# Final Feasibility Study/Remedial Action Plan
# Mountain Lake
## Presidio of San Francisco, California

## Approval Record

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# FINAL Feasibility Study/ Remedial Action Plan Mountain Lake Presidio of San Francisco California

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## List of Acronyms and Abbreviations

| | |
|---|---|
| ARARs | Applicable or Relevant and Appropriate Requirements |
| BMPs | Best Management Practices |
| bss | below sediment surface |
| Caltrans | California Department of Transportation |
| CEQA | California Environmental Quality Act |
| CERCLA | Comprehensive Environmental Response, Compensation and Liability Act (Superfund) |
| COCs | Chemicals of Concern |
| cy | cubic yards |
| DTSC | California Environmental Protection Agency, Department of Toxic Substances Control |
| EKI | Erler and Kalinowski, Inc. |
| FS | Feasibility Study |
| GGNPA | Golden Gate National Parks Association |
| GRA | General Response Action |
| GREM | Green Remediation Evaluation Matrix |
| HI | Hazard Index |
| HQ | Hazard Quotient |
| HSC | Health and Safety Code |
| mg/kg | milligrams per kilogram |
| MNR | monitored natural recovery |
| NCP | National Contingency Plan |
| NPS | National Park Service |
| PCOCs | Potential Chemicals of Concern |
| PRGs | Preliminary Remediation Goals |
| RAOs | Remedial Action Objectives |
| RAP | Remedial Action Plan |
| RDIP | Remedial Design Implementation Plan |
| RI | Remedial Investigation |
| RWQCB | California Regional Water Quality Control Board, San Francisco Bay Region |
| SVOCs | Semivolatile Organic Compounds |
| STLC | Soluble Threshold Limit Concentration |
| SWPPP | Stormwater Pollution Prevention Plan |
| TBC | To be considered |
| TCLP | Toxicity Characteristic Leaching Procedure |
| TPH | Total Petroleum Hydrocarbons |
| TPHd | Total Petroleum Hydrocarbons as diesel |
| TPHmo | Total Petroleum Hydrocarbons as motor oil |
| TMV | Toxicity, Mobility and Volume |

| | |
|---|---|
| Trust | The Presidio Trust |
| UCL | Upper confidence limit |
| URS | URS Corporation |
| USACE | United States Army of Corps of Engineers |
| USEPA | United States Environmental Protection Agency |
| VOCs | Volatile Organic Compounds |

# Executive Summary

This Final Feasibility Study and Remedial Action Plan (FS/RAP) for Mountain Lake was prepared on behalf of the Presidio Trust (Trust) by Kennedy/Jenks to identify and evaluate remedial alternatives and present the proposed remedial action for Mountain Lake at the Presidio of San Francisco (Presidio). This Final FS/RAP meets requirements specified by the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) in Guidance Document No. EO-95-007-PP, Remedial Action Plan Policy (DTSC 1995). This document is also consistent with the applicable federal requirements for the evaluation and selection of a final remedial action outlined in the U.S. Environmental Protection Agency (USEPA) National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 Code of Federal Regulations (CFR), Part 300.400 (USEPA 1990) and the California Health and Safety Code (HSC), Chapter 6.8, Section 25356.1.

The Draft FS/RAP was released for a 45-day public comment period. Following the public comment period, DTSC, in consultation with the Trust, responded to comments received, as documented in the Responsiveness Summary included in this Final FS/RAP. Following DTSC approval of the Final FS/RAP, a Remedial Design will be prepared providing details in implementing the selected remedial alternative in the FS/RAP.

Mountain Lake is a 4-acre, groundwater-fed lake located at the southern edge of the Presidio. The Lake receives runoff from Highway 1 (Park Presidio Boulevard) and the Presidio golf course. Leaded fuels associated with highway use and pesticides from the golf course have historically contributed contaminants to the lake. The golf course is not a significant continuing source of contaminants to the Lake.

The Lake is the main feature of Mountain Lake Park, a recreational area. Picnicking, dog-walking, and hiking are popular activities. The area to the south of the Lake contains a playground, tennis courts, picnic areas, and a small beach. Fishing, swimming and recreational boating are not permitted on Mountain Lake. The Lake area includes open water, wetlands, and riparian woods and vegetation, and supports a variety of exotic and native plant and animal species.

Over 185 samples of sediment have been collected from the Lake during remedial investigations conducted between 1990 and 2011. Four samples have also been collected from sediment in Park Presidio Boulevard storm drains that feed into the Lake. Twelve surface water and seven sediment elutriate (liquid expressed during dewatering) samples have also been collected and analyzed. The analytical results were presented and summarized in the *Remedial Investigation Summary and Risk Evaluation, Mountain Lake, Presidio of San Francisco* (RI Summary; URS 2011) and *Letter Report – Sediment Sampling at Mountain Lake, The Presidio Trust, San Francisco, California* (Kennedy/Jenks 2012). Metals, pesticides, and petroleum hydrocarbons were detected in sediment above screening levels. Contaminants are not present above water quality criteria or drinking water levels in surface water.

Based on the results of remedial investigations, a risk assessment was performed in this Final FS/RAP to assess potential risks to human health and ecological species from exposure to contaminants in sediment of Mountain Lake. The risk assessment demonstrated that

contaminants in Mountain Lake do not pose a risk to human health because humans are not exposed to sediment with contaminant concentrations exceeding levels that are protective of human health. However, contaminants in sediment of the Lake do pose an unacceptable risk to ecological, aquatic receptors in the lake. Chemicals of concern (COCs) in sediment of Mountain Lake that pose an unacceptable risk to ecological species are lead and total petroleum hydrocarbons as motor oil (TPHmo).

The following remedial alternatives were evaluated in this Final FS/RAP to address sediment with COCs exceeding ecological cleanup levels:

- Alternative 1 – No Action: Under this alternative, site conditions at Mountain Lake would remain unchanged as no action would be taken to remediate sediment.

- Alternative 2 – Capping: Clean sand would be imported and placed over sediment contaminated with COCs. Long-term monitoring and maintenance of the cap would be required.

- Alternative 3 – Dredging and Offsite Disposal with Limited Capping: Sediment contaminated with COCs would be removed by dredging, transported, and disposed at an offsite, permitted facility. As a contingency, a sand cap would be placed in areas where dredging is infeasible.

The selected remedial action for Mountain Lake is Alternative 3, Dredging with Offsite Disposal and Limited Capping. The primary elements of the proposed remedy are:

- Dredging of 15,600 cubic yards of sediment from the lake to achieve remaining COC concentrations that are protective of ecological resources.

- Placement of a sand cap in areas that cannot be dredged.

- Dewatering of sediment and discharge of water back into the lake.

- Transportation to and offsite disposal of dewatered sediment at an offsite, permitted landfill.

- Restoration of areas impacted by operations.

Under the remedy, the California Department of Transportation (Caltrans) will stabilize Highway 1 to protect the roadway from failure during dredging operations and treat runoff from Highway 1 to prevent future buildup of contaminants in the Lake. The cleanup actions are scheduled to occur in two construction seasons. The Highway 1 stabilization will be conducted in 2012 and the sediment dredging is scheduled for 2013.

Alternative 3 provides a high level of protection to human health and the environment, is implementable, likely results in the greatest benefit for the cost to implement, and complies with applicable and relevant laws and regulations. The present worth of the selected remedy is $9.2 million.

# Section 1: Introduction

## 1.1 Purpose

On behalf of the Presidio Trust (the Trust), Kennedy/Jenks has prepared this Final Feasibility Study and Remedial Action Plan (FS/RAP) to address the remediation of contaminated sediment within Mountain Lake in the Presidio of San Francisco, California (Presidio or the Site). The project location is shown on Figure 1-1 and the Site location is shown on Figure 1-2.

The project activities have been, and will continue to be performed by the Trust, under the regulatory oversight of the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC). As operator of the immediately adjacent highway, Caltrans is also cooperating in developing and implementing the sediment remediation project.

The FS/RAP is prepared to comply with applicable requirements of the U.S. Environmental Protection Agency (USEPA) National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 Code of Federal Regulations (CFR), Part 300.400 (USEPA 1990) and the California Health and Safety Code (HSC), Chapter 6.8, Section 25356.1. The FS/RAP is also intended to facilitate community review and public participation in selection of a remedial alternative to address chemically-impacted sediment on the floor of Mountain Lake.

## 1.2 Report Organization

This FS/RAP document is structured to be consistent with relevant USEPA guidance documents (USEPA 1988). The remainder of this report is organized as follows:

- Section 2 provides the background for the project.
- Section 3 summarizes previously acquired information on the setting and environmental conditions at Mountain Lake, presents an evaluation of risk to human health and the environment, selects chemicals of concern (COCs) in lake sediment, and defines the remedial action area.
- Section 4 presents the Remedial Action Objectives (RAOs).
- Section 5 presents the applicable, relevant and appropriate requirements (ARARs).
- Section 6 discusses the screening of technologies and process options and develops the specific remedial alternatives.
- Section 7 presents the detailed analysis of remedial alternatives.
- Section 8 presents the Remedial Action Plan.

At the end of the text, the reference documents used in developing this document are identified.

The following documentation is provided in appendices to this FS/RAP:

- Appendix A includes sediment and surface water analytical data collected during remedial investigations of the Lake.
- Appendix B lists documents in the Administrative Record.
- Appendix C presents Mountain Lake sediment cross sections (URS 2011).
- Appendix D presents the calculation of 95 percent Upper Confidence Limits for potential chemicals of concern under baseline and post-remediation conditions.
- Appendix E presents an analysis of Scatter Plots used to determine background metals concentrations in Lake sediment.
- Appendix F provides Green Remediation Evaluation Matrices used in support of the remedy selection.
- Appendix G presents Cost Estimates for the remedial alternatives included in the FS/RAP.
- Appendix H summarizes Project Controls to minimize Potential Impacts to Human Health and Resources that will be implemented under the proposed remedy.
- Appendix I presents California Environmental Quality Act (CEQA) compliance documents prepared by DTSC for the Mountain Lake remediation project.
- Appendix J presents DTSC's Statement of Reasons and Non-Binding Preliminary Allocation of Responsibility.
- Appendix K includes a Responsiveness Summary to comments received during the public comment period on the Draft FS/RAP.

# Section 2: Background

## 2.1 Mountain Lake Description and History

### 2.1.1 Description

As shown on Figure 1-2, Mountain Lake is located at the southern boundary of the Presidio. It is bordered on the west by Park Presidio Boulevard (also known as Highway 1), on the north and east by the Presidio golf course, and to the south by Mountain Lake Park and residences to the north of Lake Street. Mountain Lake is approximately four acres in size and has a maximum depth of approximately 10 feet. Approximately 0.4 acre of the southwestern corner of the lake is owned and operated by the City of San Francisco (Figure 1-2). The watershed for the Lake is approximately 162 acres (Trust 2000, URS 2011).

Park Presidio Boulevard is one of only a few major north-south vehicle thoroughfares in western San Francisco. Use of the adjoining land to the north, east and south is predominantly recreational. Picnicking, dog-walking, and hiking, are popular recreational activities. In addition, Mountain Lake Park, owned and operated by the San Francisco Recreation and Parks Department, includes children's play structures, tennis courts, picnic areas, and a small beach along the south edge of the lake. Fishing, swimming and recreational boating are not permitted on Mountain Lake.

The Lake area includes open water, wetlands, and riparian woods and vegetation. The Lake and surrounding upland areas support a variety of exotic and native plant and animal species. As the Lake has become shallower, emergent vegetation has become more prevalent along the shoreline. Some habitat enhancement and public access improvement work has been completed under a separately-funded Mountain Lake Enhancement Plan (Trust, NPS, and GGNPA 2000), There are no known special status or endangered species that reside in the Lake (Trust 2000, URS 2011).

### 2.1.2 History

Mountain Lake is historically significant and is a contributing feature to the Presidio of San Francisco National Historic Landmark District (NPS 1993). It has intrinsic and historic value as one of the few remaining natural lakes in San Francisco, and the only lake in the Presidio (Trust 2000).

Mountain Lake originally extended farther westward and northward. Significant filling of the Lake occurred in 1939 during construction of the adjacent Park Presidio Boulevard and the nearby MacArthur Tunnel, reducing the surface area of the Lake by approximately 40 percent. Over the past sixty years, runoff from Park Presidio Boulevard, the golf course and other nearby areas has contributed to sediment buildup in the Lake. The filling of the lake in 1939 and continuing sedimentation has decreased the depth of the Lake from approximately 30 feet to 10 feet (Trust 2000, URS 2011). Near-shore deciduous vegetation has contributed organic matter to the sediment layer.

## 2.2 Summary of Previous Investigations

Over 185 samples of sediment have been collected from the Lake during remedial investigations conducted between 1990 and 2011. Four samples have also been collected from sediment in Park Presidio Boulevard storm drains that feed into the Lake. Twelve surface water and seven sediment elutriate (liquid expressed during dewatering) samples have also been collected and analyzed. The analytical results were presented and summarized in the *Remedial Investigation Summary and Risk Evaluation, Mountain Lake, Presidio of San Francisco* (RI Summary; URS 2011) and *Letter Report – Sediment Sampling at Mountain Lake, The Presidio Trust, San Francisco, California* (Kennedy/Jenks 2012). Table 2-1 summarizes the sediment sampling and analysis activities. Table 2-2 summarizes the surface water and sediment elutriate sample collection activities. The sample collection locations are shown on Figure 2-1. Sediment and surface water analytical data tables are included as Appendix A.

## 2.3 Public Participation Activities

To facilitate information exchange between the Trust and the public, the Trust prepared a Community Relations Plan (CRP) for the Presidio environmental remediation program (Trust 2001). The CRP provides information on public participation in the environmental cleanup decisions at the Presidio and opportunities for public input.

In accordance with the CRP, DTSC and the Trust have implemented a public participation program for the Mountain Lake remediation project. The program has included community meetings, notices, and opportunities for early public input on the planned remediation of Mountain Lake. Pursuant to DTSC RAP Guidance (DTSC 1995), public review and comment for the project has included the following activities:

- Prior to release of the Draft FS/RAP for public comment, DTSC and the Trust held information sessions with community members on 26 September 2011, 16 November 2011, and 25 January 2012.

- A fact sheet (called a Proposed Plan) that summarizes the Draft FS/RAP was prepared and distributed to the Mountain Lake Community mailing list that was developed for the remediation project, Presidio Environmental Remediation mailing list, DTSC RAP Mailing List, residents near the project site, and interested or affected individuals and organizations. The Proposed Plan was distributed prior to the start of the public comment period.

- The release of the Draft FS/RAP for public review was announced in a Presidio E-Newsletter (transmitted to Presidio tenants), advertised in the San Francisco Chronicle, and posted on the Trust's public website and DTSC's EnviroStor website.

- A 45-day public comment period from 19 March through 3 May 2012 was held on the Draft FS/RAP that was announced by a public notice. The public comment period was specified in the Proposed Plan and public notice.

- A public meeting to present the contents of the Draft FS/RAP and receive comments was held on 19 April 2012.

- A Responsiveness Summary was prepared which responds to oral and written comments on the Draft FS/RAP received during the public comment period. The Responsiveness Summary is included as Appendix K in this FS/RAP.

- The Administrative Record has been made available. Documents related to the FS/RAP are available for public review as part of the Administrative Record, maintained at the Presidio Library at 34 Graham Street, San Francisco. The Administrative Record List is included as Appendix B.

- Preparation of and availability of CEQA documents. CEQA requires state and local agencies to consider the environmental consequences of projects that they undertake, fund, or permit. The CEQA Initial Study and Draft Negative Declaration for the implementation of the proposed remedial alternative were prepared by DTSC in compliance with CEQA. The CEQA documentation was subjected to public review concurrently with the Draft FS/RAP for the 45-day public comment period. The CEQA Initial Study and Final Negative Declaration are included in Appendix I of this FS/RAP.

# Section 3: Summary of Site Conditions

## 3.1 Geology and Hydrogeology

Mountain Lake overlies the Colma formation (Trust, NPS, and GGNPA 2000). However, data and boring logs from samples of accumulated sediment in the Lake indicate contributions from serpentinite and other Presidio native formations, such as greenstone. Greenstone is a native, secondary geologic unit that occurs at the Presidio (Schlocker 1974; EKI 2002). Also, the Lake was filled in 1939 with cuttings and materials during construction of Park Presidio Boulevard and the associated MacArthur Tunnel. Therefore, sediment in the Lake appears to contain a mixture of native materials, natural sedimentation deposits, and imported materials from nearby areas in the Presidio that may not be representative of the underlying Colma formation. The beach area along the south edge of the Lake, within the City of San Francisco property, also contains imported sand.

Evaluation of sediment cores previously collected from the Lake floor indicate that near-shore sediment is organically enriched, and contains a surface layer of vegetative materials reflective of the vegetation surrounding the Lake. Sediment cores collected away from the shoreline appeared generally uniform and contained mixtures and varying layers of peat, sand, silt, silty sand, and clay. Five cross-sections of the Lake-bottom sediments were constructed using the sediment core logs. These cross-sections are presented in the RI Summary (URS 2011), included in Appendix C, and summarized as follows:

- In the first cross-section, the shorelines consist primarily of sand with or without silt and organic material. The inner portion of the Lake consists of relatively homogenous organic matter.
- In the second cross-section, the western shoreline consists of a mixture of sand, silt, clay, and peat. The inner portion of the Lake consists of organic matter and fine-grained sediment. The eastern shoreline consists primarily of sand, with some clay and peat.
- In the third cross-section, the northern shoreline consists of sand and organic matter. Fine-grained sediments extend towards the middle and southern portions of the Lake.
- In the fourth cross-section, cores closest to the western shoreline consist primarily of sand and sandy silt or clay.
- In the fifth cross-section, a layer of peat is present from the western side of the Lake to approximately 120 feet from the eastern side of the Lake. The eastern side of the Lake consists of interbedded lenses of clay, silt, and sand.

Deeper sediment cores were collected from five locations within the Lake in 1998. The lithology of the sediment is described in the *Report of Sediment Sampling at Mountain Lake* (EKI 1998). The total depths of the cores ranged from 10.6 to 20 feet. In general the material encountered in the five cores was characterized as predominantly black and fine-grained (silt and clay). In three cores, the sand increased at approximately 11 to 15 feet. In one core, interbeds of dark gray and olive colored clayey silt were observed from approximately 14.8 to 17 feet.

Deeper sediment cores were also collected from the middle of the Lake in 1999 and 2000 by a UC Berkeley professor and graduate students. The stratigraphy of a composite core was summarized in a Masters thesis (Reidy 2001). As described in Reidy 2001, sediment within the top six feet is fairly homogenous. The sediment is silty clay from 0 to 5.2 feet with a laminated layer at approximately 2.4 feet in depth. From 5.2 feet to 6.2 feet, there is an increase in clay. Between 6.2 feet and 14.8 feet, there is organic clay with some peat. From 14.8 feet to 15.7 feet, the sediment changes to clay silt. The core is coarsely laminated between 15.7 feet and 18.9 feet and contains peat and plant macrofossils. Between 18.9 feet and 19.5 feet, the sediment is organic rich clay.

## 3.2 Hydrology

The San Francisco climate is characterized by cool, foggy summers, without significant precipitation. Precipitation typically occurs as rainfall between October and April, with an average annual rainfall of approximately 20 inches.

Mountain Lake is largely fed by groundwater. In addition, runoff from Park Presidio Boulevard, the Presidio golf course, and riparian areas around the Lake typically flows into the Lake during winter storm events. Runoff from Park Presidio Boulevard flows through three drainage culverts into the western portion of the Lake. However, groundwater from the MacArthur Tunnel dewatering system flows into the Lake on a continual basis. The water level in the Lake is controlled by an outlet structure, which discharges to a pipeline that flows westward beneath Park Presidio Boulevard and then discharges to the City's Richmond Transport pipeline near the headwaters of Lobos Creek.

## 3.3 Conceptual Site Model

Groundwater from the ongoing dewatering of the MacArthur Tunnel for Park Presidio Boulevard is discharged to the Lake. In addition, stormwater runoff from Park Presidio Boulevard enters Mountain Lake through one of three drainage structures located in the western bank of the Lake. Elevated concentrations of lead and petroleum hydrocarbons in the Lake sediment have been attributed to the highway drainage.

The Presidio golf course discharges runoff to the Lake through culverts at the eastern and northern edges of the Lake. Runoff from the golf course was a historical source of pesticide contamination to the Lake. However, the golf course now operates under an Integrated Pest Management Program which controls pesticide and fertilizer use at the golf course in a manner that minimizes risks to human health, ecological species, and the environment (Arnold Palmer Golf Management and Trust 2005). Pesticides are only used in very limited quantities when non-chemical methods have been ineffective at keeping pest levels below action thresholds. The golf course has annually monitored metals, pesticides, and/or general chemistry parameters in stormwater since 1996 (Blankinship 2010). The data indicate that contaminants are not present at levels of concern in stormwater from the golf course. Thus, the golf course is not a significant continuing source of contaminants to Mountain Lake.

Water from Mountain Lake is not used for drinking water supply. However, the Lake is in the Lobos Creek groundwater basin. Lobos Creek is used as the Presidio's drinking water supply.

Fishing, recreational boating, and swimming are not permitted in the Lake. Wading at the southern beach area may occur occasionally, providing a limited mechanism for human contact with surface water and submerged Lake sediments. Overall, the potential for human contact with the Lake floor sediment is considered to be very low (URS 2011).

The existing and planned future indirect use of Mountain Lake is to provide wildlife habitat and an aesthetic feature for land-based recreational activities such as bird-watching and walking. The *Vegetation Management Plan* for the Presidio identifies Mountain Lake as a native plant communities zone (Trust and NPS 2001).

Based upon current and anticipated future uses of Mountain Lake, a conceptual site model has been developed and is presented on Figure 3-1. This figure illustrates potential pathways for contaminants to enter the Lake and for potential exposure.

## 3.4 Identification of Potential Chemicals of Concern (PCOCs)

In the RI Summary (URS 2011), potential chemicals of concern (PCOCs) were selected by comparing contaminant concentrations with screening levels. The screening levels used in the RI Summary were cleanup levels identified in the *Development of Presidio-Wide Cleanup Levels for Soil, Sediment, Groundwater, and Surface Water* (EKI 2002). Cleanup levels applied for Mountain Lake sediment were ecological freshwater sediment criteria. Background metals concentrations characterized for the Colma formation were also used to select metal PCOCs if the background concentrations were higher than the freshwater criteria. Cleanup levels for surface water were water quality criteria for freshwater organisms. Surface water data were also compared with drinking water standards (e.g., maximum contaminant levels). In general, PCOCs were identified as those chemicals with at least one concentration exceeding its respective cleanup level. The PCOCs are summarized in Table 3-1.

### 3.4.1 PCOCs in Sediment

The following are PCOCs in Lake sediment (URS 2011):

- Metals: arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, vanadium, and zinc.[1]
- Pesticides: 4,4-dichlorodiphenyldichloroethane (DDD), alpha-BHC, beta-BHC, gamma-BHC (lindane), delta-BHC, alpha chlordane, and gamma chlordane.[2]
- Total petroleum hydrocarbons as diesel (TPHd) and as motor oil (TPHmo).

[1] Antimony was not selected as a PCOC in the RI Summary (URS 2011) because only two samples had antimony concentrations exceeding its cleanup level. Although antimony is not a PCOC, due to uncertainties with high reporting limits for non-detect values, DTSC requested that post-remediation sediment confirmation samples for antimony be collected.

[2] The RI Summary (URS 2011) indicated that 4,4-dichlorodiphenyldichloroethylene (DDE) was detected above its cleanup level. However, 4,4-DDE was not detected above the cleanup level in Mountain Lake sediment (Table 4 of the RI Summary). Therefore, 4,4-DDE is not retained as a PCOC in this Draft FS/RAP.

Lead is the primary PCOC in Lake sediment due to the high number and widespread distribution of sediment samples containing lead at concentrations exceeding its cleanup level in addition to the magnitude of the detections above the cleanup level. The presumed source of lead and other metals is stormwater runoff and drainage from the adjoining Park Presidio Boulevard (URS 2011).

Elevated concentrations of TPHd and TPHmo tend to be co-located with elevated concentrations of lead and zinc, suggesting a common source. The highest concentrations of TPHd and TPHmo were detected in sediment samples collected near the storm drain outlets along Park Presidio Boulevard at the western portion of the Lake (URS 2011).

### 3.4.2 PCOCs in Surface Water

The levels of chemicals detected in surface water samples from the Lake are less than water quality criteria and drinking water standards (Dames and Moore 1997; EKI 2000). Thus, there are no PCOCs in surface water at the Lake (URS 2011).

## 3.5 Risk Evaluation

The current and planned future use of Mountain Lake is wildlife habitat. Fishing and swimming are not permitted in the Lake. Visitors to Mountain Lake typically engage in activities where there is no exposure to sediment. Wading may occur occasionally at the southern beach area; however, human exposure to sediments during wading is expected to be infrequent and of limited duration. Furthermore, concentrations of lead and other PCOCs in sediment samples collected from the southern beach area are below levels that are protective of human health (Kennedy/Jenks 2012). Also, the ecological-based cleanup level for lead, which is the primary PCOC, is lower than the levels that are protective of human health, so remediation of sediment to address risk to ecological receptors would be protective of potential human exposures (URS 2011). Therefore, contaminants in the Lake sediment do not pose a risk to human health.

Previous evaluations of water concentrations in Mountain Lake concluded that surface water data meet water quality criteria for aquatic life and drinking water standards (e.g., maximum contaminant levels) (Dames and Moore 1997; EKI 2000, 2003; URS 2011). Therefore, ecological risk from surface water exposure and domestic use of surface water in Mountain Lake are not exposure pathways of concern and were not evaluated further in the risk evaluation.

Ecological receptors could be exposed to PCOCs in sediment at Mountain Lake. Common species of fish, amphibians, waterfowl, and mammals that occupy the Lake and surrounding area may be exposed to sediment at Mountain Lake. Complete exposure pathways for aquatic species living in the water column or sediment are direct contact with or uptake of PCOCs in sediment and dietary exposure to PCOCs. For aquatic-dependent wildlife, the primary exposure pathway of concern is dietary exposure to PCOCs (URS 2011). There are no sensitive species (i.e., species on federal or state lists of threatened and endangered species) that reside in the Lake but these species could occupy the area after the cleanup and future Lake enhancement activities (Trust, NPS, and GGNPA 2000).

Risks to ecological receptors were evaluated in this FS/RAP for baseline conditions at Mountain Lake, which assumed no remediation of sediments. To evaluate risk, the 95 percent upper confidence limit on the arithmetic mean (95 percent UCL) concentrations in sediment were

estimated for each of the PCOCs (see Appendix D). The 95 percent UCLs were calculated using data from the upper 3 feet of sediment because this is the exposure interval for ecological receptors and where biological activity in the lacustrine environment is expected to occur (URS 2011).

The 95 percent UCL sediment concentrations were compared with the freshwater sediment cleanup levels for Mountain Lake, which are based on ecological freshwater sediment criteria (EKI 2002). For metals, background concentrations for the Colma formation were used for screening if they were higher than the freshwater sediment criteria (EKI 2002). The calculations of the 95 percent UCL concentrations and comparisons with freshwater sediment cleanup levels are included in Appendix D. As shown in Appendix D, Table D-2, the 95 percent UCL concentrations for lead, nickel, and TPHmo in sediment exceed their respective freshwater sediment cleanup levels. Thus, it is concluded that baseline conditions in sediment present an unacceptable risk to the ecosystem in and around Mountain Lake.

## 3.6 Nature and Extent of Chemicals of Concern in Sediment

The nature and extent of contamination in Mountain Lake sediment was evaluated based on the results of the risk evaluation. The sediment remediation should address the chemicals of concern (COCs), which are those chemicals with 95 percent UCL concentrations greater than the respective cleanup level and not representative of background. This section describes the evaluation of background metals, identifies the COCs in lake sediment, and develops the remedial action area.

### 3.6.1 Evaluation of Background Metals

For screening purposes in the risk evaluation, metal sediment concentrations were compared with background concentrations for the Colma formation. However, boring logs from Mountain Lake cores show the presence of olive/gray fines, which indicates the possible presence of greenstone materials (URS 2011). Greenstone is a secondary geological unit that occurs at the Presidio (EKI 2002). Greenstone has been identified in fill at Graded Area 9, which is in the vicinity of Mountain Lake at the Presidio, and at the Transfer Station, which is located above the MacArthur Tunnel (EKI 2002). Cuttings from the construction of MacArthur Tunnel were used to fill the western portion of the original Mountain Lake during construction of Park Presidio Boulevard. Sediments have also built up in the lake over time through natural processes.

Appendix E provides an evaluation of background metals in Mountain Lake sediment. Bivariate scatter plots for metals data from the Presidio were prepared for sediment samples collected from Mountain Lake. The data for Mountain Lake are compared with data representing background for serpentinite, the Colma formation, and greenstone (Schlocker 1974; EKI 2002). The evaluation in Appendix E demonstrates that Mountain Lake sediment is likely a mix of Colma formation and greenstone and that chromium, nickel, and vanadium concentrations in Mountain Lake sediment are consistent with background concentrations for that mix of material.

### 3.6.2 Chemicals of Concern (COCs) in Sediment

The COCs in Mountain Lake sediment are a subset of the PCOCs. The COCs are defined as PCOCs in Lake sediment with 95 percent UCL concentrations that exceed the freshwater sediment cleanup levels from the *Development of Presidio-Wide Cleanup Levels for Soil,*

*Sediment, Groundwater, and Surface Water* (EKI 2002) under baseline (current) conditions and are not associated with background. The 95 percent UCL calculations for baseline conditions are included in Appendix D. Based on the calculation of 95 percent UCLs and metal background concentrations at the Presidio, the COCs in Mountain Lake sediment are:

- **Lead:** Lead has a 95 percent UCL concentration of 432 milligrams per kilogram (mg/kg), which is above the freshwater sediment cleanup level of 82 mg/kg, and is not assumed to be associated with native material. Lead is considered the primary COC in Lake sediment due to the high number and widespread distribution of sediment samples containing lead at concentrations exceeding its cleanup level.

- **TPHmo:** TPHmo has a 95 percent UCL concentration of 286 mg/kg, which is above the freshwater sediment cleanup level of 144 mg/kg.

The 95 percent UCL concentration for nickel under baseline conditions is above the freshwater sediment cleanup level. However, as discussed in Section 3.6.1 and Appendix E, nickel in Lake sediment is representative of background concentrations in native and fill material. Therefore, nickel is not a COC in Lake sediment. All other PCOCs have 95 percent UCL concentrations in sediment below freshwater sediment cleanup levels (Appendix D).

As discussed in Appendix D, there is uncertainty in the data set for cadmium due to potential analytical interference. The 95 percent UCL concentration for cadmium based on the 2005 data set is below the cleanup level, so cadmium is not a COC in Lake sediment. The 2001 cadmium data set was not included in the 95 percent UCL calculation because of the potential interference. To confirm the 2001 detections and ensure that no elevated concentrations will remain after the cleanup, cadmium will be included in the confirmation sampling following sediment removal.

### 3.6.3 Remedial Action Area

Based on the risk evaluation, the remedial action area at Mountain Lake was delineated as the area containing concentrations of COCs in sediment that pose an unacceptable risk to the Mountain Lake ecosystem. The remedial action area was drawn to include all sample points with lead and TPHmo exceeding cleanup levels. Additionally, the area was expanded vertically to a depth of 5.5 feet below sediment surface (bss) at location MLSE 21 in the eastern arm of the Lake to cover the maximum detected concentration of selenium at 12 mg/kg, which is almost an order of magnitude higher than its cleanup level of 1.6 mg/kg.

The remedial action area at Mountain Lake covers nearly the entire footprint of the Lake to a depth of 2.5 feet bss, and some areas to 4.5 to 6.5 feet bss. The remedial action area is shown on Figure 6-4. The anticipated volume of sediment in the remedial action area is 15,600 cubic yards. This volume takes into account the removal of the COCs and actual implementation of a sediment removal process.

The Mountain Lake remedial action area is primarily within the limits of the Presidio property. Based upon analytical results of samples collected from the beach area of Mountain Lake Park in December 2011, concentrations of PCOCs in sediment in the City-owned portion of the Lake are below sediment cleanup levels (Kennedy/Jenks 2012). As shown on Figure 6-4, the

remedial action area dips into the City limits only to cover one sample location (MLSE 28) adjacent to the City boundary.

Following remediation of sediment in the remedial action area, COC concentrations in sediment are not expected to pose an unacceptable risk to ecological receptors. In Appendix D, post-remediation 95 percent UCL concentrations for the PCOCs were calculated using the existing data set and assuming removal of sediment from the remedial action area. As shown in Appendix D, the post-remediation 95 percent UCL concentration of the primary COC (lead) in the remaining top 3.5 feet of sediment would be reduced to 25 mg/kg, which is well below the freshwater sediment cleanup level of 82 mg/kg. The post-remediation 95 percent UCL concentrations for the other PCOCs calculated are also below the freshwater sediment cleanup levels and the metal background concentrations. Post-remediation confirmation sampling following sediment removal in the remedial action area would confirm that analyte concentrations have been reduced to acceptable risk levels.

