

**Remedial Action Plan
Tourtelot Cleanup Project
Benicia, California**

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Prepared by:



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EXECUTIVE SUMMARY

DOCUMENT DESCRIPTION

This document presents a Remedial Action Plan (RAP) prepared in accordance with the *Imminent and/or Substantial Endangerment Determination and Remedial Action Order (Docket No. VSE 98/99-011)* (Order) issued on June 1, 1999, by the California Environmental Protection Agency (Cal/EPA), Department of Toxic Substances Control (DTSC). This RAP is based on the findings and recommendations contained in the remedial investigation/feasibility study (RI/FS) (Earth Tech, 2001b). The RAP describes and evaluates the preferred remedial action alternative for the Project Site in accordance with the state of California and U.S. Environmental Protection Agency (EPA) criteria.

PROJECT SITE

The 220-acre Project Site includes features known as the South Valley, Ridge, North Valley, and the D-1 Parcel. Figure ES-1 identifies the locations of these features and the identified areas of interest. In 1996, the majority of the Project Site had been fenced with controlled access through security patrols. In 1999, the entire Project Site, as described herein, was fenced and access was controlled.

BACKGROUND

From 1849 through 1958, the United States acquired, by lease, license, or fee, over 2,700 acres in Benicia, Solano County, California, for the former Benicia Arsenal. The former Benicia Arsenal began at the shore of the Carquinez Strait and extended northward. Over its 100-year history, the former Benicia Arsenal was used as a principal depot for ordnance storage, issuance, and transshipment. The Tourtelot Property (which is contained within the Project Site) consists of approximately 200 acres of undeveloped grassland situated in the northwest corner of the former Benicia Arsenal. The Tourtelot Property was leased to the Army from 1944 to 1960; for that period of time the property was part of the Benicia Arsenal. From 1945 to 1960, the Army conducted several arsenal-related activities on the property, including artillery testing, demilitarization, and demolition of damaged and obsolete munitions.

After the arsenal was closed in 1964, the Tourtelot Property changed ownership, and plans for private residential development were initiated. In 1990, grading activities were conducted on the Project Site. Soils were cut from the Ridge, the McAllister Drive Land Bridge was constructed, and the Unit D-1 lots were graded. In 1996, concrete-filled howitzer shells and live ordnance were discovered on the Project Site. This finding prompted the developer of the property, Granite Management Corporation (Granite), and the U.S. Army Corps of Engineers (USACE) to characterize the site for ordnance and explosives (OE) and chemical impacts to soil and groundwater.

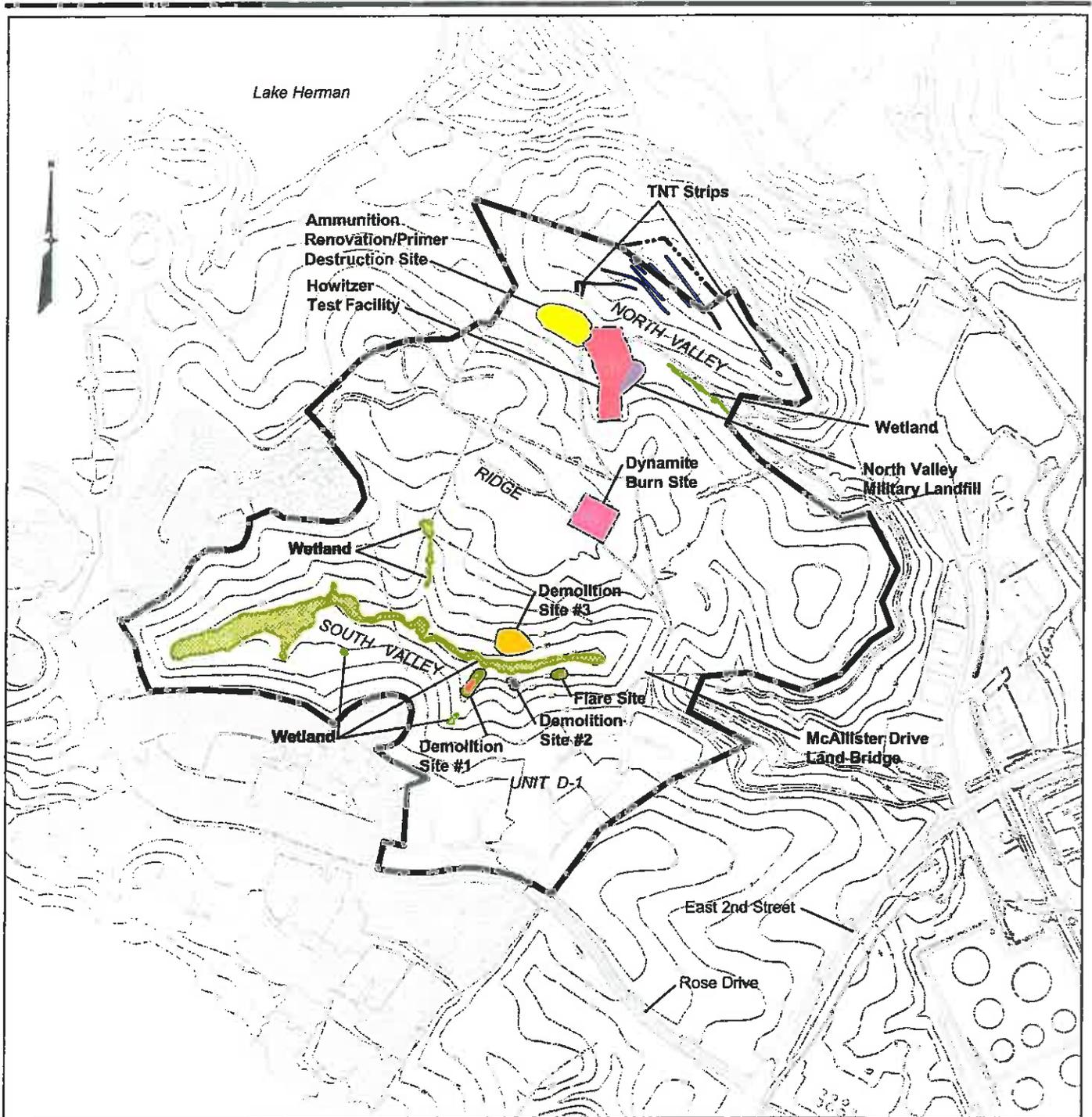
INVESTIGATIONS PERFORMED

The first part of this document presents the results of the historical and geotechnical investigations at the Project Site. USACE conducted historical investigations of the former Benicia Arsenal, including the Project Site, in 1994, 1996, and 1999 (see the March 1994 Archives Search reports [ASRs] [U.S. Army Corps of Engineers, St. Louis District, 1994a and 1994b], the May 1997 Supplemental ASR [U.S. Army Corps of Engineers, St. Louis District, 1997], and the 1999 Records Research Report [Jacobs Engineering, 1999]). In addition, USACE performed an engineering evaluation/cost analysis (EE/CA) in 1999 to evaluate potential OE, and assess safety risks at the former Benicia Arsenal. In fall 1996, Granite conducted a geophysical survey over the entire Project Site, excluding the cut portion of the Ridge, the west portion of the South Valley, and the wetland area in the South Valley, in order to assess the distribution of metallic anomalies. An additional geophysical survey of select areas throughout the Project Site was conducted by USACE in 1999.

The geophysical surveys identified potential surface and subsurface metallic anomalies at the Project Site. The data collected from these surveys were used by Granite to perform OE clearances in August and December 1996, and to support a USACE OE investigation of the former Benicia Arsenal, including the Project Site and adjacent property, in March 1999. Additionally, during the RI in May 2000, an OE clearance was conducted of proposed excavation locations at the North Valley Military Landfill to facilitate the characterization of soil beneath the landfill. Approximately one-half of the geophysical anomalies cleared from the North Valley Military Landfill were OE scrap. No live OE was encountered as part of this effort.

As a result of previous clearances and investigations, nine OE items related to former arsenal activities have been recovered from the Project Site. No live OE items have been recovered to date from the North Valley. All live OE and OE scrap recovered from the Project Site, outside the demolition sites in the South Valley, were recovered at depths less than 2 feet below ground surface (bgs), except in two areas disturbed by grading activities. The absence of live OE and OE scrap at depths greater than 2 feet bgs indicates that OE at the Project Site would likely be found at a shallow depth. This finding is consistent with the historic use of the open burn activities in the South Valley situated within the Project Site.

The preliminary investigation of surface soil and surface water conducted in 1998 by Granite identified the presence of chemicals of concern (COCs) (referred to as chemicals of interest [COIs] in the July 2001 final remedial investigation/feasibility study [RI/FS] for the Tourtelot Cleanup Project) in soil at the Project Site. Four investigations were conducted between May 1999 and September 2000 primarily to evaluate the presence of chemicals in the areas of interest identified as being associated with former Benicia Arsenal activities. The four investigations conducted by Granite under DTSC guidance included an interim investigation, RI, data gaps investigation, and the removal action investigation. The investigations



EXPLANATION

— Project Site Boundary



Note: Contour interval equals 25 feet.

Figure ES-1

Project Site Layout Map

**Tourtlot Cleanup Project
Benicia, California**

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performed to date, with the exception of the removal action investigation, were performed using techniques to avoid metallic anomalies (ordnance avoidance techniques).

Data from these and the previous investigations were used to help define the nature and extent of OE and COCs at the Project Site to the extent possible, based on ordnance avoidance techniques and to evaluate remedial action alternatives.

The Army's historic activities at the Project Site were conducted in the South Valley, the Ridge, and the North Valley. The results of the investigations are summarized by area of interest and featured below:

TNT Strips - North Valley. There are five linear features and one suspected feature on the north hillside of the North Valley, referred to as the TNT Strips. The TNT Strips were used by the Army to dispose of TNT. At two locations along the strips, TNT concentrations exceed 10 percent by weight resulting in these soils being classified as OE. In other areas on the TNT Strips and outside the strips, concentrations of TNT are less than 10 percent, but exceed the Preliminary Remediation Goals (PRGs) established in the RI/FS. Other COCs identified at the TNT Strips include unknown hydrocarbons, polynuclear aromatic hydrocarbons (PAHs), and dioxins/furans (combustion by-products).

Howitzer Test Facility - North Valley. The Howitzer Test Facility was used to test gun barrels by firing dummy/gravel-filled rounds into test tunnels. Low concentrations of petroleum hydrocarbons in the motor oil range, as well as other hydrocarbons (representing weathered fuels) have been detected in the near-surface soil in roads and parking areas at the Howitzer Test Facility.

In addition, low concentrations of petroleum hydrocarbons in the motor oil range and trace levels of petroleum-related volatile organic compounds (VOCs) were detected at depths of up to 10 feet and 20 feet bgs.

North Valley Military Landfill - North Valley. The Army reportedly used this area as a landfill. Wood crates, pallets and packing materials, a crushed metallic structure, and OE scrap were found in this ½-acre area. Low levels of hydrocarbons, VOCs, dioxins/furans, and one pesticide were detected in various soil samples in this area. Trace concentrations of two explosive compounds and one dioxin were detected in grab groundwater samples collected from test pits excavated within the landfill. With the exception of the hydrocarbons, none of these compounds has been detected in the groundwater monitoring wells downgradient of the landfill.

Ammunition Renovation/Primer Destruction Site - North Valley. The Ammunition Renovation/Primer Destruction Site was an area where ordnance was inspected and refurbished, and where ordnance primers were destroyed by burning in a cage. Low concentrations of petroleum hydrocarbons in the motor oil range,

as well as other hydrocarbons, have been detected in both the near-surface and deeper soil.

Two geophysical anomalies in this area have been interpreted as possible underground storage tanks and associated piping, and are thought to represent the source of the deeper hydrocarbon impact.

Dynamite Burn Site - Ridge. Dynamite was reportedly destroyed by burning in this area. No COCs were detected at this site; analysis of the site grading activities indicate that soil from this area was placed in the McAllister Drive Land Bridge.

Flare Site - South Valley. This area was reportedly used to destroy flares by burning. Five metals related to these activities were identified as exceeding the PRGs established to satisfy the remedial action objectives (RAOs) at this site. The metals and their maximum detected concentrations include antimony, barium, copper, lead, and zinc. Dioxins/furans were also detected.

Demolition Site #1 - South Valley. This area was identified as a potential ordnance open burn/open detonation area because of the distribution of metal anomalies. No COCs were detected at this site.

Demolition Site #2 - South Valley. No COCs were detected at this site. In addition, since no physical evidence of ordnance-related activities were found at this site, the site was eliminated from further investigation as part of the RI/FS.

Demolition Site #3 - South Valley. Physical evidence and geophysical studies indicate that this area was used to destroy ammunition by open burn/open detonation. The only COC detected in shallow soil at concentrations exceeding the PRG was mercury.

South Valley Wetland/Sediment - South Valley. The only COC detected in the wetland sediment at concentrations exceeding the PRG was mercury.

Surface Water. Surface water at the Project Site has not been impacted.

Groundwater/Seeps - North Valley. Low concentrations of petroleum hydrocarbons have been detected in groundwater samples collected from one well. Trace levels of explosives, one PAH, and one VOC have been detected in grab groundwater samples and grab seep samples. No explosives, pesticides, or PAHs have been detected in North Valley groundwater wells.

Groundwater/Seeps - South Valley. One explosive compound has been detected once in a groundwater sample collected from a well. No explosive compounds were detected in this well during the recent (August 2000) groundwater sampling event, nor were explosives detected in the first monitoring event (December 1999).

Off-Site Soil Issues. In addition to the impacts listed above within the Project Site boundary, the RI/FS identified two potential off-site issues: (1) adjacent properties to the north and east of the TNT Strips, and (2) off-site fill areas.

All off-site TNT issues will be addressed through confirmation sampling, analysis, and through the post-remediation risk assessment. If necessary, additional excavation of soils will be undertaken. A detailed sampling and analysis plan for confirmation sampling will be included in the Non-OE Remedial Design Document (non-OE RDD), and all analyses performed will be summarized in the Implementation Report required by Section 5.13 of the Order. The Implementation Report shall be approved by DTSC prior to certification and closure of the Project Site.

Soil originally situated within the boundary of the Project Site was moved off site during grading activities in 1990. The soil was used as fill material under residential subdivisions situated south and west of the Project Site. It is not known if the soil transported off site contained OE and/or OE scrap. Information on the distribution of OE and OE scrap obtained during the point clearance activities (investigation of OE and metal anomalies) on the Project Site, as well as the adjacent Gonzalves property to the east of the South Valley, will be evaluated to define the final OE Site Conceptual Model (SCM). This model will be used to assess the potential for OE-impacted soil to have been transported off site.

Granite will develop the final OE SCM based on the above data that will be reviewed and agreed upon by DTSC. The final SCM will be based on data collected during the project point clearance phase of the OE investigation and remediation at the Project Site, which is scheduled to begin in late fall 2001, and during the work at the former Benicia Arsenal, which began in May 2001. Evaluation of the data may be available in the first quarter of fiscal year 2002. Based on the final SCM and consistent with USACE procedure, if DTSC determines that OE was distributed to residential areas outside the Project Site boundary and, as a result, there is a risk that OE items can be encountered in a manner presenting a significant risk of injury or death, then, concurrent with the areawide clearance phase of work activities, a plan will be developed in accordance with an order or agreement to identify and address these off-site areas. This plan will be presented to the public. If required, the plan will include an analysis of response alternatives for these areas. Response alternatives may include development of a Community Awareness Plan to educate the public, institutional controls, surface clearance of OE, and/or detection and clearance of OE to depth.

HEALTH RISK ASSESSMENT

A screening-level Health Risk Assessment (HRA) was performed by Granite under DTSC guidance to assess the potential risks to human health and the environment associated with chemicals at the Project Site. This assessment was based on data collected during the RI. The primary objectives of the screening-level HRA

were to: (1) evaluate potential human health risks based on current Project Site conditions; (2) identify PRGs for those chemicals that contribute significantly to potential human health risks, or are present at concentrations greater than ambient levels; and (3) demonstrate that the proposed PRGs will also be protective of ecological organisms.

A Human Health Screening Assessment of current Project Site conditions was conducted separately for COCs in soils in each area of interest as well as for COCs in groundwater and surface water in the North Valley and/or South Valley. This screening assessment was based on maximum detected concentrations and readily available regulatory screening criteria (U.S. EPA Region IX PRGs). For COCs in soil, the screening excess cancer risks ranged from 2×10^{-2} to 5×10^{-7} , depending on the area of interest and whether the naturally occurring metal, arsenic, was included in the calculation. The non-cancer hazard index ranged from 40 to 0.009, depending on the area of interest and whether the naturally occurring concentrations of iron and manganese were included in the calculation. The chemicals that contributed most significantly to the screening risk estimates included explosive compounds in the TNT Strips, PAHs in Stockpiles #1 and #2 at the Ammunition Renovation/Primer Destruction Site, and dioxins and several metals in the Flare Site. Preliminary soil remediation goals were proposed for these chemicals in these areas as described below. The responsible parties have proposed no further action for chemicals detected in soils in the other areas of interest at the Project Site for protection of human health or the environment. Final determination on cleanup levels will be established through submittal and approval of the post-remediation risk assessment.

For COCs in groundwater and surface water in the North Valley or South Valley, the screening excess cancer risks ranged from 4×10^{-4} to 1×10^{-6} , and the non-cancer hazard indices ranged from 10 to 0.2. The chemicals that contributed most significantly to the screening risk estimates were either metals that are not believed to be associated with site activities, or chemicals detected infrequently or only in grab groundwater samples that are not considered to be representative of dissolved concentrations in groundwater or surface water at the Project Site.

In most instances, preliminary soil remediation goals were developed for the chemicals in specific areas identified above as contributing most significantly to the screening risk estimates, or for chemicals detected above ambient conditions. The preliminary soil remediation goals for explosives are based on protection of human health. The PRGs for dioxins and metals are based on ambient concentrations, which are also protective of human health. A non-detect value is proposed for the PAHs remediation goal. Although not of concern from a human health perspective, a preliminary soil remediation goal based on ambient concentrations is also proposed for mercury in Demolition Site #3 because mercury was detected above ambient concentrations in this area.

The results of a screening-level assessment indicate that the preliminary soil remediation goals for explosive compounds based on protection of human health will also be protective of ecological organisms. A post-remediation human health

and ecological risk assessment will be conducted to evaluate the risks from residual levels to ensure protection of public health and the environment has been achieved. This risk assessment, to be included in the Implementation Report required by Section 5.13 of the Order, will also be used by DTSC to determine whether any further remedial activities are necessary. The post remediation risk assessment will establish the final remediation goals that will be used to determine if further excavation is warranted.

SUMMARY OF RAOs

The following preliminary soil remediation goals have been established to satisfy the RAOs for the Project Site. As described above, the post-remediation risk assessment will be used to evaluate the residual risk and to determine the appropriateness of the PRGs listed below.

| | Preliminary Soil Remediation Goal | Area of Cleanup |
|--|--|--|
| <u>Metals in Soil</u> | | |
| Antimony | 2.84 mg/kg | Flare Site |
| Barium | 642 mg/kg | Flare Site |
| Copper | 87.7 mg/kg | Flare Site |
| Lead | 148 mg/kg | Flare Site |
| Mercury | 0.77 mg/kg | Demolition Site #3 |
| Zinc | 142 mg/kg | Flare Site |
| <u>Organic Compounds in Soil</u> | | |
| Dioxins | 12 pg/g | Flare Site |
| 2,4,6-trinitrotoluene (TNT) | 16 (residential) mg/kg | TNT Strips |
| 2,4,6-trinitrotoluene (TNT) | 53 (recreational) mg/kg | TNT Strips |
| 2,6-dinitrotoluene (2,6-DNT) | 0.5 mg/kg ^(a) | TNT Strips |
| PAHs: benzo(a)pyrene and dibenz(a,h)anthracene | 0.03 mg/kg ^(a) 0.05 mg/kg ^(a) | Stockpiles #1 and #2 |
| Total Petroleum Hydrocarbons | 500 (residential) mg/kg | Areas to be determined based on potential underground storage tank |

Note: (a) Goals are estimated Practical Quantitation Limit values; because these are lab-specific numbers, they may change when the laboratory for the remedial action phase is selected. It is anticipated that the lab used will be able to achieve similar numbers.

PAH = polynuclear aromatic hydrocarbon

FEASIBILITY STUDY

An FS was completed to identify a range of alternatives to remediate OE and chemically affected soil, and address groundwater at the Project Site. The FS utilized data and analyses generated as part of the RI and screening-level Health Risk Assessment to develop potential alternatives for chemicals of concern in soil.

The FS process was conducted in accordance with EPA guidance (1988), the National Oil and Hazardous Substance Pollution Contingency Plan (NCP) (EPA, 40 Code of Federal Regulations Part 300), and the California Environmental Quality Act (CEQA). This process included identification and screening of remedial technologies and process options, and the development, screening, and analysis of comprehensive alternatives to meet the RAOs and other regulatory requirements.

A total of 13 potential alternatives were initially considered in the FS. These alternatives were screened on the basis of feasibility, implementability, and cost in order to focus on those alternatives with the greatest potential to remediate the Project Site. In addition, the "no action/no project" alternative was evaluated and retained, in accordance with EPA and CEQA guidelines.

Portions of the Project Site are zoned for residential use. Accordingly, only remedial alternatives consistent with residential standards were carried through the full evaluation process in the FS.

The following eight alternatives were carried forward for detailed analysis:

Alternative 1: No Action

Alternative 2: Institutional Controls and Monitoring

Alternatives 5A and 5B: OE point clearance over entire site; areawide OE clearance in the North Valley and Ridge areas having a potential for containing OE intended for future residential use, as well as overburden soil at the north edge of the Unit D-1 lots; excavation, treatment, and disposal of chemically affected soil above Final Remedial Action Goals (FRGs) that will be determined based on results of the post-remediation risk assessment; installation of a layer of crushed bedrock over areawide clearance soils in future residential areas; and institutional controls and monitoring.

Alternatives 6A and 6B: Includes Alternative 5 components plus the excavation of South Valley OE Kick-out Zone soil and placement in the North Valley and adjacent to the South Valley wetlands; with additional geophysical scanning of OE Kick-out Zone soil in lifts during placement.

Alternatives 8A and 8B: Includes Alternative 5 components plus the excavation of South Valley OE Kick-out Zone soil and replacement in the South Valley; with additional geophysical scanning of OE Kick-out Zone soil in lifts during placement in South Valley.

Alternatives 5A, 6A, and 8A include testing of soils during remedial activities, and treatment by homogenization of soils containing TNT concentrations greater than 10 percent to levels acceptable for off-site transport and disposal. Alternatives 5B, 6B, and 8B include composting to treat soil containing TNT to nonhazardous levels acceptable for off-site transport and disposal. If treated soil meets all PRGs, and it

is determined to be acceptable following the post-remediation risk assessment, the soil would be left on site.

The above alternatives were evaluated in detail, in accordance with the nine criteria specified in the NCP and EPA guidance. Alternatives 1 and 2 would not satisfy the RAOs or provide long-term permanent remedies for OE and chemically affected soils at the Project Site. Alternatives 5, 6, and 8 would achieve the RAOs and effectively remediate the Project Site. These alternatives would remediate all areas of interest. Alternatives 5, 6, and 8 vary primarily with respect to the location and quantity of soils in the South Valley that would be remediated for OE using areawide clearance procedures. There would be potential short-term impacts for all alternatives related to excavation and construction activities, and implementation of a minimum separation distance when remediating the Project Site for OE.

Alternative 5A is the recommended alternative. Alternative 5A is the recommended remediation alternative. Alternative 5A has smaller short-term and potential long-term impacts on the South Valley than does Alternatives 6 and 8. Based on comments received on the draft RI/FS Report, Alternative 5A appears to be favored by both the agencies and the community. This alternative would be more implementable and cost-effective than Alternatives 6 and 8. Potential impacts would be managed using various engineering and institutional controls. Alternative 5A would be effective in eliminating the potential pathway for contact with OE in residential areas through application of point clearance, areawide clearance, removal of overburden soil within 14 feet of finished grade, and through placement of a 14-foot-thick layer of OE-free crushed bedrock over areawide clearance soils. In nonresidential areas, the potential exposure to OE would be reduced through the use of institutional controls and other measures, such as zoning changes, and informational devices, such as education/ information programs. Soils found to contain contamination above the PRG and FRG, will be excavated and transported to an appropriate off-site landfill. In some cases (e.g., TNT), pre-disposal treatment to reduce explosive threat may be needed.

Following completion of the remedial activities, water quality (groundwater, subdrain water, surface water, and seeps), soil stability, erosion, wetlands, and institutional controls would continue to be monitored and maintained to verify that conditions do not present any significant health or environmental risks, and that the remedy remains effective. Upon completion of point clearance and soil remediation efforts and the post-remediation risk assessment, institutional controls will be finalized, and final monitoring requirements will be incorporated into a final Operations and Maintenance (O&M) Plan. The final O&M Plan will be included in the O&M Agreement required by Section 5.14 of the Order.

REMEDIAL ACTION PLAN

The public was encouraged to participate in the remedy selection process. The draft RAP was available for review during a 45-day comment period (September 12, 2001 through October 25, 2001) in the public information repository for the Project

Site at the Benicia Public Library at 150 East L Street, Benicia, California 94510; and the DTSC office at 8800 Cal Center Drive, Sacramento, California 95826. Public comments were provided to DTSC at a public meeting held on September 25, 2001. In addition, formal written comments were sent directly to the DTSC office.

An Administrative Record list of documents related to the remedial action described in this RAP is included in Appendix B. The Statement of Reasons, which sets forth the basis for the selected remedial action, and includes the preliminary Nonbinding Allocation of Responsibility and the evaluation criteria, is included in Appendix C. The Responsiveness Summary, which responds to all oral and written public comments on the draft RAP received during the public comment period, is included in Appendix D. Copies of the final CEQA documents for implementation of the remedial measures are available for review at the Benicia Public Library or at the above DTSC office.

The above proposed remedy is based on information provided to date. Should additional information become available through activities proposed herein, or by other means, DTSC will evaluate this information for the purpose of determining whether additional remediation requirements and public review are needed.

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List of Acronyms

| | |
|-------------------|---|
| ARAR | applicable or relevant and appropriate requirement |
| ASR | Archives Search Report |
| BAAQMD | Bay Area Air Quality Management District |
| bgs | below ground surface |
| BIP | Blow in Place |
| BTEX | benzene, toluene, ethylbenzene, and xylene |
| CaCO ₃ | calcium carbonate |
| Cal/EPA | California Environmental Protection Agency |
| CAP | Contingency Action Plan |
| CDFG | California Department of Fish and Game |
| CEQA | California Environmental Quality Act |
| cm/sec | centimeters per second |
| COC | chemical of concern |
| COI | chemical of interest |
| DEM | Solano County Department of Environmental Management |
| DFG | Department of Fish and Game |
| DNT | dinitrotoluene |
| DOD | U. S. Department of Defense |
| DTSC | Department of Toxic Substances Control |
| EE/CA | engineering evaluation/cost analysis |
| EIR | Environmental Impact Report |
| EPA | Environmental Protection Agency |
| FRG | Final Remedial Action Goals |
| FS | feasibility study |
| HE | high explosive |
| HRA | Health Risk Assessment |
| µg/L | micrograms per liter |
| mg/kg | milligrams per kilogram |
| mg/L | milligrams per liter |
| mm | millimeter |
| MSD | minimum separation distance |
| msl | mean sea level |
| NCP | National Oil and Hazardous Substance Pollution Contingency Plan |
| NPDES | National Pollutant Discharge Elimination System |
| OE | ordnance and explosives |
| Order | Imminent and/or Substantial Endangerment Determination and Remedial Action Order (Docket No. I/SE 98/99-011) |
| OSHA | Occupational Safety and Health Administration |
| PAH | polynuclear aromatic hydrocarbon |
| PCB | polychlorinated biphenyl |
| pg/g | picograms per gram |
| pg/L | picograms per liter |
| PQL | Practical Quantitation Limit |
| PRG | Preliminary Remediation Goal |
| QA | quality assurance |

| | |
|-------|--|
| QC | quality control |
| RAO | remedial action objective |
| RAP | remedial action plan |
| RDD | Remedial Design Document |
| RI | remedial investigation |
| RWQCB | Regional Water Quality Control Board |
| SARA | Superfund Amendments and Reauthorization Act |
| SCM | Site Conceptual Model |
| SHPO | State Historical Preservation Office |
| SUXOS | Senior Unexploded Ordnance Supervisor |
| TBC | to be considered |
| TCDF | tetrachlorodibenzo-p-furan |
| TEF | toxicity equivalent factor |
| TEPH | total extractable petroleum hydrocarbons |
| TEQ | toxicity equivalent |
| TNT | trinitrotoluene |
| USACE | U.S. Army Corps of Engineers |
| USFWS | U.S. Fish and Wildlife Service |
| UST | underground storage tank |
| UTL | upper tolerance limit |
| UXO | unexploded ordnance |
| VOC | volatile organic compound |
| WHO | World Health Organization |

1.0 SITE BACKGROUND

1.1 INTRODUCTION

This draft Remedial Action Plan (RAP) has been prepared in accordance with the *Imminent and/or Substantial Endangerment Determination and Remedial Action Order (Docket No. V/SE 98/99-011)* dated June 1, 1999 (the "Order"), issued by the California Environmental Protection Agency (Cal/EPA), Department of Toxic Substances Control (DTSC). The Project Site covered by this draft RAP includes approximately 220 acres of undeveloped real property in Benicia, California, including property commonly known as the Tourtelot Property (Figure 1-1). The Project Site is partially within the boundaries of the former Benicia Arsenal (Figure 1-2).

The following describes the site history, environmental setting, and the known chemical uses relating to past activities at the Project Site.

1.2 SITE HISTORY

The Benicia Arsenal was created in 1849 on a leased 345-acre parcel of land. The Benicia Arsenal area expanded to over 2,000 acres in 1941. In 1944, the Army leased a 200-acre piece of undeveloped ranch land now known as the Tourtelot Property, which was situated next to the north end of the Benicia Arsenal. By 1958, the Benicia Arsenal area had reached a maximum of approximately 2,728 acres. The Benicia Arsenal was used variously as a depot for storing, issuing, repairing, and distributing ordnance, testing gunpowder, and holding and storing ammunition and explosives.

Between 1945 and 1947, the Army began developing the Tourtelot Property for a number of different activities in the North Valley, on the Ridge, and in the South Valley. These activities included artillery testing, demilitarization, and demolition of damaged and obsolete ammunition. In 1955 and 1960, the Army's leases for the Tourtelot Property terminated; in January 1962, the Department of Defense (DOD) initiated the disposal of the Benicia Arsenal by declaring leased portions as excess (Jacobs Engineering, 1999). DOD announced plans to deactivate the Benicia Arsenal on March 30, 1961, and closure was set for March 30, 1964. The actual process of closeout of the Benicia Arsenal was finalized in February 1965, when the U.S. General Services Administration deeded approximately 1,785 acres to the City of Benicia.

Portions of the Benicia Arsenal were developed for residential and commercial uses in the late 1960s. However, the lands, which are now part of the Project Site, remained under private ownership and were not developed. In 1971, portions of the Tourtelot Property were acquired by developers, 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) (EIP Associates, 1989), for residential development of the land. In 1990, grading activities were conducted on the Project Site in support of off- and on-site residential development.

The U.S. Army Corps of Engineers (USACE) conducted historical investigations of the former Benicia Arsenal, including the Project Site, in 1994, 1996, and 1999 (see the March 1994 Archives Search reports [ASRs] [U.S. Army Corps of Engineers, St. Louis District, 1994a and 1994b], the May 1997 Supplemental ASR [U.S. Army Corps of Engineers, St. Louis District, 1997], and the 1999 Records Research Report [Jacobs Engineering, 1999]).

In mid-1996, during the initial site preparation activities associated with the residential development, concrete-filled howitzer shells were unearthed. Granite (the developer) 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. On May 3, 1996, DTSC performed a site visit in response to concerns raised by local citizens concerning possible hazards on the property due to past DOD activities. Following that site visit, DTSC recommended that a thorough investigation of the site be performed, including a Preliminary Endangerment Assessment and an Ordnance and Explosive Waste Assessment. DTSC also recommended that development activities at the site be curtailed pending completion of the investigation of the site. Granite subsequently retained military-trained explosives specialists, and initiated preliminary site investigations for ordnance and explosives (OE). In fall 1996, Granite conducted a geophysical survey over the entire Project Site, excluding the cut portion of the Ridge, the west portion of the South Valley, and the wetland area in the South Valley, in order to assess the distribution of metallic anomalies. In fall 1996, live ordnance was encountered and reported by Granite to local military personnel for handling. Granite provided its investigation data to USACE.

In 1998, USACE began investigation of the Project Site as part of a Benicia Arsenal investigation to characterize the area for OE. The USACE investigation included an additional geophysical survey of select areas throughout the Project Site in 1999. Findings of the investigation were used to perform an engineering evaluation/cost analysis (EE/CA).

In response to the Order issued by DTSC, Granite initiated an RI at the Project Site in 1999. Four phases of investigations were conducted between May 1999 and September 2000 primarily to evaluate the presence of chemicals in the areas of interest. The four phases included an interim investigation, remedial investigation (RI), data gaps investigation, and the removal action investigation. The investigations performed to date, with the exception of the removal action

investigation, were performed using techniques to avoid metallic anomalies (ordnance avoidance techniques).

1.3 ENVIRONMENTAL SETTING

Topography. The Project Site is situated in a hilly area dominated by a central, northwesterly trending ridge that acts as a drainage divide between a major drainage swale to the south, referred to as the South Valley, and a smaller drainage swale to the north, referred to as the North Valley. The Project Site elevations range from approximately 60 above feet above mean sea level (msl) to 300 feet above msl.

Geology. The Project Site is underlain by bedrock units of the Panoche Formation. The bedrock units are exposed in graded cut areas, but are generally overlain by surficial deposits consisting of fill, shallow landslide deposits, alluvium, and colluvium. The Panoche Formation at the Project Site is primarily interbedded shale and siltstone with minor amounts of sandstone. The upper portion of the bedrock is severely to moderately weathered. At depth, the bedrock becomes compact and tight. Fill consists both of engineered fill associated with grading for development, and fill of unknown quality associated with activities during the previous operation of the Benicia Arsenal (bottom of the North Valley). The engineered fill at the Project Site includes the McAllister Drive Land Bridge across the South Valley, fill placed to develop building pads in Unit D-1, and fill placed along the sewer bench and to repair slide areas. Alluvium in the valley floor consists of highly plastic (fat) clay, with minor amounts of weathered shale, siltstone, and sandstone fragments. Colluvial deposits are very similar in composition to the alluvium, and include residual soils found on ridge slopes and slopes bounding the valley floor. They are generally thickest in the drainage swales, and consist of fat clay with varying amounts of sand and fragments of weathered shale, siltstone, and sandstone.

Groundwater. Groundwater occurs intermittently at the Project Site in the alluvium/colluvium horizon and the underlying weathered and fractured Panoche Formation (bedrock). Although these geologic units contain groundwater, they cannot, by definition, be considered "aquifer" material because they do not transmit significant quantities of water under ordinary hydraulic gradients (Freeze and Cherry, 1979). During the non-OE RI at the Project Site, hydraulic testing was conducted to evaluate the hydraulic conductivity for the alluvium/colluvium horizon and the Panoche Formation. The low hydraulic conductivities measured during these investigations (approximately 10^{-5} centimeters per second [cm/sec]) are consistent with the fine-grained sediments (primarily silts and fat clays) encountered at the Project Site. Additionally, the sediment thickness in most portions of the Project Site does not support the minimum well seal of 20 feet, as required by Solano County for residential water supply or 50 feet for industrial or community wells.

Groundwater beneath the Project Site does not occur in quantities and/or yields that would allow for economically feasible extraction. This is supported by both the past and present water use practices in the vicinity of the Project Site. The majority of drinking water for the City of Benicia is currently obtained from the Sacramento River via the North Bay Aqueduct; additional water for the City is obtained from Lake Herman, situated approximately 1,000 feet northwest of the Project Site.

Surface Water. Surface water occurrences within the boundaries of the Project Site consist of ephemeral creeks, surface seeps, and wetlands. There is a small area (0.093 acre) at the east end of the North Valley that has been identified as a wetland due to a shallow groundwater level and other indications. In the South Valley, an unnamed creek flows from west to east, exiting the Project Site through a culvert under the McAllister Drive Land Bridge. Additionally, there are several small seep areas. These areas (4.89 acres total) are commonly referred to as the South Valley "wetlands." The land bridge at the east end of the wetland is designed to restrict flow during periods of heavy precipitation to prevent flooding downstream. The wetland receives runoff from the seeps and storm drains, both on and off site, as well as natural runoff from the valley slopes upstream. The majority of seeps generally flow only during or immediately after major precipitation events. Surface water from the Project Site flows down to the Sulphur Springs Creek Canal, which generally runs from north to south through the industrial park east of the Project Site, eventually exiting into the Carquinez Strait near the Benicia-Martinez bridge.

Air Quality. Wind patterns heavily influenced by the Carquinez Strait have a significant effect on air quality at the Project Site and surrounding area. The predominant wind direction during the summer is from the east, while during the winter, it prevails from the west. There are industrial facilities in the area of the Project Site (e.g., a refinery) that produce air emissions. The emissions are usually moderated by the high wind speeds through the Carquinez Strait; however, there have been short-term pollution episodes from industrial facilities in the area.

Biological Resources. The Project Site and surrounding area support a number of biological resources that include the following:

- The majority of the Project Site is covered with non-native annual grassland vegetation present on the hillsides, ridgetops, and some of the valley floor areas of the Project Site.
- The unnamed creek that crosses the south portion of the Project Site (South Valley) supports both willow riparian and freshwater marsh vegetation. Wetland vegetation occurs along the creek and in seep areas on the hillsides.

- Habitat for wildlife at the Project Site includes disturbed areas, non-native grasslands, freshwater marsh, and willow riparian communities. Section 2.2.7.2 of the RI/feasibility study (FS) (Earth Tech, 2001b) provides information on the reptiles, birds, and mammals present on the Project Site.

Demographics. Benicia is the fourth largest city in Solano County, ranking in population behind the cities of Vallejo, Fairfield, and Vacaville. The current population of Benicia is estimated to be 28,300 (City of Benicia, 2000). The median age of a Benicia resident is 37 years, and the 35- to 44-year age group is the largest population group at 19.3 percent. The largest single employer in Benicia is the refinery (owned by the Valero Energy Corporation), with approximately 400 employees (City of Benicia, 2000). The 1990 census documented a total of 9,587 housing units, of which 64 percent were single-family detached units.

