ND	ND	-	ND	-	ND
CHRYSENE	SW8310	mg/kg	0.003	-	ND	ND	ND	ND	-	ND	-	ND
DIBENZ(a,h)ANTHRACENE	SW8310	mg/kg	0.002	-	ND	ND	ND	ND	-	ND	-	ND
FLUORANTHENE	SW8310	mg/kg	0.005	-	ND	ND	ND	ND	-	ND	-	ND
FLUORENE	SW8310	mg/kg	0.008	-	ND	ND	ND	ND	-	ND	-	ND
INDENO(1,2,3-c,d)PYRENE	SW8310	mg/kg	0.003	-	ND	ND	ND	ND	-	ND	-	ND
NAPHTHALENE	SW8310	mg/kg	0.008	-	ND	ND	ND	ND	-	ND	-	ND
PHENANTHRENE	SW8310	mg/kg	0.005	-	ND	ND	0.01	ND	-	ND	-	ND
PYRENE	SW8310	mg/kg	0.004	-	ND	ND	ND	ND	-	ND	-	ND
1,3,5-TRINITROBENZENE	SW8330	mg/kg	0.083	-	5	0.6	200	190	-	160	-	20
1,3-DINITROBENZENE	SW8330	mg/kg	0.041	-	ND	ND	ND	ND	-	ND	-	ND
2,4,6-TRINITROTOLUENE	SW8330	mg/kg	0.090	-	150	18	52	14	-	660	-	240
2,4-DINITROTOLUENE	SW8330	mg/kg	0.064	-	ND	ND	2.4	1.9	-	1.3	-	ND

Table A-7. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

TNT Strip #4	Field Sample ID			TNT-4A-.5	TNT-4A-1	TNT-4A-2	TNT-4B-.5	TNT-4B-1	TNT-4B-1.5	TNT-4B-2	TNT-4B-3.5	TNT-4B-4
	Sample Date			7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99
	Depth			0.5 - 1.0	1.0 - 1.5	2.0 - 2.5	0.5 - 1.0	1.0 - 1.5	1.5 - 2.0	2.0 - 2.5	3.5 - 4.0	4.0 - 4.5
Parameter	**Method**	**Units**	**MDL**									
2,6-DINITROTOLUENE	SW8330	mg/kg	0.044	-	ND	ND	ND	ND	-	ND	-	ND
2-AMINO-4,6-DINITROTOLUENE	SW8330	mg/kg	0.023	-	6	5.3	ND	ND	-	1.1	-	ND
2-NITROTOLUENE	SW8330	mg/kg	0.028	-	ND	ND	ND	ND	-	ND	-	ND
3-NITROTOLUENE	SW8330	mg/kg	0.043	-	ND	ND	ND	ND	-	ND	-	ND
4-AMINO-2,6-DINITROTOLUENE	SW8330	mg/kg	0.022	-	5.4	5.3	ND	ND	-	ND	-	ND
4-NITROTOLUENE	SW8330	mg/kg	0.044	-	ND	ND	ND	ND	-	ND	-	ND
HEXAHYDRO-1,3,5-TRINITRO-1,3,5,7-TETRAZOCINE	SW8330	mg/kg	0.036	-	ND	ND	ND	ND	-	ND	-	ND
NITROBENZENE	SW8330	mg/kg	0.029	-	ND	ND	ND	ND	-	ND	-	ND
NITROGLYCERIN	SW8330	mg/kg	0.070	ND	-	-	ND	-	ND	-	ND	-
OCTAHYDRO-1,3,5,7-TETRANITRO-1,3,5,7-TETRAZOCINE	SW8330	mg/kg	0.129	-	ND	ND	ND	ND	-	ND	-	ND
PENTAERYTHRITOL TETRANITRATE	SW8330	mg/kg	0.15	ND	-	-	ND	-	ND	-	ND	-
TETRYL	SW8330	mg/kg	0.237	-	ND	ND	ND	ND	-	ND	-	ND

Notes:

Sample results reported on a dry weight basis.

- = not analyzed

MDL = Method Detection Limit

mg/kg = milligrams per kilogram

ND= not detected above MDL

This data is preliminary, as received from the analytical laboratory, and has not been verified or validated by Earth Tech. This data will be validated and verified for presentation in the final remedial investigation report.

Table A-7. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

TNT Strip #4	Field Sample ID		TNT-4C-.5	TNT-4C-1	TNT-4C-1.5	TNT-4C-2
	Sample Date		7/20/99	7/20/99	7/20/99	7/20/99
	Depth		0.5 - 1.0	1.0 - 1.5	1.5 - 2.0	2.0 - 2.5
Parameter	**Method**	**Units**				
ALUMINUM	SW6010B	mg/kg	-	18,000	-	19,000
ANTIMONY	SW6010B	mg/kg	-	ND	-	ND
ARSENIC	SW6010B	mg/kg	-	14	-	13
BARIUM	SW6010B	mg/kg	-	250	-	130
BERYLLIUM	SW6010B	mg/kg	-	0.59	-	0.35
CADMIUM	SW6010B	mg/kg	-	ND	-	ND
CALCIUM	SW6010B	mg/kg	-	3,900	-	6,600
CHROMIUM, TOTAL	SW6010B	mg/kg	-	51	-	54
COBALT	SW6010B	mg/kg	-	21	-	27
COPPER	SW6010B	mg/kg	-	55	-	71
IRON	SW6010B	mg/kg	-	38,000	-	46,000
LEAD	SW6010B	mg/kg	-	15	-	11
MAGNESIUM	SW6010B	mg/kg	-	5,200	-	9,700
MANGANESE	SW6010B	mg/kg	-	1,400	-	660
MERCURY	SW7471A	mg/kg	-	0.047	-	0.047
MOLYBDENUM	SW6010B	mg/kg	-	0.76	-	0.39
NICKEL	SW6010B	mg/kg	-	58	-	75
POTASSIUM	SW6010B	mg/kg	-	1,700	-	1,300
SELENIUM	SW6010B	mg/kg	-	0.96	-	1.1
SILVER	SW6010B	mg/kg	-	ND	-	ND
SODIUM	SW6010B	mg/kg	-	93	-	110
THALLIUM	SW6010B	mg/kg	-	ND	-	ND
VANADIUM	SW6010B	mg/kg	-	73	-	64
ZINC	SW6010B	mg/kg	-	67	-	100
ACENAPHTHENE	SW8310	mg/kg	-	ND	-	ND
ACENAPHTHYLENE	SW8310	mg/kg	-	ND	-	ND
ANTHRACENE	SW8310	mg/kg	-	ND	-	ND
BENZO(a)ANTHRACENE	SW8310	mg/kg	-	ND	-	ND
BENZO(a)PYRENE	SW8310	mg/kg	-	ND	-	ND
BENZO(b)FLUORANTHENE	SW8310	mg/kg	-	ND	-	ND
BENZO(g,h,i)PERYLENE	SW8310	mg/kg	-	ND	-	ND
BENZO(k)FLUORANTHENE	SW8310	mg/kg	-	ND	-	ND
CHRYSENE	SW8310	mg/kg	-	ND	-	ND
DIBENZ(a,h)ANTHRACENE	SW8310	mg/kg	-	ND	-	ND
FLUORANTHENE	SW8310	mg/kg	-	ND	-	ND
FLUORENE	SW8310	mg/kg	-	ND	-	ND
INDENO(1,2,3-c,d)PYRENE	SW8310	mg/kg	-	ND	-	ND
NAPHTHALENE	SW8310	mg/kg	-	ND	-	ND
PHENANTHRENE	SW8310	mg/kg	-	0.019	-	ND
PYRENE	SW8310	mg/kg	-	ND	-	ND
1,3,5-TRINITROBENZENE	SW8330	mg/kg	-	68	-	89
1,3-DINITROBENZENE	SW8330	mg/kg	-	ND	-	ND
2,4,6-TRINITROTOLUENE	SW8330	mg/kg	-	20,000	-	2
2,4-DINITROTOLUENE	SW8330	mg/kg	-	ND	-	ND

Table A-7. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

TNT Strip #4	Field Sample ID		TNT-4C-.5	TNT-4C-1	TNT-4C-1.5	TNT-4C-2
	Sample Date		7/20/99	7/20/99	7/20/99	7/20/99
	Depth		0.5 - 1.0	1.0 - 1.5	1.5 - 2.0	2.0 - 2.5
Parameter	**Method**	**Units**				
2,6-DINITROTOLUENE	SW8330	mg/kg	-	ND	-	ND
2-AMINO-4,6-DINITROTOLUENE	SW8330	mg/kg	-	ND	-	ND
2-NITROTOLUENE	SW8330	mg/kg	-	ND	-	ND
3-NITROTOLUENE	SW8330	mg/kg	-	ND	-	ND
4-AMINO-2,6-DINITROTOLUENE	SW8330	mg/kg	-	ND	-	ND
4-NITROTOLUENE	SW8330	mg/kg	-	ND	-	ND
HEXAHYDRO-1,3,5-TRINITRO-1,3,5,7-TETRAZOCINE	SW8330	mg/kg	-	ND	-	ND
NITROBENZENE	SW8330	mg/kg	-	ND	-	ND
NITROGLYCERIN	SW8330	mg/kg	ND	-	ND	-
OCTAHYDRO-1,3,5,7-TETRANITRO-1,3,5,7-TETRAZOCINE	SW8330	mg/kg	-	ND	-	ND
PENTAERYTHRITOL TETRANITRATE	SW8330	mg/kg	ND	-	ND	-
TETRYL	SW8330	mg/kg	-	ND	-	ND

Notes:

Sample results reported on a dry weight basis.

- = not analyzed

MDL = Method Detection Limit

mg/kg = milligrams per kilogram

ND= not detected above MDL

This data is preliminary, as received from the analytical laboratory, and has not been verified or validated by Earth Tech. This data will be validated and verified for presentation in the final remedial investigation report.

Table A-8. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

TNT Strip #5	Field Sample ID			TNT-5ASURFACE	TNT-5A-.5	TNT-5A-1	TNT-5A-1.5	TNT-5A-2	TNT-5B-.5	TNT-5B-1	TNT-5B-1.5	TNT-5B-2	TNT-5C-.5
	Sample Date			7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99
	Depth			0 - 0.5	0.5 - 1.0	1.0 - 1.5	1.5 - 2.0	2.0 - 2.5	0.5 - 1.0	1.0 - 1.5	1.5 - 2.0	2.0 - 2.5	0.5 - 1.0
Parameter	**Method**	**Units**	**MDL**										
ALUMINUM	SW6010B	mg/kg	2.91	16,000	-	17,000	-	17,000	17,000	16,000	-	19,000	-
ANTIMONY	SW6010B	mg/kg	0.502	0.85	-	ND	-	1.1	ND	0.84	-	ND	-
ARSENIC	SW6010B	mg/kg	0.559	13	-	14	-	15	19	16	-	23	-
BARIUM	SW6010B	mg/kg	0.590	230	-	220	-	260	180	160	-	140	-
BERYLLIUM	SW6010B	mg/kg	0.130	0.51	-	0.48	-	0.61	0.36	0.35	-	0.35	-
CADMIUM	SW6010B	mg/kg	0.057	ND	-	ND	-	ND	ND	ND	-	ND	-
CALCIUM	SW6010B	mg/kg	8.41	2,600	-	2,600	-	3,400	3,300	3000	-	3,600	-
CHROMIUM, TOTAL	SW6010B	mg/kg	0.162	50	-	50	-	53	43	41	-	47	-
COBALT	SW6010B	mg/kg	0.112	21	-	22	-	21	17	15	-	15	-
COPPER	SW6010B	mg/kg	0.445	58	-	56	-	58	50	44	-	61	-
IRON	SW6010B	mg/kg	1.82	39,000	-	41,000	-	45,000	47,000	46,000	-	41,000	-
LEAD	SW6010B	mg/kg	0.437	11	-	14	-	10	7.3	8.4	-	8.2	-
MAGNESIUM	SW6010B	mg/kg	7.00	4,100	-	4,200	-	5,000	4,700	4,400	-	6,400	-
MANGANESE	SW6010B	mg/kg	0.164	1,300	-	1,300	-	1,500	470	590	-	290	-
MERCURY	SW7471A	mg/kg	0.0099	0.021	-	0.017	-	ND	0.036	0.035	-	0.047	-
MOLYBDENUM	SW6010B	mg/kg	0.142	0.9	-	0.65	-	0.61	1.2	1.2	-	0.84	-
NICKEL	SW6010B	mg/kg	0.591	51	-	54	-	58	38	35	-	50	-
POTASSIUM	SW6010B	mg/kg	9.91	2,100	-	2,000	-	2,100	1,100	1,400	-	1,200	-
SELENIUM	SW6010B	mg/kg	0.464	0.94	-	0.83	-	0.7	1.1	1.1	-	0.76	-
SILVER	SW6010B	mg/kg	0.099	ND	-	ND	-	ND	ND	0.13	-	ND	-
SODIUM	SW6010B	mg/kg	23.96	110	-	140	-	240	60	100	-	110	-
THALLIUM	SW6010B	mg/kg	0.741	ND	-	ND	-	ND	ND	ND	-	ND	-
VANADIUM	SW6010B	mg/kg	0.156	80	-	80	-	81	100	97	-	98	-
ZINC	SW6010B	mg/kg	0.622	66	-	67	-	70	65	64	-	91	-
1,2,3,4,6,7,8-HEPTACHLORODIBENZO-p-DIOXIN	SW8290	pg/g	0.25	-	-	ND	-	-	-	-	-	-	-
1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	SW8290	pg/g	0.25	-	-	ND	-	-	-	-	-	-	-
1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	SW8290	pg/g	0.25	-	-	ND	-	-	-	-	-	-	-
1,2,3,4,7,8-HEXACHLORODIBENZO-p-DIOXIN	SW8290	pg/g	0.51	-	-	ND	-	-	-	-	-	-	-
1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	SW8290	pg/g	0.28	-	-	ND	-	-	-	-	-	-	-
1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	SW8290	pg/g	0.35	-	-	ND	-	-	-	-	-	-	-
1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	SW8290	pg/g	0.25	-	-	ND	-	-	-	-	-	-	-
1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	SW8290	pg/g	0.34	-	-	ND	-	-	-	-	-	-	-
1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	SW8290	pg/g	0.34	-	-	ND	-	-	-	-	-	-	-
1,2,3,7,8-PENTACHLORODIBENZO-p-DIOXIN	SW8290	pg/g	0.25	-	-	ND	-	-	-	-	-	-	-
1,2,3,7,8-PENTACHLORODIBENZOFURAN	SW8290	pg/g	0.25	-	-	ND	-	-	-	-	-	-	-
2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	SW8290	pg/g	0.35	-	-	ND	-	-	-	-	-	-	-
2,3,4,7,8-PENTACHLORODIBENZOFURAN	SW8290	pg/g	0.35	-	-	ND	-	-	-	-	-	-	-
2,3,7,8-TETRACHLORODIBENZO-p-DIOXIN	SW8290	pg/g	0.30	-	-	ND	-	-	-	-	-	-	-
2,3,7,8-TETRACHLORODIBENZOFURAN	SW8290	pg/g	0.12	-	-	ND	-	-	-	-	-	-	-
HEPTACHLORINATED DIBENZO-p-DIOXINS, (TOTAL)	SW8290	pg/g	0.067	-	-	ND	-	-	-	-	-	-	-
HEPTACHLORINATED DIBENZOFURANS, (TOTAL)	SW8290	pg/g	0.0	-	-	ND	-	-	-	-	-	-	-
HEXACHLORINATED DIBENZO-p-DIOXINS, (TOTAL)	SW8290	pg/g	0.0	-	-	ND	-	-	-	-	-	-	-
HEXACHLORINATED DIBENZOFURANS, (TOTAL)	SW8290	pg/g	0.0	-	-	ND	-	-	-	-	-	-	-
OCTACHLORODIBENZO-p-DIOXIN	SW8290	pg/g	0.99	-	-	ND	-	-	-	-	-	-	-

Table A-8. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

TNT Strip #5	Field Sample ID			TNT-5ASURFACE	TNT-5A-.5	TNT-5A-1	TNT-5A-1.5	TNT-5A-2	TNT-5B-.5	TNT-5B-1	TNT-5B-1.5	TNT-5B-2	TNT-5C-.5
	Sample Date			7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99
	Depth			0 - 0.5	0.5 - 1.0	1.0 - 1.5	1.5 - 2.0	2.0 - 2.5	0.5 - 1.0	1.0 - 1.5	1.5 - 2.0	2.0 - 2.5	0.5 - 1.0
Parameter	**Method**	**Units**	**MDL**										
OCTACHLORODIBENZOFURAN	SW8290	pg/g	0.5	-	-	ND	-	-	-	-	-	-	-
PENTACHLORINATED DIBENZO-p-DIOXINS, (TOTAL)	SW8290	pg/g	0.49	-	-	ND	-	-	-	-	-	-	-
PENTACHLORINATED DIBENZOFURANS, (TOTAL)	SW8290	pg/g	0.0	-	-	4.3	-	-	-	-	-	-	-
TETRACHLORINATED DIBENZO-p-DIOXINS, (TOTAL)	SW8290	pg/g	0.0	-	-	0.94	-	-	-	-	-	-	-
TETRACHLORINATED DIBENZOFURANS, (TOTAL)	SW8290	pg/g	0.0	-	-	13	-	-	-	-	-	-	-
ACENAPHTHENE	SW8310	mg/kg	0.01	ND	-	ND	-	ND	ND	ND	-	ND	-
ACENAPHTHYLENE	SW8310	mg/kg	0.01	ND	-	ND	-	ND	ND	ND	-	ND	-
ANTHRACENE	SW8310	mg/kg	0.004	ND	-	ND	-	ND	ND	ND	-	ND	-
BENZO(a)ANTHRACENE	SW8310	mg/kg	0.004	ND	-	ND	-	ND	ND	ND	-	ND	-
BENZO(a)PYRENE	SW8310	mg/kg	0.005	ND	-	ND	-	ND	ND	ND	-	ND	-
BENZO(b)FLUORANTHENE	SW8310	mg/kg	0.005	ND	-	ND	-	ND	ND	ND	-	ND	-
BENZO(g,h,i)PERYLENE	SW8310	mg/kg	0.004	ND	-	ND	-	ND	ND	ND	-	ND	-
BENZO(k)FLUORANTHENE	SW8310	mg/kg	0.003	ND	-	ND	-	ND	ND	ND	-	ND	-
CHRYSENE	SW8310	mg/kg	0.003	ND	-	ND	-	ND	ND	ND	-	ND	-
DIBENZ(a,h)ANTHRACENE	SW8310	mg/kg	0.002	ND	-	ND	-	ND	ND	ND	-	ND	-
FLUORANTHENE	SW8310	mg/kg	0.005	ND	-	ND	-	ND	ND	ND	-	ND	-
FLUORENE	SW8310	mg/kg	0.008	ND	-	ND	-	ND	ND	ND	-	ND	-
INDENO(1,2,3-c,d)PYRENE	SW8310	mg/kg	0.003	ND	-	ND	-	ND	ND	ND	-	ND	-
NAPHTHALENE	SW8310	mg/kg	0.008	ND	-	ND	-	ND	ND	ND	-	ND	-
PHENANTHRENE	SW8310	mg/kg	0.005	0.0072	-	ND	-	ND	ND	ND	-	ND	-
PYRENE	SW8310	mg/kg	0.004	ND	-	ND	-	ND	ND	ND	-	ND	-
1,3,5-TRINITROBENZENE	SW8330	mg/kg	0.083	31	-	35	-	160	13	14	-	7.5	-
1,3-DINITROBENZENE	SW8330	mg/kg	0.041	ND	-	ND	-	ND	ND	ND	-	ND	-
2,4,6-TRINITROTOLUENE	SW8330	mg/kg	0.090	1,500	-	10,000	-	12	4,200	21,000	-	7,800	-
2,4-DINITROTOLUENE	SW8330	mg/kg	0.064	0.93	-	2.5	-	0.55	8.9	15	-	5.4	-
2,6-DINITROTOLUENE	SW8330	mg/kg	0.044	ND	-	ND	-	ND	ND	ND	-	ND	-
2-AMINO-4,6-DINITROTOLUENE	SW8330	mg/kg	0.023	ND	-	1.1	-	ND	3.8	3.9	-	0.82	-
2-NITROTOLUENE	SW8330	mg/kg	0.028	ND	-	ND	-	ND	ND	ND	-	ND	-
3-NITROTOLUENE	SW8330	mg/kg	0.043	ND	-	ND	-	ND	ND	ND	-	ND	-
4-AMINO-2,6-DINITROTOLUENE	SW8330	mg/kg	0.022	ND	-	ND	-	ND	ND	ND	-	ND	-
4-NITROTOLUENE	SW8330	mg/kg	0.044	ND	-	ND	-	ND	ND	ND	-	ND	-
HEXAHYDRO-1,3,5-TRINITRO-1,3,5,7-TETRAZOCINE	SW8330	mg/kg	0.036	ND	-	ND	-	ND	ND	ND	-	ND	-
NITROBENZENE	SW8330	mg/kg	0.029	ND	-	ND	-	ND	ND	ND	-	ND	-
NITROGLYCERIN	SW8330	mg/kg	0.070	-	0.35	-	0.3	-	ND	-	ND	-	0.6
OCTAHYDRO-1,3,5,7-TETRANITRO-1,3,5,7-TETRAZOCINE	SW8330	mg/kg	0.129	ND	-	ND	-	ND	ND	ND	-	ND	-
PENTAERYTHRITOL TETRANITRATE	SW8330	mg/kg	0.15	-	ND	-	ND	-	ND	-	ND	-	ND
TETRYL	SW8330	mg/kg	0.237	ND	-	ND	-	ND	ND	ND	-	ND	-

Notes:

Sample results reported on a dry weight basis.

- = not analyzed

MDL = Method Detection Limit

mg/kg = milligrams per kilogram

ND= not detected above MDL

pg/g = picogram per gram

This data is preliminary, as received from the analytical laboratory, and has not been verified or validated by Earth Tech. This data will be validated and verified for presentation in the final remedial investigation repo

Table A-8. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

TNT Strip #5	Field Sample ID			TNT-5ASURFACE	TNT-5A-.5	TNT-5A-1	TNT-5A-1.5	TNT-5A-2	TNT-5B-.5	TNT-5B-1	TNT-5B-1.5	TNT-5B-2	TNT-5C-.5
	Sample Date			7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99
	Depth			0 - 0.5	0.5 - 1.0	1.0 - 1.5	1.5 - 2.0	2.0 - 2.5	0.5 - 1.0	1.0 - 1.5	1.5 - 2.0	2.0 - 2.5	0.5 - 1.0
Parameter	**Method**	**Units**	**MDL**										

Table A-8. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

TNT Strip #5	Field Sample ID		TNT-5C-1	TNT-5C-1.5	TNT-5C-2	TNT-5D-.5	TNT-5D-1	TNT-5D-1.5	TNT-5D-2	TNT-5E-.5	TNT-5E-1	TNT-5E-1.5	TNT-5E-2
	Sample Date		7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99
	Depth		1.0 - 1.5	1.5 - 2.0	2.0 - 2.5	0.5 - 1.0	1.0 - 1.5	1.5 - 2.0	2.0 - 2.5	0.5 - 1.0	1.0 - 1.5	1.5 - 2.0	2.0 - 2.5
Parameter	**Method**	**Units**											
ALUMINUM	SW6010B	mg/kg	18000	-	20000	-	20000	-	22000	-	19000	-	18000
ANTIMONY	SW6010B	mg/kg	ND	-	ND	-	0.82	-	ND	-	ND	-	ND
ARSENIC	SW6010B	mg/kg	15	-	12	-	15	-	14	-	12	-	14
BARIUM	SW6010B	mg/kg	250	-	250	-	240	-	260	-	190	-	220
BERYLLIUM	SW6010B	mg/kg	0.49	-	0.5	-	0.59	-	0.59	-	0.55	-	1
CADMIUM	SW6010B	mg/kg	ND	-	ND	-	ND	-	ND	-	ND	-	ND
CALCIUM	SW6010B	mg/kg	3800	-	4000	-	3000	-	3200	-	2600	-	2800
CHROMIUM, TOTAL	SW6010B	mg/kg	47	-	48	-	59	-	58	-	50	-	54
COBALT	SW6010B	mg/kg	20	-	20	-	24	-	25	-	20	-	22
COPPER	SW6010B	mg/kg	53	-	55	-	62	-	60	-	55	-	56
IRON	SW6010B	mg/kg	43000	-	41000	-	45000	-	45000	-	38000	-	40000
LEAD	SW6010B	mg/kg	9.5	-	9.7	-	12	-	12	-	11	-	13
MAGNESIUM	SW6010B	mg/kg	5300	-	5600	-	4900	-	5000	-	4200	-	4400
MANGANESE	SW6010B	mg/kg	1400	-	1400	-	1500	-	1800	-	1200	-	1500
MERCURY	SW7471A	mg/kg	0.014	-	ND	-	0.018	-	0.015	-	0.033	-	0.023
MOLYBDENUM	SW6010B	mg/kg	0.86	-	0.94	-	0.99	-	0.68	-	0.77	-	1.1
NICKEL	SW6010B	mg/kg	50	-	52	-	64	-	67	-	45	-	61
POTASSIUM	SW6010B	mg/kg	2300	-	2500	-	2400	-	2500	-	1900	-	2200
SELENIUM	SW6010B	mg/kg	0.74	-	0.99	-	1.2	-	0.94	-	0.64	-	1.3
SILVER	SW6010B	mg/kg	ND	-	ND	-	ND	-	ND	-	ND	-	0.54
SODIUM	SW6010B	mg/kg	140	-	190	-	240	-	350	-	150	-	230
THALLIUM	SW6010B	mg/kg	ND	-	ND	-	ND	-	ND	-	ND	-	ND
VANADIUM	SW6010B	mg/kg	85	-	84	-	93	-	89	-	79	-	82
ZINC	SW6010B	mg/kg	69	-	68	-	72	-	73	-	60	-	67
1,2,3,4,6,7,8-HEPTACHLORODIBENZO-p-DIOXIN	SW8290	pg/g	-	-	-	-	-	-	-	-	-	-	-
1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	SW8290	pg/g	-	-	-	-	-	-	-	-	-	-	-
1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	SW8290	pg/g	-	-	-	-	-	-	-	-	-	-	-
1,2,3,4,7,8-HEXACHLORODIBENZO-p-DIOXIN	SW8290	pg/g	-	-	-	-	-	-	-	-	-	-	-
1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	SW8290	pg/g	-	-	-	-	-	-	-	-	-	-	-
1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	SW8290	pg/g	-	-	-	-	-	-	-	-	-	-	-
1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	SW8290	pg/g	-	-	-	-	-	-	-	-	-	-	-
1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	SW8290	pg/g	-	-	-	-	-	-	-	-	-	-	-
1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	SW8290	pg/g	-	-	-	-	-	-	-	-	-	-	-
1,2,3,7,8-PENTACHLORODIBENZO-p-DIOXIN	SW8290	pg/g	-	-	-	-	-	-	-	-	-	-	-
1,2,3,7,8-PENTACHLORODIBENZOFURAN	SW8290	pg/g	-	-	-	-	-	-	-	-	-	-	-
2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	SW8290	pg/g	-	-	-	-	-	-	-	-	-	-	-
2,3,4,7,8-PENTACHLORODIBENZOFURAN	SW8290	pg/g	-	-	-	-	-	-	-	-	-	-	-
2,3,7,8-TETRACHLORODIBENZO-p-DIOXIN	SW8290	pg/g	-	-	-	-	-	-	-	-	-	-	-
2,3,7,8-TETRACHLORODIBENZOFURAN	SW8290	pg/g	-	-	-	-	-	-	-	-	-	-	-
HEPTACHLORINATED DIBENZO-p-DIOXINS, (TOTAL)	SW8290	pg/g	-	-	-	-	-	-	-	-	-	-	-
HEPTACHLORINATED DIBENZOFURANS, (TOTAL)	SW8290	pg/g	-	-	-	-	-	-	-	-	-	-	-
HEXACHLORINATED DIBENZO-p-DIOXINS, (TOTAL)	SW8290	pg/g	-	-	-	-	-	-	-	-	-	-	-
HEXACHLORINATED DIBENZOFURANS, (TOTAL)	SW8290	pg/g	-	-	-	-	-	-	-	-	-	-	-
OCTACHLORODIBENZO-p-DIOXIN	SW8290	pg/g	-	-	-	-	-	-	-	-	-	-	-