# Section 4: Remedial Action Objectives and Cleanup Levels

The NCP and CERCLA require that remedial measures be protective of human health and the environment. Remedial Action Objectives (RAOs) are developed to address COCs (primarily lead for this Site) and a specified medium (Lake sediment). CERCLA guidance also states that RAOs should include criteria for COC concentrations and potential exposure routes. RAOs have been developed for Mountain Lake based on current and planned land use.

## 4.1 Planned Land Use

Current and planned land use of the Lake and in the immediate vicinity is for recreation and wildlife habitat. Fishing, swimming, and recreational boating are not allowed at the Lake. Therefore, the potential for future human contact with the Lake sediment is very limited. Recreational activities such as walking, dog walking, and bird watching are expected to occur around the shores of the Lake. A separately-funded effort is underway to enhance the Lake, including restoration of native plants and other Lake enhancements to improve ecological functions (Trust, NPS, and GGNPA 2000).

## 4.2 Mountain Lake Sediment Cleanup Levels

In the *Development of Presidio-wide Cleanup Levels for Soil, Sediment, Groundwater, and Surface Water* (Cleanup Level Document; EKI 2002), the Trust developed cleanup levels for various media and receptors in the Presidio. The Cleanup Level Document outlines procedures to identify specific cleanup levels that are applicable to a given contaminant release site. The procedures include selecting cleanup levels based on site-specific considerations including current and future site land use.

Based on current and future land use at Mountain Lake, freshwater sediment cleanup levels will be applied to Mountain Lake. Table 3-1 includes the sediment cleanup levels for PCOCs at Mountain Lake.

## 4.3 Remedial Action Objectives

The RAOs used to evaluate remedial alternatives and develop the remedial action plan include specific technical objectives and general strategic objectives that pertain largely to the beneficial use of the Lake. RAOs are developed specifically for the COCs, exposure route, and media of interest, as discussed in Section 3. Considering the current and planned future land use and the cleanup objectives described above, the RAOs for Mountain Lake are as follows:

- **General RAOs:** The general RAOs for the Mountain Lake sediment remediation project are provided below.
    - Protection of human health and the environment.
    - Protection of water quality and ecological resources.
    - Remediation of contaminant mass (primarily lead) in the Lake sediment, and elimination or reduction in further accumulation of contaminant mass.

- Preference for permanent remedies, whenever practicable, cost effective, and consistent with planned use of the Lake.

- **Site-Specific RAOs:** The specific RAOs for the Mountain Lake sediment remediation project are provided below.

  - Remediation of sediment in a manner that would not further impair Lake health or habitat quality.

  - Planning, design, and performance of the sediment remediation activities in a manner that maintains structural stability of the western shore and adjoining Park Presidio Boulevard. Undermining or destabilization of Park Presidio Boulevard is an unacceptable consequence of the sediment remediation activities.

  - Control of future chemical release to the Lake associated with stormwater discharges from Park Presidio Boulevard.

# Section 5: Applicable or Relevant and Appropriate Requirements

This FS/RAP has been developed to be consistent with the NCP and CERCLA. In accordance with Section 121(d)(1) of CERCLA (42 USC Section 9621[d]), remedial actions performed under CERCLA must achieve a level of cleanup and control of hazardous substances, pollutants, or contaminants that assures protection of human health and the environment. Additionally, remedial actions that propose to leave hazardous substances onsite must meet the substantive requirements of federal environmental laws or more stringent state environmental and facility siting laws, referred to as applicable or relevant and appropriate requirements (ARARs). In evaluating remedial alternatives, the NCP also requires consideration of ARARs, which it defines as follows (40 CFR 300.5):

- Applicable requirements are "...those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site."

- Relevant and appropriate requirements are "...those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not 'applicable' to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site."

ARARs are categorized as chemical-, action- or location-specific, as follows:

- Chemical-specific requirements are typically health or risk-based concentrations for specific substances in the various environmental media and represent the acceptable concentration of a specific chemical that may be found in, or discharged to, the environment based on protecting potential receptors from adverse health effects associated with the specific chemical. Chemical-specific ARARs are the primary criteria used to establish cleanup levels.

- Action-specific requirements generally set performance, design, or other similar activity- or technology-based controls related to the management of hazardous substances by restricting or directing specific types of remedial or waste management activities. Action-specific ARARs are used to identify and evaluate remedial action alternatives.

- Location-specific ARARs address restrictions on activities or permissible chemical concentrations in a particular location. For example, projects located in sensitive areas such as wetlands or a flood plain would include ARARs specific to these attributes of the project site in the evaluation of alternatives. Location-specific ARARs are used to identify and evaluate remedial action alternatives.

ARARs at the Presidio can be either federal or state requirements, with state requirements governing only when applicable to federal land and more stringent than federal requirements. In

addition to ARARs, which are regulatory requirements, to-be-considered material (TBC) should also be identified. TBCs are nonbinding criteria, advisories, guidance, and proposed standards that might provide useful information or recommended procedures for developing standards that protect human health and the environment. There may also be local permitting requirements and ordinances relevant when performing remedial actions.

ARARs and TBCs have been developed in Table 5-1 for the Mountain Lake remediation project using federal, state, and local statutes, regulations, and guidance. Compliance with the ARARs and TBCs criteria identified in Table 5-1 are considered during the preliminary screening of technologies. Compliance with ARARs is used as a threshold criterion during detailed analysis of the alternatives.

# Section 6: Identification and Screening of Remedial Technologies

This section discusses the identification, development, and screening of alternatives for removal of contaminated sediment from Mountain Lake. The goal of the CERCLA remedy selection process is to develop and select remedial alternatives that meet the following broad objectives (USEPA 40 CFR 300.430(a)(1)(I)):

- Protect human health and the environment.
- Maintain protection over time.
- Minimize untreated waste.

To develop remedial alternatives that satisfy these goals, potential suitable technologies must be identified and screened. Technologies passing this screening process can then be retained to develop specific remedial alternatives.

The first step in the development of remedial alternatives is the identification of general response actions (GRAs) considered capable of achieving the RAOs and applicable technologies within these GRAs. The specific options within each GRA are then screened based on their effectiveness, implementability, and cost. The screening process is intended to identify promising technologies and process options (specific forms or variations on technologies) potentially applicable to Site conditions.

Following this initial screening process, a range of comprehensive alternatives is then developed using the focused list of the more promising technologies. The alternatives are developed to be responsive to and satisfy the RAOs, which are developed to address specific contaminants impacting a specified medium. ARARs and TBCs that potentially apply to remedial activities are identified and used to supplement the preliminary evaluation of technologies.

The identification and screening process performed in this section is based on USEPA's general remedial investigation and feasibility study guidance (USEPA 1988) and specific contaminated sediment remediation guidance (USEPA 2005).

## 6.1 Identification of Technologies

As described in USEPA guidance (USEPA 1988), remedial alternatives are identified based on the following three components:

- **GRAs:** There are a few broad categories of remedial methods generally used to address the contaminated media (e.g., source control/natural recovery, institutional controls, containment, removal, or treatment).

- **Remedial Technologies:** Within each GRA there may be various types of technologies that represent the same general remedial method (e.g., different containment options include thin-layer capping, engineered caps, or active caps).

- **Process Options:** For each technology option there may be specific variations in the way the technology is implemented (e.g., variations in wet removal include mechanical or hydraulic dredging).

Following USEPA guidance (USEPA 1988, 2005), a wide range of contaminated sediment GRAs are identified for possible application to the Site. The GRAs are identified considering the addressable environmental media (sediment), as well as the site characteristics and the current understanding of the COCs. The GRAs responsive to the RAOs and that potentially contribute to satisfying the RAOs are as follows:

- **No Action:** This response is necessary to establish a baseline for comparison with the other potential remedial actions and is always evaluated in accordance with USEPA guidance (USEPA 1988). The No Action response assumes that no remedial action would be performed to reduce toxicity, mobility, or volume of the COCs in the impacted media.

- **Institutional Controls:** This non-engineering response includes legal, administrative, and procedural measures intended to mitigate the risks of exposure to contaminated sediment in Mountain Lake by restricting access to the Lake.

- **Monitored Natural Recovery (MNR):** This response relies upon ongoing, naturally occurring environmental processes such as chemical transformation, reduction in contaminant mobility/bioavailability, physical isolation, and dispersion that contain, destroy, or reduce the bioavailability or toxicity of contaminants in sediment and thereby reduce ecological and human health risks to acceptable levels (Magar 2009). A key component of this response is long-term monitoring to verify effectiveness.

- **Enhanced Monitored Natural Recovery (EMNR):** This response augments the natural recovery of contaminated sediments by accelerating the clean sedimentation rate and encouraging benthic re-colonization and the accompanying bioturbation to mix underlying contaminated sediment with the cleaner surface deposits. EMNR involves placing clean sediment or sand in a thin layer (e.g., six inches) above contaminated sediment. EMNR is fundamentally different from capping (see below) in that mixing of the surface deposits with underlying contaminated sediment is intended, whereas with capping the surface deposits are intended to restrict the mobility of underlying material.

- **In Situ Treatment:** This response applies traditional treatment methods previously implemented as full-scale ex situ technologies (e.g., stabilization or immobilization) to submerged sediments. Sediment geochemistry is altered by the introduction of sorbent amendments (e.g., activated carbon) into contaminated sediment to reduce exposure risks by increasing contaminant binding and therefore bioavailability and subsequent uptake by benthic organisms. In situ treatment in sediments is an innovative remediation method that is not yet widely employed, but is gaining greater support (USEPA 2005, ASTSWMO 2007).

- **Capping:** This response generally involves placing clean cover material over contaminated sediments to reduce unacceptable risk through three mechanisms (USEPA 2005):

- Physical isolation to reduce direct contact exposure and reduce contaminant mobilization by burrowing organisms.
- Stabilization and erosion protection to reduce contaminant re-suspension and transport.
- Chemical isolation to reduce direct contact exposure to dissolved contaminants.

Caps generally consist of one or more layers of granular material (e.g., clean sediment, sand, or gravel) that serve these primary functions.

- **Removal:** This response involves removal of contaminated sediments from the Site. Sediment removal can be performed either in the wet or in the dry. Wet removal or dredging involves removal of submerged sediment by mechanical or hydraulic means. Dry removal or excavation involves draining or diverting water from the excavation limits prior to sediment removal by conventional excavation means. For dredging operations, equipment must be selected, controls installed, and operational procedures followed to minimize the re-suspension and release of contaminants during the removal activities and minimize contaminant residuals that may remain following the removal operations (USEPA 2005, 2008). Both dredging and excavation would require transport of sediment to processing and/or disposal facilities.

- **Ex Situ Treatment:** This response is a component of a sediment remediation system that follows removal activities and precedes disposal or reuse of the treated materials. Dewatering is the most common form of treatment and generally precedes loading for off-haul to permitted disposal facilities. Other treatment processes are intended to destroy or reduce the toxicity, mobility, or volume of contamination in sediment prior to disposal or reuse.

- **Disposal Technologies:** This response is a component of a sediment remediation system that follows removal and possibly treatment activities. Sediment is generally disposed in an engineered in-water disposal facility or within an operating commercial upland landfill. These disposal facilities are specifically designed to control and limit environmental impacts associated with the contaminated sediments.

Table 6-1 lists these GRAs and corresponding remedial technologies with brief descriptions of specific process options considered in the screening analysis.

## 6.2 Technology Screening and Evaluation

A range of potential technologies and process options are identified for implementation of each GRA. Table 6-1 is used as the basis for the technology and process option screening process. Technologies and processes considered effective in the remediation of sediments contaminated by the COCs are considered. Following USEPA guidance (USEPA 1988), screening of the potential technologies and process options is based on simplified assessments of effectiveness, administrative and technical implementability, and the relative implementation cost, as described below:

- **Effectiveness:** This screening level criterion addresses the ability of the technology to meet the RAOs, mitigate potential impacts to human health and the environment during

construction and implementation, perform reliably with respect to the site-specific conditions and COCs, minimize unacceptable residual risk, and comply with ARARs. Technologies were also rated in terms of their relative effectiveness compared to other technology and process options within the same GRA.

- **Implementability:** This screening level criterion evaluates the site-specific technical and administrative feasibility factors involved in applying the technology or process option. Factors affecting implementability include available resources such as equipment and workers, site hydrogeology and soil types, physical obstructions such as buildings, permitting requirements, and availability and proximity of treatment and disposal facilities. As an example, options requiring equipment, specialists, or facilities that are unavailable may not be implementable and would be eliminated from further consideration.

- **Cost:** Relative costs were evaluated based on the components of both capital costs and long-term operation and maintenance (O&M) costs rather than detailed estimates. Costs are qualitatively based on engineering judgment, with each option evaluated as high, medium, or low relative to other options in the same category. Cost has a limited role in this phase of evaluation. Assumptions for unknown conditions are applied consistently to all options. Cost effectiveness is considered in terms of qualitative level of effectiveness and implementability for the cost expended. Alternatives providing comparable or reduced effectiveness and implementability for a greater cost expenditure than another alternative providing equal or greater effectiveness or ease of implementation may be eliminated from further consideration.

Screening of technologies and process options is based on the current conditions and uses of the Site and/or reasonable likely future conditions and uses related to ecological restoration and stormwater management at Mountain Lake, as currently understood for the Site. Consequently, for the screening and evaluation of remedial technologies and process options, existing Site conditions and uses are generally assumed, and information on likely potential future uses is used where available.

A summary of the screening evaluation of technologies and process options based on effectiveness, implementability, and cost is shown in Table 6-2. The technologies and process options that were retained for further consideration are also indicated in Table 6-2. The following technologies and process options have been retained as applicable strategies for remediation of sediment at Mountain Lake:

- No Action.
- Conventional Sand Cap.
- Armored Cap.
- Mechanical Dredging.
- Hydraulic Dredging.
- Upland Commercial Landfill Disposal.
- In-Barge Dewatering.
- Lagoon Dewatering.
- Geotextile Tube Dewatering.
- Mechanical Dewatering.
- Reagent Dewatering.

## 6.3 Development of Potential Remedial Alternatives

Following the screening evaluation, those technologies and process options considered feasible are assembled into remedial alternatives to address impacted sediment in Mountain Lake. When multiple technologies or process options are considered effective, implementable, and cost-effective, a representative option is chosen or combined with others and used in the development and analysis of remedial alternatives. A detailed analysis of each alternative is performed to identify and recommend the remedial alternative best suited for addressing impacts to sediment in Mountain Lake.

Implementable remedial alternatives were developed by assembling relevant combinations of the retained technologies and process options. Various options are identified above for dredging and dewatering, however only one specific process option is presented in the development of specific alternatives based on site-specific implementation preferences and a perception that the chosen option is the most likely process option to be applied at the Site. These are assumptions for the purpose of developing alternatives to reduce the number of alternative permutations to a manageable number of alternatives that are generally representative of the overall technology type and response action. This should not be inferred as an indication that these process options are necessarily preferred or superior as compared to all other potential process options. Process option selection will ultimately be determined during remedial design or chosen by the Contractor during development of the construction operation plan detailing implementation means and methods.

In particular, two principal dredging processes were retained from the screening analysis, hydraulic and mechanical dredging. Although both processes may be effective at the Site in removing sediments, development of remedial alternatives has been based on hydraulic dredging as representative of wet removal technology. Similarly, there are multiple dewatering processes that may be effective in pre-treating the dredged contaminated sediments prior to disposal. As space constraints will likely be a controlling site constraint, mechanical dredging has been included in the description of remedial alternatives as representative of dewatering processes. Based on these simplifying assumptions, three principal remedial alternatives are considered in this detailed evaluation:

- Alternative 1: No action.
- Alternative 2: Capping.
- Alternative 3: Dredging with Offsite Disposal and Limited Capping.

All alternatives assume that the targeted area of sediment contamination is as described in Section 3. These remedial alternatives are developed to address the RAOs presented in Section 4. The remedial alternatives developed for evaluation are described below in more detail and summarized in Table 6-3.

### 6.3.1 Alternative 1 – No Action

The No Action Alternative includes no remedial activities. In accordance with the NCP (40 CFR 300.420(e)(6)), the No Action Alternative must be assessed to provide baseline comparison with other alternatives. The No Action Alternative does not include active remediation or monitoring. No cost is associated with this alternative. If the No Action Alternative

is selected, contaminated sediments will continue to pose a potential risk to the health of ecological resources at the Site.

### 6.3.2 Alternative 2 – Capping

Capping is a well-developed process that has been employed as a remedial response at a number of Superfund sites. Capping involves depositing clean cover material over contaminated sediments. Capping at the Site would be intended to reduce COC concentrations at the sediment surface and reduce the flux of COCs to the water column. The cap would be designed in accordance with USEPA and U.S. Army Corps of Engineers (USACE) guidance to provide long-term chemical isolation and ensure the stability, integrity, and protectiveness of the cap as it is subjected to Site-specific erosive forces, which are anticipated to be limited.

- **Design and Installation:** The cap would be designed to meet the following objectives (ASTSWMO 2007, USEPA 2005, USACE 1998):

  - Provide physical isolation of COCs in sediment from humans and benthic organisms.
  - Provide protection from erosive forces, which can re-suspend sediments and redistribute them to other areas of the Lake.
  - Provide chemical isolation to reduce the flux of COCs into the water column.

  The lower portion of the cap forms an isolation zone that prevents the underlying contaminants from migrating via advection or diffusion into the overlying biologically active zone occupied by plants and benthic organisms. The cap thickness must be sufficient to mitigate the effects of rooting and burrowing of plants and benthic organisms, respectively, which may create preferential pathways for contaminant migration (ASTSWMO 2007, USEPA 2005).

  Caps are generally constructed of granular material (e.g., clean sediment, sand, gravel, rip rap), but may also include geotextile liners. Determination of the required cap thickness is governed by the physical and chemical properties of the contaminated sediment and capping material, bioturbation profile, and potential for consolidation and erosion of the cap (USEPA 1994). As a rule of thumb, 30 centimeters (cm) (approximately 12 inches) is the minimum cap thickness to provide adequate chemical isolation (USEPA 1994). Bioturbation depths are highly variable, but in most freshwater environments, bioturbation can be predicted to extend down to 20 to 40 cm (approximately 8 to 16 inches) for most organisms that would populate a site in great numbers (USACE 2001). Ultimately, cap thickness would likely be governed by the ability of conventional equipment to accurately place the capping material, which corresponds to a minimum cap thickness of 50 to 60 cm (approximately 20 to 24 inches; USEPA 1994).The limits of cap installation, as shown on Figure 6-1 are based on the remedial action area identified in Section 3. A standard cap cross section was assumed to include 12 inches of sand for the chemical isolation layer and 12 inches of sand for the bioturbation layer. Additional thickness to account for consolidation is not included since coarse-grained material (e.g., sand) is proposed for the capping material (USACE 1998). Due to the sheltered nature of the Lake, significant sources of erosion are not anticipated and an armoring layer is unlikely to be required except in near-shore areas such as adjacent to Park Presidio Boulevard (USACE 1998). A typical conceptual design cross section for the cap is shown on Figure 6-2. Based on the capping limits shown on

Figure 6-1 and the conceptual design cross section, it is estimated that approximately 10,390 cubic yards (cy) of clean granular material (e.g., sand) would be required to construct the cap.

Because of the disruptive nature of cap placement, sediment movement may occur during installation of the cap. Re-suspension and release of contaminated sediment may result in residues that redeposit on remaining sediment surfaces and/or newly installed cap surfaces (USEPA 2005, USACE 1998). To mitigate this condition, the capping operation must be conducted with care to minimize re-suspension, and cap installation in layers or lifts may be required to ensure adequate cover of contaminated sediment. Specific cap placement methods to achieve target cap thickness would be assessed during remedial design and the means and methods determined by the Contractor during implementation.

- **Transportation of Cap Material:** A material staging area with near-shore loading facilities would be required to transport the capping materials to vessels that are used to place the capping materials in accordance with the design requirements.

  Access to the staging area could be achieved via the existing West Pacific Avenue route and/or the existing Park Avenue route through the golf course. On the lower end of truck capacity, which might be required to make the tight turn on West Pacific at the west side of the Park Presidio Boulevard overpass, standard dump trucks can typically haul 10 cy. On the higher end of truck capacity, which might be viable given a West Pacific Avenue routing scenario, transfer dump trucks can typically haul 18 cy. These hauling capacities correspond to 578 to 1,039 truck loads of cap materials.

- **Construction Monitoring:** During construction, a monitoring program would be implemented to track conformance with design plans and specifications during placement of the cap and to monitor the extent to which contaminated sediment is released and re-suspended during cap placement. Construction monitoring would include turbidity and water quality monitoring to measure the re-suspension of capping material and contaminated sediment (USEPA 2005, USACE 1998). The rate of cap placement may need to be adjusted (i.e., slowed) to mitigate water quality effects. Construction monitoring would also include interim and post-construction monitoring of the in-place cap using bathymetric surveys or sediment cores to confirm the thickness of the cap. A pre-construction bathymetric survey has already been completed to establish baseline conditions.

- **Source Control:** A critical component of any remedial action would be the cessation of future discharges of highway runoff to the Lake. The Trust and Caltrans have identified the need for future interception and diversion of the highway runoff, and the associated planning process is underway. Under the Capping Alternative, Caltrans would install and maintain stormwater treatment measures. These may include stormwater interceptor basins (grate inlet skimmer boxes) on drainage pipes to remove particulate matter and petroleum hydrocarbons from the highway runoff before it is discharged to the Lake.

- **Post-Construction Monitoring and Maintenance:** Consistent with USEPA and USACE guidance (USEPA 2005, USACE 1998), long-term monitoring and maintenance of the cap would be required to further ensure its long-term effectiveness and permanence. A properly designed and installed cap would reduce future maintenance requirements. However,

should erosion or damage to the cap occur, the affected area would be identified during post-construction monitoring and subsequently repaired.

A monitoring and maintenance plan would be prepared to identify sampling and analysis activities, data evaluation techniques, and contingent response actions following installation of the cap. Specific monitoring activities likely to be required include (USEPA 2005):

- Periodic bathymetric surveying to confirm cap thickness and stability over time.
- Sampling and analysis of surface sediments and upper cap layer to confirm physical and chemical isolation and assess potential recontamination.
- Water quality sampling and analysis.
- Biological monitoring of benthic communities that may re-colonize the capped area and the bioturbation behavior of benthic organisms that may compromise the cap.

The monitoring and maintenance plan for the Site would include a contingency action plan, which identifies specific measures that would be implemented to address deterioration or damage of the cap or ineffectiveness of the isolation layer as demonstrated by sediment, biotic, and/or water quality data.

As this alternative would leave in place contaminated materials preventing unlimited use and unrestricted exposure, a five-year review would be required pursuant to CERCLA requirements (USEPA 2001). An Operation and Maintenance Plan would be prepared to describe and track operation, maintenance, inspection, and monitoring activities to ensure that the remedy remains protective of the environment.

### 6.3.3 Alternative 3 – Dredging with Offsite Disposal and Limited Capping

Dredging is a well-developed process that has been employed as a remedial response at a number of Superfund sites. Dredging involves the mechanical or hydraulic removal of contaminated sediments. Some over-dredging is generally expected to ensure that the targeted contaminants are removed (USEPA 2005). Based on Site characterization information and bathymetric survey data, submerged obstructions, such as utilities, debris, boulders, and shallow bedrock that would limit the dredging operations are not expected at the Site.

Dredging is a remedial process operation comprised of multiple components. The key components in a dredging operation typically consist of dredging, transport to a processing facility, pretreatment and/or dewatering, loading, transport, and disposal. A typical process flow schematic for a dredging operation is shown on Figure 6-3.

- **Dredging:** To develop a detailed dredging alternative, hydraulic dredging is described as a representative option for wet sediment removal. Although contractor means and methods would be open to mechanical or hydraulic dredging, it is likely that hydraulic dredging would be proposed by implementation contractors because it minimizes Site impacts and the potential for cross contamination when compared to the other major wet removal option, mechanical dredging (Table 6-2). Hydraulically dredged material would be pumped through

a temporary pipeline or other similar transport to a staging area that would be constructed north of the Lake.

Based on the nature and extent of contamination presented in Section 3 and considering practical implementation constraints associated with conventional dredging equipment, including the removal of sediment windrows and over-dredging allowances, the dredging volume is estimated to be approximately 15,600 cy of in situ sediment (note that this volume is a refinement of the estimated volume in the RI Summary (URS 2011)). A conceptual layout of the dredging limits is shown on Figure 6-4.

Based on physical testing data (URS 2011), the average in situ sediment moisture content is 61 percent and the average dry sediment density is 72 pounds per cubic foot. Based on these data, the total solids quantity in the sediment to be removed is 4,573 cy or 4,417 tons.

Per USEPA guidance (1994), typical hydraulic dredging production data are as follows:

- Dredged solids concentration of 15 percent by weight.
- Dredging production rate of 100 cubic meters per hour.

These production data result in a total dredging quantity of 34,480 cy or 25,032 tons. Note that the estimated dredging volumes may increase during remedial design, which can commonly occur when additional data are collected, engineering analyses are completed, and dredge prisms are refined.

Because of the invasive nature of dredging, sediment movement would occur during dredging. Re-suspension and release of contaminated sediment may result in dredging residues that redeposit on remaining sediment surfaces (USEPA 2005, USACE 2008). To mitigate this condition, the dredging operation would be controlled to minimize re-suspension. Barrier controls such as silt curtains may not be effective as nearly the entire Lake area would be dredged. Multiple-pass dredging and/or over-dredging may be required to ensure adequate removal of contaminated sediment. Operational best management practices (BMPs) for water quality may include applying target production rates consistent with dredging of contaminated sediment, which is generally performed at a slower rate than typical maintenance dredging (USEPA 2005). In most cases, hydraulic dredging has been shown to have less sediment movement than mechanical dredging. During design and implementation, the hydraulic dredging solids concentration, production rates, cutter head design, and swing rate would be optimized to balance the reduction of sediment re-suspension and the time to complete the dredging operation (ASTSWMO 2007).

Hydraulically dredged sediments would be transported via pipeline or other similar transport to a staging area near the Lake where dewatering, loading, and transport operations would be carried out.

- **Geotechnical Stability:** Geotechnical stability of the Park Presidio Boulevard roadway embankment is a prerequisite to performing the dredging operation. Caltrans is currently conducting geotechnical investigations along Park Presidio Boulevard in the vicinity of Mountain Lake to collect information necessary for engineering analysis and design of an embankment stabilization remedy. Based on preliminary assessment of Site conditions,

Caltrans has indicated that installation of a network of stone columns (or similar technology) in the shoulder and possibly traveled way of the roadway may be required to adequately stabilize the embankment for dredging operations in the Lake.

Although Caltrans' embankment stabilization project would protect the roadway from failure during dredging, dredging activities have the potential to contribute to slope failure of the exposed eastern roadway embankment slope along the western edge of the Lake. Slope stability analysis would be required for the dredging design. The results of the slope stability analysis may support vertical cuts in proximity to Park Presidio Boulevard with immediate backfill with rip rap, or may limit dredging cuts to a specified slope, such as 3 (horizontal) to 1 (vertical), as an example. In the event that dredging cut slopes are limited such that not all contaminated sediment targeted for removal could be removed, a cap would be installed, similar to Alternative 2. It is anticipated that this condition would only occur in proximity to Park Presidio Boulevard.

- **Dewatering:** Mechanical dewatering is described as a representative option for dredged material pre-treatment to remove water prior to loading, off-haul, and disposal. It is anticipated that mechanical dewatering would best conform to the space constraints at the Site. Specific equipment options would be assessed during remedial design and may be governed by the Contractor's means and methods.

  Per USEPA guidance (1994), a typical mechanical dewatering production rate is 100 gallons per minute. Interim dredged material storage following dredging and prior to dewatering may be required depending on how the Contractor stages operations. Temporary storage could be in a diked earthen surface impoundment (e.g., temporary lagoon) or tanks.

  Based on chemical testing data (URS 2011), it is not anticipated that the elutriate generated from the dewatering operation would require treatment prior to discharge back to the Lake. However, construction phase sampling and analysis of the elutriate would be conducted to confirm this, and contingencies would be in place to treat the elutriate if required.

- **Off-Hauling:** Per USEPA guidance (1994), a typical dewatered cake solids concentration is 50 percent by weight, which corresponds to an estimated total off-haul quantity of 9,851 cy or 8,835 tons. Access to the staging area could be achieved via the existing West Pacific Avenue route and/or the existing Park Avenue route through the golf course. On the lower end of truck capacity, which might be required to make the tight turn on West Pacific at the Park Presidio Boulevard overpass, standard dump trucks can typically haul 10 cy. On the higher end of truck capacity, which might be viable given a West Pacific Avenue routing scenario, transfer dump trucks can typically haul 18 cy. These hauling capacities correspond to 547 to 985 truck loads.

- **Offsite Disposal:** Chemical testing (URS 2011) indicates that no sample analysis failed the Toxicity Characteristic Leaching Procedure (TCLP) and only one sample analysis failed the lead Soluble Threshold Limit Concentration (STLC). In general, due to dilution factors, a sample has the potential for failing the STLC if the total metals concentration exceeds 10 times the STLC. Metals concentrations can also increase following dewatering operations, depending on the Contractor's means and methods, and Waste Extraction Test (WET) analysis yielded near 100 percent solubility in some sample analysis (URS 2011). Based on this information, a conservative assessment would be to consider total lead concentrations exceeding 10 times the STLC as characteristic of sediment that would be

disposed of at a Class I facility. Due to the uncertainties associated with metals concentrations following dewatering operations and for estimating purposes, it is assumed that an allowance of 10 percent of the total volume of dewatered sediment would require disposal at a Class I facility as RCRA hazardous waste (i.e., 985 cy or 883 tons) and the remaining material would require disposal at a Class I facility as California hazardous waste (i.e., 8,866 cy or 7,951 tons).

- **Construction Monitoring:** Design sediment sampling may be implemented to more accurately determine the depth and locations requiring dredging. Progress bathymetric surveys would be required to monitor the dredging progress with respect to target removal depths and confirmation sediment sampling and analysis would be conducted to confirm that the dredging was completed and the cleanup levels have been achieved. Depending on the confirmation sampling and analysis, additional dredging may be required. Water sampling may be implemented during construction to monitor the effects of sediment re-suspension and release. Water samples may be analyzed for COCs and physical parameters, such as turbidity, may be measured as a real-time tool to help evaluate and control the dredging performance.

- **Source Control:** A critical component of any remedial action would be the cessation of future discharges of highway runoff to the Lake. The Trust and Caltrans have identified the need for future interception and diversion of the highway runoff, and the associated planning process is underway. Under the Dredging Alternative, Caltrans would install and maintain stormwater treatment measures. These may include stormwater interceptor basins (grate inlet skimmer boxes) on drainage pipes to remove particulate matter and petroleum hydrocarbons from the highway runoff before it is discharged to the Lake.

- **Post-Construction Monitoring and Maintenance:** As this alternative targets removal of COCs with concentrations above cleanup levels in sediment, post-construction monitoring and maintenance is not anticipated. Since this alternative does not target leaving in place contaminated materials preventing unlimited use and unrestricted exposure, a five-year review is not anticipated. If limited capping is performed that leaves contaminated materials preventing unlimited use and unrestricted exposure, a five-year review may be required pursuant to CERCLA requirements (USEPA 2001). In this case, an Operation and Maintenance Plan would be prepared to describe and track operation, maintenance, inspection, and monitoring activities to ensure that the remedy remains protective of the environment.

# Section 7: Detailed Analysis of Remedial Alternatives

This section presents an analysis of the remedial alternatives for Mountain Lake. To provide a basis for the selection of a preferred alternative, the remedial alternatives developed in Section 6 are analyzed to evaluate the extent to which they meet the RAOs. The remedial alternatives are evaluated against the nine NCP and CERCLA criteria specified in USEPA regulations and guidance (USEPA 1988). The remedial alternatives are first evaluated individually with respect to each criterion, then compared to determine their relative strengths and weaknesses in the context of the evaluation criteria.

## 7.1 Evaluation Criteria

The detailed analysis of alternatives addresses the statutory requirements for the remedial action. The statutory requirements state that the remedial actions should:

- Be protective of human health and the environment.
- Attain ARARs or provide grounds for invoking a waiver.
- Be cost-effective.
- Utilize permanent solutions and alternative treatment technologies, or resource recovery technologies, to the maximum extent practicable.
- Satisfy the preference for treatment that reduces toxicity, mobility, or volume of the targeted contaminants as a principal element (or provide an explanation as to why it does not).

Nine evaluation criteria have been developed as guidelines under NCP and CERCLA to address the statutory requirements identified above, as well as additional technical and policy considerations that have proven to be important to the process of selecting remedial alternatives. The nine evaluation criteria are as follows.