Additional information on the Project Site environmental setting is presented in Section 2.2 of the RI/FS (Earth Tech, 2001b), and additional information on the site geology and site hydrology/hydrogeology is presented in Sections 4.3 and 4.4, respectively, of the RI/FS.

1.4 KNOWN CHEMICAL USES AND DOCUMENTED RELEASES

From 1945 to 1960, DOD used portions of the Project Site to accommodate a range of activities as follows:

North Valley - The hillside to the north of the North Valley was used to dispose of 2,4,6-trinitrotoluene (TNT) (TNT Strips). Approximately 6 acres in the North Valley were developed with roads and structures where the accuracy of howitzer gun barrels was checked (Howitzer Test Facility), ordnance was inspected and renovated, and primers were destroyed in a "squirrel cage" (Ammunition Renovation/Primer Destruction Site). A disposal area referred to as the "North Valley Military Landfill" was also situated in the North Valley. Three soil stockpiles are present in the North Valley. These stockpiles were created in 1996 during OE clearance activities in the bottom of the North Valley.

Ridge - Part of the Ridge was used to dispose of aged, out-of-service dynamite (Dynamite Burn Site). In addition, a possible mobile communications tower was identified on the Ridge in a 1950 ground-level photograph. Inspection of 1952 aerial photographs did not reveal evidence to support designating the location of the mobile communications tower as an area of interest.

South Valley - In the South Valley, there was a Flare Site, and up to three suspected demolition sites (Demolition Sites #1, #2, and #3). The Flare Site was used to burn old, out-of-service flares. This generally was accomplished by

placing a number of flares in a pile and igniting them. 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. Also, a half-track armored personnel vehicle was removed from Demolition Site #3.

The locations of these "areas of interest" are presented in Figure 1-3. Additional information on the DOD activities that are believed to have occurred at each area of interest is presented in Section 2.3.1 of the RI/FS (Earth Tech, 2001b).

Chemicals of concern (COCs) (referred to as chemicals of interest [COIs] in the July 2001 final RI/FS for the Tourtelot Cleanup Project and the Non-OE and OE Remedial Design Documents [RDDs]) identified for the Project Site include those specifically attributed to past activities, those believed to be potential by-products of past activities, those associated with other COCs, or those associated in some manner with certain types of OE that may not have had any association with past activities at the Project Site, but that could not be completely dismissed. The following COCs were identified as being or potentially being associated with activities at the Project Site: explosives, polynuclear aromatic hydrocarbons (PAHs), petroleum hydrocarbons (quantified against a diesel, motor, and kerosene standard), volatile organic compounds (VOCs), metals, phosphorus, nitrate and nitrite, dioxins/furans, perchlorate, organochlorine pesticides, chloropicrin, pentachlorophenol, hydrazine, and polychlorinated biphenyls (PCBs). Tables 4-1 and 4-2 of the RI/FS (Earth Tech, 2001b) provide a detailed summary of the COCs and their association to activities at the Project Site.

The potential migration pathways of the COCs are controlled by the Project Site topography/drainage patterns, geology and hydrogeology. In general, the mechanisms for surface migration of COCs include local downslope gravity movement of soil; surface runoff of precipitation; erosion from wind, water, and vehicle traffic; and grading activities. The subsurface migration of COCs by infiltration is limited by the low-permeability soil and bedrock and the limited occurrence of groundwater.

After closeout of the Benicia Arsenal in 1965, the findings indicating the potential presence of OE and COCs at the Project Site are as follows:

- In 1996, concrete-filled howitzer shells were unearthed during the initial site preparation activities associated with development of the Project Site. Granite alerted officials, retained military-trained explosives specialists, and initiated preliminary site investigations for OE. In late fall 1996, live ordnance was encountered and reported by Granite to local military personnel for handling.

- In 1998, SECOR International, Inc., conducted sampling and testing of surface soils and surface water from portions of the Project Site in order to obtain preliminary data for development of the property. The results indicated elevated concentrations of explosives and metals in soil.
- In 1998, USACE initiated preparation of an EE/CA to characterize the former Benicia Arsenal for OE. The Project Site was included within the area of investigation, and preliminary findings confirmed the presence of OE on the Project Site.

In response to these findings, DTSC issued the *Imminent and/or Substantial Endangerment Determination and Remedial Action Order (Docket No. VSE 98/99-011)* (the "Order") for the Project Site on June 1, 1999.

- In May 2000, a remedial action investigation was performed in the area of the North Valley Military Landfill. OE clearance activities were performed to allow collection of soil samples for chemical analysis. OE scrap and metallic debris were found. No OE items were found.

1.5 DEPARTMENT OF TOXIC SUBSTANCES CONTROL'S ROLE

The Order for the Project Site issued by DTSC requires that removal and remedial action be taken. DTSC has and continues to provide regulatory oversight over the process of assessment of the site conditions, and will provide continuing oversight through to completion of the remedial action.

2.0 REMEDIAL INVESTIGATION

The following provides a summary of the RI conducted at the Project Site. Additional information on the non-OE RI program, the results, and a summary of the work performed are presented in Chapter 4.0, Chapter 5.0, and Appendix C, respectively, of the RI/FS. Additional information on the OE RI findings and a summary of previous OE investigations are presented in Chapter 9.0 and Appendix G of the RI/FS (Earth Tech, 2001b).

2.1 SCOPE AND ACTIVITIES

The objectives of the RI were to (1) evaluate the nature and extent of COCs that may have impacted the soil, sediment, surface water, and/or groundwater as a result of DOD or other activities at the Project Site; (2) identify potential exposure pathways through environmental media; (3) assess if there was a release at the Project Site, and if there have been impacts to public health or the environment; and (4) characterize the nature and extent of OE at the Project Site to an extent sufficient to develop and evaluate remedial action alternatives in the FS, the ultimate goal being to remediate portions of the Project Site to levels acceptable for residential land use. These objectives were achieved using the following RI process:

1. Regional and Project Site information, including environmental setting, geology, hydrogeology, history of DOD activities at the Project Site, and past grading activities, was researched and documented.
2. Data from previous environmental, geotechnical, and geological investigations were compiled and evaluated.
3. COCs were identified for each area of interest, and conceptual models of potential impact developed accordingly, including the definition of transport pathways and receptors.
4. An iterative sampling and analysis program was developed and implemented for the areas of interest, as well as other areas of investigation; the COCs, location and/or dimensions of the areas of interest, and conceptual models were refined, as necessary, between each investigative phase.
5. The analytical results of the sampling and analysis program were compiled in a database, reviewed for quality, summarized on figures and tables, and described.

6. The analytical data were evaluated in the context of the Conceptual Site Model for the areas of interest and areas of investigation to delineate the horizontal and vertical extent of COCs in soil, sediment, surface water, and groundwater, to the extent necessary to evaluate health risks and remedial action alternatives.

COCs, as defined in this document, consist of organic and inorganic constituents and metals known or suspected of representing impact associated with site activities. Since metals and organic compounds naturally occur in soil, site-specific ambient concentrations were determined for each metal of interest. Results for these metals were then evaluated in terms of the site ambient concentrations.

The iterative and focused approach used for the RI at the Project Site resulted in the following four phases of fieldwork:

- **Interim Investigation** - Conducted in May through July 1999. Data from the interim investigation were used in the development of site conceptual models (SCM) that were used to determine the scope and rationale for the field sampling programs.
- **Remedial Investigation** - Conducted in December 1999. The RI was designed to evaluate the nature and extent of COCs at the Project Site.
- **Data Gaps Investigation** - Conducted in several phases starting in February 2000 through September 2000. A review of the RI preliminary (i.e., unverified and unvalidated) data identified a number of "data gaps" that would need to be filled prior to completion of the RI.
- **Removal Action Investigation** - Conducted in May and June 2000. The removal action investigation focused on the North Valley Military Landfill, which was not included in any of the previous investigations since investigation of this site would require potential "OE removal" to complete the fieldwork, as opposed to potential "OE avoidance" practiced during the interim, remedial, and data gaps investigations.

Figures 2-1 and 2-2 indicate the RI sampling locations. The RI included collection of soil, sediment, surface water, and groundwater samples for laboratory analysis from the following areas of interest resulting from DOD or other activities at the Project Site, as well as from associated areas based on the potential presence of COCs:

North Valley - TNT Strips, Howitzer Test Facility and associated Stockpile #3, North Valley Military Landfill, Ammunition Renovation/Primer Destruction Site and associated Stockpiles #1 and #2, and North Valley groundwater/seeps

Ridge - Dynamite Burn Site

South Valley - Flare Site, Demolition Sites #1 through #3, South Valley wetlands sediment/surface water and groundwater/seeps, and McAllister Drive Land Bridge (potentially impacted by COCs derived from the Ridge as a result of site grading activities).

Investigation of a number of stockpiles situated on the Ridge between the North and South Valleys (Ridge Stockpiles) was also included in the RI, although these stockpiles were brought to the Project Site from off-site areas, and are not related to DOD activities at the Project Site, to assess potential site impact and determine eventual disposition of the stockpiled materials. The Ridge stockpiles, consisting predominantly of soil mixed with construction debris, are from development activities adjacent to the Project Site.

Other activities conducted as part of the RI included (1) installation and sampling of groundwater monitoring wells to evaluate the presence and quality of groundwater in the North and South Valleys; (2) collection of soil samples from locations outside the areas of interest, which have not been subject to any grading activities, to evaluate ambient conditions; and (3) the use of shallow refraction seismic data, test pits, and geotechnical boreholes to evaluate the depth to bedrock at the Project Site to assist in the calculation of volumes of soil that may need to be excavated as part of removal action alternatives evaluated in the FS.

The following COCs, identified as being associated with or potentially associated with past DOD or other activities at the Project Site, were selected for sample analysis: explosives, PAHs, petroleum hydrocarbons (quantified against diesel, motor, and kerosene standards), VOCs, metals, phosphorus, nitrate and nitrite, dioxins/furans, perchlorate, organochlorine pesticides, chloropicrin, pentachlorophenol, hydrazine, and polychlorinated biphenyls (PCBs). In addition to these COCs, the following additional chemical or physical parameters were analyzed for selected soil and/or groundwater samples for general characterization purposes: total organic carbon, grain size, sulfate, chloride, pH, electrical conductivity, total dissolved solids, and total suspended solids. Table 4-3 of the RI/FS (Earth Tech, 2001b) provides a summary of the COCs, and the additional parameters analyzed at each area of interest. Tables 4-4 through 4-7 of the RI/FS further detail the analyses performed during each investigative phase at each area of interest.

2.2 FINDINGS

The following specific conclusions, based on the RI data, are presented with respect to nature and extent of chemical impact for each area of interest and other areas of investigation defined in the RI. Final borehole locations were subject to, and dependent upon, OE avoidance. COCs detected in the various media were compared to ambient concentrations in order to assess the nature and extent of site impact resulting from DOD or other Project Site activities. For all COCs, excluding those occurring naturally in soil and groundwater and dioxins/furans, ambient was considered to be "non-detect." Site-specific soil ambient values were established for each metal. Ambient concentrations for the Project Site were calculated as the 95th percentile of ambient soil data. The calculated ambient concentrations were then used as a screening tool to assist in the identification of DOD-related soil impact. Soil samples used for estimation of ambient concentrations consisted of 20 samples from the Project Site, which were collected using a random sampling design that targeted non-DOD-impacted areas.

Figures 2-3 through 2-6 show the estimated lateral extent of soil/bedrock impacted with COCs in the North Valley, Flare Site, and Demolition Site #3. Additional nature and extent information is presented in Chapter 6.0 of the RI/FS (Earth Tech, 2001b). The results of the site-specific ambient metals concentration evaluation are also presented in Chapter 6.0 of the RI/FS.

NORTH VALLEY

TNT Strips - Explosive compounds were detected in the soil at the TNT Strips area. Other COCs (i.e., explosives, unknown hydrocarbons) and combustion by-products (i.e., PAHs and dioxin/furans) were also detected. TNT has been detected in the upper 2-1/2 feet of soil along the axis of the TNT Strips at concentrations exceeding 100,000 milligrams per kilogram (mg/kg) (i.e., 10 percent by weight) in three samples at two locations, out of a total of 84 samples collected along the axis of the TNT Strips within the upper 2-1/2 feet. TNT concentrations in other locations along the TNT Strips in the upper 2-1/2 feet are also high, but are generally less than 50,000 mg/kg (5 percent by weight). Soil containing TNT at a concentration of 10 percent or greater is classified as OE. At a depth of approximately 10 feet below ground surface (bgs), TNT concentrations in the TNT Strips are typically non-detect, or less than 16 mg/kg, which is the proposed cleanup level for TNT in residential areas. TNT concentrations also decrease significantly away from the axis of the strips. At a distance greater than 20 feet in the downslope direction and 10 feet in the upslope direction, concentrations of TNT in the soil within the upper 4 feet are non-detect, or less than 16 mg/kg. Other compounds associated with the COCs, such as unknown hydrocarbons, PAHs, and dioxins/furans, are found with TNT, and therefore will be addressed as part of any remedial action alternative(s) considered for explosive

compounds at the TNT Strips (see Appendix A and OE RDD [Earth Tech, 2001a] for details).

Concentrations of TNT less than 200 mg/kg have been detected in surficial soil samples approximately 900 feet northwest of the TNT Strips (see Figure 2-3). Concentrations of TNT less than 100 mg/kg have also been detected sporadically in the surficial soil along the ridge top above the TNT Strips area near the eastern Project Site boundary. TNT at 17 mg/kg or less has also been detected in the soil/bedrock along the floor of the North Valley. The estimated lateral extent of the impacted soils is delineated on Figure 2-3.

Sampling completed to define the lateral extent of TNT outside the Project Site boundary, north and east of the TNT Strips area, has shown that explosive compounds have not migrated at detectable concentrations off the Project Site.

Howitzer Test Facility and Stockpile #3 - Trace levels of non-point-source petroleum hydrocarbons (i.e., motor oil [up to 58 mg/kg] and unknown hydrocarbons typical of weathered fuels [up to 97 mg/kg]) and isolated trace concentrations of fuel-related VOCs (up to 0.0055 mg/kg) were detected in soil. The estimated lateral extent of the impacted soils is delineated on Figure 2-4. Soil from associated Stockpile #3 is impacted with low levels of PAHs and moderate levels of petroleum hydrocarbons (up to 200 mg/kg) and unknown hydrocarbons, likely weathered fuels.

North Valley Military Landfill - Wood crates, pallets and packing materials, a crushed metallic structure, and OE scrap were found in this area, which the Army reportedly used as a landfill. No systematic distribution of COCs was identified at the North Valley Military Landfill. Other hydrocarbons (up to 61 mg/kg), VOCs (up to 0.086 mg/kg), two dioxins/furans (up to 1,200 picograms per gram [pg/g]), and one pesticide (beta BHC at 0.0007 mg/kg) were detected in various soil samples in the fill material, at the base of the landfill, and at 2 feet below in the underlying soil. Estimated low concentrations of two explosive compounds (HMX at 0.26 micrograms per liter [$\mu\text{g/L}$] and 2,4-dinitrotoluene [2,4-DNT] at 0.66 $\mu\text{g/L}$), other hydrocarbons (less than 200 $\mu\text{g/L}$) and one dioxin (OCDD at 260 picograms per liter [pg/L]) were detected in grab groundwater samples collected from test pits excavated within the landfill. With the exception of the hydrocarbons, none of these compounds has been detected in the groundwater monitoring wells downgradient of the landfill. No impact with respect to metals, nitrate, or phosphorus was identified.

Ammunition Renovation/Primer Destruction Site - The Ammunition Renovation/Primer Destruction Site was an area where ordnance was inspected and refurbished, and where ordnance primers were destroyed by burning in a cage. Low concentrations (typically less than 75 mg/kg) of petroleum hydrocarbons in the motor oil range, as well as other hydrocarbons, have been detected in both the

near-surface and deeper soil (up to 10 feet bgs) toward the northwest end of the Ammunition Renovation/Primer Destruction Site. Petroleum hydrocarbons in the motor oil range (less than 100 mg/kg) were also detected at depth (30 feet bgs) in the northeast corner of the site. Although the source of the petroleum hydrocarbons in this portion of the North Valley is unknown, it is assumed to be related to historical practices of oiling roads and parking areas for dust suppression.

Toward the southeast corner of the site, other petroleum hydrocarbons (up to 310 mg/kg) were detected in the near-surface soil, and petroleum hydrocarbons in the diesel range were detected in the same area at concentrations up to 630 mg/kg between 17.5 feet and 22 feet bgs. Two geophysical anomalies in this area have been interpreted as possible underground storage tanks (USTs) and associated piping, and are thought to represent the source of the impact. The estimated lateral extent of the impacted soils is delineated on Figure 2-4.

Other COCs (trace concentrations of VOCs [up to 0.014 mg/kg] commonly associated with petroleum hydrocarbons and oils) were also detected at isolated locations.

Soils from Stockpiles #1 and #2 are impacted with low levels of PAHs (up to 0.11 mg/kg) and moderate levels of petroleum hydrocarbons (up to 1,400 mg/kg). It is planned to remove the stockpiled material from the site for appropriate disposal at an off-site facility. The possibility of a UST at this site will be further evaluated after sitewide OE point clearance. If a UST is found at the site, it will be removed in accordance with California Regional Water Quality Control Board (RWQCB) guidelines.

RIDGE

Dynamite Burn Site - Soils from the Ridge area where the former Dynamite Burn Site was situated, have been excavated and, as indicated in the RI/FS (Earth Tech, 2001b), have been placed in the McAllister Drive Land Bridge. No impact by COCs to the exposed bedrock (which represents a surface approximately 30 to 40 feet below the original ground surface where dynamite was burned) was identified in this area of interest.

SOUTH VALLEY

Flare Site - This area was reportedly used to destroy flares by burning. Five metals related to these activities were identified as exceeding the Preliminary Remediation Goals (PRGs) established to satisfy the remedial action objectives (RAOs) at this site. The metals and their maximum detected concentrations are as follows: antimony (150 mg/kg), barium (20,000 mg/kg), copper (8,100 mg/kg), lead (7,600 mg/kg), and zinc (2,000 mg/kg). The lateral extent of metals impact to

soil in the north and east directions are relatively well understood, and are shown on Figure 2-5. The southern extent, although upslope, is not defined, nor is the western extent. The vertical extent is also not as well understood due to limitations on drilling boreholes in this area due to OE avoidance, but does not appear to be deeper than 5 feet bgs. Dioxins/furans were also detected near the surface at a maximum concentration of 490 pg/g (Total tetrachlorodibenzo-p-furan [TCDF]). Concentrations decrease rapidly to less than 10 pg/g at 1 foot bgs, and are not likely to extend beyond the limit of the metals-impacted soil.

Demolition Site #1 - No impact to soil was identified in this area of interest, based on the sampling performed to date. Investigation of the upper portion of this area of interest could not be performed due to a safety concern from the presence of a geophysical anomaly at the south end of the site. Additional soil sampling will be performed after OE anomalies have been cleared from the site.

Demolition Site #2 - No impact to soil was identified in this area of interest. Since no other evidence of past activities was found at this site, it was eliminated from further investigation.

Demolition Site #3 - The only COC related to site activities detected in shallow soil at concentrations exceeding the PRG was mercury, at a maximum concentration of 2.1 mg/kg. The estimated lateral extent of mercury impact to soil is delineated on Figure 2-6. The vertical extent appears to be from the ground surface to an average of 3 feet bgs.

South Valley Wetlands Sediment - DOD activities related to Demolition Site #3 have impacted a portion of the near-surface wetland sediment with total mercury at concentrations (up to 11.3 mg/kg), immediately downslope and southeast of Demolition Site #3. The estimated lateral extent of mercury impact to sediment is shown on Figure 2-6.

OTHER AREAS

Ridge Stockpiles - No impact to soil from site activities was identified in this area of investigation. The low levels of petroleum hydrocarbons (less than 35 mg/kg) were detected in the stockpiles, and are typical of soil that has been handled by earth-moving equipment. Further testing for VOCs will be performed following OE point clearance of the stockpiles.

McAllister Drive Land Bridge - No impact to soil from past activities was identified on the slopes in the lower portion of the land bridge. However, soil from the Dynamite Burn Site is in the lower portions of the fill of the land bridge (approximately 100 feet below the roadway surface). It is not known if soil from the Dynamite Burn Site is chemically impacted. Further soil sampling will be

performed on the lower slope of the land bridge after completion of the OE point clearance.

WATERS

Surface Water - No impact to surface water was identified at the Project Site.

Groundwater/Seeps - Low concentrations of petroleum hydrocarbons (less than 210 $\mu\text{g/L}$) have been detected in groundwater samples collected from one well (MW-4A) in the North Valley. Low levels of explosive compounds (TNT, HMX, 2,4-DNT, 4amDNT, amDNTs) have been detected in grab groundwater samples and grab seep samples in the North Valley at a maximum concentration of 4.9 $\mu\text{g/L}$. One PAH (acenaphthylene) was detected at less than 5.8 $\mu\text{g/L}$ in two of three grab seep samples from the North Valley. One VOC (p-cymene [p-isopropyltoluene] at 0.61 $\mu\text{g/L}$) and one pesticide (p'p'-DDD at 0.0077 $\mu\text{g/L}$) were also detected in one of the North Valley grab seep samples. No explosives, pesticides, or PAHs have been detected in North Valley groundwater wells.

One explosive compound (3-nitrotoluene) has been detected once (April 2000) at a concentration of 0.59 $\mu\text{g/L}$ in a groundwater sample collected from a well in the South Valley. No explosive compounds were detected in this well during the (August 2000) groundwater sampling event, nor were explosives detected in the first monitoring event (December 1999). It is considered that the low concentrations of explosives and dioxin associated with the unfiltered grab samples in the North Valley are a result of low levels of these compounds in sediment (turbidity) being detected. These low concentrations do not indicate dissolved chemicals in groundwater. No COCs were detected in the seep sample collected from the South Valley.

ORDNANCE AND EXPLOSIVES DISTRIBUTION

The OE RI consisted of a review of data obtained from previous OE clearances and investigations conducted at the Project Site, as well as data obtained during the removal action investigation phase of the non-OE RI (investigation of the North Valley Military Landfill). Data reviewed included geophysical data for the Project Site; anomaly excavation logs; daily field logs; and information presented in the *Archives Search Report Findings, Benicia Arsenal, Benicia, Solano County, California* (U.S. Army Corps of Engineers, St. Louis District, 1994a); *Supplement to the March 1994 Archives Search Report for Benicia Arsenal, Benicia, Solano County, California* (U.S. Army Corps of Engineers, St. Louis District, 1997); *Final Benicia Arsenal Records Research Report* (Jacobs Engineering, 1999); and *Final Engineering Evaluation/Cost Analysis, Former Benicia Arsenal, Benicia, California* (Earth Tech, 2000). Based on the available data, the types of activities conducted at the Project Site, and consultation with OE experts, a preliminary OE SCM, which suggests limited OE distribution on the Project Site, was developed and is

presented as Figure 2-7. However, based on discussions with DTSC, for the purposes of OE clearance, it has initially been assumed that OE should be expected in any soil area within the Project Site boundaries. However, the greatest likelihood of detecting OE is expected to occur within or near areas of the Project Site that have been used for demilitarization of OE by DOD.

USACE uses a 1,250-foot radius around potential demolition sites as a standard distance within which OE scrap and fragments would most likely be encountered. OE scrap can be expelled at much greater distances than intact OE items. OE experts retained by Granite generally agreed that OE items would most likely not be kicked out more than 300 to 500 feet from a given demolition site. This estimated kick-out distance is generally consistent with the data presented in the former Benicia Arsenal EE/CA report, and the distribution of OE items recovered from the site. The preliminary OE SCM is based on the very conservative assumption that all fill areas and where ever OE scrap has been encountered on the Project Site the soil would potentially contain OE. The preliminary OE SCM is presented in Figure 2-7.

No federal or state requirements (i.e., applicable or relevant and appropriate requirements [ARARs]) have been promulgated that prescribe OE remediation levels in soil. Therefore, the PRGs have been conservatively developed to allow unrestricted development of the planned residential areas of the Project Site, and to remediate open space areas to acceptable levels. Risk-based PRGs were developed for TNT, and are presented in the draft final RI/FS report.

Because the entire Project Site is assumed to have the potential to be affected with OE, OE point clearance will be conducted across the entire Project Site. The extent of areawide OE clearance within residential areas will be determined by the OE/OE scrap assessment described in Section 2.4.

If an OE item is not associated with an identified pattern in the OE SCM, it will be considered an outlier, and an additional 200-foot-radius scan area around the location of the OE item will be identified. Areawide clearance will be conducted within the 200-foot radius if it is within a future residential area. Further details of the OE remediation are presented in the OE RDD (Earth Tech, 2001a).

2.3 PROPOSED SUPPLEMENTAL HAZARDOUS SUBSTANCE INVESTIGATION AFTER SITEWIDE OE POINT CLEARANCE

COCs have been characterized using ordnance avoidance field sampling techniques to evaluate potential remedial action alternatives; however, certain areas of interest still lack full definition with regard to the extent of the COCs. Therefore, additional investigations are planned after the sitewide OE point clearance. Characterization of areas of interest where the extent of impact has not been fully defined can be achieved through further soil and groundwater sampling

as part of remediation, and through excavation confirmation sampling to ensure the RAOs are met. Details of the supplemental investigations will be presented in the non-OE RDD, which will describe the scope of work and the field sampling and analysis plans. Table 2-1 summarizes those areas of interest where post OE clearance supplemental investigations are planned.

2.4 PROPOSED OE/OE SCRAP ASSESSMENT AFTER SITEWIDE OE POINT CLEARANCE

OE and OE scrap data collected during past OE clearance activities, the data that is currently being collected by USACE for the Gonzalves Property east of the McAllister Drive Land Bridge, and the data that will be collected by Granite during the surface and point clearance of the Project Site will be input into a database, and a series of presentation maps and tables will be prepared. Granite and the remediation contractor will review the maps and tables. Based on this review, Granite will revise the preliminary OE SCM and submit the revised OE SCM to DTSC and USACE for review. The final OE SCM will be used to select the areas that require further scanning and OE clearance in lifts (areawide clearance), and will be used to assess the likelihood that OE items were moved off site during the 1990 grading of portions of the Project Site. Based on the OE SCM, if DTSC concludes that OE was distributed to residential areas outside the Project Site boundary and, as a result, there is a risk that an OE item can be encountered in a manner presenting a significant risk of injury or death, then a plan will be developed to present the proposed response actions. Appropriate response actions may include, for example, development of a community awareness plan to educate the public, investigation, and consideration of alternatives including institutional control, surface clearance of OE, or detection and clearance of OE to depth.

3.0 SUMMARY OF REMOVAL ACTIONS

The following describes the removal actions that have been taken at the Project Site prior to the RAP.

3.1 FENCING AND POSTING

An evaluation report was prepared in June 1999 to assess the need for fencing and posting at the Project Site. The follow-up work plan required by the Order outlined how the additional fencing and posting would be implemented. In early July 1999, the existing fencing of the Project Site was upgraded and expanded to secure the Project Site as it is currently defined. Signs were hung or posted throughout the Project Site, additional fencing that incorporated existing fencing (where applicable) and gates were installed, and new fencing was installed around the TNT Strips.

Another measure in place as required by the report includes a 24-hour a day on-site security force consisting of at least two patrol officers. One officer is posted at a guard shack near the public access point at the corner of McAllister Drive and Rose Drive; the other officer roams the Project Site on designated patrol routes. The report also outlines a maintenance program to ensure that the fencing is properly maintained.

3.2 ORDNANCE AND EXPLOSIVES REMOVAL

DOD conducted OE clearance activities in the South Valley in 1955 (U.S. Army Corps of Engineers, St. Louis District, 1994a, 1994b). However, during a later inspection of the South Valley in 1955, several live OE items were found. It was then recommended that a second clearance be performed. No record of a second clearance could be found. No other DOD-initiated clearance actions were reported.

A concrete-filled howitzer shell was encountered during preliminary site preparations in mid-1996, and in late 1996, an OE item was found. Granite retained OE experts and initiated OE investigations on the Project Site. The work included geophysical mapping and OE removal (see Figure 3-1).

The initial geophysical surveys at the site were limited to the Howitzer Test Facility and dispersed data collection areas across the Project Site. An EM61, a high-resolution, time-domain metal detector was used to collect data for the initial surveys. In August 1996, Granite performed an OE clearance at the Howitzer Test Facility using EM61 data. The clearance was conducted to support the dismantling of the howitzer tunnels and related structures. In addition, areas at

the Ammunition Renovation Facility, and along portions of the north and east Project Site boundaries were investigated and cleared. During the clearance activities, it was reported that howitzer dummy shells and practice land mine fuzes (OE scrap) were recovered from beneath former Building 540 in the Howitzer Test Facility area. During the removal action investigation phase of the RI in May 2000, unexploded ordnance (UXO) technicians took inventory of a on-site storage magazine that was used for the December 1996 clearance action. Two grenade fuzes were noted in the inventory. Available dig sheets from the December 1996 clearance action did not list these items as being recovered. It is uncertain from where on the Project Site that these fuzes were recovered. Granite is currently conducting additional research to address this issue. No other live OE items were recovered from the Project Site during this clearance activity. Figure 3-1 shows the cleared area.

In fall 1996, NORCAL Geophysical Consultants, Inc., performed a total magnetic field vertical gradient survey in contiguous 200-foot by 200-foot grids on behalf of Granite. The magnetometer survey did not include the Ridge cut areas where surficial materials had been stripped and the bedrock excavated, the west portion of the South Valley, nor the South Valley wetland (see Figure 3-1).

OE personnel retained by Granite cleared approximately 8.5 acres of the Project Site of OE in December 1996 using the magnetometer data. The 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 and removed. A total of six OE items were removed from the Project Site in November and December 1996, including two 37-millimeter (mm) high-explosive (HE) rounds, two 40mm antiaircraft HE rounds, one 60mm HE mortar shell, and one 76mm armor-piercing HE round. The OE clearance was suspended pending further investigation of the former Benicia Arsenal by USACE. The locations of the OE items recovered and the area cleared are shown on Figure 3-1.

USACE conducted an EE/CA investigation for the entire former Benicia Arsenal, including the majority of the Project Site. Portions of the Project Site and adjacent 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 within the Project Site (one 75mm unfuzed shrapnel projectile and one 37mm fuzed projectile) during the EE/CA field investigation. These items were disposed of by demolition (Earth Tech, 2000). The locations of these items are also shown on Figure 3-1. No live OE or OE scrap was recovered from property immediately adjacent to the north of the Project Site during the EE/CA investigation.

The removal action investigation phase of the RI conducted by Granite in May 2000 included clearing anomalies from proposed excavation locations at the North Valley Military Landfill to facilitate characterization of soil beneath the landfill for COCs. Geophysical techniques were utilized to locate subsurface anomalies

within the North Valley Military Landfill. Anomalies identified in the footprint of a proposed exploratory test pit location were intrusively investigated to determine the source of the anomaly, and to clear any OE encountered. OE scrap was encountered in approximately one-half of the excavations, although no OE was recovered from the North Valley Military Landfill.

Additional information on OE investigations and clearances is presented in Chapter 9.0 and Appendix G of the RI/FS (Earth Tech, 2001b).

4.0 SUMMARY OF SITE RISKS

The following describes the risks posed by the OE- and chemically affected soils at the Project Site, as well as the proposed soil remediation goals.

4.1 HEALTH RISK ASSESSMENT FOR ORDNANCE-IMPACTED AREAS

The Project Site soils and sediments may be affected by OE. OE is defined by USACE (U.S. Army Corps of Engineers, 2000) as either:

- (1) Ammunition, ammunition components, chemical or biological warfare material or explosives that have been abandoned, expelled from demolition pits or burning pads, lost, discarded, buried, or fired. Such ammunition, ammunition components, and explosives are no longer under accountable record control of any DOD organization or activity;
- (2) explosive soils (mixtures of explosives in soil, sand, clay, or other solid media at concentrations such that the mixture itself is explosive).

OE scrap includes those items that are fragments of functioned-as-designed ordnance, or intentionally destroyed ordnance, and that contain no explosives or other items of a dangerous nature. OE scrap is inert and does not pose a safety risk. An item is determined to be OE scrap if it can be visually inspected for the presence of explosives from all sides, and no explosive material is present. An item may also be determined not to contain explosives and to be OE scrap using other procedures in accordance with USACE standard protocol. If it cannot be determined whether explosives are present, the item is handled as potential OE. OE scrap that is explosively contaminated is considered OE. As previously described in Section 2.2, at the request of DTSC, OE is assumed to be present at the demolition sites and in the overburden soils anywhere on the Project Site. Figure 2-7 depicts the preliminary OE SCM for the distribution of OE across the site. This model is based on conservative assumptions and the results of OE clearance and investigation activities.

The objective of the OE remediation is to remove all detected anomalies including OE, OE scrap, and metallic debris within the depth of the geophysical scanning equipment and to eliminate any potential pathways for OE exposure. OE remediation will be implemented in three phases. The first phase is to identify and remove through point clearance all OE, OE scrap, and metallic debris. Point clearance is an OE cleanup approach that locates and removes individual subsurface metallic anomaly sources usually through hand excavation for shallow items or with a backhoe for deeper items. The second phase will be implemented in residential areas where there is a potential for OE to remain below the depth of the geophysical scanning. In these areas, additional areawide OE clearance will be conducted. Areawide clearance is the scanning, point clearance and

excavation of soil in lifts and placement of the cleared soil in the bottom of the North Valley with further scanning.

The Site Conceptual Model (SCM) will be completed and evaluated following point clearance of the Project Site. The SCM will be used to identify areas of the Project Site that will require area wide clearance. Upon completion of Alternative 5A remedial activities and implementation of institutional controls, there will be no unacceptable level of risk from OE at the Tourtelot Project Site.

The third phase of OE clearance is the placement of a minimum of 14 feet of OE-free crushed bedrock over the areawide clearance soils. Under residential property, in transition areas, where the depth to bedrock is 14 feet or less, the surface soils will be removed to bedrock.

At the conclusion of the OE clearance activities, there should be no complete pathways for persons to come in contact with OE.

4.2 HEALTH RISK ASSESSMENT FOR CHEMICALLY IMPACTED AREAS

This section summarizes the results of an assessment of the potential risks to human health and the environment associated with chemicals at the Project Site based on current site conditions.

4.2.1 Human Health Screening Assessment

Potential human health risks associated with exposure to chemicals detected at the Project Site were evaluated on a screening-level basis by comparing measured concentrations to readily available regulatory screening criteria. This evaluation was conducted for each area of interest at the Project Site (i.e., TNT Strips, Howitzer Test Facility, North Valley Military Landfill, Ammunition Renovation/Primer Destruction Site, McAllister Drive Land Bridge, Miscellaneous North Valley, Flare Site, Demolition Sites #1 and #3 and Miscellaneous South Valley for soil and North Valley and South Valley for groundwater and surface water), and entailed calculating screening-level estimates of potential noncancer hazard indices and theoretical lifetime excess cancer risks based on maximum detected concentrations within each area.

4.2.1.1 Chemicals Evaluated.

For the purposes of the screening-level assessment, all chemicals detected in soil, groundwater, and surface water samples collected at the Project Site are considered COCs, except as noted below.

Several petroleum hydrocarbon mixtures have been detected in soil samples collected at the Project Site. Total extractable petroleum hydrocarbon (TEPH) measurements, such as petroleum hydrocarbons in the diesel range, represent mixtures of chemicals that, because of their highly variable composition, do not

have descriptive health criteria. Therefore, the toxicity of these mixtures is best described by the aggregate toxicity of key individual chemicals in the mixture, such as benzene, toluene, ethylbenzene, and xylenes (BTEX) and PAHs. For the purposes of the risk assessment, and as is the practice in California (Department of Toxic Substances Control, 1994a), a quantitative evaluation of TEPH measurements was not conducted in this study; rather, individual measured constituents of the TEPH mixtures were evaluated.

Four inorganic chemicals (i.e., calcium, magnesium, potassium, and sodium) also were not identified as COCs because these chemicals are not considered to be of human health concern at environmental concentrations at the Project Site.

With regard to inorganic chemicals, site-specific ambient samples were collected at the Project Site and analyzed for several metals. The maximum detected inorganic concentration was compared to the 95th percentile of the site-specific ambient samples for each area of interest. If the maximum detected concentration was below the ambient value, the chemical was not further evaluated in the screening assessment for that area. This practice is consistent with DTSC guidance (Department of Toxic Substances Control, 1997).

4.2.1.2 Exposure Pathways and Scenarios.

Potential for exposure to site chemicals depends on current and future uses of the site. The Project Site is currently undeveloped. Future development plans call for the majority of the site to be used for residential purposes; the remainder of the site will be maintained as open space. In addition, after OE and non-OE remediation of site soil, clean fill will be placed in the residential areas (14 feet in most areas, 4 feet minimum in the TNT Strip area), which will substantially limit, if not prevent, future exposure to any residual levels of chemicals in site soil. Nevertheless, for purposes of the screening-level assessment, it was assumed that future residents would have frequent, long-term exposure to soil. Under this assumption, future on-site residents could be exposed to chemicals in soil via incidental ingestion, dermal contact, and inhalation of vapors or resuspended particulate (i.e., dust). All of these pathways were considered in the screening assessment.

Shallow groundwater at the Project Site is not currently used for any purpose, and is not expected to be used in the foreseeable future, due to limited groundwater occurrence and low formation permeability that does not yield sufficient quantities of water for drinking or irrigation purposes. Domestic water will be supplied to the future residential development from other sources. Surface water at the site is limited to intermittent seeps and the wetland in the South Valley, which is outside of the area to be developed for residential use. For purposes of the screening-level assessment, however, it was assumed that future residents would either use groundwater or surface water for domestic purposes some time in the future. Under this assumption, future on-site residents could be exposed to chemicals

detected in groundwater or surface water via ingestion, dermal contact, and inhalation of vapors (Figure 4-1).

In addition to the future on-site residents described above, recreational users of the portions of the Project Site that will remain as open space may also be exposed to residual chemicals in soil via incidental ingestion, dermal contact, and inhalation of vapors or particulate, and residual chemicals in surface water via dermal contact and inhalation of vapors. However, the extent of exposure to recreational users would be significantly less than that assumed for future on-site residents. Therefore, recreational users are not included in the quantitative portion of the screening assessment.

The exposure pathways and scenarios evaluated in the screening assessment are illustrated in the SCM developed for the Project Site (see Figure 4-1).