Table A-8. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

TNT Strip #5	Field Sample ID		TNT-5C-1	TNT-5C-1.5	TNT-5C-2	TNT-5D-.5	TNT-5D-1	TNT-5D-1.5	TNT-5D-2	TNT-5E-.5	TNT-5E-1	TNT-5E-1.5	TNT-5E-2
	Sample Date		7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99
	Depth		1.0 - 1.5	1.5 - 2.0	2.0 - 2.5	0.5 - 1.0	1.0 - 1.5	1.5 - 2.0	2.0 - 2.5	0.5 - 1.0	1.0 - 1.5	1.5 - 2.0	2.0 - 2.5
Parameter	**Method**	**Units**											
OCTACHLORODIBENZOFURAN	SW8290	pg/g	-	-	-	-	-	-	-	-	-	-	-
PENTACHLORINATED DIBENZO-p-DIOXINS, (TOTAL)	SW8290	pg/g	-	-	-	-	-	-	-	-	-	-	-
PENTACHLORINATED DIBENZOFURANS, (TOTAL)	SW8290	pg/g	-	-	-	-	-	-	-	-	-	-	-
TETRACHLORINATED DIBENZO-p-DIOXINS, (TOTAL)	SW8290	pg/g	-	-	-	-	-	-	-	-	-	-	-
TETRACHLORINATED DIBENZOFURANS, (TOTAL)	SW8290	pg/g	-	-	-	-	-	-	-	-	-	-	-
ACENAPHTHENE	SW8310	mg/kg	ND	-	ND	-	ND	-	ND	-	ND	-	ND
ACENAPHTHYLENE	SW8310	mg/kg	ND	-	ND	-	ND	-	ND	-	ND	-	ND
ANTHRACENE	SW8310	mg/kg	ND	-	ND	-	ND	-	ND	-	ND	-	ND
BENZO(a)ANTHRACENE	SW8310	mg/kg	ND	-	ND	-	ND	-	ND	-	ND	-	ND
BENZO(a)PYRENE	SW8310	mg/kg	ND	-	ND	-	ND	-	ND	-	ND	-	ND
BENZO(b)FLUORANTHENE	SW8310	mg/kg	ND	-	ND	-	ND	-	ND	-	ND	-	ND
BENZO(g,h,i)PERYLENE	SW8310	mg/kg	ND	-	ND	-	ND	-	ND	-	ND	-	ND
BENZO(k)FLUORANTHENE	SW8310	mg/kg	ND	-	ND	-	ND	-	ND	-	ND	-	ND
CHRYSENE	SW8310	mg/kg	ND	-	ND	-	ND	-	ND	-	ND	-	ND
DIBENZ(a,h)ANTHRACENE	SW8310	mg/kg	ND	-	ND	-	ND	-	ND	-	ND	-	ND
FLUORANTHENE	SW8310	mg/kg	ND	-	ND	-	ND	-	ND	-	ND	-	ND
FLUORENE	SW8310	mg/kg	ND	-	ND	-	ND	-	ND	-	ND	-	ND
INDENO(1,2,3-c,d)PYRENE	SW8310	mg/kg	ND	-	ND	-	ND	-	ND	-	ND	-	ND
NAPHTHALENE	SW8310	mg/kg	ND	-	ND	-	ND	-	ND	-	ND	-	ND
PHENANTHRENE	SW8310	mg/kg	ND	-	ND	-	ND	-	ND	-	ND	-	ND
PYRENE	SW8310	mg/kg	ND	-	ND	-	ND	-	ND	-	ND	-	ND
1,3,5-TRINITROBENZENE	SW8330	mg/kg	200	-	190	-	ND	-	0.59	-	ND	-	ND
1,3-DINITROBENZENE	SW8330	mg/kg	ND	-	ND	-	ND	-	ND	-	ND	-	ND
2,4,6-TRINITROTOLUENE	SW8330	mg/kg	3.1	-	460	-	1.7	-	750	-	1.6	-	0.69
2,4-DINITROTOLUENE	SW8330	mg/kg	2.5	-	1.7	-	ND	-	ND	-	ND	-	ND
2,6-DINITROTOLUENE	SW8330	mg/kg	ND	-	ND	-	ND	-	ND	-	ND	-	ND
2-AMINO-4,6-DINITROTOLUENE	SW8330	mg/kg	0.62	-	ND	-	2.7	-	5.4	-	2.1	-	0.46
2-NITROTOLUENE	SW8330	mg/kg	ND	-	ND	-	ND	-	ND	-	ND	-	ND
3-NITROTOLUENE	SW8330	mg/kg	ND	-	ND	-	ND	-	ND	-	ND	-	ND
4-AMINO-2,6-DINITROTOLUENE	SW8330	mg/kg	ND	-	ND	-	2.6	-	3.6	-	2.6	-	0.57
4-NITROTOLUENE	SW8330	mg/kg	ND	-	ND	-	ND	-	ND	-	ND	-	ND
HEXAHYDRO-1,3,5-TRINITRO-1,3,5,7-TETRAZOCINE	SW8330	mg/kg	ND	-	ND	-	ND	-	ND	-	ND	-	ND
NITROBENZENE	SW8330	mg/kg	ND	-	ND	-	ND	-	ND	-	ND	-	ND
NITROGLYCERIN	SW8330	mg/kg	-	0.8	-	ND	-	ND	-	ND	-	ND	-
OCTAHYDRO-1,3,5,7-TETRANITRO-1,3,5,7-TETRAZOCINE	SW8330	mg/kg	ND	-	ND	-	ND	-	ND	-	ND	-	ND
PENTAERYTHRITOL TETRANITRATE	SW8330	mg/kg	-	ND	-	ND	-	ND	-	ND	-	ND	-
TETRYL	SW8330	mg/kg	ND	-	ND	-	ND	-	ND	-	ND	-	ND

Notes:

Sample results reported on a dry weight basis.

- = not analyzed

MDL = Method Detection Limit

mg/kg = milligrams per kilogram

ND= not detected above MDL

pg/g = picogram per gram

This data is preliminary, as received from the analytical laboratory, and has not been verified or validated by Earth Tech. This data will be validated and verified for presentation in the final remedial investigation repo

Table A-8. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

TNT Strip #5	Field Sample ID		TNT-5C-1	TNT-5C-1.5	TNT-5C-2	TNT-5D-.5	TNT-5D-1	TNT-5D-1.5	TNT-5D-2	TNT-5E-.5	TNT-5E-1	TNT-5E-1.5	TNT-5E-2
	Sample Date		7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99	7/20/99
	Depth		1.0 - 1.5	1.5 - 2.0	2.0 - 2.5	0.5 - 1.0	1.0 - 1.5	1.5 - 2.0	2.0 - 2.5	0.5 - 1.0	1.0 - 1.5	1.5 - 2.0	2.0 - 2.5
Parameter	**Method**	**Units**											

Table A-9. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

Former Howitzer Test Facility	Field Sample ID	SS-19	
	Sample Date	11/20/98	
Parameter	**Units**	**Result**	**MDL**
Metals			
Antimony	mg/kg	ND	6.00
Manganese	mg/kg	917	0.500
Potassium	mg/kg	2,040	500
Arsenic	mg/kg	17.0	10.0
Barium	mg/kg	238	0.400
Beryllium	mg/kg	0.804	0.100
Cadmium	mg/kg	ND	1.00
Chromium	mg/kg	43.1	1.00
Cobalt	mg/kg	16.4	0.700
Copper	mg/kg	48.5	1.00
Lead	mg/kg	16.0	7.50
Molybdenum	mg/kg	ND	2.00
Nickel	mg/kg	48.0	3.00
Selenium	mg/kg	ND	10.0
Silver	mg/kg	ND	0.700
Thallium	mg/kg	ND	10.0
Vanadium	mg/kg	71.6	1.00
Zinc	mg/kg	75.3	2.00
Nitrate as Nitrogen	mg/kg	1.24	1.00
Nitrate/Nitrite as Nitrogen	mg/kg	1.24	1.00
Mercury	mg/kg	ND	0.040
Explosive Compounds			
PETN	mg/kg	ND	0.30
HMX	mg/kg	ND	0.30
Cyclonite (RDX)	mg/kg	ND	0.30
1,3,5-Trinitrobenzene	mg/kg	ND	0.30
1,3-Dinitrobenzene	mg/kg	ND	0.30
Tetryl	mg/kg	ND	0.30
Nitrobenzene	mg/kg	ND	0.30
2,4,6-Trinitrotoluene (TNT)	mg/kg	ND	0.30
4-Amino-2,6-Dinitrotoluene	mg/kg	ND	0.30
2-Amino-4,6-Dinitrotoluene	mg/kg	ND	0.30
2,4-Dinitrotoluene	mg/kg	ND	0.30
2,6-Dinitrotoluene	mg/kg	ND	0.30
4-Nitrotoluene	mg/kg	ND	0.30
3-Nitrotoluene	mg/kg	ND	0.30
2-Nitrotoluene	mg/kg	ND	0.30
Phosphate	mg/kg	10.5	0.500

Notes:

This data was collected by SECOR International, Inc. and has not been verified or validated by Earth Tech.

- = not analyzed

mg/kg = milligrams per kilogram

MDL = Method Detection Limit

ND = not detected above the method reporting limit

Notes regarding SS samples:

SS = soil sample

Samples collected from depths ranging from 2 to 5 inches below the ground surface.

Metals were analyzed for using EPA Method 6000 series.

Explosive compounds were analyzed for using EPA Method 8330.

**Sample analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

Source: SECOR International, Inc.

Table A-10. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

Former Howitzer Test Facility	Field Sample ID			SP3-1B	SP3-2-B	SP3-3A	SP3-3-A	SP3-4-A
	Sample Date			7/21/99	7/21/99	7/21/99	7/21/99	7/21/99
	Depth			0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5
Parameter	**Method**	**Units**	**MDL**					
ALUMINUM	SW6010B	mg/kg	2.91	19,000	18,000	17,000	17,000	13,000
ANTIMONY	SW6010B	mg/kg	0.502	ND	ND	1.1	0.78	ND
ARSENIC	SW6010B	mg/kg	0.559	13	17	13	13	14
BARIUM	SW6010B	mg/kg	0.590	240	200	200	210	190
BERYLLIUM	SW6010B	mg/kg	0.130	0.44	0.34	0.34	0.33	ND
CADMIUM	SW6010B	mg/kg	0.057	ND	ND	ND	ND	ND
CALCIUM	SW6010B	mg/kg	6.41	9,300	8,500	8,200	7,100	6,300
CHROMIUM, TOTAL	SW6010B	mg/kg	0.162	43	45	43	41	41
COBALT	SW6010B	mg/kg	0.112	20	19	18	19	17
COPPER	SW6010B	mg/kg	0.445	63	59	61	61	48
IRON	SW6010B	mg/kg	1.82	42,000	47,000	38,000	39,000	36,000
LEAD	SW6010B	mg/kg	0.437	41	12	89	70	120
MAGNESIUM	SW6010B	mg/kg	7.00	8,000	6,700	7,400	7,700	6,000
MANGANESE	SW6010B	mg/kg	0.164	1,100	900	800	1,100	980
MERCURY	SW7471A	mg/kg	0.0099	0.088	0.068	0.1	0.13	0.1
MOLYBDENUM	SW6010B	mg/kg	0.142	0.44	0.71	0.52	0.44	0.44
NICKEL	SW6010B	mg/kg	0.591	56	47	50	58	53
POTASSIUM	SW6010B	mg/kg	9.91	1,500	1,100	1,800	1,600	1,200
SELENIUM	SW6010B	mg/kg	0.464	0.66	1.4	1.2	1	0.89
SILVER	SW6010B	mg/kg	0.099	ND	ND	ND	ND	ND
SODIUM	SW6010B	mg/kg	23.96	110	210	160	110	100
THALLIUM	SW6010B	mg/kg	0.741	ND	ND	ND	ND	ND
VANADIUM	SW6010B	mg/kg	0.156	67	87	66	66	70
ZINC	SW6010B	mg/kg	0.622	93	84	82	89	70
ACENAPHTHENE	SW8270	mg/kg	0.0395	ND	ND	ND	ND	ND
ACENAPHTHYLENE	SW8270	mg/kg	0.0395	ND	ND	ND	ND	ND
ANTHRACENE	SW8270	mg/kg	0.0277	ND	ND	ND	ND	ND
BENZO(a)ANTHRACENE	SW8270	mg/kg	0.0203	ND	ND	ND	ND	ND
BENZO(a)PYRENE	SW8270	mg/kg	0.0229	ND	ND	ND	ND	ND
BENZO(b)FLUORANTHENE	SW8270	mg/kg	0.0281	ND	ND	ND	ND	ND
BENZO(g,h,i)PERYLENE	SW8270	mg/kg	0.0269	ND	ND	ND	ND	ND
BENZO(k)FLUORANTHENE	SW8270	mg/kg	0.0254	ND	ND	ND	ND	ND
CHRYSENE	SW8270	mg/kg	0.0225	0.077	ND	ND	ND	ND
DIBENZ(a,h)ANTHRACENE	SW8270	mg/kg	0.0297	ND	ND	ND	ND	ND
FLUORANTHENE	SW8270	mg/kg	0.0229	ND	ND	ND	ND	ND
FLUORENE	SW8270	mg/kg	0.0463	ND	ND	ND	ND	ND
INDENO(1,2,3-c,d)PYRENE	SW8270	mg/kg	0.0296	ND	ND	ND	ND	ND
NAPHTHALENE	SW8270	mg/kg	0.0480	ND	ND	ND	ND	ND
PHENANTHRENE	SW8270	mg/kg	0.0302	ND	ND	ND	ND	ND
PYRENE	SW8270	mg/kg	0.0197	0.033	ND	ND	ND	ND
ACENAPHTHENE	SW8310	mg/kg	0.01	ND	ND	ND	ND	ND
ACENAPHTHYLENE	SW8310	mg/kg	0.01	ND	ND	ND	ND	ND
ANTHRACENE	SW8310	mg/kg	0.004	ND	ND	ND	ND	ND
BENZO(a)ANTHRACENE	SW8310	mg/kg	0.004	ND	ND	ND	ND	ND

Table A-10. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

Former Howitzer Test Facility	Field Sample ID			SP3-1B	SP3-2-B	SP3-3A	SP3-3-A	SP3-4-A
	Sample Date			7/21/99	7/21/99	7/21/99	7/21/99	7/21/99
	Depth			0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5
Parameter	**Method**	**Units**	**MDL**					
BENZO(a)PYRENE	SW8310	mg/kg	0.005	ND	ND	ND	ND	ND
BENZO(b)FLUORANTHENE	SW8310	mg/kg	0.005	ND	ND	ND	ND	ND
BENZO(g,h,i)PERYLENE	SW8310	mg/kg	0.004	ND	ND	ND	ND	ND
BENZO(k)FLUORANTHENE	SW8310	mg/kg	0.003	ND	ND	ND	ND	ND
CHRYSENE	SW8310	mg/kg	0.003	ND	ND	ND	ND	ND
DIBENZ(a,h)ANTHRACENE	SW8310	mg/kg	0.002	ND	ND	ND	ND	ND
FLUORANTHENE	SW8310	mg/kg	0.005	ND	ND	ND	ND	ND
FLUORENE	SW8310	mg/kg	0.008	ND	ND	ND	ND	ND
INDENO(1,2,3-c,d)PYRENE	SW8310	mg/kg	0.003	ND	ND	ND	ND	ND
NAPHTHALENE	SW8310	mg/kg	0.008	ND	ND	ND	ND	ND
PHENANTHRENE	SW8310	mg/kg	0.005	ND	ND	ND	ND	ND
PYRENE	SW8310	mg/kg	0.004	ND	ND	ND	ND	ND
1,3,5-TRINITROBENZENE	SW8330	mg/kg	0.083	ND	ND	ND	ND	ND
1,3-DINITROBENZENE	SW8330	mg/kg	0.041	ND	ND	ND	ND	ND
2,4,6-TRINITROTOLUENE	SW8330	mg/kg	0.090	ND	ND	ND	ND	ND
2,4-DINITROTOLUENE	SW8330	mg/kg	0.064	ND	ND	ND	ND	ND
2,6-DINITROTOLUENE	SW8330	mg/kg	0.044	ND	ND	ND	ND	ND
2-AMINO-4,6-DINITROTOLUENE	SW8330	mg/kg	0.023	ND	ND	ND	ND	ND
2-NITROTOLUENE	SW8330	mg/kg	0.028	ND	ND	ND	ND	ND
3-NITROTOLUENE	SW8330	mg/kg	0.043	ND	ND	ND	ND	ND
4-AMINO-2,6-DINITROTOLUENE	SW8330	mg/kg	0.022	ND	ND	ND	ND	ND
4-NITROTOLUENE	SW8330	mg/kg	0.044	ND	ND	ND	ND	ND
HEXAHYDRO-1,3,5-TRINITRO-1,3,5,7-TETRAZOCINE	SW8330	mg/kg	0.036	ND	ND	ND	ND	ND
NITROBENZENE	SW8330	mg/kg	0.029	ND	ND	ND	ND	ND
OCTAHYDRO-1,3,5,7-TETRANITRO-1,3,5,7-TETRAZOCINE	SW8330	mg/kg	0.129	ND	ND	ND	ND	ND
TETRYL	SW8330	mg/kg	0.237	ND	ND	ND	ND	ND

Notes:

Sample results reported on a dry weight basis.

MDL = Method Detection Limit

mg/kg = milligrams per kilogram

ND= not detected above MDL

This data is preliminary, as received from the analytical laboratory, and has not been verified or validated by Ea
Tech. This data will be validated and verified for presentation in the final remedial investigation report.

Table A-11. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

Former Ammunition Renovation Area/Primer Destruction Site	Field Sample ID	FSS-32	
	Sample Date	12/02/98	
Parameter	**Units**	**Result**	**MDL**
Metals			
Antimony	mg/kg	-	-
Manganese	mg/kg	-	-
Potassium	mg/kg	-	-
Arsenic	mg/kg	-	-
Barium	mg/kg	-	-
Beryllium	mg/kg	-	-
Cadmium	mg/kg	-	-
Chromium	mg/kg	-	-
Cobalt	mg/kg	-	-
Copper	mg/kg	-	-
Lead	mg/kg	-	-
Molybdenum	mg/kg	-	-
Nickel	mg/kg	-	-
Selenium	mg/kg	-	-
Silver	mg/kg	-	-
Thallium	mg/kg	-	-
Vanadium	mg/kg	-	-
Zinc	mg/kg	-	-
Nitrate as Nitrogen	mg/kg	-	-
Nitrate/Nitrite as Nitrogen	mg/kg	-	-
Mercury	mg/kg	-	-
Explosive Compounds			
PETN	mg/kg	-	-
HMX	mg/kg	-	-
Cyclonite (RDX)	mg/kg	-	-
1,3,5-Trinitrobenzene	mg/kg	-	-
1,3-Dinitrobenzene	mg/kg	-	-
Tetryl	mg/kg	-	-
Nitrobenzene	mg/kg	-	-
2,4,6-Trinitrotoluene (TNT)	mg/kg	ND	1.0
4-Amino-2,6-Dinitrotoluene	mg/kg	-	-
2-Amino-4,6-Dinitrotoluene	mg/kg	-	-
2,4-Dinitrotoluene	mg/kg	-	-
2,6-Dinitrotoluene	mg/kg	-	-
4-Nitrotoluene	mg/kg	-	-
3-Nitrotoluene	mg/kg	-	-
2-Nitrotoluene	mg/kg	-	-
Phosphate	mg/kg	-	-

Notes:

This data was collected by SECOR International, Inc. and has not been verified or validated by Earth Tech.

- = not analyzed

mg/kg = milligrams per kilogram

MDL = Method Detection Limit

ND = not detected above the method reporting limit

Notes regarding FSS samples:

FSS = field screening soil sample

Soil samples not air dried

FSS analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

Source: SECOR International, Inc.

Table A-12. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

Former Ammunition Renovation Area/Primer Destruction Site	Field Sample ID			SP1A1	SP1B1	SP2A1	SP2B1	SP3-1B	SP3-2-B
	Sample Date			7/20/99	7/20/99	7/20/99	7/20/99	7/21/99	7/21/99
	Depth			0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5
Parameter	**Method**	**Units**	**MDL**						
ALUMINUM	SW6010B	mg/kg	2.91	19,000	19,000	18,000	16,000	19,000	18,000
ANTIMONY	SW6010B	mg/kg	0.502	0.75	ND	0.57	ND	ND	ND
ARSENIC	SW6010B	mg/kg	0.559	16	14	13	13	13	17
BARIUM	SW6010B	mg/kg	0.590	210	180	230	220	240	200
BERYLLIUM	SW6010B	mg/kg	0.130	0.33	0.33	0.45	0.33	0.44	0.34
CADMIUM	SW6010B	mg/kg	0.057	ND	ND	ND	ND	ND	ND
CALCIUM	SW6010B	mg/kg	6.41	8,800	5,000	11,000	10,000	9,300	8,500
CHROMIUM, TOTAL	SW6010B	mg/kg	0.162	47	46	41	45	43	45
COBALT	SW6010B	mg/kg	0.112	19	18	19	20	20	19
COPPER	SW6010B	mg/kg	0.445	58	52	56	57	63	59
IRON	SW6010B	mg/kg	1.82	44,000	42,000	39,000	38,000	42,000	47,000
LEAD	SW6010B	mg/kg	0.437	17	19	13	82	41	12
MAGNESIUM	SW6010B	mg/kg	7.00	7,200	6,000	7,300	6,900	8,000	6,700
MANGANESE	SW6010B	mg/kg	0.164	1,100	820	950	990	1,100	900
MERCURY	SW7471A	mg/kg	0.0099	0.055	0.045	0.067	0.067	0.088	0.068
MOLYBDENUM	SW6010B	mg/kg	0.142	0.65	0.6	0.5	0.69	0.44	0.71
NICKEL	SW6010B	mg/kg	0.591	50	46	50	49	56	47
POTASSIUM	SW6010B	mg/kg	9.91	1,600	1,600	1,800	1,400	1,500	1,100
SELENIUM	SW6010B	mg/kg	0.464	0.74	ND	0.73	ND	0.66	1.4
SILVER	SW6010B	mg/kg	0.099	ND	ND	0.11	0.12	ND	ND
SODIUM	SW6010B	mg/kg	23.96	180	140	160	140	110	210
THALLIUM	SW6010B	mg/kg	0.741	ND	ND	ND	ND	ND	ND
VANADIUM	SW6010B	mg/kg	0.156	81	84	65	64	67	87
ZINC	SW6010B	mg/kg	0.622	85	75	80	99	93	84
ACENAPHTHENE	SW8270	mg/kg	0.0395	-	ND	-	ND	ND	ND
ACENAPHTHYLENE	SW8270	mg/kg	0.0395	-	ND	-	ND	ND	ND
ANTHRACENE	SW8270	mg/kg	0.0277	-	ND	-	ND	ND	ND
BENZO(a)ANTHRACENE	SW8270	mg/kg	0.0203	-	ND	-	0.11	ND	ND
BENZO(a)PYRENE	SW8270	mg/kg	0.0229	-	ND	-	0.11	ND	ND
BENZO(b)FLUORANTHENE	SW8270	mg/kg	0.0281	-	ND	-	0.11	ND	ND
BENZO(g,h,i)PERYLENE	SW8270	mg/kg	0.0269	-	ND	-	0.044	ND	ND
BENZO(k)FLUORANTHENE	SW8270	mg/kg	0.0254	-	ND	-	0.11	ND	ND
CHRYSENE	SW8270	mg/kg	0.0225	-	ND	-	0.11	0.077	ND
DIBENZ(a,h)ANTHRACENE	SW8270	mg/kg	0.0297	-	ND	-	ND	ND	ND
FLUORANTHENE	SW8270	mg/kg	0.0229	-	ND	-	0.11	ND	ND
FLUORENE	SW8270	mg/kg	0.0463	-	ND	-	ND	ND	ND
INDENO(1,2,3-c,d)PYRENE	SW8270	mg/kg	0.0296	-	ND	-	0.067	ND	ND
NAPHTHALENE	SW8270	mg/kg	0.0480	-	ND	-	ND	ND	ND
PHENANTHRENE	SW8270	mg/kg	0.0302	-	ND	-	ND	ND	ND
PYRENE	SW8270	mg/kg	0.0197	-	ND	-	0.11	0.033	ND
ACENAPHTHENE	SW8310	mg/kg	0.01	ND	ND	ND	ND	ND	ND
ACENAPHTHYLENE	SW8310	mg/kg	0.01	ND	ND	ND	ND	ND	ND
ANTHRACENE	SW8310	mg/kg	0.004	ND	ND	ND	ND	ND	ND
BENZO(a)ANTHRACENE	SW8310	mg/kg	0.004	ND	ND	ND	ND	ND	ND

Table A-12. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

Former Ammunition Renovation Area/Primer Destruction Site	Field Sample ID			SP1A1	SP1B1	SP2A1	SP2B1	SP3-1B	SP3-2-B
	Sample Date			7/20/99	7/20/99	7/20/99	7/20/99	7/21/99	7/21/99
	Depth			0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5
Parameter	**Method**	**Units**	**MDL**						
BENZO(a)PYRENE	SW8310	mg/kg	0.005	ND	ND	ND	ND	ND	ND
BENZO(b)FLUORANTHENE	SW8310	mg/kg	0.005	ND	ND	ND	ND	ND	ND
BENZO(g,h,i)PERYLENE	SW8310	mg/kg	0.004	ND	ND	ND	ND	ND	ND
BENZO(k)FLUORANTHENE	SW8310	mg/kg	0.003	ND	ND	ND	ND	ND	ND
CHRYSENE	SW8310	mg/kg	0.003	ND	ND	ND	ND	ND	ND
DIBENZ(a,h)ANTHRACENE	SW8310	mg/kg	0.002	ND	ND	ND	ND	ND	ND
FLUORANTHENE	SW8310	mg/kg	0.005	ND	ND	ND	ND	ND	ND
FLUORENE	SW8310	mg/kg	0.008	ND	ND	ND	ND	ND	ND
INDENO(1,2,3-c,d)PYRENE	SW8310	mg/kg	0.003	ND	ND	ND	ND	ND	ND
NAPHTHALENE	SW8310	mg/kg	0.008	ND	ND	ND	ND	ND	ND
PHENANTHRENE	SW8310	mg/kg	0.005	ND	0.0078	ND	ND	ND	ND
PYRENE	SW8310	mg/kg	0.004	ND	ND	ND	ND	ND	ND
1,3,5-TRINITROBENZENE	SW8330	mg/kg	0.083	ND	ND	ND	ND	ND	ND
1,3-DINITROBENZENE	SW8330	mg/kg	0.041	ND	ND	ND	ND	ND	ND
2,4,6-TRINITROTOLUENE	SW8330	mg/kg	0.090	0.67	ND	ND	ND	ND	ND
2,4-DINITROTOLUENE	SW8330	mg/kg	0.064	ND	ND	ND	ND	ND	ND
2,6-DINITROTOLUENE	SW8330	mg/kg	0.044	ND	ND	ND	ND	ND	ND
2-AMINO-4,6-DINITROTOLUENE	SW8330	mg/kg	0.023	ND	ND	ND	ND	ND	ND
2-NITROTOLUENE	SW8330	mg/kg	0.028	ND	ND	ND	ND	ND	ND
3-NITROTOLUENE	SW8330	mg/kg	0.043	ND	ND	ND	ND	ND	ND
4-AMINO-2,6-DINITROTOLUENE	SW8330	mg/kg	0.022	ND	ND	ND	ND	ND	ND
4-NITROTOLUENE	SW8330	mg/kg	0.044	ND	ND	ND	ND	ND	ND
HEXAHYDRO-1,3,5-TRINITRO-1,3,5,7-TETRAZOCINE	SW8330	mg/kg	0.036	ND	ND	ND	ND	ND	ND
NITROBENZENE	SW8330	mg/kg	0.029	ND	ND	ND	ND	ND	ND
OCTAHYDRO-1,3,5,7-TETRANITRO-1,3,5,7-TETRAZOCINE	SW8330	mg/kg	0.129	ND	ND	ND	ND	ND	ND
TETRYL	SW8330	mg/kg	0.237	ND	ND	ND	ND	ND	ND

Notes:

Sample results reported on a dry weight basis.

- = not analyzed

MDL = Method Detection Limit

mg/kg = milligrams per kilogram

ND= not detected above MDL

This data is preliminary, as received from the analytical laboratory, and has not been verified or validated by Earth Tech. This data will be validated and verified for presentation in the final remedial investigation report.

Table A-13. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

Flare Site	Field Sample ID		SS-22		SS-22*		SS-22***	
	Sample Date		11/20/98		11/20/98		12/01/98	
Parameter		**Units**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**
Metals								
Antimony		mg/kg	1,470	600	666	48	-	-
Manganese		mg/kg	395	50.0	236	12.0	-	-
Potassium		mg/kg	ND	50,000	-	-	-	-
Arsenic		mg/kg	ND	1,000	9.9**	1.0**	-	-
Barium		mg/kg	74,100	40.0	76,600	160.0	-	-
Beryllium		mg/kg	ND	10.0	ND	4.0	-	-
Cadmium		mg/kg	ND	100	ND	4	-	-
Chromium		mg/kg	185	100	87.5	8	-	-
Cobalt		mg/kg	80.2	70.0	-	-	-	-
Copper		mg/kg	24,200	100	21,200	20	-	-
Lead		mg/kg	46,600	750	42,200/32,000**	40/5,000**	-	-
Molybdenum		mg/kg	ND	200	-	-	-	-
Nickel		mg/kg	ND	300	50.3	32	-	-
Selenium		mg/kg	ND	1,000	ND**	2.5**	-	-
Silver		mg/kg	ND	70.0	ND	8.0	-	-
Thallium		mg/kg	ND	1,000	ND**	2.5**	-	-
Vanadium		mg/kg	ND	100	-	-	-	-
Zinc		mg/kg	4,560	200	3,870	16	-	-
Nitrate as Nitrogen		mg/kg	3.21	1.0	ND	0.25	-	-
Nitrate/Nitrite as Nitrogen		mg/kg	4.56	1.0	1.3	0.25	-	-
Mercury		mg/kg	0.092	0.050	ND**	0.10**	-	-
Explosive Compounds								
PETN		mg/kg	ND	0.30	ND	0.50	-	-
HMX		mg/kg	ND	0.30	ND	0.25	-	-
Cyclonite (RDX)		mg/kg	ND	0.30	ND	0.25	-	-
1,3,5-Trinitrobenzene		mg/kg	ND	0.30	ND	0.25	-	-
1,3-Dinitrobenzene		mg/kg	ND	0.30	ND	0.25	-	-
Tetryl		mg/kg	ND	0.30	ND	0.25	-	-
Nitrobenzene		mg/kg	ND	0.30	ND	0.25	-	-
2,4,6-Trinitrotoluene (TNT)		mg/kg	ND	0.30	ND	0.25	ND	1.0
4-Amino-2,6-Dinitrotoluene		mg/kg	ND	0.30	ND	0.25	-	-
2-Amino-4,6-Dinitrotoluene		mg/kg	ND	0.30	ND	0.25	-	-
2,4-Dinitrotoluene		mg/kg	ND	0.30	ND	0.25	-	-
2,6-Dinitrotoluene		mg/kg	ND	0.30	ND	0.25	-	-
4-Nitrotoluene		mg/kg	ND	0.30	ND	0.25	-	-
3-Nitrotoluene		mg/kg	ND	0.30	ND	0.25	-	-
2-Nitrotoluene		mg/kg	ND	0.30	ND	0.25	-	-
Phosphate		mg/kg	17.1	0.500	18.1	10.0	-	-

Notes:

This data was collected by SECOR International, Inc. and has not been verified or validated by Earth Tech.