- Overall protectiveness.
- Compliance with ARARs and other guidelines.
- Long-term effectiveness and permanence.
- Reduction of mobility, toxicity, or volume of the targeted contaminants through treatment.
- Short-term effectiveness.
- Implementability.
- Cost.
- State acceptance.
- Community acceptance.

The NCP (40 CFR 300.430(e)(9)(iii)) categorizes these nine criteria into three groups: 1) threshold criteria; 2) balancing criteria; and 3) modifying criteria. Additional criteria provided by the state of California that were also considered for Mountain Lake are presented following the NCP criteria.

The following sections contain descriptions of the evaluation criteria, individual evaluations of each alternative (without regard to the other alternatives), and a comparative evaluation of the alternatives. Descriptions of the remedial alternatives are provided in Section 6.

### 7.1.1 Threshold Criteria

The first two evaluation criteria are considered *threshold* criteria:

- **Overall Protection of Human Health and the Environment:** This evaluation criterion focuses on how well the alternative would achieve protection of human health and the environment over time and how well it would reduce unacceptable risks associated with contaminants at the Site. That assessment is intended to determine how well the risks posed by each pathway associated with the addressable media are eliminated, reduced, or controlled through removal, containment, treatment, engineered controls, or institutional controls. The evaluation of overall protectiveness criteria addresses the long- and short-term effects of each alternative under consideration. Each alternative is assessed with regard to how well it would mitigate long-term exposure to the targeted contaminants and protect human health and the environment.

- **Compliance with ARARs and Other Guidelines:** To determine if an alternative satisfies ARAR criteria, the effects of federal, state, and local laws, requirements, and regulations, and other institutional considerations relative to the design, operation, and timing of each alternative is evaluated. ARARs and other standards to be considered are identified in Table 5-1.

Threshold criteria must be satisfied as a minimum requirement for selection as the preferred alternative.

### 7.1.2 Balancing Criteria

The next five evaluation criteria are primary *balancing* criteria:

- **Long-Term Effectiveness and Permanence:** This evaluation criterion examines the remaining risk at the Site following implementation of a remedial action and attainment of the RAOs, with a primary focus on the adequacy and reliability of the implemented remedy and the controls that may be required to manage unacceptable risks associated with any remaining contaminants.

- **Reduction of Toxicity, Mobility, or Volume through Treatment:** This evaluation criterion addresses the extent to which an alternative employs treatment technologies that permanently and significantly reduce the toxicity, mobility, and volume (TMV) of contaminants at the Site. CERCLA and the NCP prefer remedial actions that use treatment to reduce unacceptable site risks by destroying toxic substances, reducing the total mass of toxic substances, irreversibly reducing the mobility of toxic substances, or reducing the total volume of media contaminated by toxic substances.

- **Short-Term Effectiveness:** This evaluation criterion considers the period of time needed to complete the remedy and potential impacts or effects of each alternative on workers, the community, and the environment during the construction and implementation process prior to achieving the RAOs.

- **Implementability:** This evaluation criterion considers the practical, technical, and administrative feasibility (that is, the ease or difficulty) of completing a remedial action and the availability of services and materials required for implementation.

- **Cost:** This evaluation criterion estimates the implementation cost, including capital, operation, and maintenance costs incurred over the life of the project, taking into consideration site-specific factors identified from available information and determined during development of the alternative. A 25 percent contingency is included for capital costs and a 30 percent contingency is included for O&M costs. According to CERCLA guidance, these cost estimates are planning level costs and are developed with an accuracy ranging from 30 percent less to 50 percent more than the estimated cost. This range of costs reflects the conceptual level of design detail applied to feasibility studies; variability of construction means, methods, and materials; time variability in construction costs; the complexity of developing site-specific design criteria following selection of the preferred alternative; and the sensitivity of construction costs to short-term economic factors such as interest rates, inflation, and material costs. The sources for these cost estimates include input from contractors, estimates for similar projects, standard costing guidance documents, and professional judgment.

  The costs of the remedial alternatives are compared using the estimated net present value (NPV) of the alternative. NPV analysis is used to evaluate expenditures that occur over different time periods by discounting all future costs to the present. Although it is not yet known how long the preferred remedy would operate, the demonstrated persistence of the COCs and nature of certain alternatives (such as capping) suggest that monitoring of the remedial action could be required for decades. Therefore, the period of performance is limited to 30 years for the purpose of comparative analysis. Costs in each planning year are estimated in constant dollars, representing the general purchasing power at the time of construction. Consistent with USEPA policy (USEPA 2000), a discount rate of seven (7) percent, with a base year of 2012, is assumed in the present value analysis. The cost opinions are summarized in Table 7-1 for each of the three alternatives.

  Although cost factors are not as important as other criteria for selection of alternatives under NCP and CERCLA, they are considered whenever the cost of an alternative far exceeds that of other alternatives without a demonstrated and equivalent difference in protectiveness, implementability, and reliability.

Balancing criteria are used to identify the preferred alternative amongst those alternatives meeting the threshold criteria. The comparison of remedial alternatives is primarily based on these criteria. Risk is an important factor in the analysis of effectiveness and permanence. The analysis evaluates the residual risk after the RAOs have been met. The evaluation also considers the potential impacts on human health and the environment if the remedy fails. The evaluation is performed in a narrative fashion for each of the five balancing criteria.

### 7.1.3 Modifying Criteria

The last two evaluation criteria are considered *modifying* criteria and do not include risk information:

- **State Acceptance:** This evaluation criterion indicates whether, based on its review of the information, the applicable state regulatory agency finds an alternative acceptable. DTSC acceptance was evaluated during the review period for the Draft FS/RAP.

- **Community Acceptance:** This evaluation criterion assesses whether community concerns have been addressed by the remedial alternative and whether the community has its own preferred remedial alternative. Community acceptance was evaluated during the public comment period for the Draft FS/RAP. Most of the commenters on the Draft FS/RAP concur with the selected remedial alternative for Mountain Lake. The Responsiveness Summary for the Draft FS/RAP in Appendix K presents and responds to public comments on the Draft FS/RAP.

Modifying criteria further shape the remedial alternatives by taking into account the concerns of state agencies and the public. These criteria were used to modify aspects of the selected alternative when finalizing the FS/RAP. The evaluation of modifying criteria was completed after public comments were received on the Draft FS/RAP.

### 7.1.4 Additional State Criteria

Additional criteria provided by the State of California were also considered in the evaluation of remedial alternatives include:

- **California Health and Safety Code (HSC) Section 25356.1:** This state code requires alternative evaluation with respect to the following six criteria:

  - Health and safety risks due to site conditions.

  - The effect of identified COCs on probable present and future uses of contaminated or threatened resources.

  - The effect on probable present and future beneficial uses of available groundwater resources, with a preference for treatment that reduces the TMV of contaminants as opposed to off-site transport and disposal.

  - Site-specific conditions related to potential off-site migration of contaminants and existing background media quality.

  - Short-term and long-term cost effectiveness with consideration as to whether a delayed remedial action could result in increases to cost and/or unacceptable risks to human health or the environment.

  - Potential environmental impacts associated with implementation of a remedial alternative such as land disposal of contaminated material versus treatment to remove or reduce its TMV prior to disposal.

  However, due to the similarity and overlapping considerations of the six HSC criteria and the nine NCP/CERCLA criteria, the detailed analysis presented in this FS/RAP consider all of these evaluation criteria collectively.

- **Interim Advisory for Green Remediation (DTSC 2009):** This state advisory provides guidance on incorporating sustainability and green remediation concepts into remediation projects by using the Green Remediation Evaluation Matrix (GREM) to perform qualitative comparisons between treatment alternatives. GREMs were prepared for each remedial alternative retained for detailed analysis, and are included as Appendix F.

  Based on DTSC guidance (DTSC 2009), the GREMs are not intended as primary evaluation criteria (threshold or balancing criteria) used to make decisions amongst alternatives, but represent additional criteria that may be considered primarily to highlight the relative impact to environmental stressors associated with implementation of each alternative. As such, the GREM are considered in this FS/RAP to be a component of the Modifying Criteria for state acceptance, reflecting DTSC's potential preference for "greener" remedial alternatives.

  The GREM will be further considered during design of the selected remedial alternative to identify and potentially mitigate impacts to environmental stressors. The GREM included in this FS/RAP focus on environmental impacts during the construction phase of the remedial alternative.

## 7.2 Individual Analysis of Remedial Alternatives

These evaluation criteria are used to conduct a detailed analysis of the three potential remedial alternatives in Section 6.3. Application of these criteria is addressed in USEPA regulations and guidance (USEPA 1988). A detailed evaluation of the remedial alternatives is provided in Table 7-2, which assesses each alternative with respect to the threshold, balancing, and modifying criteria. The assessment incorporates the cost analysis discussed above and presented in Appendix G.

As noted previously, while representative process options are identified in the development of remedial alternatives, process options may be appropriately modified during the design and implementation phases of the selected alternative based on engineering considerations, changing site conditions, and/or new information.

The results of this detailed analysis are used to compare the alternatives and support identification of the most appropriate remedial action for the Site. Further evaluation is provided in Section 7.3 with a detailed comparison of the remedial alternatives with respect to the evaluation criteria.

## 7.3 Comparative Analysis of Remedial Alternatives

The technology assessments and risk management judgments from the individual evaluation criteria assessment are used to qualitatively rank the alternatives based on the comparative advantages and disadvantages of each alternative. The performances of the alternatives are compared for each criterion to evaluate the relative strengths and weaknesses of the alternatives and identify substantive differences among alternatives to facilitate selection of a preferred remedial alternative. Detailed comparison of the remedial alternatives is discussed below and a comparison of the alternatives based on a relative ranking is summarized in Table 7-3.

- **Overall Protection of Human Health and the Environment:** The threshold criterion of overall protectiveness must be met before a remedy can be selected. Alternative 1

(No Action Alternative) does not meet criteria for overall protectiveness because existing chemical impacts to sediment are not addressed. Alternative 2 (Capping) and Alternative 3 (Dredging with Offsite Disposal and Limited Capping) meet this threshold criterion by eliminating exposure to contaminated sediments through containment or removal. However, capping of the Lake would impair the overall health and functioning of the Lake to support ecological species as the reduced water volume would support increased invasion of emergent species, lowered oxygen levels, and higher nutrient levels.

- **Compliance with ARARs:** The threshold criterion of compliance with ARARs must be met before a remedy can be selected. The No Action Alternative does not comply with ARARs because it is inconsistent with sediment quality objectives for the Site. The Capping and Dredging Alternatives comply with ARARs.

- **Long-Term Effectiveness and Permanence:** The No Action Alternative does not provide long-term effectiveness or permanence. Both the Capping and Dredging Alternatives provide long-term effectiveness and permanence far superior to the No Action Alternative. However, the effectiveness and permanence of the Capping Alternative is dependent upon long-term monitoring and maintenance of the cap. The Dredging Alternative involves removal of contaminated sediments from the Site with no long-term monitoring or maintenance. Therefore, the Dredging Alternative is considered to provide better long-term effectiveness and permanence compared to the Capping Alternative.

- **Reduction of Toxicity, Mobility, and Volume Through Treatment:** The No Action Alternative does not provide any reduction of toxicity, mobility, or volume through treatment. Neither the Capping nor the Dredging Alternatives provide direct treatment of contaminants. The Capping Alternatives provides reduction in the mobility of contaminants, but the effectiveness is dependent upon long-term monitoring and maintenance of the cap. The Dredging Alternative involves removal of contaminated sediments from the Site, thereby reducing the volume of contaminated sediment at the Site. Disposal at a permitted offsite landfill also reduces contaminant mobility. Potential treatment of elutriate following sediment dewatering, if required, may also provide some treatment to reduce contaminant toxicity, mobility, and/or volume. As there are more mechanisms by which the Dredging Alternative satisfies this balancing criterion, the Dredging Alternative is preferred to the Capping Alternative.

- **Short-Term Effectiveness:** The No Action Alternative would have no additional impacts or effects on workers, the community, and the environment because no action would be taken. Both the Capping and Dredging Alternatives provide comparable levels of short-term effectiveness. In particular, both of these alternatives involve impacts associated with construction of a staging area to support the capping and dredging operations, some trucking and transport of capping materials and dredged material, and water quality impacts during placing of the cap and dredging of sediments. It is estimated that the Capping and Dredging Alternatives could be implemented in one construction season. The Capping and Dredging Alternatives are considered equivalent with respect to this balancing criterion.

- **Implementability:** The No Action Alternative is easily implemented as it does not require any remedial action. Both the Capping and Dredging Alternatives provide comparable levels of implementability that are more difficult than the No Action Alternative. In particular, both of these alternatives involve construction means and methods that are well established,

require effort to develop and restore a staging area to support the capping and dredging operations, and could be monitored using well-established processes. The Capping and Dredging Alternatives are considered equivalent with respect to this balancing criterion.

- **Cost:** The No Action Alternative has no associated costs and therefore represents the cheapest alternative. The Dredging Alternative at $9.2 million is the most expensive alternative, but offers a higher degree of risk reduction and reliability compared to the less expensive Capping Alternative at $4.9 million. Also, potential cap repairs associated with the long-term maintenance of the cap described in the Capping Alternative could be substantial (i.e., on the order of the initial installation) due to the disruption to surrounding resources required to facilitate cap installation.

- **State Acceptance:** Based on the results of the public review and comment period, DTSC supports the remedial alternative proposed in the Draft FS/RAP.

- **Community Acceptance:** Based on the results of the public review and comment period, the public supports the remedial alternative proposed in the Draft FS/RAP.

The GREM analyses for the alternatives are presented in Appendix F. The No Action Alternative would meet most of the objectives of DTSC's Green Remediation program since there would be no substances released, no physical disturbances, and no resource depletion. The Capping Alternative would not meet all of the objectives of DTSC's Green Remediation program because of dust emissions during construction, diesel particulate matter (DPM) and other greenhouse gas emissions from vehicle exhaust, fossil fuel use, and noise and traffic from haul trucks and construction equipment. Similarly, the Dredging Alternative would not meet all of the objectives of DTSC's Green Remediation program because of odors during construction, DPM and other greenhouse gasses from vehicle exhaust, and fossil fuel use from haul trucks and construction equipment.

As indicated in Table 7-3, the qualitative relative ranking of the alternatives suggests that Alternative 3, Dredging with Offsite Disposal and Limited Capping, best satisfies the evaluation criteria presented in this FS/RAP.

# Section 8: Proposed Remedial Alternative

Based on consideration of the screening, detailed, and comparative analyses presented in the previous sections, the Trust selects Alternative 3, Dredging with Offsite Disposal and Limited Capping, as the preferred remedial action. Alternative 3 provides a high level of protection to human health and the environment, is implementable, likely results in the greatest benefit for the cost to implement, and complies with ARARs.

## 8.1 Remedial Alternative Implementation

Following approval of the Final FS/RAP by DTSC, a Remedial Design Implementation Plan (RDIP) will be developed to better describe the implementation details for the approved remedy. Although mechanical and hydraulic dredging are both feasible, the sequence of work described herein includes hydraulic dredging as representative of wet removal operations. Similarly, there are multiple feasible dewatering processes that could be applied at the Site, but mechanical dewatering is described herein as representative of dewatering processes. The RDIP and construction documents will be prepared to allow the contractor flexibility with respect to means and methods to facilitate removal operations within the Site space and schedule constraints. A conceptual layout of the remedial action is illustrated on Figure 8-1 and the core elements of the proposed remedial alternative briefly described below.

The proposed remedial action entails dredging, transport, dewatering, and offsite disposal of sediments containing COCs at concentrations exceeding cleanup levels. Details of the proposed remedial action will be described in the RDIP, with specific construction requirements developed through the remedial design and included in the construction documents. It is anticipated that the remedial construction activities associated with the proposed remedial action will consist of the following:

- Continuance of public outreach and communication program.
- Installation of project Site controls such as fencing, signage, and appropriate notifications and permitting.
- Preparation of access and staging areas in advance of the dredging operation mobilization. These preparatory activities will likely include:
    - Removal of above-grade vegetation in preparation for dredged material dewatering, handling, and offloading operations.
    - Trail and traffic controls and signage along the project haul route. The project haul route, including use of Park Avenue and/or West Pacific Avenue is shown on Figure 8-2.
- Slope stabilization activities, performed by Caltrans, to ensure the stability of the Park Presidio roadway embankment prior to the sediment removal operation. Caltrans will also complete stormwater runoff treatment, which will include installing filter inserts into highway drop inlets, confirming the location of the northern storm water pipe outfall location, and cleaning out drop inlets and storm drains that direct highway runoff into Mountain Lake.

- Mobilization of dredging and dredged material processing equipment and infrastructure, including dredge barge, transport pipelines, temporary holding cells, dewatering equipment and/or infrastructure, temporary roadway and lay down areas, and potentially elutriate treatment facilities.

- Dredging of an estimated 15,600 cy of sediment containing COCs exceeding Mountain Lake cleanup levels until confirmation sampling of remaining sediment within the removal limits meets cleanup levels. Figure 6-4 shows the extent of dredging and summarizes the depth of dredging relative to the existing sediment surface. Figure 8-3 shows a conceptual dredging plan and Figure 8-4 shows typical cross sections through the Lake assuming side slopes of 3 (horizontal) to 1 (vertical). Actual slope requirements will be determined by a slope stability analysis performed during remedial design. Table G-2 in Appendix G provides details for the estimated costs of the dredging operation.

- If analytes are detected at concentrations exceeding cleanup levels in samples collected at the limits of dredging, the Trust will consult with DTSC to:

  - Evaluate the risk associated with the remaining analyte concentrations.

  - Assess potential impacts of continued dredging on slope stability.

  - Determine if additional dredging is warranted and feasible.

  In areas of acute slope stability issues, such as along Park Presidio Boulevard, additional excavation contingent upon confirmation sampling and analysis is not anticipated. Confirmation sample results will be used solely to document the sediment quality remaining in place.

- Limited backfilling will be performed with clean sand and/or aggregate material in areas of steep slopes and as needed where required for slope stability. In areas for which slope geometry limits sediment removal, such backfill may constitute a partial cap. Conceptual cross sections of these areas are shown on Figure 8-5.

- Re-contouring of the remaining bottom sediments to smooth out the bathymetry, thereby minimize the potential for dead spots in Lake water circulation. The re-contoured bathymetric plan for the Lake bottom will not involve the removal of additional sediment.

- Progress bathymetric surveying to confirm dredging depths. A post-dredging bathymetric survey will be performed to document the total removal of sediments from Mountain Lake. A final bathymetric survey will be performed following re-contouring activities to document the bottom sediment topography.

- Temporary sediment storage and dewatering of dredged material.

- Waste characterization, transport, and disposal of dewatered dredged material to appropriately permitted landfills.

- Testing and potential treatment of elutriate generated during the dredged material dewatering operations. Testing and treatment of elutriate will be in compliance with ARARs and specified in the RDIP.

As part of the dredging operations, confirmation sampling and analysis for analytes in sediment will be performed to verify that material left in place meets cleanup levels or to document the quality of sediment to remain where slope stability prevents sediment removal. Confirmation samples will be analyzed for the COCs: lead and TPHmo.

Although not identified as COCs, the following metals will also be analyzed:

- **Cadmium:** Due to potential analytical interferences (see Appendix D), confirmation samples will be collected and analyzed for cadmium at locations where existing samples have cadmium concentrations exceeding its cleanup level.

- **Antimony:** As requested by DTSC, confirmation samples will be collected and analyzed for antimony at locations where existing samples have reporting limits exceeding 3.0 mg/kg (the background threshold value for Colma Formation).

- **Copper and Zinc:** To confirm residual concentrations of these metals that are most likely associated with automobile use of Highway 1; a subset of confirmation samples will be analyzed for copper and zinc. The details of the additional metals analysis will be provided in the RDIP.

Results of confirmation sediment analyses will be compared to cleanup levels in Table 3-1 to assess whether additional dredging should be conducted. If the concentrations of all constituents analyzed are below cleanup levels, then dredging activities will be terminated. For confirmation samples containing one or more analytes at concentrations exceeding cleanup levels, the confirmation sample results for the constituent exceeding the cleanup level will be evaluated using an analyte-specific 95 percent UCL of the mean and the UCL compared to the cleanup level to assess whether that analyte poses residual risk. Concentrations of metals that appear to represent background in naturally occurring sediment or fill material will be evaluated using existing Site data and background data to assess whether the metal concentrations are representative of background. If the analyte concentration poses residual risk, the analyte concentration is not associated with background, and additional dredging is feasible, sediment will be further dredged and the newly dredged area will be re-sampled and analyzed for the analyte that triggered the additional dredging. The Trust will consult with DTSC regarding confirmation sample results, potential additional dredging, and partial cap areas. Additional details related to confirmation sediment sampling, analytical test methods, sample frequency, and decision logic for additional dredging will be included in the RDIP.

Backfill material that may be used to partially cap areas where potential slope stability issues limit sediment removal will be fill imported from off-site or local source areas. The potential backfill material will meet the following minimum requirements prior to use as backfill in Mountain Lake:

- Potential fill material will be sampled and analyzed at each source at a frequency and analytical suite consistent with DTSC guidance (DTSC 2001).

- The concentration of chemical constituents in potential fill material will be compared to Site-specific cleanup and background levels identified in this FS/RAP to protect human health and the environment.

- Potential fill material will be compatible with Site-specific restoration plans.

If limited capping is performed that leaves contaminated materials preventing unlimited use and unrestricted exposure, a five-year review may be required pursuant to CERCLA requirements (USEPA 2001). In this case, an Operation and Maintenance Plan would be prepared to describe and track operation, maintenance, inspection, and monitoring activities to ensure that the remedy remains protective of the environment.

To obtain funding from available sources, remediation activities are targeted to be complete by May 2014.

## 8.2 Project Controls During Implementation

Temporary staging areas will be re-graded, imported or locally borrowed clean fill placed to provide proper drainage, disturbed ground surfaces protected with erosion control measures, and revegetation implemented consistent with restoration goals, as necessary. Erosion control measures are discussed in Appendix H. Post-construction erosion control monitoring will be performed during the first year following completion of the remedial action, with maintenance and repair activities performed as needed. Details on these measures will be included in the Storm Water Pollution Prevention Plan (SWPPP) that will be prepared for the construction project.

To mitigate potential impacts to the existing cultural and ecological resources, construction activities will be coordinated with Trust cultural and natural resources personnel. Specific information regarding the Site preparation activities, dredging, dredged material handling, construction staging, off-hauling, haul roads, traffic controls, air monitoring, dust and odor controls, erosion controls, and other implementation details regarding the proposed remedial action will be described in the RDIP and design documents, as necessary. Construction scheduling and the use of BMPs during implementation of the proposed remedial action will help reduce emissions and minimize potential impacts to human health and the environment. Project control measures to be included during implementation of the Mountain Lake remedial action to minimize impacts on existing resources are described in Appendix H. Specific plans containing the details of these measures will be submitted to DTSC separately or included in the RDIP.

By combining the above elements, the proposed remedial action will meet the RAOs and will protect potential receptors and the environment during implementation of the proposed remedial action.

## 8.3 California Environmental Quality Act

In accordance with CEQA, DTSC evaluated the potential environmental impacts of the selected remedial alternative for Mountain Lake in an Initial Study (IS), and prepared a Final Negative Declaration for the remediation project. The scope of the IS included consideration of potential impacts to traffic and transportation, air quality, noise, cultural and biological resources, and greenhouse gas emissions, among other topics, attributed to the proposed remedial action. DTSC found that although there will be limited minor and short-term impacts, implementation of the selected remedial alternative will improve the overall environmental quality of Mountain

Lake, and therefore would have no significant negative impact on the environment. The IS and Final Negative Declaration are included in Appendix I of this FS/RAP.

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# Tables

# Table 2-1: Summary of Sediment Sampling Activities in Mountain Lake

| Sample Collection Date | Sponsor | Samples Collected By | Number of Samples | Analytes | Comments |
|---|---|---|---|---|---|
| 1990-1995 | U.S. Army | Dames & Moore[a] | 4 shallow samples | Inorganics, SVOCs[g], VOCs[h], pesticides | |
| 1998 | Presidio Trust | EKI[b] | Depth-composited core samples from 5 locations | Metals, PCBs[i], Pesticides, chlorinated herbicides, SVOCs, TPH[j], VOCs, nitrates | |
| 2001 | University of California, Berkeley | Reidy (for Paleoecological Masters Thesis)[c] | 74 samples from sediment cores | Metals via XRF | Independent paleoecological study of the Lake, not performed under remediation investigations |
| | | | 18 sediment surface samples | Metals | |
| 2001 | Presidio Trust | URS[d] | 80 samples from 15 sediment cores | Metals, TPH, VOCs, total cyanide. Select locations also analyzed for nitrates, pesticides, grain size, moisture content. | |
| | | | 4 samples from 3 storm drain inlets | Metals, TPH, cyanide | |
| 2004 | Presidio Trust | URS[e] | 82 samples from 25 sediment cores | Metals, organochlorine pesticides, cyanide | |
| 2011 | Presidio Trust | Kennedy/Jenks[f] | 15 samples from 6 locations in southern portion of Lake | Metals, organochlorine pesticides, TPH, moisture content | |

# Table 2-1: Summary of Sediment Sampling Activities in Mountain Lake

**Notes:**

(a) Source is *Final Remedial Investigation Report, Presidio Main Installation* (Dames & Moore 1997).
(b) Source is *Report of Sediment Sampling at Mountain Lake* (EKI 1998).
(c) Source is *Evidence of Environmental Change over the Last 20 Years at Mountain Lake, in the Northern San Francisco Peninsula* (Reidy 2001).
(d) Source is *Mountain Lake Sediment Investigation, Final Report* (URS 2001).
(e) Source is *Remedial Investigation Summary and Risk Evaluation, Mountain Lake, Presidio of San Francisco* (URS 2011).
(f) Source is Letter Report – Sediment Sampling at Mountain Lake, The Presidio Trust, San Francisco, California (Kennedy/Jenks 2012).
(g) SVOCs = semivolatile organic compounds.
(h) VOCs = volatile organic compounds.
(i) PCBs = polychlorinated biphenyls.
(j) TPH = total petroleum hydrocarbons.

# Table 2-2: Summary of Surface Water and Sediment Elutriate Sampling Activities in Mountain Lake

| Sample Collection Date | Sponsor | Samples Collected By | Number of Samples | Type | Analytes |
|---|---|---|---|---|---|
| 1990-1995 | U.S. Army | Dames & Moore[a] | 6 | Surface water | Inorganics, SVOCs[d], VOCs[e], organochlorine pesticides, herbicides, PCBs[f], TPH[g] |
| 2000 | Presidio Trust | EKI[b] | 6 | Surface water | Cyanide, lead, chlorinated pesticides |
| 2004 | Presidio Trust | URS[c] | 7 | Sediment Elutriate | Leachable metals |

**Notes:**

(a) Source is *Final Remedial Investigation Report, Presidio Main Installation* (Dames & Moore 1997).
(b) Source is *Draft Sampling Results for Selected Public Health Service Hospital Sites* (EKI 2000).
(c) Source is *Remedial Investigation Summary and Risk Evaluation, Mountain Lake, Presidio of San Francisco* (URS 2011).
(d) SVOCs = semivolatile organic compounds.
(e) VOCs = volatile organic compounds.
(f) PCBs = polychlorinated biphenyls.
(g) TPH = total petroleum hydrocarbons.

# Table 3-1: Mountain Lake Sediment Cleanup Levels

| Potential Chemical of Concern | Ecological Cleanup Level (mg/kg)[a] | |
|---|---|---|
| | Serpentinite | Colma |
| **Inorganic Chemicals** | | |
| Arsenic | 19 | 19 |
| Cadmium | 1.9 | 1.1 |
| Chromium | 1,700 | 140 |
| Copper | 114 | 114 |
| Lead | 82 | 82 |
| Mercury | 0.62 | 0.62 |
| Nickel | 4,500 | 110 |
| Selenium | 1.6[b] | 1.6[b] |
| Vanadium | 74 | 90 |
| Zinc | 230 | 230 |
| **Pesticides** | | |
| alpha-BHC | 0.008 | 0.008 |
| beta-BHC | 0.013 | 0.013 |
| gamma-BHC (Lindane) | 0.003 | 0.003 |
| delta-BHC | 0.0075 | 0.0075 |
| Chlordane | 0.01 | 0.01 |
| 4,4'-DDD | 0.016 | 0.016 |
| **Petroleum Compounds** | | |
| TPHd | 144 | 144 |
| TPHmo | 144 | 144 |

**Notes:**

(a) Cleanup levels are based upon ecological freshwater sediment criteria and background metals concentrations for the Colma and Serpentinite formations. Source is Table 7-3 and Table 7-5 from *Development of Presidio-Wide Cleanup Levels for Soil, Sediment, Groundwater and Surface Water* (EKI 2002). Colma formation and serpentinite formations are considered likely, based upon previous sediment sampling, to be encountered during sediment remediation of Mountain Lake. Other soil types, such as greenstone, are also expected to be encountered during remediation.

(b) For selenium, cleanup level is based on special-status species (EKI 2002).