4.2.1.3 Screening-Level Health Risk Estimates for Soil.

Screening-level estimates of potential human health risks associated with exposure to the chemicals detected in soil were calculated using the maximum detected concentration in each area of interest, regardless of depth, in addition to EPA Region IX PRGs for residential soil (U.S. Environmental Protection Agency, 2000a). PRGs combine current EPA toxicity values with standard exposure factors to estimate concentrations in environmental media (e.g., soil) that are protective of human health over a lifetime. PRGs are based on either non-cancer or cancer effects.

The residential soil PRGs are appropriate for evaluating chemicals detected in soil in this assessment, because they assume continuous and long-term exposure to chemicals in soil via the same exposure pathways, as identified in the SCM. With regard to evaluating chemicals in groundwater and surface water, tap water PRGs assume long-term exposure to chemicals in water via ingestion of drinking water at a rate of 2 liters per day, and inhalation of vapors for volatile chemicals. The tap water PRGs do not include potential exposure via dermal contact. Nevertheless, the tap water PRGs are considered sufficiently conservative for purposes of the screening-level assessment. Using tap water PRGs to evaluate surface water is very conservative in that it assumes a person drinks 2 liters per day of surface water. This is an unrealistic assumption in that seep water is limited to intermittent seeps and the wetland in the South Valley.

It should be noted that PRGs have not been developed for some of the explosive compounds detected in one or more areas of interest at the Project Site. In two cases (i.e., 2,6-DNT and tetryl), PRGs were calculated according to EPA Region IX methodology using toxicity criteria from DTSC (Department of Toxic Substances Control, 1994b). For the majority of the remaining chemicals, sufficient information was available to identify a surrogate PRG based on similarities in chemical, physical, and toxicological characteristics. Those chemicals for which insufficient

information was available to identify a surrogate PRG were evaluated qualitatively in conjunction with the quantitative analysis for the other chemicals.

Finally, the PRGs for some of the inorganic chemicals lie near or below the estimated ambient concentrations for the Project Site. For example, the arsenic residential PRG of 0.39 mg/kg is significantly below the 95th percentile of the site ambient data of 18.2 mg/kg. Similarly, the 95th percentile of the site ambient data for iron in soil is 43,805 mg/kg, while the residential PRG is 23,000 mg/kg. Finally, the residential PRG for manganese of 1,800 mg/kg is only slightly greater than the 95th percentile of the site ambient data of 1,645 mg/kg. In these instances, it is often appropriate to modify the PRG to consider the ambient concentrations (U.S. Environmental Protection Agency, 2000a). However, for this assessment, the screening risk calculations were based on the residential PRG values, without consideration of the ambient concentrations. When appropriate, calculations have been presented both with and without the arsenic, iron, and/or manganese results. It has been proposed by the responsible parties that the findings of an evaluation of arsenic, iron, and manganese concentrations detected at the Project Site (presented in Appendix F of the RI/FS) indicate no systematic pattern for these metals at the Project Site. However, final determination regarding distribution and the risk, these three metals will be included in the post-remediation risk assessment.

The results of this assessment for each area are summarized for each area of interest in Tables 7-1 through 7-10 of the RI/FS (Earth Tech, 2001b). Estimated screening-level total excess cancer risks ranged from 2×10^{-2} to 5×10^{-7} , depending on the area of interest and whether the naturally occurring metal arsenic was included in the calculation. The highest excess cancer risk was estimated for the TNT Strips. The estimated screening-level total non-cancer hazard indices ranged from 40 to 0.009, depending on the area of interest and whether the naturally occurring metals iron and manganese were considered in the calculation. The highest hazard index was estimated for the Flare Site.

Based on the results of the screening-level evaluation, several explosive compounds in the TNT Strips area, two PAHs (i.e., benzo[a]pyrene and dibenz[a,h]anthracene) in the Ammunition Renovation/Primer Destruction Site or Howitzer Test Facility, and dioxins and several metals in the Flare Site contributed most significantly to the screening risk estimates. Therefore, preliminary soil remediation goals have been proposed for these chemicals in these areas. Although arsenic, iron, and manganese in some areas of interest contributed to risk estimates, based on a weight-of-evidence approach, which included further statistical analysis, cumulative probability plots, comparison to background literature values, and an evaluation of spatial distribution, site soils do not appear to have been impacted by arsenic, iron, or manganese. Therefore, the responsible parties have proposed, as part of the preferred remedial action, that no remediation of soils containing arsenic, iron, or manganese occur at the Project Site.

4.2.1.4 Screening-Level Health Risk Estimates for Groundwater and Surface Water.

Screening-level estimates of potential human health risks associated with exposure to the chemicals detected in groundwater and surface water were calculated using the maximum detected filtered and unfiltered concentration in the North Valley or South Valley, along with EPA Region IX tap water PRGs. For groundwater, data collected from permanent monitoring wells, when available, were used in this assessment. The exception to this is the North Valley Military Landfill area in which only grab groundwater samples were collected. As a result, the grab groundwater samples from the North Valley Military Landfill may not be representative of groundwater conditions in this area of the site. With regard to surface water, grab surface water and seep samples from each valley were used in this evaluation. It should be noted that all of the seep samples collected from the North Valley were filtered prior to analysis for metals; therefore, the results for these samples may underestimate the concentration of metals in unfiltered samples. These samples were collected prior to DTSC's request to have filtered and unfiltered data.

The results of this assessment for each area are summarized in Tables 7-11 through 7-13 of the RI/FS (Earth Tech, 2001b) for each area of interest. Estimated screening-level total excess cancer risks ranged from 4×10^{-4} to 1×10^{-6} , depending on the area of interest and whether the sample was filtered. The highest excess cancer risk was estimated for groundwater in the North Valley and South Valley for unfiltered samples. The estimated screening-level total non-cancer hazard indices ranged from 10 to 0.2, depending on the area of interest and whether the sample was filtered. The highest hazard index was estimated for groundwater in the North Valley for unfiltered samples.

Based on the results of the screening-level evaluation, several chemicals in groundwater in the North Valley or South Valley and in surface water seeps in the North Valley contribute most significantly to the screening risk estimates. The majority of these chemicals are metals, and have been reported by the responsible party not to be associated with historical site activities. The other chemicals were detected infrequently or only in grab groundwater samples. Their presence in these samples is not considered to be representative of groundwater conditions at the Project Site, since their presence has not been confirmed by downgradient groundwater wells. Given these results and the fact that (1) the low yielding formation and limited quantity of groundwater at the Project Site is not sufficient for drinking water or irrigation purposes, and (2) water will be supplied to the residential development from other sources, residual chemicals in groundwater, if present, should not be of human health concern. Accordingly, remediation of groundwater and surface water has not been proposed at this time. However, water quality will continue to be sampled, monitored, and evaluated at the Project Site as part of the Operation and Maintenance O&M Plan summarized in Appendix A. These activities will ensure protection of public health and the environment and compliance with ARARs are maintained.

4.2.2 Ecological Screening Assessment

Potential ecological impacts associated with exposure to chemicals detected at the Project Site were evaluated through use of a screening assessment. This assessment was conducted in four steps: (1) wildlife habitats that will remain on site following post-grading and redevelopment activities (the areas of current and future habitat) were identified; (2) the chemicals measured in these habitats were identified; (3) risk-based criteria for ecological receptors, in the form of reference concentrations in soil, sediment, or water protective of wildlife, were developed (for those chemicals for which toxicity data are available); and (4) maximum concentrations of the chemicals detected in the habitat areas of interest were compared to risk-based criteria for ecological receptors and other available data to identify chemicals for which ecological remediation goals are to be developed.

4.2.2.1 Habitat Assessment.

Previous assessments of habitat are described in Section 2.2.7 of the RI/FS (Earth Tech, 2001b). In addition, a reconnaissance of the Project Site was conducted to evaluate potential habitat areas that will remain following post-grading and redevelopment activities (Wetlands Research Associates, 2000a-e). Two habitat types were identified that will not be modified by the planned development activities, and that have been investigated for possible chemical impacts. These are the North Valley and South Valley grassland areas, and the freshwater marsh wetland area in the South Valley. The remainder of the site is covered by the planned development. These wildlife habitats of interest were evaluated in this ecological risk assessment.

4.2.2.2 Chemicals Evaluated.

Four areas of interest were identified in the non-native grassland habitat in the North Valley and South Valley of the Project Site: TNT Strips, Flare Site, Demolition Site #1, and Demolition Site #3. The chemicals evaluated in the ecological risk assessment for the grassland habitat were the chemicals detected in soil samples from these four areas, with the exception of calcium, magnesium, potassium, and sodium, which are essential elements and toxic to plants and animals only at relatively high levels, far in excess of levels detected at the Project Site. Also, petroleum mixtures, for which there are no appropriate toxicity criteria, and for which individual constituents were screened, were not evaluated. Therefore, the list of chemicals evaluated consisted of all detected chemicals from the four areas with the above noted exceptions, and the screening concentrations were the maximum measured from samples in each of the four areas.

The chemicals evaluated in the freshwater wetland habitat were the chemicals detected in water and sediment in this habitat with the same exceptions as noted above for soil. The screening values were the maximum measured concentrations of the chemicals in water and surface sediment samples.

4.2.2.3 Ecological Screening Criteria.

As a basis for screening risks to ecological receptors, risk-based criteria were developed for chemicals in soil in the non-native grassland habitat and water and sediment in the freshwater wetland habitat. Criteria were developed as reference concentrations of the chemicals in media (soil, water, or sediment) that are protective of ecological receptors that commonly come into contact with that media or feed on biota that live in or on that media. These criteria for soil were derived separately for four groups of ecological receptors: plants, soil invertebrates, mammals, and birds. The criteria for water and sediment were derived separately for water-column and sediment-dwelling aquatic organisms. The process used to develop these criteria is based on that described in EPA's draft Ecological Soil Screening Level Guidance" (U.S. Environmental Protection Agency, 2000b).

For some chemicals, there are no appropriate criteria; while for others, there are one to four values for ecological receptors that could be applied in the screening assessment. In addition, since criteria are developed largely from laboratory studies of unknown relevance to the Project Site, and many of the chemicals detected are natural constituents in soil, a comparison of the screening criteria concentrations with ambient concentrations is necessary to identify unrepresentative values. If the chemical is not a natural constituent of soil, and no site-specific ambient data are available, then the minimum criterion (lowest concentration) was identified as the screening criterion. If Project Site ambient data were available, then the screening criteria for each receptor were compared to ambient, and the lowest criterion above the ambient concentration was selected as the screening criterion for ecological receptors. If none of the criteria was above ambient, then ambient was identified as the screening criterion. If no relevant criteria were found for a chemical, then the chemical was evaluated qualitatively to determine whether to include it in the assessment.

Only a single criterion for aquatic organisms was identified for water and sediment, respectively. Because there are no Project Site data on ambient concentrations of naturally occurring COCs in surface water and sediment, no comparison to ambient concentrations could be made. Therefore, the identified criteria for water and sediment for aquatic organisms were applied in the screening evaluation. With regard to sediment criteria for birds, only a screening criterion for methyl mercury was developed. No relevant toxicity data were available for the other bioaccumulative chemicals detected in the sediment at the site. These chemicals were evaluated for aquatic organisms as described below.

4.2.2.4 Comparison of Site Chemical Concentrations with Ecological Screening Criteria.

The maximum concentrations of chemicals detected in soil (regardless of depth), surface water, and sediment (0 to 1 foot bgs) were compared to their respective

screening criteria. The results of the ecological screening assessment are summarized in Tables 7-14 through 7-19 of the RI/FS (Earth Tech, 2001b).

With regard to soils, TNT was selected as the representative explosive chemical for which an ecological remediation goal was established. Based on the evaluation for the Flare Site, antimony, barium, copper, lead, and zinc were selected as compounds for which a remediation goal was established. No chemicals were identified for soil in Demolition Site #1 that required further ecological evaluation. Mercury was the only chemical to exceed the screening criterion in Demolition Site #3, and it was selected for the remediation evaluation.

The screening evaluation identified concentrations of aluminum in surface water above the water quality criterion (see Table 7-18 in the RI/FS). However, aluminum poses a threat to aquatic organisms only in low pH and low hardness waters. The screening criterion for aluminum is from a toxicity study performed at low pH and hardness. The wetland water is believed to have a neutral pH (based on measurements of site groundwater) and hardness of approximately 400 milligrams per liter (mg/L) as calcium carbonate (CaCO_3) (based on measurements of calcium and magnesium in surface water). Therefore, aluminum was not selected for further evaluation. No screening criteria were found for barium, manganese, and vanadium. These chemicals are naturally found in surface waters and do not appear to be at elevated levels in the wetland water or soils in areas of interest surrounding the wetland. Therefore, these chemicals were not considered for further evaluation.

No chemicals detected in surface water were selected as chemicals for which remediation goals will be established. However, the post-remediation risk assessment will include an ecological risk assessment, as well.

With regard to sediment, the screening evaluation identified copper, iron, manganese, and mercury as having concentrations above sediment quality criteria for sediment-dwelling organisms (see Table 7-19 in the RI/FS); however, the exceedence of a screening criterion in sediment is insufficient evidence by itself to warrant remediation. For example, the maximum detected concentration of copper in sediment (51.7 mg/kg) is less than the ambient soil concentration (71.7 mg/kg), suggesting that sediment has not been impacted by copper. Iron was eliminated from further evaluation for the same reasons as described previously for iron in soil (i.e., iron normally occurs in percent levels and is generally only bioavailable [and potentially toxic] in acidic [low pH] conditions). For manganese, the maximum detected concentration in sediment is essentially equivalent to its sediment quality criterion; other sediment samples contained manganese at concentrations well below the screening criterion. With regard to mercury, only three of ten surface sediment samples had concentrations exceeding the screening criterion of 0.2 mg/kg, and the average mercury concentration in these samples is approximately 0.3 mg/kg, which is only slightly greater than the screening criterion. In addition, mercury was selected as a chemical for which a remediation goal will be established for affected soil upland of the South Valley wetland.

Therefore, remediation of mercury in sediment is not proposed. Finally, the inorganic chemicals detected for which no sediment criteria were found appeared to be at relatively low levels in sediment, were not selected for evaluation in adjacent soil, and; therefore, were not selected for further evaluation in sediment.

Three of the chemicals in sediment were considered to be potentially bioaccumulative (benzo[b]fluoranthene, methyl mercury, and TNT). These chemicals were evaluated for birds foraging in sediment (Appendix F, Table F-7 of RI/FS). No relevant toxicity data were available for TNT and benzo(b)fluoranthene; however, these chemicals were found at low concentrations in sediment and below screening criteria for aquatic organisms. The maximum concentration of methyl mercury was below its screening criterion indicating that the risk of bioaccumulation from sediment is negligible (see Table 7-19 of RI/FS). No bioaccumulative chemicals in sediment were selected as chemicals for which remediation goals will be established.

4.2.3 PRELIMINARY SOIL REMEDIATION GOALS

As presented in Section 4.2, some current concentrations of several explosive compounds in soil in the TNT Strips area; benzo(a)pyrene and dibenz(a,h)anthracene) in North Valley Stockpiles #1, #2, and #3 in the Ammunition Renovation/Primer Destruction Site and Howitzer Test Facility; and dioxins and furans, antimony, barium, copper, lead, and zinc in soil in the Flare Site may pose a potential human health risk under the conservative baseline residential conditions. In addition, some current concentrations of several explosive compounds in soil in the TNT Strips area; antimony, copper, lead, mercury, and zinc in soil in the Flare Site; and mercury in soil in the Demolition Site #3 area may pose a potential risk to ecological receptors using conservative ecological screening criteria (see Section 4.3). Based on the results of these screening-level assessments, soil remediation goals are proposed for these chemicals to ensure protection of human health and the environment.

4.2.3.1 Preliminary Soil Remediation Goals for Metals.

The proposed soil remediation goals for the metals detected at concentrations greater than human health and/or ecological screening criteria will be the calculated upper tolerance limit (UTL) of the ambient soil samples, as presented in Appendix E of the RI/FS (Earth Tech, 2001b). As shown in Table 4-1, these calculated UTL values are significantly below the EPA Region IX PRGs for residential soil, assuming exposure pathways relevant to future development of the site (i.e., incidental soil ingestion, dermal contact, and inhalation of dusts).

These UTLs are also significantly below the screening criteria for ecological receptors for antimony, copper, lead, and zinc, and are clearly also protective of ecological receptors. The UTLs for barium and mercury are slightly above the screening criteria for these metals (642 to 500 mg/kg for barium and 0.77 to 0.3 mg/kg for mercury). The lowest screening criteria for these metals are from

plant studies. The applicability of these generic screening criteria to the Project Site is unknown, but there is substantial vegetation covering both the Flare Site and Demolition Site #3. The other available screening criterion for barium is 3,489 mg/kg, which is based on birds, and the other available screening criteria for mercury are 534 mg/kg and 238 mg/kg, which are based on birds and mammals, respectively. These criteria are well above the UTLs, indicating that the proposed remediation goals are protective of these ecological receptors. The small difference between plant criteria and the UTLs and the large margin of protection the UTLs afford mammals and birds, suggest that the proposed soil remediation goals for these metals are sufficiently protective for ecological receptors.

The remediation goals will be applied by comparing individual sample results of excavation confirmatory samples to the proposed remediation goals.

4.2.3.2 Preliminary Soil Remediation Goals for Non-explosive Organic Compounds.

Benzo(a)pyrene and dibenz(a,h)anthracene were detected above their respective PRGs in the stockpiled soil in the Ammunition Renovation/Primer Destruction Site and Howitzer Test Facility, respectively. Neither of these chemicals was identified as being of potential concern for ecological receptors.

Dioxins and furans were detected above PRGs only at the Flare Site; dioxins and furans in this area will be remediated to ambient levels. Dioxins and furans were not identified as being of potential concern for ecological receptors in any of the areas of interest at the Project Site. Results of numerous environmental studies indicate that virtually all areas in the western world have measurable concentrations of dioxins in soil. Even areas not considered impacted by human activities show some levels of dioxins (U.S. Environmental Protection Agency, 2000c). EPA reported background soil concentrations for dioxins (in terms of 2,3,7,8-TCDD toxicity equivalents [TEQ] and the 1998 World Health Organization [WHO] toxicity equivalent factors [TEFs]) ranging from 1 pg/g to 6 pg/g (0.000001 mg/kg to 0.000006 mg/kg) for rural areas, and 7 pg/g to 20 pg/g (0.000007 mg/kg to 0.00002 mg/kg) for urban areas (U.S. Environmental Protection Agency, 2000d). The estimated mean values were approximately 4 pg/g (0.000004 mg/kg) and 12 pg/g (0.000012 mg/kg) for rural and urban areas, respectively (U.S. Environmental Protection Agency, 2000c). Based on this information, and given that the site is situated in an urban area, the soil remediation goal for dioxins is 12 pg/g (0.000012 mg/kg). This value will be applied by comparing individual sample results (in terms of 2,3,7,8-TCDD TEQ) of excavation confirmatory samples to the proposed remediation goal.

Individual petroleum hydrocarbon constituents were evaluated in the screening-level assessment, rather than aggregate measurements of petroleum hydrocarbon mixtures. Although health-based remediation goals cannot be estimated for the various TEPH mixtures detected at the Project Site, the RWQCB plans to begin using a screening value for TEPHs (as diesel, motor oil, or gasoline) of 500 mg/kg

for residential land use for exposed soil (based on elimination of nuisance issues such as odor or visible staining). Only two soil samples collected at the Project Site contained petroleum hydrocarbons at concentrations greater than 500 mg/kg. The higher of these values is 1,400 mg/kg (quantified as unknown extractable hydrocarbons) in a composite soil sample (SP1-R2) from Stockpile #1 in the Ammunition Renovation/Primer Destruction Site. The other value is 630 mg/kg (quantified as diesel) in a sample from a borehole (AR-3) in the Ammunition Renovation/Primer Destruction Site collected from 17.5 feet bgs. Petroleum hydrocarbons in the diesel range were not detected in other samples collected from this location, nor were petroleum hydrocarbons in the diesel, motor oil, or kerosene ranges detected in groundwater samples collected from wells MW-1 and MW-7 in the vicinity of the Ammunition Renovation/Primer Destruction Site. Although no specific remediation goal for petroleum hydrocarbons is necessary due to the limited presence of petroleum hydrocarbons in the diesel range above 500 mg/kg in Project Site soil and the lack of impact in surrounding groundwater, a soil remediation goal of 500 mg/kg for TEPH is proposed. The remediation goal will be applied by comparing individual sample results of excavation confirmatory samples to the proposed remediation goal (see Table 4-1).

4.2.3.3 Preliminary Soil Remediation Goals for Explosive Compounds.

Residential Remediation Goals

A variety of explosive compounds have been detected above their respective PRGs in the TNT Strip area. Of these compounds, TNT was detected most frequently, and at the highest concentrations (up to percent levels immediately along the TNT Strips). A PRG of 16 mg/kg is proposed for TNT, based on standard residential default exposure parameters (U.S. Environmental Protection Agency, 2000a), assuming exposure via incidental ingestion, dermal contact, and inhalation of particulates. This value is equal to the EPA Region IX PRG for residential soil (U.S. Environmental Protection Agency, 2000a). In addition, soil will be remediated to non-detect for 2,6-DNT because the health-based remediation goal for this chemical (0.02 mg/kg), which was calculated based on DTSC's recommended toxicity criterion and EPA's standard residential default exposure parameters, is below the analytical Practical Quantitation Limit (PQL). Individual remediation goals for all other remaining explosive compounds are not recommended at this time. An assessment of residual risks, assuming removal of TNT greater than 16 mg/kg and removal of detectable levels of 2,6-DNT, indicates that the cumulative risk from all explosive compounds is likely to be below de minimus risk levels. Therefore, it is appropriate to focus the remediation effort based on the remediation goals of 16 mg/kg for TNT and non-detect for 2,6-DNT. Table 4-1 summarizes soil remediation goals for explosive compounds.

Recreational Remediation Goals

The planned development calls for an open hillside in the area of TNT Strips #1 through #3; the back yards of some of the homes will border this area. As described above, the TNT Strips that overlie areas to be developed for residential use will be remediated to 16 mg/kg for TNT and to non-detect for 2,6-DNT. In locations away from the immediate area of TNT Strips (e.g., top of hillside ridge), a remediation target of 53 mg/kg is proposed for TNT. This value is based on recreational, rather than residential, exposure parameters, assuming exposure via the same pathways as the residential scenario. The remediation goals will be applied by comparing individual sample results from excavation confirmatory samples to the proposed remediation goals.

Ecological Remediation Goals

Based on the screening evaluation, the most sensitive receptors to TNT exposure are mammals. The screening evaluation suggested that a deer population that foraged solely on the TNT Strips should not be exposed to a reference concentration greater than 10 mg/kg. Assuming that all foraging is on vegetation from the TNT Strips is unrealistic, as most herbivorous mammal populations forage over much larger areas. The home range for deer has been estimated to be from 59 to 520 hectare (Sample and Suter 1994). If the TNT-contaminated area on the Project Site were from 1-2 hectares, then a conservative area use factor for deer would be 30 (59 hectares range/2 hectares on site). Applying the area use factor of 30 to the screening criterion of 10 mg/kg gives a representative remediation target for mammals of 300 mg/kg.

The screening criterion for TNT and plants is 30 mg/kg. However, soil and plant characteristics greatly influence the toxicity of chemicals to plants. Therefore, a site-specific evaluation of plants in the TNT Strips area was conducted by Wetlands Research Associates, Inc. The results of this evaluation are summarized in their report, which is included as an attachment in Appendix F of the RI/FS (Earth Tech, 2001b). The purpose of this analysis was to compare characteristics of vegetation at locations with varying TNT concentrations. Quantitative measurements of vegetative characteristics, including plant species composition, plant height, and areal cover, were made to identify variation in growing conditions as a result of TNT concentration. The results of this evaluation indicate that a site-specific remediation target for plants would be 1,000 mg/kg, because plants are unaffected by TNT concentrations up to this level.

The screening criterion for TNT and soil invertebrates is 140 mg/kg. There are currently no evaluations of the applicability of this generic criterion to the Project Site. If this generic criterion is assumed to be representative, then 140 mg/kg is the lowest applicable ecological criteria, and this value could be used as the soil remediation goal protective of ecological receptors. However, since the soil remediation goals derived for protection of human health are lower than the ecological remediation goal, the human health goals will be applied to the site.

5.0 SUMMARY AND EVALUATION OF ALTERNATIVES

An FS was completed to identify a range of alternatives to remediate OE- and chemically affected soil at the Project Site. A total of 13 potential alternatives were initially considered. These alternatives were screened on the basis of feasibility, implementability, and cost to focus the FS on those alternatives with the greatest potential to remediate the Project Site. From these, eight alternatives were carried forward for detailed analysis. The following describes the retained alternatives and the proposed alternative. Additional information on the FS is presented in Chapters 10.0 through 12.0 of the RI/FS (Earth Tech, 2001b).

5.1 REGULATORY REQUIREMENTS

The Superfund Amendments and Reauthorization Act (SARA) requires that remedial actions at federal Superfund sites achieve a cleanup level that protects health and the environment. In addition, cleanup must attain ARARs that are promulgated under federal or state law, unless a waiver is warranted. Although the Tourtelot Property is not a Superfund site, the concept of ARARs has been used to evaluate and select final remedial actions for the proposed future residential use of the Project Site.

The following local, state, and federal agencies may have jurisdiction over remedial activities at the Project Site:

- DTSC is the lead regulatory agency for investigation and cleanup of the Project Site
- USACE has the responsibility for protection of wetlands, and is the primary DOD agency responsible for the investigation and cleanup of OE at Formerly Used Defense Sites
- U.S. Fish and Wildlife Service (USFWS) has the responsibility for protection of federally listed threatened and endangered species
- California Department of Fish and Game (CDFG) has the responsibility for protection of state-listed threatened and endangered species
- Bay Area Air Quality Management District (BAAQMD) has responsibility for protection of air quality
- California Occupational Safety and Health Administration (OSHA) has oversight authority for worker protection during removal activities

- RWQCB has responsibility for protection of groundwater and surface water quality
- City of Benicia has authority to issue zoning and grading permits for the grading on Site and has issued a fire code permit for storing, using, and handling of OE and explosives on the Project Site
- Solano County Department of Environmental Management (DEM) has the authority to oversee the investigation and closure of underground storage tanks, and to issue well permits for the Project Site.

ARARs. As defined in the National Oil and Hazardous Substance Pollution Contingency Plan (NCP), an "applicable" requirement is a promulgated federal or state standard that specifically addresses a hazardous constituent, remedial action, location, or other circumstance.

As defined in the NCP, a "relevant and appropriate" requirement is a promulgated federal or state requirement that addresses problems or situations sufficiently similar to those encountered, even though the requirement is not legally applicable. A requirement may be relevant but not appropriate given site-specific circumstances; such a requirement would not be an ARAR. If only part of a requirement is relevant and appropriate, then only that portion needs to be addressed.

ARARs may be chemical specific, action specific, or location specific. Chemical-specific ARARs are health- or risk-based concentration limits, such as federal or state drinking water standards for specific chemicals. Action-specific ARARs are technology-based requirements that are triggered by the specific remedial actions. An example of action-specific ARARs is the National Pollutant Discharge Elimination System (NPDES) requirements, which regulate the discharge of pollutants to surface water. Location-specific ARARs impose restrictions, based on site characteristics, on certain types of activities. Examples of location-specific ARARs include possible requirements associated with remedial activities in areas designated as wetlands, floodplains, or historic sites.

The proposed ARARs for the Project Site, including more detailed information on the regulatory requirements, is included as Attachment H-1 of the RI/FS report (Earth Tech, 2001b).

TBC Criteria. Non-promulgated advisories or guidance are referred to as "to be considered" (TBC) criteria that may also be incorporated into the evaluation of potential remedies. Superfund remedies are not required to meet TBCs, but they may be used in the selection of remedies in the absence of ARARs. TBC criteria may be considered when determining the degree of remediation necessary to protect human health and the environment. For example, the Department of the

Army has adopted the criterion of 10-percent explosive content as a measure of the potential reactivity of soil containing explosives such as TNT. This TBC criterion has been utilized at the Project Site to characterize OE-affected soil and develop appropriate remedial alternatives.

5.2 EVALUATION CRITERIA

Each of the eight remedial alternatives retained through the preliminary screening process was further evaluated in a detailed analysis. The purpose of the detailed analysis is to provide sufficient information for comparing the alternatives and selecting the remedy for the Project Site. The following nine evaluation criteria for the alternatives are based on statutory requirements: (1) overall protection of human health and the environment; (2) compliance with ARARs; (3) long-term effectiveness and permanence; (4) reduction of toxicity, mobility, or volume through treatment; (5) cost; (6) short-term effectiveness; (7) implementability; (8) regulatory agency acceptance; and (9) community acceptance.

Evaluation criteria 1 and 2 listed above are threshold criteria that must be satisfied in order for a remedy to be eligible for selection. Criteria 3 through 7 are balancing criteria used to evaluate the advantages and disadvantages of the remedies, and criteria 8 and 9 are modifying criteria, generally taken into account after public comment is received on the recommended alternative. A summary of each criterion is included in Appendix C.

5.3 EVALUATION OF ALTERNATIVES

5.3.1 Summary of Feasibility Study Alternatives

Of the eight alternatives evaluated in the detailed analysis, two of them included the "no action/no project" alternatives in accordance with EPA and CEQA guidelines. Three groups of alternatives include subalternatives "A" and "B" related to the remediation of soil containing TNT. Subalternative A involves the in situ homogenization of shallow soil in the vicinity of the TNT Strips prior to excavation. Subalternative B also includes the homogenization step. Additionally, this subalternative includes composting of soil, as necessary, to lower TNT concentrations to acceptable levels for disposal as a nonhazardous waste. The alternatives considered in the detailed analysis of the FS included the following:

Alternative 1 - No Action, to provide a baseline for comparison as required by regulatory guidelines. This alternative would not include maintenance of current security measures or other access restrictions. The Project Site would remain in its current state with respect to OE and non-OE constituents in soil.

Alternative 2 - Institutional controls over entire Project Site and monitoring (the "no project" alternative), where no cleanup activities would be conducted, and the Project Site would not be developed for residential use. Current security measures and access restrictions would be maintained, and periodic monitoring would be performed to evaluate groundwater and surface water quality over time, and the stability of slopes at the Project Site where there is a potential for soil erosion or slope instability. USACE would assume responsibility for performing periodic monitoring. USACE would also implement institutional controls to increase public awareness of potential risks associated with OE (e.g., creation of display cases, distribution of pamphlets and OE safety awareness training video, participation with Underground Service Alert program to notify parties planning subsurface activities in areas with potential OE). Additionally, covenants to restrict use of the property would be recorded to prohibit any development on the Project Site, unless and until appropriate cleanup activities were completed.

Alternatives 5A and 5B - The major components of these alternatives are as follows:

Point Clearance of OE, OE Scrap, and Metallic Anomalies over the Entire Site. This component includes surface preparation, surface clearance, geophysical investigation and mapping, removal and disposal of all detected anomalies, and a quality assurance (QA)/quality control (QC) scan of the entire Project Site after completing the initial point clearance. Wetland areas would be temporarily dewatered as necessary to expose the ground surface for surface clearance and geophysical mapping and removal activities.

Areawide OE Clearance. Soil considered to have a potential to contain OE below the geophysical scan depth would be excavated in portions of the North Valley, South Valley, and Ridge areas intended for future residential use, as well as overburden soil associated with Unit D-1 lots. Prior to excavation, soil would be scanned using geophysical techniques to identify metallic anomalies, including OE, OE scrap, and non-OE debris. Each lift would have a QA/QC activity consisting of rescanning soils in the North Valley after placement in lifts, or an in-situ QA/QC scan. The process of scanning, QA/QC, and excavation in lifts would be continued until no OE or OE scrap are found in two consecutive lifts, or bedrock is encountered. Following point clearance and areawide clearance, a layer of crushed bedrock would be placed over areawide cleared soil in future residential areas to provide additional protection against potential exposure to OE. Areas confirmed as locations where destruction of munitions by open detonation took place will be scanned and excavated to bedrock.

Remediation of Chemically Affected Soil. Soil that contains chemicals at concentrations exceeding soil remediation goals would be removed from the Project Site, and disposed of at an approved off-site facility. Affected areas include the TNT Strips, the Flare Site, Demolition Site #3, and Stockpiles #1, #2, and #3 on the floor of the North Valley. TNT Strip soils would be treated prior to

removal to ensure that TNT concentrations are less than 10 percent. This treatment step involves in situ homogenization using special equipment and procedures to safely lower the TNT concentrations of affected soils prior to excavation, loading, and removal from the Project Site. Subalternative B includes composting as a subsequent treatment process for soils containing TNT. Composting involves the biotreatment of soils through the addition of organic matter, nutrients, air, and water to stimulate the naturally occurring microorganisms to degrade TNT. Following composting, the soil would be removed from the Project Site as a nonhazardous material, or it may be placed on site, if no constituents are present at concentrations that exceed remedial goals.

Institutional Controls. Institutional controls would include recording covenants or similar control mechanisms ("covenants") with Solano County to restrict use of portions of the property. The restrictions are necessary because the portions of the Project Site to be restricted will not be subject to areawide OE clearance. The specific portions of the Project Site that would be restricted include the roads and other paved areas in the portion of Unit D-1 that are within the boundaries of the Project Site, the currently paved portion of the McAllister Drive Land Bridge, and parcels in the North Valley and South Valley that are designated in the City of Benicia's General Plan as Open Space (excluding an open space area in the North Valley that is designated for use as a park, and will be remediated to residential standards). Prior to DTSC's Site Certification, the City of Benicia would change the zoning of the Open Space parcels from Single-Family Residential to Open Space. The covenants would then limit the ability of the owners of the restricted areas to change the land use designations or zoning of a restricted area if the change would be inconsistent with the restrictions imposed by the covenants.

The restrictions imposed by the covenants would permanently apply to the specified areas, and would restrict excavation and other ground-intrusive activities that would penetrate the ground. The proposed restricted activities ("excavation activities") are those that involve (1) the displacement of 10 cubic feet or more of soil within 1 foot of the surface on any portion of the Open Space parcels, (2) any penetration to a depth greater than 1 foot on any portion of the Open Space parcels, or (3) any penetration beneath the aggregate base that underlies the restricted paved portions of the Project Site. Excavation activities would only be undertaken in accordance with requirements to be set forth in the covenants. The covenants will describe a review and approval process that the City will follow to authorize City employees or third parties to conduct excavation activities. All excavation activities must also comply with the requirements of a Contingency Action Plan (CAP) (described in Appendix A of this RAP). The CAP would address on-site safety support by OE-qualified personnel during excavation activities, the safety procedures to be followed by field personnel during excavation activities, and the procedures that will be followed if a suspected OE or OE item is found. In addition to excavation activities, the covenants would also prohibit other specified uses of the restricted areas. Other institutional controls would include informational devices to warn of the dangers of encountering OE within the restricted area, to instruct on response, and to keep DTSC and USACE informed

in the event that OE is encountered. A program for monitoring, assessing, and reporting to DTSC compliance with the requirements for conducting excavation activities would also be required. A draft proposed covenant is attached as Appendix B to the draft EIR for the Project, State Clearinghouse Number 99042079, dated September 2000.

Proposed requirements for the CAP, informational devices, and other institutional controls are described in Appendix A of this RAP as part of the O&M Plan.

Environmental Monitoring. Environmental monitoring would be performed to verify, monitor, and maintain the effectiveness of the proposed remedial actions. Water quality monitoring would include sampling groundwater, groundwater seeps, subdrain water, and surface water, as well as testing the samples for constituents specified in the O&M Plan. Slope stability and erosion monitoring would be conducted to evaluate the stability of areas that have been point cleared in the North Valley and the South Valley. Wetlands monitoring and maintenance would also be conducted. The required monitoring and maintenance activities are summarized in Appendix A of this RAP. These activities in addition to the details of sample collection/analysis requirements and protocols are described in the OE or non-OE RDD. It is anticipated that DTSC will finalize the RDDs after consideration of public comment and issuance of the final RAP.

Alternatives 6A and 6B. - These alternatives include the Alternative 5 components, plus excavation of the South Valley kick-out zone soil surrounding the demolition sites (exclusive of wetland areas). The extent of the kick-out zone would be determined by the OE SCM, which will be developed after completion of point clearance activities. This mass excavation work would involve removing all soil above bedrock, to the maximum practical depth, and placing most of the soil as engineered fill in the bottom of the North Valley. The OE kick-out zone soil would be scanned using geophysical methods before it is excavated, and after placement in lifts in the North Valley. A portion of the OE-cleared soil would be scanned using geophysical methods, and reused as fill along the edge of the South Valley wetlands to maintain the stability and hydrologic characteristics of the wetlands.

Alternatives 8A and 8B. - These alternatives include the Alternative 5 components, plus excavation of South Valley kick-out zone soil and replacement in the South Valley, with additional geophysical scanning of OE kick-out zone soil in lifts. The plan to excavate and replace OE kick-out zone soil in the South Valley would be carefully engineered to maintain slope stability, including surface and subsurface drainage controls.

5.3.2 Evaluation of Alternatives

Section 12.1 of the R/VFS (Earth Tech, 2001b) presents the evaluation of all the remedial alternatives for the Project Site. A comparison of the advantages and disadvantages of Alternatives 5, 6, and 8 including subalternatives, in relation to the nine U.S. EPA decision-making criteria, is presented below:

(1) Overall protection of human health and the environment. All of the alternatives are effective in eliminating the potential pathway for contact with OE in residential areas through application of point clearance, areawide clearance, removal of overburden soil within 14 feet of finished grade, and through placement of a 14-foot-thick layer of OE-free crushed bedrock over areawide clearance soils. Alternatives 6 and 8 provide the greatest amount of overall protection, since OE kick-out zone soil would be excavated to bedrock, and scanned for OE in lifts during placement as fill. Under Alternative 5, the likelihood of the public encountering OE is greatly reduced; however, a potential pathway would still exist for contact with OE in the areas that were not subject to areawide clearance if intrusive activities were conducted, or if the soils become exposed through landsliding or erosion. Consequently, the use of the restricted areas for certain uses may entail unacceptable health and safety risks from potential accidental detonation of OE. The uses raising such health and safety concerns would include a residence, including any mobile home or factory-built housing, constructed or installed for use as residential human habitation; a hospital for humans; a public or private school for persons under 21 years of age; a day care center for children; certain types of park activities and facilities such as tot lots, playgrounds, play fields, and par course equipment; camping; construction of any structure (as defined in the 1998 California Building Code) to be used for commercial or industrial purposes; and excavation activities, unless performed in a manner acceptable to DTSC, as discussed in Section 5.3.1 above. Prohibiting use of restricted areas for such purposes through the Alternative 5 institutional controls, and requiring compliance with the monitoring requirements that will be incorporated into a final O&M Plan to be included in the O&M Agreement required by Section 5.14 of the Order would reduce the health and safety risks to an acceptable level.