- = not analyzed

mg/kg = milligrams per kilogram

MDL = Method Detection Limit

ND = not detected above the method reporting limit

Notes regarding SS samples:

SS = soil sample

Samples collected from depths ranging from 2 to 5 inches below the ground surface.

Metals were analyzed for using EPA Method 6000 series.

Explosive compounds were analyzed for using EPA Method 8330.

*Second analysis of Sample SS-22.

** Samples analyzed using EPA Method 7000 series.

***Sample analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

Notes regarding FSS samples:

FSS = field screening soil sample

Soil samples not air dried

FSS analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

Source: SECOR International, Inc.

Table A-13. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

Flare Site	Field Sample ID	FSS-21		FSS-29	
	Sample Date	12/02/98		12/02/98	
Parameter	**Units**	**Result**	**MDL**	**Result**	**MDL**
Metals					
Antimony	mg/kg	-	-	-	-
Manganese	mg/kg	-	-	-	-
Potassium	mg/kg	-	-	-	-
Arsenic	mg/kg	-	-	-	-
Barium	mg/kg	-	-	-	-
Beryllium	mg/kg	-	-	-	-
Cadmium	mg/kg	-	-	-	-
Chromium	mg/kg	-	-	-	-
Cobalt	mg/kg	-	-	-	-
Copper	mg/kg	-	-	-	-
Lead	mg/kg	-	-	-	-
Molybdenum	mg/kg	-	-	-	-
Nickel	mg/kg	-	-	-	-
Selenium	mg/kg	-	-	-	-
Silver	mg/kg	-	-	-	-
Thallium	mg/kg	-	-	-	-
Vanadium	mg/kg	-	-	-	-
Zinc	mg/kg	-	-	-	-
Nitrate as Nitrogen	mg/kg	-	-	-	-
Nitrate/Nitrite as Nitrogen	mg/kg	-	-	-	-
Mercury	mg/kg	-	-	-	-
Explosive Compounds					
PETN	mg/kg	-	-	-	-
HMX	mg/kg	-	-	-	-
Cyclonite (RDX)	mg/kg	-	-	2.6	1.0
1,3,5-Trinitrobenzene	mg/kg	-	-	-	-
1,3-Dinitrobenzene	mg/kg	-	-	-	-
Tetryl	mg/kg	-	-	-	-
Nitrobenzene	mg/kg	-	-	-	-
2,4,6-Trinitrotoluene (TNT)	mg/kg	ND	1.0	ND	1.0
4-Amino-2,6-Dinitrotoluene	mg/kg	-	-	-	-
2-Amino-4,6-Dinitrotoluene	mg/kg	-	-	-	-
2,4-Dinitrotoluene	mg/kg	-	-	-	-
2,6-Dinitrotoluene	mg/kg	-	-	-	-
4-Nitrotoluene	mg/kg	-	-	-	-
3-Nitrotoluene	mg/kg	-	-	-	-
2-Nitrotoluene	mg/kg	-	-	-	-
Phosphate	mg/kg	-	-	-	-

Notes:

This data was collected by SECOR International, Inc. and has not been verified or validated by Earth Tech.

- = not analyzed

mg/kg = milligrams per kilogram

MDL = Method Detection Limit

ND = not detected above the method reporting limit

Notes regarding SS samples:

SS = soil sample

Samples collected from depths ranging from 2 to 5 inches below the ground surface.

Metals were analyzed for using EPA Method 6000 series.

Explosive compounds were analyzed for using EPA Method 8330.

*Second analysis of Sample SS-22.

** Samples analyzed using EPA Method 7000 series.

***Sample analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

Notes regarding FSS samples:

FSS = field screening soil sample

Soil samples not air dried

FSS analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

Source: SECOR International, Inc.

Table A-14. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

Fiare Site	Field Sample ID			FA1-.5	FA1-1	FA1-2	FA2-1	FA2-2	FA3-.5
	Sample Date			7/21/99	7/21/99	7/21/99	7/21/99	7/21/99	7/21/99
	Depth			0.5 - 1.0	1.0 - 1.5	2.0 - 2.5	1.0 - 1.5	2.0 - 2.5	0.5 - 1.0
Parameter	Method	Units	MDL						
ALUMINUM	SW6010B	mg/kg	2.91	23,000	18,000	17,000	17,000	18,000	31,000
ANTIMONY	SW6010B	mg/kg	0.502	ND	ND	ND	2.3	2.2	150
ARSENIC	SW6010B	mg/kg	0.559	16	14	16	15	13	18
BARIUM	SW6010B	mg/kg	0.560	190	190	190	290	220	3,400
BERYLLIUM	SW6010B	mg/kg	0.130	0.45	0.44	0.46	0.47	0.44	0.22
CADMIUM	SW6010B	mg/kg	0.057	0.091	ND	ND	0.12	ND	1.6
CALCIUM	SW6010B	mg/kg	6.41	4,700	4,900	4,300	4,000	4,100	3,600
CHROMIUM, TOTAL	SW6010B	mg/kg	0.162	54	45	48	45	51	110
COBALT	SW6010B	mg/kg	0.112	20	20	21	20	18	20
COPPER	SW6010B	mg/kg	0.445	69	67	77	100	100	8100
IRON	SW6010B	mg/kg	1.82	47,000	43,000	48,000	48,000	43,000	66,000
LEAD	SW6010B	mg/kg	0.437	11	29	21	110	110	7600
MAGNESIUM	SW6010B	mg/kg	7.00	7,500	7,100	7,300	7,400	8,300	11,000
MANGANESE	SW6010B	mg/kg	0.164	620	900	460	830	610	1100
MERCURY	SW7471A	mg/kg	0.0099	0.26	0.22	0.41	0.59	0.26	0.25
MOLYBDENUM	SW6010B	mg/kg	0.142	0.68	0.66	0.58	0.7	0.58	4.5
NICKEL	SW6010B	mg/kg	0.591	53	52	56	52	57	98
POTASSIUM	SW6010B	mg/kg	9.91	1,400	1,400	1,500	1,500	1,200	2,100
SELENIUM	SW6010B	mg/kg	0.464	1.1	1.1	1.2	1	1.1	1.1
SILVER	SW6010B	mg/kg	0.099	ND	ND	ND	ND	0.11	0.89
SODIUM	SW6010B	mg/kg	23.96	100	110	100	93	110	220
THALLIUM	SW6010B	mg/kg	0.741	ND	ND	ND	ND	ND	ND
VANADIUM	SW6010B	mg/kg	0.156	79	75	74	83	71	86
ZINC	SW6010B	mg/kg	0.622	91	100	100	270	240	2,000
1,2,3,4,6,7,8-HEPTACHLORODIBENZO-p-DIOXIN	SW8290	pg/g	0.25	-	-	-	-	-	34
1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	SW8290	pg/g	0.25	-	-	-	-	-	36
1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	SW8290	pg/g	0.25	-	-	-	-	-	3.4
1,2,3,4,7,8-HEXACHLORODIBENZO-p-DIOXIN	SW8290	pg/g	0.51	-	-	-	-	-	2.7
1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	SW8290	pg/g	0.29	-	-	-	-	-	37
1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	SW8290	pg/g	0.35	-	-	-	-	-	6.3
1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	SW8290	pg/g	0.25	-	-	-	-	-	13
1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	SW8290	pg/g	0.34	-	-	-	-	-	9.1
1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	SW8290	pg/g	0.34	-	-	-	-	-	0
1,2,3,7,8-PENTACHLORODIBENZO-p-DIOXIN	SW8290	pg/g	0.25	-	-	-	-	-	4.2
1,2,3,7,8-PENTACHLORODIBENZOFURAN	SW8290	pg/g	0.25	-	-	-	-	-	13
2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	SW8290	pg/g	0.35	-	-	-	-	-	20
2,3,4,7,8-PENTACHLORODIBENZOFURAN	SW8290	pg/g	0.35	-	-	-	-	-	26
2,3,7,8-TETRACHLORODIBENZO-p-DIOXIN	SW8290	pg/g	0.30	-	-	-	-	-	1.5
2,3,7,8-TETRACHLORODIBENZOFURAN	SW8290	pg/g	0.12	-	-	-	-	-	19
HEPTACHLORINATED DIBENZO-p-DIOXINS, (TOTAL)	SW8290	pg/g	0.067	-	-	-	-	-	76
HEPTACHLORINATED DIBENZOFURANS, (TOTAL)	SW8290	pg/g	0.0	-	-	-	-	-	57
HEXACHLORINATED DIBENZO-p-DIOXINS, (TOTAL)	SW8290	pg/g	0.0	-	-	-	-	-	110
HEXACHLORINATED DIBENZOFURANS, (TOTAL)	SW8290	pg/g	0.0	-	-	-	-	-	140
OCTACHLORODIBENZO-p-DIOXIN	SW8290	pg/g	0.99	-	-	-	-	-	69

Table A-14. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

Flare Site	Field Sample ID			FA1-.5	FA1-1	FA1-2	FA2-1	FA2-2	FA3-.5
	Sample Date			7/21/99	7/21/99	7/21/99	7/21/99	7/21/99	7/21/99
	Depth			0.5 - 1.0	1.0 - 1.5	2.0 - 2.5	1.0 - 1.5	2.0 - 2.5	0.5 - 1.0
Parameter	**Method**	**Units**	**MDL**						
OCTACHLORODIBENZOFURAN	SW8290	pg/g	0.5	-	-	-	-	-	9.9
PENTACHLORINATED DIBENZO-p-DIOXINS, (TOTAL)	SW8290	pg/g	0.49	-	-	-	-	-	83
PENTACHLORINATED DIBENZOFURANS, (TOTAL)	SW8290	pg/g	0.0	-	-	-	-	-	310
TETRACHLORINATED DIBENZO-p-DIOXINS, (TOTAL)	SW8290	pg/g	0.0	-	-	-	-	-	60
TETRACHLORINATED DIBENZOFURANS, (TOTAL)	SW8290	pg/g	0.0	-	-	-	-	-	490
ACENAPHTHENE	SW8310	mg/kg	0.01	ND	ND	ND	ND	ND	ND
ACENAPHTHYLENE	SW8310	mg/kg	0.01	ND	ND	ND	ND	ND	ND
ANTHRACENE	SW8310	mg/kg	0.004	ND	ND	ND	ND	ND	ND
BENZO(a)ANTHRACENE	SW8310	mg/kg	0.004	ND	ND	ND	ND	ND	ND
BENZO(a)PYRENE	SW8310	mg/kg	0.005	ND	ND	ND	ND	ND	ND
BENZO(b)FLUORANTHENE	SW8310	mg/kg	0.005	ND	ND	ND	ND	ND	ND
BENZO(g,h,i)PERYLENE	SW8310	mg/kg	0.004	ND	ND	ND	ND	ND	ND
BENZO(k)FLUORANTHENE	SW8310	mg/kg	0.003	ND	ND	ND	ND	ND	ND
CHRYSENE	SW8310	mg/kg	0.003	ND	ND	ND	ND	ND	ND
DIBENZ(a,h)ANTHRACENE	SW8310	mg/kg	0.002	ND	ND	ND	ND	ND	ND
FLUORANTHENE	SW8310	mg/kg	0.005	ND	ND	ND	ND	ND	ND
FLUORENE	SW8310	mg/kg	0.008	ND	ND	ND	ND	ND	ND
INDENO(1,2,3-c,d)PYRENE	SW8310	mg/kg	0.003	ND	ND	ND	ND	ND	ND
NAPHTHALENE	SW8310	mg/kg	0.008	ND	ND	ND	ND	ND	ND
PHENANTHRENE	SW8310	mg/kg	0.005	ND	ND	ND	ND	ND	ND
PYRENE	SW8310	mg/kg	0.004	ND	ND	ND	ND	ND	ND
1,3,5-TRINITROBENZENE	SW8330	mg/kg	0.083	ND	ND	ND	ND	ND	ND
1,3-DINITROBENZENE	SW8330	mg/kg	0.041	ND	ND	ND	ND	ND	ND
2,4,6-TRINITROTOLUENE	SW8330	mg/kg	0.090	ND	ND	ND	ND	ND	ND
2,4-DINITROTOLUENE	SW8330	mg/kg	0.064	ND	ND	ND	ND	ND	ND
2,6-DINITROTOLUENE	SW8330	mg/kg	0.044	ND	ND	ND	ND	ND	ND
2-AMINO-4,6-DINITROTOLUENE	SW8330	mg/kg	0.023	ND	ND	ND	ND	ND	ND
2-NITROTOLUENE	SW8330	mg/kg	0.028	ND	ND	ND	ND	ND	ND
3-NITROTOLUENE	SW8330	mg/kg	0.043	ND	ND	ND	ND	ND	ND
4-AMINO-2,6-DINITROTOLUENE	SW8330	mg/kg	0.022	ND	ND	ND	ND	ND	ND
4-NITROTOLUENE	SW8330	mg/kg	0.044	ND	ND	ND	ND	ND	ND
HEXAHYDRO-1,3,5-TRINITRO-1,3,5,7-TETRAZOCINE	SW8330	mg/kg	0.036	ND	ND	ND	ND	ND	ND
NITROBENZENE	SW8330	mg/kg	0.029	ND	ND	ND	ND	ND	ND
OCTAHYDRO-1,3,5,7-TETRANITRO-1,3,5,7-TETRAZOCINE	SW8330	mg/kg	0.129	ND	ND	ND	ND	ND	ND
TETRYL	SW8330	mg/kg	0.237	ND	ND	ND	ND	ND	ND

Notes:

Sample results reported on a dry weight basis.

- = not analyzed

MDL = Method Detection Limit

mg/kg = milligrams per kilogram

ND= not detected above MDL

pg/g = picogram per gram

This data is preliminary, as received from the analytical laboratory, and has not been verified or validated by Earth Tech. This data will be validated and verified for presentation in the final remedial investigation report.

Table A-15. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

Demolition Site #1	Field Sample ID	SS-24		FSS-24	
	Sample Date	11/20/98		12/02/98	
Parameter	**Units**	**Result**	**MDL**	**Result**	**MDL**
Metals					
Antimony	mg/kg	ND	6.00	-	-
Manganese	mg/kg	759	0.500	-	-
Potassium	mg/kg	1,770	500	-	-
Arsenic	mg/kg	14.7	10.0	-	-
Barium	mg/kg	173	0.400	-	-
Beryllium	mg/kg	0.778	0.100	-	-
Cadmium	mg/kg	ND	1.00	-	-
Chromium	mg/kg	46.4	1.00	-	-
Cobalt	mg/kg	14.6	0.700	-	-
Copper	mg/kg	48.9	1.00	-	-
Lead	mg/kg	12.7	7.50	-	-
Molybdenum	mg/kg	ND	2.00	-	-
Nickel	mg/kg	48.6	3.00	-	-
Selenium	mg/kg	ND	10.0	-	-
Silver	mg/kg	ND	0.700	-	-
Thallium	mg/kg	ND	10.0	-	-
Vanadium	mg/kg	63.0	1.00	-	-
Zinc	mg/kg	97.9	2.00	-	-
Nitrate as Nitrogen	mg/kg	9.16	1.00	-	-
Nitrate/Nitrite as Nitrogen	mg/kg	9.16	1.00	-	-
Mercury	mg/kg	0.12	0.500	-	-
Explosive Compounds					
PETN	mg/kg	ND	0.30	-	-
HMX	mg/kg	ND	0.30	-	-
Cyclonite (RDX)	mg/kg	ND	0.30	-	-
1,3,5-Trinitrobenzene	mg/kg	ND	0.30	-	-
1,3-Dinitrobenzene	mg/kg	ND	0.30	-	-
Tetryl	mg/kg	ND	0.30	-	-
Nitrobenzene	mg/kg	ND	0.30	-	-
2,4,6-Trinitrotoluene (TNT)	mg/kg	ND	0.30	ND	1.0
4-Amino-2,6-Dinitrotoluene	mg/kg	ND	0.30	-	-
2-Amino-4,6-Dinitrotoluene	mg/kg	ND	0.30	-	-
2,4-Dinitrotoluene	mg/kg	ND	0.30	-	-
2,6-Dinitrotoluene	mg/kg	ND	0.30	-	-
4-Nitrotoluene	mg/kg	ND	0.30	-	-
3-Nitrotoluene	mg/kg	ND	0.30	-	-
2-Nitrotoluene	mg/kg	ND	0.30	-	-
Phosphate	mg/kg	360	5.00	-	-

Notes:

This data was collected by SECOR International, Inc. and has not been verified or validated by Earth Tech.

- = not analyzed

mg/kg = milligrams per kilogram

MDL = Method Detection Limit

ND = not detected above the method reporting limit

Notes regarding SS samples:

SS = soil sample

Samples collected from depths ranging from 2 to 5 inches below the ground surface.

Metals were analyzed for using EPA Method 6000 series.

Explosive compounds were analyzed for using EPA Method 8330.

Notes regarding FSS samples:

FSS = field screening soil sample

Soil samples not air dried

FSS analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

Source: SECOR International, Inc.

Table A-15. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

Demolition Site #1	Field Sample ID	FSS-25		FSS-26		FSS-27	
	Sample Date	12/02/98		12/02/98		12/02/98	
Parameter	**Units**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**
Metals							
Antimony	mg/kg	-	-	-	-	-	-
Manganese	mg/kg	-	-	-	-	-	-
Potassium	mg/kg	-	-	-	-	-	-
Arsenic	mg/kg	-	-	-	-	-	-
Barium	mg/kg	-	-	-	-	-	-
Beryllium	mg/kg	-	-	-	-	-	-
Cadmium	mg/kg	-	-	-	-	-	-
Chromium	mg/kg	-	-	-	-	-	-
Cobalt	mg/kg	-	-	-	-	-	-
Copper	mg/kg	-	-	-	-	-	-
Lead	mg/kg	-	-	-	-	-	-
Molybdenum	mg/kg	-	-	-	-	-	-
Nickel	mg/kg	-	-	-	-	-	-
Selenium	mg/kg	-	-	-	-	-	-
Silver	mg/kg	-	-	-	-	-	-
Thallium	mg/kg	-	-	-	-	-	-
Vanadium	mg/kg	-	-	-	-	-	-
Zinc	mg/kg	-	-	-	-	-	-
Nitrate as Nitrogen	mg/kg	-	-	-	-	-	-
Nitrate/Nitrite as Nitrogen	mg/kg	-	-	-	-	-	-
Mercury	mg/kg	-	-	-	-	-	-
Explosive Compounds							
PETN	mg/kg	-	-	-	-	-	-
HMX	mg/kg	-	-	-	-	-	-
Cyclonite (RDX)	mg/kg	-	-	1.4	1.0	-	-
1,3,5-Trinitrobenzene	mg/kg	-	-	-	-	-	-
1,3-Dinitrobenzene	mg/kg	-	-	-	-	-	-
Tetryl	mg/kg	-	-	-	-	-	-
Nitrobenzene	mg/kg	-	-	-	-	-	-
2,4,6-Trinitrotoluene (TNT)	mg/kg	ND	1.0	ND	1.0	ND	1.0
4-Amino-2,6-Dinitrotoluene	mg/kg	-	-	-	-	-	-
2-Amino-4,6-Dinitrotoluene	mg/kg	-	-	-	-	-	-
2,4-Dinitrotoluene	mg/kg	-	-	-	-	-	-
2,6-Dinitrotoluene	mg/kg	-	-	-	-	-	-
4-Nitrotoluene	mg/kg	-	-	-	-	-	-
3-Nitrotoluene	mg/kg	-	-	-	-	-	-
2-Nitrotoluene	mg/kg	-	-	-	-	-	-
Phosphate	mg/kg	-	-	-	-	-	-

Notes:

This data was collected by SECOR International, Inc. and has not been verified or validated by Earth Tech.

- = not analyzed

mg/kg = milligrams per kilogram

MDL = Method Detection Limit

ND = not detected above the method reporting limit

Notes regarding SS samples:

SS = soil sample

Samples collected from depths ranging from 2 to 5 inches below the ground surface.

Metals were analyzed for using EPA Method 6000 series.

Explosive compounds were analyzed for using EPA Method 8330.

Notes regarding FSS samples:

FSS = field screening soil sample

Soil samples not air dried

FSS analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

Source: SECOR International, Inc.

Table A-16. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

Demolition Site #1	Field Sample ID			DA1-1-1	DA1-1-2	DA1-1-4	DA1-2 -.5	DA1-2-1	DA1-2-2	DA1-2-3.5
	Sample Date			7/21/99	7/21/99	7/21/99	7/21/99	7/21/99	7/21/99	7/21/99
	Depth			1.0 - 1.5	2.0 - 2.5	4.0 - 4.5	0.5 - 1.0	1.0 - 1.5	2.0 - 2.5	3.5 - 4.0
Parameter	**Method**	**Units**	**MDL**							
ALUMINUM	SW6010B	mg/kg	2.91	20,000	20,000	20,000	21,000	19,000	17,000	20,000
ANTIMONY	SW6010B	mg/kg	0.502	1.2	1.3	ND	ND	ND	2	0.66
ARSENIC	SW6010B	mg/kg	0.559	18	17	16	16	16	17	16
BARIUM	SW6010B	mg/kg	0.590	280	310	320	180	170	200	220
BERYLLIUM	SW6010B	mg/kg	0.130	0.46	0.47	0.49	0.34	0.33	0.34	0.46
CADMIUM	SW6010B	mg/kg	0.057	0.35	0.35	ND	0.22	0.21	0.45	ND
CALCIUM	SW6010B	mg/kg	6.41	4,500	4,300	4,300	3,700	3,800	3,800	4,100
CHROMIUM, TOTAL	SW6010B	mg/kg	0.162	51	50	52	55	51	51	52
COBALT	SW6010B	mg/kg	0.112	17	22	21	17	19	20	19
COPPER	SW6010B	mg/kg	0.445	99	85	69	59	59	88	75
IRON	SW6010B	mg/kg	1.82	48,000	43,000	47,000	46,000	42,000	46,000	45,000
LEAD	SW6010B	mg/kg	0.437	37	36	11	16	14	48	20
MAGNESIUM	SW6010B	mg/kg	7.00	7,500	7,000	7,900	7,900	8,000	7,200	7,400
MANGANESE	SW6010B	mg/kg	0.164	660	1,300	1,000	860	870	850	850
MERCURY	SW7471A	mg/kg	0.0099	0.12	0.081	0.049	0.067	0.078	0.18	0.046
MOLYBDENUM	SW6010B	mg/kg	0.142	0.86	0.62	0.64	0.67	0.85	0.96	0.84
NICKEL	SW6010B	mg/kg	0.591	52	57	58	54	56	55	58
POTASSIUM	SW6010B	mg/kg	9.91	2,400	2,800	1,700	1,600	1,700	1,900	2,300
SELENIUM	SW6010B	mg/kg	0.464	1.5	1.6	2	1	1.7	1.5	1.5
SILVER	SW6010B	mg/kg	0.099	ND	ND	ND	ND	0.13	0.21	ND
SODIUM	SW6010B	mg/kg	23.96	200	170	210	110	180	200	230
THALLIUM	SW6010B	mg/kg	0.741	ND	ND	ND	ND	ND	ND	ND
VANADIUM	SW6010B	mg/kg	0.156	79	78	79	77	71	74	77
ZINC	SW6010B	mg/kg	0.622	120	130	91	86	90	110	92
ACENAPHTHENE	SW8310	mg/kg	0.01	ND	ND	ND	ND	ND	ND	ND
ACENAPHTHYLENE	SW8310	mg/kg	0.01	ND	ND	ND	ND	ND	ND	ND
ANTHRACENE	SW8310	mg/kg	0.004	ND	ND	ND	ND	ND	ND	ND
BENZO(a)ANTHRACENE	SW8310	mg/kg	0.004	ND	ND	ND	ND	ND	ND	ND
BENZO(a)PYRENE	SW8310	mg/kg	0.005	ND	ND	ND	ND	ND	ND	ND
BENZO(b)FLUORANTHENE	SW8310	mg/kg	0.005	ND	ND	ND	ND	ND	ND	ND
BENZO(g,h,I)PERYLENE	SW8310	mg/kg	0.004	ND	ND	ND	ND	ND	ND	ND
BENZO(k)FLUORANTHENE	SW8310	mg/kg	0.003	ND	ND	ND	ND	ND	ND	ND
CHRYSENE	SW8310	mg/kg	0.003	ND	ND	ND	ND	ND	ND	ND
DIBENZ(a,h)ANTHRACENE	SW8310	mg/kg	0.002	ND	ND	ND	ND	ND	ND	ND
FLUORANTHENE	SW8310	mg/kg	0.005	ND	ND	ND	ND	ND	ND	ND
FLUORENE	SW8310	mg/kg	0.008	ND	ND	ND	ND	ND	ND	ND
INDENO(1,2,3-c,d)PYRENE	SW8310	mg/kg	0.003	ND	ND	ND	ND	ND	ND	ND
NAPHTHALENE	SW8310	mg/kg	0.008	ND	ND	ND	ND	ND	ND	ND
PHENANTHRENE	SW8310	mg/kg	0.005	ND	ND	ND	ND	ND	ND	ND
PYRENE	SW8310	mg/kg	0.004	ND	ND	ND	ND	ND	ND	ND
1,3,5-TRINITROBENZENE	SW8330	mg/kg	0.083	ND	ND	ND	ND	ND	ND	ND
1,3-DINITROBENZENE	SW8330	mg/kg	0.041	ND	ND	ND	ND	ND	ND	ND
2,4,6-TRINITROTOLUENE	SW8330	mg/kg	0.090	ND	ND	ND	ND	ND	ND	ND
2,4-DINITROTOLUENE	SW8330	mg/kg	0.064	ND	ND	ND	ND	ND	ND	ND

Table A-16. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

Demolition Site #1	Field Sample ID			DA1-1-1	DA1-1-2	DA1-1-4	DA1-2 -.5	DA1-2-1	DA1-2-2	DA1-2-3.5
	Sample Date			7/21/99	7/21/99	7/21/99	7/21/99	7/21/99	7/21/99	7/21/99
	Depth			1.0 - 1.5	2.0 - 2.5	4.0 - 4.5	0.5 - 1.0	1.0 - 1.5	2.0 - 2.5	3.5 - 4.0
Parameter	**Method**	**Units**	**MDL**							
2,6-DINITROTOLUENE	SW8330	mg/kg	0.044	ND	ND	ND	ND	ND	ND	ND
2-AMINO-4,6-DINITROTOLUENE	SW8330	mg/kg	0.023	ND	ND	ND	ND	ND	ND	ND
2-NITROTOLUENE	SW8330	mg/kg	0.028	ND	ND	ND	ND	ND	ND	ND
3-NITROTOLUENE	SW8330	mg/kg	0.043	ND	ND	ND	ND	ND	ND	ND
4-AMINO-2,6-DINITROTOLUENE	SW8330	mg/kg	0.022	ND	ND	ND	ND	ND	ND	ND
4-NITROTOLUENE	SW8330	mg/kg	0.044	ND	ND	ND	ND	ND	ND	ND
HEXAHYDRO-1,3,5-TRINITRO-1,3,5,7-TETRAZOCINE	SW8330	mg/kg	0.036	ND	ND	ND	ND	ND	ND	ND
NITROBENZENE	SW8330	mg/kg	0.029	ND	ND	ND	ND	ND	ND	ND
OCTAHYDRO-1,3,5,7-TETRANITRO-1,3,5,7-TETRAZOCINE	SW8330	mg/kg	0.129	ND	ND	ND	ND	ND	ND	ND
TETRYL	SW8330	mg/kg	0.237	ND	ND	ND	ND	ND	ND	ND

Notes:

Sample results reported on a dry weight basis.

MDL = Method Detection Limit

mg/kg = milligrams per kilogram

ND= not detected above MDL

This data is preliminary, as received from the analytical laboratory, and has not been verified or validated by Earth Tech. This data will be validated and verified for presentation in the final remedial investigation report.