# Table 5-1: Applicable or Relevant and Appropriate Requirements

| ARAR | Citation | Description | ARAR Determination | Comments [a] |
|---|---|---|---|---|
| **CHEMICAL-SPECIFIC ARARs AND TBCs** | | | | |
| **Federal Chemical-Specific ARARs and TBCs** | | | | |
| Safe Drinking Water Act (SDWA) | 42 USC § 300g-1 | The National Contingency Plan (NCP) at 40 CFR §§300.43(e)(2)(i)(B)-(D) states that maximum contaminant level goals (MCLGs), established under the SDWA, that are set at levels above zero should be attained by remedial actions for surface water or groundwater that are current or potential sources of drinking water. For contaminants of concern (COCs) in groundwater that do not have MCLGs, or if the MCLGs have been set at zero, the remedial actions should achieve Maximum Contaminant Levels (MCLs). | Relevant and appropriate | Mountain Lake is located within the Lobos Creek groundwater basin, a drinking water supply. The surface water cleanup levels for Mountain Lake meet or are more stringent than Federal drinking water criteria (MCLs). |
| Residential Lead-Based Paint Hazard Reduction Act of 1992 (Title X of TSCA) | 15 U.S.C. §2681,2683, and 2688; 40 Code of Federal Regulations (CFR) Section 745.65(c) and 745.227(h)(4) | 66 Fed. Reg. 1206, 1238 (5 January 2001) revised 40 CFR Part 745 to establish a hazard standard of 400 mg/kg for lead in bare soil in a play area at residential sites and child-occupied facility sites. | Relevant and appropriate | Lead has been detected in sediment at Mountain Lake. While sediment in the lake is not in a play area at a residential site or a child-occupied facility, freshwater sediment cleanup levels for Mountain Lake meet or are more stringent than residential land use levels. |
| U.S. EPA Office of Solid Waste and Emergency Response (OSWER) Lead Guidance | OSWER Directive #9355.4-12 (Revised Interim Soil Lead Guidance for CERCLA sites and RCRA Corrective Action Facilities, July 1994); OSWER #9200.4-27P (Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities, August 27, 1998) | Outlines approach to determining protective levels for lead in soils at CERCLA sites and identifies 400 parts per million (ppm) as screening level for lead in soil for residential land use. | To be considered | Lead has been detected in sediment at Mountain Lake. While land use at Mountain Lake is recreational, freshwater sediment cleanup levels for Mountain Lake meet or are more stringent than residential land use levels. |
| U.S. EPA, Region 9, Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites | U.S. EPA (May, 2010) (http://www.epa.gov/region9/superfund/prg/index.html) | RSLs are risk-based concentrations which can be used to evaluate whether a chemical release may pose a risk that warrants further investigation. RSLs are not legally enforceable standards. They are used for site "screening" and should not be used as cleanup levels for a CERCLA site until the other remedy selections identified in the relevant portions of the National Contingency Plan (NCP), 40 CFR Part 300, have been evaluated and considered. | To be considered | The cleanup levels for the Presidio were developed using a risk-based approach similar to the development of RSLs. |
| California Toxics Rule (CTR) | 33 USC §1313(c)(2)(B); 40 CFR §131.38(b)(1), (2) | The California Toxics Rule sets forth freshwater and saltwater criteria for a number of metals and chemical compounds. | Applicable | Mountain Lake is located within the Lobos Creek groundwater basin. The surface water cleanup levels for Mountain Lake meet or are more stringent than the criteria established in the CTR. |
| **State Chemical-Specific ARARs and TBCs** | | | | |
| California Regional Water Quality Control Board, San Francisco Bay Region (Water Board), Water Quality Control Plan (Basin Plan) – Chapter 3: Water Quality Objectives | Porter-Cologne Water Quality Control Act promulgated under California Water Code § 13240-13241, Basin Plan, Chapter 3 | Chapter 3 of the Basin Plan sets forth water quality objectives for surface water and groundwater. | Relevant and appropriate | Mountain Lake is located within the Lobos Creek groundwater basin. The surface water cleanup levels for Mountain Lake meet or are more stringent than the criteria established in the Basin Plan. |

# Table 5-1: Applicable or Relevant and Appropriate Requirements

| ARAR | Citation | Description | ARAR Determination | Comments [(a)] |
|---|---|---|---|---|
| Domestic Water Quality and Monitoring Regulations | Cal. Health and Safety Code §11635, 22 CCR §§64431, 64432, 64432.1, 64432.2, 64444, 64444.5 | These sections of the California Code of Regulations, part of the state water quality standards, establish MCLs for organic and inorganic chemicals in drinking water. | Relevant and appropriate where, on a chemical by chemical basis, the standard is more stringent than federal standard | Mountain Lake is located within the Lobos Creek groundwater basin, a drinking water supply. The surface water cleanup levels for Mountain Lake meet or are more stringent than California drinking water criteria (MCLs). |
| California Department of Public Health (CDPH) Drinking Water Program | CDPH Drinking Water Notification Level | Notification levels are health-based advisory levels established by CDPH for chemicals in drinking water that lack maximum contaminant levels (MCLs). When chemicals are found at concentrations greater than their notification levels, certain requirements and recommendations apply. | To be considered | Mountain Lake is located within the Lobos Creek groundwater basin, a drinking water supply. The surface water cleanup levels for Mountain Lake meet or are more stringent than notification levels. |
| Safe Drinking Water Act (SDWA) | Cal. Health and Safety Code § 116375, 22 CCR § 64449 | This section of the SDWA establishes secondary MCLs for chemicals in drinking water that adversely affect its odor, taste, or appearance. They are desirable goals and are not enforceable. | To be considered | Mountain Lake is located within the Lobos Creek groundwater basin, a drinking water supply. The surface water cleanup levels for Mountain Lake meet or are more stringent than California drinking water criteria (MCLs). |
| State Water Resources Control Board (SWRCB) Resolution No. 88-63 | Porter-Cologne Water Quality Control Act promulgated under California Water Code § 13140 | The resolution states that all surface and groundwaters of the State are considered to be suitable, or potentially suitable, for municipal or domestic water supply, unless the surface or groundwaters contain total dissolved solids ("TDS") in excess of 3,000 milligrams per liter ("mg/L"), the waters contain high levels of contamination, or the water source does not provide sufficient water to supply a well capable of producing 200 gallons per day. | To be considered | Mountain Lake is located within the Lobos Creek groundwater basin, a drinking water supply. The cleanup standards of SWRCB Resolution No. 88-63 have been incorporated into the cleanup criteria for Mountain Lake. The surface water cleanup levels for Mountain Lake meet or are more stringent than California drinking water criteria (MCLs). |
| Water Board Order No. R2-2003-0080, Revised Site Cleanup Requirements and Rescission of Order No. 91-082 and Order No. 96-070. 96-070; U.S. Army Corps of Engineers (USACE), Fuel Product Action Level Development Report (FPALDR), Final, Oct. 1995 (soil cleanup levels) | Porter-Cologne Water Quality Control Act promulgated under California Water Code | Order No. R2-2003-0080 includes soil cleanup levels for petroleum hydrocarbons and a number of petroleum-related constituents including carcinogenic and noncarcinogenic polynuclear aromatic hydrocarbons (PAHs), benzene, toluene, ethylbenzene, xylenes (BTEX), methyl tert-butyl ether (MTBE), and lead: soil cleanup levels for the protection of human health (Table 1); soil cleanup levels for the protection of ecological receptors (Table 2); soil cleanup levels for the protection of water quality at detectable levels (Table 3); soil cleanup levels for the protection of water quality at drinking water standards (Table 4); and soil cleanup levels for Crissy Field (Table 5). | To be considered | The cleanup levels for petroleum hydrocarbons and related constituents in sediment for Mountain Lake meet or are more stringent than Board Order R2-2003-0080 Site Cleanup Requirements and FPALDR soil cleanup levels. |
| | | Order No. R2-2003-0080 also includes point-of-compliance concentrations for soil and water for petroleum hydrocarbons, BTEX, and/or MTBE for the saltwater protection zone of the Presidio (Table 6) and the proposed freshwater stream (Table 7). | | Mountain Lake is not located within an ecological protection zone as defined in Order No. R2-2003-0080. |
| | | Order No. R2-2003-0080 also specifies that groundwater cleanup levels shall meet drinking water standards (i.e. MCLs) using EPA/California MCLs as a basis. | | Mountain Lake is located within the Lobos Creek groundwater basin, a drinking water supply. The surface water cleanup levels for Mountain Lake meet or are more stringent than Federal and California drinking water criteria (MCLs). |
| Water Board Environmental Screening Levels (ESLs) | Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, Interim Final, May 2008 (http://www.swrcb.ca.gov/sanfranciscobay/esl.shtml) | ESLs can be used to evaluate whether a chemical release may pose a risk that warrants further investigation. ESLs are not legally enforceable standards. They are used for site "screening". | To be considered | The cleanup levels for the Presidio were developed using a risk-based approach similar to the development of ESLs. |

# Table 5-1: Applicable or Relevant and Appropriate Requirements

| ARAR | Citation | Description | ARAR Determination | Comments [a] |
|---|---|---|---|---|
| DTSC Leadspread, Computer Model, Version 7.0 | Leadspread 7, DTSC Lead Risk Assessment Spreadsheet (http://www.dtsc.ca.gov/AssessingRisk/leadspread.cfm) | A State of California computer model which calculates human health preliminary remediation goals for lead in soil based on DTSC default factors and exposure assumptions based on planned land-use. | To be considered | Lead has been detected in sediment at Mountain Lake. Land use at Mountain Lake is recreational. The recreational cleanup level for lead in soil at the Presidio, calculated with the DTSC Leadspread model, is 500 mg/kg. |
| Presidio-Wide Cleanup Levels | *Development of Presidio-Wide Cleanup Levels for Soil, Sediment, Groundwater, and Surface Water*, October 2002 (Revised May 2006) | The Cleanup Level Document presents cleanup levels for soil, sediment, groundwater, and surface water that are protective of human health and ecological habitat at the Presidio. The cleanup levels were developed under DTSC guidance and are anticipated to be applied to new decision documents for the Presidio. | To be considered | The sediment and surface water cleanup levels for Mountain Lake are based on the criteria established in the Cleanup Level Document. |
| **LOCATION-SPECIFIC ARARs AND TBCs** | | | | |
| **Federal Location-Specific ARARs and TBCs** | | | | |
| National Historic Preservation Act (NHPA) | 16 USC §§ 470–470x-6; 36 CFR §§ 800.1–.16, 60.2 (effect of listing in National Register), 65.2 (effect of designation as National Historic Landmark), 68.1–.4 (Dept. of Interior [DOI] standards for historic property projects assisted by the National Historic Preservation Fund) | This Act is applicable to the entire Presidio, since it is designated in the National Register as a historic landmark. | Applicable | |
| | The Trust Programmatic Agreement | The Programmatic Agreement among the Advisory Council on Historic Preservation, the State Historic Preservation Officer, the Trust and NPS, sets forth the procedures to implement the historic compliance process of Section 106 of the NHPA. | To be considered | . |
| Archeological Resources Protection Act (ARPA) | 16 USC §§ 470aa–470mm; 43 CFR §§ 7.1–.37 (DOI regulations for protection of archeological and historical resources) | ARPA prohibits excavation of, damage to, or destruction of archeological resources on public lands without a permit issued by the federal land manager. | Applicable | The procedural permit requirement is not applicable to on-site remedial action. However, the substantive requirements of ARPA apply to remedial actions affecting archeological resources, Native American resources, or artifacts at the Presidio. |
| Federal Endangered Species Act (ESA) | 16 USC §§ 1531(c)(1); 1532; 1533(d); 1536(a)–(d), (g), (h); 1538(a)(1)(B), (a)(1)(G), (a)(2)(B), (a)(2)(E); 1539(a), (c), (d); 1540(a)–(c); 50 CFR §§ 11.1–11.26, 13.1–13.29, 402.01–402.16, 424.01–424.21 | Under the ESA, federal agencies must make sure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or cause the destruction or adverse modification of critical habitat. Two federal endangered or threatened bird species have been recorded as casual visitors to the Presidio and vicinity: marbled murrulet, and snowy plover. Four federal threatened or endangered plant species have been identified at various locations at the Presidio: Raven's manzanita, Presidio clarkia, Marin dwarf flax, and San Francisco lessingia. | Applicable | Threatened or endangered species and critical habitat for the species under the ESA are not known to occur in the vicinity of Mountain Lake. |
| Archeological and Historic Preservation Act (AHPA) | 16 USC §§ 469–469c-2; 43 CFR §§ 7.1-3.7 (DOI regulations for protection of archeological and historic resources) | AHPA requires federal agencies, prior to engaging in activities that could cause irreparable loss of scientific, prehistorical, historical, or archeological data, to notify the Secretary of the Interior of the threatened data and the proposed activities, and to preserve the data or request that the Secretary do so. The DOI must conduct a survey and recovery effort if it finds the data are significant and may be irrevocably lost without such action. | Applicable | |

# Table 5-1: Applicable or Relevant and Appropriate Requirements

| ARAR | Citation | Description | ARAR Determination | Comments [(a)] |
|---|---|---|---|---|
| Native American Graves Protection and Repatriation Act (NAGPRA) | 25 USC §§ 3001-3013; 43 CFR §§ 10.1-.17 | NAGPRA establishes a system for determining ownership and proper disposal/removal of Native American cultural items discovered in federal lands and requires inventorying and identification of those items. Such items must be returned to the relevant tribe. | Applicable | |
| Migratory Bird Treaty Act | 16 USC §§ 703–708; 50 CFR §§ 10.12, 10.13 | The Act prohibits the taking of migratory birds, their nests and their eggs, unless permitted by the Secretary of the Interior. Migratory birds have been observed at the Presidio. | Applicable | |
| Golden Gate National Recreation Area (GGNRA) Act | 16 USC § 460bb–460bb-5, purposes of Section 1 | Among the purposes stated in Section 1 of the GGNRA Act are to preserve the recreation area, to the degree possible, in its natural setting, and protect it from development and uses that would destroy the scenic beauty and natural character of the area. | Applicable | |
| Presidio Trust Act | The Presidio Trust Act, Section 104(a) of Public Law 104-333 as amended; 16 U.S.C §460bb appendix | The Trust shall manage the leasing, maintenance, rehabilitation, repair, and improvement of property within the Presidio under its administrative jurisdiction using the authorities provided in this section, which shall be exercised in accordance with the purposes set forth in Section 1 of the act, entitled "An Act to establish the Golden Gate National Recreation Area in the State of California, and for other purposes," approved 27 October 1972 (Public Law 92-589; 86 Stat. 1299; 16 USC 460bb), and in accordance with the general objectives of the General Management Plan for the Presidio. Resolution 99-11 of the Presidio Trust Board sets forth the general objectives which are not explicit in the General Management Plan Amendment. | Applicable | |
| Vegetation Management Plan (VMP) | *Presidio of San Francisco Vegetation Management Plan and Environmental Assessment*, December 2001 | The VMP guides the management of vegetative resources within the Presidio, including enhancing, restoring, and rehabilitating native and planted vegetation at the Presidio. The VMP establishes the vegetative zones for the Presidio. | To be considered | |
| Presidio Trust Management Plan (PTMP) | *Presidio Trust, Presidio Trust Management Plan, Land Use Policies for Area B of the Presidio of San Francisco*, May 2002 | The PTMP provides guidelines for the management and improvement of Area B of the Presidio. The PTMP emphasizes preservation and enhancement of the Presidio's cultural, natural, scenic, and recreational resources for public use. | To be considered | |
| Federal Coastal Zone Management Act (CZMA); California Government Code, title 7.2 (including McAteer-Petris Act); San Francisco Bay Conservation and Development Commission's (BCDC) San Francisco Bay Plan. | 16 USC 1453, 1456; Cal. Gov. Code 66602.1, 66605, 66632; Cal. Code Regs., title 14 10300-10316; BCDC's San Francisco Bay Plan's water Quality Policies (pp.10-11), Recreation Policies (pp. 32-35), Public Access Policies (pp.36-37) | Remedial actions that affect any land or water use or natural resource of the coastal zone must comply with CZMA section 307 which mandates that federal agency activities be consistent to the maximum extent practicable with the enforceable policies of approved State management programs. BCDC's San Francisco Bay Plan policies include: protecting and increasing wetlands, maintenance of Bay water quality, protecting the Bay through erosion control, minimizing the impact of polluted runoff from projects, increasing recreational opportunities adjacent to the Bay, and providing maximum public access to the Bay. | Applicable | As federal property, by definition Mountain Lake is excluded from the coastal zone. Further, remediation activities should not result in coastal effects since Mountain Lake is an isolated water of the U.S. |

# Table 5-1: Applicable or Relevant and Appropriate Requirements

| ARAR | Citation | Description | ARAR Determination | Comments [a] |
|---|---|---|---|---|
| Clean Water Act (CWA) | 33 USC §1344; 33 CFR §323, 320-330; 40 CFR 230, 232 | Section 404 of the CWA regulates the placement of dredged and fill material into waters of the U.S., including wetlands. The Act authorizes the issuance of permits for such discharges as long as the proposed activity complies with environmental requirements specified in Section 404(b)(1) of the CWA. The U.S. Army Corps of Engineers (USACE) has primary responsibility for the permit program and issues Section 404 permits. Section 404 of the CWA requires that states certify compliance of federal permits or licenses with state water quality requirements and other applicable state laws. Under Section 401, states have authority to review any federal permit or license that may result in a discharge to wetlands and other waters under state jurisdiction. | Applicable | The procedural permit requirement is not applicable to on-site remedial action at Mountain Lake. Potential USACE jurisdictional wetlands cover 2.10 acres around the perimeter of the lake. The Mountain Lake East Arm wetland is approximately 0.40 acre and extends across a depressional area on either side of the East Arm drainage. |
| Federal wetlands regulations and state wetland policy | Executive Order 11990; 40 CFR § 6.302.(a), (d), (g); CA Fish & Game Commission's Wetlands Policy | Executive Order 11990 requires federal agencies conducting certain activities to avoid, to the extent practicable, adverse impacts associated with the destruction or loss of wetlands. The Cal. Dept. of Fish & Game Commission's wetlands policy instructs the Dept. of Fish & Game to recommend protection, preservation, restoration, enhancement and expansion of wetlands when the Dept. of Fish & Game acts in an advisory role. | Executive Order - Relevant and appropriate<br>CA Wetlands Policy – To be considered | Potential USACE jurisdictional wetlands cover 2.10 acres around the perimeter of the lake. The Mountain Lake East Arm wetland is approximately 0.40 acre and extends across a depressional area on either side of the East Arm drainage. Approximately 3.13 acres of the Mountain Lake area, including the East Arm, contains USFWS wetland habitat vegetation. |
| **State Location-Specific ARARs and TBCs** | | | | |
| Basin Plan, Wetlands Protection Management | Porter-Cologne Water Quality Control Act promulgated under California Water Code, § 13240-13241, Basin Plan, pp. 4-49 to 4-51 | The Basin Plan reaffirms the goal of the California Wetlands Conservation Policy of ensuring no net loss of wetlands. | To be considered | Potential USACE jurisdictional wetlands cover 2.10 acres around the perimeter of the lake. The Mountain Lake East Arm wetland is approximately 0.40 acre and extends across a depressional area on either side of the East Arm drainage. Approximately 3.13 acres of the Mountain Lake area, including the East Arm, contains USFWS wetland habitat vegetation. |
| California Regulations for Discovery of Human Remains | Cal. Health & Safety Code §§ 7050.5 | The Cal. Health & Safety Code establishes intentional disturbance, mutilation, or removal of interred human remains as a misdemeanor. This Code requires that further excavation or disturbance of land, upon discovery of human remains outside of a dedicated cemetery, cease until a county coroner makes a report. This Code requires a county coroner to contact the Native American Heritage Commission within 24 hours if the coroner determines that the remains are not subject to his or her authority and if the coroner recognizes the remains to be those of a Native American. | To be considered | |
| California Endangered Species Act (CESA) | Cal. Fish & Game Code §§ 2053–2054, 2081, 2080.1, 2081.1; 14 CCR §§ 670.2, 670.5, 783.1-783.6; Cal. Fish & Game Code § 2014 | The California ESA provides authority similar to the Federal ESA for the protection of threatened and endangered species listed by the State. Four California endangered or threatened plant species have been identified at the Presidio: Raven's Manzanita, Presidio clarkia, Marin dwarf flax, and San Francisco Lessingia. Three California endangered or threatened bird species have been recorded as casual visitors to the Presidio and vicinity: bald eagle, marbled murrulet, and willow flycatcher. | To be considered | Threatened or endangered species under the California ESA are not known to occur in the vicinity of Mountain Lake. |
| California Native Plant Protection Act | Cal. Fish & Game Code § 1908; 14 CCR §§ 783.1–783.6 | The California Native Plant Protection Act prohibits the taking of endangered or rare native plants, unless authorized by an incidental take permit. The Presidio has a number of endangered or rare plants specified under the California Native Plant Protection Act. | To be considered | Endangered or rare native plant species under the California Native Plant Protection Act are not known to occur in the vicinity of Mountain Lake. |
| California Fish & Game Code regarding protection of birds, mammals, reptiles, or amphibia | Cal. Fish & Game Code §§ 3503, 3503.5, 3511, 3513; 14 CCR § 747 | The California Fish & Game Code prohibits taking, possessing, or destroying certain birds, their nests, and their eggs; mammals; reptiles; or amphibia. Migratory and other birds have been observed at the Presidio. Remedial actions that include removal of vegetation that may provide nests for migratory birds may require additional review. | To be considered | |

# Table 5-1: Applicable or Relevant and Appropriate Requirements

| ARAR | Citation | Description | ARAR Determination | Comments [a] |
|---|---|---|---|---|
| **ACTION-SPECIFIC ARARs AND TBCs** | | | | |
| **Federal Action-Specific ARARs and TBCs** | | | | |
| Resource Conservation and Recovery Act (RCRA) | 40 CFR §§260-299; Subtitle C (hazardous waste requirements); State of California citation: Cal. Health & Safety Code, Title 22 | RCRA is the primary federal law governing the disposal of hazardous and non-hazardous or municipal solid waste passed by Congress in 1976 and amended in 1984 by Hazardous and Solid Waste Amendments (HSWA).<br><br>RCRA Subtitle C sets standards for the classification of hazardous waste, and requirements governing handling, management, transportation, treatment, and off-site disposal of these wastes.<br><br>As specified in the Consent Agreement, the Trust addresses releases of (1) hazardous substances and hazardous waste at the Presidio under its hazardous substances and hazardous waste program overseen by the DTSC; and (2) non-hazardous petroleum hydrocarbons at the Presidio under its petroleum program overseen by the Water Board. | Relevant and appropriate | |
| | 40 CFR §§257-258; Subtitle D (non-hazardous or municipal solid waste requirements); State of California citation: Cal. Health & Safety Code, Title 27 | RCRA Subtitle D focuses on state and local governments as the primary planning, regulating, and implementing entities for the management of non-hazardous solid waste. Under Subtitle D, EPA developed federal criteria for the proper design and operation of municipal solid waste landfills (MSWLFs) and other solid waste disposal facilities. Pursuant to 42 USC § 7926, the State of California is authorized to implement the federal RCRA Program for solid waste. Federal statutes may apply to areas not covered by the state program, or where incorporated by reference. | Relevant and appropriate | |
| Toxic Substances Control Act (TSCA) | 15 USC §§ 2602, 2605(e) (regulation of polychlorinated biphenyls [PCBs]); 40 CFR 761.1-761.3 (definitions) & Subparts C (§§ 761.40-.45)(marking of PCBs and PCB items), D (§§ 761.50-.79) (storage and disposal of PCBs), N-R (§§ 761.260-.359) (sampling and analysis of PCB waste | TSCA regulates the use and disposal of various chemicals, including PCBs. Subpart D of 40 CFR Part 761 outlines disposal and cleanup procedures for wastes with a PCB concentration of at least 50 ppm [40 CFR §§ 761.60-.61] and prohibits the unpermitted discharge of PCBs to navigable waters or a treatment works at more than 3 parts per billion (ppb) concentration [id. § 761.50(a)(3)]. Certain PCBs in soil must be cleaned up and disposed of in accordance with Section 761.61. Certain liquid PCBs must be incinerated or otherwise disposed of in accordance with Section 761.60(a) or (e) [id. § 761.61(b)]. TSCA also contains specified requirements for labeling of containers and equipment with PCB-containing materials, and of transport vehicles carrying a certain amount of liquid PCBs (id. § 761.40). | Relevant and appropriate | PCBs are not chemicals of concern at Mountain Lake. |
| Clean Water Act (CWA) | 33 USC §1342 | Section 402 of the CWA regulates discharges of pollutants under the National Pollutant Discharge Elimination System (NPDES). The storm water discharges program is regulated by the State Water Board for certain municipal, industrial, and construction storm water discharges through NPDES permits. NPDES permits include requirements to prevent or reduce discharges of pollutants that cause or contribute to violations of water quality objectives. | Relevant and appropriate | The procedural permit requirement is not applicable to on-site remedial action at Mountain Lake. |

# Table 5-1: Applicable or Relevant and Appropriate Requirements

| ARAR | Citation | Description | ARAR Determination | Comments [a] |
|---|---|---|---|---|
| Fish and Wildlife Coordination Act | 16 USC §§ 661-663(c) | If stream realignment or modification is proposed or authorized by a Federal agency in an area not under its land management authority, then 16 USC § 662(a) requires the Federal agency to consult with U.S. Fish and Wildlife Service and the DOI to prevent loss or damage to wildlife as a result of the project. Under 16 USC § 662(h), projects carried out by Federal agencies with respect to Federal lands under their jurisdiction are exempt from and not applicable to these provisions. | To be considered | |
| **State Action-Specific ARARs and TBCs** | | | | |
| Consent Agreement for the Remediation of Hazardous Substances at the Presidio of San Francisco (Consent Agreement) | Consent Agreement Among the California Department of Toxic Substances Control, the Presidio Trust, and the US Department of the Interior, National Park Service for the Remediation of Hazardous Substances at the Presidio of San Francisco (August 30, 1999) | The Consent Agreement establishes responsibilities and procedures between these parties for cleanup of releases of hazardous substances and hazardous waste at the Presidio under CERCLA and RCRA, specifically governing cleanup of nine Operable Units (OUs).<br><br>The Trust addresses releases of hazardous substances and hazardous waste at the Presidio under its hazardous substances and hazardous waste program overseen by the DTSC. The definition of hazardous substances governed under CERCLA excludes petroleum hydrocarbons, as specified in the NCP at 40 CFR, Part 300.5. Accordingly, the Trust addresses releases of petroleum hydrocarbons at the Presidio under its petroleum program overseen by the Water Board. | To be considered | |
| Institutional controls on soil and groundwater | California Civil Code § 1471; Cal. Health & Safety Code § 25355.5(a)(1)(C); CCR tit. 22 § 67391.1(e) | Provides conditions under which land use restrictions will apply to successive owners of land. The substantive provision is the following general narrative standard: "to do or refrain from doing some act on his or her own land…where (c) each such act relates to the use of land and each such act is reasonably necessary to protect present or future human health or safety of the environment as a result of the presence of hazardous materials, as defined in § 25260 of the Cal. Health & Safety Code." This language provides authority for establishing a durable institutional control that will be implemented through incorporation of restrictive environmental covenants that run with the land in both the federal deed at the time of transfer of the property and in the Covenant to Restrict Use of Property with DTSC to be executed at the time of transfer. Whenever DTSC determines that it is not feasible to record a land use covenant for property owned by the federal government, such as transfers from one federal agency to another, DTSC and federal government shall use other mechanisms to ensure that future land use will be compatible with the levels of hazardous materials, hazardous wastes or constituents, or hazardous substances which remain on the property. Examples include: amendments to the federal government facility master plan, physical monuments, or agreements between the federal government facility and DTSC.<br><br>The Presidio Trust's LUCMRR for Area B serves as the implementation and enforcement plan to meet the requirements of this Code. The LUCMRR describes the procedures used to implement LUCs at Area B sites at the Presidio. | Relevant and appropriate | |
| Basin Plan - Chapter 4: Effluent Limitations | Porter-Cologne Water Quality Control Act promulgated under California Water Code § 13240-13241, Basin Plan, pages 4-8 to 4-11 | Limitations to construction-related storm water discharges are described in this provision. | To be considered | |

# Table 5-1: Applicable or Relevant and Appropriate Requirements

| ARAR | Citation | Description | ARAR Determination | Comments [a] |
|---|---|---|---|---|
| Discharge of Treated Groundwater Table 4-1: Discharge Prohibitions | Porter-Cologne Water Quality Control Act promulgated under California Water Code § 13240-13241, Basin Plan, pp. 4-17 to 4-18; Table 4-1 | Table 4-1 more broadly describes discharge prohibitions (e.g., with respect to toxic substances, solid wastes, silt, sediments, oil, and petroleum by-products). Page 4-17 of the Basin Plan refers to SWRCB Resolution No. 88-160, Disposal of Extracted Groundwater from Cleanup Projects, which urges dischargers of groundwater extracted from site clean-up projects to reclaim their effluent. It states that when reclamation is not feasible, discharges must be piped to a municipal treatment plant or discharged under a National Pollutant Discharge Elimination System (NPDES) permit authorizing the discharge from these sites. | To be considered | |
| Surface Water Protection | Porter-Cologne Water Quality Control Act promulgated under California Water Code, § 13240-13241, Basin Plan pp. 4-28, 4-32, 4-40 to 4-41 | Surface Water Protection and Management through nonpoint source control is regulated by the Water Board. Under the Construction General Permit 99-08-DWQ, the Water Board requires a Notice of Intent (NOI) to be filed prior to construction, a Storm Water Pollution Prevent Plan (SWPPP) to be prepared and implemented, and a Notice of Termination to be filed upon construction completion for construction activities involving disturbance of one acre or greater total land. Permit conditions address pollutant and waste discharges occurring during construction activities and the discharge of pollutants in runoff after construction. The Erosion and Sediment Control program establishes guidelines for the regulation of erosion and sedimentation for the protection of beneficial uses of water due to the impairment by sediment. | To be considered | The procedural permit requirement is not applicable to on-site remedial action at Mountain Lake. |
| Hazardous Waste Requirements - Generation, Transport, and Disposal Regulations | State of California citation: Cal. Health & Safety Code §§ 25100–25249, 25250–25250.26, 25260–25929; 22 CCR §§ 66260.1–68500.35. Federal citation: 42 USC §§ 6901–6991i; 40 CFR Parts 260–282. §§ 25100-25166.5, 25179.1–.12 (land disposal restrictions [LDRs]), 25244–25244.24 (waste reduction and recycling); 22 CCR §§ 66260.10–66262.41, 66264.1–.172, 66265.16–199; 66268.10–.44, .105–113 (LDRs + treatment standards); 49 CFR Parts 172, 173, 178, 179 (transportation) [incorporated by reference] | Pursuant to 42 USC § 7926, the State of California is authorized to implement the federal RCRA Program. Federal statutes may apply to areas not covered by the state program, or where incorporated by reference. | Relevant and appropriate | |
| Medical Waste Handling Requirements | Cal. Health and Safety Code 117600-118360; SF Municipal Health Code §§ 1501-1514 | Medical waste is required to undergo certain treatment requirements prior to disposal so that it can be characterized as a "solid" waste. Without such treatment, land disposal of medical waste is not permitted. | Relevant and appropriate | Based on existing site data, medical waste is not expected to be present at Mountain Lake. |
| Solid (Nonhazardous) Waste Requirements | Cal. Pub. Res. Code §40000-40201, 43000-44820; 27 CCR §§ 20005-20278 | These requirements govern disposal of nonhazardous solid waste and closure and post closure of solid waste management units. | To be considered | |
| Clean Closure Requirements | 27 CCR § 20380(d)(2); 27 CCR § 21090(f); CCR § 21410 | For clean closure, all waste, waste residues, contaminated containment systems components, contaminated subsoil, and all other contaminated materials are removed or decontaminated at closure pursuant to the specific requirements for landfills, etc. Clean closure renders the landfill no longer a threat to water quality. | Relevant and appropriate | |

# Table 5-1: Applicable or Relevant and Appropriate Requirements

| ARAR | Citation | Description | ARAR Determination | Comments [(a)] |
|---|---|---|---|---|
| Closure, Post-Closure Maintenance and Land Use Restrictions | Cal. Health and Safety Code §§ 25100-25124 (definitions), 25208-25208.17 (special rules for surface impoundments), 25209-25209.7 (land treatment units); 25245-25249 (financial responsibility and closure and maintenance of facilities), 25297.15, 25299.10-25299.99.3 (closure of/corrective action regarding USTs); 22 CCR §§ 66264.110-66264.120, 66265.110-66265.120; 67217 (post-closure care) | Provisions of the California Health and Safety Code and implementing regulations govern the method and timing of closure of certain types of locations with material above hazardous waste levels (e.g., landfills), and the required post-closure care of those facilities, including meeting associated financial requirements (H & S Code 25208-25208.17, 25245-25249 financial responsibility and closure and maintenance of facilities); 22 CCR 66264.110-66264.148, 66264.228 (surface impoundments); 22CCR 66264.258 (waste piles); H & S Code 25209-25209.7; 22CCR 66264.280 (land treatment units); 66264.310 (landfills); 66264.351 (incinerators). | To be considered | |
| Federal Clean Air Act (CAA), certain Bay Area Air Quality Management District (BAAQMD) Regulations | BAAQMD Regulations (see citations below) | Implementation of federal Clean Air Act requirements has been delegated, in part, to the State of California. The BAAQMD is the local implementing agency. Where BAAQMD requirements have been incorporated into the State Implementation Plan (SIP) and approved by EPA, they are federally-enforceable. Where BAAQMD requirements have not been incorporated into the SIP and approved by EPA, they are not federally enforceable. | Relevant and appropriate | |
| | Air Resources Board Executive Order G-02-026, Resolution 0128, Modification to Section 93105 of Title 17 of the CCR, Asbestos Air-borne Toxic Control Measures for Construction, Grading, Quarrying, and Surface Mining Operations | The Model Rule addresses potential asbestos releases that may occur during construction, grading, quarrying, and surface mining on areas that contain naturally occurring asbestos. Excavation in serpentine rock may result in the emission of naturally occurring asbestos. Such activities in areas larger than 1 acre will require a dust mitigation plan. | To be considered | |
| | BAAQMD Regulation 7; Regulation 8, Rule 40; and Regulation 9, Rule 2 | These requirements regulate the emission of odorous substances, organic compounds, and hydrogen sulfide. | Relevant and appropriate | |
| | BAAQMD Regulation 8, Rule 15 | BAAQMD Regulation 8, Rule 15 prohibits the use of certain types of liquid and emulsified asphalts (those that would emit large amounts of organic compounds). This rule was approved into the SIP on 22 March 1995, as amended by BAAQMD on 1 June 1994. | Relevant and appropriate | |
| California prohibitions on polluting waters of the State | Cal. Fish & Game Code § 5650 | Cal. Fish & Game Code § 5650(a) prohibits depositing enumerated substances, including "any substance or material deleterious to fish, plant life, or bird life" into the waters of the state. | To be considered | |
| Underground Storage Tank (UST) Regulations | California Code of Regulations, Title 23, Chapter 16, Article 11 | UST regulations protect waters of the state from discharges of hazardous substances from USTs. | Relevant and appropriate | No USTs are known to be present at Mountain Lake. |

# Table 5-1: Applicable or Relevant and Appropriate Requirements

| ARAR | Citation | Description | ARAR Determination | Comments [(a)] |
|---|---|---|---|---|
| Water Board Order No. R2-2003-080 | Porter-Cologne Water Quality Control Act promulgated under California Water Code Section 13304 | Order No. R2-2003-0080, Task 16, outlines requirements for Contingency Petroleum Sites. | To be considered | |
| San Francisco Bay Water Board UST Program | California Health and Safety Code, Division 20, Chapters 6.7 and 6.75 | The San Francisco Bay Water Board UST Program gives local agencies the authority to oversee investigation and cleanup of UST leak sites. | Relevant and appropriate | No USTs are known to be present at Mountain Lake. |
| City and County of San Francisco UST Regulations | San Francisco Health Code, Article 21 | These regulations describe procedures that the San Francisco Department of Public Health requires UST owners and operators to follow in removing USTs. | To be considered | No USTs are known to be present at Mountain Lake. |
| City of San Francisco Noise Regulations | City of San Francisco Code, Article 29 § 2907 and 2908 | These regulations describe provisions to regulate noise during operation of construction equipment and when performing construction work at night. Nighttime construction (between 8 p.m. to 7 a.m.) to erect, construct, demolish, excavate for, alter, or repair any building or structure if the noise level created thereby is in excess of the ambient noise level by 5 dBA requires a permit by the Director of Public Works. | To be considered | |
| San Francisco Public Utilities Commission, Permit No. 05-0246 Industrial User Class II Wastewater Permit, dated February 7, 2005 | San Francisco Municipal Code: Public Works Code, Article 4.1 | Permit No. 05-0246 from the San Francisco Public Utilities Commission authorizes the Trust to discharge wastewater into the City and County of San Francisco sewerage system, provided that such wastewater discharges are performed in accordance with the conditions set forth in this permit. Discharge to the sewer of groundwater from dewatering must meet these requirements. | To be considered | |
| Department of Fish and Game's Lake and Streambed Alteration Program | Cal. Fish & Game Code §§ 1600-1607 | These regulations require a state or local agency who proposes a project that will substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any stream or use materials from a streambed to notify the Dept. of Fish & Game before beginning the project. If Dept. of Fish & Game determines that the proposed project may substantially adversely affect existing fish or wildlife resources, the project proponent would need to obtain a Lake or Streambed Alteration Agreement from the Dept. of Fish & Game and the proposed project, unless it is otherwise exempt, would have to be reviewed in accordance with the California Environmental Quality Act (CEQA) (Pub. Resources Code, § 21000 et seq.). | To be considered | |

**Note:**

(a) Locations for remote staging areas will be identified prior to remedial activities. Remote staging areas will have similar action- and chemical-specific ARARs and TBCs as Mountain Lake. Location-specific ARARs and TBCs may be more or less stringent, depending on the location of the staging area.