(2) Compliance with ARARs. All of the alternatives would be expected to meet this criterion. Applicable requirements would not be applied to the "no-action" alternatives. Alternatives 5, 6, and 8 would be designed and implemented to satisfy ARARs, including requirements to control emissions to air and water, to protect biological resources including wetlands, to appropriately manage hazardous waste, and to protect workers performing the remedial activities.

(3) Long-term effectiveness and permanence. Alternatives 5, 6, and 8 each include OE remediation and excavation/disposal of chemically affected soil, including treatment of TNT-affected soils. Therefore, each of these alternatives would provide a high degree of long-term effectiveness. Alternatives 6 and

8 provide the greatest degree of OE remediation, since they include scanning, excavation, and rescanning of kick-out zone soil to bedrock. However, these alternatives also have the greatest potential long-term environmental impacts on the South Valley. Alternative 8 would require reconstruction of the South Valley slopes. With this alternative, it would be necessary to cut benches in the bedrock and place fills on each bench. A subdrainage system would also be required to properly reconstruct the hillsides. The subdrainage system would also impact the hydrologic conditions in this portion of the South Valley. Alternative 8 would involve the most earthwork and require the greatest cost. A contingency plan would be prepared to mitigate potential adverse impacts to wetlands resulting from implementation of Alternatives 6 and 8. Alternative 8 would also require a long-term monitoring plan to inspect the condition of the South Valley slopes, following placement of engineered fill in these areas.

(4) Reduction of toxicity, mobility, or volume through treatment.

Alternatives 5, 6, and 8 would all satisfy this criterion by identifying and treating OE, and by treating and/or removing soils containing chemicals above the remedial goals. Alternatives 6 and 8 provide the greatest potential reduction of OE items, since kick-out zone soils would be excavated to bedrock and cleared in lifts during placement as fill. With respect to the chemically affected soils, subalternative B for Alternatives 5, 6, and 8 provide the greatest reduction in the toxicity through treatment of the TNT-affected soils.

(5) Cost. The total project cost is the present value of capital costs and O&M costs. There would be substantial costs to implement Alternatives 5, 6, and 8; however, Alternative 5A would be most cost-effective, with a total estimated cost of approximately \$17.5 million dollars. Alternative 8B is the most costly alternative, with a total estimated cost of approximately \$22.1 million dollars. Tables presenting the cost analysis for all alternatives are contained in the RI/FS.

(6) Short-term effectiveness. Alternatives 5, 6, and 8 would have potential short-term impacts related to OE clearance, excavation, and off-site transport of soils for disposal. Alternative 5 would have the least short-term impacts, because less soil would be excavated and the impacts to the existing neighborhood resulting from implementation of the minimum separation distance (MSD) and voluntary separation distance would be less than for Alternatives 6 and 8. Remedial activities for all of these alternatives would be performed in accordance with an approved Site-Specific Safety and Health Plan. The above alternatives also include contingencies to address conditions that could potentially occur during implementation of the RAP. These contingency plans address the detection of underground storage tanks and piping, the detection of OE, the presence of TNT-affected soil beyond the Project Site boundary, and the evaluation of the SCM consistent to determine whether OE was distributed to residential areas outside the Project Site boundary. In addition, air monitoring would be performed to assess the effectiveness of dust control measures, and remedial activities would

be performed in accordance with a storm water pollution prevention plan to limit potential impacts on surface water quality.

(7) Implementability. Alternatives 5, 6, and 8 are all considered to be implementable. Each of these alternatives employ OE remediation and TNT-treatment technologies that have been proven effective in the field. Alternative 5 would be more implementable than Alternatives 6 and 8, because the MSD would be in effect for less time, and would have less effects on residents in the Project Site vicinity.

(8) Regulatory agency acceptance. Alternative 5 would likely be acceptable to the regulatory agencies. Alternatives 6 and 8 may also be acceptable; however, these alternatives would have greater potential impacts on the South Valley wetlands, and are considered less favorable to the involved regulatory agencies. The RWQCB has indicated that a contingency plan and financial assurance would be required to protect or replace the wetlands if they are adversely impacted by the hydrologic changes resulting from excavation of the kick-out zone soils. The RWQCB would also require a contingency plan if Alternative 8 was selected, since Alternative 8 also would affect South Valley wetlands hydrology.

(9) Community acceptance. Based on comments received to date, the community appears to favor Alternative 5 over Alternatives 6 and 8. Community members have expressed concern about the potential environmental and aesthetic impacts of removing kick-out zone soils from the South Valley. This criterion will be further assessed following the public notice and comment period on the draft RAP.

5.4 PROPOSED ALTERNATIVE

Alternative 5A, as modified to incorporate the mitigation measures set forth in Appendix E, is the recommended remediation alternative. Alternative 5A has smaller short-term and potential long-term impacts on the South Valley than do Alternatives 6 and 8. DTSC's evaluation of these impacts is summarized in Appendix C (factor 6). Based on comments received on the draft R/FS Report, Alternative 5A appears to be favored by both the agencies and the community. This alternative would be more implementable and cost-effective than Alternatives 6 and 8. Potential environmental impacts during construction would be managed using various engineering controls. This alternative would be effective in eliminating the potential pathway for contact with OE in residential areas through application of point clearance, areawide clearance, removal of overburden soil within 14 feet of finished grade, and through placement of a 14-foot-thick layer of OE-free crushed bedrock over areawide clearance soils. In nonresidential areas in the North Valley and South Valley, the likelihood of the public encountering OE is greatly reduced by the OE clearance activities, and is further enhanced by the institutional controls and other measures.

Following completion of the remedial activities, water quality (groundwater, subdrain water, surface water, and seeps), soil stability, erosion, wetlands, and institutional controls would continue to be monitored and maintained to verify protection of public health and the environment and compliance with ARARs. Monitoring of institutional controls and measures will be incorporated into a final O&M Plan. The final O&M Plan will be included in the O&M Agreement, which is required by Section 5.14 of the Order.

Selection of Alternative 5A as the Recommended Remediation Alternative is based on the understanding that the institutional controls of the covenant shall be applicable to the areas within the project site described in Section 5.3.1 under the heading institutional controls. Should this not be the case, cleanup of these areas to unrestricted levels shall become the selected remedial alternative.

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Table 2-1. Summary of Remediation and Planned Supplemental Non-OE Investigation after OE Point Clearance
Page 1 of 8

| Area of Interest | Outstanding Issue | When Issue is to be Addressed | Document that will present Scope of Work | Chemicals to be Considered |
|------------------|--|--|---|--|
| TNT Strips | Lateral and vertical extent of explosives impact associated with TNT Strips (including possible sixth strip identified during the updated aerial photographic review between TNT Strip #3 and #4). | During remediation through excavation confirmation sampling. | Details of excavation confirmation sampling plan will be presented in Non-OE RDD. | Explosives. |
| | Lateral extent of explosives impact to east beyond the Project Site boundary. | During remediation through excavation confirmation sampling. | Details of excavation confirmation sampling plan will be presented in Non-OE RDD. | Explosives. |
| | Lateral and vertical extent of contamination between TNT Strip #4 and sample location TNT-R-6. | During remediation through excavation confirmation sampling. | Details of excavation confirmation sampling plan will be presented in Non-OE RDD. | Explosives. |
| | Lateral and vertical extent of petroleum hydrocarbons, nitrates, PAHs, and dioxins/furans. | During remediation of TNT Strips through excavation confirmation sampling. | Details of excavation confirmation sampling plan will be presented in Non-OE RDD. | Ten percent of the confirmation samples will be analyzed for TEPHs, nitrates, and PAHs. Two samples per strip will be analyzed for dioxins/furans. |

Table 2-1. Summary of Remediation and Planned Supplemental Non-OE Investigation after OE Point Clearance
Page 2 of 8

| Area of Interest | Outstanding Issue | When Issue is to be Addressed | Document that will present Scope of Work | Chemicals to be Considered |
|-------------------------------------|---|---|--|---|
| Howitzer Test Facility Stockpile #3 | Off-site disposal of stockpile material. Vertical extent of stockpile material. | During remediation through additional sampling of stockpile material at a frequency required by the disposal facility and confirmation beneath stockpile after removal. | Details of stockpile and confirmation sampling plan will be presented in Non-OE RDD. | Supplemental stockpile analyses to be determined by the disposal facility. Confirmation sampling beneath stockpile for chemicals identified in the stockpiles (TEPH and PAHs). Ten percent of the confirmation samples will also be analyzed for the full suite of metals. |

Table 2-1. Summary of Remediation and Planned Supplemental Non-OE Investigation after OE Point Clearance
Page 3 of 8

| Area of Interest | Outstanding Issue | When Issue is to be Addressed | Document that will present Scope of Work | Chemicals to be Considered |
|---|--|---|---|---|
| Ammunition Renovation/Primer Destruction Site | Removal of possible UST (point source) | Geophysical anomaly will be investigated as part of site-wide OE point clearance. | Details of site-wide OE point clearance will be presented in OE RDD. | TEPH as diesel and motor oil, TEPH as kerosene, and TEPH as gasoline, and BTEX. |
| | | <p>Area of the geophysical anomaly will be excavated to determine the existence of an UST. If a UST is identified, it will be removed in accordance with the RWQCB guidelines. Additional investigation will be performed including soil boreholes or installation of monitoring wells, if conditions warrant. Overexcavation will be conducted as necessary to achieve preliminary remediation goals, and confirmation sampling performed in accordance with UST removal guidelines.</p> | <p>Details of UST removal procedures and excavation confirmation sampling plan will be presented in Non-OE RDD.</p> | |

Table 2-1. Summary of Remediation and Planned Supplemental Non-OE Investigation after OE Point Clearance
Page 4 of 8

| Area of Interest | Outstanding Issue | When Issue is to be Addressed | Document that will present Scope of Work | Chemicals to be Considered |
|---|--|--|--|---|
| Ammunition Renovation/Primer Destruction Site Stockpile #1 and #2 | Off-site disposal of stockpile material. Vertical extent of stockpile material. | During remediation through additional sampling of stockpile material at a frequency required by the disposal facility and confirmation sampling beneath stockpile after removal. | Details of stockpile and confirmation sampling plan will be presented in Non-OE RDD. | Supplemental stockpile material analyses to be determined by the disposal facility. Confirmation sampling beneath stockpile for chemicals identified in the stockpiles (TEPHs and PAHs). Ten percent of the confirmation samples will also be analyzed for a full suite of metals. |
| North Valley - General | Extent of non-point-source petroleum hydrocarbon impact to soil in North Valley. | After OE point clearance. Additional soil boreholes to further define lateral extent of non-point-source petroleum hydrocarbons. | Details of sampling plan will be presented in Non-OE RDD. | TEPHs. |
| Ridge Area Stockpiles 1 through 9 | Determine presence of VOCs. | During remediation through field screening techniques. | Details of soil sampling plan will be presented in Non-OE RDD. | VOCs. |
| Downgradient Areas from Dynamite Burn Site | Downgradient soil quality has not been investigated. | During remediation through soil sampling which will include soil downgradient in the North Valley and the drainage swale northeast of the McAllister Drive Land Bridge. | Details of soil sampling plan will be presented in Non-OE RDD. | Explosives, TEPH, PAHs, PCBs, and one dioxin/furan sample per borehole. |

Table 2-1. Summary of Remediation and Planned Supplemental Non-OE Investigation after OE Point Clearance
Page 5 of 8

| Area of Interest | Outstanding Issue | When Issue is to be Addressed | Document that will present Scope of Work | Chemicals to be Considered |
|--------------------|---|--|---|---|
| Flare Site | Vertical and lateral extent of metals and dioxins/furans. | Additional soil sampling to define vertical and lateral extent during remediation and through soil boreholes and excavation confirmation sampling. | Details of soil sampling and excavation confirmation sampling plan will be presented in Non-OE RDD. | Metals (antimony, barium, copper, lead, zinc). The confirmation samples will be analyzed for a full suite of metals including Strontium and Perchlorate. Five confirmation samples will be analyzed for dioxins/furans. |
| Demolition Site #1 | Site not fully investigated due to presence of a geophysical anomalies. | After anomaly removal, additional sampling will be performed at the demolition site. | Details of sampling plan will be presented in Non-OE RDD. | Explosives, PAHs, Metals. If this site is established as a demolition site, ten percent of the confirmation samples will be analyzed for dioxins/furans |
| Demolition Site #3 | Vertical and lateral extent of mercury impact. | Additional soil sampling to define vertical and lateral extent during remediation and through and excavation confirmation sampling. | Details of soil sampling and excavation confirmation sampling plan will be presented in Non-OE RDD. | Mercury. Ten percent of the confirmation samples will be analyzed for dioxins/furans and metals. |

Table 2-1. Summary of Remediation and Planned Supplemental Non-OE Investigation after OE Point Clearance
Page 6 of 8

| Area of Interest | Outstanding Issue | When Issue is to be Addressed | Document that will present Scope of Work | Chemicals to be Considered |
|--|---|-------------------------------|--|--|
| McAllister Drive Land Bridge | Additional sampling for compounds of interest possibly associated with a mobile communications tower previously situated in the borrow area. In addition, TNT will be added to the list of explosives analysis. | After OE point clearance. | Details sampling plan will be presented in Non-OE RDD. | Explosives (including TNT), TEPH, PAHs, PCBs, dioxins/furans. |
| 1945 Disturbed Area on Ridge northeast of McAllister Drive Land Bridge | Assessment of disturbed area. | After OE point clearance. | Details of sampling plan will be presented in Non-OE RDD. | All chemicals previously identified for the Tourtelot Remediation Project (See Table 4-1). |
| Unit D-1 Stockpile | Characterize Unit D-1 area soil stockpile. Off-site disposal if contaminated; use for backfill if below preliminary remediation goals. If contaminated, collect confirmatory samples below stockpile. | After OE point clearance. | Details of stockpile sampling and confirmation sampling will be presented in Non-OE RDD. | Explosives, TEPH, PAHs, PCBs, dioxins/furans (if evidence of burning), Metals (entire suite). Confirmation samples will be analyzed for chemicals defined during characterization. |

Table 2-1. Summary of Remediation and Planned Supplemental Non-OE Investigation after OE Point Clearance
Page 7 of 8

| Area of Interest | Outstanding Issue | When Issue is to be Addressed | Document that will present Scope of Work | Chemicals to be Considered |
|---|--|---|---|---|
| North Valley and South Valley Groundwater/Seeps and Surface Water | Need for further groundwater data. | After OE point clearance. Additional groundwater monitoring wells will be installed outside the construction area to create well pairs monitoring the alluvium/ colluvium and weathered bedrock, respectively, at the west and east ends of the North Valley and either adjacent to, or downgradient of, well MW-12 in the South Valley, depending on the results of the drainage swale sampling northeast of the McAllister Drive Land Bridge. | Monitoring will include sampling North Valley and South Valley groundwater, North Valley seeps and subdrain, and South Valley surface water. Groundwater/seep/ subdrain monitoring will be conducted on a quarterly basis for a period of 1 year and on a semiannual basis for an additional 4 years. Surface water monitoring will be conducted on a quarterly basis for a period of 1 year. Specific details of the monitoring program will be presented in Non-OE RDD. | All chemicals detected with concentrations above upgradient levels in either the groundwater or seeps at the Project Site will be analyzed. |
| Sitewide | Human health risk assessment and ecological risk assessment. | After OE point clearance, non-OE remediation, and prior to backfilling of the remediated areas. | Chapter 7.0 of RI/FS with specific details presented in Non-OE RDD. | Human health and ecological risks will be assessed for all chemical constituents evaluated in confirmation sampling, as well as analytical results for other areas where soil will remain in place. |

Table 2-1. Summary of Remediation and Planned Supplemental Non-OE Investigation after OE Point Clearance
Page 8 of 8

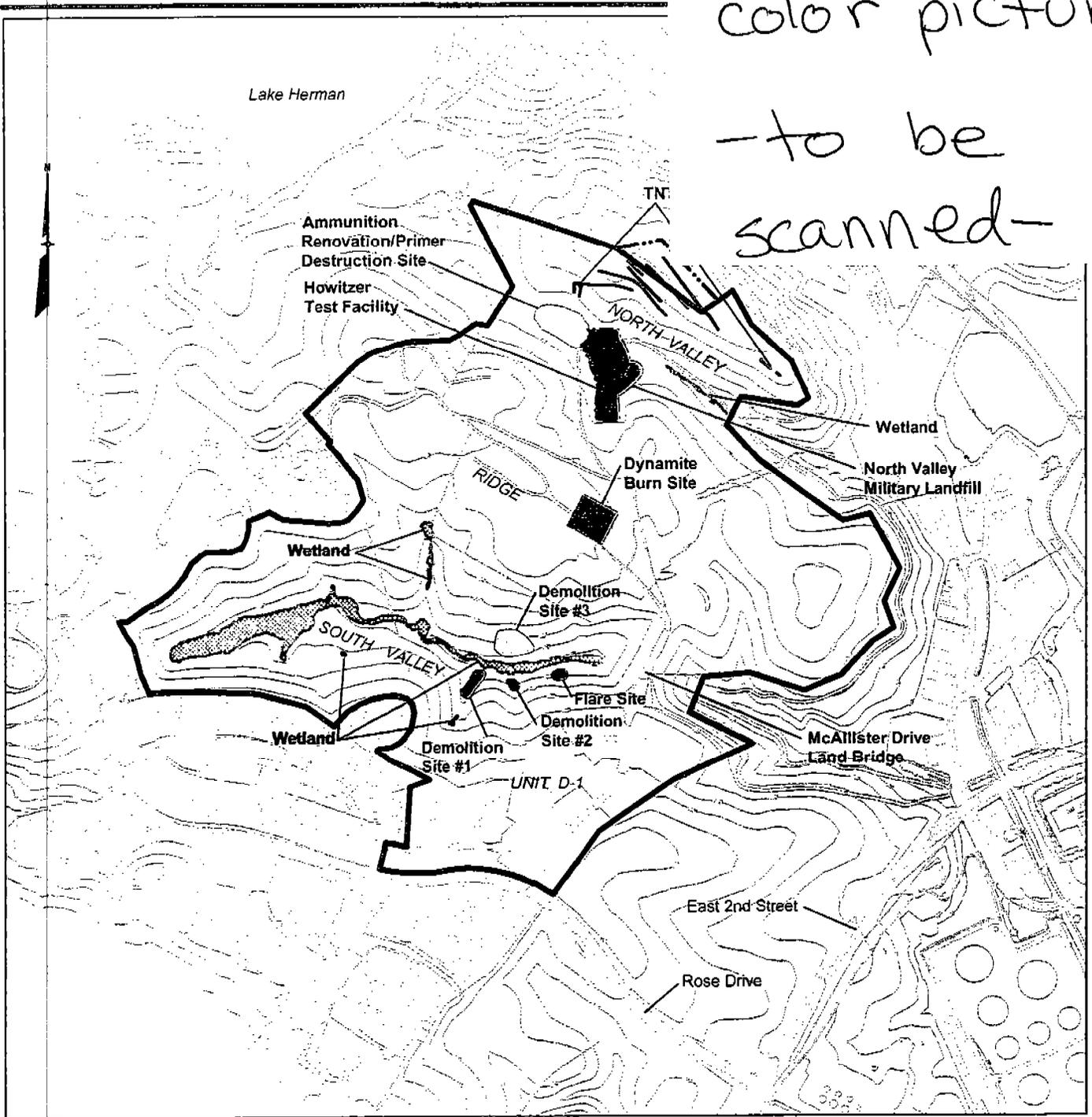
| Area of Interest | Outstanding Issue | When Issue is to be Addressed | Document that will present Scope of Work | Chemicals to be Considered |
|------------------|---|-------------------------------|--|----------------------------|
| BTEX | = benzene, toluene, ethylbenzene, and total xylenes | | | |
| DNT | = dinitrotoluene | | | |
| MW | = monitoring well | | | |
| OE | = ordinance and explosives | | | |
| PAH | = polycyclic aromatic hydrocarbon | | | |
| PCB | = polychlorinated biphenyl | | | |
| RWQCB | = Regional Water Quality Control Board | | | |
| RDD | = remedial design document | | | |
| R/FS | = remedial investigation/feasibility study | | | |
| SVOC | = semivolatile organic compound | | | |
| TEPH | = total extractable petroleum hydrocarbon | | | |
| TNT | = trinitrotoluene | | | |
| UST | = underground storage tank | | | |
| VOC | = volatile organic compound | | | |

Table 4-1. Preliminary Soil Remediation Goals

| | Preliminary Soil Remediation Goal | Area of Cleanup |
|----------------------------------|--|--|
| Metals in Soil | | |
| Antimony | 2.84 mg/kg | Flare Site |
| Barium | 642 mg/kg | Flare Site |
| Copper | 87.7 mg/kg | Flare Site |
| Lead | 148 mg/kg | Flare Site |
| Mercury | 0.77 mg/kg | Demolition Site #3 |
| Zinc | 142 mg/kg | Flare Site |
| Organic Compounds in Soil | | |
| Dioxins | 12 pg/g ^(a) | Flare Site |
| 2,4,6-TNT | 16 (residential) mg/kg ^(b) | TNT Strips |
| 2,4,6-TNT | 53 (recreational) mg/kg ^(b) | TNT Strips |
| 2,6-DNT | non-detect (PQL = 0.5 mg/kg) ^(c) | TNT Strips |
| benzo(a)pyrene | non-detect (PQL = 0.03 mg/kg) ^(c) | Ammunition Renovation/Primer Destruction Site - Stockpiles #1 and #2 |
| dibenz(a,h)anthracene | non-detect (PQL = 0.05 mg/kg) ^(c) | Howitzer Test Facility - Stockpile #3 |
| TPHs | 500 (residential) mg/kg ^(d) | Areas to be determined based on potential UST |

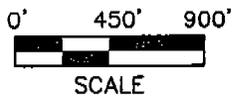
- Notes: (a) Dioxin concentrations are expressed in terms of 2,3,7,8-TCDD TEQ.
 (b) Individual remediation goals for all other explosives detected in soils have not been proposed. This decision is based on cumulative risks indicating that explosive compounds are likely to be below de minimus risk levels if TNT and 2,6-DNT are removed to remedial goals.
 (c) Goals are estimated PQL values. Because these are laboratory-specific numbers, they may change once the laboratory for the remedial action phase has been selected. DTSC will be notified if there are changes in the PQL from the values noted.
 (d) This value will be used as a basis for remediation of the North Valley.
- DNT = dinitrotoluene
 DTSC = Department of Toxic Substances Control
 mg/g = milligrams per gram
 pg/g = picograms per gram
 PQL = Practical Quantitation Limit
 TCDD = tetrachlorodibenzo-p-dioxin
 TEQ = Toxicity Equivalence
 UST = underground storage tank

color picture
-to be
scanned-



EXPLANATION

— Project Site Boundary



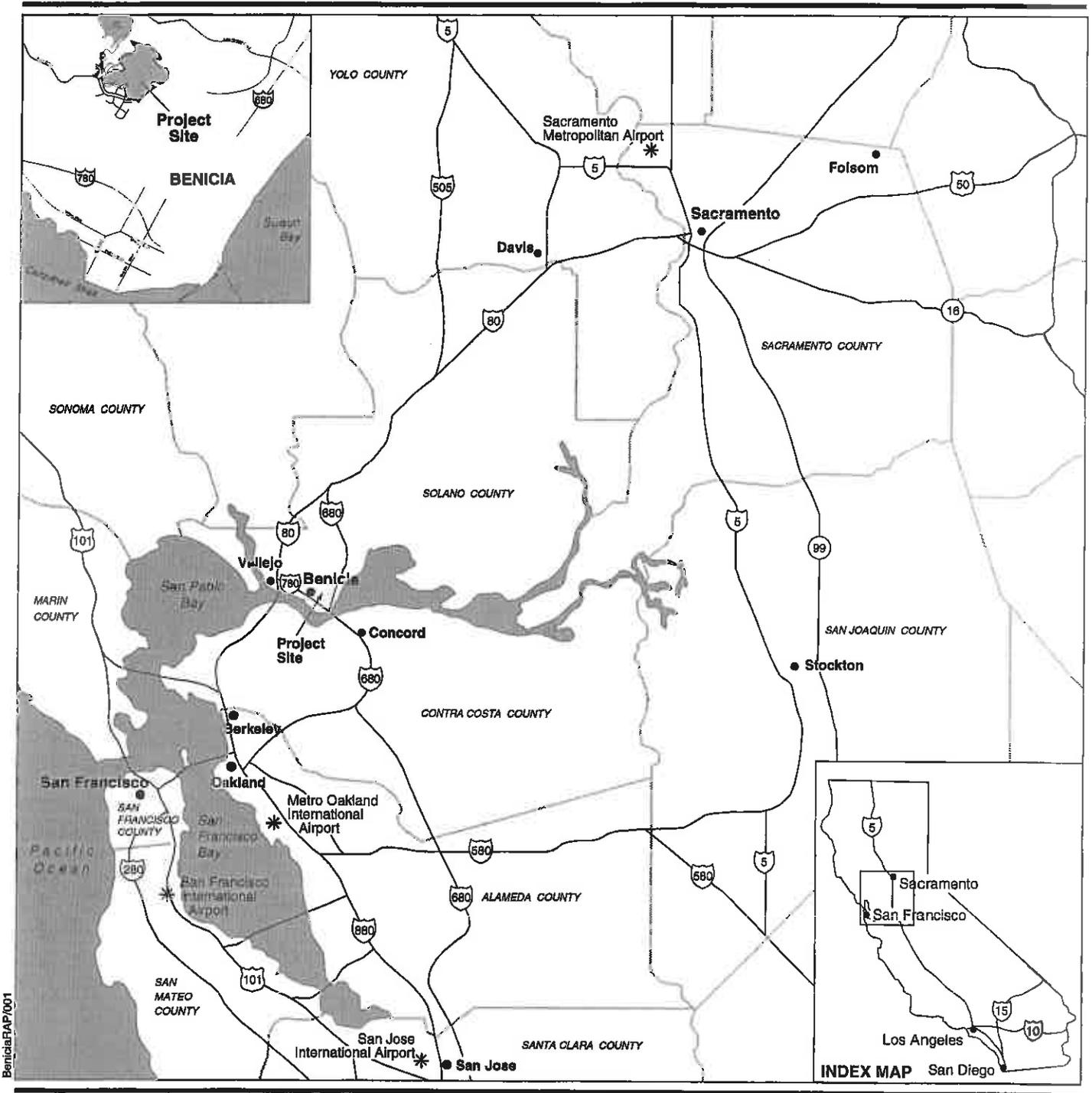
Note: Contour interval equals 25 feet.

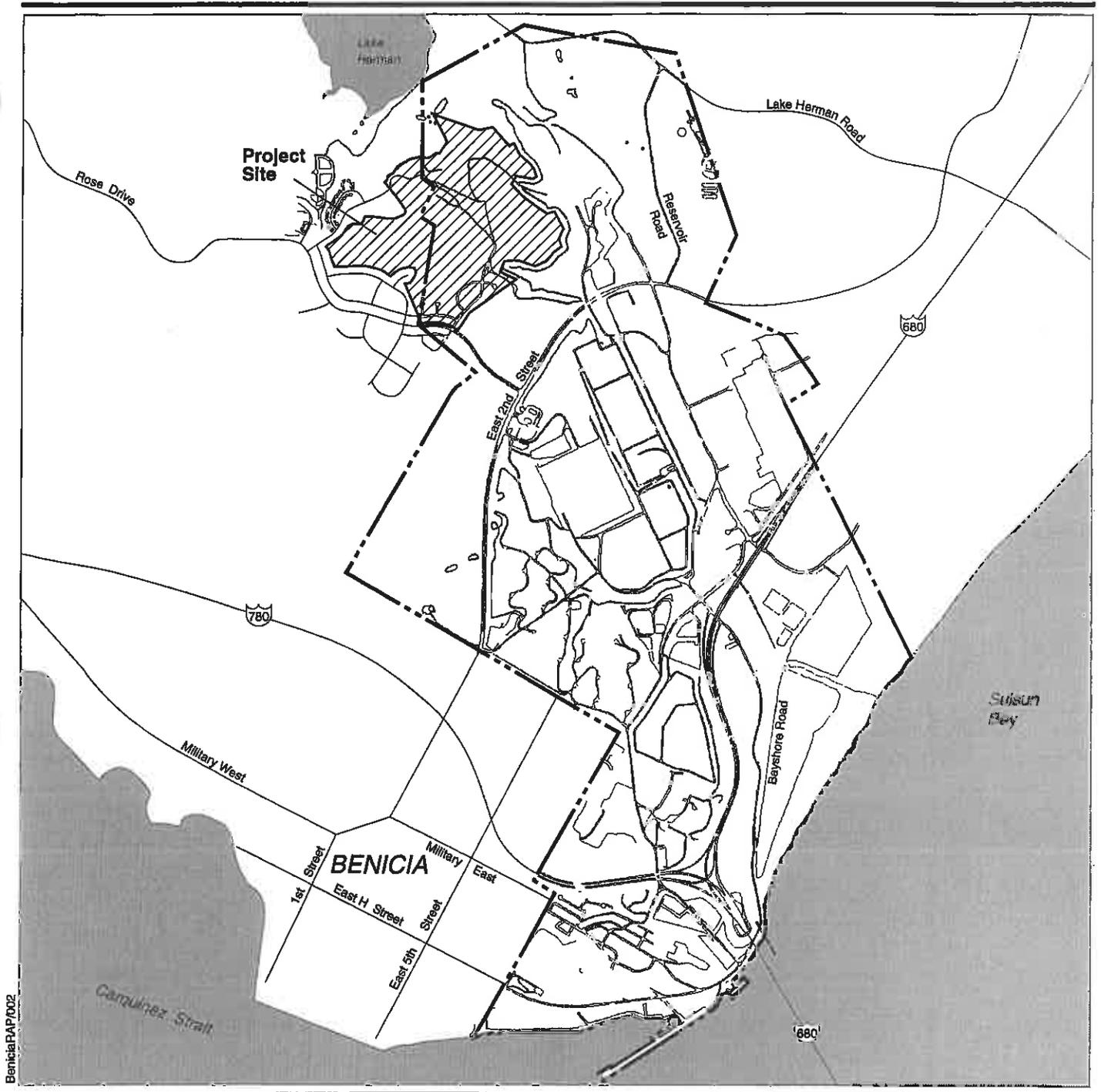
Figure ES-1

Project Site Layout Map

**Tourtlot Cleanup Project
Benicia, California**

January 2002





BeniciaPAP/002

EXPLANATION

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

Project Site Location Map

January 2002

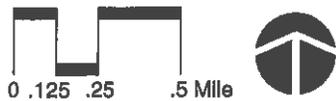
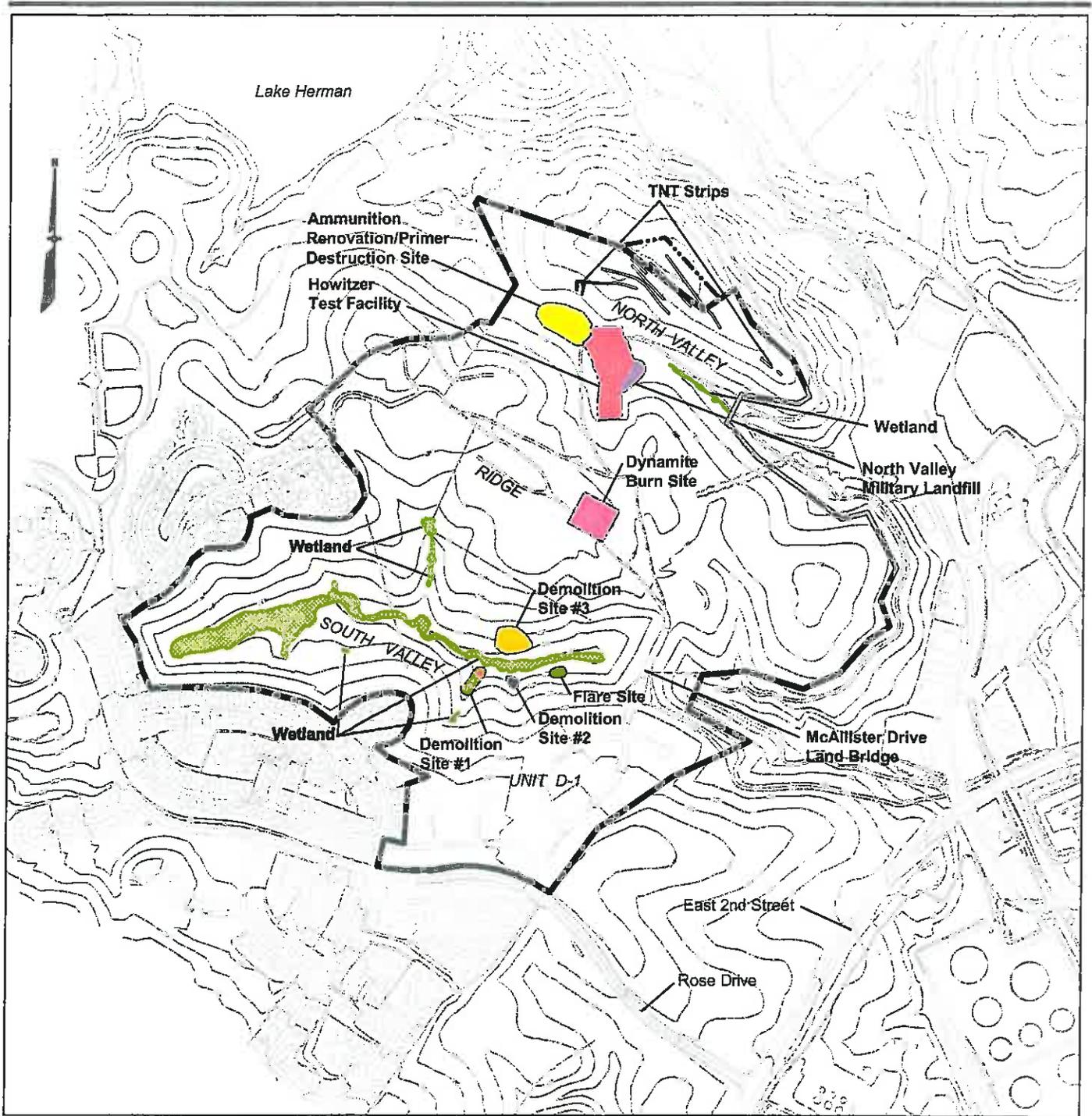


Figure 1-2



EXPLANATION

 Project Site Boundary



Note: Contour interval equals 25 feet.

Figure 1-3

Project Site Layout Map

**Tourtelot Cleanup Project
Benicia, California**

January 2002



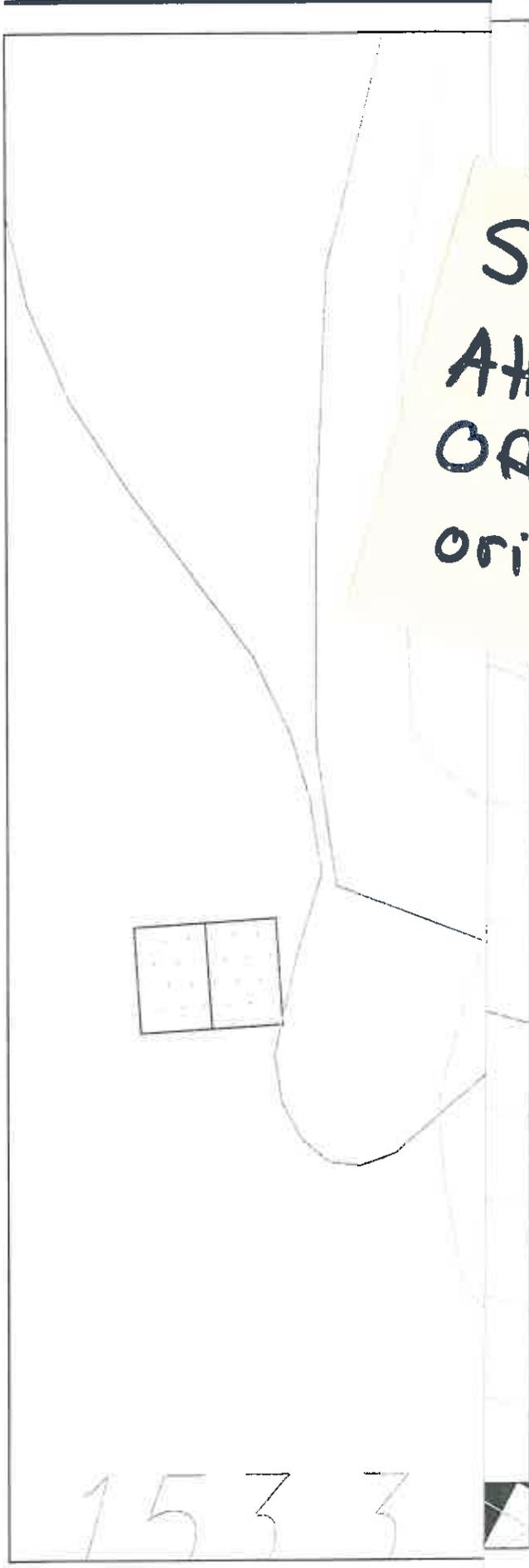
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Attorney's
Office for
original.

Figure 2-1

Non-OE Remedial Investigation Sampling Locations

Tourtelot Cleanup Project Benicia, California

January 2002



See City
Attorney's
Office for
original.