Table A-17. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

Demolition Site #2	Field Sample ID	SS-23		FSS-22		FSS-23		FSS-28	
	Sample Date	11/20/98		12/02/98		12/02/98		12/02/98	
Parameter	Units	Result	MDL	Result	MDL	Result	MDL	Result	MDL
Metals									
Antimony	mg/kg	ND	6.00	-	-	-	-	-	-
Manganese	mg/kg	928	0.500	-	-	-	-	-	-
Potassium	mg/kg	2,260	500	-	-	-	-	-	-
Arsenic	mg/kg	16.8	10.0	-	-	-	-	-	-
Barium	mg/kg	206	0.400	-	-	-	-	-	-
Beryllium	mg/kg	0.821	0.100	-	-	-	-	-	-
Cadmium	mg/kg	ND	1.00	-	-	-	-	-	-
Chromium	mg/kg	50.4	1.00	-	-	-	-	-	-
Cobalt	mg/kg	20.6	0.700	-	-	-	-	-	-
Copper	mg/kg	55.1	1.00	-	-	-	-	-	-
Lead	mg/kg	25.8	7.50	-	-	-	-	-	-
Molybdenum	mg/kg	ND	2.00	-	-	-	-	-	-
Nickel	mg/kg	52.4	3.00	-	-	-	-	-	-
Selenium	mg/kg	ND	10.0	-	-	-	-	-	-
Silver	mg/kg	ND	0.700	-	-	-	-	-	-
Thallium	mg/kg	ND	10.0	-	-	-	-	-	-
Vanadium	mg/kg	71.1	1.00	-	-	-	-	-	-
Zinc	mg/kg	86.3	2.00	-	-	-	-	-	-
Nitrate as Nitrogen	mg/kg	11.6	1.00	-	-	-	-	-	-
Nitrate/Nitrite as Nitrogen	mg/kg	11.6	1.00	-	-	-	-	-	-
Mercury	mg/kg	0.21	0.050	-	-	-	-	-	-
Explosive Compounds									
PETN	mg/kg	ND	0.30	-	-	-	-	-	-
HMX	mg/kg	ND	0.30	-	-	-	-	-	-
Cyclonite (RDX)	mg/kg	ND	0.30	-	-	-	-	-	-
1,3,5-Trinitrobenzene	mg/kg	ND	0.30	-	-	-	-	-	-
1,3-Dinitrobenzene	mg/kg	ND	0.30	-	-	-	-	-	-
Tetryl	mg/kg	ND	0.30	-	-	-	-	-	-
Nitrobenzene	mg/kg	ND	0.30	-	-	-	-	-	-
2,4,6-Trinitrotoluene (TNT)	mg/kg	ND	0.30	ND	1.0	ND	1.0	ND	1.0
4-Amino-2,6-Dinitrotoluene	mg/kg	ND	0.30	-	-	-	-	-	-
2-Amino-4,6-Dinitrotoluene	mg/kg	ND	0.30	-	-	-	-	-	-
2,4-Dinitrotoluene	mg/kg	ND	0.30	-	-	-	-	-	-
2,6-Dinitrotoluene	mg/kg	ND	0.30	-	-	-	-	-	-
4-Nitrotoluene	mg/kg	ND	0.30	-	-	-	-	-	-
3-Nitrotoluene	mg/kg	ND	0.30	-	-	-	-	-	-
2-Nitrotoluene	mg/kg	ND	0.30	-	-	-	-	-	-
Phosphate	mg/kg	307	2.50	-	-	-	-	-	-

Notes:

This data was collected by SECOR International, Inc. and has not been verified or validated by Earth Tech.

- = not analyzed

mg/kg = milligrams per kilogram

MDL = Method Detection Limit

ND = not detected above the method reporting limit

Notes regarding SS samples:

SS = soil sample

Samples collected from depths ranging from 2 to 5 inches below the ground surface.

Metals were analyzed for using EPA Method 6000 series.

Explosive compounds were analyzed for using EPA Method 8330.

Notes regarding FSS samples:

FSS = field screening soil sample

Soil samples not air dried

FSS analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

Source: SECOR International, Inc.

Table A-18. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

Demolition Site #2	Field Sample ID			DA2-1-1	DA2-1-2	DA2-1-3.75	DA2-2-1	DA2-2-2	DA2-2-4
	Sample Date			7/21/99	7/21/99	7/21/99	7/21/99	7/21/99	7/21/99
	Depth			1.0 - 1.5	2.0 - 2.5	3.75 - 4.25	1.0 - 1.5	2.0 - 2.5	4.0 - 4.5
Parameter	**Method**	**Units**	**MDL**						
ALUMINUM	SW6010B	mg/kg	2.91	20,500	20,000	21,000	23,000	22,000	15,000
ANTIMONY	SW6010B	mg/kg	0.502	1.25	1	ND	ND	ND	0.78
ARSENIC	SW6010B	mg/kg	0.559	17	16	15	15.5	17	13
BARIUM	SW6010B	mg/kg	0.590	235	230	200	225	190	170
BERYLLIUM	SW6010B	mg/kg	0.130	0.53	0.48	0.49	0.525	0.46	0.35
CADMIUM	SW6010B	mg/kg	0.057	0.235	ND	ND	ND	ND	ND
CALCIUM	SW6010B	mg/kg	6.41	4,200	3,900	4,100	4,350	4,400	21,000
CHROMIUM, TOTAL	SW6010B	mg/kg	0.162	53	48	49	56	52	41
COBALT	SW6010B	mg/kg	0.112	23	20	20	19.5	18	16
COPPER	SW6010B	mg/kg	0.445	65.5	62	60	64	64	51
IRON	SW6010B	mg/kg	1.82	43,500	43,000	46,000	47,500	44,000	36,000
LEAD	SW6010B	mg/kg	0.437	23	11	11	14.5	31	14
MAGNESIUM	SW6010B	mg/kg	7.00	7,400	7,400	7,400	7,450	6,800	8,400
MANGANESE	SW6010B	mg/kg	0.164	1,250	1,100	1,000	855	830	840
MERCURY	SW7471A	mg/kg	0.0099	0.0845	0.036	0.037	0.084	0.1	0.069
MOLYBDENUM	SW6010B	mg/kg	0.142	0.74	0.8	0.62	0.81	0.68	0.58
NICKEL	SW6010B	mg/kg	0.591	62	54	52	57	54	49
POTASSIUM	SW6010B	mg/kg	9.91	2,500	2,900	1,900	2,000	2,400	1,500
SELENIUM	SW6010B	mg/kg	0.464	1.55	1.3	0.99	1.2	2.3	0.74
SILVER	SW6010B	mg/kg	0.099	ND	ND	ND	ND	ND	ND
SODIUM	SW6010B	mg/kg	23.96	175	170	120	230	230	230
THALLIUM	SW6010B	mg/kg	0.741	ND	ND	ND	ND	ND	ND
VANADIUM	SW6010B	mg/kg	0.156	77	78	79	86.5	81	60
ZINC	SW6010B	mg/kg	0.622	91	84	80	103.5	91	71
ACENAPHTHENE	SW8310	mg/kg	0.01	ND	ND	ND	ND	ND	ND
ACENAPHTHYLENE	SW8310	mg/kg	0.01	ND	ND	ND	ND	ND	ND
ANTHRACENE	SW8310	mg/kg	0.004	ND	ND	ND	ND	ND	ND
BENZO(a)ANTHRACENE	SW8310	mg/kg	0.004	ND	ND	ND	ND	ND	ND
BENZO(a)PYRENE	SW8310	mg/kg	0.005	ND	ND	ND	ND	ND	ND
BENZO(b)FLUORANTHENE	SW8310	mg/kg	0.005	ND	ND	ND	ND	ND	ND
BENZO(g,h,i)PERYLENE	SW8310	mg/kg	0.004	ND	ND	ND	ND	ND	ND
BENZO(k)FLUORANTHENE	SW8310	mg/kg	0.003	ND	ND	ND	ND	ND	ND
CHRYSENE	SW8310	mg/kg	0.003	ND	ND	ND	ND	ND	ND
DIBENZ(a,h)ANTHRACENE	SW8310	mg/kg	0.002	ND	ND	ND	ND	ND	ND
FLUORANTHENE	SW8310	mg/kg	0.005	ND	ND	ND	ND	ND	ND
FLUORENE	SW8310	mg/kg	0.008	ND	ND	ND	ND	ND	ND
INDENO(1,2,3-c,d)PYRENE	SW8310	mg/kg	0.003	ND	ND	ND	ND	ND	ND
NAPHTHALENE	SW8310	mg/kg	0.008	ND	ND	ND	ND	ND	ND
PHENANTHRENE	SW8310	mg/kg	0.005	ND	ND	ND	ND	ND	ND
PYRENE	SW8310	mg/kg	0.004	ND	ND	ND	ND	ND	ND
1,3,5-TRINITROBENZENE	SW8330	mg/kg	0.083	ND	ND	ND	ND	ND	ND
1,3-DINITROBENZENE	SW8330	mg/kg	0.041	ND	ND	ND	ND	ND	ND
2,4,6-TRINITROTOLUENE	SW8330	mg/kg	0.090	ND	ND	ND	ND	ND	ND
2,4-DINITROTOLUENE	SW8330	mg/kg	0.064	ND	ND	ND	ND	ND	ND
2,6-DINITROTOLUENE	SW8330	mg/kg	0.044	ND	ND	ND	ND	ND	ND
2-AMINO-4,6-DINITROTOLUENE	SW8330	mg/kg	0.023	ND	ND	ND	ND	ND	ND
2-NITROTOLUENE	SW8330	mg/kg	0.028	ND	ND	ND	ND	ND	ND

Table A-18. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

Demolition Site #2	Field Sample ID			DA2-1-1	DA2-1-2	DA2-1-3.75	DA2-2-1	DA2-2-2	DA2-2-4
	Sample Date			7/21/99	7/21/99	7/21/99	7/21/99	7/21/99	7/21/99
	Depth			1.0 - 1.5	2.0 - 2.5	3.75 - 4.25	1.0 - 1.5	2.0 - 2.5	4.0 - 4.5
Parameter	**Method**	**Units**	**MDL**						
3-NITROTOLUENE	SW8330	mg/kg	0.043	ND	ND	ND	ND	ND	ND
4-AMINO-2,6-DINITROTOLUENE	SW8330	mg/kg	0.022	ND	ND	ND	ND	ND	ND
4-NITROTOLUENE	SW8330	mg/kg	0.044	ND	ND	ND	ND	ND	ND
HEXAHYDRO-1,3,5-TRINITRO-1,3,5,7-TETRAZOCINE	SW8330	mg/kg	0.036	ND	ND	ND	ND	ND	ND
NITROBENZENE	SW8330	mg/kg	0.029	ND	ND	ND	ND	ND	ND
OCTAHYDRO-1,3,5,7-TETRANITRO-1,3,5,7-TETRAZOCINE	SW8330	mg/kg	0.129	ND	ND	ND	ND	ND	ND
TETRYL	SW8330	mg/kg	0.237	ND	ND	ND	ND	ND	ND

Notes:

Sample results reported on a dry weight basis.

MDL = Method Detection Limit

mg/kg = milligrams per kilogram

ND= not detected above MDL

This data is preliminary, as received from the analytical laboratory, and has not been verified or validated by Earth Tech. This data will be validated and verified for presentation in the final remedial investigation report.

Table A-19. Benicia Tourtelot Analytical Results of Soil (Unvalidated Data)

Demolition Site #3	Field Sample ID	SS-25		SS-25*		SS-26	
	Sample Date	11/20/98		11/20/98		11/20/98	
Parameter	**Units**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**
Metals							
Antimony	mg/kg	ND	6.00	-	-	ND	6.00
Manganese	mg/kg	589	0.500	-	-	735	0.500
Potassium	mg/kg	1,040	500	-	-	1,250	500
Arsenic	mg/kg	13.4	10.0	-	-	19.1	10.0
Barium	mg/kg	158	0.400	-	-	183	0.400
Beryllium	mg/kg	0.547	0.100	-	-	0.637	0.100
Cadmium	mg/kg	ND	1.00	-	-	ND	1.00
Chromium	mg/kg	26.4	1.00	-	-	38.1	1.00
Cobalt	mg/kg	13.7	0.700	-	-	13.8	0.700
Copper	mg/kg	44.8	1.00	-	-	49.9	1.00
Lead	mg/kg	24.9	7.50	-	-	12.9	7.50
Molybdenum	mg/kg	ND	2.00	-	-	ND	2.00
Nickel	mg/kg	24.6	3.00	-	-	34.0	3.00
Selenium	mg/kg	ND	10.0	-	-	ND	10.0
Silver	mg/kg	ND	0.700	-	-	ND	0.700
Thallium	mg/kg	ND	10.0	-	-	ND	10.0
Vanadium	mg/kg	67.6	1.00	-	-	76.2	1.00
Zinc	mg/kg	90.0	2.00	-	-	72.7	2.00
Nitrate as Nitrogen	mg/kg	3.00	1.00	-	-	ND	1.00
Nitrate/Nitrite as Nitrogen	mg/kg	3.75	1.00	-	-	ND	1.00
Mercury	mg/kg	0.90	0.050	-	-	0.39	0.043
Explosive Compounds							
PETN	mg/kg	ND	0.30	-	-	ND	0.30
HMX	mg/kg	ND	0.30	ND	0.25	ND	0.30
Cyclonite (RDX)	mg/kg	ND	0.30	ND	0.25	ND	0.30
1,3,5-Trinitrobenzene	mg/kg	ND	0.30	ND	0.25	ND	0.30
1,3-Dinitrobenzene	mg/kg	ND	0.30	ND	0.25	ND	0.30
Tetryl	mg/kg	ND	0.30	ND	0.25	ND	0.30
Nitrobenzene	mg/kg	ND	0.30	ND	0.25	ND	0.30
2,4,6-Trinitrotoluene (TNT)	mg/kg	ND	0.30	ND	0.25	ND	0.30
4-Amino-2,6-Dinitrotoluene	mg/kg	ND	0.30	ND	0.25	ND	0.30
2-Amino-4,6-Dinitrotoluene	mg/kg	ND	0.30	ND	0.25	ND	0.30
2,4-Dinitrotoluene	mg/kg	ND	0.30	ND	0.25	ND	0.30
2,6-Dinitrotoluene	mg/kg	ND	0.30	ND	0.25	ND	0.30
4-Nitrotoluene	mg/kg	ND	0.30	ND	0.25	ND	0.30
3-Nitrotoluene	mg/kg	ND	0.30	ND	0.25	ND	0.30
2-Nitrotoluene	mg/kg	ND	0.30	ND	0.25	ND	0.30
Phosphate	mg/kg	255	5.00	-	-	214	2.50

Notes:

This data was collected by SECOR International, Inc. and has not been verified or validated by Earth Tech.

- = not analyzed

mg/kg = milligrams per kilogram

MDL = Method Detection Limit

ND = not detected above the method reporting limit

Notes regarding SS samples:

SS = soil sample

Samples collected from depths ranging from 2 to 5 inches below the ground surface.

Metals were analyzed for using EPA Method 6000 series.

Explosive compounds were analyzed for using EPA Method 8330.

*Second analysis of Samples SS-25 and SS-26.

**Sample analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

FSS = field screening soil sample

Soil samples not air dried

FSS analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

Source: SECOR International, Inc.

Table A-19. Benicia Tourtelot Analytical Results of Soil (Unvalidated Data)

Demolition Site #3	Field Sample ID	SS-26**		SS-27		SS-27**		SS-28	
	Sample Date	12/01/98		11/20/98		12/01/98		11/20/98	
Parameter	**Units**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**
Metals									
Antimony	mg/kg	-	-	ND	6.00	-	-	ND	6.00
Manganese	mg/kg	-	-	614	0.500	-	-	448	0.500
Potassium	mg/kg	-	-	1,420	500	-	-	881	500
Arsenic	mg/kg	-	-	16.3	10.0	-	-	16.7	10.0
Barium	mg/kg	-	-	197	0.400	-	-	182	0.400
Beryllium	mg/kg	-	-	0.650	0.100	-	-	0.599	0.100
Cadmium	mg/kg	-	-	ND	1.00	-	-	ND	1.00
Chromium	mg/kg	-	-	28.4	1.00	-	-	27.8	1.00
Cobalt	mg/kg	-	-	23.1	0.700	-	-	13.5	0.700
Copper	mg/kg	-	-	59.1	1.00	-	-	44.6	1.00
Lead	mg/kg	-	-	27.4	7.50	-	-	12.7	7.50
Molybdenum	mg/kg	-	-	ND	2.00	-	-	ND	2.00
Nickel	mg/kg	-	-	31.8	3.00	-	-	27.0	3.00
Selenium	mg/kg	-	-	ND	10.0	-	-	ND	10.0
Silver	mg/kg	-	-	ND	0.700	-	-	ND	0.700
Thallium	mg/kg	-	-	ND	10.0	-	-	ND	10.0
Vanadium	mg/kg	-	-	78.6	1.00	-	-	77.2	1.00
Zinc	mg/kg	-	-	74.8	2.00	-	-	64.5	2.00
Nitrate as Nitrogen	mg/kg	-	-	4.13	1.00	-	-	ND	1.00
Nitrate/Nitrite as Nitrogen	mg/kg	-	-	4.13	1.00	-	-	ND	1.00
Mercury	mg/kg	-	-	0.861	0.200	-	-	0.455	0.050
Explosive Compounds									
PETN	mg/kg	-	-	ND	0.30	-	-	ND	0.30
HMX	mg/kg	-	-	ND	0.30	-	-	ND	0.30
Cyclonite (RDX)	mg/kg	-	-	ND	0.30	-	-	ND	0.30
1,3,5-Trinitrobenzene	mg/kg	-	-	ND	0.30	-	-	ND	0.30
1,3-Dinitrobenzene	mg/kg	-	-	ND	0.30	-	-	ND	0.30
Tetryl	mg/kg	-	-	ND	0.30	-	-	ND	0.30
Nitrobenzene	mg/kg	-	-	ND	0.30	-	-	ND	0.30
2,4,6-Trinitrotoluene (TNT)	mg/kg	ND	1.0	ND	0.30	ND	1.0	ND	0.30
4-Amino-2,6-Dinitrotoluene	mg/kg	-	-	ND	0.30	-	-	ND	0.30
2-Amino-4,6-Dinitrotoluene	mg/kg	-	-	ND	0.30	-	-	ND	0.30
2,4-Dinitrotoluene	mg/kg	-	-	ND	0.30	-	-	ND	0.30
2,6-Dinitrotoluene	mg/kg	-	-	ND	0.30	-	-	ND	0.30
4-Nitrotoluene	mg/kg	-	-	ND	0.30	-	-	ND	0.30
3-Nitrotoluene	mg/kg	-	-	ND	0.30	-	-	ND	0.30
2-Nitrotoluene	mg/kg	-	-	ND	0.30	-	-	ND	0.30
Phosphate	mg/kg	-	-	44.1	0.500	-	-	149	2.50

Notes:

This data was collected by SECOR International, Inc. and has not been verified or validated by Earth Tech.

- = not analyzed

mg/kg = milligrams per kilogram

MDL = Method Detection Limit

ND = not detected above the method reporting limit

Notes regarding SS samples:

SS = soil sample

Samples collected from depths ranging from 2 to 5 inches below the ground surface.

Metals were analyzed for using EPA Method 6000 series.

Explosive compounds were analyzed for using EPA Method 8330.

*Second analysis of Samples SS-25 and SS-26.

**Sample analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

FSS = field screening soil sample

Soil samples not air dried

FSS analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

Source: SECOR International, Inc.

Table A-19. Benicia Tourtelot Analytical Results of Soil (Unvalidated Data)

Demolition Site #3	Field Sample ID	SS-28*		SS-28**		SS-29		SS-29**	
	Sample Date	11/20/98		12/01/98		11/20/99		12/01/98	
Parameter	**Units**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**	**Result**	**MDL**
Metals									
Antimony	mg/kg	-	-	-	-	ND	6.00	-	-
Manganese	mg/kg	-	-	-	-	662	0.500	-	-
Potassium	mg/kg	-	-	-	-	1,560	500	-	-
Arsenic	mg/kg	-	-	-	-	17.2	10.0	-	-
Barium	mg/kg	-	-	-	-	190	0.400	-	-
Beryllium	mg/kg	-	-	-	-	0.650	0.100	-	-
Cadmium	mg/kg	-	-	-	-	ND	1.00	-	-
Chromium	mg/kg	-	-	-	-	32.1	1.00	-	-
Cobalt	mg/kg	-	-	-	-	14.7	0.700	-	-
Copper	mg/kg	-	-	-	-	53.3	1.00	-	-
Lead	mg/kg	-	-	-	-	28.6	7.50	-	-
Molybdenum	mg/kg	-	-	-	-	ND	2.00	-	-
Nickel	mg/kg	-	-	-	-	30.5	3.00	-	-
Selenium	mg/kg	-	-	-	-	ND	10.0	-	-
Silver	mg/kg	-	-	-	-	ND	0.700	-	-
Thallium	mg/kg	-	-	-	-	ND	10.0	-	-
Vanadium	mg/kg	-	-	-	-	73.1	1.00	-	-
Zinc	mg/kg	-	-	-	-	80.1	2.00	-	-
Nitrate as Nitrogen	mg/kg	-	-	-	-	4.50	1.00	-	-
Nitrate/Nitrite as Nitrogen	mg/kg	-	-	-	-	4.50	1.00	-	-
Mercury	mg/kg	-	-	-	-	2.17	0.200	-	-
Explosive Compounds									
PETN	mg/kg	-	-	-	-	ND	0.30	-	-
HMX	mg/kg	ND	0.25	-	-	ND	0.30	-	-
Cyclonite (RDX)	mg/kg	ND	0.25	-	-	ND	0.30	-	-
1,3,5-Trinitrobenzene	mg/kg	ND	0.25	-	-	ND	0.30	-	-
1,3-Dinitrobenzene	mg/kg	ND	0.25	-	-	ND	0.30	-	-
Tetryl	mg/kg	ND	0.25	-	-	ND	0.30	-	-
Nitrobenzene	mg/kg	ND	0.25	-	-	ND	0.30	-	-
2,4,6-Trinitrotoluene (TNT)	mg/kg	ND	0.25	ND	1.0	ND	0.30	ND	1.0
4-Amino-2,6-Dinitrotoluene	mg/kg	ND	0.25	-	-	ND	0.30	-	-
2-Amino-4,6-Dinitrotoluene	mg/kg	ND	0.25	-	-	ND	0.30	-	-
2,4-Dinitrotoluene	mg/kg	ND	0.25	-	-	ND	0.30	-	-
2,6-Dinitrotoluene	mg/kg	ND	0.25	-	-	ND	0.30	-	-
4-Nitrotoluene	mg/kg	ND	0.25	-	-	ND	0.30	-	-
3-Nitrotoluene	mg/kg	ND	0.25	-	-	ND	0.30	-	-
2-Nitrotoluene	mg/kg	ND	0.25	-	-	ND	0.30	-	-
Phosphate	mg/kg	-	-	-	-	233	2.50	-	-

Notes:

This data was collected by SECOR International, Inc. and has not been verified or validated by Earth Tech.

- = not analyzed

mg/kg = milligrams per kilogram

MDL = Method Detection Limit

ND = not detected above the method reporting limit

Notes regarding SS samples:

SS = soil sample

Samples collected from depths ranging from 2 to 5 inches below the ground surface.

Metals were analyzed for using EPA Method 6000 series.

Explosive compounds were analyzed for using EPA Method 8330.

*Second analysis of Samples SS-25 and SS-26.

**Sample analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

FSS = field screening soil sample

Soil samples not air dried

FSS analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

Source: SECOR International, Inc.

Table A-19. Benicia Tourtelot Analytical Results of Soil (Unvalidated Data)

Demolition Site #3	Field Sample ID		FSS-3		FSS-11	
	Sample Date		12/02/98		12/02/98	
Parameter		**Units**	**Result**	**MDL**	**Result**	**MDL**
Metals						
Antimony		mg/kg	-	-	-	-
Manganese		mg/kg	-	-	-	-
Potassium		mg/kg	-	-	-	-
Arsenic		mg/kg	-	-	-	-
Barium		mg/kg	-	-	-	-
Beryllium		mg/kg	-	-	-	-
Cadmium		mg/kg	-	-	-	-
Chromium		mg/kg	-	-	-	-
Cobalt		mg/kg	-	-	-	-
Copper		mg/kg	-	-	-	-
Lead		mg/kg	-	-	-	-
Molybdenum		mg/kg	-	-	-	-
Nickel		mg/kg	-	-	-	-
Selenium		mg/kg	-	-	-	-
Silver		mg/kg	-	-	-	-
Thallium		mg/kg	-	-	-	-
Vanadium		mg/kg	-	-	-	-
Zinc		mg/kg	-	-	-	-
Nitrate as Nitrogen		mg/kg	-	-	-	-
Nitrate/Nitrite as Nitrogen		mg/kg	-	-	-	-
Mercury		mg/kg	-	-	-	-
Explosive Compounds						
PETN		mg/kg	-	-	-	-
HMX		mg/kg	-	-	-	-
Cyclonite (RDX)		mg/kg	-	-	-	-
1,3,5-Trinitrobenzene		mg/kg	-	-	-	-
1,3-Dinitrobenzene		mg/kg	-	-	-	-
Tetryl		mg/kg	-	-	-	-
Nitrobenzene		mg/kg	-	-	-	-
2,4,6-Trinitrotoluene (TNT)		mg/kg	ND	1.0	ND	1.0
4-Amino-2,6-Dinitrotoluene		mg/kg	-	-	-	-
2-Amino-4,6-Dinitrotoluene		mg/kg	-	-	-	-
2,4-Dinitrotoluene		mg/kg	-	-	-	-
2,6-Dinitrotoluene		mg/kg	-	-	-	-
4-Nitrotoluene		mg/kg	-	-	-	-
3-Nitrotoluene		mg/kg	-	-	-	-
2-Nitrotoluene		mg/kg	-	-	-	-
Phosphate		mg/kg	-	-	-	-

Notes:

This data was collected by SECOR International, Inc. and has not been verified or validated by Earth Tech.

- = not analyzed

mg/kg = milligrams per kilogram

MDL = Method Detection Limit

ND = not detected above the method reporting limit

Notes regarding SS samples:

SS = soil sample

Samples collected from depths ranging from 2 to 5 inches below the ground surface.

Metals were analyzed for using EPA Method 6000 series.

Explosive compounds were analyzed for using EPA Method 8330.

*Second analysis of Samples SS-25 and SS-28.

**Sample analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

FSS = field screening soil sample

Soil samples not air dried

FSS analyzed using EnSys Soil Test System, Rapid Field Screen for TNT and RDX.

Source: SECOR International, Inc.