# Table 6-1: Summary of GRAs, Technologies, and Process Options for Mountain Lake Sediment Remediation

| General Response Action | Remedial Technology | Process Option | Description |
|---|---|---|---|
| No Action | Not Applicable | Not Applicable | No remedial action is implemented. |
| Institutional Controls | Government Controls | Commercial Fishing Bans | Prohibits commercial fishing for specific species or sizes of fish or shellfish. |
| | | Water Body Use Restrictions | Prohibits navigation in the lake to prevent damage to caps, in-situ treatment, etc. |
| | Proprietary Controls | Land Use/Access Restrictions | Property restrictions (e.g., deed restrictions, easements, or covenants) associated with real estate documents or physical boundaries (i.e., fencing). |
| | Enforcement and Permit Tools | Permit Processes or Provisions of Administrative Orders or Consent Decrees | Legal tools (e.g., administrative orders, permits, or Consent Decrees) that limit specific site activities or place requirements on activities (e.g., monitoring and reporting). |
| | Informational Devices | Fish Consumption Advisories | Information provided to the public by government entities recommending acceptable fish consumption rates and preparation techniques. |
| Monitored Natural Recovery | Monitored Natural Recovery | Monitored Natural Recovery | Use of existing natural physical, chemical, and biological process to contain, destroy, or reduce contaminant bioavailability or toxicity. Involves extensive monitoring. |
| | Enhanced Monitored Recovery | Clean Material Layer | Enhancing monitored natural recovery through increased burial by placing a thin (e.g., six inches) layer of sand. |
| Containment in Place | Capping | Conventional Sand Cap | Physical isolation using a sand layer placed over contaminated sediment. |
| | | Conventional Sand/Clay Cap | Physical isolation using sand and clay layers placed over contaminated sediment. |
| | | Armored Cap | Physical isolation of contaminants using sand and rip rap layers placed over contaminated sediment. |
| | | Composite Cap (e.g. HDPE, Geotextile) | Introduction of heavy-duty composite mats into a typical cap cross section to provide further protection from damage by erosion, scouring, heavy equipment, or other forces. |
| | | Active Cap | Placing a reactive cap (e.g., activated carbon or organoclay) to reduce contaminant flux through the capping material. |

# Table 6-1: Summary of GRAs, Technologies, and Process Options for Mountain Lake Sediment Remediation

| General Response Action | Remedial Technology | Process Option | Description |
|---|---|---|---|
| In-Situ Treatment | Biological | Slurry Bioremediation | Enhancement of biological degradation by adding nutrients and other amendments to the sediment. |
| | | Phytoremediation | Planting vegetation that will take up contaminants. |
| | | Aerobic or Anaerobic Biodegradation | Biological degradation by microorganism in the presence or absence of oxygen. |
| | | Imbiber Beads | Absorption of organic contaminants onto spherical plastic particles. |
| | Physical-Immobilization | Solidification/Stabilization | Binding contaminants in the sediment by forming a solid matrix through the addition of reagents. |
| | | Vitrification | Application of high electrical current to heat sediment above 2,400°F to fuse it into a glassy solid. |
| | | Electrochemical Oxidation | Application of an electrical current to create redox reactions that degrade organic compounds. |
| | | Carbon/Other Amendments | Reduction in bioavailability of organic compounds by mixing granular activated carbon with sediment. |
| Removal | Dry Removal | Excavation | Diversion of water to create non-submerged conditions (i.e., installation of sheet piles coffer dams) and then sediment removal using conventional land-based equipment (e.g., excavators, backhoes, etc.). |
| | Wet Removal | Mechanical Dredging | Barge-based removal of sediment in in-situ conditions using clamshell or bucket type equipment, typically with barge transport and dewatering. |
| | | Hydraulic Dredging | Slurry removal of sediments using various cutter and suction heads (e.g., cutterhead, horizontal auger, plain suction, pneumatic, or specialty dredge), typically with pipeline transport and ex-situ treatment to dewater. |

# Table 6-1: Summary of GRAs, Technologies, and Process Options for Mountain Lake Sediment Remediation

| General Response Action | Remedial Technology | Process Option | Description |
|---|---|---|---|
| Disposal/ Confinement | Upland Commercial Landfill | Upland Commercial Landfill | Regulated and permitted disposal sites at which solid waste is buried between layers of soil and other materials to mitigate contamination of surrounding soil, groundwater, and surface water. |
| | Confined Aquatic Disposal | Confined Aquatic Disposal | Submerged pits that are filled and then covered with clean material (i.e., capped). |
| | Confined Disposal Facility | Confined Disposal Facility | A separate disposal facility specifically designed and constructed to mitigate transport of contaminants to surrounding soil and surface water. |
| Ex-Situ Treatment | Physical – Dewatering | In-Barge Dewatering | Passive gravity settling in a barge with slow release of elutriate back into the lake. |
| | | Lagoon Dewatering | Passive gravity settling in a diked confinement with periodic discharge of elutriate. |
| | | Geotextile Tube Dewatering | Dewatering through a geotextile membrane that allows water to pass but retains sediment particles. |
| | | Mechanical Dewatering | Dewatering using filter presses or similar equipment. |
| | | Reagent Dewatering | Additional of reagents to sediment slurry to chemically absorb excess water. |
| | | Particle Separation | Segregation of coarse grained material that may be less contaminated and potentially suitable for beneficial reuse. |
| | Physical - Immobilization | Cement Solidification/Stabilization | Use of Portland cement to solidify and stabilize contaminated sediments. |
| | | Sorbent Clay Solidification/Stabilization | Use of sorbent clays (i.e., bentonite) to solidify and stabilize contaminated sediments. |
| | | Asphalt Emulsion | Removal of water and binding of contaminants using asphalt emulsion. |
| | | Solar Detoxification | Use of concentrated sunlight to break down and destroy toxic compounds. |

# Table 6-1: Summary of GRAs, Technologies, and Process Options for Mountain Lake Sediment Remediation

| General Response Action | Remedial Technology | Process Option | Description |
|---|---|---|---|
| Ex-Situ Treatment (cont'd) | Biological Methods | Composting | Composting induced reduction in contaminant concentrations using large scale land treatment. |
| | | Biopiles | Biopile induced reduction in contaminant concentrations using large scale land treatment. |
| | | Fungal Biodegradation | Fungi induced reduction in contaminant concentrations using large scale land treatment. |
| | | Slurry-Phase Treatment | Biological treatment in slurry form. |
| | | Enhanced Biodegradation | Mixing sediment with oxygen, reducing agents, nutrients, and microorganisms to accelerate natural biodegradation processes. |
| | Chemical | Acid Extraction | Extracting contaminants from sediments by washing with acids. |
| | | Solvent Extraction | Extracting contaminants from sediments by washing with solvents. |
| | Physical – Separation | Sediment Washing | Washing sediments with water and an oxidizing agent to remove contaminants. |
| | Thermal Methods | Incineration | Decomposition of organic compounds at temperatures above 900°C (1,650°C). |
| | | Pyrolysis | Decomposition of organic compounds at temperatures above 430°C (800°F) in the absence of oxygen. |
| | | Thermal Desorption | Volatilization of organic compounds and water at low temperatures of 320 to 560°C (600 to 1,000°F) or high temperature with of 90 to 320°C (200 to 600°F)off gas transport and treatment (e.g. thermal oxidation or recovery unit). |
| | | High Pressure Oxidation | Use of high temperatures and pressures to break down organic compounds via wet air oxidation or supercritical water oxidation. |
| | | Vitrification | Contaminated sediments are heated in a rotary kiln or furnace at temperatures up to 1,600°C (2,900°F). |

## Table 6-2: Summary of Screening Evaluation

| General Response Action | Remedial Technology | Process Option | Effectiveness | Implementability | Cost | Screening Comments |
|---|---|---|---|---|---|---|
| No Action | Not Applicable | Not Applicable | **LOW:** Does not meet RAOs | **HIGH:** Does not require any effort to implement. | **LOW:** There are no associated costs. | Required for consideration by NCP. |
| Institutional Controls | Government Controls | Commercial Fishing Bans | **LOW:** Mountain Lake is not used for commercial fishing. Does not address exposure of ecological receptors to contaminants. Does not meet RAOs. | **HIGH:** Mountain Lake is not used for commercial fishing. | **LOW:** Mountain Lake is not used for commercial fishing. | Screened out due to limited effectiveness. |
| | | Water Body Use Restrictions | **LOW:** Mountain Lake is not used for recreational activities on the lake. Does not address exposure of ecological receptors to contaminants. Does not meet RAOs. | **HIGH:** Mountain Lake is not used for recreational activities on the lake. | **LOW:** Mountain Lake is not used for recreational activities on the lake. | Screened out due to limited effectiveness. |
| | Proprietary Controls | Land Use/Access Restrictions | **LOW:** Future use of Mountain Lake involves shoreline recreation that would be impeded by perimeter fencing. Does not address exposure of ecological receptors to contaminants. Does not meet RAOs. | **MODERATE:** Public resistance is anticipated to be high, which would likely impede implementation. | **LOW:** Depending on the construction details, fencing can generally be installed at a low cost. | Screened out due to limited effectiveness. |
| | Enforcement and Permit Tools | Permit Processes or Provisions of Administrative Orders or Consent Decrees | **LOW:** Land uses other than limited recreational and scenic are not contemplated for the lake currently or in the future. Does not address exposure of ecological receptors to contaminants. Does not meet RAOs. | **LOW:** Would required participated and coordination with DTSC to setup restrictions and requirements. No actual field work required. | **LOW:** Primarily administrative and oversight costs. | Screened out due to limited effectiveness. |
| | Informational Devices | Fish Consumption Advisories | **LOW:** Mountain Lake is not used for fishing. Does not address exposure of ecological receptors to contaminants. Does not meet RAOs. | **HIGH:** Mountain Lake is not used for fishing. | **LOW:** Mountain Lake is not used for fishing. | Screened out due to limited effectiveness. |
| Monitored Natural Recovery | Monitored Natural Recovery | Monitored Natural Recovery | **LOW:** Not anticipated to be effective for the principal contaminant, lead. Burial mechanism is not consistent with current and future lake function. Does not adequately address exposure of ecological receptors to contaminants. Unlikely to meet RAOs. | **HIGH:** Capital improvements are not required. Predictive modeling and development of a detailed and comprehensive monitoring program is required. | **MODERATE:** Predictive modeling and extensive ongoing monitoring of ecological quality parameters. | Screened out due to limited effectiveness. |
| | Enhanced Monitored Recovery | Clean Material Layer | **LOW:** Generally effective for organic contaminants and not anticipated to be effective for the principal contaminant, lead. Burial mechanism is not consistent with current and future lake function. Does not adequately address exposure of ecological receptors to contaminants. Unlikely to meet RAOs. | **MODERATE:** Installation of a thin sand layer is implementable with regards to erosion and slope stability issues. However, final installed sand layer configuration may be inconsistent with future lake beneficial uses. | **HIGH:** Requires material import, staging, and handling; careful installation and construction monitoring; extensive ongoing monitoring of ecological quality parameters. | Screened out due to limited effectiveness. |

## Table 6-2: Summary of Screening Evaluation

| General Response Action | Remedial Technology | Process Option | Effectiveness | Implementability | Cost | Screening Comments |
|---|---|---|---|---|---|---|
| Containment in Place | Capping | Conventional Sand Cap | **MODERATE:** May address exposure of ecological receptors to contaminants. However, may compromise ecological and hydrologic function of lake. May partially meet RAOs. | **MODERATE:** Engineered caps are implementable with regards to erosion and slope stability issues. However, final installed cap configuration may be inconsistent with future lake beneficial uses. | **HIGH:** Requires material import, staging, and handling; careful installation and construction monitoring; ongoing monitoring of cap integrity. | Retained in accordance with EPA recommendations (EPA 2005). |
| | | Conventional Sand/Clay Cap | **MODERATE:** May address exposure of ecological receptors to contaminants. Addition of clay is not responsive to principal contaminant, lead. May compromise ecological and hydrologic function of lake. May partially meet RAOs. | **MODERATE:** Engineered caps are implementable with regards to erosion and slope stability issues. However, final installed cap configuration may be inconsistent with future lake beneficial uses. | **HIGH:** Requires material import, staging, and handling; careful installation and construction monitoring; ongoing monitoring of cap integrity. | Screened out as redundant with conventional sand cap. |
| | | Armored Cap | **MODERATE:** May address exposure of ecological receptors to contaminants. Generally does not provide enhanced effectiveness compared to conventional sand cap. However, may be required to address limited areas with slope stability sensitivities. May compromise ecological and hydrologic function of lake. May partially meet RAOs. | **MODERATE:** Engineered caps are implementable with regards to erosion and slope stability issues. However, final installed cap configuration may be inconsistent with future lake beneficial uses. | **HIGH:** Requires material import, staging, and handling; careful installation and construction monitoring; ongoing monitoring of cap integrity. | Retained for limited application in areas of potential submerged slope stability issues. |
| | | Composite Cap (e.g. HDPE, Geotextile) | **MODERATE:** May address exposure of ecological receptors to contaminants. Generally does not provide enhanced effectiveness compared to conventional sand cap. In general, the lake is a low energy environment in which erosion is not anticipated to significantly compromise an installed cap. May compromise ecological and hydrologic function of lake. May partially meet RAOs. | **MODERATE:** Engineered caps are implementable with regards to erosion and slope stability issues. However, final installed cap configuration may be inconsistent with future lake beneficial uses. | **HIGH:** Requires material import, staging, and handling; careful installation and construction monitoring; ongoing monitoring of cap integrity. | Screened out as redundant with conventional sand cap. |
| | | Active Cap | **MODERATE:** May address exposure of ecological receptors to contaminants. Addition of reactive layers is not anticipated to be responsive to principal contaminant, lead. May compromise ecological and hydrologic function of lake. May partially meet RAOs. | **MODERATE:** Engineered caps are implementable with regards to erosion and slope stability issues. However, final installed cap configuration may be inconsistent with future lake beneficial uses. | **HIGH:** Requires material import, staging, and handling; careful installation and construction monitoring; ongoing monitoring of cap integrity. | Screened out as redundant with conventional sand cap. |

## Table 6-2: Summary of Screening Evaluation

| General Response Action | Remedial Technology | Process Option | Effectiveness | Implementability | Cost | Screening Comments |
|---|---|---|---|---|---|---|
| In-Situ Treatment | Biological | Slurry Bioremediation | **LOW:** Generally intended for organic contaminants and not anticipated to be effective for the principal contaminant, lead. Does not address exposure of ecological receptors to contaminants. Does not meet RAOs. | **MODERATE:** Existing bathymetric surveys and sediment cores do not indicate the presence of obstructions that would limit implementation. | **MODERATE:** Requires material import, staging, and handling; careful installation and construction monitoring; ongoing monitoring of sediment quality. | Screened out due to limited effectiveness. |
| | | Phytoremediation | **LOW:** Water depth would limit the application of this process to the perimeter of the lake, which is not collocated with the contaminated sediment. Does not address exposure of ecological receptors to contaminants. Does not meet RAOs. | **LOW:** Implementation would require extensive filling of the lake to create conditions conducive to planting and harvesting. | **MODERATE:** Requires labor intensive planting operation and ongoing harvesting and disposal costs. | Screened out due to limited effectiveness and implementability. |
| | | Aerobic or Anaerobic Biodegradation | **LOW:** Generally intended for organic contaminants and not anticipated to be effective for the principal contaminant, lead. Does not address exposure of ecological receptors to contaminants. Does not meet RAOs. | **MODERATE:** Existing bathymetric surveys and sediment cores do not indicate the presence of obstructions that would limit implementation. | **MODERATE:** Requires material import, staging, and handling; careful installation and construction monitoring; ongoing monitoring of sediment quality. | Screened out due to limited effectiveness. |
| | | Imbiber Beads | **LOW:** Generally intended for organic contaminants and not anticipated to be effective for the principal contaminant, lead. Does not address exposure of ecological receptors to contaminants. Does not meet RAOs. | **HIGH:** Distribution of beads could be accomplished simply from a small vessel. | **MODERATE:** Requires specialized material import, staging, and handling; careful installation and construction monitoring; ongoing monitoring of sediment quality. | Screened out due to limited effectiveness. |
| | Physical-Immobilization | Solidification/Stabilization | **LOW:** May address exposure of ecological receptors to contaminants. Would likely compromise ecological and hydrologic function of lake. Unlikely to meet RAOs. | **MODERATE:** Existing bathymetric surveys and sediment cores do not indicate the presence of obstructions that would limit implementation. | **MODERATE:** Requires material import, staging, and handling; careful installation and construction monitoring; ongoing monitoring of sediment quality. | Screened out due to limited effectiveness. |
| | | Vitrification | **LOW:** May address exposure of ecological receptors to contaminants. Would likely compromise ecological and hydrologic function of lake. Unlikely to meet RAOs. | **MODERATE:** Existing bathymetric surveys and sediment cores do not indicate the presence of obstructions that would limit implementation. | **MODERATE:** Requires material import, staging, and handling; careful installation and construction monitoring; ongoing monitoring of sediment quality. | Screened out due to limited effectiveness. |
| | | Electrochemical Oxidation | **LOW:** Generally intended for organic contaminants and not anticipated to be effective for the principal contaminant, lead. Does not address exposure of ecological receptors to contaminants. Does not meet RAOs. | **MODERATE:** Existing bathymetric surveys and sediment cores do not indicate the presence of obstructions that would limit implementation. | **HIGH:** Requires careful installation of temporary in-lake infrastructure; performance monitoring; ongoing monitoring of sediment quality. | Screened out due to limited effectiveness. |
| | | Carbon/Other Amendments | **LOW:** Generally intended for organic contaminants and not anticipated to be effective for the principal contaminant, lead. Does not address exposure of ecological receptors to contaminants. Does not meet RAOs. | **MODERATE:** Existing bathymetric surveys and sediment cores do not indicate the presence of obstructions that would limit implementation. | **MODERATE:** Requires material import, staging, and handling; careful installation and construction monitoring; ongoing monitoring of sediment quality. | Screened out due to limited effectiveness. |

## Table 6-2: Summary of Screening Evaluation

| General Response Action | Remedial Technology | Process Option | Effectiveness | Implementability | Cost | Screening Comments |
|---|---|---|---|---|---|---|
| Removal | Dry Removal | Excavation | **HIGH:** With proper management of re-suspension and residuals, this response would effectively remove contaminants. Addresses exposure of ecological receptors to contaminants. Would likely meet RAOs. | **LOW:** There are technical infeasibility issues related to water management and slope stability that prevent dewatering of the lake. In particular, dewatering the lake may destabilize Park Presidio, a concern explicitly expressed by Caltrans (Caltrans 2012), and the rate of groundwater inflow to the lake would likely generate too much water to manage over the course of the removal operations. | **HIGH:** Requires dewatering; careful excavation to limit cross contamination; potentially additional material dewatering and handling; loading, transport, and disposal. | Screened out due to limited implementability. |
| | Wet Removal | Mechanical Dredging | **HIGH:** With proper management of re-suspension and residuals, this response would effectively remove contaminants. Addresses exposure of ecological receptors to contaminants. Would likely meet RAOs. | **MODERATE:** Dredging is technically feasible at the site, although space is limited for dewatering operations and access is limits for off-haul operations. Slope stability issues along Park Presidio would require further analysis and may required combining removal with capping. | **HIGH:** Requires mobilization of specialized equipment; careful dredging operations to limit re-suspension and residual contaminated sediment; intermediate transport via trucks or conveyor system to an onsite temporary dredged material handling area; potentially additional material dewatering and handling; loading, transport, and disposal. | Retained in accordance with EPA recommendations (EPA 2005). However, to simplify the evaluation process, a single process option would be chosen to represent the wet removal technology, as described in the text. Therefore, further analysis would be based on hydraulic dredging as representative of wet removal. |
| | | Hydraulic Dredging | **HIGH:** With proper management of re-suspension and residuals, this response would effectively remove contaminants. Addresses exposure of ecological receptors to contaminants. Would likely meet RAOs. | **MODERATE:** Dredging is technically feasible at the site, although space is limited for dewatering operations and access is limits for off-haul operations. Slope stability issues along Park Presidio would require further analysis and may required combining removal with capping. | **HIGH:** Requires mobilization of specialized equipment; careful dredging operations to limit re-suspension and residual contaminated sediment; intermediate transport via pipeline to an onsite temporary dredged material handling area; material dewatering and handling; loading, transport, and disposal. | Retained in accordance with EPA recommendations (EPA 2005). Preferred over mechanical dredging as it better minimizes cross contamination with the surrounding areas. |
| Disposal/ Confinement | Upland Commercial Landfill | Upland Commercial Landfill | **HIGH:** Design, operated, and monitored to meet federal and state regulatory criteria. Slightly greater risk of short-term impacts due to transport distances. | **HIGH:** There are many facilities available in California and nearby states with the capacity to accept the volume of sediment anticipated. | **HIGH:** Trucking is the only viable alternative for the site and disposal fees can be substantial. | Retained. |
| | Confined Aquatic Disposal | Confined Aquatic Disposal (CAD) | **HIGH:** A CAD would be designed and built to provide permanent effective containment of contaminated sediment with adequate controls on contaminant mobility and erosion of the CAD cap. | **LOW:** Installation of a CAD within Mountain Lake is not in accordance with the future development plans for the lake. There are no adjacent sites suitable for installation of a CAD. | **HIGH:** Requires material import, staging, and handling; careful installation and construction monitoring; ongoing monitoring and reporting. | Screened out due to limited implementability. |
| | Confined Disposal Facility | Confined Disposal Facility (CDF) | **HIGH:** A CDF would be designed and built to provide permanent effective containment of contaminated sediment with adequate controls on contaminant mobility and CDF stability. | **LOW:** Installation of a CDF within the Presidio is not consistent with future development plans for the park. There are no adjacent sites suitable for installation of a CDF. | **HIGH:** Requires material import, staging, and handling; careful installation and construction monitoring; ongoing monitoring and reporting. | Screened out due to limited implementability. |

## Table 6-2: Summary of Screening Evaluation

| General Response Action | Remedial Technology | Process Option | Effectiveness | Implementability | Cost | Screening Comments |
|---|---|---|---|---|---|---|
| Ex-Situ Treatment | Physical – Dewatering | In-Barge Dewatering | **MODERATE:** Passive gravity dewatering is dependent upon environmental factors such as evaporation and precipitation rates. This process would likely limit production rates and would require additional material handling and transport to an off-haul staging area, resulting in additional opportunities for cross contamination. | **LOW:** In-barge dewatering would required near shore unloading facilities for which there is limited or no areas available around the perimeter of the lake. | **LOW:** This is a passive gravity dewatering process that simply requires mobilization of dewatering barge. | Retained as a potential process component of mechanical dredging. However, further analysis would be based on hydraulic dredging as representative of wet removal. Therefore, in-barge dewatering is not further evaluated. |
| | | Lagoon Dewatering | **MODERATE:** Passive gravity dewatering is dependent upon environmental factors such as evaporation and precipitation rates. This process would likely limit production rates and would require a large area of land, which may hamper onsite operations. | **LOW:** A large staging area is required within close proximity to the lake and it may take significant time to sufficiently dewater the dredged material to meet water quality standards and offsite disposal requirements. | **MODERATE:** Some earthwork operations would be required to prepared the diked areas. Mitigation measures would also be required to address cross contamination with soil and groundwater in the staging area. | Retained as an interim storage stage of a multi-stage dewatering system. |
| | | Geotextile Tube Dewatering | **HIGH:** This process is expected to be effective in dewatering dredged material. | **MODERATE:** A moderately sized staging area is required within close proximity to the lake and it may take significant time to sufficiently dewater the dredged material (depending on the actual particle size distribution) to meet water quality standards and offsite disposal requirements. | **MODERATE:** Requires specialized materials; pumping facilities; and potentially material re-handling following dewatering. | Retained as a potential process component of dredging. However, further analysis would be based on mechanical dewatering as a representative process option. Therefore, geotextile tube dewatering is not further evaluated. |
| | | Mechanical Dewatering | **HIGH:** This process is expected to be highly effective in dewatering dredged material. There are a number of mechanical processes that can be employed to accomplish the dewatering. | **HIGH:** A smaller staging area is required and dewatering times are expected to be shorter. Specialized equipment mobilization is required and electrical power supply. | **HIGH:** Requires specialized equipment and power to implement. | Retained as a representative process option. |
| | | Reagent Dewatering | **HIGH:** This process is expected to be highly effective in dewatering dredged material. There are a number of mechanical processes that can be employed to accomplish the dewatering. | **HIGH:** A smaller staging area is required and dewatering times are expected to be shorter. Specialized material and mixing facilities required. | **HIGH:** Requires specialized materials, equipment, and power to implement. | Retained as a potential process component of dredging. However, further analysis would be based on mechanical dewatering as a representative process option. Therefore, reagent dewatering is not further evaluated. |
| | | Particle Separation | **LOW:** Contaminants are associated fine and coarse grained particles at the site. Particle separation would not provide any benefit. | **MODERATE:** A moderately sized staging area is required within close proximity to the lake. Specialized equipment mobilization is required and electrical power supply. | **HIGH:** Requires specialized equipment and power to implement. | Screened out due to limited effectiveness. |

## Table 6-2: Summary of Screening Evaluation

| General Response Action | Remedial Technology | Process Option | Effectiveness | Implementability | Cost | Screening Comments |
|---|---|---|---|---|---|---|
| Ex-Situ Treatment (cont'd) | Physical - Immobilization | Cement Solidification/Stabilization | **MODERATE:** Would likely reduce leaching of contaminants, but would still required offsite disposal. | **HIGH:** A smaller staging area is required. Specialized material and mixing facilities required. Material loading, transport, and offsite disposal would still be required. | **HIGH:** Requires specialized materials, equipment, and power to implement. Due to lack of onsite disposal space, would still require offsite disposal. | Screened out as it does not eliminate the need for offsite disposal. |
| | | Sorbent Clay Solidification/Stabilization | **LOW:** Generally intended for organic contaminants and not anticipated to be effective for the principal contaminant, lead. | **HIGH:** A smaller staging area is required. Specialized material and mixing facilities required. Material loading, transport, and offsite disposal would still be required. | **HIGH:** Requires specialized materials, equipment, and power to implement. Due to lack of onsite disposal space, would still require offsite disposal. | Screened out due to limited effectiveness. |
| | | Asphalt Emulsion | **MODERATE:** Would likely reduce leaching of contaminants, but would still required offsite disposal. | **HIGH:** A smaller staging area is required. Specialized material and mixing facilities required. Material loading, transport, and offsite disposal would still be required. | **HIGH:** Requires specialized materials, equipment, and power to implement. Due to lack of onsite disposal space, would still require offsite disposal. | Screened out as it does not eliminate the need for offsite disposal. |
| | | Solar Detoxification | **LOW:** Generally intended for organic contaminants and not anticipated to be effective for the principal contaminant, lead. | **HIGH:** A smaller staging area is required. Specialized equipment mobilization is required and electrical power supply. Material loading, transport, and offsite disposal would still be required. | **HIGH:** Requires specialized materials, equipment, and power to implement. Due to lack of onsite disposal space, would still require offsite disposal. | Screened out due to limited effectiveness. |
| | Biological Methods | Composting | **LOW:** Generally intended for organic contaminants and not anticipated to be effective for the principal contaminant, lead. | **LOW:** A large staging area is required within close proximity to the lake, it may take significant time to sufficiently treat contaminants, and it may require extensive mitigation measures to control air emissions and prevent rainfall infiltration. High concentrations of contaminants can also be toxic to microorganisms. | **MODERATE:** Requires repeated material handling; possibly application of amendments; mitigation of cross contamination in the treatment area; performance monitoring. | Screened out due to limited effectiveness. |
| | | Biopiles | **LOW:** Generally intended for organic contaminants and not anticipated to be effective for the principal contaminant, lead. | **LOW:** A large staging area is required within close proximity to the lake, it may take significant time to sufficiently treat contaminants, and it may require extensive mitigation measures to control air emissions and prevent rainfall infiltration. High concentrations of contaminants can also be toxic to microorganisms. | **MODERATE:** Requires repeated material handling; possibly application of amendments; mitigation of cross contamination in the treatment area; performance monitoring. | Screened out due to limited effectiveness. |
| | | Fungal Biodegradation | **LOW:** Generally intended for organic contaminants and not anticipated to be effective for the principal contaminant, lead. | **LOW:** A large staging area is required within close proximity to the lake, it may take significant time to sufficiently treat contaminants, and it may require extensive mitigation measures to control air emissions and prevent rainfall infiltration. High concentrations of contaminants can also be toxic to microorganisms. | **MODERATE:** Requires repeated material handling; possibly application of amendments; mitigation of cross contamination in the treatment area; performance monitoring. | Screened out due to limited effectiveness. |

## Table 6-2: Summary of Screening Evaluation

| General Response Action | Remedial Technology | Process Option | Effectiveness | Implementability | Cost | Screening Comments |
|---|---|---|---|---|---|---|
| Ex-Situ Treatment (cont'd) | Biological Methods (cont'd) | Slurry-Phase Treatment | **LOW:** Generally intended for organic contaminants and not anticipated to be effective for the principal contaminant, lead. | **LOW:** A large staging area is required within close proximity to the lake, it may take significant time to sufficiently treat contaminants, and it may require extensive mitigation measures to control air emissions and prevent rainfall infiltration. High concentrations of contaminants can also be toxic to microorganisms. | **MODERATE:** Requires repeated material handling; possibly application of amendments; mitigation of cross contamination in the treatment area; performance monitoring. | Screened out due to limited effectiveness. |
| | | Enhanced Biodegradation | **LOW:** Generally intended for organic contaminants and not anticipated to be effective for the principal contaminant, lead. | **LOW:** A large staging area is required within close proximity to the lake, it may take significant time to sufficiently treat contaminants, and it may require extensive mitigation measures to control air emissions and prevent rainfall infiltration. High concentrations of contaminants can also be toxic to microorganisms. | **MODERATE:** Requires repeated material handling; possibly application of amendments; mitigation of cross contamination in the treatment area; performance monitoring. | Screened out due to limited effectiveness. |
| | Chemical | Acid Extraction | **LOW:** May be effective is leaching metals from sediment, but would then require treatment and/or disposal of leachate. Essentially substitutes one onsite contaminated media for another. | **MODERATE:** A moderately sized staging area is required within close proximity to the lake. Specialized materials and equipment mobilization is required and electrical power supply. Safety issues require mitigation due to hazardous materials introduced. | **HIGH:** Requires specialized materials, equipment, and power to implement. Due to lack of onsite disposal space, would still require offsite disposal. | Screened out due to limited effectiveness. |
| | | Solvent Extraction | **LOW:** Generally intended for organic contaminants and not anticipated to be effective for the principal contaminant, lead. | **MODERATE:** A moderately sized staging area is required within close proximity to the lake. Specialized materials and equipment mobilization is required and electrical power supply. Safety issues require mitigation due to hazardous materials introduced. | **HIGH:** Requires specialized materials, equipment, and power to implement. Due to lack of onsite disposal space, would still require offsite disposal. | Screened out due to limited effectiveness. |
| | Physical - Separation | Sediment Washing | **LOW:** Unlikely to provide treatment to sufficiently low levels. Would require treatment and/or disposal of wash water. Essentially creates an additional onsite contaminated media. | **MODERATE:** A moderately sized staging area is required within close proximity to the lake. Specialized materials and equipment mobilization is required and electrical power supply. | **HIGH:** Requires source of clean water, equipment, and power to implement. Due to lack of onsite disposal space, would still require offsite disposal. | Screened out due to limited effectiveness. |

## Table 6-2: Summary of Screening Evaluation

| General Response Action | Remedial Technology | Process Option | Effectiveness | Implementability | Cost | Screening Comments |
|---|---|---|---|---|---|---|
| Ex-Situ Treatment (cont'd) | Thermal Methods | Incineration | **LOW:** Generally intended for organic contaminants and not anticipated to be effective for the principal contaminant, lead. | **LOW:** A moderately sized staging area is required within close proximity to the lake. Specialized equipment mobilization is required. Mitigation of air pollution and extensive permitting is required. | **HIGH:** Requires specialized equipment and power to implement. | Screened out due to limited effectiveness and implementability. |
| | | Pyrolysis | **LOW:** Generally intended for organic contaminants and not anticipated to be effective for the principal contaminant, lead. | **LOW:** A moderately sized staging area is required within close proximity to the lake. Specialized equipment mobilization is required. Mitigation of air pollution and extensive permitting is required. | **HIGH:** Requires specialized equipment and power to implement. | Screened out due to limited effectiveness and implementability. |
| | | Thermal Desorption | **LOW:** Generally intended for organic contaminants and not anticipated to be effective for the principal contaminant, lead. | **LOW:** A moderately sized staging area is required within close proximity to the lake. Specialized equipment mobilization is required. Mitigation of air pollution and extensive permitting is required. | **HIGH:** Requires specialized equipment and power to implement. | Screened out due to limited effectiveness and implementability. |
| | | High Pressure Oxidation | **LOW:** Generally intended for organic contaminants and not anticipated to be effective for the principal contaminant, lead. | **LOW:** A moderately sized staging area is required within close proximity to the lake. Specialized equipment mobilization is required. Mitigation of air pollution and extensive permitting is required. | **HIGH:** Requires specialized equipment and power to implement. | Screened out due to limited effectiveness and implementability. |
| | | Vitrification | **LOW:** Generally intended for organic contaminants and not anticipated to be effective for the principal contaminant, lead. | **LOW:** A moderately sized staging area is required within close proximity to the lake. Specialized equipment mobilization is required. Mitigation of air pollution and extensive permitting is required. | **HIGH:** Requires specialized equipment and power to implement. | Screened out due to limited effectiveness and implementability. |

**Notes**

(a) Options retained for development of remedial alternatives and further evaluation are indicated by grey shading:

# Table 6-3: Summary of Remedial Alternatives

| Alternative | | Description |
|---|---|---|
| 1 | No Action | No remedial action is implemented. |
| 2 | Capping | The alternative involves the installation of conventional sand cap across most of the lake area to isolate underlying contaminated sediments from potential human and environmental receptors. The key remedy components are as follows:<br>• Design in accordance with EPA and USACE guidance.<br>• Preparation of a staging and access areas for cap material handling and transport to over-water installation equipment.<br>• Mobilization of specialized marine equipment to place the cap and material delivery.<br>• Careful placement of cap material to minimize release and re-suspension of cap material and/or contaminated sediment.<br>• Construction phase monitoring of the cap placement and residuals.<br>• Installation and maintenance of stormwater treatment measures to control runoff from Park Presidio Blvd.<br>• Long-term monitoring and reporting of cap integrity and effectiveness following installation of the cap. |
| 3 | Dredging with Offsite Disposal and Limited Capping | The alternative involves removal, processing, and offsite disposal of approximately 15,600 cubic yards of sediment, with limited capping of contaminated sediments left in place in areas due to slope stability constraints. The key remedy components are as follows:<br>• Preparation of a staging area for dredged material processing.<br>• Mobilization of specialized marine equipment to dredge sediments and process the dredged material.<br>• Wet removal (i.e., dredging) of contaminated sediments. It is likely that hydraulic dredging would be used to minimize release and re-suspension of contaminated sediment, although the contractor's means and methods would not be constrained and mechanical dredging could also be employed. This operation may involve multi-pass dredging and/or over-dredging.<br>• Limited sediment removal with capping in areas of slope stability constraints.<br>• Pipeline or other similar transport of dredged material to the staging area.<br>• Mechanical dewatering of dredged material.<br>• Waste profiling, loading, and transport to an offsite landfill.<br>• Installation and maintenance of stormwater treatment measures to control runoff from Park Presidio Blvd.<br>• Construction phase monitoring of the potential residuals, sediment quality, and elutriate quality. |

# Table 7-1: Comparison of Total Cost of Remedial Alternatives

| Description | Alternative 1: No Action | Alternative 2: Capping | Alternative 3: Dredging and Offsite Disposal with Limited Capping |
|---|---|---|---|
| Total Project Duration (Years) | 0 | 30 | 1 |
| Undiscounted Capital Cost[(a)] | No Costs | $4.0 Million | $9.2 Million |
| Undiscounted Annual O&M Cost[(a)] | No Costs | $73 Thousand | No Costs |
| Undiscounted Periodic Costs[(a)] | No Costs | $84 Thousand | No Costs |
| Total Present Value of Alternative (Discount Rate of 7%[(b)]) | No Costs | $4.9 Million | $9.2 Million |

**Notes:**

(a) Quantities and costs are not based on an engineering design, but rather reflect a conceptual level assessment of system components and are based on experience at the Site and with similar projects. This opinion of costs is estimated to range from -30% to +50% accuracy.