EXPLANATION

-  Landfill Test Pit (Earth Tech, May - June 2000)
-  Test Pit Sampled
-  Test Pit Sampled and Groundwater Encountered
-  Debris (e.g., decayed metal, E scrap, etc.)
-  Investigation Station
-  Investigation Sample Location
-  Monitoring Well (Number 1999 - April 2000)
-  Location of Former Structure
-  Topographic Contour

Date of Topography July 1998
(Cartwright Aerial)

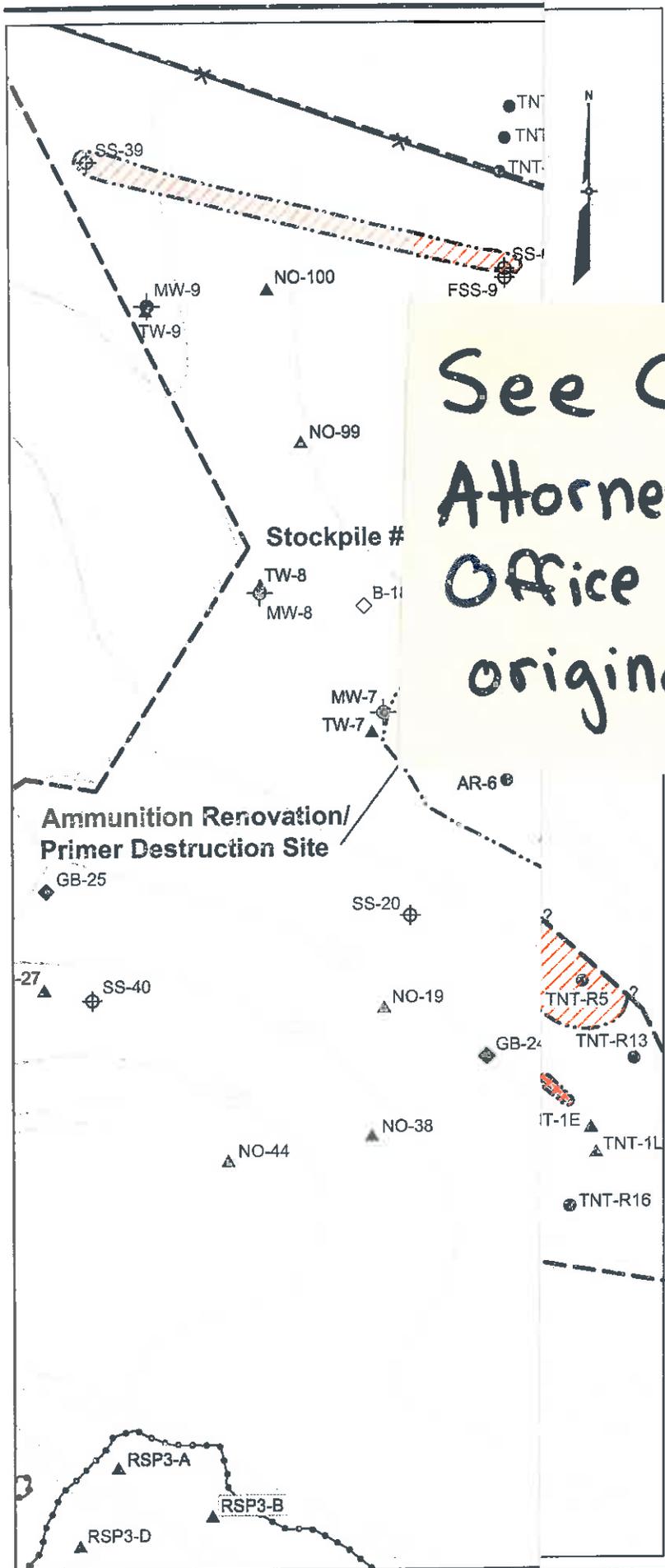


Figure 2-2
North Valley Military Landfill
Sampling Locations

Tourtlot Cleanup Project
Benicia, California

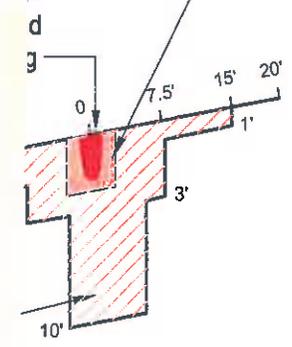
January 2002

1533



- EXPLANATION**
- Area of Interest
 - Approximate Location of Former Building/Structure
 - Project Boundary

Explosive - impacted soil
 >1,000 - 100,000 mg/kg



c section through
 'NT Strips

erty Boundary

See City
 Attorney's
 Office for
 original.

Date of topography July 1998
 (Cartwright Aerial)

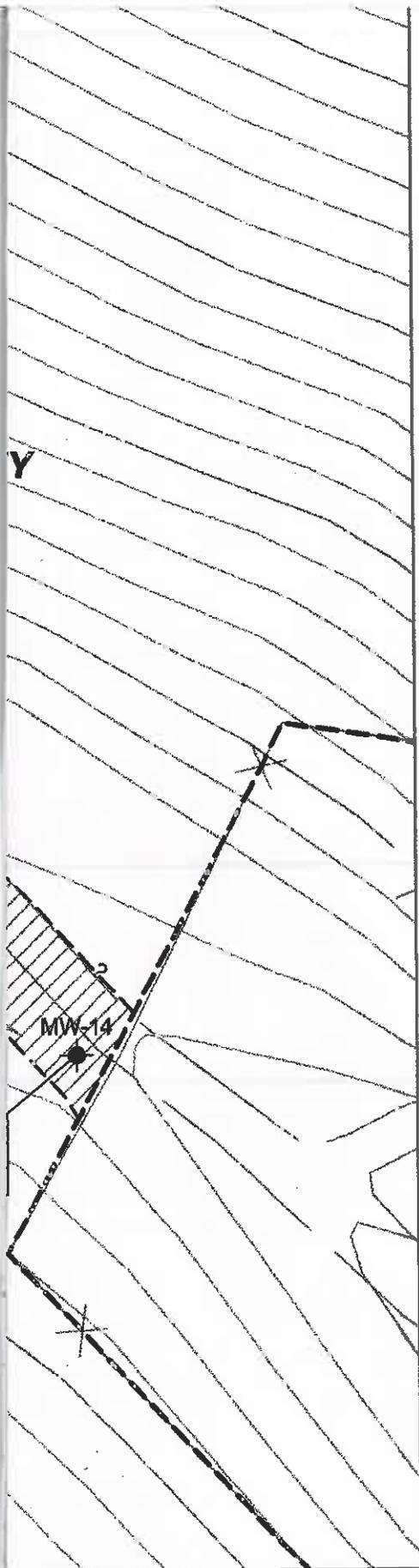


Figure 2-3

**Estimated Extent of
 Explosives-Impacted Soil
 North Valley**

**Tourtlot Cleanup Project
 Benicia, California**

January 2002



See City
Attorney's
Office for
original.

Figure 2-4

**Estimated Extent of
Petroleum Hydrocarbon-
Impacted Soil
North Valley**

**Tourtlot Cleanup Project
Benicia, California**

January 2002

All analytical data are verified and validated, unless indicated with an asterisk (*).

Soil results reported on dry weight basis in milligrams per kilogram (mg/kg) unless otherwise stated.

ND = Not detected at specified detection limits listed in analytical summary tables

pg/g = Picograms per gram

- HpCDF = Heptachlorodibenzo furan
- HpCDD = Heptachlorodibenzo-p-dioxin
- HxCDF = Hexachlorodibenzo furan
- HxCDD = Hexachlorodibenzo-p-dioxin
- OCDD = Octachlorodibenzo-p-dioxin
- OCDF = Octachlorodibenzo furan
- PeCDD = Pentachlorodibenzo-p-dioxin
- PeCDF = Pentachlorodibenzo furan
- TCDD = Tetrachlorodibenzo-p-dioxin
- TCDF = Tetrachlorodibenzo furan

J = Estimated trace concentration

R = Results rejected during data verification/validation

EXPLANATION



Area of Interest

Additional Area Investigated

See City
Attorney's
Office for
original.

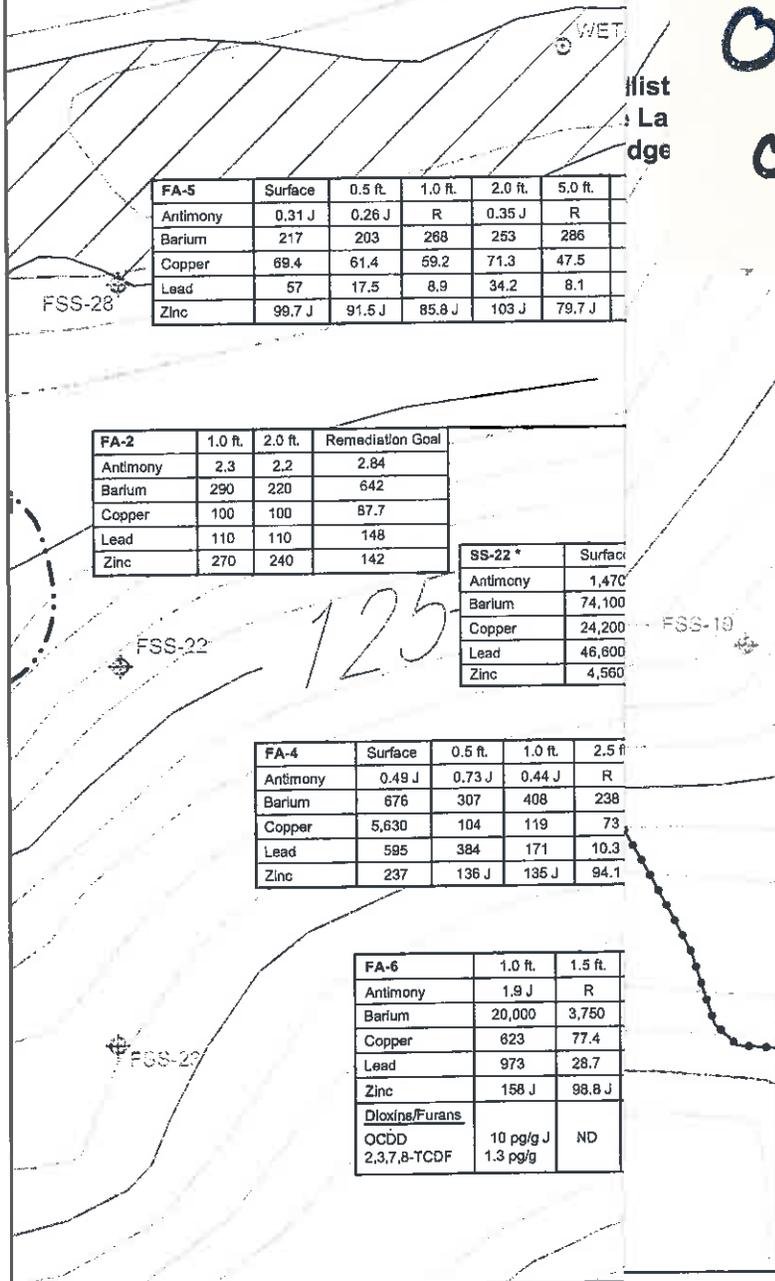


Figure 2-5

**Estimated Extent of
Metals-Impacted Soil
Flare Site**

**Tourtelot Cleanup Project
Benicia, California**

January 2002

All analytical data are verified and validated, unless indicated with asterisk (*).

Soil sediment results reported on dry weight basis in milligrams per kilogram (mg/kg) unless otherwise stated.

ng/g nanograms/gram

ND = Not detected at specified detection limits specified in RI/FS

J = Estimated concentration

Only mercury and methyl mercury results listed (see RI/FS for complete list of metals analyzed and concentrations detected)

EXPLANATION



Area of Interest



Estimated Extent of Mercury-Impacted

See City
Attorney's
Office for
original.

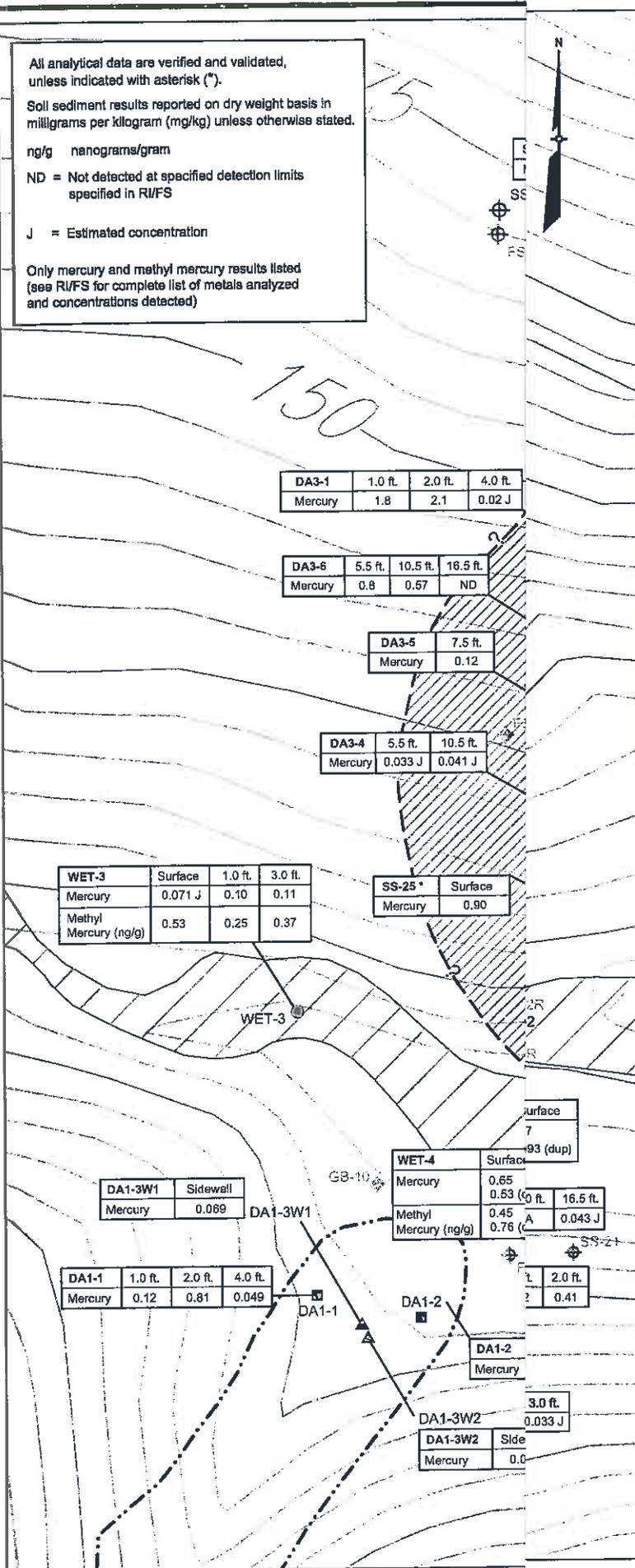
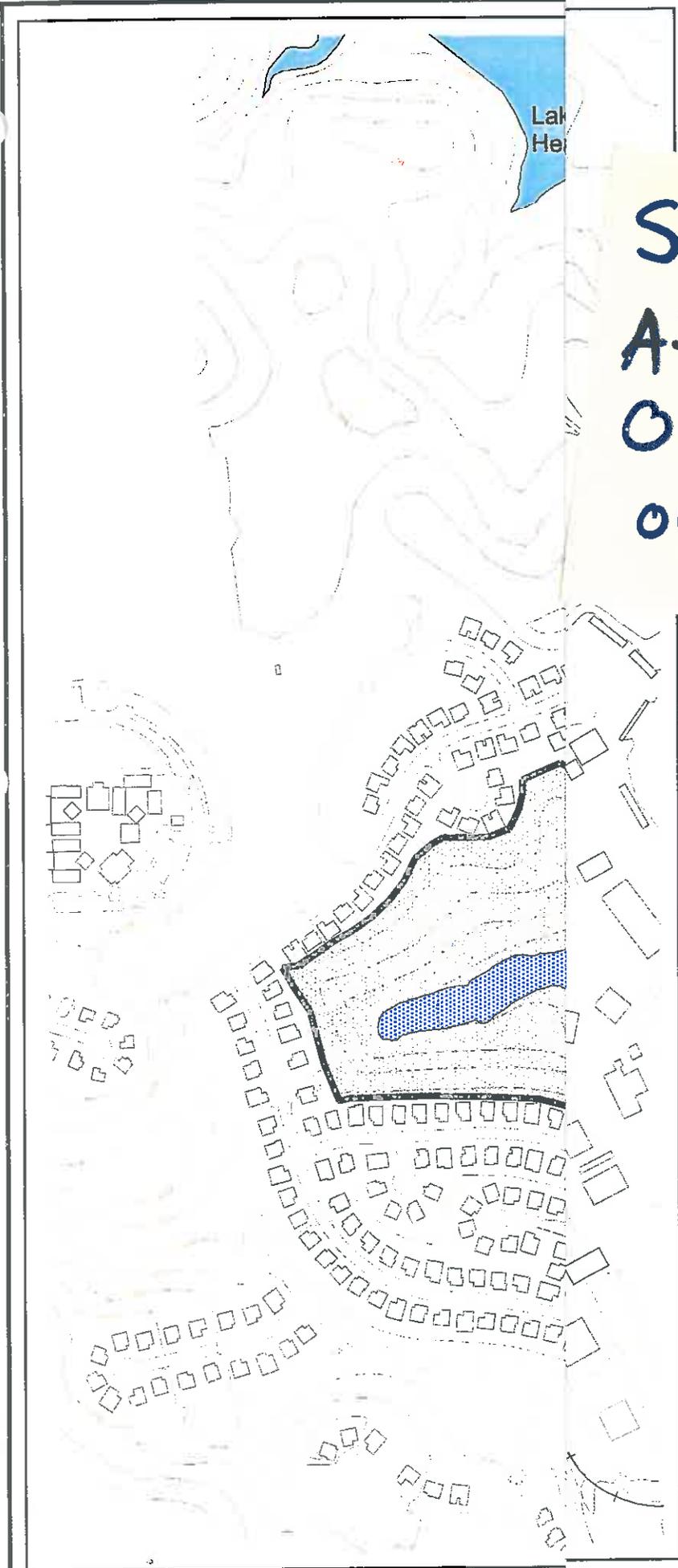


Figure 2-6

Estimated Extent of
Mercury-Impacted Soil/Sediment
Demolition Site #3

Tourtelot Cleanup Project
Benicia, California

January 2002



Explanation

-  Project Site Boundary
-  Wetlands with Potential for OE
-  TNT Strips (OE Where Explosives Concentration \geq 10% by Weight)

25 25 Foot Contour

See City
Attorneys
Office for
original.

/2714/date/cityofbenicia/arcview/projects/sectors-sep-dist-maps.apr (Figure2-7RAP)



FIGURE 2-7

Preliminary Site Conceptual Model
For Ordnance

Tourtlot Cleanup Project
Benicia, California

JANUARY 2002



Scale: 1" = 180'

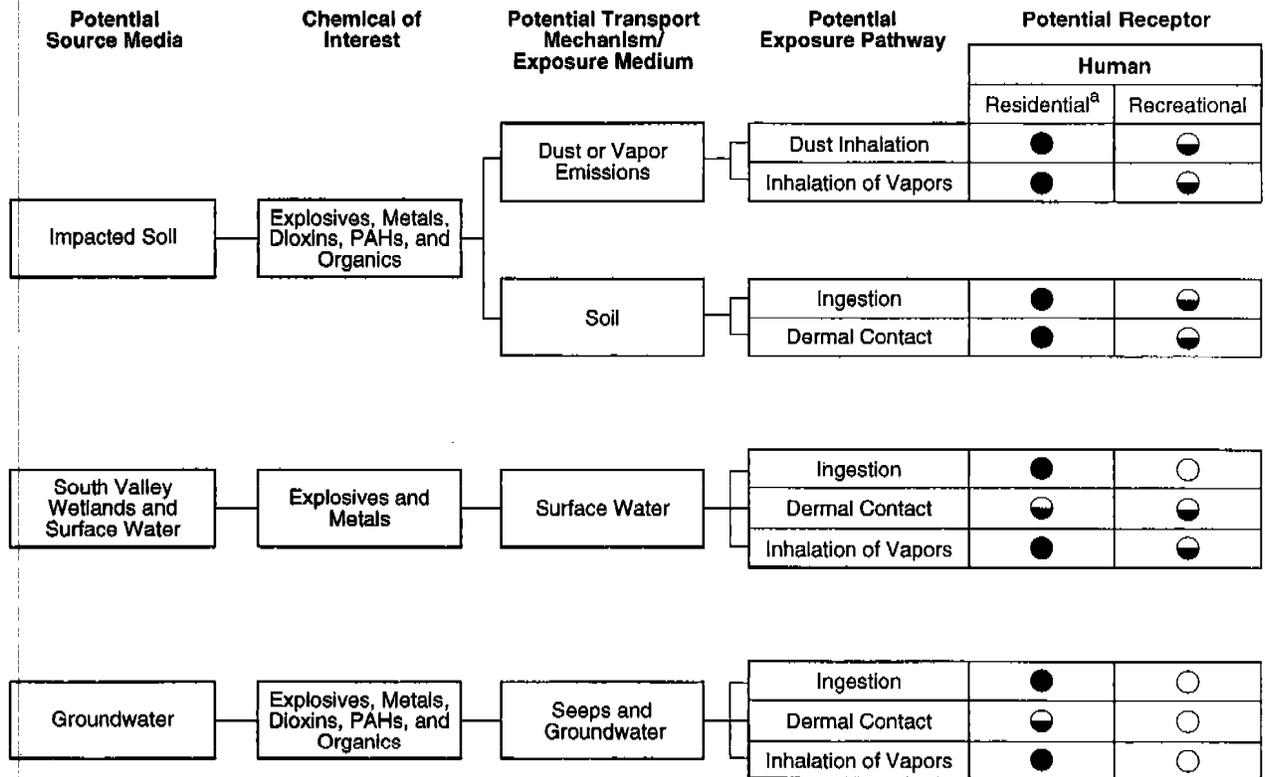
See City
Attorney's
Office for
original.

FIGURE 3-1

Summary of Ordnance Data

Tourtelot Cleanup Project Benicia, California

January 2002



BenticalRAP/003

EXPLANATION

- Evaluated quantitatively in risk assessment
 - ◐ Evaluated Qualitatively in risk assessment
 - No complete exposure pathway
- ^a Does not consider layer of clean fill that will be placed in residential areas (14 feet in most areas)

**Conceptual Site Model
for Chemically
Impacted Media**

January 2002

Figure 4-1

APPENDIX A

OPERATION AND MAINTENANCE PLAN

Following completion of remediation activities, operation and maintenance (O&M) activities will be performed to monitor and maintain the effectiveness of the remedial actions at the Project Site. The O&M activities are summarized below, and include monitoring of institutional controls and other institutional measures considered necessary due to the inherent uncertainties associated with ordnance cleanups.

O&M activities, listed below in Sections A-1 through A-4, will be finalized upon completion of point clearance activities, site remediation, and the Department of Toxic Substances Control's (DTSC's) concurrence with the Post-Remediation Risk Assessment and incorporated into a Final O&M Plan. The Final O&M Plan shall be submitted as part of the O&M Agreement required under Section 5.14 of the Order. The submittal shall include a matrix outlining the tasks, responsible entity, and schedule for performance, as well as when the results will be provided to DTSC.

A-1 WETLANDS MONITORING

Wetlands maintenance and monitoring activities are discussed in the Wetlands Mitigation Plan detailed in Appendix E of the Administrative Draft Non-Ordnance and Explosives Remedial Design Document (OE RDD). The wetlands should be self-sustaining and maintenance-free over the long term. Initial maintenance during the first 5 years after remediation will consist of visual assessments of the wetlands hydrology, soil, and vegetation. The Wetlands Mitigation Plan also discusses contingency measures to be implemented if the wetlands mitigation efforts do not achieve annual or final success criteria. The monitoring described in the Wetlands Mitigation Plan and the O&M Plan shall include any noted changes in landscape, water levels, or access by individuals that may result in unanticipated exposure to OE. A copy of the Administrative Draft Non-OE RDD submitted by Granite for DTSC review is a part of the Administrative Record, and is available at the Benicia City Library. DTSC shall complete its review of the Administrative Draft Non-OE RDD after consideration of public comment and issuance of the final Remedial Action Plan (RAP).

A-2 SLOPE STABILITY AND EROSION MONITORING

Slope stability and erosion monitoring will be conducted to evaluate the stability of areas that have been point cleared in the South Valley, including evidence of landsliding or erosion. Details of this monitoring plan will be described in the Administrative Draft Non-OE RDD. Appendix F of the Administrative Draft Non-OE RDD describes monitoring measures that will be carried out at the Project Site to assess the status of slope stability and erosion, and actions to be taken if signs of slope instability or erosion are observed. It also lists parties to be notified if instability or erosion is observed. A baseline report (including a photograph log) of erosion-prone areas and potential landslide areas shall be made. These areas will be monitored annually following the rainy season for indications of slope instability or erosion. Details of this monitoring plan are currently described in Appendix F of the Administrative Draft Non-OE RDD submitted by Granite for DTSC review. A copy of this Administrative Draft Non-OE RDD is a part of the Administrative Record on file at the Benicia City Library. DTSC shall complete its review of the Administrative Draft Non-OE RDD after consideration of public comment and issuance of the final RAP.

A-3 WATER MONITORING

Water monitoring activities will be conducted as part of the O&M plan for the Project Site, as required by DTSC. Locations of proposed water monitoring activities are identified in the Administrative Draft Non-OE RDD.

In order to ensure the effectiveness of the remedial actions, long-term water monitoring at the Project Site will be implemented (groundwater, surface water, subdrain water, and seeps). Groundwater will be monitored at the property boundaries at the southeast and northwest ends of the North Valley, and southeast of the McAllister Drive Land Bridge (center of the valley), and at the outlet of the small tributary swale that enters the South Valley from the north. An existing shallow monitoring well, MW-12, will be used for future monitoring of the alluvium/colluvium in groundwater. A new groundwater monitoring well will be installed east of MW-12, which will monitor the alluvium groundwater in the deeper zone. Subdrain water will be sampled at both ends of the North Valley (southeast and northwest) at the toe of the fill slopes. Surface water will be monitored at a station situated northwest of the McAllister Drive Land Bridge. The two existing seeps will be monitored in the South Valley. All chemicals that were previously detected in samples taken from surface water, groundwater, or seeps during the RI will be monitored.

The remedial investigation/feasibility study (RI/FS) (Earth Tech, 2001a) concluded that ingestion of groundwater is not considered a complete exposure pathway. Shallow groundwater at the Project Site is not currently used for any purpose, and is not expected to be used in the foreseeable future due to limited groundwater occurrence and low formation permeability that does not yield sufficient quantities of water for drinking or irrigation purposes. The RI/FS concluded that surface water in the South Valley is not impacted.

The following sections outline the monitoring of groundwater, surface water, subdrain water, and seeps.

A-3.1 Groundwater Monitoring

Groundwater will be monitored for a minimum of 5 years. Monitoring will be conducted based on a quarterly monitoring schedule during the first year, and on a semiannual schedule during the following 4 years. Sample collection and analysis will be performed pursuant to Appendix B, Section 1.2.3.1, North and South Valley Groundwater, of the Administrative Draft Non-OE RDD dated June 2001.

Groundwater will be monitored in the alluvium (shallow sediments) and in the bedrock in three locations. The locations of proposed groundwater monitoring wells are identified on Figure A6-1 of the Administrative Draft Non-OE RDD. Groundwater monitoring wells will be installed using the hollow-stem auger or mud rotary drilling methods. Installation will generally occur prior to remediation of chemically affected soil, but after the sitewide point clearance.

Groundwater monitoring wells will be constructed as single-cased wells, and drilled and installed using the hollow-stem auger drilling method.

A-3.1.1 Monitoring Well Inspections and Maintenance

Maintenance of the monitoring wells will be performed as needed, based on quarterly and semiannual inspections conducted during routine monitoring events. The following items will be checked during inspections:

- Structural integrity of well boxes and stove pipes;
- Security of well boxes and stove pipes (locks and caps installed and functioning properly);
- Proper drainage of well boxes and stove pipes so that excess surface water does not accumulate inside;
- Condition of well casing; and
- Total depth of wells.

Any of the above items that require corrective maintenance or significant changes in the total depth of the wells will be reported to the appropriate authorities, and corrective maintenance will be scheduled and performed. Field staff will routinely carry spare locks and well caps while performing scheduled monitoring activities, so that these items can be immediately replaced if the ones previously installed are missing or defective.

O&M work may be modified if conditions or usage of the site change. Such changes will be documented through amendments to the O&M Plan.

A-3.2 Surface Water Monitoring

Surface water will be monitored in the South Valley wetlands at a location northwest of the McAllister Drive Land Bridge, as shown in Figure A6-1 of the Administrative Draft Non-OE RDD. Surface water will be collected and analyzed per Appendix B, Section 1.2.3.2, of the Administrative Draft Non-OE RDD dated June 2001.

A-3.3 Subdrain Monitoring

Subdrain water will be monitored at the subdrain outlets situated at the southeast and northwest ends of the North Valley, as shown in Figure A6-1 of the Administrative Draft Non-OE RDD. At a minimum, subdrain water will be monitored on a quarterly basis for 1 year and on a semiannual basis for an additional 4 years. Monitoring will be performed in accordance with Appendix B, Section 1.2.3.4, of the Administrative Draft Non-OE RDD dated June 2001.

A-3.4 Seep Monitoring

Three potential seeps (SPS-1, SPS-2, and SPS-3) in the South Valley will be monitored at the locations shown on Figure A6-1 of the Administrative Draft Non-OE RDD. At a minimum, seeps will be monitored on a quarterly basis for 1 year and on a semiannual basis for an additional 4 years. Sampling will be performed pursuant to Appendix B, Section 1.2.3.3, South Valley Seeps/Springs, of the Administrative Draft Non-OE RDD dated June 2001.

A-3.5 Institutional Controls

The Covenant to restrict use of selected areas of the Project Site requires a Contingency Action Plan (CAP) that would address on-site safety support by OE-qualified personnel during excavation activities, the safety procedures to be followed by field personnel during excavation activities, and the procedures that will be followed if a suspected OE or OE item is found. Other institutional controls would include informational devices to warn of the dangers of encountering OE within the

restricted area, and to instruct on response and keep DTSC and U.S. Army Corps of Engineers (USACE) informed in the event that OE is encountered. The proposed elements of the CAP and the informational devices are described below, and will be incorporated into the Final O&M Plan.

A-3.5.1 Summary of CAP Requirements:

The CAP will contain the following elements:

- A-3.5.1.1** A map, with sufficient detail and scale, which shows the restricted areas. Should variations in risks be defined during the finalization of the Site Conceptual Model, this map may be formatted using a color scheme or other methods that depict the varying levels of risk.
- A-3.5.1.2** A process flow chart showing steps, time lines, and content of information that must be provided to the City to obtain City authorization to conduct excavation activities. The information must include a description of the location and footprint of the planned intrusive work, the anticipated depth of excavation(s), a description of the type of excavation equipment, and the identification of who will be performing the ordnance avoidance/construction support effort.
- A-3.5.1.3** A description of the modified notification procedures that will be followed during emergency type situations (e.g., breaks in utility lines). This procedure shall be consistent with requirements of the Covenant.
- A-3.5.1.4** The presence of qualified unexploded ordnance (UXO) technicians during excavation activities. (The CAP shall require a team consisting of a minimum of two UXO technicians (one UXO Technician III and one UXO Technician II) to provide safety support during construction activities in areas that potentially contain OE. The qualifications for these individuals ("OE/UXO team") shall be consistent with the Department of Defense Explosives Safety Board and USACE, Engineering and Support Center, Huntsville Data Item Description, DID-ET-025 (or the equivalent).
- A-3.5.1.5** A list of qualified OE/UXO technicians
- A-3.5.1.6** Defined procedures in the event an OE item(s) is found. The CAP shall clearly delineate how a preliminary assessment of the potential to find OE will be made. It may be appropriate to consider some areas higher than others for the potential to find OE. If that is the case, excavation in the area(s) not likely to contain OE may proceed with minimal OE potential and then in the event an OE is found, *policy shall be notified*. Actions from that point on about shall be done will be the responsibility of the responding official and *will be consistent with state laws regarding emergency treatment of hazardous waste. For areas where the potential is high that OE will be found, then preparation for treatment shall be required prior to excavation. Preparation shall include submitting a Remedial Action Work Plan (RAW) or Remedial Action Plan for DTSC approval that which defines how OE will be treated.*
- A-3.5.1.7** Reporting requirements upon completion of activities. A completion report shall be submitted to the City of Benicia.

A-3.6 Summary of Informational Device Requirements

The Informational Devices shall contain the following elements:

- A-3.6.1** A public education program to increase awareness of the potential safety hazards of conducting excavation activities. The public education program will be conducted in conjunction with the requirements of the O&M Plan **as described below**.

A-3.6.2 An OE recognition safety program to be given, in conjunction with the O&M Plan, to city and county workers who may access, oversee or perform excavation activities in the restricted areas. City personnel responsible for Processing permits for excavation activities shall be included in the program.

A-3.7 The following shall also be incorporated into the Final O&M Plan and incorporated into the O&M Agreement required pursuant to Section 5.14 of the Order:

A-3.7.1 An annual check and report of any signs of unauthorized excavations or other intrusive activities in the open space.

A-3.7.2 An educational program for the purpose of educating the Benicia community regarding the potential safety issues associated with the former Benicia Arsenal, including the Tourtelot property.

A-3.7.3 A safety briefing program for the City of Benicia staff and others that advise of potential hazards, precautions and requirements for excavations within the restricted area.

A-3.7.4 A notice to be placed with underground service alert systems to warn of the potential of unearthing ordnance during intrusive activities in the restricted areas as defined in Appendix E.

A-3.7.5 Establishment of standard operating procedures to notify DTSC and USACE of any incident involving ordnance discoveries.

A-3.7.6 A program for monitoring, assessing and reporting to DTSC compliance with the requirements for conducting excavation activities set forth in Section 4.03 of the Covenant.

A-4.0 O&M REPORT PREPARATION AND EFFECTIVENESS EVALUATION

Data interpretation and reporting O&M activities shall include at a minimum, figures, laboratory data sheets, and recommendations for changes to the O&M Plan, if necessary. As indicated in the opening paragraphs to Appendix A of this RAP, O&M Report submittal shall be pursuant to a schedule established in the O&M Plan and incorporated into the O&M Agreement.

**APPENDIX B
ADMINISTRATIVE RECORD LIST**

Southampton Tourtelot Property: General Land Use Amendment and Rezoning/Draft Environmental Impact Report, 1988

City Information: Tourtelot Property, 1999

Southampton Development Agreement Documents, 1999

Tourtelot Property Cleanup Project CAG Meeting, (video recording), 1999

Tourtelot Property Cleanup Project DTSC Public Meeting (video recording), 1999

Tourtelot Property Cleanup Project Public Meeting (video recording), April, 27, 1999

Fence and Post Evaluation Work Plan, June 18, 1999

Fence and Post Evaluation Work Plan Addendum, June 28, 1999

Public Participation Plan, July 11, 1999

Preliminary Draft Project Description, July 27, 1999

Remedial Investigation/Feasibility Study (RI/FS) Work Plan, July 30, 1999

Communication and Coordination Plan, August 5, 1999

Public Participation Plan, September 30, 1999

Fence and Post Report, November 12, 1999

Draft Final Non-Ordnance and Explosives Remedial Investigation/Feasibility Study (RI/FS) Work Plan, November 16, 1999

Remedial Investigation/Feasibility Study (RI/FS) Site-Specific Safety and Health Plan, November 29, 1999

Draft Site-Specific Safety and Health Plan, February 9, 2000

Draft Removal Action Work Plan for the North Valley Military Landfill, February 11, 2000

Non-Ordnance and Explosives Remedial Investigation/Feasibility Study (RI/FS) Work Plan, February 15, 2000

Technical Memorandum for Remedial Investigation, March 2, 2000

Draft Negative Declaration and California Environmental Quality Act Initial Study for Non-Ordnance and Explosives Site Characterization at the North Valley Military Landfill at the Tourtelot Property, March 10, 2000

Removal Action Work Plan for the North Valley Military Landfill, May 2000

Draft Remedial Investigation/Feasibility Study, November 16, 2000

Revised Final Draft Tourtelot Project Site Ordnance and Explosives Remedial Design Document, Tourtelot Remediation, July 2001

Final Remedial Investigation/Feasibility Study, Tourtelot Cleanup Project, July 2001

Department of Toxic Substance Control, Correspondence to Bruce Handel, Project Coordinator, USACE and Ted Splitter, Project Coordinator for Granite Management Corp., Comments on the Draft Remedial Investigation/Feasibility Study, Tourtelot Cleanup Project, Benicia, California, January 29, 2001

U.S. Army Corps of Engineers, Correspondence to Heather McLaughlin, Project Manager, City of Benicia, Comments on the Draft Remedial Investigation/Feasibility Study, Tourtelot Cleanup Project, Benicia, California, December 15, 2000

Bruce Handel, U.S. Army Corps of Engineers, Correspondence to "All", Comments on the Draft Remedial Investigation/Feasibility Study, Tourtelot Cleanup Project, Benicia, California, December 14, 2000

California Regional Water Quality Control Board, Correspondence to Scott Goldie, Comments on the Draft Remedial Investigation/Feasibility Study, Tourtelot Cleanup Project, Benicia, California, January 16, 2001

City of Benicia, Correspondence to Stewart Black, Project Manager DTSC, Comments on the Draft Remedial Investigation/Feasibility Study, Tourtelot Cleanup Project, Benicia, California, December 18, 2000

Tourtelot Community Advisory Group, Correspondence to Stewart Black, Comments on the Draft Remedial Investigation/Feasibility Study, Tourtelot Cleanup Project, Benicia, California, December 18, 2000

Ken Dexter, Correspondence to Stewart Black, Project Manager DTSC, Comments on the Draft Remedial Investigation/Feasibility Study, Tourtelot Cleanup Project, Benicia, California, November 30, 2000

Sherry Barrow, Correspondence to Stewart Black, Project Manager DTSC, Comments on the Draft Remedial Investigation/Feasibility Study, Tourtelot Cleanup Project, Benicia, California, December 18, 2000

Marilyn Bardet, Correspondence to Stewart Black, Project Manager DTSC, Comments on the Draft Remedial Investigation/Feasibility Study, Tourtelot Cleanup Project, Benicia, California, December 17, 2000

Brian Harkins, Correspondence to Stewart Black, Project Manager DTSC, Comments on the Draft Remedial Investigation/Feasibility Study, Tourtelot Cleanup Project, Benicia, California, December 18, 2000

David Logan, Correspondence to Stewart Black, Project Manager DTSC, Comments on the Draft Remedial Investigation/Feasibility Study, Tourtelot Cleanup Project, Benicia, California, December 7, 2000

Jon Kennedy, Correspondence to Heather McLaughlin, Comments on the Draft Remedial Investigation/Feasibility Study, Tourtelot Cleanup Project, Benicia, California, December 18, 2000

Transcripts from the September 25, 2001 Public Meeting

The Final Environmental Impact Report certified by DTSC on December 19, 2001

The Findings of Facts and Statement of Overriding Considerations for the Tourtelot Remediation/Cleanup Project, City of Benicia, California, dated January 2002

**APPENDIX C
STATEMENT OF REASONS FOR
TOURTELOT SITE
REMEDIAL ACTION PLAN**

Pursuant to California Health and Safety Code (HSC), section 25356.1(d), the California Environmental Protection Agency (Cal/EPA), Department of Toxic Substances Control (DTSC), has prepared this Statement of Reasons as part of the attached Remedial Action Plan (RAP) for the Tourtelot Project Site situated in the City of Benicia, Solano County, California. The Site is partially within the boundaries of the former Benicia Arsenal. The Department of Defense used the site from 1947 to 1960 for various activities, including the testing of Howitzer barrels, and the demilitarization and demolition of damaged and obsolete munitions.