Table A-20. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

Demolition Site #3	Field Sample ID			DA3-1-1	DA3-1-2	DA3-1-4	DA3-2-.5	DA3-2-1	DA3-2-2	DA3-2-4
	Sample Date			7/21/99	7/21/99	7/21/99	7/21/99	7/21/99	7/21/99	7/21/99
	Depth			1.0 - 1.5	2.0 - 2.5	4.0 - 4.5	0.5 - 1.0	1.0 - 1.5	2.0 - 2.5	4.0 - 4.5
Parameter	**Method**	**Units**	**MDL**							
ALUMINUM	SW6010B	mg/kg	2.91	13,000	13,000	16,000	14,000	15,000	15,000	18,000
ANTIMONY	SW6010B	mg/kg	0.502	ND	ND	ND	ND	ND	ND	ND
ARSENIC	SW6010B	mg/kg	0.559	13	14	11	15	14	14	14
BARIUM	SW6010B	mg/kg	0.590	180	180	130	250	240	230	250
BERYLLIUM	SW6010B	mg/kg	0.130	0.17	0.16	ND	0.33	0.33	0.22	ND
CADMIUM	SW6010B	mg/kg	0.057	ND	0.12	ND	ND	ND	ND	ND
CALCIUM	SW6010B	mg/kg	6.41	2,400	2,900	2,400	2,600	2,700	3,000	3,100
CHROMIUM, TOTAL	SW6010B	mg/kg	0.162	31	34	29	41	41	40	40
COBALT	SW6010B	mg/kg	0.112	18	18	24	18	17	17	15
COPPER	SW6010B	mg/kg	0.445	42	64	37	41	39	50	30
IRON	SW6010B	mg/kg	1.82	40,000	42,000	43,000	45,000	41,000	42,000	48,000
LEAD	SW6010B	mg/kg	0.437	6.7	16	3.2	7.5	7.5	17	4.7
MAGNESIUM	SW6010B	mg/kg	7.00	3,600	4,100	5,700	3,400	3,500	4,400	6,100
MANGANESE	SW6010B	mg/kg	0.164	660	680	190	1,100	1,100	920	350
MERCURY	SW7471A	mg/kg	0.0099	1.8	2.1	0.02	0.044	0.076	0.65	0.046
MOLYBDENUM	SW6010B	mg/kg	0.142	0.37	0.7	0.32	0.44	0.44	0.43	0.34
NICKEL	SW6010B	mg/kg	0.591	23	28	22	33	33	35	31
POTASSIUM	SW6010B	mg/kg	9.91	1,300	1,300	450	1,500	1,400	1,300	800
SELENIUM	SW6010B	mg/kg	0.464	1.3	1.2	0.95	1.1	1.1	1.1	1.1
SILVER	SW6010B	mg/kg	0.099	ND	0.18	ND	ND	ND	ND	ND
SODIUM	SW6010B	mg/kg	23.96	83	71	140	55	44	86	110
THALLIUM	SW6010B	mg/kg	0.741	ND	ND	ND	ND	ND	ND	ND
VANADIUM	SW6010B	mg/kg	0.156	92	89	91	97	97	92	110
ZINC	SW6010B	mg/kg	0.622	55	74	66	55	58	75	66
ACENAPHTHENE	SW8310	mg/kg	0.01	ND	ND	ND	ND	ND	ND	ND
ACENAPHTHYLENE	SW8310	mg/kg	0.01	ND	ND	ND	ND	ND	ND	ND
ANTHRACENE	SW8310	mg/kg	0.004	ND	ND	ND	ND	ND	ND	ND
BENZO(a)ANTHRACENE	SW8310	mg/kg	0.004	ND	ND	ND	ND	ND	ND	ND
BENZO(a)PYRENE	SW8310	mg/kg	0.005	ND	ND	ND	ND	ND	ND	ND
BENZO(b)FLUORANTHENE	SW8310	mg/kg	0.005	ND	ND	ND	ND	ND	ND	ND
BENZO(g,h,I)PERYLENE	SW8310	mg/kg	0.004	ND	ND	ND	ND	ND	ND	ND
BENZO(k)FLUORANTHENE	SW8310	mg/kg	0.003	ND	ND	ND	ND	ND	ND	ND
CHRYSENE	SW8310	mg/kg	0.003	ND	ND	ND	ND	ND	ND	ND
DIBENZ(a,h)ANTHRACENE	SW8310	mg/kg	0.002	ND	ND	ND	ND	ND	ND	ND
FLUORANTHENE	SW8310	mg/kg	0.005	ND	ND	ND	ND	ND	ND	ND
FLUORENE	SW8310	mg/kg	0.008	ND	ND	ND	ND	ND	ND	ND
INDENO(1,2,3-c,d)PYRENE	SW8310	mg/kg	0.003	ND	ND	ND	ND	ND	ND	ND
NAPHTHALENE	SW8310	mg/kg	0.008	ND	ND	ND	ND	ND	ND	ND
PHENANTHRENE	SW8310	mg/kg	0.005	ND	ND	ND	ND	ND	ND	ND
PYRENE	SW8310	mg/kg	0.004	ND	ND	ND	ND	ND	ND	ND
1,3,5-TRINITROBENZENE	SW8330	mg/kg	0.083	ND	ND	ND	ND	ND	ND	ND
1,3-DINITROBENZENE	SW8330	mg/kg	0.041	ND	ND	ND	ND	ND	ND	ND
2,4,6-TRINITROTOLUENE	SW8330	mg/kg	0.090	ND	ND	ND	ND	ND	ND	ND
2,4-DINITROTOLUENE	SW8330	mg/kg	0.064	ND	ND	ND	ND	ND	ND	ND

Table A-20. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

Demolition Site #3	Field Sample ID			DA3-1-1	DA3-1-2	DA3-1-4	DA3-2-.5	DA3-2-1	DA3-2-2	DA3-2-4
	Sample Date			7/21/99	7/21/99	7/21/99	7/21/99	7/21/99	7/21/99	7/21/99
	Depth			1.0 - 1.5	2.0 - 2.5	4.0 - 4.5	0.5 - 1.0	1.0 - 1.5	2.0 - 2.5	4.0 - 4.5
Parameter	**Method**	**Units**	**MDL**							
2,6-DINITROTOLUENE	SW8330	mg/kg	0.044	ND	ND	ND	ND	ND	ND	ND
2-AMINO-4,6-DINITROTOLUENE	SW8330	mg/kg	0.023	ND	ND	ND	ND	ND	ND	ND
2-NITROTOLUENE	SW8330	mg/kg	0.028	ND	ND	ND	ND	ND	ND	ND
3-NITROTOLUENE	SW8330	mg/kg	0.043	ND	ND	ND	ND	ND	ND	ND
4-AMINO-2,6-DINITROTOLUENE	SW8330	mg/kg	0.022	ND	ND	ND	ND	ND	ND	ND
4-NITROTOLUENE	SW8330	mg/kg	0.044	ND	ND	ND	ND	ND	ND	ND
HEXAHYDRO-1,3,5-TRINITRO-1,3,5,7-TETRAZOCINE	SW8330	mg/kg	0.036	ND	ND	ND	ND	ND	ND	ND
NITROBENZENE	SW8330	mg/kg	0.029	ND	ND	ND	ND	ND	ND	ND
OCTAHYDRO-1,3,5,7-TETRANITRO-1,3,5,7-TETRAZOCINE	SW8330	mg/kg	0.129	ND	ND	ND	ND	ND	ND	ND
TETRYL	SW8330	mg/kg	0.237	ND	ND	ND	ND	ND	ND	ND

Notes:

Sample results reported on a dry weight basis.

MDL = Method Detection Limit

mg/kg = milligrams per kilogram

ND= not detected above MDL

This data is preliminary, as received from the analytical laboratory, and has not been verified or validated by Earth Tech. This data will be validated and verified for presentation in the final remedial investigation report.

Table A-21. Benicia Tourtelot Analytical Results for Water (Unvalidated Data)

Wetlands (Water Samples)	Field Sample ID / Sample Date		WS-1 12/04/98	WS-1 12/10/98	WS-2 12/04/98	WS-2 12/10/98
Parameter	**Units**	**MDL**				
Metals						
Antimony	mg/L	60.0	ND	ND	ND	ND
Manganese	mg/L	5.00	377	25.9	22.6	ND
Potassium	mg/L	5000	ND	ND	ND	ND
Arsenic	mg/L	100	ND	ND	ND	ND
Barium	mg/L	4.00	82.3	56.1	12.3	9.24
Beryllium	mg/L	1.00	ND	ND	ND	ND
Cadmium	mg/L	10.0	ND	ND	ND	ND
Chromium	mg/L	10.0	ND	ND	ND	ND
Cobalt	mg/L	7.00	ND	ND	ND	ND
Copper	mg/L	10.0	17.8	ND	11.8	ND
Lead	mg/L	75.0	ND	ND	ND	ND
Molybdenum	mg/L	20.0	ND	ND	ND	ND
Nickel	mg/L	30.0	ND	ND	ND	ND
Selenium	mg/L	100	ND	ND	ND	ND
Silver	mg/L	7.00	ND	ND	ND	ND
Thallium	mg/L	100	ND	ND	ND	ND
Vanadium	mg/L	10.0	11.1	ND	ND	ND
Zinc	mg/L	20.0	33.6	28.9	61.5	26.0
Nitrate as Nitrogen	mg/L	100	ND	-	338	-
Nitrate/Nitrite as Nitrogen	mg/L	100	ND	-	338	-
Mercury	mg/L	0.20	ND	ND	ND	ND
Explosive Compounds						
PETN	mg/L	1.50	ND	-	ND	-
HMX	mg/L	1.50	ND	-	ND	-
Cyclonite (RDX)	mg/L	1.50	ND	-	ND	-
1,3,5-Trinitrobenzene	mg/L	1.50	ND	-	ND	-
1,3-Dinitrobenzene	mg/L	1.50	ND	-	ND	-
Tetryl	mg/L	1.50	ND	-	ND	-
Nitrobenzene	mg/L	1.50	ND	-	ND	-
2,4,6-Trinitrotoluene (TNT)	mg/L	1.50	ND	-	ND	-
4-Amino-2,6-Dinitrotoluene	mg/L	1.50	ND	-	ND	-
2-Amino-4,6-Dinitrotoluene	mg/L	1.50	ND	-	ND	-
2,4-Dinitrotoluene	mg/L	1.50	ND	-	ND	-
2,6-Dinitrotoluene	mg/L	1.50	ND	-	ND	-
4-Nitrotoluene	mg/L	1.50	ND	-	ND	-
3-Nitrotoluene	mg/L	1.50	ND	-	ND	-
2-Nitrotoluene	mg/L	1.50	ND	-	ND	-
Phosphate	mg/L	50.0	85.3	-	95.4	-

Notes:

This data was collected by SECOR International, Inc. and has not been verified or validated by Earth Tech.

- = not analyzed

mg/L = micrograms per liter

ND = not detected above the method reporting limit

MDL = Method Detection Limit

Metals were analyzed for using EPA Method 6000/7000 Series.

Nitrate/Nitrite were analyzed for using EPA Method 353.2.

Total Phosphate was analyzed for using EPA Method 365.2.

Explosive compounds were analyzed for using EPA Method 8330.

Source: SECOR International, Inc.

Table A-22. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

Wetlands (Sediment Sample)	Field Sample ID			WET-1B
	Sample Date			7/21/99
	Depth			0 - 0.5
Parameter	**Method**	**Units**	**MDL**	
ALUMINUM	SW6010B	mg/kg	2.91	18,000
ANTIMONY	SW6010B	mg/kg	0.502	ND
ARSENIC	SW6010B	mg/kg	0.559	15
BARIUM	SW6010B	mg/kg	0.590	250
BERYLLIUM	SW6010B	mg/kg	0.130	0.35
CADMIUM	SW6010B	mg/kg	0.057	0.35
CALCIUM	SW6010B	mg/kg	6.41	4,700
CHROMIUM, TOTAL	SW6010B	mg/kg	0.182	45
COBALT	SW6010B	mg/kg	0.112	18
COPPER	SW6010B	mg/kg	0.445	120
IRON	SW6010B	mg/kg	1.82	44,000
LEAD	SW6010B	mg/kg	0.437	35
MAGNESIUM	SW6010B	mg/kg	7.00	6,200
MANGANESE	SW6010B	mg/kg	0.164	810
MERCURY	SW7471A	mg/kg	0.0099	1.3
MOLYBDENUM	SW6010B	mg/kg	0.142	0.69
NICKEL	SW6010B	mg/kg	0.591	45
POTASSIUM	SW6010B	mg/kg	9.91	2,100
SELENIUM	SW6010B	mg/kg	0.464	1
SILVER	SW6010B	mg/kg	0.099	ND
SODIUM	SW6010B	mg/kg	23.96	120
THALLIUM	SW6010B	mg/kg	0.741	ND
VANADIUM	SW6010B	mg/kg	0.156	85
ZINC	SW6010B	mg/kg	0.622	160
ACENAPHTHENE	SW8310	mg/kg	0.01	ND
ACENAPHTHYLENE	SW8310	mg/kg	0.01	ND
ANTHRACENE	SW8310	mg/kg	0.004	ND
BENZO(a)ANTHRACENE	SW8310	mg/kg	0.004	ND
BENZO(a)PYRENE	SW8310	mg/kg	0.005	ND
BENZO(b)FLUORANTHENE	SW8310	mg/kg	0.005	ND
BENZO(g,h,i)PERYLENE	SW8310	mg/kg	0.004	ND
BENZO(k)FLUORANTHENE	SW8310	mg/kg	0.003	ND
CHRYSENE	SW8310	mg/kg	0.003	ND
DIBENZ(a,h)ANTHRACENE	SW8310	mg/kg	0.002	ND
FLUORANTHENE	SW8310	mg/kg	0.005	ND
FLUORENE	SW8310	mg/kg	0.008	ND
INDENO(1,2,3-c,d)PYRENE	SW8310	mg/kg	0.003	ND
NAPHTHALENE	SW8310	mg/kg	0.008	ND
PHENANTHRENE	SW8310	mg/kg	0.005	ND
PYRENE	SW8310	mg/kg	0.004	ND
1,3,5-TRINITROBENZENE	SW8330	mg/kg	0.083	ND
1,3-DINITROBENZENE	SW8330	mg/kg	0.041	ND
2,4,6-TRINITROTOLUENE	SW8330	mg/kg	0.090	ND
2,4-DINITROTOLUENE	SW8330	mg/kg	0.064	ND

Table A-22. Benicia Tourtelot Analytical Results for Soil (Unvalidated Data)

Wetlands (Sediment Sample)	Field Sample ID			WET-1B
	Sample Date			7/21/99
	Depth			0 - 0.5
Parameter	**Method**	**Units**	**MDL**	
2,6-DINITROTOLUENE	SW8330	mg/kg	0.044	ND
2-AMINO-4,6-DINITROTOLUENE	SW8330	mg/kg	0.023	ND
2-NITROTOLUENE	SW8330	mg/kg	0.028	ND
3-NITROTOLUENE	SW8330	mg/kg	0.043	ND
4-AMINO-2,6-DINITROTOLUENE	SW8330	mg/kg	0.022	ND
4-NITROTOLUENE	SW8330	mg/kg	0.044	ND
HEXAHYDRO-1,3,5-TRINITRO-1,3,5,7-TETRAZOCINE	SW8330	mg/kg	0.036	ND
NITROBENZENE	SW8330	mg/kg	0.029	ND
OCTAHYDRO-1,3,5,7-TETRANITRO-1,3,5,7-TETRAZOCINE	SW8330	mg/kg	0.070	ND
TETRYL	SW8330	mg/kg	0.129	ND

Notes:

Sample results reported on a dry weight basis.

MDL = Method Detection Limit

mg/kg = milligrams per kilogram

ND= not detected above MDL

This data is preliminary, as received from the analytical laboratory, and has not been verified or validated by Earth Tech. This data will be validated and verified for presentation in the final remedial investigation report.

APPENDIX B

RESUMES

BRIAN D. WEITH — Project Manager

EDUCATION

B.S., Geology, Colorado State University, Fort Collins, 1985

TRAINING

EMS First Aid and CPR Training
NEPA Executive Overview Workshop
OSHA 8-Hour HAZWOPER Refresher Course
OSHA 40-Hour HAZWOPER Training Course
OSAH 8-Hour HAZWOPER Supervisor Training Course

PROFESSIONAL SUMMARY

Mr. Weith has over 10 years of experience in the investigation of all phases of unexploded ordnance/ordnance and explosives (UXO/OE) sites, geophysical surveys, geotechnical surveys, groundwater studies, and hazardous waste sites. He has been responsible for project planning, field implementation, supervision of personnel, quality control, and evaluation of field data for various projects throughout the western U.S. For the past 4 years, he has worked continuously on various programs for the U.S. Army Corps of Engineers (USACE), including UXO/OE engineering evaluation/cost analysis (EE/CA) investigations for the Former Buckley Bombing Range, Former Baywood Park Training Area and the Umatilla Chemical Depot Ammunition Demolition Activity Area, project manager for hazardous waste site investigations at the Defense Distribution Depot, Atchison Facility and the Defense Distribution Depot, Ogden. He has been involved with the Air Force Base Realignment and Closure (BRAC) program for 3 years as the Principal Investigator for all issues relating to geology and hydrology. For the past 10 years, he has been involved with geophysical, geotechnical and hydrological surveys of various sites. His broad background of experience has allowed him to gain a working knowledge of all phases of a variety of subsurface investigations and several sets of state and local regulations. The following is an overview of relevant project management experience.

- **Former Benicia Arsenal, Benicia, California.** Project manager for an EE/CA investigation to assess the risk UXO may present to the public. The project has high visibility with the public and an aggressive schedule to meet critical milestones for planned residential development on a portion of the property. The EE/CA investigation included developing a work plan, field investigation, coordinating with local residents, businessmen, and local governmental agencies, and producing a final EE/CA report that will document the findings of the field investigation, evaluate alternatives, and provide recommendations for risk management actions.

- **Former Buckley Bombing Range, Colorado.** Project Manager for an EE/CA investigation of the Former Buckley Bombing Range to assess the risk UXO may present to the public. The project had high visibility with the public and an aggressive schedule to meet critical milestones agreed upon between the state of Colorado and the USACE. The EE/CA investigation was phased between three investigative zones that were based on public need with multiple tasks to be accomplished within each zone. The project faced many technical challenges that had to be addressed in order to meet the critical milestones.

- **Defense Distribution Depot Ogden, Utah.** Project Manager for a hazardous waste site investigation. Several aboveground and underground storage tanks were investigated for possible leaks and releases of hazardous materials into the surrounding environment. The project included preparation of a Work Plan, Sampling Analysis Plan, and Quality Control

- Plan, field investigation of the sites, and preparation of an engineering report presenting the results of the investigation.

- **Defense Distribution Depot Oklahoma City, Oklahoma – Atchison Facility, Kansas.** Project Manager for a hazardous waste site investigation. The facility consisted of two large caves and outside support facilities that were used for the storage of various surplus items for Department of Defense. The project included preparation of a Work Plan, Sampling Analysis Plan, and Quality Control Plan, field investigation of the sites, and preparation of an engineering report presenting the results of the investigation. The project presented unique challenges because of the accessibility problems the caves presented for sampling equipment.

- **Former Baywood Park Training Area, California.** Deputy Manager for an EE/CA investigation of the Former Baywood Park Training Area to assess the risk UXO may present to the public. As deputy manager for the site, Mr. Weith was responsible for assisting the project manager in producing the work plan, managing field operations, tracking data, and producing the EE/CA report. The project presented several challenges concerning the protection of cultural and biological resources within the investigative area.

- **Closure of Abandoned Wells at Former Norton AFB, California.** Project Manager for overseeing the proper closure of historic agricultural wells, base production wells, and homestead wells at the Former Norton AFB. The project involved locating, abandoning, and documenting the closure of nearly 60 wells on the base. The process included overdrilling and/or drilling out the inside of old abandoned wells at the base. Once the field work was complete, detailed records of closure procedures were filed with the state and presented in a report.

EMPLOYMENT HISTORY

1994-present	Earth Tech, Project Geologist II
1989-1994	GeoSoils, Inc., Staff Geologist

CITIZENSHIP

United States

RICHARD A. BURZINSKI, REA, RG — Site Safety Coordinator/Field Team Leader

EDUCATION

BA, 1978, Geology, California State University, Sacramento, California

PROFESSIONAL CERTIFICATIONS AND REGISTRATIONS

Registered Geologist: California No. 5674, 1993
Certified Hydrogeologist: California No. 552, 1997
Registered Environmental Assessor: California No. 2642, 1991

AREAS OF EXPERTISE

Soil and groundwater contamination - Remedial Investigations/Feasibility Studies
Soil and groundwater remediation system design and implementation
Development of groundwater resources for mining, municipal and domestic concerns
Aquifer testing, hydrogeologic interpretation, aquifer characterization and groundwater flow modeling
Underground storage tank removal
California Senate Bill SB2004 requirements
Litigation support and deposition
Geotechnical and geophysical data collection and interpretation
Phase I environmental audits/preliminary site assessments for real estate transactions
Project cost estimates, proposal writing, project development and management
Class I, II and III disposal work

EXPERIENCE

Mr. Burzinski has over 18 years of experience in environmental and engineering geology, and hydrogeology. Mr. Burzinski serves as project manager and senior hydrogeologist in connection with selected projects. He is principally involved in project development, direct implementation or oversight, and project fruition with respect to soil and groundwater contamination investigation, aquifer characterization and remediation and all aspects of corrective action. Additional expertise includes all aspects of hydrogeologic and groundwater resource studies. Mr. Burzinski is trained according to OSHA Hazardous Waste Operations and Emergency Response Standards (29 CFR 1910.120). The following is a summary of recent experience related to water supply development, and soil and groundwater contamination investigations and compliance monitoring or remediation.

PROGRAM MANAGEMENT

Santa Clara Valley Transportation Authority Contract #950185, On-Call Environmental Services, San Jose, California. As the project and program manager for SCTVA Contract #950185 on-call environmental services, Mr. Burzinski ensured a rapid, high quality and cost effective response to the tasks which arose in this on-call services project. The scope included environmental services prior to and during construction of the Light Rail Extension from Great America Parkway in Santa Clara to Castro Street in Mountain View. In addition to managing the program, Mr. Burzinski performed major portions of the site assessment, investigation, remedial alternatives analysis and construction support activities. The following brief descriptions are indicative of the work conducted within this contract.

- ***1135 N. Mathilda Well Closures.*** Under SCVWD permit, abandoned 6 groundwater monitoring wells as part of Moffett Spur Light Rail Project.
- ***3331 N. 1st St. Geotechnical Pavement Evaluation.*** Geotechnical evaluation of parking lot pavement failures.
- ***860 West San Carlos Street UST Removal and Soil Treatment.*** Oversaw UST Tank removal, collected samples from the excavation and subsequently overexcavated pit. Conducted on-site

treatment of the lead impacted ex-situ soil with Pozzalonic ash, thus cost-effectively disposed as cover material at a Class II Landfill.

- ***Don Pedro Chaboya Bus Maintenance Facility Asbestos Investigation.*** Conducted Asbestos investigation of coving in work areas.

- ***Don Pedro Chaboya Bus Maintenance Facility Asbestos Remediation.*** Conducted Asbestos investigation and remediation of coving and back panels in restrooms.

- ***Don Pedro Chaboya Bus Maintenance Facility Regulatory Compliance Issues.*** Submitted letter request to RWQCB for reduction in groundwater monitoring and quarterly sampling requirements of site remediation system.

- ***Evelyn Station Underpass Geotechnical Soil Boring.*** Advanced soil boring to 85 feet depth at location of Evelyn Station Bridge Underpass to Joint Powers Board Rail Lines to determine hydrogeological and geotechnical considerations during construction.

- ***Highway 237 & Gold Street Wetland Mitigation.*** Investigated, sampled, analyzed, and interpreted results of fill material; resulting in the reclassification as concrete rubble construction material, thereby providing a significant cost saving for disposal of the material.

- ***Moffett Park Auto Repair Center Asbestos Survey.*** Conducted pre-demolition asbestos survey to determine take-out volumes for disposal of asbestos waste.

- ***Moffett SP Spur Track Groundwater Sampling.*** Conducted quarterly sampling of 13 wells distributed between Highway 101 and Whisman Avenue.

- ***North Coach Maintenance Division Facility – Hoist Removals.*** Performed confirmatory soil sample collection after hoist removals. Produced required Agency report.

- ***North Coach Maintenance Division Facility - Upgradient Groundwater Investigation.*** Performed groundwater investigation and determined that solvents detected in the shallow aquifer zone under the site were from upgradient source(s).

- ***Ron Cerone Bus Maintenance Facility Bus Wash.*** Emergency mobilization on site to determine genesis of water emanating from cracks in parking lot pavement. Sample collection and analyses to determine source and possible contamination release.

- ***Ron Cerone Bus Maintenance Facility Well Closures.*** Closed 8 groundwater monitoring wells under permit of SCVWD.

- ***State Highway 237 and Fair Oaks Boulevard Emergency Sampling.*** Within 30 minutes of telecommunication, visited Light Rail right-of-way excavation (while crew was standing by) to determine potential problem associated with uncovering of discolored soil and release of hydrocarbon odors. Tested area with OVM and collected soil samples for analyses on 24-hour turn-around.

- ***Tasman Corridor Light Rail Extension, Hydrologic Testing.*** Installed one temporary boring and performed slug tests on one temporary boring and two groundwater monitoring wells to estimate potential water infiltration during construction in a depressed area of the right-of-way. Recommended number of Baker tanks to be used for dewatering during construction.

City of San Francisco Department of Public Works, On-Call Environmental Services Contract, County of San Francisco, California. As the project and program manager for SFDPW Contract #169,098 on-call environmental services, Mr. Burzinski ensured a rapid, high quality and cost effective response to the tasks which arose in this on-call services project. The following brief descriptions are indicative of the work conducted within this contract.

- ***Port Soil Testing.*** Conducted soil sample collection, analyses, and characterization for disposal of 500 cubic yards of lead contaminated soil.

- ***Saint Mary's Square Parking Garage Remediation.*** Produced Corrective Action Plan and designed Soil Vapor Extraction Remediation System for soil and groundwater contamination resulting from past use of previously removed USTs.

- ***San Francisco Hospital Soil Investigation.*** Conducted subsurface investigation, soil sample collection and analyses to determine if 4 USTs could be closed in place.

SITE REMEDIATION

American National Can Company, Site Remediation, National Contract. Project Manager for field work for facility in Oakland, California. Directed remediation of the following: an underground storage tank (UST) previously containing gasoline; a UST previously containing bunker fuel; a UST containing acetone; an area of surface spillage of solvents; and, two areas registered as RCRA storage areas. Areas were closed by overexcavating impacted soils. 4000 tons of petroleum hydrocarbon impacted soil were off-hauled by truck to an in-state Class II landfill, 5500 tons of lead impacted soil were off-hauled by rail to an out-of-state Class I Non-RCRA landfill. 1300 tons of soil from the two RCRA units were off-hauled by truck to an in-state Class I RCRA landfill as listed waste. Regulatory involvement included the Alameda County Department of Environmental Health, the Bay Area Regional Water Quality Control Board, the Bay Area Air Quality Management District, the California EPA Department of Toxic Substances Control, and the City of Oakland Fire Department.

City of San Francisco Department of Public Works, Remediation, San Francisco, California. Produced Corrective Action Plan and designed Soil Vapor Extraction Remediation System for soil and groundwater contamination resulting from past use of previously removed USTs at Saint Mary's Square Parking Garage in San Francisco.

City of San Jose Redevelopment Agency, Soil Remediation, San Jose, California. Managed the excavation, loading, transporting and landfill disposal of over 6,000 cubic yards of petroleum hydrocarbon contaminated soil from the Century Center Parking Lot project.

Department of Defense, Remediation Workplan, Edwards Air Force Base, California. Developed and implemented soil remediation workplan for asphalt and tar impacted soil at Site 279, Edwards AFB, under DO-45.

E.A. Hathaway Company, Site Investigation and Remediation, Santa Clara, California. Investigation and remediation of shallow aquifer contaminated by petroleum fuel leak from USTs. Conducted groundwater extraction and treatment, followed by natural attenuation monitoring, culminating in RWQCB/SCVWD case closure.

Lincoln Property Company, Riverpark Development, Hydrogeologic Investigation, Groundwater Monitoring, and Remediation, San Jose, California. Investigation and remediation of □A□ aquifer and □B□ aquifer chlorinated solvent contamination by soil vapor extraction and groundwater extraction and treatment, respectively. Groundwater was extracted at 250 gpm, aerated, and discharged into the Guadalupe River under NPDES permit.

Nob Hill General Store, Inc., Site Investigation and Remediation, Nob Hill Family Park, Gilroy, California. Investigation, excavation and disposal of 500 yards of metals contaminated soils from unauthorized leach field french drain under oversight of RWQCB - Central Coast Region Clean-up and Abatement Order.

Ran-Rob Tool and Die, Solvent Remediation, Oakland, California. Site characterization resulting in engineered, designed, and installed groundwater extraction and remediation system for chlorinated solvents. Agencies involved were Alameda County Department of Environmental Health (*Workplan for Remediation,*

Site Health and Safety Plan, quarterly reporting) and East Bay Municipal Utility District (permit to discharge treated groundwater to the local POTW, quarterly reporting).

Santa Clara Valley Transportation Authority, Soil Remediation, San Jose, California. UST removal at 860 West San Carlos Street resulted in stockpiling of lead contaminated soil. Conducted on-site treatment of the lead impacted ex-situ soil with Pozzalonic ash, thus cost-effectively disposed as cover material at a Class II Landfill.

Sierra Constructors and Atkinson Engineering, Site Investigation and Remediation, Stanislaus County, California. Managed all on-site corrective action and remediation activities at 17 areas of fuel/oil contaminated soils. Excavated, and deployed to landfill, approximately 5,800 yards of soil. During the construction of the North Fork Stanislaus River Hydroelectric Project, 17 areas were impacted by site operations during the seven years of the project. Upon completion of remediation activities, a Soil Remedial Activities Report was produced and accepted as site closure by the CVRWQCB.

Stanford University, Soil Remediation, Palo Alto, California. Managed bioremediation of 500 cubic yards of excavated soils from two sites on campus (i.e.; Alvarado Row and Site 525) contaminated with a full range of petroleum hydrocarbons.

Tri-County Sand Blasting, Soil Remediation, Irvine, California. Installed Soil Vapor Extraction (SVE) Remediation System at petroleum LUFT facility in Irvine, consisting of a six well array coupled to an outside burner unit.

SOIL and/or GROUNDWATER CONTAMINATION INVESTIGATION

Al Silver Property, LUFT Subsurface Investigation, Mountain View, California. Managed LUFT subsurface investigation at a muffler shop to define lateral and vertical extent of soil and groundwater contamination from previously removed waste oil UST. Installed three groundwater monitoring wells to 35 feet. Determined site was impacted by Exxon facility upgradient.

A.P.C. International, Subsurface Investigation, San Jose, California. Managed subsurface investigation at Santa's Village in Scotts Valley. Advanced seven borings and constructed one trench. Defined lateral and vertical extent of soil contamination. Produced RI report with recommendations for remediation.

Apple City Investments, Subsurface LUFT Investigation, Watsonville, California. Project Manager for subsurface LUFT investigation at property in Watsonville to define extent of petroleum hydrocarbon contamination in soil and groundwater from previously removed UST. Installed three monitoring wells to 35 feet.

ARCO Mini Mart, LUFT Subsurface Investigation, San Carlos, California. Managed LUFT subsurface investigation at facility at Holly Street in San Carlos. Installed four groundwater monitoring wells and 12 soil borings; performed off-site investigations; performed aquifer tests; provided RI/FS report; produced corrective action plan (CAP).

Boeing Aero Space/NASA Ames Research Center, Soil Sampling, Mountain View, California. Managed soil sampling at Moffett Field NAS to determine extent of contamination of inorganic lead from paint in shallow soils. Collected shallow soil samples from over 200 locations.

Catering by Andre', LUFT Subsurface Investigation, Oakland, California. Managed LUFT subsurface investigation at 434 25th Street to define lateral and vertical extent of soil and groundwater contamination from historically removed UST. Installed three groundwater monitoring wells to 20 feet and 6 soil borings to 13 feet. Conducted quarterly monitoring.

Chrysler Corporation, Phase II Investigation, National Contract. Advanced 11 borings to the first encounter of groundwater and conducted Phase II subsurface soil and groundwater investigation of Recognized Environmental Conditions determined from previous Phase I ESA at Fireside Dodge in Modesto, California.