(b) Source: United States Environmental Protection Agency (USEPA). 200b. A Guide to Developing and Documenting Cost Estimates During the Feasibility Study. EPA 540-R-00-002. July 2000.

# Table 7-2: Detailed Evaluation of Remedial Alternatives

| Evaluation Criteria | | Alternative 1: No Action | Alternative 2: Capping and Monitoring | Alternative 3: Dredging with Offsite Disposal and Limited Capping |
|---|---|---|---|---|
| **Threshold Criteria** | Overall Protection of Human Health and the Environment | • Not protective of human health and the environment. | • Protective of human health and the environment by eliminating potential contact with contaminated sediment.<br>• Cap could permanently, negatively affect health of lake and associated habitat by decreasing volume of lake water and inhibiting water circulation.<br>• Placement of the cap would provide protection of human health and the environment by reducing COC concentrations at the sediment surface and reducing flux to the water column.<br>• The cap would be designed in accordance with EPA and USACE guidance to provide long-term chemical isolation and ensure cap stability, integrity, and protectiveness.<br>• Effectiveness depends in part on cap design and absence of residual soluble COCs. | • Protective of human health and the environment because contaminated sediment with chemical concentrations exceeding cleanup levels is permanently removed from the Site and disposed of in a permitted landfill, controlling potential future exposure to humans and the environment. |
| | Compliance with ARARs | • Does not comply with ARARs. | • Complies with all ARARs. | • Complies with all ARARs. |
| **Balancing Criteria** | Long-Term Effectiveness | • Would not prevent long-term exposure. | • Provides long-term and permanent protection from exposure to contaminated sediment when implemented with maintenance and monitoring requirements.<br>• Is inconsistent with future lake restoration goals.<br>• The cap would be designed in accordance with EPA and USACE guidance to provide long-term chemical isolation and stability. It is expected that the installed cap would be stable over the long-term and would protect underlying contaminated sediments from erosion under future conditions, thereby minimizing residual risks associated with remaining contaminants.<br>• Long-term monitoring and maintenance of the cap is required to further ensure its long-term effectiveness and permanence, consistent with EPA and USACE guidance. | • Effective in the long-term.<br>• Residual risks associated with re-suspension and release of contaminated sediment during the dredging activities would be minimized or eliminated by dredging operation procedures, implementation of multi-pass removal, and/or over-dredging.<br>• Sediment removed during dredging would be disposed of at an offsite permitted landfill, which would provide effective long-term management of the dredged material, controlling potential future exposure to humans and the environment.<br>• Long-term monitoring is not anticipated. |
| | Reduction of Toxicity, Mobility, or Volume through Treatment | • Would not result in a reduction of toxicity, mobility, or volume of contaminants or contaminated sediment. | • Reduces the mobility of contaminants in sediment as a function of the cap's isolation barrier characteristics.<br>• Does not reduce toxicity or volume of contaminants or contaminated sediment as the alternative does not include treatment or removal. | • Reduces the volume of contaminated sediment on Site.<br>• Does not directly reduce the toxicity or mobility of contaminants. However, the toxicity of RCRA hazardous waste would be reduced when treated at an offsite facility prior to disposal and the mobility of contaminants would be reduced via disposal in a permitted offsite landfill.<br>• Additionally, if elutriate sampling and analysis indicates that treatment is required prior to discharge back to the lake, then overall contaminant toxicity, mobility, and volume may be reduced following the dewatering activities. |

## Table 7-2: Detailed Evaluation of Remedial Alternatives

| Evaluation Criteria | | Alternative 1: No Action | Alternative 2: Capping and Monitoring | Alternative 3: Dredging with Offsite Disposal and Limited Capping |
|---|---|---|---|---|
| **Balancing Criteria (cont'd)** | Short-Term Effectiveness | • Would have no additional impacts or effects on workers, the community, and the environment because no action would be taken. | • Short-term impacts would be expected during implementation.<br>• Placement of the cap would affect benthic organisms and available habitat.<br>• Construction controls and monitoring for dust, odor, and other emissions would be required during material handling and cap installation activities.<br>• Traffic impacts accompany delivery of materials.<br>• Water quality in the lake may be affected during cap placement, primarily due to temporary increases in turbidity.<br>• There should be low potential for health impacts to the community and workers during cap placement.<br>• Staging needs for cap placement may disrupt local community during placement.<br>• Short-term impacts would occur over one construction season.<br>• Complete biota recovery would take several years if at all. | • Short-term impacts would be expected during implementation.<br>• Sediment removal would temporarily affect benthic organisms, but ultimately provide better quality habitat for the future.<br>• Construction controls and monitoring for dust, odor, and other emissions would be required during removal activities.<br>• Traffic impacts accompany off-hauling activities.<br>• Water quality in the lake may be affected during dredging, primarily due to temporary increases in turbidity associated with re-suspension and release of sediments during removal.<br>• There should be low to moderate potential for health impacts to the community and workers from contaminant release during dredging, staging, transport, and disposal.<br>• Staging needs for dredged material processing may disrupt local community during these operations.<br>• Short-term impacts would occur over one construction season.<br>• Complete biota recovery is expected to occur within a few years. |
| | Implementability | • Easily implemented as no remedial actions would be conducted. | • Administratively and technically implementable.<br>• Cap placement methods are generally well-established.<br>• Would require removal of some trees and planting areas to prepare a staging area and provide shoreline access for preparation of the cap materials and transportation of the cap materials form the staging area to the lake.<br>• Necessary personnel for the various capping activities, including crane and loader operators, GPS surveyors, monitoring and implementation crews are readily available.<br>• It is likely that suitable capping materials could be obtained from local sources.<br>• Relatively easy to repair cap in case of localized erosion or disruption, but could be difficult or costly to implement sediment removal if cap is shown to be ineffective.<br>• Methods for monitoring cap integrity and contaminant migration within cap are relatively well established. | • Administratively and technically implementable.<br>• Dredging methods are generally well-established.<br>• Disposal in upland landfills is a well-established technique.<br>• Would require removal of some trees and planting areas to prepare a staging area.<br>• Necessary equipment, personnel, and services are expected to be available in sufficient supply from a number of marine and specialty dredging contractors.<br>• Fully supports future intended land uses.<br>• Implementation of additional remedial actions, such as monitored natural recovery or capping, is relatively easy if dredging is shown to be ineffective.<br>• Monitoring methods for sediment cleanup levels and short-term releases form dredging are relatively well-established. |
| | Cost | • There are no costs associated with this alternative. | • Moderate to high capital cost.<br>• Moderate long-term maintenance and monitoring costs. | • High capital cost.<br>• No long-term operation, maintenance, and monitoring costs. |

## Table 7-2: Detailed Evaluation of Remedial Alternatives

| Evaluation Criteria | | Alternative 1: No Action | Alternative 2: Capping and Monitoring | Alternative 3: Dredging with Offsite Disposal and Limited Capping |
|---|---|---|---|---|
| **Modifying Criteria** | State/Regulatory Agency Acceptance | • Not favored by the regulatory agencies. | • Acceptable to DTSC. | • Acceptable to DTSC. |
| | Attainment of Green Remediation Goals | • Does not meet the green remediation goals. | • Meets most green remediation goals.<br>• Emissions would consist of vehicle and equipment emissions.<br>• Natural resources required would include fill soil for cap and fuel for vehicles and equipment.<br>• Temporary physical disturbances would be created (noise, dust, and traffic). | • Would not meet most of the objectives of the DTSC Green Remediation program.<br>• Implementation of this technology would result in the greatest amount of disturbances including traffic, noise, dust, odors, and increased risk of traffic-related death or injury from the trucks transporting and disposing of the dredged material. |
| | Community Acceptance | • Not favored by the community. | • Community acceptance was evaluated during the public comment period for the Draft FS/RAP. Based on community input received during the public participation events, the community generally prefers Alternative 3 to this alternative. | • Community acceptance was evaluated during the public comment period for the Draft FS/RAP. Based on community input received during the public participation events, this alternative is generally acceptable to the community. |

# Table 7-3: Qualitative Comparison of Remedial Alternatives[a]

| | Evaluation Criteria | Alternatives | | |
|---|---|---|---|---|
| | | **1-No Action** | **2-Capping** | **3-Dredging** |
| **Threshold Criteria** | Overall protection of human health and the environment | Does not meet criteria | Meets criteria | Meets criteria |
| | Compliance with applicable or relevant and appropriate requirements (ARARs) | Does not meet criteria | Meets criteria | Meets criteria |
| **Balancing Criteria** | Long-term effectiveness and permanence | 3 | 2 | 1 |
| | Reduction of mobility, toxicity, or volume through treatment | 3 | 2 | 1 |
| | Short-term effectiveness | 1 | 2 | 2 |
| | Implementability | 1 | 2 | 2 |
| | Cost | 1 | 2 | 3 |
| | **Sum of Rankings:** | **9** | **10** | **9** |
| **Modifying Criteria** | State acceptance | Unfavorable | Favorable | Favorable |
| | Attainment of Green Remediation Goals | Not achieved | Mostly achieved | Minimally achieved |
| | Community acceptance | Unfavorable | Unfavorable | Favorable |

**Notes**

(a) Alternatives were ranked, with "1" considered the best and "3" the worst. Ties were assigned the lowest common value.

# Figures

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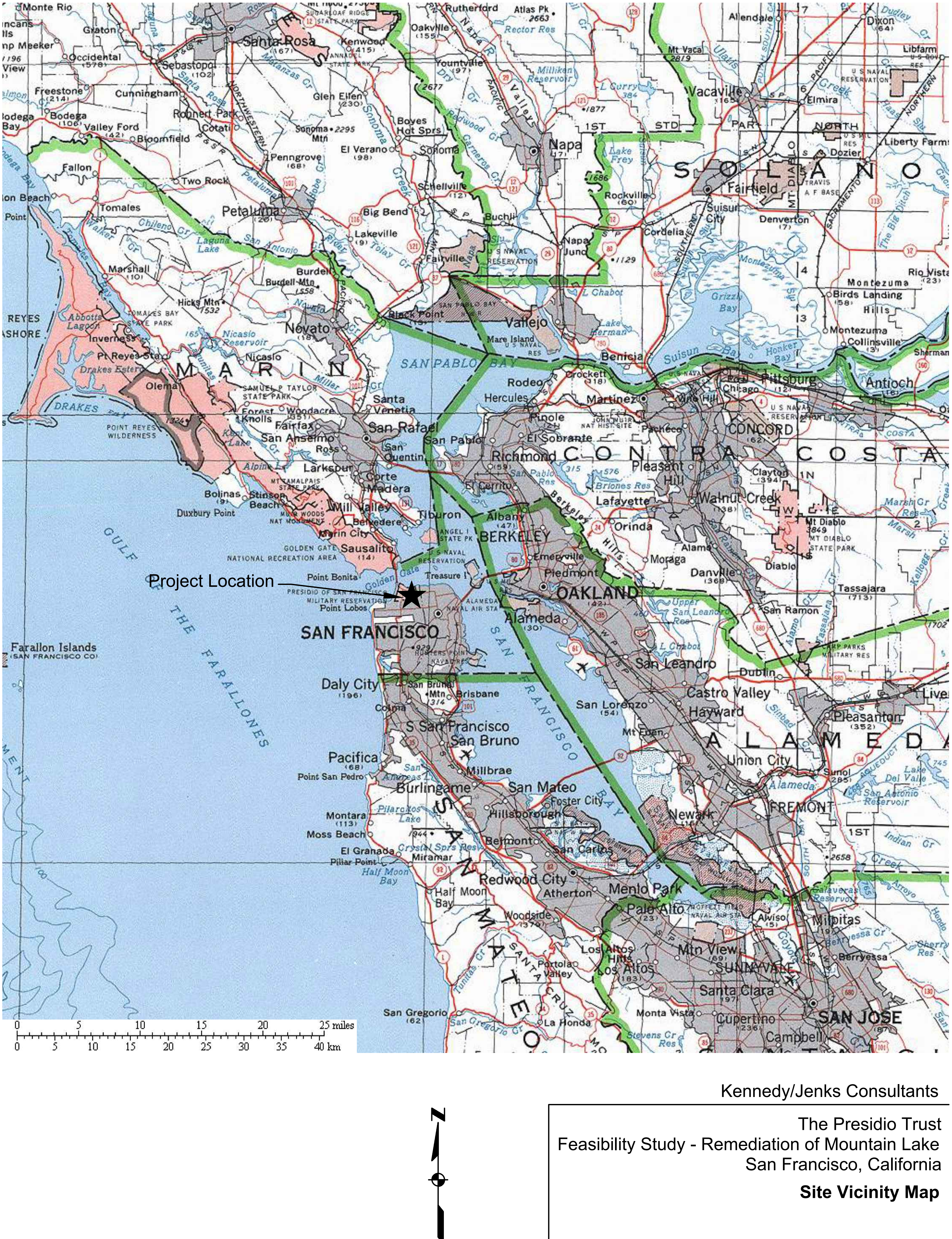


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San Francisco, California

**Site Vicinity Map**

K/J 1165014*00
May 2012

**Figure 1-1**

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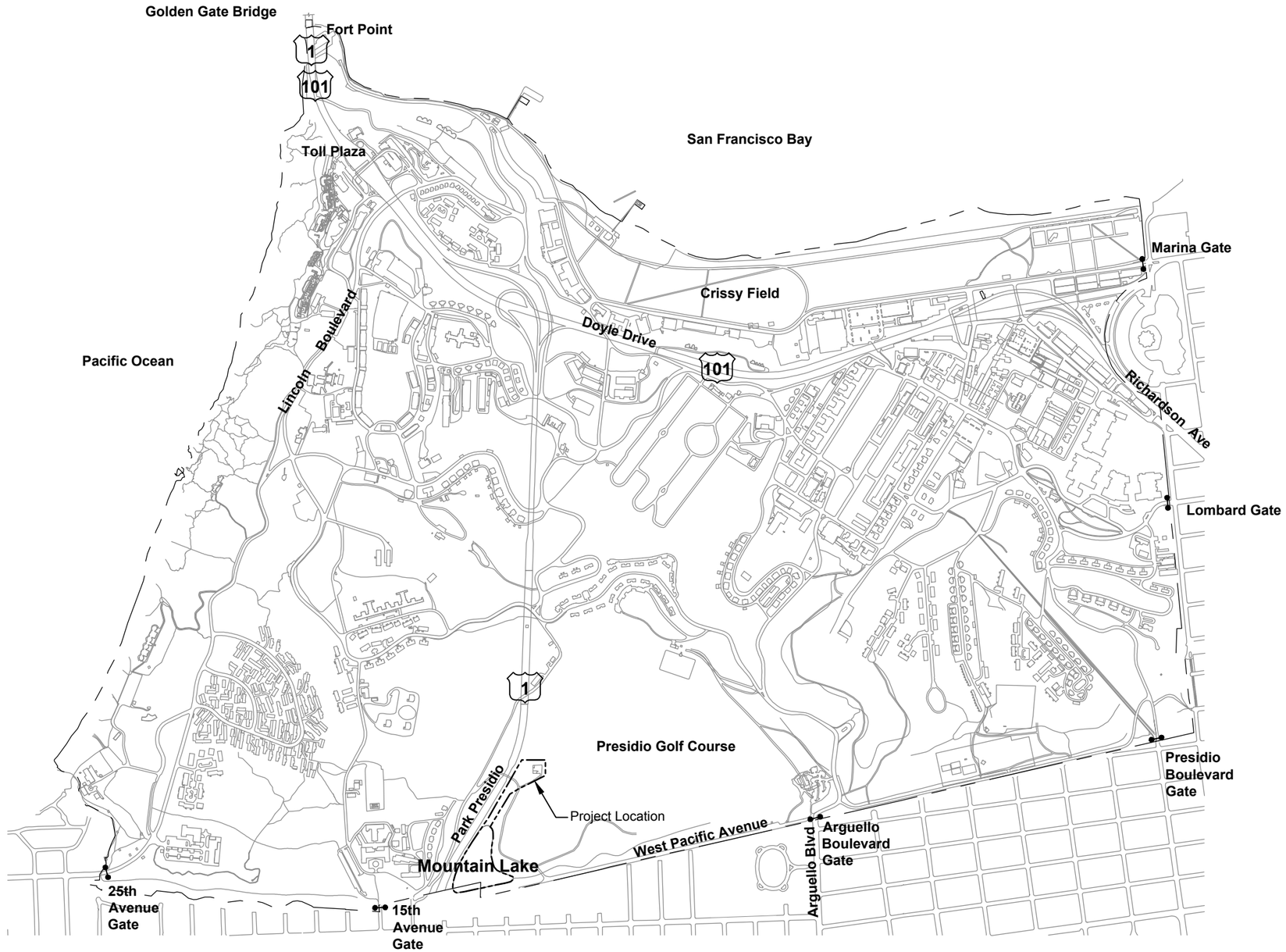


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San Francisco, California

**Site Location Map**

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**Figure 1-2**

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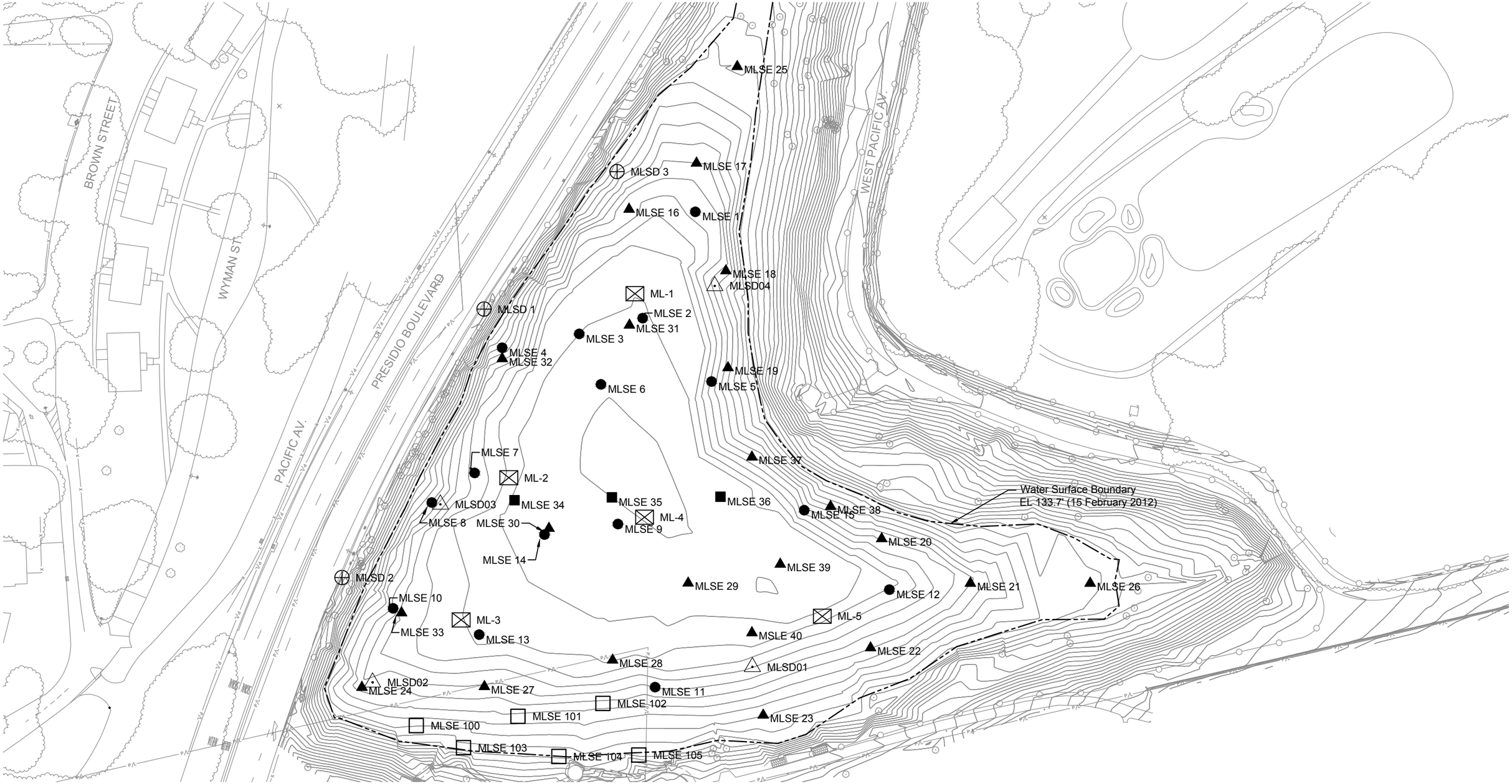


## LEGEND

| | |
|---|---|
| Lake Surface Boundary | |
| MLSD 1 | Storm Drain Inlet |
| MLSE 35 | Archaeological Sampling Location (2004) |
| ML-4 | EKI Composite Sediment Sample (1998) |
| MLSD01 | Army Shallow Sediment Sampling Locations (1997) |
| City of San Francisco/Presidio Trust Property Line | |
| MLSE 28 | Chemical/Physical Sampling Location (2004) |
| MLSE 11 | Sediment Sampling Location (2001) |
| MLSE 104 | Sediment Sampling Location (2011) |

N

0 45 90 135

1"=90'

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San Francisco, California

**Sampling Locations**

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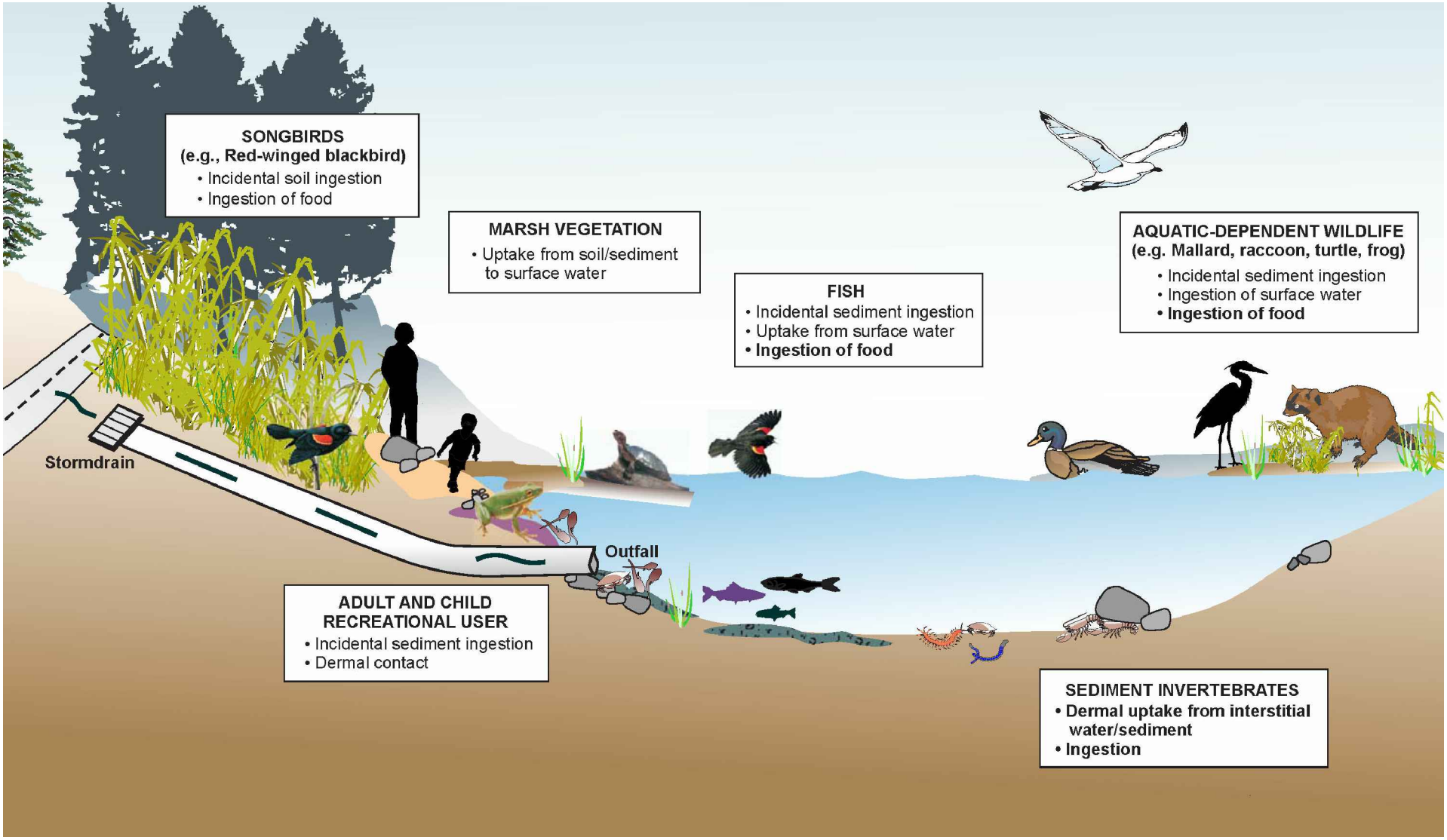
**Figure 2-1**




Source: URS Corporation. October 2011. Remedial Investigation Summary and Risk Evaluation, Mountain Lake, Presidio of San Francisco, California. URS Corporation, San Francisco, California.