The RAP presents a summary of the Remedial Investigation (RI) to address chemicals of interest that have been detected in soil and groundwater at the Site. Chemicals of interest include primarily metals, trinitrotoluene (TNT), dinitrotoluene (DNT), dioxin and furans and polyaromatic hydrocarbons (PAHs). The RAP summarizes the results of the screening level risk assessment performed to evaluate the potential risks to public health and the environment associated with the chemicals of interest. The RAP also describes the remedial alternatives that were evaluated in the Feasibility Study (FS), including the remediation associated with ordnance and explosives (OE). The RAP recommends a remedial alternative that will meet the objectives of protecting public health and the environment. The RAP proposes remediation of soil using a combination of technologies, including treatment, offsite disposal, monitoring, and institutional controls.

The DTSC believes that the attached RAP complies with the law as specified in California Health and Safety Code, section 25356.1. Section 25356.1 (e) requires that RAPs "shall include a statement of reasons setting forth the basis for the removal and remedial actions selected." The statement of reasons "shall also include an evaluation of the consistency of the removal and remedial actions proposed by the plan with the federal regulations and factors specified in subdivision (d)..." Subdivision (d) specifies six factors against which the remedial alternatives in the RAP must be evaluated. The proposed remedial action is consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), and the federal Superfund regulations. The attached RAP has addressed all these factors in detail. A brief summary of each factor follows. The statement of reasons also includes the preliminary Nonbinding Allocation of Responsibility (NBAR) as required by HSC section 25356.1(e).

1. Health and Safety Risks - Section 25356.1(d)(1)

The chemicals of interest identified for this site include primarily TNT, metals, dioxin and furans, and PAHs. The screening level risk assessment, assuming a residential scenario, included use of maximum detected concentrations of chemicals of interest. Remediation goals have been developed for chemicals that contributed significantly to potential health and ecological risks that are associated with site activities. The proposed remediation goals are a risk-based screening criteria for hydrocarbons, upper tolerance limits for metals, an ambient value for dioxin and furans, human health-based criteria for TNT (16 mg/kg for residential areas and 53 mg/kg for open space areas), and non-detect for DNT. The entire site will be scanned for OE using iterative and redundant procedures, and all detected OE will be treated and removed from the Site. The

proposed cleanup goals for non-OE and OE constituents will be protective of health and the environment.

2. Beneficial Uses of the Site Resources - Section 25356.1(d)(2)

The primary natural resources at the Site are the wetlands on the floor of the South Valley. Based on the RI observations and results, the wetlands have not been significantly affected by Site conditions. The proposed alternative will be an upland source removal and will therefore be protective of this natural resource. A much smaller wetland area (0.093 acre) has been delineated in the North Valley as well as two small wetlands on the north slope of the South Valley (0.122 acres combined). These wetlands will be filled as part of the proposed remedial action, in accordance with applicable permit requirements, including required mitigation measures.

3. Effect of the Remedial Actions on Groundwater Resources

Very limited groundwater is present at the site. Shallow water bearing sediments do not yield water in significant enough quantities to constitute an aquifer. Consistent with the above observations, there is no history of significant groundwater use or supply at the Site. Shallow groundwater at the site does not appear to be significantly affected by previous Site activities, and the proposed remedial actions will reduce potential sources of chemicals. Therefore, the remediation should not have any significant adverse impacts on the limited groundwater resources at the site.

4. Site-Specific Characteristics - Section 25356.1(d)(4)

Soil and groundwater beneath the site have been adequately characterized to implement the proposed remedial actions. Non-OE chemicals of interest have been identified in areas related to Site activities, including the disposal of TNT, flares, and other items. The potential occurrence of OE is expected to be the highest within a 300 to 500 foot radius of the former demolition and Flare sites in the South Valley. However, it has been assumed that OE may be present in soil through the Site.

5. Cost-Effectiveness of Alternative Remedial Action Measures - Section 25356.1(d)(5)

Alternative 5A is the recommended remedial alternative. This alternative includes various activities to cost-effectively remediate OE and non-OE affected soil. OE would be detected and removed using point clearance and area-wide clearance methods. All detected OE will be treated, as necessary, and removed from the site. All non-OE affected soil that exceeds remedial goals would be removed from the site and disposed at an approved landfill. Soil containing TNT concentrations above 10 percent would be treated by homogenization prior to offsite disposal. Existing overburden soils in areas proposed for residential development and determined to have a potential to contain OE through the evaluation of OE point clearance data to require areawide clearance, would be removed in lifts (6 inches less the reliable scan depth) until two clean lifts (lifts of soil with no OE or OE scrap encountered) have been removed. These soils would be scanned in 8-inch lifts as being placed as engineered fill in the bottom of the North Valley. Areawide clearance soils placed in the North Valley would be covered with at least 14 feet of OE-free crushed bedrock, as an additional measure to eliminate potential for persons to come in contact with areawide clearance soils. The

proposed activities utilize proven methods to cost-effectively remediate chemicals of interest and OE at the site.

6. Potential Environmental Impacts of Remedial Actions - Section 25356.1(d)(6)

Appendix C, page C-3, start at line 6, revise paragraph to read:

An environmental impact report (EIR) has been prepared to evaluate this proposed activity and other remedial components, pursuant to the California Environmental Quality Act (CEQA). The EIR was certified on December 19, 2001. The associated findings for significant impacts (DTSC's findings) show that the most significant impacts will be mitigated to a less-than-significant level under the proposed remedial alternative, as modified to incorporate the mitigation measures set forth in Appendix E. Other mitigation measures, which can and should be adopted by the city of Benicia, will also contribute to mitigation of significant impacts to a less-than-significant level. Some significant and unavoidable impacts will result from the modified proposed remedial alternative. However, DTSC has found these impacts to be outweighed by the benefits of the modified proposed remedial alternative, as discussed in DTSC's statement of overriding consideration ("DTSC's statement"). DTSC's findings and DTSC's statement may be found in DTSC's Findings of Fact and Statement of Overriding Considerations for the Tourtelot Property Remediation/Cleanup Project, dated December 2001, and contained in the Administrative Record.

7. Preliminary Nonbinding Allocation of Financial Responsibility - Section 25356.1(e)

The RAP must include a "nonbinding preliminary allocation of responsibility (NBAR) among all identifiable potentially responsible parties at a particular site, including those parties which may have been released, or may otherwise be immune, from liability..." (HSC section 25356.1 (e)). The current NBAR for the Tourtelot Site, as issued by the DTSC, is presented on the next page.

PRELIMINARY NONBINDING ALLOCATION OF RESPONSIBILITY

Health and Safety Code (HSC) section 25356.1(e) requires the Department of Toxic Substances Control (DTSC) to prepare a preliminary nonbinding allocation of responsibility (the "NBAR") among all identifiable potentially responsible parties (PRPs). HSC section 25356.3 (a) allows PRPs with an aggregate allocation in excess of 50 percent to convene an arbitration proceeding by submitting to binding arbitration before an arbitration panel. If PRPs with over 50 percent of the allocation convene arbitration, then any other PRP wishing to do so may also submit to binding arbitration.

The sole purpose of the NBAR is to establish which PRPs will have an aggregate allocation in excess of 50 percent and can therefore convene arbitration if they so choose. The NBAR, which is based on the evidence available to the DTSC, is not binding on anyone, including PRPs, DTSC, or the arbitration panel. If a panel is convened, its proceedings are de novo and do not constitute a review of the provisional allocation. The arbitration panel's allocation will be based on the panel's application of the criteria spelled out in HSC section 25356.3© to the evidence produced at the arbitration hearing. Once arbitration is convened, or waived, the NBAR has no further effect, in arbitration, litigation or any other proceeding, except that both the NBAR and the arbitration panel's allocation are admissible in a court of law, pursuant to HSC section 25356.7 for the sole purpose of showing the good faith of the parties who have discharged the arbitration panel's decision.

DTSC sets forth the following preliminary nonbinding allocation of responsibility for the Tourtelot Project Site:

The U.S. Army Corps of Engineers is allocated (50 percent) responsibility, and Granite Management Corporation is allocated (50 percent) responsibility.

THE NINE EVALUATION CRITERIA

Health and Safety Code section 25356.1(d) requires that RAPs be based on the NCP. The NCP identifies the nine criteria, or standards, to evaluate alternatives for cleaning up a hazardous substance release site. The nine criteria, as modified for the State of California, are summarized below:

1. Overall Protection of Human Health and the Environment

Addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

2. Compliance with State and Federal Requirements

Addresses whether or not a remedy will meet all appropriate federal, state, and local environmental laws and regulations.

3. Long-term Effectiveness and Permanence

Refers to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met.

4. Reduction of Toxicity, Mobility and Volume (TMV) through Treatment

Refers to the ability of a remedy to reduce the toxicity, mobility, and volume of the hazardous substances or constituents present at the site.

5. Cost - 30-Year Present Worth

Evaluates the estimated capital, operation and maintenance costs of each alternative.

6. Short-term Effectiveness

Addresses the period of time needed to complete the remedy, and any adverse impact on human health and the environment that may be posed during the construction and implementation period, until the cleanup standards are achieved.

7. Implementability

Refers to the technical and administrative feasibility of a remedy, including the availability of materials and services needed to carry out a particular option.

8. Regulatory Agency Acceptance

Indicates whether, based on its review of the information, the applicable regulatory agencies would agree with the preferred alternative.

9. Community Acceptance

Indicates whether community concerns are addressed by the remedy, and whether or not the community has a preference for a remedy.

In order for an alternative to be eligible for selection, it must meet the first two criteria described above, called "threshold criteria." Criteria 3 through 7 are the "primary balancing criteria," and criteria 8 and 9 are "modifying criteria." See the NCP (40 Code of Federal Regulations Part 300.430(e)) for a discussion on the use of these criteria.

**APPENDIX D
RESPONSIVENESS SUMMARY**

Provided below are written comments received by DTSC during the public comment period for the DEIR and draft RAP prepared for the Tourtelot Remediation/Cleanup Project, and the responses to those comments. Only comments on remedial action issues requiring a specific response are addressed in this section. When the entire comment is provided verbatim, the comment is shown in quotations (" "). If the comment has been paraphrased, it is not shown in quotations.

This section also provides a complete record of all written comments received. Comments from the following persons, organizations, and public agencies are addressed in this section:

- A Tourtelot Community Advisory Group
- B Benicia School District
- C Reginald Page, private citizen
- D Diane Rieschick, private citizen
- E Marilyn Bardet, private citizen
- F Granite Management Corporation/Pacific Bay Homes
- G California Regional Water Quality Control Board
- H California Department of Transportation
- I U.S. Army Corps of Engineers.

A. TOURTELOT COMMUNITY ADVISORY GROUP

- A-1. Comment: "Section 2.3.5 of the DEIR discusses the reported discovery in August 2000 of a tail fin assembly on residential property south of the Tourtelot Project Site. The DEIR indicates in Section 2.3.7 that DTSC will evaluate the site conceptual model to assess whether ordnance and explosives (OE) were distributed to residential areas outside the Project Site boundary and; if so, DTSC will evaluate risk and determine whether a plan is needed to address off-site areas. Section 2.4 of the Draft RAP also discusses this additional evaluation. Neither document discusses the DTSC's view of a possible hazardous condition existing off the Tourtelot Project Site. Please clarify that DTSC does not believe significant hazards relating to the former military activities at the Tourtelot Project Site exist in residential areas outside the Site. Include references to the Site Conceptual model and other bases for your position."

Response: The final Remedial Investigation/Feasibility Study (RI/FS) approved by DTSC discusses the discovery of the tail fin assembly. The RI/FS concludes that the tail fin assembly is nonhazardous and does not pose a safety risk. Discovery of the tail fin assembly does not provide a basis for concluding that an unacceptable level of risk exists at the off-site residential areas adjacent to the Tourtelot Project Site.

- A-2. Comment: "At the DTSC's public meeting for the Draft EIR and Draft RAP on September 25, 2001, the residents who reported the tail fin also expressed concern that the soil on their property may have been moved from the Dynamite Burn Site on the Tourtelot Project Site during pre-construction grading and could contain explosive chemical residue. Please expand the document to clarify why DTSC does not believe significant hazards from explosive chemical residue exist outside the Project Site."

Response: The final Remedial Investigation/Feasibility Study (RI/FS) approved by DTSC discusses the Dynamite Burn Site. It states that dynamite was reportedly destroyed by burning in a location on the Ridge. It is not known if the soil from the Dynamite Burn Site was chemically affected. The project records show that soil used to construct the McAllister Drive Land Bridge was obtained from a borrow area situated on the Ridge. Since the former Dynamite Burn Site was situated on the Ridge, soil from the Dynamite Burn Site would have been placed in the lower portion of the fill that had been used to construct the land bridge. DTSC has no basis to believe that the fill on any off-site residential lot contains explosive chemical residue as a result of the Dynamite Burn Site or any other activities conducted by the Army at the Tourtelot Project Site.

The above analysis concerning the placement of soil from the Dynamite Burn Site is clearly presented in the final RI/FS. This analysis was considered in the proposed remedy described in the RAP.

- A-3. Comment: "The following sentence appears in the second paragraph on Page ES-5 of the Draft RAP: 'It is not known if the soil transported off site contained OE and/or OE scrap.' Please clarify the statement to reference the tail fin found south of the Project Site."

Response: The final RI/FS approved by DTSC discusses the discovery of the tail fin assembly and concludes that it is unclear where the soil that contained the item came from or how the item got into the soil. In the specific area where the item was found, the plans indicate a fill slope with several feet of fill. The area was altered since the lot was graded by the construction of two small terrace retaining walls. The tail fin assembly was recovered from the upper terrace. It is unclear where the soil that contained the tail fin assembly from behind the retaining walls came from or how the tail fin assembly got in the soil. Therefore, it is not known if the soil transported off site contained OE and/or OE scrap.

- A-4. Comment: "Chapter 4 of the Draft RAP describes the risks posed by OE at the Project Site. The Draft RAP does not clearly state DTSC's conclusion on whether any OE risks will exist following the remedial activities at the Tourtelot Project Site. Please expand on DTSC's risk conclusion based on the current evolution of the Site Conceptual Model."

Response: The following text has been added to Chapter 4, Paragraph 4.1 Health Risk Assessment for Ordnance-Impacted Areas.

The Site Conceptual Model (SCM) will be completed and evaluated following point clearance of the Project Site. The SCM will be used to identify areas of the Project Site that will require area wide clearance. Upon completion of Alternative 5A remedial activities and implementation of institutional controls, there will be no unacceptable level of risk from OE at the Tourtelot Project Site.

- A-5. Comment A-5 was provided to the draft EIR. The response to this comment is provided in the final EIR.

- A-6. Comment: "Figure 3-1 of the Draft RAP shows geophysical anomalies on the Project Site. There appear to be very dense concentrations of anomalies along Rose Drive, in Unit D-1 and on the McAllister Land Bridge. Is there an explanation for the dense concentrations of anomalies in these locations?"

Response: The very dense concentrations of anomalies along Rose Drive and on the McAllister Land Bridge indicate utility lines that have been installed to support the residential housing units in Unit D-1.

- A-7. Comment A-7 was provided to the draft EIR. The response to this comment is provided in the final EIR.

- A-8. Comment: "The executive summaries of the RAP and EIR must address all major aspects and issues of the project and be clearly written for the public, since most individual who review these documents would consult the executive summary for the synopsis of information contained within the text. For example, the executive summaries should discuss the Site Conceptual Model and explain what it is and why it is important to this project."

Response: DTSC concurs with the comment concerning the importance of a clear and complete Executive Summary. The executive summary in the RAP discusses the SCM at page ES-5.

B. BENICIA SCHOOL DISTRICT

- B-1. Comment: "Work that would require either mandatory or voluntary withdrawal from the Matthew Turner School and grounds will not be conducted during school hours."

Response: It is not anticipated that work at the Project Site would involve any mandatory withdrawals from the Matthew Turner Elementary School or its grounds. With respect to voluntary withdrawals, Mitigation Measure 10-1 (see Appendix E) requires that the project applicant obtain concurrence from the Benicia School District before proceeding with activities that would put the Matthew Turner Elementary School within the Voluntary Separation Distance (VSD). While Mitigation Measure 10-1 does not require that such activities occur outside school hours, the Benicia School District may base its required concurrence on the project applicant's commitment to limit such activities to non-school hours. It is also noted that the project applicant proposes to utilize engineering controls that would reduce the VSD to a distance that would not encompass the Matthew Turner Elementary School.

B-2. Comment: "Matthew Turner School site administration, principal Dan Dempsey, and the Benicia Unified School District Office, Superintendent Joanne Haukland, Ph.D., will be notified prior to any work being done at any other time that might affect people on the school site or on the school facility itself."

Response: See the response to Comment B-1. The Benicia School District may require that the project applicant provide the requested notifications as a condition of the Benicia School District's providing its concurrence for activities that put the Matthew Turner Elementary School within the VSD.

C. REGINALD PAGE, PRIVATE CITIZEN

C-1. Comment: "It is my understanding that the issue of "evacuating" the school will be addressed by scheduling work outside of the times when school children will be present at Matthew Turner, whether the work taking place is within the mandatory or the voluntary withdrawal distance."

Response: See the response to Comment B-1.

C-2. Comment: "... the school and district need to be notified whenever work takes place outside of normal school hours so that appropriate steps can be taken to ensure the safety of district personnel or others who may be at the site during those times."

Response: See the response to Comment B-2.

D. DIANE P. RIESCHICK, PRIVATE CITIZEN

Comments D-1 through D-7 were provided to the draft EIR. The responses to these comments are provided in the final EIR.

E. MARILYN BARDET, PRIVATE CITIZEN

Comments E-1 through E-9 were provided to the draft EIR. The responses to these comments are provided in the final EIR.

F. GRANITE MANAGEMENT CORPORATION/PACIFIC BAY HOMES

Comments F-1 through F-4 were provided to the draft EIR. The responses to these comments are provided in the final EIR.

G. CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

Comments G-1 through G-5 were provided to the draft EIR. The responses to these comments are provided in the final EIR.

H. CALIFORNIA DEPARTMENT OF TRANSPORTATION

Comment H-1 was provided to the draft EIR. The response to this comment is provided in the final EIR.

I. U.S. ARMY CORPS OF ENGINEERS

I-1 Comment: "**Executive Summary.** The executive summary does not provide a complete review of the investigations/actions performed and the responsible agency/organization conducting the

activity. The executive summary provides a jumble of various activities completed without proper time sequence or responsible organization identification and likely does not identify all phases or activities completed. By omitting a complete review, it appears that all activities mentioned were conducted by the U.S. Army Corps of Engineers. It should be made very clear what activities were completed by the U.S. Army Corps of Engineers under the FUDS Program, and by Granite Management Corporation under the DTSC Order.”

Response: The text in the executive summary (Page ES-2) has been revised to state what entity (Corps, Granite, or other) performed each investigation/activity at the site and under whose direction/guidance (USACE, DTSC, or Granite).

I-2 **“Section 1.1 and 1.2.** Same comments as in No. 1 above.”

Response: The text in Section 1.2 (Page 1-2) has been revised to state what entity (Corps, Granite, or other) performed each investigation/activity at the site and under whose direction/guidance (USACE, DTSC, or Granite). Text has been added to Section 1.6 that discusses the remedial action investigation that was performed in the area of the North Valley Military Landfill.

I-3 **“Section 2.2.** Figure 2-7. What is the basis for identifying the ‘existing open space with potential for OE’? This figure represents a different area identified in the Ordnance and Explosives Remedial Design Document and accompanying Explosives Safety Submittal for the OE Removal Action for the project site. It would seem that any and all areas that are being investigated and identified for OE removal actions should be identified in this figure.”

Response: Figure 2-7 sets out the Preliminary Site Conceptual Model (SCM) for the Project Site. Figure 3-1 of the Revised Final Draft OE RDD is the same figure; the figure is not included in the ESS. The Preliminary SCM is based on data obtained during OE clearance activities on portions of the Project Site by Granite and on portions of the Project Site and adjacent property by USACE during its engineering evaluation/cost analysis (EE/CA) for the former Benicia Arsenal. No OE or OE scrap items other than scrap associated with the Howitzer Test Facility were found in the North Valley during these clearance activities and that area is accordingly identified in Figure 2-7 as “Existing Open Space with No OE.” Figure 2-7 is not intended to identify the areas on the Project Site where OE clearance activities will be conducted. Because the available information on which the Preliminary SCM is based is limited, point clearance and QA/QC work will be conducted on the entire Project Site. The data obtained through such activities, as well as data obtained by USACE during clearance activities on the Gonzalves property east of the McAllister Drive Land Bridge, will be used to revise the SCM. The final SCM will be used to assess if residential areas of the Project Site require areawide clearance and will also be used to assess the likelihood that OE items were moved off site during the 1990 grading of portions of the Project Site.

I-4 Comment: **“Section 3.2.** Same comment as in No. 1 above.”

Response: The text in Section 3.2 has been revised to state what entity (Corps, Granite, or other) performed each investigation/activity at the site and under whose direction/guidance (USACE, DTSC, or Granite).

I-5 **“Section 3.2, pg. 3-2, line 34.** It is unclear what purpose this sentence serves. In addition, what is the basis for this statement? It could also be stated that this is true for all areas outside of the project site/areas investigated to date. The sentence should be eliminated from the document.”

Response: The sentence referenced in the Comment states that "No live OE or OE scrap was recovered from property immediately adjacent to the north of the Project Site during the EE/CA investigation." The clearance activities during the EE/CA investigated eight grids in the area referenced in the sentence and no OE or OE scrap was recovered. This information is part of the data considered in preparing the Preliminary SCM and determining the recommended Alternative for remedial activities on the Project Site. It is accordingly appropriate to include in the RAP.

- I-6 **"Section 4.1, pg. 4-1, lines 21-34.** This paragraph is very confusing in providing a clear definition of OE Scrap, and should be rewritten."

Response: Lines 20 through 23 are the standard definition for OE scrap. The remainder of the paragraph describes procedures used to handle and identify OE scrap in the field. The procedures described are consistent with the USACE protocol.

- I-7 **Section 5.4, page 5-9.** "The proposed alternative, as presented in section 5.4 of the subject document, is not consistent with the recommendations provided by the USACE under Section 8.2 of reference A.

"Moreover, the actions described in this document indicate that the project site is being prepared for long-term residential development; the recommendations provided under reference (A) are designed to protect public health and safety if fully implemented."

Response: In evaluating Alternatives for remediation of the Project Site and identifying the recommended Alternative, DTSC considered the future and probable beneficial uses of the Project Site. The city of Benicia has responsibility for determining the land uses for real property within its boundaries and has designated most of the Project Site for residential use. One of the objectives of the project is to remediate areas of the Project Site that the Benicia General Plan designates for residential use to a standard suitable to allow unrestricted use of residential lots. Alternative 5A, the recommended alternative, is designed to allow the development of portions of the Project Site for unrestricted residential use as approved by the city of Benicia. Alternative 5A accomplishes the design intent by meeting the requirements set forth in the Imminent and/or Substantial Endangerment Determination and Remedial Action Order (the Order), issued by DTSC on June 1, 1999. Section 7.2 of the EE/CA (Reference (A) mentioned in the Comment) anticipates that further risk management actions may be required following clearance to depth (the remediation recommended by USACE in the EE/CA). Section 7.2 also states that residual risks that may remain "will be addressed with institutional controls." Alternative 5A allows for the residential development, the land use determined by the city of Benicia, without institutional controls on residential property. Because the USACE recommended clearance to depth does not result in unrestricted residential use and does not meet the requirements of the Order, it was not the recommended Alternative.

- I-8 **Reference: ES-6, Line 32.** "Use of non-detect as a cleanup level for PAHs is a very expensive decision. We have cleaned up PAHs elsewhere in the Bay Area for residential exposure scenarios and did not use non-detect."

Response: A non-detect value for PAHs was selected as the remediation goal because the Project Site data indicates that the only areas that require remediation for PAHs are the soil stockpiles in the North Valley. These stockpiles occupy a very small portion of the Project Site and should be easily removed. The data does not support the conclusion that this is a "very expensive decision." If, during the course of the remediation, low levels (typical of Bay Area background) of PAHs are detected in other areas, the need for remediation would be evaluated in the post remediation Human Health and Ecological Risk Assessments.

- I-9 **Reference: ES-6, line 34.** "Similar issue for mercury. Going to ambient levels is costly. Please clarify."

Response: As indicated in the referenced section, the proposed clean-up level for mercury in Demolition Site #3 is based on the ambient condition for mercury. The initial intent for the Project Site, as proposed by Granite, was to remove any DoD-related chemical impacts on the Project Site to the extent possible. In some areas this standard was considered impractical and excessively expensive for the benefit that might result, and a human health and ecological risk approach was taken. In the Demolition Site 3 area, it is feasible to continue with the approach to remove impacted soils. In addition, the ecological risk assessment found some levels of mercury for Demolition Site 3 to be above the ecological screening levels. After remediation is complete, the post-remediation Human Health and Ecological Risk Assessment will be performed that will assess if any unacceptable risks remain which must be remediated.

- I-10 **Reference: ES-7, Line 24.** "Although use of the 500 mg/kg cleanup value for petroleum hydrocarbons based on the SF Bay Regional Water Quality Control Board's Taste and Odor Criteria makes sense for shallow soils (10' bgs or less) in residential areas, soils deeper than 10' bgs should not be clean up to this strict criteria. Justify why this is being proposed for soils at depth."

Response: The proposed clean-up level of 500 mg/kg TPH is based on the RWQCB Risk Based Screening Level for residential property. Clean-up levels in soils/bedrock below residential property are based on residential clean-up levels. There is only one detection of TPH above 500 mg/kg in the North Valley. Because the concentration is close to the clean-up level and the depth of the soil is in excess of 20 feet below the ground surface, the RI/FS did not propose to excavate and remove that soil. If soil containing concentrations of TPH greater than 500 mg/kg is detected during activities to remove the suspected USTs, the appropriate remedial approach will be determined by DTSC following consultation with the RWQCB.

- I-11 **Reference: ES-8, line 34.** "You mention that soils might be treated on site to the PRGs then discharged on site. Do you have agreed upon discharge levels? If not, you may be required to treat your on-site soils to a lower level than your in-situ cleanup numbers. Clarify."

Response: The Comment refers to a discussion of Alternatives that include composting of soils containing TNT concentrations greater than 10 percent to a level that would allow the treated soils to remain on site. The recommended Alternative (Alternative 5A) does not include composting. Under the recommended Alternative, soils with TNT concentrations greater than 10 percent will be treated by homogenization to levels acceptable for off-site transport and disposal. ***The recommended Alternative also includes removal of impacted soils that are above PRGs. Table 4-1 of the RAP indicates the residential PRG for TNT is 16 milligrams/kilogram. TNT soils that are removed from the site will be disposed of in a landfill authorized to accept such waste.***

- I-12 "You mention 'Final Remediation Goals' (FRGs) here, but they are never mentioned or noted anywhere else. Are these different than what you are proposing? Clarify."

Response: Preliminary remedial goals were set for the project to estimate the extent of impacted soil and develop alternatives. The term FRG refers to final remedial goals that will be determined based on the results of the post-remediation Human Health and Ecological Risk Assessments. The FRGs and their relationship to the Risk Assessments are more fully described in the RI/FS.

Alternatives 5A and 5B: OE point clearance over entire site; areawide OE clearance in the North Valley and Ridge areas having a potential for containing OE intended for future residential use, as well as overburden soil at the north edge of the Unit D-1 lots; excavation, treatment, and disposal of chemically affected soil above Final Remedial Action Goals (FRGs) that will be determined based on results of the post-remediation human health and ecological risk assessments; installation of a layer of crushed bedrock over areawide clearance soils in future residential areas; and institutional controls and monitoring.

- I-13 Reference: Page 4-3, Line 38.** "I'm not sure it is in the best interests of the Gov't to have you propose applying drinking water MCLs to groundwater that is clearly not going to be used as such. Clarify why this is being proposed?"

Response: Screening level estimates of potential human health risk associated with chemicals detected in groundwater were compared to USEPA Region IX tap water PRGs. These PRGs included drinking water MCLs. Based on the results of the comparison and site conditions, remediation of groundwater to meet drinking water MCLs or any other standard has not been proposed at this time. Instead, water quality will continue to be sampled, monitored, and evaluated as part of the Operations and Maintenance Plan. These activities will ensure protection of public health and the environment.

- I-14 Reference Page 4-5, Line 10.** "Why were ambient levels of metals not used in your screening risk assessment? This would result in a higher risk (and thus need for remediation) than if they were taken into account? Clarify."

Response: As described in Chapter 7.0 of the RI/FS, the maximum detected metal concentrations were compared to their respective 95th percentile of the site-specific ambient samples. If the maximum detected concentration for an areas of concern was found to be below the site-specific ambient value, the chemical was not evaluated further in the screening assessment. This practice is consistent with regulatory guidance. All metals detected above the ambient were evaluated in the screening level assessment.

- I-15 Reference: Page 4-10, Line 43.** "Again, your approach of cleaning up soils for heavy metals to ambient levels is a very expensive approach. Justification for this needs to be provided."

Response: See Response to USACE Comment #9.

- I-16 Reference Page 4-11, Line 20.** "Here and throughout this document, you refer to confirmation sampling which uses a 'bright line' approach – that is, discrete samples will be individually compared to the cleanup goals to decide on further remediation. A statistical confirmation sampling methodology needs to be proposed to be acceptable."

Response: Preliminary remedial goals for metals are based on the upper tolerance limit of the ambient data set. This value represents the upper end of the range of naturally occurring concentrations. These remediation goals should be protective of human health and the environment or should be representative of the ambient concentrations. This approach is consistent with the approach to chemical cleanup at the Project Site (see response No. 9). Using a single bound clean-up level allows for a rapid assessment if the cleanup is complete or if additional removal is necessary. This approach should also minimize the possibility that the post remediation risk assessment will show that additional chemically affected soil will have to be removed (eliminating multiple mobilizations and reducing cost).

- I-17 Reference Page 4-12, Line 1.** "Was your intent of using a global ambient for dioxin/furan for site cleanup goals discussed with the USACE toxicologist? Did you not have local ambient data? Clarify."

Response: The preliminary remediation goal for dioxin/furans was selected based on the USEPA estimated mean for urban areas. Local ambient dioxin/furan data is not available. As listed in Table 4-1 of the RAP, the decision to use a global ambient level of 12 picogram/gram (parts per trillion) for dioxin/furan as the preliminary remediation goal was also presented in the R/FS which was reviewed by USACE.

- I-18 Reference Page 4-12, Line 5.** "See comment 3."

Response: See response to USACE Comment #10. See also response to Comment #3.

- I-19 Reference Page 5-9, Line 25.** "I'm not clear why Alternative 5A was selected. It results in a lot of off-site disposal of TNT contaminated soils that will result in a long-term liability. Treatment options are usually preferred as part of the CERCLA alternative analysis process. Clarify."

Response: Alternative 5A was chosen over 5B because Alternative 5B includes composting results in several undesirable conditions. (1) In order to reduce the high concentrations to levels that can be composted, the soil would have to be mixed with large amounts of clean soil thus greatly increasing the volume of TNT affected soil. (2) As part of composting, large volumes of organic materials are required to blend with the soil thus further increasing volume. (3) The cost of treatment is approximately three times or more than that of landfill disposal and the increases in volume further exacerbates the remediation cost. (4) A dedicated area is necessary to place the soil and treat it. Since the entire site needs to be cleared of OE, there is insufficient space to create a long-term treatment area. (5) Since the Project Site is consistently windy, there is a risk that TNT affected soils that are being treated would be carried by the wind to unaffected areas.

- I-20 "Figures 2-3, 2-4 and 2-5 show the horizontal extent of 'Impacted Soils.' Does the use of the term 'impacted' imply that these are soils above the cleanup levels? If so, then I could not find any soil samples on Figure 2-5 (petroleum impacted soils) which were over the 500 mg/kg cleanup level you have proposed. Please clarify."**

Response: The term impacted means that the soils have concentrations of chemicals in excess of ambient levels. The preliminary remediation goals are proposed as initial clean-up levels. The final remedial goals to be based on the post-remediation Human Health and Ecological Health Risk Assessments will be used to verify that no additional remediation is required. As noted in the comment, not all the soils noted as impacted are above the preliminary remediation goals.

Comments I-21 through I-32 were provided to the draft EIR. Responses to these comments are provided in the final EIR.

Tourtelot Community Advisory Group

250 East L Street
Benicia, CA 94510

October 26, 2001

Via E-mail and U.S. Mail

Mr. Jim Austreng, Project Manager
Department of Toxic Substances Control
2800 Cal Center Drive
Sacramento, CA 95826-3200

Re: Comments on Draft Remedial Action Plan (RAP) and the Draft Environmental Impact Report (EIR) for the Remediation of the Tourtelot Project Site in Benicia, California

Dear Mr. Austreng:

The Tourtelot Community Advisory Group, City of Benicia, has reviewed the Draft Remedial Action Plan (RAP) and the Draft Environmental Impact Report (EIR) for the remediation of the Tourtelot Project Site. We appreciate the willingness of the Department of Toxic Substances Control (DTSC) staff to meet with the Tourtelot Community Advisory Group (CAG), on several occasions, to discuss our questions about the documents. DTSC is to be commended not only for their work on the RAP and EIR, but also for addressing our concerns. Public participation remains an essential part of this project and you have shown by your actions that you are listening to us as representatives of the public.

Our comments on the Draft RAP and EIR reflect our desire to ensure that adequate information is available so the public can understand the proposed project. As we noted in our comments on the RI/FS, it is important that the community have a high degree of confidence in the ultimately selected alternative. Documents that are clear and understandable by the general public are essential to the project's overall credibility. While we generally are convinced that the proposed cleanup action is the best choice overall, we believe our comments reflect parts of the documents that could be improved. We are encouraged by your oral responses to our comments, which have fully addressed our comments. For the record, our comments are stated below.

1. Section 2.3.5 of the Draft EIR discusses the reported discovery in August 2000 of a tail fin assembly on residential property south of the Tourtelot Project Site. The Draft EIR indicates in Section 2.3.7 that DTSC will evaluate the site conceptual model to assess whether ordnance and explosives (OE) were distributed to residential areas outside the Project Site boundary and; if so, DTSC will evaluate risk and determine whether a plan is needed to address off-site areas. Section 2.4 of the Draft RAP also

Jim Austreng
October 24, 2001
Page 2

discusses this additional evaluation. Neither document discusses the DTSC's view of a possible hazardous condition existing off the Tourtelot Project Site. Please clarify that DTSC does not believe significant hazards relating to the former military activities at the Tourtelot Project Site exist in residential areas outside the Site. Include references to the Site Conceptual model and other bases for your position.

A-1
Cont.

2. At the DTSC's public meeting for the Draft EIR and Draft RAP on September 25, 2001, the residents who reported the tail fin also expressed concern that the soil on their property may have been moved from the Dynamite Burn Site on the Tourtelot Project Site during pre-construction grading and could contain explosive chemical residue. Please expand the document to clarify why DTSC does not believe significant hazards from explosive chemical residue exist outside the Project Site.

A-2

3. The following sentence appears in the second paragraph on Page ES-5 of the Draft RAP: "It is not known if the soil transported off site contained OE and/or OE scrap." Please clarify the statement to reference the tail fin found south of the Project Site.

A-3

4. Chapter 4 of the Draft RAP describes the risks posed by OE at the Project Site. The Draft RAP does not clearly state DTSC's conclusion on whether any OE risks will exist following the remedial activities at the Tourtelot Project Site. Please expand on DTSC's risk conclusion based on the current evolution of the Site Conceptual Model.

A-4

5. Mitigation Measure 7-5 in the Draft EIR requires a revegetation plan to mitigate impacts to annual grassland areas on the Project Site. It specifies that the plan will provide for enhancement or restoration of nonnative annual grasslands. Can the plan allow for the possible use of native plants?

A-5

6. Figure 3-1 of the Draft RAP shows geophysical anomalies on the Project Site. There appear to be very dense concentrations of anomalies along Rose Drive, in Unit D-1 and on the McAllister Land Bridge. Is there an explanation for the dense concentrations of anomalies in these locations?

A-6

7. Page ES-11 of the Draft EIR lists five items that are labeled as "areas of controversy". Please explain the use of the phrase "areas of controversy" and clearly state that the project plan as proposed is intended to mitigate them.

A-7

Jim Austreng
October 24, 2001
Page 3

8. The executive summaries of the RAP and EIR must address all major aspects and issues of the project and be clearly written for the public, since most individuals who review these documents would consult the executive summary for the synopsis of information contained within the text. For example, the executive summaries should discuss the Site Conceptual Model and explain what it is and why it is important to this project.

A-8

Thank you for the opportunity to comment. Please let us know if you need further information or clarification of our comments. We look forward to work beginning on the actual cleanup before the end of this year!

Sincerely,



Carey Corbaley
Chair, Tourtelot Community Advisory Group

cc: City Council
City Manager
City Attorney/Project Manager
Bruce Handel
Ed Lowry
Dorothy Rice
Donn Diebert
Roman Rocca
Scott Goldie

Benicia Unified School District
A Partnership For Learning

October 24, 2001

SUPERINTENDENT:

Joanne Haukland, Ph. D.