Chrysler Corporation, Phase II Investigation, National Contract. Advanced 6 borings to the first encounter of groundwater and conducted Phase II subsurface soil and groundwater investigation of Recognized Environmental Conditions determined from previous Phase I ESA at Timberline Dodge in Portland, Oregon.

Chrysler Corporation, Phase II Investigation, National Contract. Advanced 3 borings to the first encounter of groundwater and conducted Phase II subsurface soil and groundwater investigation of Recognized Environmental Conditions determined from previous Phase I ESA at Tonkin Dodge in Portland, Oregon.

City of Benecia/Ford Motor Company/Granite Management Company, Remedial Investigation/Feasibility Study, Tourtelot Property, Benecia Arsenal, Benecia, California. Subsurface soil and groundwater investigation of former military site and dumping ground where the arsenal tested, stored, and distributed military ordinance for over a century. Purpose of investigation (and subsequent remediation) is to allow developer to build 426 homes on the site. Investigation included trenching, hand auguring and subsurface soil sampling, seismic survey of depth to bedrock, surface soil and surface water sample collection, and groundwater monitoring well installation and groundwater sampling. Contaminants of concern were polynuclear aromatic hydrocarbons, metals, explosives, dioxin, nitroglycerine, and petroleum hydrocarbons. Major safety issue was unexploded ordinance.

City of San Jose Redevelopment Agency, High Technology Museum Site Subsurface Investigation. Groundwater contamination investigation at Guadalupe River Park Zone "B" west area; Children's Discovery Museum site. Installed three monitoring wells to 35' depth.

Coherent, Inc., Subsurface Investigation, Palo Alto, California. Managed subsurface investigation of solvent contamination at 5,100 Patrick Henry Drive in Santa Clara, California. Installed four groundwater monitoring wells and six soil borings to define vertical and lateral extent of soil and groundwater contamination.

Cord Associates, Groundwater Investigation, San Jose, California. Installed 6 groundwater monitoring wells to 20 feet to investigate subsurface conditions at "closed" LUST site at historic Stoffer Chemical Plant in San Jose.

Empire Waste Management, LUFT Subsurface Investigation, Santa Rosa, California. Managed LUFT subsurface investigation at recycling facility and administrative offices at 3400 Standish Avenue to define lateral and vertical extent of soil and groundwater contamination from previously removed USTs. Installed eight groundwater monitoring wells to 25 feet. Performed interim remediation and achieved case closure.

Empire Waste Management, Sensitive Receptor Survey, Santa Rosa, California. Conducted Sensitive Receptor Survey at surrounding vicinity of administrative offices at 3400 Standish Avenue in compliance with Sonoma County Department of Health Services in response to request for case closure of this LUFT site.

Gilroy Unified School District, Subsurface Investigation, Gilroy, California. Conducted subsurface investigation at transportation yard to explore possibility of soil and groundwater contamination from waste oil UST. Installed one 80 foot deep monitoring well.

Golden Rain Foundation, LUFT Subsurface Investigation, Rossmoor, California. Managed LUFT subsurface investigation to define lateral and vertical extent of potential soil and groundwater contamination from in-situ USTs at administrative buildings. Installed 10 soil borings to the first encounter of groundwater and 10 soil vapor probes to 8 feet.

Jim & Shirley Tibbs Property, LUFT Subsurface Investigation, Mountain View, California. Managed LUFT subsurface investigation at 980 Yuba Drive to define lateral and vertical extent of soil and groundwater contamination. Installed four groundwater monitoring wells to 80 feet and 3 soil borings to 40 feet. Achieved SCVWD case closure.

Kayo Oil Company, LUFT Investigation, California. Conducted subsurface investigation of Jet Gas Station in La Habra to determine existence of contamination from leaking product lines of USTs. Installed five monitoring wells to 40 feet.

Lincoln Property Company, Site Investigation, San Jose, California. Managed installation of 120-foot deep monitoring well into "C" aquifer at site, at intersection of Park Avenue and the Guadalupe River, by reverse air rotary, to determine if site solvent contamination had matriculated to deeper potable water supply aquifer; sampled groundwater and produced report.

Northern Trust of California, LUFT Subsurface Investigation, San Jose, California. Managed LUFT subsurface investigation at intersection of 10th Street and 13th Street in San Jose to define lateral and vertical extent of soil and groundwater contamination. Installed four groundwater monitoring wells to 40 feet and 3 soil borings to 25 feet. Conducted step-drawdown test, and constant discharge test at 5 gpm, to determine aquifer parameters. Conducted soil vapor extraction feasibility study.

Parlex Corporation, Soil Sampling, National Contract. Managed soil sampling at Dynaflex (computer board manufacturer) to determine existence/non-existence of soil contamination beneath concrete slab of wet processing area of facility in San Jose, California. Hand augured to 4.5 feet at four locations and collected shallow soil samples for volatile organics, semi-volatile organics, and metals.

Pieunte, et. al.; Law Offices, LUFT Subsurface Investigation, Mountain View, California. Managed LUFT subsurface investigation to define lateral and vertical extent of soil and groundwater contamination at 1001 N. Rengstorff. Installed six groundwater monitoring wells to 25 feet and 8 soil borings to 16 feet.

Radian International, LUST Investigations, California. As subconsultant to Radian, delineated extent of soil and groundwater contamination at 15 sites at Tracy Army Depot in Tracy and 15 sites at Sharpe Army Depot near Stockton, under the direction of the Army Corps of Engineers.

RAS Capital Corporation, Subsurface Investigation, California. Conducted subsurface investigation at a site in Benecia. Scope involved the preliminary determination of site contamination based on visual inspection of site, hand auguring at four locations, and soil chemical analyses.

Rusconi, Foster, Thomas, Van Keulen and Pipal - Attorneys (Rutherford Property), Site Investigation Fuel Leak, Morgan Hill, California. Investigation to define lateral and vertical extent of soil and groundwater contamination, at end of Tenant Avenue, due to LUST; under oversight of RWQCB - Central Coast. Installed five monitoring wells to 25' depth.

San Francisco International Airport (Contract 3183), Subsurface Investigation, San Francisco, California. Managed field work of $500,000 contract. Subsurface investigation of numerous sites at San Francisco International Airport involved hand auguring, soil boring advancement, soil and groundwater sample collection, soil gas survey of jet fuel pipeline, and analysis for metals, solvents, petroleum hydrocarbons and PCBs.

Stanford University, LUFT Subsurface Investigation, Palo Alto, California. Managed subsurface investigation to define lateral and vertical extent of soil contamination from ground surface waste oil degradation at Site 525. Defined extent and excavated impacted soils for ex-situ bioremediation.

Stapleton-Spence Packing Company, LUFT Investigation, San Jose, California. Site investigation at 7th Street facility for determination of extent of soil and groundwater contamination due to previously removed UST. Installed five monitoring wells to 25' depth.

Susan Gwynn/Nancy Stoverud Property, LUFT Subsurface Investigation, Palo Alto, California. Managed LUFT subsurface investigation at 830 E. Charleston Avenue to define lateral and vertical extent of soil and groundwater contamination. Installed three groundwater monitoring wells to 25 feet and 14 soil borings to 14 feet. Conducted quarterly monitoring. Produced Corrective Action Plan.

U.C. Berkeley, LUFT Subsurface Investigation, Berkeley, California. Managed LUFT subsurface investigation to define lateral and vertical extent of soil and groundwater contamination at administrative

offices at 2000 Carleton Street in Berkeley. Installed three groundwater monitoring wells to 20 feet and 3 soil borings to 10 feet.

Valley Waste Management, Phase II Investigation, Walnut Creek, California. Advanced 5 wells and 4 soil borings and conducted Phase II soil and groundwater investigation at Walnut Creek facility as post LUST case closure investigation.

Waste Management of Alameda County, LUFT Subsurface Investigation, California. Managed LUFT subsurface investigation at 3050 W. Winton Ave. in Hayward to define lateral and vertical extent of soil and groundwater contamination from previously removed USTs. Installed three groundwater monitoring wells to 35 feet and 16 soil borings to 20 feet. Conducted quarterly monitoring. Achieved case closure.

Wilbur Properties, LUFT Subsurface Investigation, Palo Alto, California. Managed LUFT subsurface investigation at 780 High Street to define lateral and vertical extent of soil and groundwater contamination resulting from both solvents and petroleum hydrocarbons from previously removed USTs. Installed four groundwater monitoring wells to 45 feet and 4 soil borings to 30 feet.

WOLCO Oil Company, Subsurface LUFT Investigation, San Jose, California. Managed subsurface LUFT investigation at its facility in San Jose to determine the presence or absence of contamination from existing USTs. Installed five soil borings to 10 feet and four monitoring wells to 20 feet.

REGULATORY PERMITTING

Adobe Corporation, Permitting, San Jose, California. Prepared *National Pollutant Discharge Elimination System (NPDES)* permit for Adobe Corporate Headquarters in San Jose.

City of San Jose Redevelopment Agency, Permitting, San Jose, California. Prepared the Site "A" property *National Pollutant Discharge Elimination System (NPDES)* permit.

County of Santa Clara Roads and Airports, Compliance Monitoring and Reporting, Palo Alto, California. Conducted POTW and NPDES compliance monitoring and reporting of Oregon Expressway underpass Pump Station discharges in Palo Alto.

Empire Waste Management, Permitting, Santa Rosa, California. Prepared the Santa Rosa facility *Spill Prevention Control and Countermeasures (SPCC) Plan.*

Nelcor Puritan Bennet, Permitting, National Contract. Prepared the Richmond facility *Stormwater Pollution Prevention Plan (SPPP).*

Oakland Children's Hospital, Federal Compliance, Oakland, California. Set up waste accumulation satellite stations at 29 individual testing laboratories associated with the hospital.

UNDERGROUND STORAGE TANK (UST) REMOVAL

American National Can Company, UST Removal, California. Managed removal one underground storage tank (UST) previously containing gasoline, one UST previously containing bunker fuel, and one UST containing acetone from a site in Oakland. The acetone UST was characterized as a RCRA listed waste.

Chem Central Western Division, UST Removals, National Contract. Emptied, made inert, and removed 40 USTs from tank farm at facility in Hayward. Collected confirmatory soil samples. USTs previously contained virgin RCRA product including MEK, toluene, xylene.

City of Redwood City, UST Removal, Redwood City, California. Oversight of removal of 10,000-gallon, fiberglass, double-walled UST and associated pipelines and dispenser island at administrative offices, collected confirmatory samples, and produced closure report. The UST and associated piping was certified as a non-RCRA hazardous waste solid following its removal and was transported to a facility in Richmond, California for disposal.

City of San Jose Redevelopment Agency, UST Removal, San Jose, California. Oversight of removal of UST at United Artist Theater site in downtown San Jose, collected confirmatory samples, and produced closure report.

Randell Graham, UST Removal, Bonny Doon, California. Oversight of removal of 500 gallon UST at private residence in Bonny Doon, collected confirmatory samples, and produced closure report.

Santa Clara Valley Transportation Authority, UST Removal, San Jose, California. Oversaw UST Tank removal at 860 West San Carlos Street. Collected samples from the excavation and subsequently overexcavated pit.

Susan Gwynn/Nancy Stoverud, UST Removals, California. Oversight of removal of tank farm consisting of 4 USTs at 830 Charleston Road in Palo Alto, collected confirmatory samples, and produced closure report.

Terminix International, UST Removal, National Contract. Oversight of removal of 5,000-gallon UST and associated pipelines at facility in Oakland, collected confirmatory samples, and produced closure report.

Waste Management of Alameda County, UST Removal, Oakland, California. Removed, from the main headquarters in Oakland, UST previously containing a wastewater and diesel/gasoline mixture, and transported off-site as a non-RCRA hazardous waste solid for recycling at Erickson's Richmond, California facility. Based on analytical chemical results of confirmatory soil samples collected, case closure was received from Alameda County Department of Health Services.

PHASE I ENVIRONMENTAL SITE ASSESSMENT – ASTM STANDARD

3M Company, Phase I ESA, National Contract. Conducted Phase I Environmental Site Assessment of facility on Otterson Drive in Chico, California preliminary to vacating the property.

Adobe Corporation, Phase I ESA, San Jose, California. Conducted Phase I Environmental Site Assessment of Adobe Corporate Headquarters at Adobe I-Adobe II Complex in San Jose preliminary to refinancing of expansion.

Apple Computer, Phase I ESAs, Santa Clara, California. Conducted Phase I Environmental Site Assessments at two facilities in Santa Clara preliminary to Client entering into lease renewal agreements.

Chrysler Corporation, Phase I ESA, National Contract. Conducted Phase I ESA at Fireside Dodge in Modesto, California, preliminary to dealership change-of-ownership.

Chrysler Corporation, Phase I ESA, National Contract. Conducted Phase I ESA at Crown Chevrolet in Dublin, California, preliminary to dealership change-of-ownership.

City of San Francisco, Phase I ESAs, San Francisco International Airport, California. Conducted Phase I Environmental Site Assessments at Plot 52, Lot DD, and Millbrae Viewing Lot as part of airport expansion.

City of San Jose Redevelopment Agency, Phase I ESA, San Jose, California. Conducted Phase I Environmental Site Assessment of 4-block area near Park and Gifford preliminary to property purchase.

City of San Jose Redevelopment Agency, Phase I ESA, San Jose, California. Conducted Phase I Environmental Site Assessment at 35 and 43 E. Santa Clara Street preliminary to property purchase.

City of San Jose Redevelopment Agency, Phase I ESA, San Jose, California. Conducted Phase I Environmental Site Assessment of 62-68 S. 2nd Street preliminary to property purchase.

City of San Jose Redevelopment Agency, Phase I ESA, San Jose, California. Conducted Phase I Environmental Site Assessment of 27 S. 1st Street preliminary to property purchase.

City of San Jose Redevelopment Agency, Phase I ESA, San Jose, California. Conducted Phase I Environmental Site Assessment of 3-block strip of Bellevue Avenue Corridor preliminary to property purchase.

DLR Group of Nebraska, Phase I ESA, California. Conducted Phase I Environmental Site Assessment at area in Mendota, California preliminary to property purchase and construction of prison facility.

GE Capital Supply, Phase I ESA, National Contract. Conducted Phase I Environmental Site Assessment of facility on Lindbergh Avenue in Livermore, California preliminary to property purchase.

Nelcor Puritan Bennett, Phase I ESA, National Contract. Conducted Phase I Environmental Site Assessment at facility in Hayward preliminary to property purchase.

Rockwell Semiconductor, Phase I ESA, Santa Clara, California. Conducted Phase I Environmental Site Assessments at one facility in Santa Clara preliminary to Client vacating lease.

Valley Waste Management, Phase I ESA, Walnut Creek, California. Conducted Phase I Environmental Site Assessment at Walnut Creek facility as post LUST case closure investigation.

GROUNDWATER WELL CLOSURE

Apple Computer, Well Closures, California. Managed the closures, under permit from Napa County Department of Health Services, of three 35 foot deep groundwater monitoring wells at Apple's Napa Data Center at 2500 Corporate Drive in Napa.

City of Redwood City, Well Closures, Redwood City, California. Managed the well closure, under permit from San Mateo County Department of Health Services, of three 25 foot deep and three 45 foot deep groundwater monitoring wells at the Jefferson Street Parking Structure.

City of San Jose Redevelopment Agency, Well Closure, San Jose, California. Managed the well closures, under permit from SCVWD, of two 25 foot deep wells at San Jose Repertory Theater.

Santa Clara Valley Transportation Authority, Well Closures, San Jose, California. Under SCVWD permit, abandoned 6 groundwater monitoring wells at 1135 N. Mathilda as part of Moffett Spur Light Rail Project.

Santa Clara Valley Transportation Authority, Well Closures, San Jose, California. Closed 8 groundwater monitoring wells at Ron Cerone Bus Maintenance Facility under permit of SCVWD.

Waste Management of Alameda County, Well Closure, California. Managed the pump removal and well closure, under permit from Zone 7 Water District, of one 650 foot deep (i.e.; Newark Aquifer), old agricultural well at 3050 W. Winton Ave. in Hayward.

GEOTECHNICAL INVESTIGATION

Failure Analysis Associates, Palo Alto, California. Trained and supervised FAA personnel in conducting tracer test at private residence to determine direction of water penetration in shallow soils, using fluorescein dye.

Fantozzi Company of Cupertino, Geological and Geotechnical Investigation, California. Conducted field mapping, trenching, and borehole logging and generated geologic portions of report for Bay Area Teleport Facility, Niles Canyon.

Santa Clara Valley Transportation Authority, San Jose, California. Advanced soil boring to 85 feet depth at location of Evelyn Station Bridge Underpass to Joint Powers Board Rail Lines to determine hydrogeological and geotechnical considerations during construction.

Victory Outreach Church, Feasibility Study, San Jose, California. Conducted study, using Kirkee's Method, to determine if soils at Santa Clara County property had permeability suitable for construction of a septic tank and leach field.

WATER RESOURCES DEVELOPMENT

City of Palo Alto, Water Resources Development, Palo Alto, California. Managed installation of 10-inch diameter Duck Pond water supply well by mud rotary method to 220 feet deep. Conducted step-drawdown test, and constant discharge test at 80 gpm for 24 hours. Rated well and sized pump.

City of San Jose Redevelopment Agency, Water Resources Investigation, San Jose, California. Installed borings and performed slug tests at Lots 2 & 4 to estimate potential water infiltration during construction for subterranean portion of proposed parking garage.

City of San Jose Redevelopment Agency, Water Resources Development, San Jose, California. Conducted initial study of water availability and quality for industrial development site at Monterey Road and State Highway 85 in San Jose.

Cyprus Mines Corporation of Colorado, Water Resources Development, Bruno Creek, Idaho. Field mapping. Drilled 500 foot water supply production well. Conducted step-drawdown test, and constant discharge test at 4,000 gpm for 7 days. Monitored 11 observation points during pumping.

Cyprus Mines Corporation of Colorado, Water Resources Development, Thompson Creek, Idaho. Field mapping. Drilled to 1,300 feet and intersected molybdenite bearing quartz monzonite intrusive of Idaho Batholith. Conducted step-drawdown test, and constant discharge test at 150 gpm for 72 hours. Produced report on Water Supply Exploration Drilling Program - Thompson Creek Project (Idaho) - Buckskin Creek Area.

Cyprus Mines Corporation of Colorado, Water Resources Development, Idaho. Managed field office for Thompson Creek Project. Developed water supply for Crusherman Plant, Concentrator Plant, and 700 person man-camp. Man-camp water supply well rated at 250 gpm. Conducted geothermal research near Challis, Idaho.

Cyprus Mines Corporation of Colorado, Water Resources Development, Idaho. Conducted field mapping, drilling to depths of 700', aquifer testing and production of report titled "Groundwater Exploration Drilling and Testing Program - Thompson Creek Project, Bruno Creek Area."

Cyprus Mines Corporation of Colorado, Water Resources Development, Idaho. Conducted drilling of water supply production well to 1,178'. Conducted step drawdown and constant discharge test. Tested well at 4,000 gpm for eight days. Monitored 11 observation points during pumping. Produced report titled "Production Well No. 1 - Construction and Testing - Thompson Creek Project."

Department of Defense, North Muroc Hydrogeologic Study, Edwards Air Force Base, California. Supervised the borehole advancement and 3-well nested, stainless steel construction at two groundwater monitoring well locations at Edwards AFB northern boundary under DO-42. Total depth of each hole was 500 feet; both by mud rotary; one continuously sampled using wire line sampler.

Environmental Management Consultants, EIR, Monterey, California. Responsible for the hydrogeologic contribution to an EIR for Hilltop Properties in Watsonville, California.

Greegan & D'Angelo, Water Resources Investigation, Pleasanton, California. Produced hydrogeologic, groundwater supply assessment, and environmental contamination assessment portions of pre-purchase site assessment report for Hayes Valley.

San Jose State University, Water Resources Development, San Jose, California. Managed construction of 12-inch diameter potable water supply well by mud rotary method to 660 feet deep. Well is located on campus. Conducted step-drawdown test, and constant discharge test at 1,200 gpm for 24 hours. Interpreted borehole geophysical logs. Rated well and sized pump.

United Technologies Chemical Division, Water Resources Development, Coyote Facility, San Jose, California. Managed installation of 10-inch diameter, 200 gpm, fire control groundwater supply well by cable tool method to 150-foot deep. Conducted step-drawdown test, and constant discharge test at 150 gpm for 36 hours. Rated well and sized pump.

PROFESSIONAL MEMBERSHIPS

Groundwater Resources Association of California

PRESENTATIONS, PUBLICATIONS, AND AWARDS

Presentations

Seminar on Geotechnical and Geoenvironmental Exploration, San Jose, California, August 8, 1985. *Using Electrical Resistivity to Differentiate Zones of Varying Total Dissolved Solids (TDS) in Groundwater.*

Awards

National Science Foundation Grant, 1977. Received grant to conduct geothermal research in Nevada under the guidance of the United States Geological Survey (USGS) out of Menlo Park, California.

University of Wisconsin; Extension; Department of Engineering and Applied Science; Educational Achievement; Groundwater Quality Protection, March 22-24, 1982.

STEVEN P. CLAY — Senior Project Manager-CWM Safety Specialist

EDUCATION

B.S., Chemical Engineering
Certified Industrial hygienist
14 years of Industrial Hygiene experience
Certified Safety Professional
11 years as Project Manager
7 years experience on UXO/CWM Projects

Years Experience with Proposing Firm: 14 years of Industrial Hygiene consulting service, 11 years of Project Management experience, 7 years engineering consultant on UXO and CWM projects

Educational Information (Degrees, years of completion, and specialization):

- B.S., University of Tulsa, 1985, Chemical Engineering
- Graduate Studies, Oklahoma State University, 1985-86, Organic Chemistry

PROFESSIONAL TRAINING

Hazardous Waste Operations Site Health & Safety (40 hour course)
Hazardous Waste Operations Site Health & Safety Supervisor (8 hour course)
Chemical Protection Practical Use in Hazardous Waste Operations and Emergency Response
Occupational and Environmental Air Monitoring at Hazardous Waste Sites
Developing Site-Specific Safety and Health Plans for Hazardous Waste Site Operation
Fundamentals of Indoor Air Quality

Active Registration (Year First Registered & Discipline):

- Certified Industrial Hygienist (CIH), Certified in Comprehensive Practice, Certificate No. 5696, 12/92
- Certified Safety Professional (CSP), Certified in Comprehensive Practice, Certificate No. 15261, 01/98

Health & Safety Training (Course(s) & Date(s) of Completion):

- 8-Hour OSHA 29 CFR 1910.120(e)(4) Refresher – 06/98
- 40-Hour OSHA CFR 1910.120(e)(3) – 01/91 & 02/95

8-Hour Supervisor OSHA CFR 1910.120(e)(3) – 01/91 & 02/95

EXPERIENCE AND QUALIFICATIONS

Mr. Clay has 10 years of project management and technical services experience. Mr. Clay has been providing engineering project design and management for UXO and Chemical Warfare Materiel projects for over 5 years. He has been developing and enforcing site specific safety and health plans for ordnance/ explosive waste and chemical warfare material sites throughout the U.S. for 7 years. Mr. Clay performs direct project management for CWM and Ordnance projects. Responsibilities include management, planning, financial control, subcontractor management and coordination. Specific responsibilities include the management and technical design of UXO, demining, and CWM projects. Experienced in management and design of UXO/CWM programs (including Non-Stockpile Support Services, Small Burials, U.S. Army Corps of Engineers – Huntsville CONUS, and many confidential international client contracts).

Civilian Experience:

1999 - Present **Project Manager/ CWM Safety Specialist,** Earth Tech, Inc. Colton, CA. Provides project management, engineering design, and Health & Safety Program/Plan development for UXO and Chemical Warfare Materiel cleanup projects. Specific responsibilities include the management and technical design of UXO and CWM projects including planning, financial control, and coordination.

1992 - 1999 **Manager of Industrial Hygiene and Safety,** UXB International, Inc., Ashburn, VA. Provides engineering project management on all UXO and CWM projects requiring specialized control measures. Responsible for the direct management of Site Safety and Health Officers at all UXB OEW, CWM, or HTRW project sites. Responsibilities include management, planning, financial control, and coordination. Specific responsibilities include the management and technical design of UXO, demining, and CWM projects. Experienced in management and design of all UXB UXO/CWM programs (including Non-Stockpile Support Services, Small Burials, U.S. Army Corps of Engineers – Huntsville CONUS, and many confidential international client contracts). Position requires complete technical and management coordination of all of UXB's projects. Key interface between design and work prosecution. Provides technical guidance to the UXB President, senior management, and Technical Design Engineering Group regarding specialized control measures, industrial hygiene and health & safety issues.

The Senior Project Manager - Maui Technical Office - responsible for directing work activities as outlined in the contract and the associated task orders for UXO, historic preservation, construction, environmental operations and related actions. Duties include ensuring that the statement of work and the individual task orders and their inclusive project plans and specifications can be implemented within schedule and budget; recommending and justifying modifications; developing or modifying methods of tracking materials and resources; coordinating subcontractor work; and complying with health and safety procedures, the Regulatory Framework and Site Protection Plan requirements.

1990 - 1998 **Vice President, Senior Project Manager,** Clay, Sovich Environmental, Inc., Manassas, VA. Responsibilities include management, planning, financial control, and coordination of all aspects of Clay, Sovich Environmental (CSE). Specific responsibilities include the management and technical design of Environmental Remediation Projects, UXO, and CWM projects. A list of UXO & CWM projects is included in *Scientific And Technical Accomplishments*. Position requires complete technical and management coordination of all of CSE projects. Responsible for establishing corporate policy to include development and supervision of employee training programs. Responsible for the management of up to 20 projects simultaneously and all field personnel. As an environmental engineering consultant and project manager, developed remediation work plans and site-specific safety & health plans (SSHP), and Site Specific Health & Emergency Response Plans (SHERP) for varied site activities, such as ammunition plants, buried ordnance removal and chemical weapons removal. Also hazardous communication plans and hazardous waste disposal plans for individual sites and specialized conditions. Performed Phase I Environmental Assessments in Virginia and Texas. The assessments included review of National Priority List (NPL),

Comprehensive Environmental Response Compensation Liability Information System (CERCLIS), Toxic Release Inventory (TRI), Resource Conservation and Recovery Act (RCRA), Underground Storage Tank (UST), and Leaking Underground Storage Tank (LUST) records and state water control board files. Federal file information was confirmed by interviews with the U.S. Environmental Protection Agency (EPA) regional managers.

Performed asbestos building inspections and assessments for the Virginia Department of Transportation to the Virginia Museum of Fine Arts, to the Medical College of Virginia, as well as numerous commercial clients. The inspections were performed in strict compliance with all Federal (AHERA and National Emissions Standards Hazardous Air Pollutants (NESHAP)), state, and local requirements for projects requiring renovation, demolition, or refinancing.

Provided asbestos, lead, and polychlorinated biphenyl (PCB) abatements, including remediation design and oversight. Additional responsibilities included air monitoring and subsequent analysis, development of remediation specifications, as well as project coordination involving the building owner, the removal contractor, and other trades.

Provided indoor air quality assessments and assessment design and air testing, designed remediation action to alleviate harmful conditions. Projects ranged from military installations (Pentagon), schools, industrial, and commercial sites. Additional responsibilities included air monitoring and subsequent analysis, development of safety and health plans, as well as project coordination.

1988 - 1990 **Senior Environmental Engineer, Asbestos Division Manager,** Espey, Huston and Associates, Inc., Falls Church, VA. As division manager for the asbestos department, Provided management of 6 person department. Performed project management on all asbestos, lead, and PCB remediation and inspection projects on the east coast Responsibilities include management, planning, financial control, and coordination. Led asbestos survey project of 15 shopping centers throughout Virginia, Maryland, Pennsylvania, and New Jersey, involving approximately 5 million square feet, in three months. Developed abatement and orchestrated all abatement activities. Also performed oversight and air monitoring on a variety of abatement projects, ranging from manufacturing plants to retail stores.

1986 - 1988 **Project Manager,** Kaselaan & D'Angelo Associates, Inc., Haddon Heights, NJ. Performed asbestos survey for Massachusetts Bay Transit Authority on all buildings and subway tunnels, as well as performed survey of Gateway Towers in Pittsburgh, Pennsylvania. Performed abatement oversight on a long term project in St. Louis and started and managed the St. Louis Branch office. Responsibilities included management, planning, financial considerations, and coordination performing all inspections, conducting weekly meetings between the building owner and the abatement contractor, and ensuring compliance with all job specifications by the contractor.

Scientific and Technical Accomplishments

Safety Health and Environmental Response Plans/Site Specific Safety and Health Plans: Former Raritan Arsenal, New Jersey (Chemical Warfare and Munitions Clean-up); Twin Cities Army Ammunition Plant (Chemical Warfare and Munitions Clean-up); Spring Valley, Washington, D.C. (Chemical Warfare and Munitions Clean-up); Sioux Army Depot (Munitions Clean-up); Fort Ord, California (Munitions Clean-up); Camp Forrest (Munitions Clean-up); Former Morgan Depot, Sayreville, NJ (Munitions Clean-up); Camp Clayborne (Munitions Clean-up); Baywood Park (Munitions Clean-up); Southwest Proving Grounds (Munitions Clean-up); Tooelle Army Depot (Munitions Clean-up); Umatilla Army Depot (Munitions Clean-up); Former Black Hills Arsenal (Chemical Warfare and Munitions Clean-up); Rocky Mountain Arsenal (Munitions Clean-up); Fort Wingate (Munitions Clean-up); Castner Range at Fort Bliss (Munitions Clean-up); Radford Army Ammunition Plant (Ammonia Tank Clean-up), Jefferson Proving Ground (Munitions Clean-up), Former Ogden Depot, Ogden, UT (Chemical Warfare and Munitions), Bellows AFS, Oahu, HI (Munitions Clean-up), Deseret Chemical Depot (Ton Container Testing), Pine Bluff Arsenal (Ton Container Testing)

GREGORY J. PETERSON — OE Safety Manager

CAREER OBJECTIVE: UXO Program Management, with an aggressive company involved with UXO Recovery, Demolition Operations and, or training individuals to conduct such operations.