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**Conceptual Site Model**

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**Figure 3-1**

N:\2011.isb\1165014.00 Mt Lake Conceptual Design\0-Document\Figures\FS\FS_Report_Figure 3-1.dwg DILLON MORRA 5/7/2012 11:08 AM

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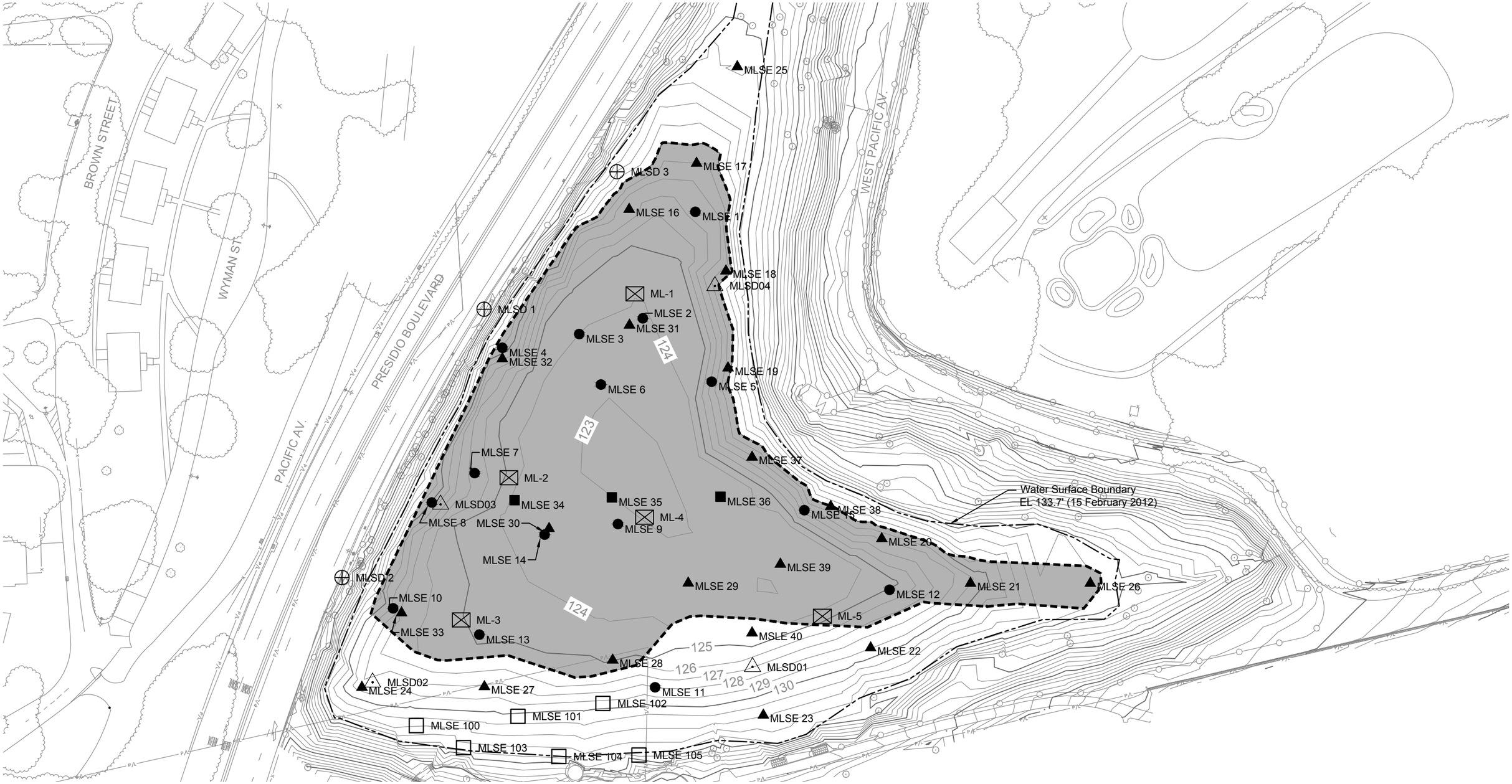


## LEGEND

- Limits of Cap
- Lake Surface Boundary
- City of San Francisco/Presidio Trust Property Line

N

0 45 90 135

1"=90'

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**Capping Conceptual Layout**

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**Figure 6-1**

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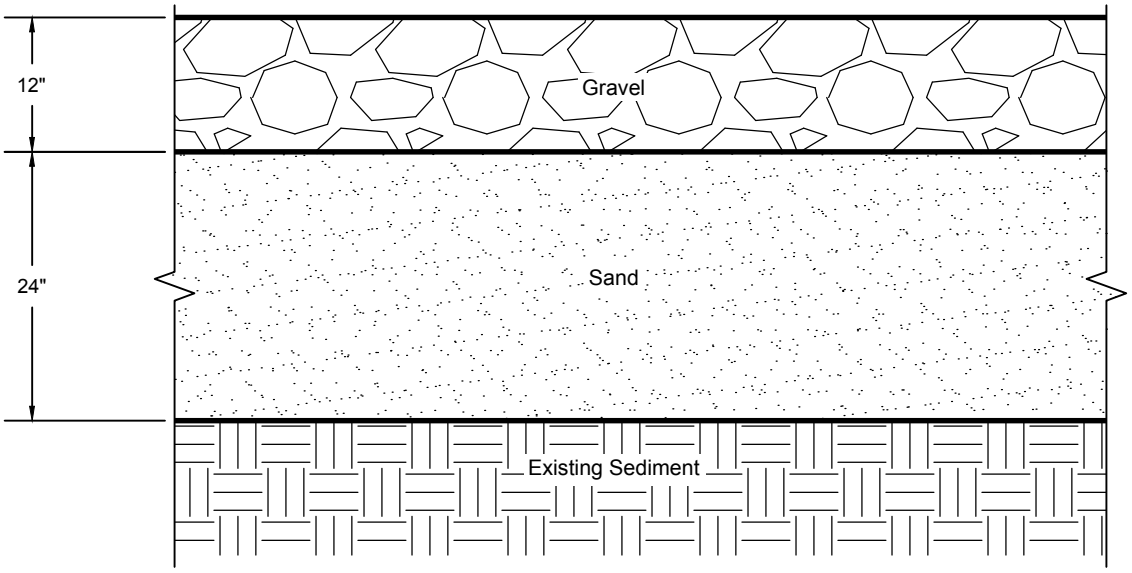


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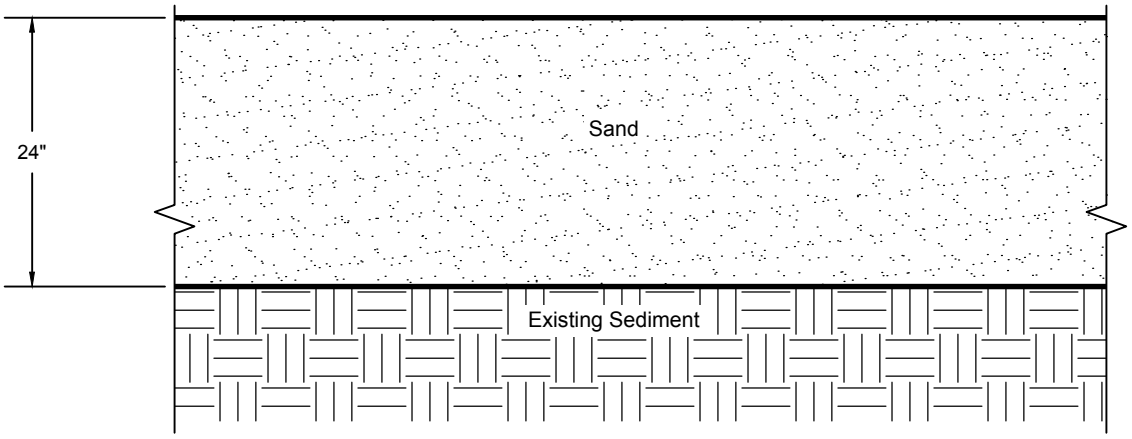


**Option No. 2**
Not to Scale

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**Capping Conceptual Design Cross Section**

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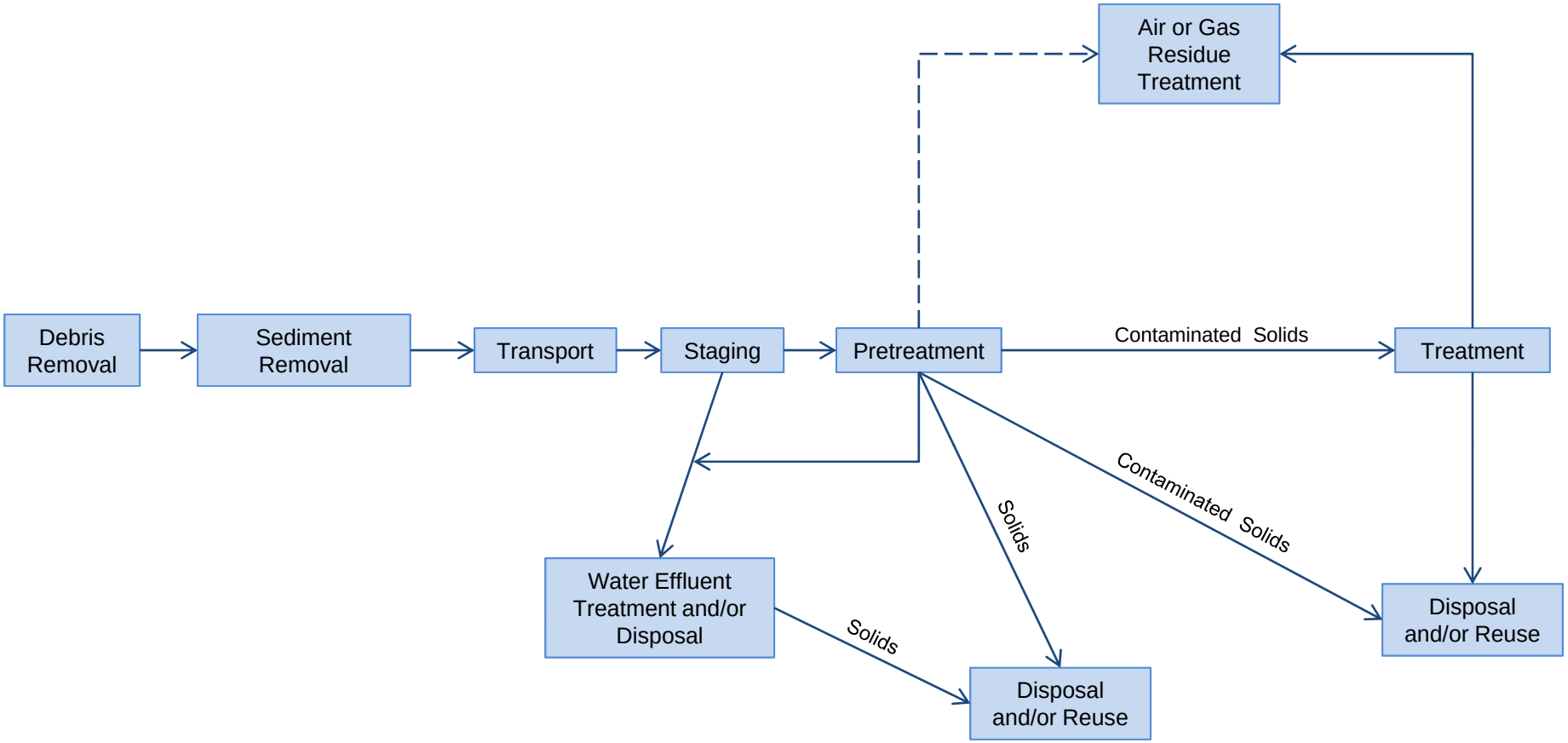
**Figure 6-2**

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San Francisco, California
**Dredging Process Flow Schematic**

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**Figure 6-3**

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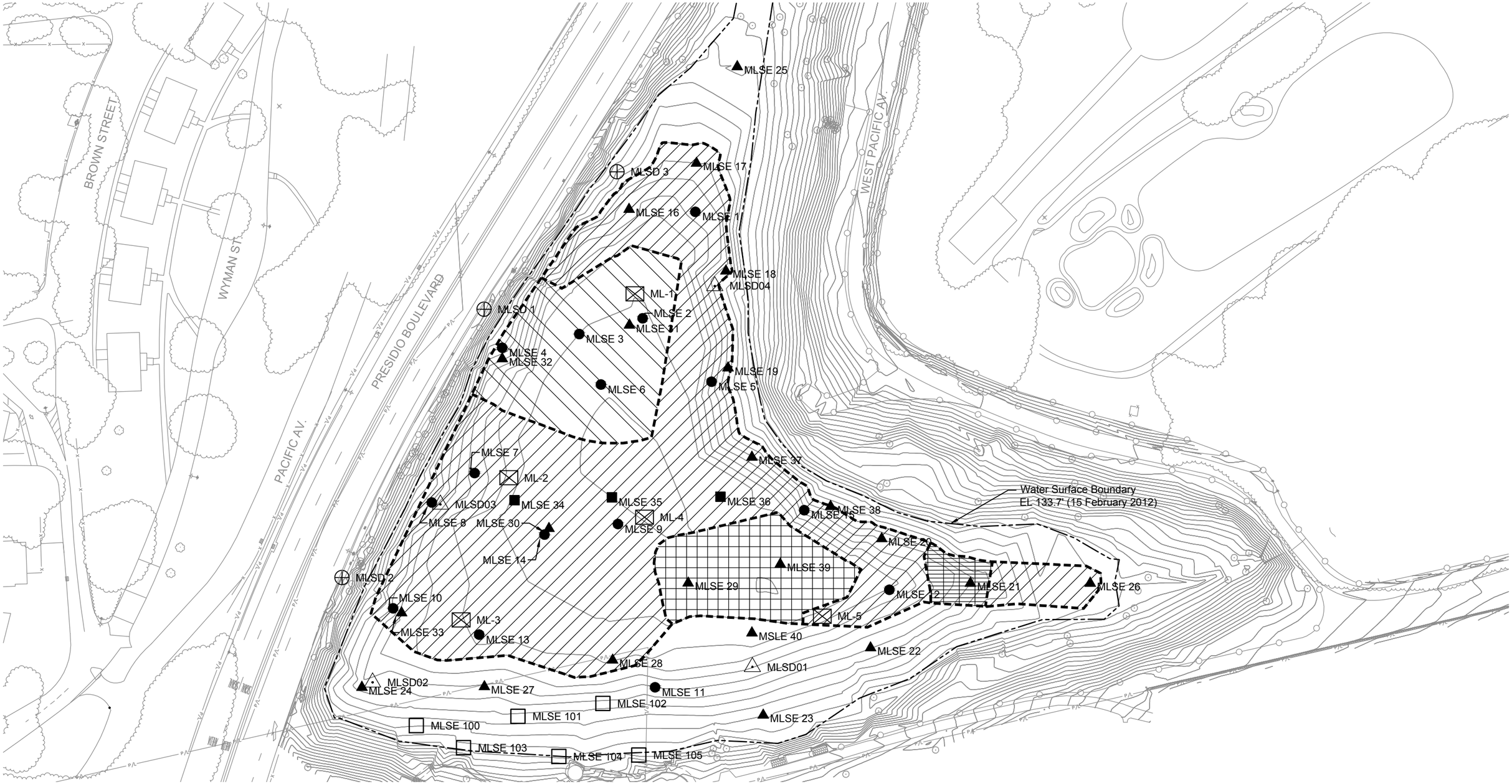


## LEGEND

- 2.5-Feet Dredge Depth
- 4.5-Feet Dredge Depth
- 5.5-Feet Dredge Depth
- 6.5-Feet Dredge Depth
- Dredge Limits
- City of San Francisco/Presidio Trust Property Line
- Lake Surface Boundary

N

0 45 90 135

1"=90'

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San Francisco, California

**Dredging Conceptual Layout**

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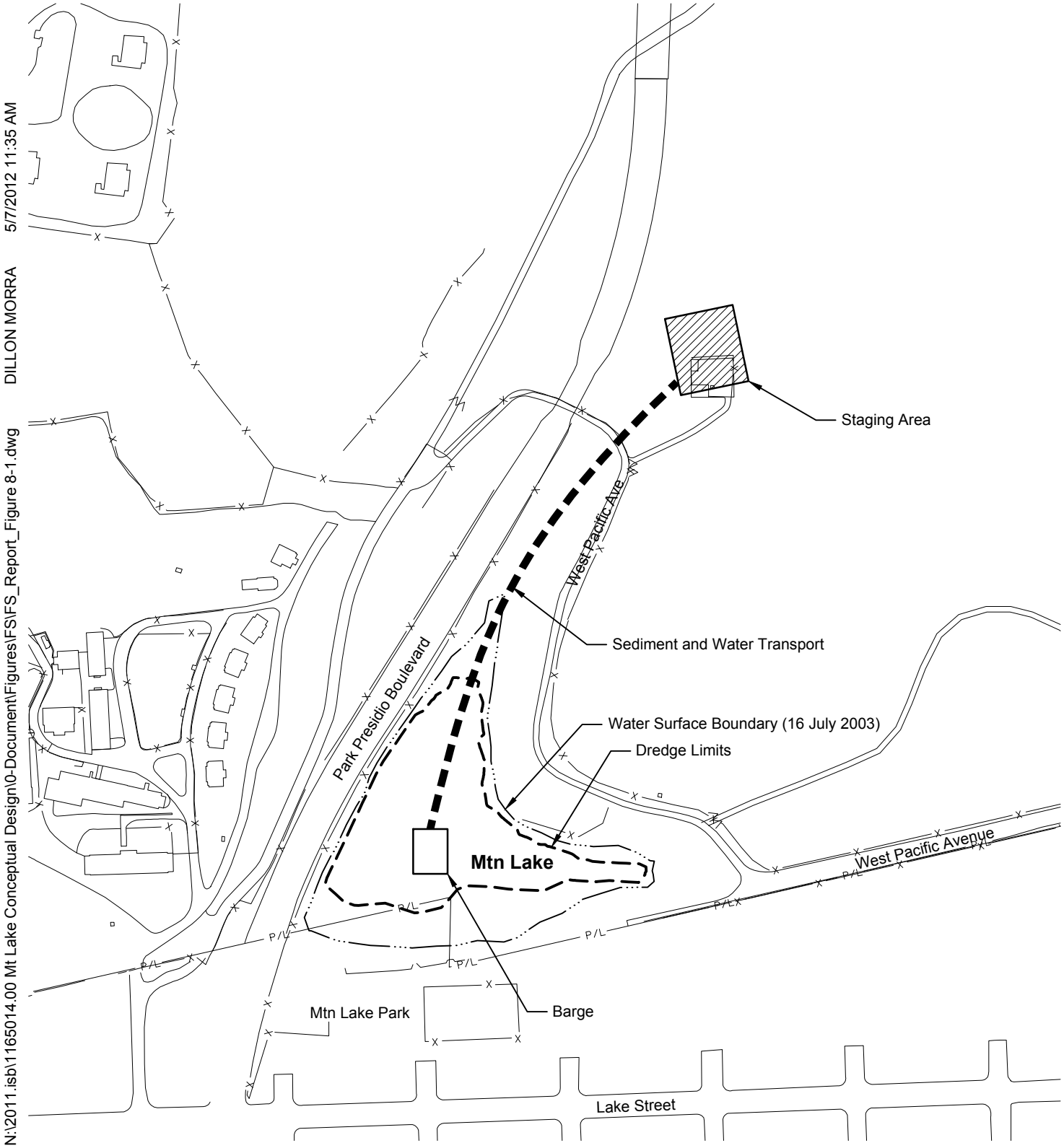
May 2012

**Figure 6-4**

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N

0 300 600

Approximate Scale: 1"=300'

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**Conceptual Plan for Dredging, Material Handling, and Staging Area**

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**Figure 8-1**

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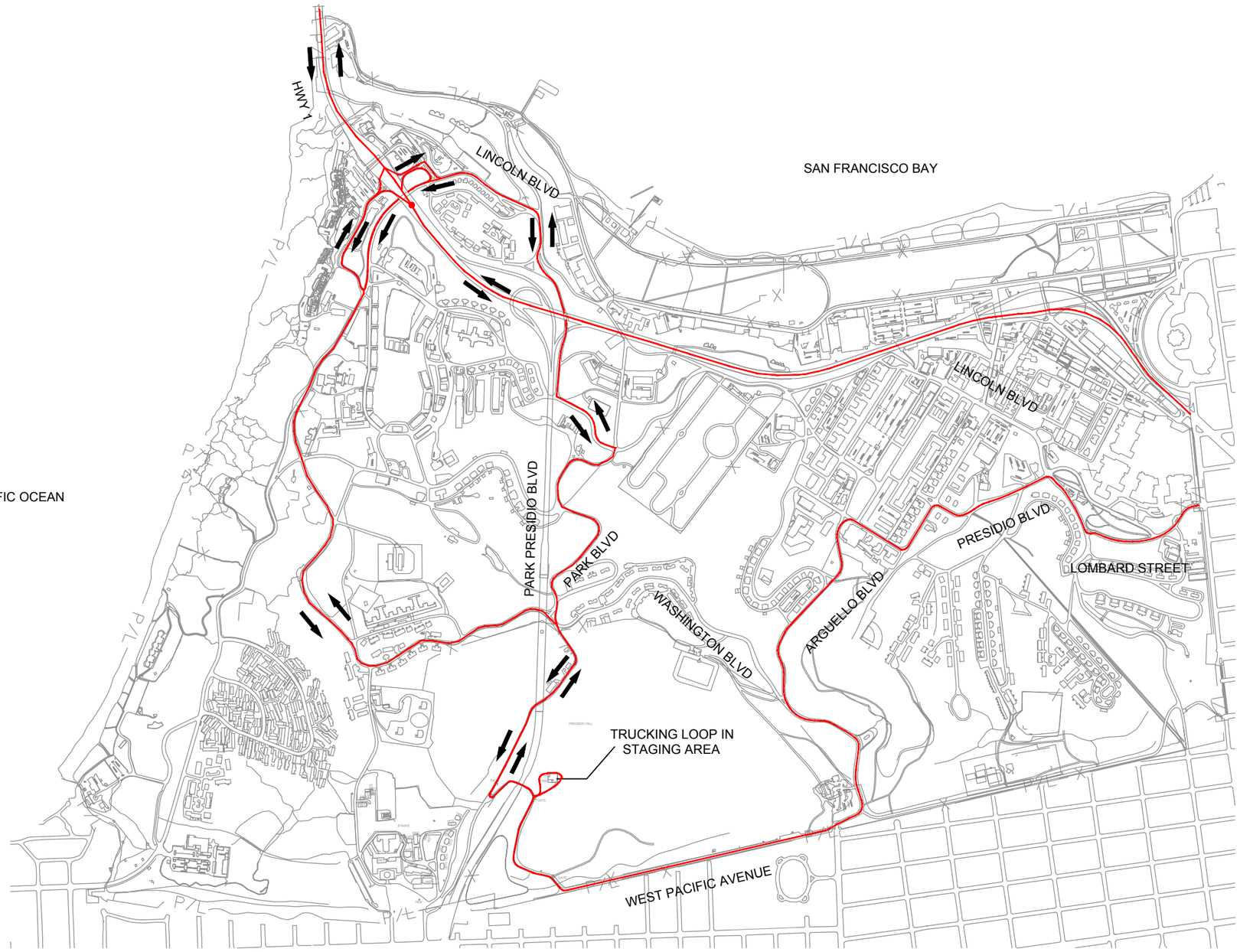


Notes:

1. The Marina Blvd, Gorgas Ave, and Highway 1 toll plaza gates may also be used as alternatives for Presidio egress/ingress.
2. No entry or exit of project trucks into or out of the Presidio will be allowed via Arguello Blvd, Presidio Blvd, 15th Ave, or 25th Ave.
3. Site feature map provided by Mactec.
4. Maintain and Repair West Pacific Ave access (if used).
5. Contractor shall maintain and repair staging area.
6. Contractor shall be aware that other construction in and around the Presidio is occurring and that not all roadways may be open and available.

LEGEND

Possible Hauling Routes

Haul Route Traffic Flow Directions

N

0 1100 2200

Approximate Scale: 1"=1100'

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**Project Haul Routes**

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**Figure 8-2**

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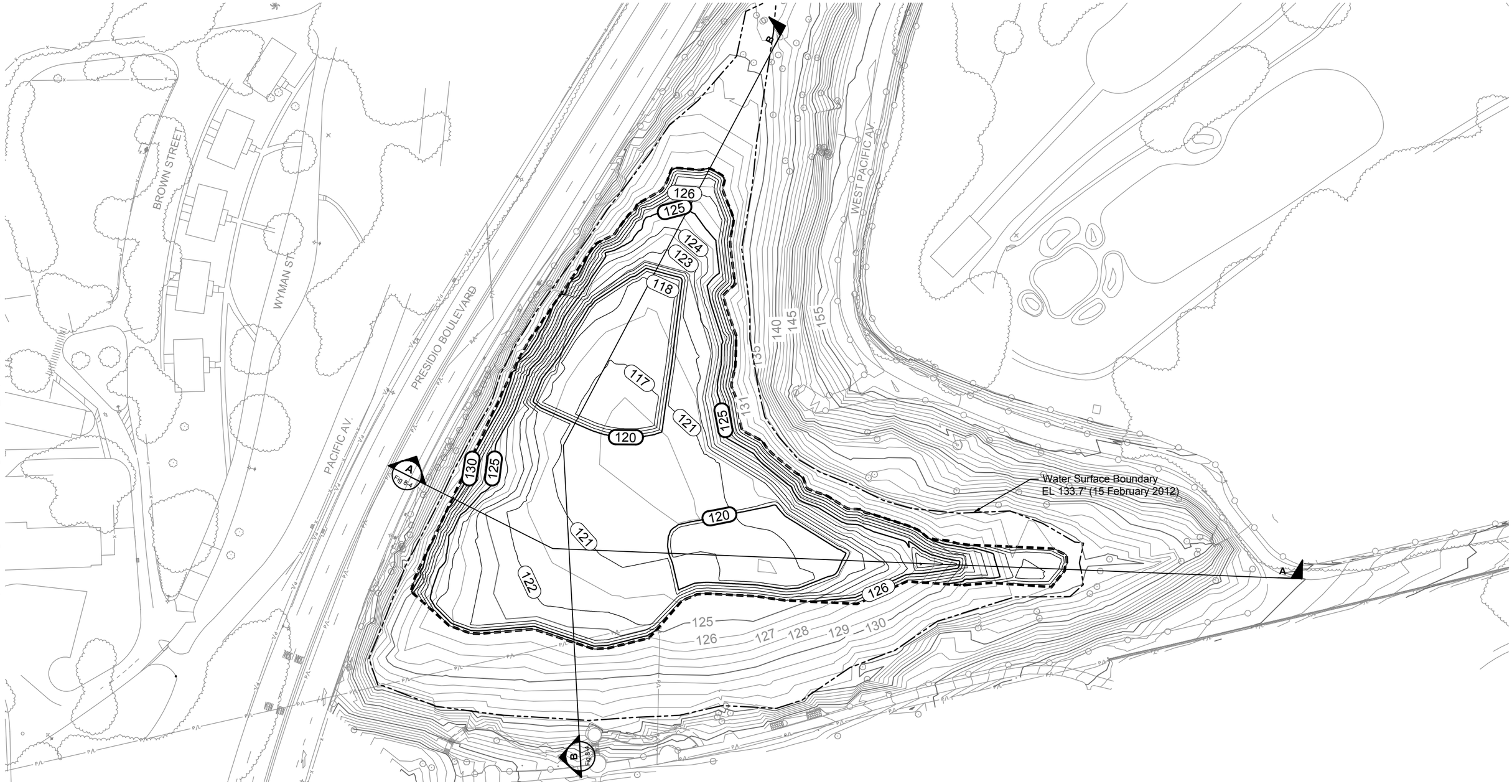


LEGEND

Dredge Limits

Lake Surface Boundary

City of San Francisco/Presidio Trust Property Line

N

0 100 200

1"=100'

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San Francisco, California

**Dredging Plan**

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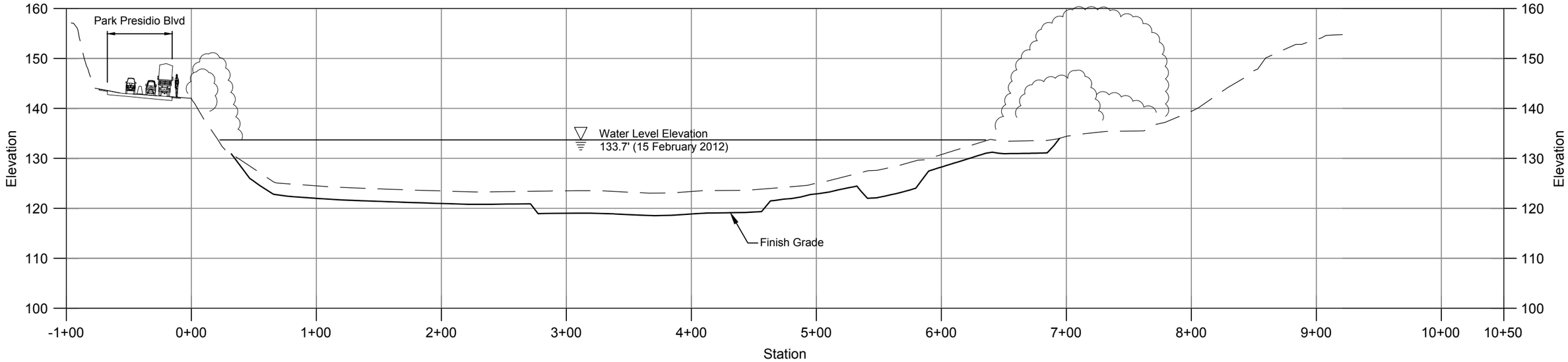
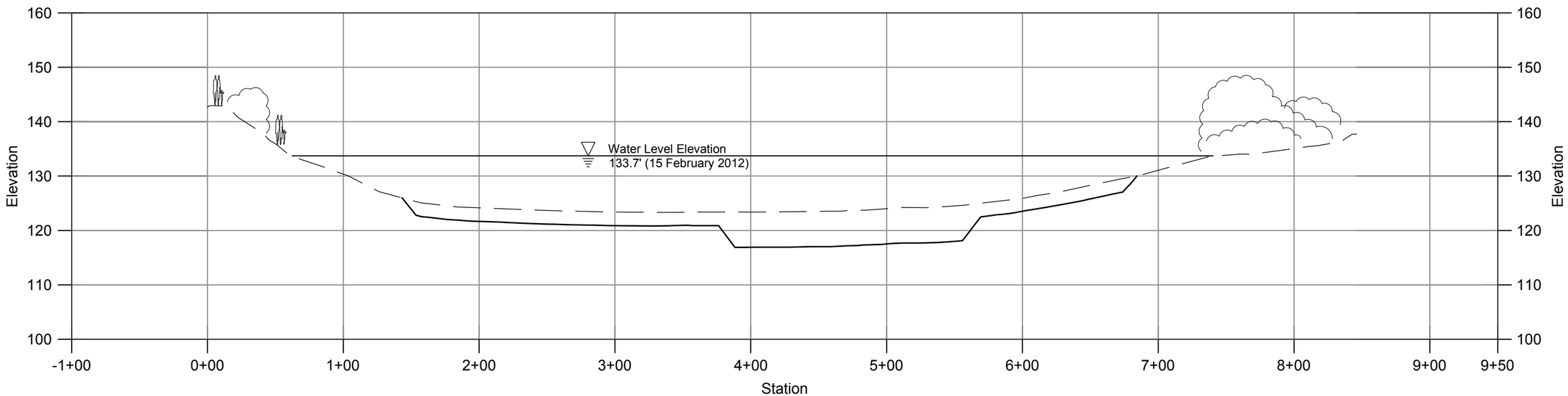
May 2012

**Figure 8-3**




**Section A**




**Section B**

0 40 80 120
Horizontal: 1"=80'

0 10 20 30
Vertical: 1"=20'

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**Typical Dredging Cross Sections**

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**Figure 8-4**

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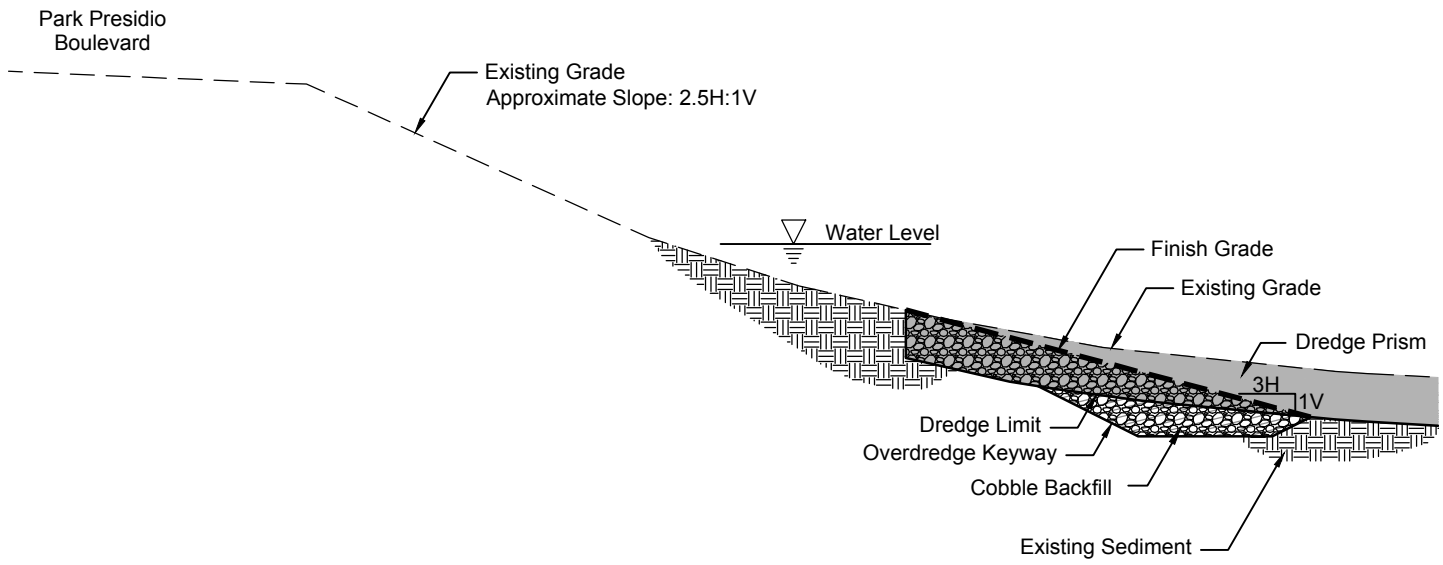
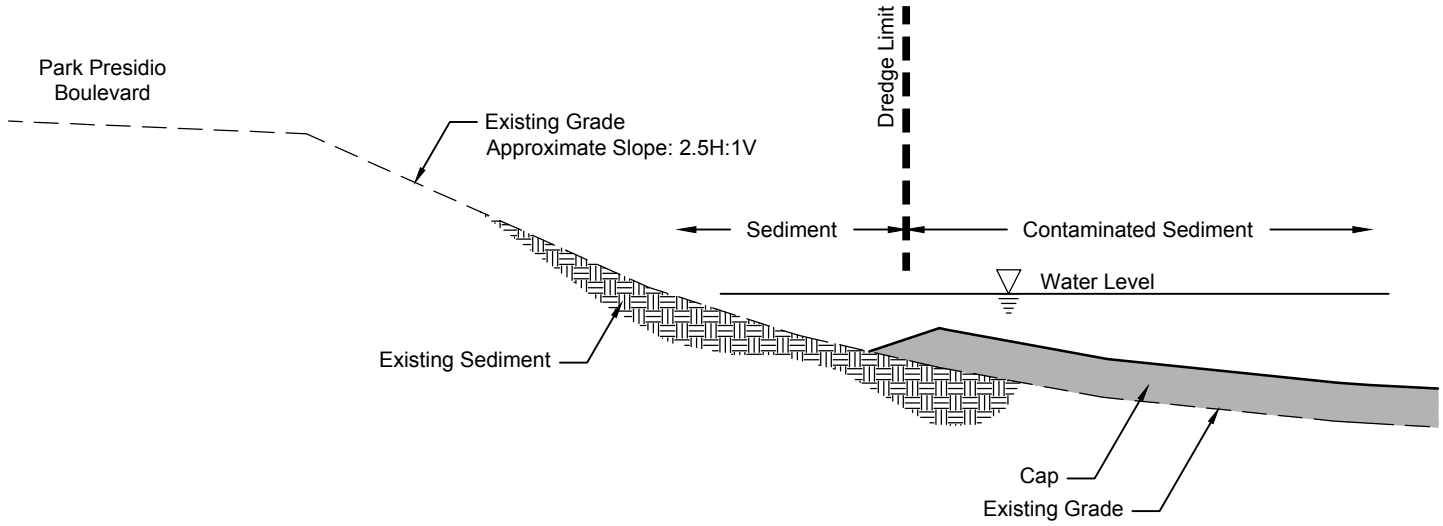