GOVERNING BOARD:

Becky Billing
Diane Dooley, M.D.
Don Luce
Reg Page
Rhea Zaks

SCHOOLS:

- Benicia High School
California Distinguished High School 1992
California Distinguished High School 1996
- Benicia Middle School
California Distinguished Middle School 1994
National Blue Ribbon School 1996
- Liberty High School
- Joe Henderson Elementary
California Distinguished Elementary School 1993
- Mary E. Farmer Elementary
California Distinguished Elementary School 2000
- Matthew Turner Elementary
- Mills Elementary
California Distinguished Elementary School 1995
- Robert Semple Elementary
California Distinguished Elementary School 1998

Mr. Jim Austreng, Project Manager
8800 Cal Center Drive
Sacramento, CA 95826-3200

Dear Mr. Austreng:

The purpose of this letter is to respond to a request for comments concerning the Remedial Action Plan and Environmental Impact Report for the Tourtelot Clean-up Project, Benicia, California, and to document the District's understanding with regard to the impacts of Tourtelot clearance and remediation work on the Matthew Turner School site. Work that would require either mandatory or voluntary withdrawal from the Matthew Turner School and grounds will not be conducted during school hours. Matthew Turner School site administration, principal Dan Dempsey, and the Benicia Unified School District Office, Superintendent Joanne Haukland, Ph.D., will be notified prior to any work being done at any other time that might affect people on the school site or on the school facility itself.

With these understandings in place, the Governing Board and the District look forward to the rapid conclusion of the project.

Sincerely,

Joanne Haukland
Joanne Haukland, Ph.D.
Superintendent

cc: Scott Goldie
Pacific Bay Homes

350 East K Street
Benicia, CA 94510
(707) 747-8300
FAX (707) 746-6152

B-1

B-2

444 Mills Drive
Benicia, California 94510
October 28, 2001

LETTER
C

Mr. Jim Austreng, Project Manager
Department of Toxic Substances Control
8800 Cal Center Drive
Sacramento, Ca 95826-3200

Subject: Comments on the Draft EIR and RAP for Tourtelot Site Remediation

Dear Mr. Austreng:

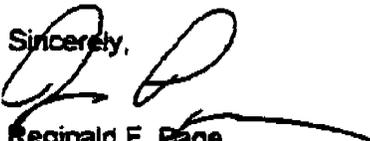
Thank you for the opportunity to comment on these documents and for the process that DTSC has used to include the public in its review of this project. As a Trustee of the Benicia Unified School District I'd like to comment specifically on the issue regarding the proximity of the Matthew Turner Elementary School to the work site. It is my understanding that the issue of "evacuating" the school will be addressed by scheduling work outside of the times when school children will be present at Matthew Turner, whether the work taking place is within the mandatory or the voluntary withdrawal distance. Moreover, the school and district need to be notified whenever work takes place outside of normal school hours so that appropriate steps can be taken to ensure the safety of district personnel or others who may be at the site during those times.

C-1

C-2

I sincerely appreciate the work that Granite management has done to work with the school district about issues of concern and the district's management may have other comments concerning these documents or the work outlined therein. Certainly, if there is any change that would impact the approach that I have outlined above the school (office of the Principal) as well as the District Office (office of Superintendent) must be notified.

Sincerely,


Reginald F. Bage

Cc: City Attorney
Benicia Unified School District
Mr. Dan Dempsey, Principal - Matthew Turner Elementary School
Dr. Joanne Haukland - Superintendent

Diane P. Rieschick

474 Casey Court
Benicia, CA 94510

October 29, 2001

California Environmental Protection Agency
Department of Toxic Substances Control
Northern California – Office of Military Facilities
8800 Cal Center Drive
Sacramento, CA 95826-3200
Contact: Jim Austreng

Dear Mr. Austreng:

I offer my comments on the Draft Environmental Impact Report, Tourtelot Remediation/Cleanup Project, Benicia, California.

Reference ES-5 and Section 3.2.5.1: Minimum Separation Distance (MSD) is not needed for surface clearance activities. Since the Project Area was cordoned off a few years ago, periodically Pacific Bay has cleared vegetation using hand-held weed-trimmers without incident. No residents need to withdraw during the surface clearance phase.

D-1

Reference ES-11, Areas of Controversy: Where does the DEIR address these listed areas of controversy? Add the following to the list: Why was the project boundary chosen? Why does the project boundary include areas not leased/employed by DOD?

D-2

D-3

Reference ES-31, Impact 15-3: Should be expanded to state, "Short-term Inconvenience, loss of income, and additional costs to residents from temporary withdrawal." Many residents work at home. Withdrawal means loss of income. Residents may need to take off time from regular employment to handle children after school with a resulting loss of income. Lack of access to kitchen cooking facilities, laundry facilities, and such will involve additional out-of-pocket expenses for families temporarily displaced.

D-4

Reference ES-31, Mitigation Measures:

1. Make withdrawal voluntary for residents whose property is located 200 feet or more from DOD leased property (rather than the project boundary) as there is a markedly lower risk of OE or OE scrap on the non-DOD leased areas.
2. Shorten the time for the MSD withdrawal; i.e. allow residents to return home at 2 PM to allow students access to their homes after school.

D-5

3. Allow residents to return home from the temporary withdrawal at a pre-designated lunch period to care for animals and handle other domestic affairs.
4. Provide stipend to residents to cover out-of-pocket expenses.

D-5
Cont.

Reference page 2-15, the paragraph discussing the final site conceptual model should include this statement: "If DTSC determines from the final site conceptual model data that no OE was distributed to residential areas outside the Project Site boundary, then residents of these areas will be notified that there is no significant risk from OE on their properties."

D-6

Reference page 3-13, Section 3.2.5.1: The MSD appears to have been calculated based upon damage/risk to property or unprotected individuals. If residents were allowed a voluntary withdrawal, instead of mandatory, with a requirement to stay inside their homes or cars (when leaving the home), the home itself would provide shelter in the case of the accidental detonation. This voluntary withdrawal option should be considered, also, for those residences that are not located within 200 feet of the DOD leased land boundary. The MSD calculation does not take into effect the difference between the Project Area located adjacent to the DOD leased land and the Project Area located away from DOD leased land. Note the earlier comments regarding the determination of the Project Area boundary.

D-7

Reference page 3-18, Figure 3-4: This figure shows a typical daily MSD, which would potentially affect 32 residences in one day. Closing streets will leave the residents of Hugh Court no access to their homes. Work should be accomplished in daily blocks to minimize the MSD withdrawal area. Instead of this large work area depicted, crews should begin at the resident property line and work away from it to impact six or fewer residences per day.

D-8

Reference page 3-19, Section 3.2.5.3: The Hospitality Center should have bathroom/shower/clothes changing areas available for residents to prepare for work, school, and after-school activities.

D-9

Sincerely,

Diane P. Rieschick

MARILYN BARDET

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LETTER
E

October 29th, 2001

Jim Austreng, Project Manager
California Environmental Protection Agency
Northern California—Office of Military Facilities
8800 Cal Center Drive
Sacramento CA 95826-3200

SUBJECT:

Comments on the Draft Environmental Impact Report: Tourtelot Remediation/Cleanup Project, Benicia CA, dated Spetember 2001; also the Draft Remedial Action Plan, Sept. 2001.

Dear Jim,

Thank you on behalf of many I know for leading this last phase of the preliminary work necessary before the actual cleanup of the Tourtelot Project site begins. I've appreciated every opportunity Cal-EPA has given the public to understand and comment on this project. I have personally attended nearly all the Tourtelot CAG meetings and all but one DTSC sponsored workshop, and have followed the development of the project from its beginnings in 1997-98. I have read both the Draft EIR and also the Draft RAP, and offered written comments on the RI/FS draft document.

I have been very impressed by the careful attention to detail given by Nicole Sotek and all those professionals contributing to the DEIR, including Ted Splitter for Northgate Environmental. My main concern all along has been to make sure that the various investigations (including the Army Corps' EE/CA) would be as conclusive and transparent as possible about the past uses of the site, that all possible OE and non-OE hazards and contaminants would be identified, and that the design of the cleanup and its actual conduct would make the site safe for the housing planned, account for any problem with the "Site Conceptual Model" and resolve those potential problems, and make specific plans for institutional controls and other methods for protecting the public in the future from any possible remaining hazards as part of a risk management plan.

I feel confident that the current DEIR and Draft RAP demonstrate that Cal-EPA is doing everything within its jurisdiction to protect the public health and safety on this unique, privatized military cleanup of an ordnance-contaminated site of the former Benicia Arsenal. The methodical and close analysis of details that the EPA's team has achieved in close work with USACE and Northgate (and EarthTech) is revealed in the

DEIR, which leaves little room for doubt or reservation about the care with which this cleanup is intended to be accomplished.

In light of the national tragedy unfolding and because of the bombing campaign in Afghanistan that began during this 45 day review period, I feel doubly appreciative of the care being given this project, albeit with a strange sense of our unique privilege: to be concerned to protect the public from what would appear to be minimal risks by comparison elsewhere. If all goes according to plan here, we should have a very safe and thorough cleanup, with little to worry about in the future from "residual risks" from remaining or undetected hazards. The perception of risk has been one of the general topics that has been most discussed at the CAG meetings, with some members seeming to want numerical proof of "how little actual risk" there is from any OE remnant that might accidentally explode during a removal action or be left undetected in the ground. (I've thought about our discussions—of accidental OE detonation during removal operation, etc.—in light of the seeming impossible odds of steering two planes into the WTC and bringing both towers down within 1/2 hour of each other... The entire government seems to be scrambling, trying to cope with a "worst case" they hadn't thought of, let alone planned for, despite the fact that a suicide hijacker had taken down an EgyptAir plane, enroute from NY to Cairo in 1993.) As the DEIR suggests, outlining the few questions left regarding the Site Conceptual Model, there are still answers to be gleaned from the cleanup itself. Whatever questions that remain unanswered by the cleanup about potential remaining hazards that may be left behind for whatever reason below ground in open space areas, the McAllister St. land-bridge, or "fill areas" outside the Project site, etc., must be fully articulated as part of the risk management plan or program associated to the final certification of the site by Cal-EPA. In my view, the public and the CAG should be encouraged to stay thoroughly involved until such a plan is hammered out, instituted and implemented by the City.

1. At the two recent CAG meetings held in September I offered comments on the DEIR which I would like incorporated. | E-1
2. It may seem a small matter, but the Executive Summary does not fully summarize the material in 1.2 (Background of Project). | E-2
3. I support the various comments made by CAG members, especially those regarding use of native grasses when re-seeding land disturbed by removal actions and the protection of wetlands in the South Valley. | E-3
4. I would like to know what sort of Conservation Fund is being planned for and whether the public will have opportunity for input. | E-4
5. The figure (2-5, Grading Map and Other Features) showing the areas outside the Project Site that received fill soils from the South Valley Ridge during excavations by the developer in the early 1990's needs to include the areas' roads and the house lots. The map in the RI/FS showing fill areas is much better, since the schematic is overlaid on the development's actual site plan (city zoning map?). | E-5

6. I am confused by the actual number of houses being planned for the Site: in section 1.2 (Background .1-3) 241 single family residences are said to have been proposed by Southampton Co, with an additional 50 houses to be built on adjoining 15 acres then owned by the City of Benicia, (acreage that was to be traded to Southampton Co.) In other places in the DEIR, most notably in one section on "growth-inducing" impacts, I couldn't find mention of the number of houses being planned for. In the section on Cumulative Impacts, however, the number of houses projected to be built is "426 single-family units and 42 accessory dwelling units on approximately 254 acres south of Lake Herman Park, on the Project Site...

E-6

7. I would like to know how many houses the portion of the North Valley that is to be filled with soils (from the Ridge and South Valley demolition pit #3 kick-out area during OE removal activities as well as 14 feet of clean fill) will actually accommodate.

E-7

8. I believe the DEIR should also consider the impact of the OE remediation plan chosen, which calls for filling in of the North Valley, in the case where, for whatever reason, the Project Site was *not* certified as safe (or "suitable") for residential. What would the Project Site look like after cleanup, if no houses were to get built except in the area of D-1?

E-8

9. I believe that a straightforward description of how Cal-EPA will arrive at its final judgement that the Tourtelot Site is certifiable as "suitable" for housing following cleanup needs to be included in the final EIR and needs to be included as part of formal certification. In that description, a reasonable accounting of why the word "suitable" has been elected to replace "safe" would be most helpful, considering where the public began with its questions, petitioning DTSC prior to June 1, 1999.

E-9

Thank you for considering these comments as part of your review of the DEIR. I'm very grateful to all involved at Cal-EPA and DTSC for its consistent and high level of oversight on this project.

Sincerely,

Marilyn Bardet



LETTER

F

Granite Management Corporation

4041 MacArthur Boulevard, Suite 500
Newport Beach, CA 92660
Telephone (949) 440-7257
Fax (949) 261-8943

October 29, 2001

Jim Austreng, Project Manager
8800 Cal Center Drive
Sacramento, CA 95826-3200

RE: Tourtelot Cleanup Project

Dear Jim,

On behalf of Granite Management Corporation, we submit the enclosed comments on the Draft Remedial Action Plan and Draft Environmental Impact Report for the Tourtelot Cleanup Project.

Very Truly Yours,

Scott B. Goldie
Granite Management Corporation

Granite Comment #1: Section 3.2.1 of the Draft EIR describes the institutional controls to be imposed on "restricted areas" of the Project Site. The "restricted areas" include the Open Space Parcels and existing paved portions of the Project Site (i.e., the D-1 Roads and the paved portion of the McAllister Land Bridge). The second paragraph of Section 3.2.1 says that "Excavation activities [in restricted areas] would only be conducted using UXO technicians support." "Excavation activities" are defined by reference to the draft Covenant (Appendix B to Draft EIR). Similarly, Section A-3.5.2.4 in Appendix A of the Draft RAP requires that one of the elements of the Contingency Action Plan will be "The presence of qualified UXO technicians during excavation activities". The draft Covenant's current definition of Excavation Activities includes activities that can be safely conducted without UXO technicians support.

For example, the definition of Excavation Activities is broad enough that it would apply to fire discing in the Open Space Parcels. Fire discing would penetrate the ground less than one foot so it would not be considered an Excavation Activity under part (2) of the definition of Excavation Activities in the Covenant. However, fire discing on the Project Site would displace more than 10 cubic feet of soil which would make it an Excavation Activity under part (1) of the definition. Fire discing has occurred on the Project Site for many years without incident and without any reports of the unearthing of any OE related items. During the OE remediation activities, all Open Space parcels (including all areas where fire discing will occur) will be subject to point clearance plus the 100% QA QC scan. Given these considerations, it is reasonable to believe that fire discing can occur safely without having UXO technicians present.

In addition, the definition of Excavation Activities would apply to any work in utility trenches below D-1 Roads. Unit D-1 was cut to bedrock before utility trenches were excavated and except in the D-1 Fill Area, the trenches were backfilled with imported sand and with crushed bedrock and would accordingly be free of OE. During the grading of Unit D-1 and installation of the utility trenches, no encounters of OE or OE scrap were reported. Some of the utility trenches in the D-1 areas are not located under paved areas and will be subject to point clearance. This clearance activity would confirm that the utility trenches were backfilled only with imported sand and with crushed bedrock. Also, the utility trenches that are below pavement in the D-1 Fill Area will be subject to point clearance which would remove any non-crushed bedrock fill they may contain and would insure that they would be free of OE and OE scrap. Granite proposes that DTSC consider as part of the evaluation of the Site Conceptual Model whether it can reasonably be concluded based on the results of the point clearance of the Unit D-1 area that it is unlikely that OE would be present in utility trenches in D-1. If such a conclusion is reached, UXO technicians should not be required to be present when Excavation Activities occur in the trenches.

Finally, the definition of Excavation Activities would apply to work in utility trenches on the McAllister Land Bridge since the Land Bridge is located in an Open Space Parcel. Granite expects to revise the Draft OE RDD before it is approved by DTSC to require that areawide clearance protocols be used to clear a "utilities corridor" where the yet to be installed utilities would be located on the McAllister Land Bridge. It should not be necessary to have UXO support when excavating only within the confines of the cleared utilities corridor.

Granite Comment #2. The final paragraph of Section 3.3.5.4 of the Draft EIR discusses the subdrains to be installed in the North Valley. It indicates that the subdrains would be constructed using a blanket drain concept. The blanket drain would be constructed of Class 2 Permeable Material meeting Caltrans Standard Specification. The final paragraph of the sentence currently provides "No pipes would be installed within the Class 2 Permeable Material". Granite proposes to omit this final sentence of Section 3.3.5.4. Granite proposes to install two 8-inch diameter slotted pipes in the lower section of the three-foot thick drain. The slots will be sized to prevent loss of the Class 2 permeable material into the pipes. The intent of the pipes is to remove water more quickly from the drain to insure that hydrostatic pressures do not build up beneath the fill and saturate the fill. The original intent of eliminating the pipes from the drain was to eliminate the possibility that repair work might be required in the future if the drain malfunctioned. The concept of the blanket drain was developed to address this concern by installing a very wide and thick drain that would function without pipes. The blanket drain is still proposed and would function indefinitely even if the pipes were to collapse. Accordingly, it would never be necessary to repair the pipes.

F-2

Granite Comment #3. Mitigation Measure 10-1 of the Draft EIR discusses the implementation of a Voluntary Separation Distance (VSD) based on the maximum fragmentation distance of the MPMs. Mitigation Measure 10-1 indicates that the initial VSD distances based on current MPMs would be 1,181 feet for a 37 mm item and 1,080 feet for a 60 mm item. The Mitigation Measure requires that notices be given to all residents, schools or businesses situated within the applicable VSD. Granite is evaluating the use of a Mobile Open Front Barricade during activities requiring an MSD when the applicable VSD, if one applied, would include Matthew Turner School. The purpose of using a Mobile Open Front Barricade is to reduce the maximum fragmentation distance that could be generated from an accidental detonation. When the Mobile Open Front Barricade is used, USACE procedures allow the maximum fragmentation distance to be reduced to 200 feet. Granite proposes that Mitigation Measure 10-1 be revised to clarify that through the use of engineering controls (the Mobile Open Front Barricade), the VSD can be reduced to 200 feet which would avoid impacts to the school since the school is located at a distance more than 200 feet from the boundary of the Project Site.

F-3

Granite Comment #4. In Section 3.3.4 of the Draft EIR, Granite proposes to add the following landfill to both lists of potential landfill locations that appear on page 3-44: Forward Landfill, Stockton, California (Class II/III).

F-4



California Regional Water Quality Control Board San Francisco Bay Region



Gray Davis
Governor

Winston H. Hickox
Secretary for
Environmental
Protection

Internet Address: <http://www.swrcb.ca.gov>
1515 Clay Street, Suite 1400, Oakland, California 94612
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LETTER
G

October 22, 2001
File No. 2128.04 (MRL)

Jim Austreng
California Environmental Protection Agency
Department of Toxic Substances Control
8800 Cal Center Drive
Sacramento, California 95826-3200

Re: Tourtelot Remediation/Cleanup Project
North of Rose Drive and east of East 2nd Street
Benicia, California
SCH #1999042079

Dear Mr. Austreng:

We have received the above referenced Draft Environmental Impact Report (DEIR) and offer the following comments on issues concerning the Regional Water Quality Control Board.

The project objective is the remediation of all detected ordnance and explosives (OE) at the project site, including the identification, characterization, treatment, and removal of soil containing contaminant concentrations exceeding the final remediation goals.

The DEIR indicates that filling activities in both the North Valley and South Valley will result in the loss of jurisdictional wetlands. The DEIR also indicates that the short-term loss of marsh and riparian habitat from vegetation clearance in the South Valley could degrade the water quality of the wetlands. Third, there will be short-term impacts from increased storm water runoff from the South Valley. A Clean Water Act (CWA) Section 401 water quality certification is required for such activities. A CWA Section 404 Permit from the U.S. Army Corps of Engineers may also be necessary for this project.

G-1

The Board adopted U.S. EPA's Section 404(b)(1), "Guidelines for Specification of Disposal Sites for Dredge or Fill Material," dated December 24, 1980, in its Basin Plan for determining the circumstance under which filling of wetlands, streams or other waters of the State may be permitted. The Section 404(b)(1) Guidelines prohibit all discharges of fill material into regulated waters of the United States, unless a discharge, as proposed, constitutes the least environmentally damaging practicable alternative that will achieve the basic project purpose.

G-2

California Environmental Protection Agency



The Guidelines sequence the order in which proposal should be approached: (1) Avoid – avoid impacts to waters; (2) Minimize – modify project to minimize impacts to waters; and (3) Mitigate – once impacts have been fully minimized, compensate for unavoidable impacts to waters. When it is not possible to avoid water bodies, disturbance should be minimized. Mitigation for lost water body acreage and functions through restoration or creations should only be considered after disturbance has been minimized.

G-2
Cont.

The proposed project would disturb more than five acres of land during implementation. As noted in Section 7.3.2, Project Impacts, an NPDES General Permit for Discharges of Storm Water Associated with Construction Activity (General Permit) is required, as well as a Storm Water Pollution Prevention Plan (SWPPP). A Notice of Intent (NOI) must be filed with the State Water Resources Control Board, Division of Water Quality. Copies of the General Permit and NOI can be obtained from the State Board's web page, www.swrcb.ca.gov, or by contacting the San Francisco Bay Regional Water Quality Control Board at (510) 622-2300.

G-3

Regional Board staff recommends obtaining a copy of *Start at the Source*, a design guidance manual for storm water quality protection. The manual provides innovative design techniques for structures, drainage systems, and landscaping. This manual may be obtained at most cities planning offices, or by calling the Regional Water Quality Control Board at (510) 622- 2465.

G-4

Regional Board staff is unable to offer more specific comments at this time, however, I have attached our General Comments, which discuss the Regional Board's areas of responsibilities and may help guide the preparation of further CEQA documentation, if necessary.

G-5

If you have any questions, please call me at (510) 622-2345.

Sincerely,



Stephen Berger
Water Resource Control Engineer

Enclosure: General Comments Document
cc: w/o enclosure: State Clearinghouse

General Comments

The San Francisco Regional Water Quality Control Board (Regional Board or RWQCB) is charged with the protection of the Waters of the State of California in the San Francisco Bay Region, including wetlands and stormwater quality. The Regional Board is responsible for administering the regulations established by the Federal Clean Water Act. Additionally, the California Water Code establishes broad state authority for regulation of water quality. The San Francisco Bay Basin Water Quality Control Plan (Basin Plan) explains the Regional Board's strategy for regulating water quality. The Basin Plan also describes the range of responses available to the Regional Board with regard to actions and proposed actions that degrade or potentially degrade the beneficial uses of the Waters of the State of California.

NPDES

The Federal National Pollutant Discharge Elimination System (NPDES) Program, established by the Clean Water Act, which controls and reduces pollutants to water bodies from point and nonpoint discharges, regulates water quality degradation. In California, the program is administered by the California Regional Water Quality Control Boards. The Regional Board issues NPDES permits for discharges to water bodies in the San Francisco Bay Area, including Municipal (area- or county-wide) Stormwater Discharge Permits.

Projects disturbing more than five acres of land during construction must be covered under the State NPDES General Permit for Discharges of Storm Water Associated with Construction Activity (General Permit). This can be accomplished by filing a Notice of Intent with the State Water Resources Control Board. An NOI and the General Permit can be obtained from the Board at (510) 622-2300. The project sponsor must propose and implement control measures that are consistent with the General Permit and with the recommendations and policies of the local agency and the RWQCB.

Projects that include facilities with discharges of Storm Water Associated with Industrial Activity must be covered under the State NPDES General Permit for Discharges of Storm Water Associated with Industrial Activity. This may be accomplished by filing a Notice of Intent. The project sponsor must propose control measures that are consistent with this, and with recommendations and policies of the local agency and the RWQCB. In a few cases, the project sponsor may apply for (or the RWQCB may require) issuance of an individual (industry- or facility-specific) permit.

The RWQCB's Urban Runoff Management Program requires Bay Area municipalities to develop and implement storm water management plans (SWMPs). The SWMPs must include a program for implementing new development and construction site storm water quality controls. The objective of this component is to ensure that appropriate measures to control pollutants from new development are: considered during the planning phase, before construction begins; implemented during the construction phase; and maintained after construction, throughout the life of the project.

G-5
Cont.

Impacts and Mitigation Measures

Wetlands

Wetlands enhance water quality through such natural functions as flood and erosion control, stream bank stabilization, and filtration and purification of contaminants. Wetlands also provide critical habitats for hundreds of species of fish, birds, and other wildlife, offer open space, and provide many recreational opportunities. Water quality impacts occur in wetlands from construction of structures in waterways, dredging, filling, and altering drainage to wetlands.

The Regional Board must certify that any permit issued by the U.S. Army Corps of Engineers pursuant to Section 404 of the Clean Water Act (covering, dredging, or filling of Waters of the United States, including wetlands) complies with state water quality standards, or waive such certification. Section 401 Water Quality Certification is necessary for all 404 Nationwide permits, reporting and non-reporting, as well as individual permits.

All projects must be evaluated for the presence of jurisdictional wetlands and other Waters of the State. Destruction of or impact to these waters should be avoided. If the proposed project impacts wetlands or other Waters of the State and the project applicant is unable to demonstrate that the project was unable to avoid those adverse impacts, water quality certification will most likely be denied. 401 Certification may also be denied based on significant adverse impacts to wetlands or other Waters of the State. In considering proposals to fill wetlands, the Regional Board has adopted the California Wetlands Conservation Policy (Executive Order W-59-93, signed August 23, 1993). The goals of the Policy include ensuring "no overall net loss and achieving a long-term net gain in the quantity, quality, and permanence of wetlands acreage and values." Under this Policy, the Regional Board also considers the potential post-construction impacts to wetlands and Waters of the State and evaluates the measures proposed to mitigate those impacts (see Storm Water Quality Control, below).

The Regional Board has adopted U.S. EPA's Clean Water Act Section 404(b)(1) "Guidelines for Specification of Disposal Sites for Dredge or Fill Material," dated December 24, 1980, in the Board's Basin Plan for determining the circumstances under which fill may be permitted.

Section 404(b)(1) Guidelines prohibit all discharges of fill material into regulated waters of the United States, unless a discharge, as proposed, constitutes the least environmentally damaging practicable alternative that will achieve the basic project purpose. For non-water dependent projects, the guidelines assume that there are less damaging alternatives, and the applicant must rebut that assumption.

The Section 404(b)(1) Guidelines sequence the order in which proposals should be approached. First, impacts to wetlands or Waters of the State must be avoided to the maximum extent practicable. Second, the remaining impacts must be minimized. Finally, the remaining unavoidable adverse impacts to wetlands or Waters of the State must be mitigated. Mitigation will be preferably in-kind and on-site, with no net destruction of habitat value. A proportionately greater amount of mitigation is required for projects that are out-of-kind and/or off-site. Mitigation will preferably be completed prior to, or at least simultaneous to, the filling or other loss of existing wetlands.

Successful mitigation projects are complex tasks and difficult to achieve. This issue will be strongly considered during agency review of any proposed wetland fill. Wetland features or ponds created as mitigation for the loss of existing jurisdictional wetlands or Waters of the United States cannot be used as storm water treatment controls.

G-5
Cont.

In general, if a proposed project impacts wetlands or Waters of the State and the project applicant is unable to demonstrate that the project was unable to avoid adverse impacts to wetlands or Waters of the State, water quality certification will be denied. 401 Certification may also be denied based on significant adverse impacts to wetlands or other Waters of the State.

Storm Water Quality Control

Storm water is the major source of fresh water to creeks and waterways. Storm water quality is affected by a variety of land uses and the pollutants generated by these activities. Development and construction activities cause both site-specific and cumulative water quality impacts. Water quality degradation may occur during construction due to discharges of sediment, chemicals, and wastes to nearby storm drains or creeks. Water quality degradation may occur after construction is complete, due to discharges of petroleum hydrocarbons, oil, grease, and metals from vehicles, pesticides and fertilizers from landscaping, and bacteria from pets and people. Runoff may be concentrated and storm water flow increased by newly developed impervious surfaces, which will mobilize and transport pollutants deposited on these surfaces to storm drains and creeks. Changes in runoff quantity or velocity may cause erosion or siltation in streams. Cumulatively, these discharges will increase pollutant loads in creeks and wetlands within the local watershed, and ultimately in San Francisco Bay.

To assist municipalities in the Bay Area with complying with an area-wide NPDES Municipal Storm Water Permit or to develop a Baseline Urban Runoff Program (if they are not yet a co-permittee with a Municipal Storm Water Permit), the Regional Board distributed the *Staff Recommendations for New and Redevelopment Control for Storm Water Programs (Recommendations)* in April 1994. The Recommendations describe the Regional Board's expectations of municipalities in protecting storm water quality from impacts due to new and redevelopment projects, including establishing policies and requirements to apply to development areas and projects; initiating appropriate planning, review, approval, and inspection procedures; and using best management practices (BMPs) during construction and post-construction.

Developing and implementing a Storm Water Pollution Prevention Plan (SWPPP) should minimize project impacts. A SWPPP is required by the State Construction Storm Water General Permit (General Permit). The SWPPP should be consistent with the terms of the General Permit, the Manual of Standards for Erosion & Sedimentation Control Measures by the Association of Bay Area Governments (ABAG), policies and recommendations of the local urban runoff program (city and/or county), and the Recommendations of the RWQCB. SWPPPs should also be required for projects that may have impacts, but which are not required to obtain an NPDES permit. Preparation of a SWPPP should be a condition of development. Implementation of the SWPPP should be enforced during the construction period via appropriate options such as citations, stop work orders, or withholding occupancy permits.

Impacts identified should be avoided and minimized by developing and implementing the types of controls listed below. Explanations of the controls are available in the Regional Board's construction *Field Manual*, available from Friends of the San Francisco Estuary at (510) 286-0924, in BASMAA's *Start at the Source*, and in the *California Storm Water Best Management Practice Handbooks*.

G-5
Cont.

Site Planning

The project should minimize impacts from project development by incorporating appropriate site planning concepts. This should be accomplished by designing and proposing site planning options as early in the project planning phases as possible. Appropriate site planning concepts to include, but are not limited to the following:

- Phase construction to limit areas and periods of impact.
- Minimize directly connected impervious areas.
- Preserve natural topography, existing drainage courses and existing vegetation.
- Locate construction and structures as far as possible from streams, wetlands, drainage areas, etc.
- Provide undeveloped, vegetated buffer zones between development and streams, wetlands, drainage areas, etc.
- Reduce paved area through cluster development, narrower streets, and use of porous pavement and/or retaining natural surfaces.
- Minimize the use of gutters and curbs, which concentrate and direct runoff to impermeable surfaces.
- Use existing vegetation and create new vegetated areas to promote infiltration.
- Design and lay out communities to reduce reliance on cars.
- Include green areas for people to walk their pets, thereby reducing build-up of bacteria, worms, viruses, nutrients, etc. in impermeable areas, or institute ordinances requiring owners to collect pets' excrement.
- Incorporate low-maintenance landscaping.
- Design and lay out streets and storm drain systems to facilitate easy maintenance and cleaning.
- Consider the need for runoff collection and treatment systems.
- Label storm drains to discourage dumping of pollutants into them.

Erosion

The project should minimize erosion and control sediment during and after construction. This should be done by developing and implementing an erosion control plan, or equivalent plan. This plan should be included in the SWPPP. The plan should specify all control measures that will be used or which are anticipated to be used, including, but not limited to, the following:

- Limit access routes and stabilize access points.
- Stabilize denuded areas as soon as possible with seeding, mulching, or other effective methods.
- Protect adjacent properties with vegetative buffer strips, sediment barriers, or other effective methods.
- Delineate clearing limits, easements, setbacks, sensitive areas, vegetation and drainage courses by marking them in the field.
- Stabilize and prevent erosion from temporary conveyance channels and outlets.
- Use sediment controls and filtration to remove sediment from water generated by dewatering or collected on-site during construction. For large sites, stormwater settling basins will often be necessary.

G-5
Cont.

Chemical and Waste Management

The project should minimize impacts from chemicals and wastes used or generated during construction. This should be done by developing and implementing a plan or set of control measures. The plan or control measures should be included in the SWPPP. The plan should specify all control measures that will be used or which are anticipated to be used, including, but not limited to, the following:

- Designate specific areas of the site, away from streams or storm drain inlets, for storage, preparation, and disposal of building materials, chemical products, and wastes.
- Store stockpiled materials and wastes under a roof or plastic sheeting.
- Store containers of paint, chemicals, solvents, and other hazardous materials stored in containers under cover during rainy periods.
- Berm around storage areas to prevent contact with runoff.
- Cover open Dumpsters securely with plastic sheeting, a tarp, or other cover during rainy periods.
- Designate specific areas of the site, away from streams or storm drain inlets, for auto and equipment parking and for routine vehicle and equipment maintenance.
- Routinely maintain all vehicles and heavy equipment to avoid leaks.
- Perform major maintenance, repair, and vehicle and equipment washing off-site, or in designated and controlled areas on-site.
- Collect used motor oil, radiator coolant or other fluids with drip pans or drop cloths.
- Store and label spent fluids carefully prior to recycling or proper disposal.
- Sweep up spilled dry materials (cement, mortar, fertilizers, etc.) immediately—do not use water to wash them away.
- Clean up liquid spills on paved or impermeable surfaces using "dry" cleanup methods (e.g., absorbent materials, cat litter, rags) and dispose of cleanup materials properly.
- Clean up spills on dirt areas by digging up and properly disposing of the soil.
- Keep paint removal wastes, fresh concrete, cement mortars, cleared vegetation, and demolition wastes out of gutters, streams, and storm drains by using proper containment and disposal.

Post-Construction

The project should minimize impacts from pollutants that may be generated by the project following construction, when the project is complete and occupied or in operation. These pollutants may include: sediment, bacteria, metals, solvents, oil, grease, and pesticides, all of which are typically generated during the life of a residential, commercial, or industrial project after construction has ceased. This should be done by developing and implementing a plan and set of control measures. The plan or control measures should be included in the SWPPP.

The plan should specify all control measures that will be used or which are anticipated to be used, including, but not limited to, the source controls and treatment controls listed in the Recommendations. Appropriate control measures are discussed in the Recommendations, in:

- Table 2: Summary of residential post-construction BMP selection
- Table 3: Summary of industrial post-construction BMP selection
- Table 4: Summary of commercial post-construction BMP selection

G-5
Cont.

Additional sources of information that should be consulted for BMP selection include the *California Storm Water Best Management Practice Handbooks*; the Bay Area Preamble to the *California Storm Water Best Management Practice Handbooks and New Development Recommendations*; the BASMAA New Development Subcommittee meetings, minutes, and distributed information; and Regional Board staff. Regional Board staff also has fact sheets and other information available for a variety of structural stormwater treatment controls, such as grassy swales, porous pavement and extended detention ponds.

G-5
Cont.



Gray Davis
GOVERNOR

STATE OF CALIFORNIA

GOVERNOR'S OFFICE of PLANNING AND RESEARCH
State Clearinghouse



Steven A. Nissen
DIRECTOR

October 31, 2001

Jim Austreng
Department of Toxic Substances Control
8800 Cal Center Drive
Sacramento, CA 95826-3200

Subject: Tourelot Remediation/Cleanup Project
SCH#: 1999042079

Dear Jim Austreng:

The State Clearinghouse submitted the above named Draft EIR to selected state agencies for review. On the enclosed Document Details Report please note that the Clearinghouse has listed the state agencies that reviewed your document. The review period closed on October 26, 2001, and the comments from the responding agency (ies) is (are) enclosed. If this comment package is not in order, please notify the State Clearinghouse immediately. Please refer to the project's ten-digit State Clearinghouse number in future correspondence so that we may respond promptly.

Please note that Section 21104(c) of the California Public Resources Code states that:

"A responsible or other public agency shall only make substantive comments regarding those activities involved in a project which are within an area of expertise of the agency or which are required to be carried out or approved by the agency. Those comments shall be supported by specific documentation."

These comments are forwarded for use in preparing your final environmental document. Should you need more information or clarification of the enclosed comments, we recommend that you contact the commenting agency directly.

This letter acknowledges that you have complied with the State Clearinghouse review requirements for draft environmental documents, pursuant to the California Environmental Quality Act. Please contact the State Clearinghouse at (916) 445-0613 if you have any questions regarding the environmental review process.

Sincerely,

Terry Roberts
Senior Planner, State Clearinghouse

Enclosures
cc: Resources Agency

1400 TENTH STREET P.O. BOX 3044 SACRAMENTO, CALIFORNIA 95812-3044
916-445-0613 FAX 916-325-3018 WWW.OPR.CA.GOV/CLEARINGHOUSE.HTML



State Clearinghouse Data Base

SCH# 1999042079
Project Title Tourelot Remediation/Cleanup Project
Lead Agency Toxic Substances Control, Department of

Type EIR Draft EIR
Description The remediation involves the characterization, treatment, and removal of ordnance and explosives (OE) and chemically contaminated soil at the Project Site.

Lead Agency Contact

Name Jim Austreng
Agency Department of Toxic Substances Control
Phone 916 255-3702 **Fax**
email
Address 8800 Cal Center Drive
City Sacramento **State** CA **Zip** 95826-3200

Project Location

County Solano
City Benicia
Region
Cross Streets Rose Drive, East 2nd Street

Parcel No.

| Township | Range | 3N | Section | Base |
|-----------------|--------------|-----------|----------------|-------------|
|-----------------|--------------|-----------|----------------|-------------|

Proximity to:

Highways 790,680
Airports
Railways Union Pacific
Waterways
Schools Matthew Turner
Land Use The property is currently undeveloped open space, land use designations are open space and single family residential.

Project Issues Aesthetic/Visual; Air Quality; Geologic/Seismic; Noise; Population/Housing Balance; Public Services; Recreation/Parks; Schools/Universities; Soil Erosion/Compaction/Grading; Toxic/Hazardous; Traffic/Circulation; Vegetation; Water Quality; Water Supply; Wetland/Riparian; Wildlife; Growth Inducing; Landuse; Cumulative Effects

Reviewing Agencies Resources Agency; Department of Fish and Game, Region 3; Office of Historic Preservation; Department of Parks and Recreation; Reclamation Board; San Francisco Bay Conservation and Development Commission; California Highway Patrol; Caltrans, District 4; Department of Conservation; Department of Health Services; Integrated Waste Management Board; Regional Water Quality Control Board, Region 2; Native American Heritage Commission; State Lands Commission

Date Received 09/12/2001 **Start of Review** 09/12/2001 **End of Review** 10/26/2001

Note: Blanks in data fields result from insufficient information provided by lead agency.

DEPARTMENT OF TRANSPORTATION

P O BOX 23650
OAKLAND, CA 94623-0650
(510) 286-4444
TDD (510) 286-4454



September 25, 2001

SOL780-2.02
SOL780024
SCH# 1999042079

Mr. Jim Austreng
Department of Toxic Substances Control
8800 Cal Center Drive
Sacramento, CA 95826-3200

Dear Mr. Austreng:

**TOURTELOT REMEDIATION/CLEANUP PROJECT - DRAFT ENVIRONMENTAL
IMPACT REPORT**

Thank you for including the California Department of Transportation in the environmental review process for the above-referenced project. We have reviewed the Draft Environmental Impact Study, dated September 2001, and we are satisfied that the proposed activities will not significantly impact the State highway system.