Proven leader, with outstanding supervisory, and managerial, skills.
Problem solver, who works very well under pressure.
Team builder, and team player with great communication ability.

EDUCATION

Evaluated, 90 Credit Hours at various Colleges and Military experience by New York Regencies University External Degree Program, 1995
Senior Leadership Training in TQL, July 1993
Graduate, Naval Instructor Training, 4 Sep 1981
Navy Leadership/Management Education and Training, August 1981
Naval Instructor Training/Curriculum Development Course, July 1981
Graduate, Basic EOD School, 22 Jul 1977
Navy EOD Course Phase II, Land/Underwater Ordnance, July 1977
Explosive Ordnance Technologists, 1977, Charles County Community College, La Plata MD
Graduate, Second Class Dive School, Feb 1975
EOD Course Phase I, Chemical/Biological Weapons, July 1976
Graduate, Lake Crystal High School, Lake Crystal, MN 56055

HEALTH AND SAFETY TRAINING

All safety training has been on the job, Mr. Peterson served as Safety Officer at the command level for 8.5 years, managing Command Safety Programs.
Medic First Aid/CPR, June 1997
40-hour OSHA HAZWOPER course (29 CFR 1910.120), June 1997
8-hour OSHA HAZWOPER course, June 1998
8-hour OSHA HAZWOPER Supervisor course June 1998
CPR 1 First Aid current though June 1999

EXPERIENCE AND ACCOMPLISHMENTS

MILITARY:

May 1996 - May 1997: Operations Officer/COMEODGRU ONE
April 1994 - April 1996: Readiness/Training Officer/COMEODGRU ONE
April 1992 - March 1994: Executive Officer/EODTEU ONE
June 1989 - April 1992: Operational/Readiness Officer/COMEODGRU TWO
November 1985 - June 1989: Officer in Charge/EODGRU TWO DET BERMUDA
November 1983 - October 1985: Curriculum Standards Dept Head/EODTEU ONE
October 1982 - November 1983: Officer in Charge/shipboard unit/EODMU ONE
September 1981 - June 1982: EOD instructor/NAVSCOLEOD
May 1979 - July 1981: Leading Petty Officer/EODGRU TWO DET GTMO BAY CUBA
July 1977 - May 1979: Reported to COMEODGRU TWO from NAVSCOLEOD

PROFESSIONAL SUMMARY

Mr. Peterson graduated from Naval School Explosive Ordnance Disposal and has amassed 22.7 years of well rounded experience in all areas of EOD/UXO clearance and demolition range operations at the field and management levels. He has 2.7 years of civilian UXO experience in team supervision and program management and 20 years of experience in military EOD programs. He has 3 years of military field experience as a Senior EOD Technician directly supervising EOD teams, over 5 years of hands on range operations experience performing UXO operations, and 8 of his 14 years as a Master EOD Technician have been spent directly supervising complex, multi team EOD/UXO operations from priming the shot to managing complete projects. This experience includes all aspects of; planning, logistics supervision, safety, training, and execution of operations with a perfect safety record. Mr. Peterson has never been removed from an EOD/UXO position for unsatisfactory performance, safety reliability, personal reliability, or cause of any kind. His background provides expertise in:

SUMMARY OF QUALIFICATIONS: 2.7 years of civilian UXO experience in team supervision/program management, and 25 years of distinguished Naval service. Ten enlisted and fifteen as a Naval Officer achieving the rank of Lieutenant Commander. Twenty of those years have been spent working in the field of Explosive Ordnance Disposal(EOD) in a wide variety of positions from, Team Member, Demolition Range Safety Supervisor, Diving Supervisor, Free Fall Jump Master and Instructor, EOD Instructor for U.S. and foreign students, Officer in Charge of Shipboard and Shore Detachments, Quality Control and Safety Officer for all east coast EOD assets, Executive Officer of an EOD Training Unit, Quality Control and Operations Officer for all west coast EOD assets.

- Present: Ordnance Explosives Tech. Director, Earth Tech Inc.
- Logistics and transportation of personnel, material and equipment to include, explosives, fuels, vehicles, and boats throughout the U.S. and remote overseas locations to conduct EOD/UXO operations during fleet wide exercises and contractor job sites.
- The planning, execution and control of all Pacific Fleet EOD/UXO range activity to include; detection, clearance, disposal, and training for operations, and fleet wide exercises.
- The direct management/supervision of large numbers of personnel and multiple subordinate commands assigned to both Atlantic and Pacific Fleet EOD forces.
- Years of experience managing Command Safety Programs, to include Explosive Safety, and Quality Control Programs used to monitor EOD/UXO training and operations at the Command and Group levels.
- Five years of direct explosive allowance management, magazine management, and transportation and storage of UXO recovered during off base UXO responses.

PROJECTS HIGHLIGHTING HIS EXPERIENCE ARE LISTED BELOW

CIVILIAN:

- **Earth Tech Inc. 1999 to present:** Ordnance/Explosive Technical Director.
- **American Technologies Inc. OES Division (1998/1999):** UXO Team Leader. Working as a Team Leader on the Ft. Irwin range clearance project.

- **BioGenesis Pacific Inc. (1997):** Mr. Peterson was hired to develop, organize and manage a UXO capability for BPI for the purpose of conducting UXO operations in support of a USAF bombing range clearance operation. This contract was completed on time and with a 4.0 USAF approval rating, on a 4.0 scale. This project required the surface clearance of 2,600 acres of bombing range target area. During this clearance over 15,000 dud ordnance items were safely disposed of on site, and over 500 ton of ordnance/target scrap was gathered, inspected, certified safe to ship, and removed from the range. Mr. Peterson conducted this project with a team of 8 UXO personnel, 2 Equipment Operators, 16 Range Techs., and 1 on site field Office Manager.

- **Human Factors Applications, Inc. (1997):** As a UXO Team Leader, Conducted UXO remediation of several former ordnance impact areas for the U.S. Navy at NAS Miramar to clear the way for the construction of new facilities. This project included surface and subsurface remediation action.

- **Lockheed Martian Idaho Tech Co. (1997):** As UXO Team Leader Mr. Peterson was responsible for the health and safety of a six person team engaged in UXO remediation of several former explosive test sites located at the Idaho National Engineering laboratory. Using a systematic grid layout with visual and geophysical searches we safely removed live UXO rounds and several hundred pounds of bulk high explosives.

MILITARY:

- **Explosive Ordnance Disposal Group ONE (1996-1997):** Mr. Peterson was hand selected to serve as Staff Operations Officer to re-organize the department, and the overall deployment strategy for Pacific Fleet EOD. He directed the employment of 34, 7 man EOD Detachments, and 8 subordinate commands to cover all EOD/UXO requirements for the Pacific Fleet. Coordinated and managed Pacific Fleet EOD participation in five fleet level training exercises, to include the management of all logistics, (movement of large numbers of personnel, several short tons of equipment and managed exercise re-supply by sea and air), and provided Quality Control personnel to evaluate EOD performance during the course of each drill during exercises.

- **Explosive Ordnance Disposal Group ONE (1994-1996):** As Assistant Chief inspector Mr. Peterson was directly responsible for the administration of Pacific Fleet EOD Training/Readiness, and Administrative Quality Control programs. As Officer in Charge of 8 Quality Control Evaluators, he monitored the Readiness/Training and administrative effectiveness of 8 subordinate commands and their detachments in the following areas; Command Safety Program, Hazardous Material Handling/Stowage Program, Ammunition/Explosives Handling and Certification Program, Personnel/Physical Security Programs, all Supply and Material Records, and all Vehicle/Material Maintenance Records were reviewed. At the completion of each review Mr. Peterson would draft a formal report to COMEODGRU ONE outlining the findings, and recommend a course of action to correct any deficiencies found. He also, coordinated and facilitated all of the Commanders' staff level meetings, and the Chief of Naval Operations sponsored Executive Steering Committee meetings, maintaining the minutes, and drafting required correspondence.

- **Explosive Ordnance Disposal Training and Evaluation ONE (1992-1994):** As the Executive Officer Mr. Peterson was responsible for all command administrative functions, financial/materiel management of over $3.5m in funds equipment annually, management of 52 personnel, (38 EOD Technicians and 13 support personnel), Director of the commands NAVOSH and Explosive Safety programs, passing all fleet level and navy wide inspections with a perfect score. Directly responsible for the Quality Control of all Pacific Fleet advanced training during his tour to include; 1484 diving

- **Explosive Ordnance Disposal Training and Evaluation ONE (1992-1994):** cont. operations, 74 demolition operations using live explosives, and 1843 premeditated parachute jumps, with a perfect safety record, while providing advanced EOD training to 34 (seven man) EOD Detachments. Managed the implementation of a High Risk Safety Training Program throughout the commands

training curricula, greatly improving the safety factor for students as well as instructors and supervised the development of four new training curriculums which greatly improved EODs ability to respond and support the fleet.

- **Explosive Ordnance Disposal Group TWO (1989-1992):** Mr. Peterson, as the Quality Control Advisor to the Commander, directed operations involving the location, neutralization, render safe, and exploitation of U.S. and foreign nuclear, chemical, conventional ordnance, demolition, dive, and parachute operations for the propose of evaluating the ability of Atlantic Fleet EOD units to safely and successfully conduct EOD/UXO range operations. He also, developed special chemical weapons briefings for all Atlantic Fleet EOD personnel preparing for EOD/UXO operations during Desert Shield, and was responsible for developing numerous underwater ordnance clean up contingency plans for strategic harbors in support of Desert Storm. Served as EODGRU TWO Atlantic Fleet Safety Officer. During his tour, EODGRU TWO and all subordinate commands had perfect safety records, and passed all NAVOSH inspections with zero discrepancies.

- **Explosive Ordnance Disposal Group TWO Detachment Bermuda (1985-1989):** Provided emergency and routine diving, demolition, and UXO render safe services to NATO military forces. As detachment Safety Officer, Mr. Peterson developed, implemented, and managed a NAVOSH program involving surface and underwater explosive operations, diving operations, air operations; small arms training, ammunition and explosives use. Detachment Dive and Demolition Supervisor. Conducted monthly demolition operations for the Bermuda Regiment and the U.S. Marine Corns Marine Barracks Company and, provided the same units advanced demolition training.

- **AGMJ4C U.S. Navy Target Drone Recovery Project 1986:** Mr. Peterson, as Officer in Charge of the project, recovered four drones at a cost savings to the Government of over 800,000 dollars. The drones were lost on the target range at NAS Roosevelt Roads, PR and were recovered as they passed by the island of Bermuda in the gulf stream. He accomplished this by providing numerous training and identification lectures to the islands main fishing fleet. This proved to be very successful as three of the four drones were sighted and reported to the U.S. Navy by the fleet.

- **Explosive Ordnance Disposal Training and Evaluation Unit ONE (1983-1985):** As curriculum Instructional Standards Dept. Head Mr. Peterson was responsible for all curriculum development and maintenance, also he implemented/managed a Quality Control program that allowed the command to ensure its instructors were properly trained and instructional output was maintained at a quantifiable level throughout the command. Command Physical and Personnel Security Officer and Safety Officer.

- **Explosive Ordnance Disposal Mobile Unit ONE. Detachment USS MOUNT HOOD (1982-1983):** During this period, Mr. Peterson was Officer in Charge of the detachment where he directly provided and performed crisis and routine diving, demolition and render safe services support to U.S. and Allied military forces, and civil government agencies.

- **WWII UXO Recover Project for the U.S. Trust Territories 1982:** Mr. Peterson, as Officer in Charge, developed Standard Operating Procedures that enabled himself, his detachment, and 15 non EOD personnel to remove over 4 tons of Japanese WWII UXO from various Southern Pacific Islands. This was extremely dangerous as 80% of the ordnance was armed and approximately the same percentage was exuding picric acid. This project was completed under very remote conditions without incident. Detachment Dive and Demolition Range Control Officer.

- **Makua Impact Area Target Renovation and Demolition Operations Project (1982-1983):** As Demolition Range Control Officer, Mr. Peterson was responsible for all operations on the range to include; transport of personnel, equipment, and explosives to and from the impact area, training of all personnel on the range, control of all demolition operations on the range, and responsible for over all safety of the operation. The project consisted of conducting UXO recovery and routine demolition

operations monthly at Makua impact area to maintain impact target area sanitation, and to conduct command demolition operations for both training, and disposal of retrograde ordnance.

- **Masirah Beach Head Logistic Project for Battle Group Operations (1983):** Mr. Peterson volunteered to assist the USS MOUNT HOOD as Officer in Charge of the Masirah Beach Head Logistic operation. He was responsible for ensuring the smooth and on-time movement of passengers, mail, and cargo between the air head site, Diego Garcia, and the two carrier battle groups that the USS MOUNT HOOD was primary support platform for. As a result of Mr. Peterson's outstanding performance, a beach head detachment of 29 personnel, and 4 heavy forklifts, off loaded seventeen C141 cargo aircraft, setting impressive cargo handling records, safely, and without incident.

- **Special Operations Project NORPAC Operations (1983):** Mr. Peterson and his detachment were hand selected for this, at the time, highly classified project due to the detachment's outstanding reputation and their above average physical conditioning. Long hours were spent, just days after completing a 6-month deployment, preparing for this project. It was necessary for the detachment to spend long hours in briefing rooms, and equal time was spent training for rough water boat operations. This project required that Mr. Peterson's detachment be ready to launch its boat on 5 minutes notification 24 hours a day in extremely hazardous conditions in the Northern Pacific and Arctic Oceans. Mr. Peterson prepared the detachment well as they were very successful in their mission, and conducted several launch, and recoveries in heavy seas without incident to personnel or equipment. They also, recovered several free floating objects from the oceans that were very beneficial to the U.S. intelligence community.

- **Naval School Explosive Ordnance Disposal (1981-1982):** In this position Mr. Peterson served as a Basic EOD Instructor responsible for classroom and practical instruction in; aircraft hazards (cads, carts, injection seats); bombs and bomb fuses, (foreign and domestic); and missiles, (foreign and domestic). Directed classes of 25 personnel in classroom instruction and field operations, and was directly responsible for their safety while on the range using explosive render safe procedures during practical exercises.

- **Explosive Ordnance Disposal Group TWO Detachment Guantanamo Bav Cuba (1979-1981):** During this tour Mr. Peterson was responsible for unit training, demolition, and range recovery operations. He was directly responsible for and destroyed over 39 tons of live anti tank and anti personnel mines during mine field maintenance operations, and 120 tons of UXO during maintenance and upkeep operations on 7 major ordnance impact areas. As demolition supervisor he was responsible for the direction of all range operations at the detachment and supervision of 3 EOD personnel and up to 10 minefield maintenance personnel from the Marine Corns at any given time. Personnel on many occasions were divided into multi teams of two to cover different ranges and target areas. On the average, 3 days a week were spent on the ranges, and he responded for another four or five calls per week for misfires on the Law Rocket, Hand Grenade and Mortar Ranges. Mr. Peterson was also the detachments Ammunition and Explosive Manager, responsible for the safe stowage, transportation, and security of all detachment's ammunition, explosives, and retrograde ordnance.

- **GTMO 20MM Ammunition Range Remediation Project (1981):** Mr. Peterson acted as the Range Control Officer and was responsible for remediation of the 20MM demolition range at GTMO. During the course of this project over 50,000 rounds

- **GTMO 20MM Ammunition Range Remediation Project (1981) cont:** of live 20MM ammunition were recovered from a 5 acre area, and safely disposed of properly without incident.

- **GTMO Hazardous Material Neutralization Project (1980):** On this project Mr. Peterson acted as Safety Officer during the neutralization of 2,300 pounds of industrial chemicals. The operation was meticulously planned, and conducted safely without incident.

- **GTMO Anti Tank Armed Fuze Removal Project 1979:** As Range Safety Officer, and Project Manager, Mr. Peterson developed a procedure that would allow the remote removal of 25 armed anti tank fuzes via a modified tape and line procedure. The removal was at the request of an Explosive Safety Review Board. After removal the fuzes were tested for deterioration because of prolonged field application in the mine fields at the Guantanamo Naval Base. This project was initiated after a fuze that was armed for many years detonated as it was turned to the safe position by Mine Field Maintenance Personnel. This project was completed without incident.

- **Explosive Ordnance Disposal Group TWO (1977-1979):** Reported from Naval School Explosive Ordnance Disposal July 1977. Mr. Peterson served as a shipboard detachment Leading Petty Officer providing and performing crisis and routine diving, demolition and render safe services support to U.S. and Allied military forces, and civil government agencies.

- **Putnam FL. Bombing Range Clearance Project (1977-1978):** As an EOD Team Leader, Mr. Peterson was involved on a project where 120,000 ordnance items were removed and 150,000 cubic yards of earth stripped sanitized and replaced to successfully complete the surface and subsurface UXO clearance to a depth of 18 inches. This operation was conducted without incident.

- **Fort Manroe Inner Moat Clearance Project (1978):** As an EOD Team Leader, Mr. Peterson assisted in the UXO clearance of the inner moat surrounding the old fort at Fort Monroe, Va. Over 22,000 UXO items were recovered safely in harsh working conditions, without incident.

- **Dam Neck Lake Clearance Project 1978:** EOD Team Leader, and Project Explosive Manager, responsible for the safe stowage, transportation, and security of explosives, and retrograde ordnance. 10,000 ordnance items were safely removed, stored, and later properly destroyed.

- **As a Member of the Mobile Team at COMEODGRU TWO 1977:** Provided services to the Marine Corps as a Demolition Range Safety Officer for beach landing operations, routinely supervising from 60 to 100 Marines, both officer, and enlisted during monthly training operations at Little Creek Va. During this operation Mr. Peterson was responsible for planting demolition charges at various intervals on a given landing area, and using controlled detonation of the charges to add realism, as the Marine Corns conducted beach landings. All operations were conducted safely and without incident.

APPENDIX C

GENERAL SAFETY RULES FOR CONTRACTORS

GENERAL SAFETY RULES FOR CONTRACTORS

Introduction

The rules and requirements contained in this attachment have been written for the guidance of Contractors who are performing work under contract with Earth Tech. This booklet prescribes general requirements. Additional specific rules may be necessary to ensure the safety of workers on a particular job. The Contractor, working in collaboration with the Earth Tech representative, will be expected to establish such additional rules and procedures as may be necessary to conduct a safe operation and comply with all Earth Tech, regulatory, and insurance requirements and those of our clients. Earth Tech health and safety professionals are available to assist.

The term Contractor, as used in this attachment, shall be understood to include any and all persons, sole proprietorships, partnerships, corporations, or other business ventures under contract, oral or written, to Earth Tech.

Contractor is responsible for informing its subcontractors of these requirements, for directing and supervising work of subcontractors, and for assuring that its subcontractors adhere to the requirements herein. Earth Tech may request Contractor to provide proof of its subcontractor's adherence to all rules and regulations and will prohibit access to Earth Tech property or job sites or our client's property for those Contractors not in compliance.

In order to assist Contractor in following these instructions, a Earth Tech Representative will be assigned to the Contractor to act as Earth Tech's agent in all matters relative to work activities at Earth Tech facilities or job sites. Under no circumstances shall any work be started until the Earth Tech Representative has been contacted, a job orientation has been conducted by the Earth Tech Representative, and all permits, insurance, Earth Tech, client, and regulatory pre-job requirements met.

The Earth Tech Representative and the Earth Tech Health and Safety professionals are authorized to stop any work which they may consider hazardous to Earth Tech personnel or equipment or Contractor personnel. This authority may be delegated to appropriate individuals.

General Safety Rules and Requirements

Accident Reporting

All accidents (personal and property damage) shall be reported orally to the Earth Tech Representative as soon as emergency conditions no longer exist. A written report shall follow within 7 days after emergency conditions are resolved.

Alcohol, Firearms, etc.

Alcoholic beverages, illegal drugs or narcotics, or guns and ammunition are not permitted on Earth Tech property or job sites. Personnel under the influence of alcohol or drugs shall not be allowed on Earth Tech property or job sites.

Approvals

The Contractor shall be required to obtain pertinent work permits or authorization and approval from the Earth Tech Representative before:

- Working on existing pipelines or equipment
- Entering tanks or closed vessels
- Entering any designated high-hazard areas
- Using torches, electrodes, electronic motors, forges, soldering irons, any open flames, or any device which could produce sparks or ignition source
- Closing walkways, roads, or restricting traffic
- Starting excavations
- Removing tanks from excavations
- Backfilling excavations
- Using utilities such as steam, water, compressed air, or electricity
- Sandblasting, spray painting, or guniting
- Storing flammable materials such as gasoline, oil, paints, oxygen cylinders, etc.
- Walking or working on roofs of buildings or equipment
- Drilling, boring, preparing test pits, or using geophysical equipment or any other exploratory equipment requiring penetration of surfaces
- Operating cranes or similar equipment near overhead power lines or pipelines
- Opening cutting through firewalls or berms
- Fueling or repairing Contractor operating equipment on Earth Tech property or job sites.

Security

For security reasons, entrance to and exit of Earth Tech facilities and job sites is restricted to those areas designated as the Contractor's work area.

Speed Limits

All vehicles on Earth Tech job sites and facilities must observe a maximum speed limit of 10 mph unless otherwise posted.

Vehicle Safety

- All vehicles must be parked in authorized areas only.
- There will be no passing of moving vehicles at job sites where there are narrow roads and short-sight distances.
- Vehicles will only be operated by personnel with valid licenses and good driving records.
- Vehicles shall have all required inspection and operating permits.
- Seat belts shall be used.

Safe Work Practices

Communication

Communication and coordination is vital to prevent accidents on construction sites. Every worker must be aware of equipment operating in his vicinity.

Confined Space Entry

Confined spaces include storage tanks, bins, sewers, in-ground vaults, degreasers, boilers, vessels, tunnels, manholes, pits. etc. These enclosures, because of inadequate ventilation and/or the introduction of hazardous gases and vapors, may present conditions that could produce asphyxiation or injury.

Before entering a confined space, Contractor must notify the Earth Tech Representative of intent to enter. The Earth Tech Representative will review with Contractor the safe entry requirements which include:

Removal of Contents. Before entering, confined spaces should be as clean and free of hazardous materials and chemicals as possible. Where appropriate, confined spaces may be purged by water or other suitable means. Purging with hazardous solvents should be avoided where possible.

Isolation. All input lines which discharged into the confined space shall be disconnected and capped or isolated. The use of a single in-line valve shut-off as the sole means of isolating the confined space from any input lines is prohibited.

However, the use of a double in-line valving arrangement with a vent or drain in between the two valves is acceptable provided that dangerous air contaminants are not introduced by such venting. Isolation valves shall be locked closed, vent or drain valves shall be locked open, and the key shall be kept by that person performing the job.

Electrical Lockout. Where electrical devices located within the confined space (motors, switches, etc.) are to be repaired or worked on, the line-disconnect switches supplying the power must be tagged and locked in the "OFF" position. The lock key is to be kept by the person performing the job, and only this person is authorized to unlock the switch and remove the tag upon completion of the job. Where more than one person is working on the line, each must place a lock on the switch and retain his own key.

- Where there are multiple sources of power to an electrical device that supplies power to the device through an automatic or manual bus transfer switch, lockout devices must be placed on the breaker nearest to the electrical device that is to be isolated, and an electrician shall test the power supply lines to ensure that power has been secured.
- Line-disconnect switches supplying power to any mechanical apparatus in the confined space (mixers, conveyors, etc.) must also be tagged and locked in the "OFF" position. This must be done for any entry, even though work will not be performed on the apparatus itself.

Securing of Covers. All manhole and cleanout covers shall be removed and the openings maintained clear of any obstructions. When hinged doors or lids are provided, they shall be secured so they cannot close. See **Excavations and Trenches** for guarding requirements.

Testing Atmosphere. A qualified person (NIOSH Publication No. 80-106) using only equipment approved and tagged for Class 1, Division 1 locations shall make appropriate tests of the atmosphere in the confined space and place a record of the test results at the entrance to the confined space. Testing shall ensure the following:

- Combustible gas and vapor concentrations do not exceed 10 percent of the lower explosive limit
- Oxygen content is no less than 20 percent and no greater than 25 percent
- Appropriate respiratory protective equipment and other appropriate personal protective devices have been provided for all employees when concentrations of toxic materials exceed established threshold limit values (TLVs).

Continuous Monitoring. If the nature of the work to be performed introduces, or has the potential to introduce, harmful air contaminants, continuous monitoring of the atmosphere and/or the oxygen content drops below 20 percent, all personnel shall evacuate the confined space immediately.

Ventilation. All confined spaces found to be unsafe must be ventilated by means of mechanical exhaust systems arranged so as to avoid recirculating contaminated air. The Contractor must contact the Earth Tech Representative to obtain approval not to ventilate. Personnel shall be evacuated immediately in the event of failure of the

mechanical ventilation system. The confined space shall be retested prior to reentry following ventilation system repair.

Buddy System. At least two workers shall remain outside the confined space. One standby worker shall be stationed just outside the access opening of the any confined space while such space is occupied. This person shall:

- Maintain continuous awareness of the activities and well-being of the occupant in the confined space
- Be able to maintain communication at all times
- Be alert and fully capable of quickly summoning help
- Be physically able and equipped to assist in the rescue of an occupant from a confined space under emergency conditions.

Safety Gear and Personal Protective Equipment. All Contractor employees must be instructed in accordance with OSHA regulations regarding safety gear and personal protective clothing, hard hats, respirators, lifelines, and harnesses. Such instructions shall be received and documented before entering any confined space.

Compressed Gas Cylinders

Valve protection caps. Valve protection caps shall be in place when compressed gas cylinders are transported, moved, or stored.

Cylinder valves. Cylinder valves shall be closed when work is finished and when cylinders are empty or are moved.

Compressed gas cylinders. Compressed gas cylinders shall be secured against rolling or tipping (roped or chained) at all times, except when cylinders are actually being hoisted or carried.

Gas regulators. Gas regulators shall be in proper working order while in use.

Leaks. If a leak develops in a gas cylinder, after donning appropriate safety equipment, immediately remove it to a safe location. If the leak cannot be corrected, report it to the Earth Tech Representative.

Identification of Contents. Cylinders should be permanently marked or stenciled to identify the type of gas in the cylinder.

Breathing Air. All compressed breathing air shall meet OSHA specifications for breathing air quality. All compressed breathing air cylinders shall have their contents checked at the job site for correct oxygen concentration and rejected for breathing air if the oxygen concentration is not 20.7% ±0.2%.

Oil and oily rags. Oil and oily rags shall be kept away from oxygen equipment.

Cranes, Hoists, and Other Heavy Equipment

Contractor personnel will not be permitted to use hoists and powered apparatus belonging to Earth Tech unless approval is obtained in each instance from the Earth Tech Representative.

ROPs. Roll over protection shall be used when conditions or regulations call for such use.

Cutting or Welding

Hot Work/Welding/Burning. "Hot Work" authorization must be obtained from the Earth Tech Representative before any welding, cutting, or other "hot work" is done. "Hot work" permits and results of tests are to be submitted to the Earth Tech Representative at the completion of the job or at the end of each workday.

Welding Flash. Noncombustible or flame-proof shields or screens must be provided to protect welder or others who might be harmed by direct rays or arc.

Personal Protective Equipment. Goggles, gloves, aprons, and other personal protective equipment appropriate to the job shall be used.

High Fire-Hazard Areas

- Contractor personnel are responsible to see that a fire watch is maintained and all adjacent combustible materials are protected or removed as designated by the Earth Tech Representative.
- Contractor shall provide his own calibrated combustible gas meter or other instruments for checking areas before hot work.
- Documentation of calibration shall be submitted to the Earth Tech Representative for review by the Earth Tech Health and Safety Section.
- Contractor is responsible for all testing and monitoring required by applicable regulations and to assure work place safety.
- Earth Tech shall have the right, not the responsibility, to perform additional testing. Earth Tech testing shall not be in lieu of Contractor's requirements.
- In the event of a bona fide emergency, such as emergency spill response work, and where the Contractor warrants that he cannot conduct the required testing, Earth Tech may upon written agreement then conduct all tests necessary to assure safety and regulatory compliance. The Contractor shall cosign the "hot work" permit form when tests are conducted by Earth Tech personnel.
- Contractor shall provide his own fire extinguisher(s) for welding and cutting, as designated by the Earth Tech Representative.

Electrical Safety

Grounding. The noncurrent-carrying metal parts of fixed, portable, or plug-connected equipment shall be grounded. Since ground wires can break, they shall be tested with an electrical resistance meter to assure conductivity as often as necessary to assure safety. Portable tools and appliances protected by an approved system of double insulation need not be grounded.

Extension Cords. Extension Cords shall be the three-wire type for grounded tools (two-wire is permissible for double-insulated tools) and shall be protected from damage; do not fasten with staples or extend across an aisleway or walkway. Worn or frayed cords shall not be used. Cords shall not be run through doorways where the door could cut or damage them.

Light Bulbs. Exposed bulbs on temporary lights shall be guarded to prevent accidental contact, except where bulbs are deeply recessed in the reflector. Temporary lights shall not be suspended by their electric cords unless designed for this use. Explosion-proof bulb covers shall be used when contact with flammable vapors or gases is likely and shall meet Class I, Division I requirements.

Electrical Receptacles. Receptacles for attachment plugs shall be of the approved, dead-front, concealed contact type. Where different voltages, frequencies, or types of current are supplied, receptacles shall be of such design that attachment plugs are not interchangeable.

Wet Environments. Work done in wet environments shall require ground fault interrupters and water-tight connectors.

Emergency Equipment

Earth Tech's fire equipment is not to be moved, relocated, or otherwise rendered inaccessible unless specific permission is granted in each case by the Earth Tech Representative.

Self-contained breathing apparatus, first aid equipment, fire blankets, stretchers, eyewash fountains, and deluge showers are not to be moved, relocated, or blocked without the express permission of the Earth Tech Representative.

Excavations and Trenches

Permits. Before any excavation work begins, all required permits shall be obtained.

"Dig-Alert". Before any excavation work begins, the existence and location of underground pipes, electrical conductors, etc., must be determined by Contractor who shall in turn notify the Earth Tech Representative.

Cave In Protection. The walls and spaces of all excavations and trenches (which will be entered by people) more than 4 feet deep shall be guarded by shoring, sloping of the ground, or some other equivalent means, in accordance with Cal/OSHA regulations.

Daily Inspections. Daily inspections of excavations shall be made by the Contractor. If there is evidence of possible cave-in or slide, all work in the excavation shall cease until the necessary safeguards have been taken.

Egress. Trenches more than 4 feet deep shall have ladders or steps located so as to require 10 feet or less of lateral travel between means of access.

Backfill. All trenches shall be backfilled as soon as practical after work is completed and all associated equipment removed.

Housekeeping. All Contractor equipment, such as pipe, rebar, etc., shall be kept out of traffic lanes and access ways. Equipment shall be stored in a manner which ensures the safety of Earth Tech and Contractor employees at all times.

Fall In Protection. All trenches shall be completely guarded on all sides. Standard guardrails are preferred. However, when wooden or metal barricades are used for trench guarding, they shall be spaced no further apart than 20 feet, and at least two feet from the edge of the trench. Such barricades shall be at least 36 inches high when erected.

- Battery-lighted barricades shall be used as follows:

  (1) A minimum of two battery-lighted barricades shall be used at corners, one on each side of the barricade.

  (2) At least one battery-lighted barricade shall be used where vehicular traffic approaches the trench at right angles.

  (3) Where trenches parallel roadway, distance between battery-lighted barricades shall not exceed 40 feet unless this requirement conflicts with Item (1), above, and additional units are required.

  (4) All battery-lighted units shall be serviced as necessary to ensure equipment is operating.

- Caution tape shall be stretched securely between barricades. The caution tape shall be at least 3/4-inch-wide and shall be yellow or yellow and black and may have the words "CAUTION - DO NOT ENTER."

- Barricaded sections immediately adjacent to where pedestrians cross trenches shall be arranged to direct pedestrians to the walkway or bridge.

Encroachment. Use of other trench excavating equipment, or storage of equipment or supplies within a distance equal to the depth of the trench, will not be permitted without approval by the Earth Tech Representative.

Bridges. All pedestrian bridges shall be of sufficient strength to prevent no greater vertical deflection than one-half inch when a 250-pound weight is applied to the center of the bridge.

- Handrails shall consist of intermediate and top rails on both sides of the bridge. The top rail shall be between 42 and 45 inches above the walking surface and be capable of withstanding a lateral force of 200 pounds against the center of the top rail.
- All surfaces which a person could reasonably contact should be sufficiently free of splinters, nails, or protrusions which may cause injury.
- All bridges intended for vehicular traffic shall be constructed to withstand twice the load of the heaviest vehicle anticipated.

Earth Grading Activity

Vest. All persons within an area where earthmoving are operating shall wear a safety vest or jacket at all times. Vests may be red, orange, or day-glo green in color, but bright or fluorescent orange is preferred. Significantly faded or damaged vest must be replaced.

Communication. Anytime a test pit is to be excavated, the technician shall notify the grading contractor's **authorized** representative for that area. That individual may be acting in the capacity as a dump man, operator, or supervisor from an independent vehicle. Advise that representative of the test pit location and request their cooperation to promote safety during the test period. This should include their advising those under their supervision of your existence in the grading area. Make a notation on your records of the name of the individual with whom you spoke so that the communication is documented.

- Provide notice to the grading contractor
- Identify location of test pit
- Request the cooperation through the completion of the tests and document accordingly.
- A flag must be affixed to any vehicle driving in an earth grading activity area and hazard warning lights shall be operated.

Flags. Every over-the-road vehicle operating in the area of earthmoving equipment activity must carry a flag. The flag must be at least 300 square inches in area with no dimension less than 12 inches. Flags must be high visibility red, orange, day-glo green and mounted approximately 12 feet above grade level.

Hazard Warning Lights. Every over-the-road vehicle operating in the area of earthmoving equipment activity must operate the hazard warning flashers at all times.

Rotating or Flashing Beacon. All vehicles stationary in the grading area shall use a rotating or flashing amber beacon or strobe light on the top of the cab of the vehicle during all field testing.

Orientation of Test Pits. The technician is responsible for selecting a test pit location. Of paramount concern is the technician's safety. The test pit should be located behind the established pattern of grading equipment and outside any existing patterns. The orientation of the pit should include the use of the technician's vehicle as a barrier to potential oncoming traffic. The waste pile created from the excavation of the test pit should be opposite the vehicle so that the test pit is positioned between the vehicle and the waste pile. A flag shall be placed immediately on top of the waste (spoil) pile, satisfying the same requirements as the vehicle flag.

Zone of Non-Encroachment. The location of the test pit must be selected so that no earthmoving equipment will approach closer than 50 feet from the center of the test pit. This is not only for the technician's safety, but to ensure the integrity of the test. Excessive vibration from the operation of earthmoving equipment operating too closely may impair the accuracy or spoil the test results.

Completion of Tests. Immediately upon completion of tests, record the data and withdraw flags and vehicles outside the grading area to record notes and do calculations.

Fire Prevention

Earth Tech Representative, or his designee, is authorized to correct any condition which he may consider a fire hazard. In any emergency, the site personnel are authorized to act directly with Contractor's Foreman in regard to fire hazards without waiting for the Earth Tech Representative.

Floor Openings

Floor openings shall be guarded by substantial barriers, railings, and/or covering materials strong enough to sustain twice the load of pedestrians or vehicular traffic. Barriers will be supplied by the Contractor.

Where a danger of falling exists for personnel, elevated floor areas must be provided with guardrails. In addition, toeboards shall be provided when the possibility of falling objects striking personnel below exists.

High-Hazard Areas

Although this list may not be all inclusive, there are certain areas and operations at Earth Tech facilities and job sites where extra precautions must be taken because of the nature of the hazards. When starting up any operation, the Contractor is required to check with the Earth Tech Representative for a review of the safety and health rules which apply before entering any of the following areas:

- Confined spaces (tanks, manholes, vaults, pits, etc.)
- Laboratories
- Chemical storage and disposal areas.

The contractor is also required to check with the Earth Tech Representative before any work is done on a flammable gas or solvent line; a tank or vessel that presently contains, or has contained, a

flammable material; and before making an excavation anyplace on the site.

Housekeeping

Material should be carefully stacked and located so that it does not block aisles, doors, self-contained breathing apparatus, fire extinguishers, fire blankets, stretchers, emergency eyewash fountains, emergency safety showers, fixed ladders, stairways, or electrical breaker panels.

- Nails protruding from boards must be removed or bent over.
- All work areas shall be kept clear of form and scrap lumber and all other debris.
- Combustible scrap, waste materials, and debris shall be removed at regular and frequent intervals.
- Containers shall be provided for the collection and separation of refuse by type. Covers shall be provided on containers used for flammable, combustible, or harmful substances.
- Overhead storage of debris, tools, equipment, pipes, etc., is prohibited.
- At the end of each work day, Contractor shall provide for pick up of all debris such as paper, rags, empty cans and bottles, etc.

Ladders

The use of ladders with broken or missing rungs or steps, broken or split handrails, or with other faulty or defective construction is prohibited.

- Ladders must not be placed adjacent to a door unless the door is locked or guarded.
- Metal ladders shall not be used for electrical work.
- Tie off top of ladder to structure.

Medical Service and First Aid

Emergency Medical Service. Preplanned emergency medical service shall be provided as designated by Contractor and approved by the Earth Tech Representative.

First Aid Kit. Each Contractor shall provide a first aid kit for his employees which meets minimum OSHA requirements.

Mobile Cranes

Mobile cranes, including portable crane derricks, power shovels, or similar equipment, shall not be operated within ten feet of overhead electrical power lines.

Overhead Work

No overhead work shall be performed when, as a result of that work, the possibility of a falling object striking any person exists. Do not work above any person at any time.

Personal Protective Clothing and Equipment

In certain construction and maintenance operations, personal protective equipment such as safety glasses, chemical goggles, respirators, hard hats, and protective clothing is required. The type of protective equipment to be worn will be determined by the degree of exposure to the potential hazard. There will be very few occasions when hard hats and eye protection will not be required at Earth Tech job sites. When in doubt of the safety measures to be observed, Contractor shall contact the Earth Tech Health and Safety Section. This shall not, however, relieve Contractor of his responsibilities to determine appropriate protection.

Eye protection is required when engaging in such operations as the following:

- Drilling, chipping, grinding, wire brushing
- Handling caustics and acids
- Breaking bricks or concrete
- Hammering chisels, drift pins, etc.
- Burning or welding
- Other situations which create a possible eye hazard, e.g., chemical environments.

Photographs

Only Earth Tech photographers, with permission from DIPEF, are permitted to carry cameras or take pictures. If progress or finished construction photographs are desired, request for same should be made through the Earth Tech Representative.

Power Tools

Power and Air-Actuated Tools. Gasoline-powered, electric, or air-actuated tools are not to be used on Earth Tech property or job sites without prior approval of the Earth Tech Health and Safety Department. To obtain approval, Contractor must contact the Earth Tech Representative.

Explosive-Actuated Tools. Explosive-actuated (powder-actuated) fastening tools shall meet the design requirements in "American National Standard Safety Requirements for Explosive-Actuated Fastening Tools" (ANSI A10.3-1970). A tool which does not meet these design standards cannot be used.

- Power tools shall never be left unattended in a place where they would be available to unauthorized persons.
- Power tools shall not be used in explosive or flammable atmospheres.

Fall Protection

Appropriate fall protection, such as safety harness and lanyard, must be worn when worker is exposed to falling more than 6 feet. Lanyard or lifeline must

be tied off to appropriate structure capable of supporting five times the weight of the person (nominal 1000 pounds).

- Appropriate fall protection, such as safety harness and lanyard, must be worn when working above eight feet on straight or extension ladders when the work involves pushing, pulling, or action which may dislodge the person from the ladder.
- Safety harnesses are also required on swinging or portable scaffolds when handrails and toeboards are not provided (eight feet or more above ground or floor level).
- Safety harnesses and lifelines (including extraction devices for top entry spaces) are required on all work performed in confined spaces where an oxygen deficiency or toxic vapors may exist.
- All lifelines shall be safety secured to stable and adequate supports.
- Safety harnesses and lifelines must be worn on rooftops where there are no guardrails and where the work is within ten feet of the edge.

Salamanders

- "Hot work" authorization must be obtained from the Earth Tech Representative before using a salamander.
- Salamanders must be a Factory Mutual or Underwriters Laboratories-approved type.
- Position salamanders away from all combustible material to reduce the possibility of uncontrolled fire.
- Guard salamanders from traffic to prevent them from being overturned.

Scaffolds

All scaffolds, whether fabricated on site, purchased, or rented, shall conform to the specifications found in ANSI A10.8, Safety Requirements for Scaffolding. Rolling scaffolds shall maintain a three-to-one height-to-base ratio.

- The footing or anchorage for a scaffold shall be sound, rigid, and capable of carrying the maximum intended load without settling or displacement.
- Unstable objects, such as barrels, boxes, loose bricks, or concrete blocks, shall not be used to support scaffolds or planks.
- No scaffold shall be erected, moved, dismantled, or altered except under the supervision of competent persons.
- Scaffolds and their components shall be capable of supporting at least four times the maximum intended load without failure.
- Guardrails and toeboards shall be installed on all open sides and ends of platforms more than 10 feet above the ground or floor.
- Scaffolds measuring four to ten feet in height, and having a horizontal dimension of less than 45 inches, shall have standard guardrails installed on all open sides and ends of the platform.
- Wire, synthetic, or fiber rope used for suspended scaffolds shall be capable of supporting at least six times the rated load.
- No riveting, welding, burning, or open flame work shall be performed on any staging suspended by means of fiber or synthetic rope.
- Tested fiber or approved synthetic ropes shall be used for or near any work involving the use of corrosive substances.
- All scaffolds, boatswain's (bosun's) chairs, and other work access platforms shall conform to the requirements set forth in the federal OSHA Regulations for Construction (29 CFR 1926.451) except where the specifications in ANSI A10.8 7 or state or local regulations are more rigorous.

Smoking and Open Flames

Smoking and the use of open flames are strictly prohibited in areas where flammable liquids, gases, or highly combustible materials are stored, handled, or processed. Obey "No Smoking" signs. Smoke only in designated areas.

Solvents and Paints

- Adequate ventilation must be maintained at all times when paints or solvents are used.
- Personnel should use proper respiratory protection and protective clothing when toxicity of the material requires such protection.
- Flammable solvents and materials must be used with extreme caution when possible sources of ignition exist.
- Flammable paints and solvents must be stored in an approved (Factory Mutual or Underwriters Laboratories) flammable liquids storage cabinet when storage is required inside the buildings. If an approved cabinet is not available, paints and solvents must be removed from the building when not in use.
- Flammable liquids must be dispensed in safety cans with flash arresters bearing a Factory Mutual or Underwriters Laboratories approval. These containers must be clearly identified as to their contents.

- Material Safety Data sheets, for materials used by the Contractor, shall be maintained by the Contractor, and a copy provided to the Earth Tech Representative.

Tarpaulins

When tarpaulins are required for the detection of hot slag, dust, paint drippings, etc., or as security barriers, they shall be flame-resistant and in good condition.

Tools

Hand and power tools shall be kept in safe operating condition. Mushroomed heads on cold chisels, star drills, etc., are unsafe and should not be used. Hammers should have handles which are not cracked, split, or broken.

Nonsparking tools may be necessary in certain areas where flammable materials are handled or where sparks could create an explosion.

Transporting Material and Equipment

Extreme care must be taken while carrying sections of pipe, conduit, and other materials to assure safety to Earth Tech, Contractor, and client personnel and property. This includes, but is not limited to, flagging and use of two people to carry pipe of lengths greater than 10 feet.

- Tools, materials, and equipment must not be left unattended in access ways.
- Tools, material, and equipment shall not be removed from the job site without permission of the Earth Tech Representative.

Walking and Work Surfaces

- Workroom floors shall be clean and, to the extent possible, dry.
- Drainage mats, platforms, or false floors should be used where wet processes are performed.
- Floors shall be free from protruding nails, splinters, holes, and loose boards or tiles.
- Permanent aisles or passageways shall be marked.
- Floor holes shall be protected by covers that eave no openings of more than one inch wide.
- Floor openings into which persons can accidentally walk shall be guarded by standard railing and toeboards.
- Open-sided floors, platforms, and runways higher than four feet shall be guarded by standard railings.
- Toeboards shall be used wherever people can pass below, or where hazardous equipment or materials are located below.

Warning Signs

All posted warning, safety, and security signs and barriers shall be observed. Additionally, Contractor shall provide warning signs, barriers, barricades, etc. wherever such protection is needed. Where signs and barricades do not provide adequate protection, particularly along a road, flagmen shall be used.

Regulatory References

Contractors are expected to brief their employees on these requirements and enforce these rules with their employees. Earth Tech management may stop or suspend work at any time the Contractor fails to comply with Earth Tech rules and regulations.

(a) *Standard Operating Safety Guides*, USEPA, November 1984

(b) *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, NIOSH 85-115, 1985

(c) Title 29 of the Code of Federal Regulations, Part 1910 (29 CFR 1910), Occupational Safety and Health Standards (USDOL/OSHA), with special attention to Section .120, Hazardous Waste Operations and Emergency Response

(d) Title 29 of the Code of Federal Regulations, Part 1926 (29 CFR 1926), Safety and Health Regulations for Construction (USDOL/OSHA), with special attention to Section 1926.65, Hazardous Waste Operations and Emergency Response

(e) Title 8 of the California Code of Regulations, Chapter 4, Subchapter 7, (commencing with Section 3200) General Industry Safety Orders (Cal/OSHA), with special attention to Section 5192, Hazardous Waste Operations and Emergency Response

(f) Title 8 of the California Code of Regulations, Chapter 4, Subchapter 4, (commencing with Section 1500) Construction Safety Orders (Cal/OSHA)

(g) Title 22 of the California Code of Regulations, Division 4, Chapter 30 (commencing with Section 66000) Environmental Health Standards for the Management of Hazardous Waste (California Environmental Protection Agency, Department of Toxic Substances Control)

(h) Title 22 of the California Code of Regulations, Division 2, Chapter 3, (commencing with Section 12000) Safe Drinking Water and Toxic Enforcement Act Regulations (California Health and Welfare Agency)

(I) National Oil and Hazardous Substances Contingency Plan

APPENDIX D

HS601 MEDICAL SURVEILLANCE

EARTH TECH	PROCEDURE NO. HS601
	DATE November 3, 1995
STANDARD PROCEDURE	SUPERSEDES New
	APPROVED Steven L. Scott
SUBJECT MEDICAL SURVEILLANCE	

1.0 PURPOSE AND POLICY

1.1 Purpose

The medical surveillance program ensures that employees are physically fit to perform their assigned duties and that exposures to chemical and physical agents has not compromised their health. The medical surveillance program is designed to monitor the effectiveness of health and safety programs.

The medical surveillance program consists of baseline (initial), periodic (annual or biennial), special, exposure-specific examinations, and exit medical examinations. In addition to ensuring the fitness of workers for demanding assignments and tracking the effects of exposures, the medical surveillance program satisfies regulatory requirements.

1.2 Policy

It is the policy of EARTH TECH that each employee whose work assignments involves potential or actual exposure to harmful agents participate in a medical surveillance program.

2.0 TABLE OF CONTENTS

3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility. The Environmental Health and Safety Director is responsible for the issuance, revision, and maintenance of this procedure.

3.2 Action/Approval Responsibilities. The Responsibility Matrix is Attachment 1.

4.0 DEFINITIONS

Light Duty. Light Duty Work is defined as a temporary alternate job assignment other than the employee's normal duties, in response to physical activity restrictions established by an EARTH TECH contract physician or clinic.

Medical Director. The Medical Director is a physician, board certified in occupational medicine, employed by the Medical Services Contractor. The Medical Director manages the services provided by the Medical Services Contractor and provides guidance on medical matters to EARTH TECH.

Medical Services Contractor. The Medical Services Contractor manages all occupational medical services, including medical surveillance programs, substance abuse prevention programs, and care for workers with occupational injuries or illness.

Physical Activity Restriction. To prevent aggravation of an existing condition, the Medical Director recommends a physical activity restriction to limit exposure to a chemical or class of chemicals, such as hepatotoxins; a physical agent, such as temperatures above 26°C WBGT; or an activity, such as lifting in excess of 10 kg.

Safety-Critical. A task or position is designated as safety-critical when the task or position is such that malfeasance or incompetence would endanger the lives of others. Examples, but not a complete list, of positions that have been designated safety-critical by federal and state regulations are

- Drivers of commercial vehicles
- Workers on pipelines carrying fuels or toxic or corrosive substances
- Workers at nuclear power plants
- Operators of cranes of more than 6,000 pounds capacity
- Aircraft pilots

5.0 TEXT

5.1 Classes of Medical Examinations

5.1.1 Baseline/Preplacement/Preemployment

The baseline medical examination is used to identify physical capabilities and medical limitations that may have an impact on the candidate's ability to perform in the position for which he/she is being considered and to provide a baseline against which periodic or project-specific monitoring can be compared. The baseline medical examination is used to determine the suitability of an existing employee for a new assignment (preplacement) or a candidate's suitability to be hired (preemployment).

5.1.2 Periodic/Annual/Biennial

The periodic medical examination is used to evaluate an employee's continued fitness for duty and to assess any impact occupational exposures may have on his/her health status. The periodic examination includes an update to the medical and work history, results of any occupational exposure assessments, and a detailed medical examination tailored to the job description.

The Medical Director determines the frequency of the periodic medical examinations based on regulatory requirements, the position held by the employee, and the level of exposures to physical, chemical and biological agents.

5.1.3 Exposure/Activity/Project-Specific

The exposure-specific examination consists of specific medical tests to assess the impact of occupational exposures associated with a specific activity or project. The Medical Director will require an exposure-specific examination when he/she has reason to believe occupational exposures are impacting or may be impacting the health of an employee, or when he/she receives a recommendation from the Regional EHS Manager. Clients may recommend exposure-specific examinations for persons working on their projects. A client recommendation for an exposure-specific examination will be forwarded to the Regional EHS Manager who will evaluate the request, and if appropriate, forward the recommendation to the Medical Director. The Medical Director will determine the frequency of the exposure-specific medical examinations for each individual employee designated to participate based on sound medical practice and regulatory requirements.

5.1.4 Exit/Termination

An exit medical examination is given when an employee leaves the medical surveillance program, either because of termination of employment with EARTH TECH or because of reassignment to a position not designated to participate in the medical surveillance program. The exit examination assesses any impact occupational exposures may have on his/her health status.

5.2 Participating Employees

5.2.1 Required Participation

Participation in the medical surveillance program is required for employees who are or may be

- Exposed to substances at or above permissible exposure levels (PEL) for 30 or more days per year
- Required to wear a respirator for 30 or more days per year
- Exposed above PEL in accidents or emergency situations
- Working on sites covered by any of the following regulations:
  - 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response
  - 29 CFR 1926.65 Hazardous Waste Operations and Emergency Response
  - 29 CFR 1926.62 Lead
  - 29 CFR 1926.1101 Asbestos
  - 29 CFR 1926.1118 Inorganic Arsenic
  - 29 CFR 1926.1127 Cadmium
  - 29 CFR 1926.1128 Benzene
- Driving a commercial vehicle
- Performing safety-critical tasks

5.2.2 Directed Participation

The Medical Director or the Corporate EHS Director may designate other employees to participate in a medical surveillance program with the concurrence of the other.

5.2.3 Mandatory Participation

All employees designated to participate in the medical surveillance program are required to do so as a condition of employment. Only employees who fall within the above listed categories will be included in the medical surveillance program

5.3 Entry Into the Medical Surveillance Program

5.3.1 Manager

Each Manager evaluates the duties of each employee and prospective employee reporting to him/her. If the duties meets the criteria for required participation in the medical surveillance program (see Section 5.1), then the employee must be enrolled in the medical surveillance program.

Candidates for positions which require medical surveillance may not be hired until satisfactory completion of the baseline (pre-employment) medical examination.

The Manager is responsible for providing the Medical Services Contractor with the following:

- Description of the employee's duties
- Description of actual and potential exposures to chemical, physical, and biological agents and results of measurements when available
- Description of personal protective equipment used or which may be used
- Information from previous examinations which may not be readily available.

5.3.2 Employee

When designated to participate in the medical surveillance program, the employee completes and signs the following documents:

- Medical and Work History Questionnaire
- Medical Records release form for medical records from previous examinations
- Medical Records release authorizing EARTH TECH to receive the results of the examination.

5.3.3 Regional EHS Manager

The Regional EHS Manager reviews employee assignments with Managers in his/her region to ensure all employee who should be participating in the medical surveillance program have been enrolled. The Regional EHS Manager provides such assistance as may be required to ensure all required information is provided to the Medical Director.

5.3.4 Corporate EHS Director

To ensure the appropriate medical examination and tests, the Corporate EHS Director provides the Medical Services Contractor with the following references:

- A copy of the medical program
- A copy of each regulation requiring the examination, including:
  - 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response
  - 29 CFR 1926.65 Hazardous Waste Operations and Emergency Response
  - 29 CFR 1926.62 Lead
  - 29 CFR 1926.1101 Asbestos
  - 29 CFR 1926.1118 Inorganic Arsenic
  - 29 CFR 1926.1127 Cadmium
  - 29 CFR 1926.1128 Benzene
- Where appropriate, a copy of the corresponding state regulations

5.4 Scheduling Preemployment Medical Examination

5.4.1 Human Resources Representative

The Human Resources Representative coordinating the hire will provide the candidate with a baseline medical and work history questionnaire and determine from the candidate the geographical preference for the medical examination. The Human Resources Representative will contact the Medical Services Contractor to obtain the name, address, telephone number and contact person of the contract medical clinic which best suits the geographic preference of the candidate. The Human Resources Representative will coordinate the scheduling of the examination and ensure the scheduling information is provided to the Medical Services Contractor.

5.4.2 Hiring Manager

The hiring Manager informs the candidate that the offer of employment is contingent on the candidate being physically and medically capable of performing the duties of the position for which he/she is being hired. The Manager may not make the final offer until the medical examination is successfully completed and the medical clearance certificate has been received.

5.4.3. Regional EHS Manager

The Regional EHS Manager provides such assistance as is necessary to ensure the job description for the position being filled adequately describes the physical, chemical, and biological stresses of the position, and the PPE used or which may be used, including respiratory protection. The Regional EHS Manager provides

all necessary assistance to ensure that required and appropriate information is provided with the request and authorization for medical examination.

The Regional EHS Manager provides assistance to the hiring Manager to interpret physical activity restrictions if such restrictions are noted on the medical clearance certificate.

5.5 Scheduling Periodic and Exposure-Specific Medical Examinations

5.5.1 Medical Services Contractor

The Medical Services Contractor provides notification to the employee 60 to 30 days before the periodic or exposure-specific medical examination is due. This notification is in the form of a letter or fax to the office of record.

The Medical Services Contractor provides notification of delinquent medical examinations to the Manager, the Regional EHS Manager, and the Corporate EHS Director.

5.5.2 Manager

The Manager ensures the notification of examination due is forwarded to the employee in a timely way.

The Manager arranges the work assignment so that the employee is available to take the medical examination before the expiration of the medical clearance certificate.

The Manager removes the employee from the assignment if the employee has not completed the medical examination before the expiration of the medical clearance certificate.

5.5.3 Regional EHS Manager

The Regional EHS Manager ensures that all exposure assessments appropriate to the employee have been appropriately annotated to show the applicability to the employee and forwarded to the Medical Services Contractor.

The Regional EHS Manager ensures employees on delinquent medical examination list have been removed from designated assignments.

5.6 Scheduling Exit Medical Examinations

5.6.1 Human Resources Representative

Upon notification of termination or impending termination, the Human Resources Representative notifies the Medical Services Contractor to arrange for exit medical examination. The Human Resources Representative ensures terminating and reassigned employees who decline the opportunity to take an exit medical examination sign the waiver.

5.6.2 Manager

Upon notification of termination or reassignment, the Manager contacts the Human Resources Representative.

The Manager releases the terminating or reassigned employee from duties as necessary to complete the exit medical examination.

5.6.3 Regional EHS Manager

The Regional EHS Manager provides such assistance as needed to ensure terminating and reassigned employees are offered the opportunity to take an exit medical examination.

5.7 Medical Records

Medical records must be preserved and protected in accordance with 29 CFR 1910.20 for the duration of employment plus 30 years. Medical records contain information that is protected by the Privacy Act. To meet the obligations of preserving the medical records and protecting the information they contain, EARTH TECH has arranged for the Medical Services Contractor to manage the medical records.

5.7.1 Access to Records

An employee or designated representative may request to review his/her medical and exposure records. Such a request must be in writing, and signed and dated. The Regional EHS Manager will forward the request to the Medical Services Contractor who will provide the employee with a copy of the medical record.

The Medical Services Contractor will supply the copy within 15 days after the request has been submitted by the employee or designated representative. If the copy cannot be supplied within the allotted time, a request for extension will be submitted to the cognizant OSHA office.

5.7.2 Quality Control and Quality Assurance

The Medical Services Contractor performs quality control checks on all medical records to ensure examining physicians appropriately record the findings of the examination and tests.

The Corporate EHS Director has access to all medical records to perform quality assurance checks to ensure proper recording and preservation.

5.8 Reports

5.8.1 Report of Examination

The Medical Services Contractor provides the employee with a confidential report of findings of the examination and a medical clearance certificate. EARTH TECH recommends the employee preserve the medical clearance certificate in a safe place and carry copies of the medical clearance certificate to provide to project managers and clients.

The Medical Services Contractor provides Regional EHS Manager with a copy of the medical clearance certificate.

5.8.2 Examinations Due Report

The Medical Services Contractor produces a list by organization code of employees due to be examined 30 to 60 days before the expiration of their medical clearance certificate. This list is provided to Regional EHS Managers. The Regional EHS Manager ensures each Manager is notified of the employees in his/her charge due examinations so that he/she can schedule appropriately.

The Medical Services Contractor notifies each employee by letter or fax to the office of record 60 to 30 days before the periodic or exposure-specific medical examination is due.

5.8.3 Delinquent Examinations Report

The Medical Services Contractor distributes a report of delinquent medical examinations to the Manager, the Regional EHS Manager, and the Corporate EHS Director.

When an employee's name appears on the delinquent examination report for two consecutive months, the Corporate EHS Director in coordination with the Regional EHS Manager brings this to the attention of the Division Vice President for resolution.