H-1

If you have any questions regarding this letter, please call Rick Kuo of my staff at (510) 286-5988.

Sincerely,

RANDELL H. IWASAKI
Acting District Director

By

A handwritten signature in cursive script that reads "Jean C. R. Finney".

JEAN C. R. FINNEY
District Branch Chief
IGR/CEQA

c: Katie Shulte Joung (State Clearinghouse)



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO
CORPS OF ENGINEERS
1325 J STREET
SACRAMENTO, CALIFORNIA 95814-2922

LETTER

I

October 29, 2001

Programs and Project
Management Division

Mr Jim Austreng, Project Manager
Department of Toxic Substances Control
8800 Cal Center Drive
Sacramento, CA 95826-3200

Dear Mr. Austreng:

The U.S. Army Corps of Engineers has reviewed the Draft Remedial Action Plan and the Draft Environmental Impact Report for the Benicia Tourtelot Project Site. Comments from our review are enclosed.

If you have any questions, please call me at (916) 557-7906.

Sincerely,

A handwritten signature in cursive script that reads "Bruce Handel".

Encl

Bruce Handel
Project Manager
HTRW Branch

MEMORANDUM FOR FUDS UNIT (Mr. Jerry Vincent)

SUBJECT: Review comments on the Remedial Action Plan, Tourtelot Cleanup Project, Benicia, California, dated September 2001.

1. Executive Summary. The executive summary does not provide a complete review of the investigations/actions performed and the responsible agency/organization conducting the activity. The executive summary provides a jumble of various activities completed without proper time sequence or responsible organization identification and likely does not identify all phases or activities completed. By omitting a complete review, it appears that all activities mentioned were conducted by the U. S. Army Corps of Engineers. It should be made very clear what activities were completed by the U. S. Army Corps of Engineers under the FUDS Program, and by Granite Management Corporation under the DTSC Order. | 1-1
2. Section 1.1 and 1.2. Same comments as in No. 1 above. | 1-2
3. Section 2.2. Figure 2-7. What is the basis for identifying the "existing open space with potential for OE"? This figure represents a different area identified in the Ordnance and Explosives Remedial Design Document and accompanying Explosives Safety Submittal for the OE Removal Action for the project site. It would seem that any and all areas that are being investigated and identified for OE removal actions should be identified in this figure. | 1-3
4. Section 3.2. Same comment as in No. 1 above. | 1-4
5. Section 3.2, pg. 3-2, line 34. It is unclear what purpose this sentence serves. In addition, what is the basis for this statement? It could also be stated that this is true for all areas outside of the project site/areas investigated to date. The sentence should be eliminated from the document. | 1-5
6. Section 4.1, pg. 4-1, lines 21-34. This paragraph is very confusing in providing a clear definition of OE Scrap, and should be rewritten. | 1-6

Bruce Handel
Project Manager
(916) 557-7906

29 October 2001

MEMORANDUM FOR CESPK-ED-PM (B. Handel)

SUBJECT: Review comments – Draft Remedial Action Plan, Tourtelot Cleanup Project, Benicia, California, September 2001

REFERENCE:

A. *Engineering Evaluation/Cost Analysis Action Memorandum Former Benicia Arsenal, Solano County California, March 2000.*

1. The subject RAP has been reviewed. The following comments are provided for your use.

| Comment No. | Page | Section | Comment |
|-------------|------|---------|---|
| 1 | 5-9 | 5.4 | <p>The following comment has been provided previously under the Administrative version of the subject document as well as the associated RI/FS Study:</p> <p>The proposed alternative, as presented in section 5.4 of the subject document, is not consistent with the recommendations provided by the USACE under Section 8.2 of reference A.</p> <p>Moreover, the actions described in the document indicate that the project site is being prepared for long-term residential development; the recommendations provided under reference (A) are designed to protect public health and safety if fully implemented.</p> |

1-7

2. If you have any questions please contact me by phone at (916) 557-7451 or by e-mail at [jesparza@spk.usace.army.mil].

JOHN ESPARZA
 Chief, Environmental Chemistry Section
 Environmental Engineering

cc: Allen Curley, Edward Ketchum (USACE)

MEMORANDUM FOR BRAC-ER/IRP UNIT (Ms. Linda Finley-Miller)

SUBJECT: Review Comments on the Remedial Action Plan, Tourtelot Cleanup Project, Benecia, California

1. References

- a. Remedial Action Plan, Tourtelot Cleanup Project, Benecia, California, prepared by EarthTech Corporation, dated Sept 2001.
- b. Engineering Evaluation/Cost Analysis Action Memorandum, Former Benecial Arsenal, Solano County, California, dated March 2000.

2. A review of the subject document has been completed. The following comments are provided for your use.

| CMT # | Page | Line # | Comment |
|-------|------|--------|--|
| 1 | ES-6 | 32 | Use of non-detect as a cleanup level for PAHs is a very expensive decision. We have cleaned up PAHs elsewhere in the Bay Area for residential exposure scenarios and did not use non-detect. [REDACTED] [REDACTED] [REDACTED] |
| 2 | ES-6 | 34 | Similar issue for mercury. Going to ambient levels is costly. Please clarify. |
| 3 | ES-7 | 24 | Although use of the 500 mg/kg cleanup value for petroleum hydrocarbons based on the SF Bay Regional Water Quality Control Board's Taste and Odor Criteria makes sense for shallow soils (10' bgs or less) in residential areas, soils deeper than 10' bgs should not be cleaned up to this strict criteria. Justify why this is being proposed for soils at depth. |
| 4 | ES-8 | 34 | You mention that soils might be treated on site to the PRGs then discharged on site. Do you have agreed upon discharge levels? If not, you may be required to treat your on-site soils to a lower level than your in-situ cleanup numbers. Clarify. |
| 5 | ES-8 | 19 | You mention "Final Remedial Goals" (FRGs) here, but they are never mentioned or noted anywhere else. Are these different than what you are proposing? Clarify. |
| 6 | 4-3 | 38 | I'm not sure it is in the best interests of the Gov't to have you propose applying drinking water MCLs to groundwater that is clearly not going to be used as such. Clarify why this is being proposed? |
| 7 | 4-5 | 10 | Why were ambient levels of metals not used in your screening risk assessment? This would result in a higher risk (and thus need for remediation) than if they were taken into account? Clarify. |
| 8 | 4-10 | 43 | Again, your approach of cleaning up soils for heavy metals to ambient levels is a very expensive approach. Justification for this needs to be provided. |

I-8

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I-10

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I-14

I-15

SUBJECT: Review Comments on the Remedial Action Plan, Tourist Cleanup Project,
Benecia, California

| CMT # | Page | Line # | Comment | |
|-------|---------|--------|---|------|
| 9 | 4-11 | 20 | Here and throughout this document, you refer to confirmation sampling which uses a "bright line" approach - that is, discrete samples will be individually compared to the cleanup goals to decide on further remediation. [REDACTED] A statistical confirmation sampling methodology needs to be proposed to be acceptable. | I-16 |
| 10 | 4-12 | 1 | Was your intent of using a global ambient for dioxin/furan for site cleanup goals discussed with the USACE toxicologist? Did you not have local ambient data? Clarify. | I-17 |
| 11 | 4-12 | 5 | See comment 3. | I-18 |
| 12 | 5-9 | 25 | I'm not clear why Alternative 5A was selected, it results in a lot of off-site disposal of TNT contaminated soil that will result in a long-term liability [REDACTED]. Treatment options are usually preferred as part of the CERCLA alternative analysis process. Clarify. | I-19 |
| 13 | Figures | -- | Figures 2-3, 2-4 and 2-5 show the horizontal extent of "Impacted Soils". Does the use of the term "impacted" imply that these are soils above the cleanup levels? If so, then I could not find any soil samples on Figure 2-5 (petroleum impacted soils) which were over the 500 mg/kg cleanup level you have proposed. Please clarify. | I-20 |

3. Point of contact for this review is Roger Henderson, P.E., C/Environmental Engineering Section, US Army Corps of Engineers, Sacramento District, (916) 557-5378 or rhenderson@spk.usace.army.mil.


Roger Henderson, P.E.

MEMORANDUM FOR CESPK-ED-E (John Esparza)

SUBJECT: Review comments - *Draft Environmental Impact Report, Tourtelot Remediation/Cleanup Project, Benicia, California, September, 2001*. Prepared by Department of Toxic Substances Control.

1. I have reviewed the subject document as requested. The following comments are provided for your use.

2. General comments: Although the subject matter covered by the document was generally in-depth, overall the document failed to address the full scope of the project. It is obvious that the project only begins with the remediation efforts associated with the UXO cleanup. Instead, the actions described in the document indicate that the project site is being prepared for long-term residential development. Although UXO and HTRW cleanup are addressed in the project actions, the resculpting and recontouring of the terrain have little to do with UXO cleanup. The responsibility of UXO cleanup is to return the terrain to the contours and grading which existed prior to the undertaking of the cleanup actions. Under the Project Objectives section of the document (Section 3.1), the text states: "Remediate the areas of the Project Site that the Benicia General Plan designates for the residential or park use to a standard suitable to allow unrestricted use of residential lots and the park." Also, "In order to meet these project objectives, ... site remediation will consist of several coordinated activities:" (to include) "Areawide clearance in order to ensure clearance of areas ... that are planned for future residential use in the North Valley and South Valley and on the Ridge, and to provide 14 feet of clean crushed bedrock below final site grades in future residential areas ...". This is reiterated in the Proposed Project section of the Executive Summary.

The movement of soil is evidence of the greater scope of the project. In Table 3-4, On-Site Earth Moving Activities, approximately 218,000 cubic yards of soil are being moved in relation to the UXO/HTRW cleanup, while over 1,430,000 cubic yards of soil are being moved to prepare the site for the long-term development objectives. This is over six times the amount of dirt being moved. It is clear that these activities represent the greater efforts associated with the project, and thus, the true objectives of the project. To that end, the document fails to address the impacts associated with the long-term residential development.

Impacts associated with the project are generally described as either non-existent, short-term or reduced to less than significant, through mitigation measures. In virtually every scenario described in the Biological Resources section of the document (Section 7), the environmental impact has been kept at a minimal level because the impacted area is able to return to a state of natural equilibrium after being disturbed through project-related activities. In reality, this return to a state of natural equilibrium would never take place due to the anticipated residential development, or it would be short-lived. In fact, it is highly unlikely that any habitat, species, or area of environmental quality (air quality, water quality, noise, aesthetics, ...) will escape the long-term significant impacts as a result of the

I-21

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I-23

residential development intended by the project. Those resources that are not directly impacted by the project actions and subsequent development (loss of habitat, diminished air quality, etc) will be indirectly impacted from the same. Cumulative impacts have not been considered or addressed in the document. The remaining wetland in the South Valley area will likely never see the return of most displaced species and will inevitably be irreparably damaged or destroyed as a result of human encroachment. The introduction of increased numbers of domesticated pets that are allowed to run free will stress the species that will not have already been driven out of their habitats.

I-23
Cont.

Although the document presents the project as remediation/cleanup, the preparation of the site for residential development is being hidden within the project. The document should either limit the scope of the project to only UXO/HTRW cleanup and remediation or it should fully address the known and intended future development of the site and the long-term and cumulative environmental impacts associated with that development.

I-24

Two sections of the document, Section 20, Growth Inducing Impacts, and Section 21, Cumulative Impacts, offer the opportunity to fully address these issues. In each case, the relationship to the residential development aspect of the overall project is acknowledged, however, it is only in passing and only enough to describe how this project will correct the situation (discovery of UXO/HTRW) that prevented the development begun under a previously approved project (Tourtelot Property Residential Development Project).

I-25

It is clear that the document describes two separate construction activities, the latter of which has no relationship to the remediation of the UXO/HTRW cleanup action. It should be addressed in a separate document that is directly related to the residential development of the site.

I-26

3. Specific comments follow:

| No. | Section | Page | Comment/Note |
|-----|---------|--------------|--|
| 1 | 6.3.2 | 6-6 | Long-term air impacts should be considered due to the development of 416 residences. |
| 2 | 6.3.2 | 6-7 & 6-8 | Final sentence states that "Current data suggest that concentrations of these soil contaminants are not high enough to present a concern should they become airborne." Data should be referenced and quantified. |
| 3 | 7.2.2.3 | 7-27 | Text in first paragraph should include "However, the habitat exhibits a moderate probability of occurrence." |

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I-29

| | | | | |
|---|---------|------|---|------|
| 4 | 7.2.2.3 | 7-28 | Text in third paragraph (California Newt) should include: "However, presence has been confirmed Regarding occurrence and habitat. | I-30 |
| 5 | 7.2.2.3 | 7-29 | Northern Harrier. Add "therefore probability for occurrence is high" to last sentence. | I-31 |
| 6 | 7.2.2.3 | 7-31 | Loggerhead Shrike. Add to end of second paragraph: "Presence has been confirmed based on occurrence and habitat." | I-32 |

4. If you have any questions please contact me by phone at (916) 557-6719 or by e-mail at [jsuazo@spk.usace.army.mil].

JOHN SUAZO
Environmental Analysis Section
Environmental Resources Branch
Planning Division

| Mitigation Measure | Monitoring or Reporting Procedure | Oversight Responsibility | Mitigation Schedule |
|---|--|--|---|
| Aesthetics | | | |
| 4-1: Limit maintenance to as early in the evening as possible and to a location not readily visible to adjacent residences to minimize the light and glare from construction equipment maintenance | Project Engineer to notify the City of Benicia of the location designated for maintenance activities, and as the location changes throughout project activities; Project Engineer to report on compliance during weekly meetings, if necessary | City of Benicia Planning Department | Notification to be given prior to the start of mobilization, and as the location changes, as necessary |
| Air Quality | | | |
| 6-1: Implement PM ₁₀ fugitive dust control measures recommended by the BAAQMD to control exhaust and fugitive emissions from project activities, control soil erosion and sedimentation, and protect water quality from increased sedimentation and contaminated soil in storm water runoff (listed by activity) | | | |
| Water all active construction areas at least twice daily, if visible dust is present or if dust potential exists | Project Engineer to report on compliance during weekly meetings, if necessary; monthly site visit from DTSC and/or City of Benicia official | DTSC/City of Benicia Public Works Department, Engineering Division | Water unpaved roads on days when roads are in use, water active areas during ground-disturbing activities such as areawide clearance and grading |
| Pave, apply water three times daily, or apply nontoxic soil stabilizers on all unpaved access roads, parking areas, and staging areas at construction sites, if visible dust is present or if dust potential exists | Project Engineer to report on compliance during weekly meetings, if necessary; monthly site visit from DTSC and/or City of Benicia official | DTSC/City of Benicia Public Works Department, Engineering Division | Pave prior to the start of mobilization, apply water three times daily in active areas on workdays, and/or apply soil stabilizers prior to the start of mobilization, if visible dust is present or if dust potential exists, and as necessary as project activities continue |

| Mitigation Measure | Monitoring or Reporting Procedure | Oversight Responsibility | Mitigation Schedule |
|--|---|--|--|
| Sweep daily (with water sweepers) all paved access roads, parking areas, and staging areas at construction sites | Project Engineer to report on compliance during weekly meetings, if necessary; monthly site visit from DTSC and/or City of Benicia official | DTSC/City of Benicia Public Works Department, Engineering Division | Sweep daily all active paved roads, parking areas, and staging areas on workdays |
| Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets | Project Engineer to report on compliance during weekly meetings, if necessary; monthly site visit from DTSC and/or City of Benicia official | DTSC/City of Benicia Public Works Department, Engineering Division | if soil material is visible on public streets near the Project Site, sweep daily |
| Cover all trucks hauling soil, sand, and other loose material, or require all trucks to maintain at least 2 feet of freeboard | Project Engineer to report on compliance during weekly meetings, if necessary; monthly site visit from DTSC and/or City of Benicia official | DTSC/City of Benicia Public Works Department, Engineering Division | Any time haul trucks are used on the Project Site, or during transit to or from the Project Site |
| Hydroseed or apply (nontoxic) soil stabilizers to inactive construction areas (previously graded areas inactive for 10 days or more) | Geologist/Engineer to monitor construction activity and direct hydroseeding or soil stabilizing efforts, if necessary; monthly site visit from DTSC and/or City of Benicia official | DTSC/City of Benicia Public Works Department, Engineering Division | if graded areas remain inactive for 10 consecutive days, hydroseeding or application of soil stabilizers will be conducted |
| Enclose, cover, water twice daily, or apply (nontoxic) soil binders to exposed stockpiles (e.g., dirt, sand) | Geologist/Engineer to inspect and maintain stockpiles covers biweekly; record inspection results and maintenance activities in a log made available to DTSC and/or the City of Benicia upon request | DTSC/City of Benicia Public Works Department, Engineering Division | When stockpiles are present on the Project Site |
| Limit speeds on unpaved roads to 15 mph | Project Engineer to provide regular advisories to workers on equipment operations and monitor equipment use daily; monthly site visit from DTSC and/or City of Benicia official | DTSC/City of Benicia Public Works Department, Engineering Division | Prior to the start of mobilization, and as necessary during project activities |

| Mitigation Measure | Monitoring or Reporting Procedure | Oversight Responsibility | Mitigation Schedule |
|--|--|--|--|
| Install sandbags or other erosion control measures to prevent silt runoff to public roadways | Geologist/Engineer to monitor/supervise the placement and construction of erosion control measures and inspect biweekly; record inspection results and maintenance activities in a log made available to DTSC and/or the City of Benicia upon request | DTSC/City of Benicia Public Works Department, Engineering Division | Prior to the start of earthwork activities, including areawide clearance and grading |
| Replant vegetation in disturbed areas as quickly as possible | Applicant, assisted by qualified biologist, to comply with monitoring and reporting requirements established in the revegetation plan, including revegetation timeframes established in the plan | DTSC/DFG | Replant vegetation as specified in the mitigation and monitoring plan developed for the revegetation of grassland habitat (see Mitigation Measure 7-5) |
| Install wheel washers for all existing trucks, or wash off the tires or tracks of all trucks and equipment leaving the site, if mud or loose soil is present | Project Engineer to provide regular advisories to workers on equipment operations and procedures; monitor equipment use daily; Project Engineer to report on compliance during weekly meetings, if necessary; monthly site visit from DTSC and/or City of Benicia official | DTSC/City of Benicia Public Works Department, Engineering Division | Install wheel washer prior to truck use on the Project Site; wash tires and tracks before trucks or equipment leaves the Project Site |
| Suspend excavation and grading activity when winds (instantaneous gusts) exceed 25 mph | Project Engineer to monitor weather conditions and discontinue operations during unfavorable conditions; Project Engineer to report on compliance during weekly meetings, if necessary | City of Benicia Public Works Department, Engineering Division | Throughout project activities |
| Trucks hauling contaminated soil for disposal off site will be tarped to prevent fugitive emissions of soil contaminants | Project Engineer to report on compliance during weekly meetings, if necessary; monthly site visit from DTSC and/or City of Benicia official | DTSC/City of Benicia Public Works Department, Engineering Division | Any time trucks are used to haul contaminated soil |

| Mitigation Measure | Monitoring or Reporting Procedure | Oversight Responsibility | Mitigation Schedule |
|---|--|---|--|
| <p>6-2: Implementation of measures to minimize exhaust emissions from construction equipment (listed by activity):</p> <ul style="list-style-type: none"> Use less polluting equipment/methods that can accomplish the activity Specify stringent equipment air emissions Advise operators to use only the necessary power to accomplish the activity Keep equipment well maintained to minimize air emissions Have equipment powered down or turned off when not in use | <p>Project Engineer to provide regular advisories to workers on equipment operations and monitor equipment use daily; monthly site visit from DTSC and/or City of Benicia official</p> | <p>DTSC/City of Benicia Public Works Department, Engineering Division</p> | <p>Prior to the start of each project activity and use of construction equipment</p> |
| <p>6-3: Restrictions of weather conditions on BIP to avoid damage to local residences from a detonation</p> | <p>OE Safety Manager and SUXOS to determine if unfavorable weather conditions exist prior to BIP activities; Project Engineer to report on compliance during weekly meetings, if necessary</p> | <p>DTSC/USACE</p> | <p>During OE surface clearance, point clearance, and areawide clearance activities</p> |

| Mitigation Measure | Monitoring or Reporting Procedure | Oversight Responsibility | Mitigation Schedule |
|---|---|--|---|
| Biological Resources | | | |
| 7-1: Implement erosion and sediment control measures to limit or prevent soil erosion and manage or control the movement of mobilized sediment, limit storm water runoff, and protect water quality from increased sedimentation and contaminated soil in storm water runoff (listed by activity) | | | |
| Construct drainage swales to collect surface runoff and direct it away from disturbed surfaces | Geologist/Engineer to design and supervise the construction of swales; inspect and maintain biweekly; record inspection results and maintenance activities in a log made available to DTSC and/or the City of Benicia upon request | DTSC/City of Benicia Public Works Department, Engineering Division | Prior to the start of, and during, earthwork activities, including areawide clearance and grading |
| Use sandbags and small check dams to control and direct flows away from disturbed surfaces, as well as to contain sediment particles that are dislodged | Geologist/Engineer to supervise the placement and construction of dams; inspect and maintain biweekly; record inspection results and maintenance activities in a log made available to DTSC and/or the City of Benicia upon request | DTSC/City of Benicia Public Works Department, Engineering Division | Prior to the start of, and during, earthwork activities, including areawide clearance and grading |
| Use earthen dikes to slow the flow of water and reduce its potential for erosion as well as to contain sediment | Geologist/Engineer to supervise placement and construction of dikes; inspect and maintain biweekly; record inspection results and maintenance activities in a log made available to DTSC and/or the City of Benicia upon request | DTSC/City of Benicia Public Works Department, Engineering Division | Prior to the start of, and during, earthwork activities, including areawide clearance and grading |

| Mitigation Measure | Monitoring or Reporting Procedure | Oversight Responsibility | Mitigation Schedule |
|---|---|--|---|
| Use subsurface drains to reduce the buildup of shallow subsurface water and reduce the potential slumping and sloughing of large amounts of soil which would then be available for erosion by surface water | Geologists/Engineer to supervise placement and construction of drains | City of Benicia Public Works Department, Engineering Division | Prior to placement of material in the upslope swale area |
| Place riprap along vulnerable channels and slope surfaces | Geologists/Engineer to supervise placement of riprap; inspect and maintain biweekly; record inspection results and maintenance activities in a log made available to DTSC and/or the City of Benicia upon request | DTSC/City of Benicia Public Works Department, Engineering Division | Prior to the start of earthwork activities, including areawide clearance and grading, during the course of earthwork activities, if areas of potential erosion are identified |
| Use straw bales, silt fences, and sandbag barriers to slow flows and promote sediment deposition | Geologists/Engineer to supervise placement and construction activities; inspect and maintain biweekly; record inspection results and maintenance activities in a log made available to DTSC and/or the City of Benicia upon request | DTSC/City of Benicia Public Works Department, Engineering Division | Prior to the start of earthwork activities, including excavation/stockpiling, areawide clearance, and grading |
| Use sediment traps and sediment basins to collect sediment and prevent it from being transported downstream | Geologists/Engineer to supervise placement and construction activities; inspect and maintain biweekly; record inspection results and maintenance activities in a log made available to DTSC and/or the City of Benicia upon request | DTSC/City of Benicia Public Works Department, Engineering Division | Prior to the start of earthwork activities, including areawide clearance and grading |
| Grade surfaces so that runoff is directed to sediment control structures | Geologists/Engineer to supervise grading operations; Project Engineer inspect weekly and report during weekly meetings, if necessary | City of Benicia Public Works Department, Engineering Division | During areawide clearance and grading activities |
| Conduct grading activities during the dry season (typically from March 15 through October 15 only) | Project Engineer to submit project schedule showing areawide clearance and grading activity dates to be conducted in the dry season | City of Benicia Public Works Department, Engineering Division | Prior to the start of areawide clearance and grading |

| Mitigation Measure | Monitoring or Reporting Procedure | Oversight Responsibility | Mitigation Schedule |
|--|---|--|--|
| Install erosion control structures and hydroseed prior to the rainy season | Geologist/Engineer to supervise the placement and construction of erosion control structures; inspect and maintain biweekly; record inspection results and maintenance activities in a log made available to DTSC and/or the City of Benicia upon request | DTSC/City of Benicia Public Works Department, Engineering Division | Prior to the start of ground-disturbing activities on any area of the Project Site |
| Inspect and maintain erosion control structures regularly | Geologists/Engineer to inspect and maintain biweekly; Biologist to inspect monthly during rainy season and during other periods when the nature of project activities reasonably require; record inspection results and maintenance activities in a log made available to DTSC and/or the City of Benicia upon request | DTSC/City of Benicia Public Works Department, Engineering Division | During earthwork activities, including soil remediation, areawide clearance, and grading |
| Design erosion control measures and structures according to the standards of the Association of Bay Area Governments and Solano County | Geologist/Engineer to design and supervise the construction of erosion control measures and structures; Project Engineer to inspect bi-weekly and report on compliance during weekly meetings, if necessary | City of Benicia Public Works Department, Engineering Division | Prior to the installation of erosions control measures and structures |
| Maintain vegetative buffer strips of existing vegetation adjacent to natural stream channels or downslope from cleared areas to retard flow and capture sediment carried by sheet flow | Engineer, in consultation with qualified biologist, to designate vegetation buffer locations; Applicant to maintain buffers throughout project activities unless portions of the buffer must be removed in order to perform OE clearance activities as specified in the OE RDD; Project Engineer to inspect bi-weekly and report on compliance during weekly meetings, if necessary | City of Benicia Public Works Department, Engineering Division | Establish buffer strips during vegetation clearance activities and maintain vegetation throughout ground-disturbing activities |

| Mitigation Measure | Monitoring or Reporting Procedure | Oversight Responsibility | Mitigation Schedule |
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| 7-2: Protection of water quality and aquatic habitat through regular maintenance activities to prevent soil, petroleum products, and litter from accumulating on the Project Site and degrading water quality through surface runoff | Project Engineer to establish regular procedures for fueling of equipment and collection of trash and debris; designate fueling and collection areas away from wetlands and water bodies; and perform regular monitoring of fueling and collection procedures. Project Engineer to report on compliance during weekly meetings, if necessary; monthly site visit from DTSC and/or City of Benicia official | DTSC/City of Benicia Public Works Department | Establish procedures prior to the start of mobilization; monitor fuel and collection procedures daily |
| 7-3: On-site biological monitoring to allow the project biologist to oversee all aspects of construction monitoring that pertain to biological resources protection | Qualified biologist to review grading plans and provide oversight for all aspects of construction monitoring that pertain to biological resources protection; ensure that all sensitive habitats are clearly marked on all project maps; regularly inspect and maintain erosion control devices; develop contractor education program for biological resources on the Project Site; conduct regular program briefings with workers; Project Engineer to report on compliance during weekly meetings, if necessary | DTSC/DFG/City of Benicia Public Works Department, Engineering Division | All grading plans and project maps will be reviewed prior to their implementation and use on the Project Site; inspection and maintenance of erosion control devices will occur biweekly; contractor education program will be designed prior to the start of mobilization; program briefings will occur periodically prior to project workers beginning activities on the site |
| 7-4: Pre-construction marsh bird survey to determine if the tricolored blackbird, saltmarsh common yellowthroat, or northern harrier nesting sites are present and to ensure that impacts to nesting habitat and disturbance to breeding pairs are avoided and minimized | Qualified biologist to conduct survey, flag nesting sites, publish a findings report, and submit report to DTSC and the City of Benicia; Project Engineer to direct project activities away from sites until nesting period is over and young have left the nest, to the maximum extent possible; Project Engineer to report on compliance during weekly meetings, if necessary | DTSC | Survey will be conducted at the optimal time when nesting birds are likely to be detected; the optimal time will be determined by a qualified biologist; findings will promptly be provided to DTSC and the City of Benicia; avoidance of nesting sites will occur throughout project activities |

| Mitigation Measure | Monitoring or Reporting Procedure | Oversight Responsibility | Mitigation Schedule |
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| <p>7-5: Revegetation of grassland habitat to reestablish annual grasslands removed or disturbed during project activities, reduce the long-term visual impact of project activities, control soil erosion and sedimentation, limit storm water runoff, and protect water quality from increased sedimentation and contaminated soil in storm water runoff</p> <p>Use soil retention blankets and mulches in conjunction with hydroseeding to reestablish vegetation on graded areas</p> <p>In consultation with DFG, develop a detailed 5-year mitigation and monitoring plan for the revegetation of grassland habitat on the Project Site. The plan will include methods for enhancement or restoration of the impacted grasslands. The plan may include restoration of nonnative grasses and/or may include native plants provided that the biologist hired by the applicant determines, in consultation with DFG, that native plants can successfully be established, can achieve the goal of mitigating impacts to sensitive wildlife species that currently depend on the nonnative annual grasslands, and are otherwise feasible to use.</p> | <p>Applicant, assisted by qualified biologist, to comply with monitoring and reporting requirements established in the revegetation plan; Project Engineer to report on compliance during weekly meetings, if necessary</p> | <p>DTSC/DFG/City of Benicia Public Works Department, Engineering Division</p> | <p>Hydroseed within 30 days of completion of grading activities; develop plan and gain approval, if required, from DFG prior to the start of grading activities</p> |

| Mitigation Measure | Monitoring or Reporting Procedure | Oversight Responsibility | Mitigation Schedule |
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| 7-6: Pre-construction survey for grassland avian species to determine if nesting sites are present and to ensure that impacts to nesting habitat and disturbance to breeding pairs are avoided and minimized | Qualified biologist to conduct survey, flag nesting sites, publish a findings report, and submit report to DTSC and the City of Benicia; Project Engineer to direct project activities away from sites to avoid destruction of the sites, to the maximum extent possible; applicant to consult USFWS and DFG regarding additional mitigation measures that may be required; Project Engineer to report on compliance during weekly meetings, if necessary | DTSC | Survey will be conducted at the optimal time when grassland avian species are likely to be detected; the optimal time will be determined by a qualified biologist; findings will promptly be provided to DTSC and the City of Benicia; avoidance of nesting sites will occur throughout project activities; initiate consultation with USFWS and DFG within 5 days of findings report submission |
| 7-7: Restore marsh and riparian vegetation if Mitigation Measures 7-1, 7-2, and 7-3 fail to avoid long-term disturbance to marsh and riparian habitat, reduce the long-term visual impact of project activities, control soil erosion and sedimentation, limit storm water runoff, and protect water quality from increased sedimentation and contaminated soil in storm water runoff | If mitigation measure is determined to be necessary, qualified biologist/engineer to design and reconstruct the drainage area supporting the South Valley wetland; inspect and maintain the drainage area monthly for a period of six months to ensure that measures are not failing; record inspection results and maintenance activities in a log made available to DTSC and/or the City of Benicia upon request | DTSC/City of Benicia Public Works Department, Engineering Division | Drainage area restoration, if necessary, will be conducted within 30 days of project completion |
| 7-8: Implement wetland permit requirements In consultation with DFG, the RWQCB, and USACE Regulatory, if applicable, develop a detailed 5-year mitigation and monitoring plan to compensate for the loss of 0.093 acre of the North Valley jurisdictional wetlands and the 0.122 acre of South Valley seep wetland | Applicant, assisted by qualified biologist, to comply with mitigation and monitoring requirements established in the wetland mitigation and monitoring plan; Project Engineer to report on compliance during weekly meetings, if necessary | DFG/RWQCB/USACE Regulatory (ensure permit requirements are implemented)/DTSC (ensure Applicant obtains permit) | Consult with DFG, RWQCB, and USACE Regulatory within 30 days following completion of all remediation activities; implement requirements established in the wetland mitigation and monitoring plan according to a schedule outlined in the plan |
| Cultural Resources | | | |

| Mitigation Measure | Monitoring or Reporting Procedure | Oversight Responsibility | Mitigation Schedule |
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| <p>8-1: Cease work and consult the SHPO if previously undetected archaeological remains are found during excavation or other project activities to avoid long-term impacts to cultural and paleontological resources on the Project Site</p> | <p>Project Engineer to report any previously undetected archaeological remains to a qualified archeologist; archeologist to inspect the site and determine if it is potentially eligible for inclusion in the California Register; report findings to the City of Benicia; if potentially eligible, archeologist to initiate consultation with the California SHPO; Project Engineer to report on compliance during weekly meetings, if necessary</p> | <p>City of Benicia/SHPO</p> | <p>If any previously undetected archaeological remains are discovered, cease work immediately; archeologist to report affirmative findings to the City of Benicia and initiate consultation with SHPO prior to work resuming on the Project Site; report negative findings to the City of Benicia within 7 days of inspection</p> |

| Mitigation Measure | Monitoring or Reporting Procedure | Oversight Responsibility | Mitigation Schedule |
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| Geology and Soils | | | |
| 9-1: Obtain NPDES Permit and implement permit requirements to control erosion and prevent contaminated soils from leaving the site during excavation activities | Geologist/Engineer to supervise the placement and construction of erosion control measures; inspect and maintain biweekly; record inspection results and maintenance activities in a log made available to DTSC and/or the City of Benicia upon request; Project Engineer to verify that NPDES permit was issued prior to the start of grading activities | DTSC (ensure Applicant obtains NPDES permit/RWQCB (oversee implementation of NPDES permit requirements)) | Prior to excavation of soils |
| 9-2: Implement engineering controls during grading activities to minimize the potential for landslides or soil instability | Geologist/Engineer to supervise the placement and construction of erosion control measures; inspect and maintain biweekly; record inspection results and maintenance activities in a log made available to DTSC and/or the City of Benicia upon request | DTSC/City of Benicia Public Works Department, Engineering Division | Prior to the start of areawide clearance or grading activities |
| 9-3: Reestablish topsoil through revegetation of the site | Applicant, assisted by qualified biologist, to hydroseed graded areas; monitor hydroseeded areas for establishment of vegetation; import topsoil or implement other appropriate measures, if hydroseeding is not successful within 2 years from the time of application; Project Engineer to report on compliance during weekly meetings, if necessary | City of Benicia Public Works Department, Engineering Division | Initial hydroseeding to be conducted within 30 days after completion of grading activities; evaluate success of vegetation establishment 2 years after initial hydroseeding; import topsoil or implement other appropriate measures, within 30 days of 2-year evaluation, if necessary |

| Mitigation Measure | Monitoring or Reporting Procedure | Oversight Responsibility | Mitigation Schedule |
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| Hazards and Hazardous Materials | | | |
| 10-1: Implement a Voluntary Separation Distance (VSD) based on maximum fragmentation distances to further reduce the risk to public health and safety caused by an accidental detonation | Applicant to implement a VSD and, when it is in effect, provide hospitality and other services to residents and businesses within the VSD comparable to those provided to residents within the MSD; regular site visits from DTSC and/or City of Benicia official, as requested | City of Benicia | During times when an MSD is in effect |
| 10-2: Repair or replace property damaged by detonation to mitigate potential hazards to private property | Applicant to designate a point-of-contact to assist residents with special needs; repair or replace damage in kind | DTSC | Point-of-contact to be designated prior to the start of mobilization; repair or replace damage as soon as practicable |

| Mitigation Measure | Monitoring or Reporting Procedure | Oversight Responsibility | Mitigation Schedule |
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| <p>Noise</p> <p>14-1: Minimize use of heavy equipment to reduce noise levels (listed by activity)</p> <p>Specify stringent equipment noise emissions corresponding to limits attainable by equipment in good working condition with high quality mufflers</p> <p>Perform noise certification testing on all construction equipment arriving on site; remove from service all equipment failing the certification testing</p> <p>Advise operators to use only the necessary power to accomplish the activity</p> <p>Use adjustable back-up alarms at the lowest setting that safety requirements will permit</p> <p>Keep all equipment powered down or turned off when not in use</p> <p>A technician will be on site to monitor equipment noise emissions and compliance</p> <p>Avoid the use of engine braking (compression braking) by heavy trucks on site and on access roads</p> | <p>Project Engineer, assisted by a noise technician, to establish noise emission standards and monitor compliance with standards; perform certification testing on all equipment; record results of testing in a log made available to DTSC and/or the City of Benicia upon request; provide regular advisories to workers on equipment operations and monitor report on compliance during weekly meetings, if necessary</p> | <p>DTSC/City of Benicia Planning Department</p> | <p>Establish noise emission standards and perform certification testing prior to the start of equipment use</p> |

| Mitigation Measure | Monitoring or Reporting Procedure | Oversight Responsibility | Mitigation Schedule |
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| <p>14-2: Use alternate transportation route to reduce noise levels on Rose Drive from hauling contaminated soil off site and avoid the incompatible use of streets by construction traffic</p> <p>Direct construction traffic to use alternative route off the Project Site</p> <p>Install signs along Rose Drive and East Second Street to direct traffic to the alternate route, if approved by the City of Benicia</p> <p>Implement other traffic control measures as directed by the City of Benicia to facilitate turns from Industrial Way onto East Second Street</p> | <p>Project Engineer to provide regular advisories to workers on appropriate construction routes; monitor construction traffic routes and the installation of traffic signs, as directed by the City of Benicia; Project Engineer to report on compliance during weekly meetings, if necessary</p> | <p>City of Benicia Public Works Department, Engineering Division</p> | <p>Alternate transportation route to be used throughout project activities, if possible; installation of signs prior to the start of mobilization, if approved by the City of Benicia; implement other traffic control measures directed by the City of Benicia, upon request</p> |
| <p>14-3: Delay Occupancy of Houses along McAllister Drive in Unit D-1 to avoid traffic noise impacts to future residents</p> | <p>Applicant to allow occupation of Unit D-1 homes after completing phases of the project that generate truck traffic on McAllister Drive for transport of soils offsite</p> | <p>City of Benicia, Public Works Department</p> | <p>From commencement of the project until project activities generating truck traffic on McAllister Drive for transport of soils offsite are completed</p> |
| Recreation | | | |
| <p>17-1: Coordinate with City of Benicia Parks Department regarding enforcement of the MSD on City parkland to allow for a timely and safe withdrawal of recreation users from parkland areas and compensate for the incompatibility of project activities with adjacent land uses</p> | <p>Applicant to provide regular updates to the Parks Department via the City of Benicia regarding anticipated dates of withdrawal, areas falling within the MSA, and general withdrawal and relocation procedures; Project Engineer to report on compliance during weekly meetings, if necessary</p> | <p>City of Benicia Parks and Community Services Department</p> | <p>Prior to implementation of an MSD on City parkland</p> |