**Vertical Cut and Backfill Option**

Not to Scale




**Limited Capping Option**

Not to Scale

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San Francisco, California

**Slope Stabilization Conceptual Design**
**Cross Section**

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May 2012

**Figure 8-5**

# Appendix A

Sediment and Surface Water Analytical Data
(Reproduced from URS 2011 and Kennedy/Jenks 2012, and EKI 2003)

**TABLE 2**
**METALS RESULTS**
**PRESIDIO - MOUNTAIN LAKE**


| Sample Number | | Antimony | Arsenic | Barium | Beryllium | Cadmium | Chromium | Cobalt | Copper | Lead | Mercury | Molybdenum | Nickel | Selenium | Silver | Thallium | Vanadium | Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Freshwater Sediment Cleanup Level (mg/kg)** | **Source** | **3** | **19** | **3,100** | **7,200** | **1.1** | **140** | **50** | **114** | **82** | **0.62** | **522** | **110** | **1.6** | **1** | **3.7** | **90** | **230** |
| MLSD01 | D&M, 1997 | - | <2.50 | **24.0** | - | - | **51.2** | **6.58** | **4.71** | **19.2** | <0.050 | - | **20.7** | - | - | - | **50.1** | **36.7** |
| MLSD02 | D&M, 1997 | - | <2.50 | **26.8** | - | - | **73.9** | **5.50** | **6.09** | **25.3** | **0.069** | - | **21.6** | - | - | - | **44.8** | **24.1** |
| MLSD03 | D&M, 1997 | - | <2.50 | **27.7** | - | - | **50.1** | **5.09** | **5.16** | **34.4** | <0.050 | - | **19.1** | - | - | - | **36.0** | **21.5** |
| MLSD04 | D&M, 1997 | - | <2.50 | **28.5** | - | - | **74.3** | **6.40** | **6.85** | <7.44 | <0.050 | - | **21.3** | - | - | - | **66.3** | **21.2** |
| ML-1 (9.7-0.3)comp | EKI, 1998 | ND | **1.6** | **19** | ND | **0.24** | **22** | **3.9** | **10** | **93** | ND | ND | **23** | ND | ND | ND | **14** | **57** |
| ML-2 (19.5-2)comp | EKI, 1998 | ND | **2.1** | **29** | ND | <0.13 | **33** | **5.8** | **5.4** | **2.4** | ND | ND | **20** | ND | ND | ND | **25** | **17** |
| ML-3 (19.4-5)comp | EKI, 1998 | ND | **2.1** | **23** | ND | **0.15** | **32** | **5.1** | **8.2** | **40** | ND | ND | **24** | ND | ND | ND | **22** | **34** |
| ML-4 (19.5-5)comp | EKI, 1998 | ND | **4.2** | **20** | ND | **0.16** | **27** | **3.6** | **9.7** | **47** | ND | ND | **22** | ND | ND | ND | **17** | **38** |
| ML-5 (14.7-0.3)comp | EKI, 1998 | ND | **2.9** | **30** | ND | <0.13 | **41** | **6.8** | **7.2** | **15** | ND | ND | **33** | ND | ND | ND | **30** | **32** |
| MLSD 1 (0.1) | URS, 2001 | **5.9 J** | <3.9 | **150** | <2.0 | **12** | **190** | **26** | **310** | **250** | **0.81** | **2.6** | **120** | <1.6 | <2.0 | <3.9 | **110** | **2900** |
| MLSD 1 (0.25) | URS, 2001 | <0.89 UJ | <1.3 | **40** | <0.63 | **0.98** | **30** | **5.6** | **16** | **26** | <0.063 | <1.3 | **28** | <0.51 | <0.63 | <1.3 | **21** | **200** |
| MLSD 2 (0.1) | URS, 2001 | **3.4 J** | **3.0** | **110** | <0.99 | **3.3** | **89** | **11** | **610** | **560** | **0.23** | **3.9** | **61** | <0.79 | <0.99 | <2.0 | **44** | **570** |
| MLSD 3 (0.5) | URS, 2001 | **1.5 J** | <1.4 | **110** | <0.68 | **1.8** | **28** | **6.6** | **95** | **120** | **0.091** | **1.8 J** | **31** | <0.54 | <0.68 | <1.4 | **24** | **430** |
| MLSE 1 (0.5) | URS, 2001 | <0.93 | <1.3 | **24 J** | <0.66 | <0.66 | **31** | **4.8 J** | **6.1** | **27** | <0.066 | <1.3 | **34 J** | <0.53 | <0.66 | <1.3 | **16 J** | **53** |
| MLSE 1 (1) | URS, 2001 | <0.90 | <1.3 | **31** | <0.64 | <0.64 | **37** | **7.2** | **6.8** | **15** | <0.064 | <1.3 | **50** | <0.51 | <0.64 | <1.3 | **18** | **41** |
| MLSE 1 (2) | URS, 2001 | <0.83 UJ | <1.2 | **26 J** | <0.59 | <0.59 UJ | **36 J** | **5.9 J** | **5.2 J** | **4.2 J** | <0.059 | <1.2 UJ | **30 J** | <0.47 UJ | <0.59 | <1.2 UJ | **18 J** | **27 J** |
| MLSE 1 (6) | URS, 2001 | <2.8 UJ | <3.9 | **130** | <2.0 | <2.0 UJ | **140** | **26** | **31** | **32** | <0.20 | <3.9 UJ | **150** | <1.6 UJ | <2.0 | <3.9 UJ | **100** | **74** |
| MLSE 1 (7) | URS, 2001 | <2.7 UJ | **10** | **100** | <1.9 | **3.3** | **110** | **38** | **15** | <3.9 | <0.19 UJ | <3.9 | **110** | <1.5 | <1.9 | <3.9 | **70** | **49** |
| MLSE 1 (9) | URS, 2001 | <0.92 UJ | <1.3 | **100** | <0.66 | <0.66 | **53** | **9.3** | **9.8** | **3.4** | <0.066 UJ | <1.3 | **25** | <0.53 | <0.66 | <1.3 | **43** | **23** |
| MLSE2 (0.5) | URS, 2001 | <5.0 UJ | <7.2 | **180** | <3.6 | **5.0** | **150** | **25** | **130** | **1200** | **0.73** | <7.2 | **170** | <2.9 | <3.6 | <7.2 | **81** | **670** |
| MLSE2 (1) | URS, 2001 | <3.5 UJ | <5.0 | **140** | **0.63J** | **4.1** | **120** | **23** | **87** | **1000** | **0.55** | <5.0 | **150** | <2.0 | <2.5 | <5.0 | **70** | **530** |
| MLSE2 (2) | URS, 2001 | <2.7 UJ | <3.9 | **120** | <1.9 | **2.5** | **110** | **19** | **47** | **290** | **0.28** | <3.9 | **140** | <1.5 | <1.9 | <3.9 | **68** | **220** |
| MLSE2 (5) | URS, 2001 | <2.5 UJ | <3.5 | **170** | **0.60J** | **2.3** | **160** | **22** | **36** | **76** | **0.19** | <3.5 | **210** | <1.4 | <1.8 | <3.5 | **88** | **86** |
| MLSE 2 (6) | URS, 2001 | <2.7 UJ | <3.8 | **160** | <1.9 | <1.9 | **190** | **17** | **24** | **13** | <0.19 UJ | <3.8 | **150** | <1.5 | <1.9 | <3.8 | **110** | **54** |
| MLSE 2 (8) | URS, 2001 | <4.5 UJ | <6.5 | **79** | <3.2 | <3.2 | **110** | **26** | **18** | <6.5 | <0.32 UJ | <6.5 | **120** | <2.6 | <3.2 | <6.5 | **78** | **55** |
| MLSE3 (0.5) | URS, 2001 | <3.1 UJ | <4.4 | **120** | <2.2 | **3.0** | **92** | **19** | **67** | **630** | **0.39** | <4.4 | **120** | <1.8 | <2.2 | <4.4 | **68** | **320** |
| MLSE3 (1) | URS, 2001 | <2.5 UJ | <3.6 | **160** | <1.8 | **2.5** | **130** | **22** | **44** | **140** | **0.24** | <3.6 | **160** | <1.4 | <1.8 | <3.6 | **82** | **150** |
| MLSE3 (2) | URS, 2001 | <2.4 UJ | <3.5 | **180** | **0.57** | **2.2** | **150** | **20** | **38** | **65** | **0.20** | <3.5 | **200** | <1.4 | <1.7 | <3.5 | **90** | **97** |
| MLSE3 (6) | URS, 2001 | <5.1 UJ | <7.2 | **79** | <3.6 | **2.2J** | **100** | **22** | **21** | **7.5** | **0.073 J** | **1.1J** | **120** | <2.9 | <3.6 | <7.2 | **74** | **59** |
| MLSE 3 (7) | URS, 2001 | <4.8 UJ | <6.9 | **120** | <3.5 | <3.5 | **190** | **49** | **32** | **7.4** | <0.35 UJ | <6.9 | **210** | <2.8 | <3.5 | <6.9 | **140** | **100** |
| MLSE 3 (9) | URS, 2001 | <4.4 UJ | <6.2 | **50** | <3.1 | <3.1 | **110** | **34** | **19** | <6.2 | <0.31 UJ | <6.2 | **120** | <2.5 | <3.1 | <6.2 | **76** | **61** |
| MLSE 4 (0.5) | URS, 2001 | <0.87 | <1.2 | **29** | <0.62 | **0.77** | **27** | **4.1** | **22** | **100** | <0.062 | <1.2 | **30** | <0.49 | <0.62 | <1.2 | **14** | **190** |
| MLSE 4 (1) | URS, 2001 | <1.2 | <1.7 | **61** | <0.83 | **2.1** | **29** | **3.7** | **70** | **2000 J** | **0.14** | **2.5** | **30** | <0.66 | <0.83 | <1.7 | **19** | **240** |
| MLSE 4 (2) | URS, 2001 | **5.4** | <1.5 | **57** | <0.73 | **0.95** | **180** | **2.8** | **31** | **1200** | **0.12** | **29** | **24** | <0.58 | <0.73 | <1.5 | **18** | **99** |
| MLSE 4 (6) | URS, 2001 | <0.86 | **1.8** | **25** | <0.61 | <0.61 | **28** | **5.3** | **5.1** | **25** | <0.061 | <1.2 | **32** | <0.49 | <0.61 | <1.2 | **16** | **20** |
| MLSE5 (0.5) | URS, 2001 | <1.7 UJ | <2.5 | **44** | <1.2 | **0.77J** | **44** | **6.7** | **17** | **100** | **0.078 J** | <2.5 | **38** | <0.99 | <1.2 | <2.5 | **25** | **74** |
| MLSE5 (1) | URS, 2001 | <0.98 UJ | <1.4 | **24** | <0.70 | <0.70 | **28** | **4.6** | **7.0** | **39** | <0.070 | <1.4 | **21** | <0.56 | <0.70 | <1.4 | **13** | **34** |
| MLSE5 (2) | URS, 2001 | <1.4 UJ | <2.0 | **54** | <1.0 | **0.68J** | **64** | **8.2** | **12** | **17** | <0.10 | <2.0 | **48** | <0.81 | <1.0 | <2.0 | **38** | **32** |
| MLSE5 (5) | URS, 2001 | <1.1 UJ | <1.5 | **61** | <0.76 | **0.67J** | **50** | **6.2** | **10** | **2.9** | <0.076 | <1.5 | **20** | <0.61 | <0.76 | <1.5 | **39** | **23** |

**TABLE 2**
**METALS RESULTS**
**PRESIDIO - MOUNTAIN LAKE**


| Sample Number | | Antimony | Arsenic | Barium | Beryllium | Cadmium | Chromium | Cobalt | Copper | Lead | Mercury | Molybdenum | Nickel | Selenium | Silver | Thallium | Vanadium | Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Freshwater Sediment Cleanup Level (mg/kg)** | **Source** | **3** | **19** | **3,100** | **7,200** | **1.1** | **140** | **50** | **114** | **82** | **0.62** | **522** | **110** | **1.6** | **1** | **3.7** | **90** | **230** |
| MLSE6 (0.5) | URS, 2001 | <4.0 | <5.8 | 180 | 0.69J | 4.7 | 150 | 20 | 120 | 1000 | 0.72 | <5.8 | 150 | <2.3 | 0.51J | <5.8 | 86 | 530 |
| MLSE6 (1) | URS, 2001 | <3.1 | 2.1J | 150 | 0.52J | 3.5 | 130 | 21 | 68 | 590 | 0.73 | <4.4 | 140 | <1.8 | <2.2 | <4.4 | 81 | 320 |
| MLSE6 (2) | URS, 2001 | <2.8 | <4.0 | 140 | <2.0 | 2.6 | 130 | 22 | 48 | 180 | 0.28 | <4.0 | 160 | <1.6 | <2.0 | <4.0 | 79 | 190 |
| MLSE6 (5) | URS, 2001 | <2.8 | <4.0 | 180 | 0.57J | 2.3 | 140 | 19 | 50 | 110 | 0.28 | <4.0 | 170 | <1.6 | <2.0 | <4.0 | 85 | 180 |
| MLSE 6 (6) | URS, 2001 | <2.7 UJ | <3.9 | 200 | <1.9 | 2.2 | 160 | 24 | 54 | 100 | 0.25 J | <3.9 | 220 | <1.5 | <1.9 | <3.9 | 97 | 190 |
| MLSE 6 (8) | URS, 2001 | <2.4 UJ | <3.5 | 170 | <1.7 | 1.8 | 190 | 20 | 28 | 36 | <0.17 UJ | <3.5 | 200 | <1.4 | <1.7 | <3.5 | 110 | 68 |
| MLSE7 (0.5) | URS, 2001 | <1.3 | <1.8 | 39 | <0.92 | 0.89J | 35 | 7.8 | 17 | 150 | 0.097 | <1.8 | 46 | <0.73 | <0.92 | <1.8 | 23 | 92 |
| MLSE7 (1) | URS, 2001 | <1.4 | <1.9 | 45 | <0.97 | 0.74J | 59 | 9.3 | 9.6 | 36 | <0.097 | <1.9 | 55 | <0.78 | <0.97 | <1.9 | 32 | 43 |
| MLSE7 (2) | URS, 2001 | <2.4 | <3.4 | 130 | <1.7 | 1.5J | 140 | 16 | 23 | 12 | 0.074 J | <3.4 | 140 | <1.4 | <1.7 | <3.4 | 97 | 48 |
| MLSE7 (6) | URS, 2001 | <4.3 | <6.1 | 85 | <3.0 | 2.7J | 93 | 23 | 17 | 3.3 | <0.30 | <6.1 | 96 | <2.4 | <3.0 | <6.1 | 73 | 48 |
| MLSE 7 (7) | URS, 2001 | <4.2 UJ | <6.0 | 100 | <3.0 | 3.2 | 110 | 30 | 19 | <6.0 | <0.30 UJ | <6.0 | 120 | <2.4 | <3.0 | <6.0 | 84 | 58 |
| MLSE 7 (9) | URS, 2001 | <4.0 UJ | <5.8 | 82 | <2.9 | 3.5 | 80 | 26 | 19 | <5.8 | <0.29 UJ | <5.8 | 88 | <2.3 | <2.9 | <5.8 | 57 | 49 |
| MLSE 8 (0.5) | URS, 2001 | <2.5 UJ | <3.6 | 120 | <1.8 | 1.0 | 150 | 15 | 26 | 7.0 | 0.091 J | <3.6 | 120 | <1.4 | <1.8 | <3.6 | 97 | 45 |
| MLSE 8 (1) | URS, 2001 | <4.1 UJ | <5.9 | 110 | <2.9 | 1.4J | 120 | 22 | 31 | 6.0 | 0.095 J | <5.9 | 130 | <2.3 | <2.9 | <5.9 | 93 | 56 |
| MLSE 8 (2) | URS, 2001 | <5.1 UJ | <7.3 | 110 | <3.7 | 2.1J | 99 | 26 | 27 | 6.1 | 0.053 J | <7.3 | 120 | <2.9 | <3.7 | <7.3 | 74 | 56 |
| MLSE 8 (6) | URS, 2001 | <2.6 UJ | 2.1 | 260 | 0.57 | 2.5 | 160 | 24 | 30 | 11 | 0.094 J | <3.7 | 81 | <1.5 | <1.8 | <3.7 | 120 | 79 |
| MLSE 8 (7) | URS, 2001 | <0.95 UJ | <1.4 | 110 | <0.68 | <0.68 | 44 | 8.9 | 11 | 3.1 | <0.068 UJ | <1.4 | 26 | <0.54 | <0.68 | <1.4 | 37 | 23 |
| MLSE 8 (9) | URS, 2001 | <0.86 UJ | <1.2 | 84 | <0.61 | <0.61 | 48 | 9.5 | 9.1 | 3.1 | <0.061 UJ | <1.2 | 26 | <0.49 | <0.61 | <1.2 | 41 | 18 |
| MLSE 9 (0.5) | URS, 2001 | <3.3 UJ | <4.7 | 240 | 0.61J | 4.3 | 170 | 22 | 88 | 510 | 0.52 | <4.7 | 190 | <1.9 | <2.3 | <4.7 | 97 | 360 |
| MLSE 9 (1) | URS, 2001 | <3.2 UJ | <4.5 | 220 | 0.54J | 3.3 | 160 | 21 | 75 | 290 | 0.44 | <4.5 | 190 | <1.8 | <2.3 | <4.5 | 90 | 270 |
| MLSE 9 (2) | URS, 2001 | <2.5 UJ | <3.6 | 210 | 0.62J | 2.7 | 180 | 26 | 46 | 94 | 0.40 | <3.6 | 230 | <1.5 | <1.8 | <3.6 | 97 | 190 |
| MLSE 9 (5) | URS, 2001 | <2.4 UJ | <3.4 | 190 | 0.58J | 2.6 | 200 | 26 | 40 | 67 | 0.20 | <3.4 | 280 | <1.4 | <1.7 | <3.4 | 93 | 110 |
| MLSE 9 (6) | URS, 2001 | <4.9 UJ | <7.0 | 100 | <3.5 | <3.5 | 100 | 20 | 23 | 30 | <0.35 UJ | <7.0 | 120 | <2.8 | <3.5 | <7.0 | 76 | 75 |
| MLSE 9 (8) | URS, 2001 | <4.8 UJ | <6.9 | 80 | <3.4 | <3.4 | 82 | 22 | 17 | <6.9 | <0.34 UJ | <6.9 | 90 | <2.7 | <3.4 | <6.9 | 68 | 51 |
| MLSE10(0.5) | URS, 2001 | <0.87 | <1.2 | 39 | <0.62 | 0.55 | 30 | 5.6 | 13 | 23 | <0.062 | - | 31 | <0.50 | <0.62 | <1.2 | 22 | 32 |
| MLSE10(1) | URS, 2001 | <1.3 | 13 | 68 | <0.90 | 1.4 | 36 | 5.7 | 64 | 690 | 0.23 | - | 35 | <0.72 | <0.90 | <1.8 | 25 | 200 |
| MLSE10(2) | URS, 2001 | <2.4 | <3.5 | 99 | <1.7 | 1.0 | 110 | 14 | 21 | 27 | 0.10 | - | 98 | <1.4 | <1.7 | <3.5 | 82 | 45 |
| MLSE10(6) | URS, 2001 | <0.97 | <1.4 | 78 | <0.69 | 0.71 | 50 | 9.0 | 11 | 3.0 | <0.069 | - | 27 | <0.55 | <0.69 | <1.4 | 36 | 24 |
| MLSE11(0.5) | URS, 2001 | <0.84 | <1.2 | 17 | <0.60 | <0.60 | 35 | 4.7 | 5.4 | 8.6 | <0.060 | - | 24 | <0.48 | <0.60 | <1.2 | 26 | 20 |
| MLSE11(1) | URS, 2001 | <0.83 | <1.2 | 17 | <0.59 | <0.59 | 39 | 4.6 | 5.2 | 6.9 | <0.059 | - | 23 | <0.47 | <0.59 | <1.2 | 27 | 17 |
| MLSE11(2) | URS, 2001 | <0.81 | <1.2 | 16 | <0.58 | <0.58 | 25 | 4.2 | 5.8 | 3.6 | <0.058 | - | 21 | <0.46 | <0.58 | <1.2 | 19 | 16 |
| MLSE11(6) | URS, 2001 | <0.80 | <1.1 | 15 | <0.57 | 0.50 | 40 | 5.6 | 6.2 | 1.8 | <0.057 | - | 27 | <0.46 | <0.57 | <1.1 | 33 | 15 |
| MLSE 12 (0.5) | URS, 2001 | <2.0 UJ | <2.9 | 160 | 0.54 | 2.1 | 180 | 24 | 37 | 44 | 0.16 | <2.9 | 290 | <1.2 | <1.5 | <2.9 | 78 | 69 |
| MLSE 12 (1) | URS, 2001 | <1.8 UJ | <2.5 | 92 | <1.3 | 1.5 | 110 | 15 | 21 | 60 | 0.11 J | <2.5 | 130 | <1.0 | <1.3 | <2.5 | 59 | 160 |
| MLSE 12 (2) | URS, 2001 | <1.6 UJ | <2.3 | 130 | <1.1 | 1.8 J | 160 | 16 | 19 | 25 | 0.061 J | <2.3 UJ | 230 | <0.92 UJ | <1.1 | <2.3 UJ | 71 | 48 |
| MLSE 12 (5) | URS, 2001 | <3.6 UJ | <5.1 | 89 | <2.6 | 4.0 | 120 | 30 | 21 | 7.9 | <0.26 | <5.1 | 110 | <2.0 | <2.6 | <5.1 | 84 | 62 |
| MLSE 12 (6) | URS, 2001 | <3.2 UJ | <4.6 | 74 | <2.3 | 3.6 | 87 | 28 | 17 | 11 | <0.23 UJ | <4.6 | 120 | <1.8 | <2.3 | <4.6 | 64 | 72 |

**TABLE 2**
**METALS RESULTS**
**PRESIDIO - MOUNTAIN LAKE**


| Sample Number | | Antimony | Arsenic | Barium | Beryllium | Cadmium | Chromium | Cobalt | Copper | Lead | Mercury | Molybdenum | Nickel | Selenium | Silver | Thallium | Vanadium | Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Freshwater Sediment Cleanup Level (mg/kg)** | **Source** | **3** | **19** | **3,100** | **7,200** | **1.1** | **140** | **50** | **114** | **82** | **0.62** | **522** | **110** | **1.6** | **1** | **3.7** | **90** | **230** |
| MLSE 12 (8) | URS, 2001 | <1.1 UJ | 4.0 | 28 | <0.79 | 0.81 | 60 | 11 | 5.6 | 3.2 | 0.099 J | <1.6 | 33 | <0.63 | <0.79 | <1.6 | 56 | 23 |
| MLSE13(0.5) | URS, 2001 | <2.2 | <3.2 | 100 | <1.6 | 2.7 | 97 | 21 | 75 | 370 | 0.16 | - | 120 | <1.3 | <1.6 | <3.2 | 52 | 340 |
| MLSE13(1) | URS, 2001 | <3.2 | <4.5 | 150 | 0.55 | 1.7 | 170 | 21 | 42 | 18 | 0.09 | - | 180 | <1.8 | <2.3 | <4.5 | 130 | 59 |
| MLSE13(2) | URS, 2001 | <2.9 | <4.2 | 150 | 0.50 | 1.5 | 160 | 16 | 33 | 28 | 0.12 | - | 140 | <1.7 | <2.1 | <4.2 | 120 | 66 |
| MLSE13(5) | URS, 2001 | <5.6 | <8.0 | 93 | <4.0 | 2.2 | 93 | 25 | 42 | 19 | 0.058 | - | 110 | <3.2 | <4.0 | <8.0 | 67 | 72 |
| MLSE 13 (6) | URS, 2001 | <4.9 UJ | <7.0 | 94 | <3.5 | <3.5 | 96 | 25 | 19 | <7.0 | <0.35 UJ | <7.0 | 110 | <2.8 | <3.5 | <7.0 | 70 | 60 |
| MLSE 13 (8) | URS, 2001 | <4.9 UJ | <7.0 | 110 | <3.5 | <3.5 | 100 | 24 | 21 | <7.0 | <0.35 UJ | <7.0 | 110 | <2.8 | <3.5 | <7.0 | 73 | 58 |
| MLSE14 (0.5) | URS, 2001 | <4.4 | <6.3 | 200 | 0.53J | 4.5 | 140 | 20 | 120 | 880 | 0.74 | <6.3 | 150 | <2.5 | <3.1 | <6.3 | 75 | 520 |
| MLSE14 (1) | URS, 2001 | <3.2 | 2.6J | 180 | 0.55J | 4.2 | 140 | 21 | 100 | 810 | 0.47 | <4.6 | 150 | <1.8 | <2.3 | <4.6 | 79 | 480 |
| MLSE14 (2) | URS, 2001 | <2.2 | <3.2 | 160 | 0.50J | 2.0 | 120 | 22 | 44 | 92 | 0.30 | <3.2 | 170 | <1.3 | <1.6 | <3.2 | 74 | 180 |
| MLSE14 (5) | URS, 2001 | <3.7 | <5.3 | 100 | <2.6 | 1.3J | 130 | 17 | 30 | 14 | 0.10 J | <5.3 | 110 | <2.1 | <2.6 | <5.3 | 90 | 50 |
| MLSE 14 (6) | URS, 2001 | <5.9 UJ | <8.4 | 87 | <4.2 | <4.2 | 88 | 24 | 19 | <8.4 | <0.42 UJ | <8.4 | 110 | <3.4 | <4.2 | <8.4 | 61 | 62 |
| MLSE 14 (8) | URS, 2001 | <4.6 UJ | <6.5 | 92 | <3.3 | <3.3 | 94 | 24 | 19 | <6.5 | <0.33 UJ | <6.5 | 97 | <2.6 | <3.3 | <6.5 | 73 | 54 |
| MLSE15 (0.5) | URS, 2001 | <1.3 | <1.9 | 46 | <0.95 | 0.55J | 60 | 5.3 | 9.9 | 27 | 0.11 | <1.9 | 35 | <0.76 | <0.95 | <1.9 | 36 | 30 |
| MLSE15 (1) | URS, 2001 | <1.1 | 1.3J | 41 | <0.79 | <0.79 | 47 | 8.7 | 6.9 | 32 | <0.079 | <1.6 | 47 | <0.63 | <0.79 | <1.6 | 33 | 27 |
| MLSE15 (2) | URS, 2001 | <0.88 | <1.3 | 23 | <0.63 | <0.63 | 32 | 2.6 | 2.7 | 3.7 | <0.063 | <1.3 | 13 | <0.50 | <0.63 | <1.3 | 19 | 11 |
| MLSE15 (5) | URS, 2001 | <0.86 | 2.2 | 34 | <0.62 | <0.62 | 37 | 9.2 | 8.1 | 2.4 | <0.062 | <1.2 | 29 | <0.49 | <0.62 | <1.2 | 35 | 17 |
| DUP012401-1 [MLSD-1 (0.25)][a] | URS, 2001 | <0.88 UJ | 1.1J | 39 | <0.63 | 0.91 | 31 | 6.0 | 51 | 19 | 0.062 J | <1.3 | 33 | <0.50 | <0.63 | <1.3 | 22 | 210 |
| DUP012401-2 [MLSD-2 (0.1)][a] | URS, 2001 | 1.1 J | <1.4 | 100 | <0.72 | 1.7 | 51 | 8.2 | 370 | 320 | 0.12 | <1.4 | 41 | <0.58 | <0.72 | <1.4 | 28 | 440 |
| DUP012401-3 [MLSD-3 (0.5)][a] | URS, 2001 | 4.6 J | <1.6 | 140 | <0.78 | 1.9 | 38 | 5.7 | 110 | 150 | 0.072 | 11 J | 33 | <0.62 | <0.78 | <1.6 | 22 | 430 |
| DUP012401-4 [MLSE-8 (1)][a] | URS, 2001 | <4.7 | <6.6 | 92 | <3.3 | <3.3 | 93 | 21 | 29 | <6.6 | <0.33 | <6.6 | 110 | <2.7 | <3.3 | <6.6 | 75 | 48 |
| DUP012401-5 [MLSE-8 (2)][a] | URS, 2001 | <4.9 UJ | <7.0 | 110 | <3.5 | <3.5 | 94 | 27 | 34 | <7.0 | <0.35 | <7.0 | 120 | <2.8 | <3.5 | <7.0 | 71 | 54 |
| DUP012401-6 [MLSE-4 (1)][a] | URS, 2001 | <1.0 | <1.5 | 61 | <0.73 | 1.3 | 35 | 3.1 | 50 | 930 J | 0.10 | <1.5 | 27 | <0.59 | <0.73 | <1.5 | 19 | 130 |
| DUP012401-7 [MLSE-1 (0.5)][a] | URS, 2001 | <0.96 UJ | <1.4 | 55 J | <0.69 | 0.80 J | 59 | 11 J | 12 | 14 | <0.069 | <1.4 UJ | 75 J | <0.55 UJ | <0.69 | <1.4 UJ | 33 J | 51 |
| DUP012401-8 [MLSE-1 (2)][a] | URS, 2001 | <1.5 UJ | <2.1 | 59 J | <1.0 | 1.0 J | 77 J | 13 J | 16 J | 19 J | <0.10 | <2.1 UJ | 82 J | <0.84 UJ | <1.0 | <2.1 UJ | 46 J | 55 J |
| MLSE 16 (1) | URS, 2005 | <1.1 UJ | 4.7 | 40 J | <0.45 | <1.1 | 57 | 8.5 | 13 J | 120 J | 0.53 | <4.5 | 52 | 1.4 | <1.1 | <1.1 | 37 J | 70 J |
| MLSE 16 (2) | URS, 2005 | <1.5 UJ | 11 | 72 J | <0.62 | <1.5 | 89 | 18 | 12 J | 7.5 J | <0.12 | <6.2 | 77 | 3.6 | <1.5 | <1.5 | 68 J | 45 J |
| MLSE 16 (5) | URS, 2005 | <1.3 UJ | 20 | 40 J | <0.51 | <1.3 | 98 | 32 | 15 J | 2.6 J | <0.11 | <5.1 | 110 | 4.9 | <1.3 | <1.3 | 63 J | 64 J |
| MLSE 16 (6) | URS, 2005 | - | 20 | - | - | - | - | - | - | - | - | - | - | 5.6 | - | - | - | - |
| MLSE 16 (7) | URS, 2005 | - | 3.8 J | - | - | - | - | - | - | - | - | - | - | 1.2 J | - | - | - | - |
| MLSE 17 (1) | URS, 2005 | <0.65 | 4.7 | 48 J | 0.33 | 0.8 | 57 | 8.7 | 24 J | 440 J | 0.13 | <2.6 | 62 | 0.83 | <0.65 | <0.65 | 33 J | 210 J |
| MLSE 17 (2) | URS, 2005 | <0.27 UJ | 2.5 | 37 J | 0.22 | <0.27 | 55 | 8.3 | 5.5 J | 9.3 J | <0.022 | <1.1 | 68 | 0.35 | <0.27 | <0.27 | 27 J | 43 J |
| MLSE 17 (5) | URS, 2005 | <0.89 UJ | 5.7 | 120 J | 0.7 | <0.89 | 150 | 15 | 18 J | 11 J | <0.08 | <3.6 | 140 | 2.8 | <0.89 | <0.89 | 110 J | 45 J |
| MLSE 17 (6) | URS, 2005 | - | - | - | - | - | - | - | - | 2.0 | - | - | - | - | - | - | - | - |

**TABLE 2**
**METALS RESULTS**
**PRESIDIO - MOUNTAIN LAKE**


| Sample Number | | Antimony | Arsenic | Barium | Beryllium | Cadmium | Chromium | Cobalt | Copper | Lead | Mercury | Molybdenum | Nickel | Selenium | Silver | Thallium | Vanadium | Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Freshwater Sediment Cleanup Level (mg/kg)** | **Source** | **3** | **19** | **3,100** | **7,200** | **1.1** | **140** | **50** | **114** | **82** | **0.62** | **522** | **110** | **1.6** | **1** | **3.7** | **90** | **230** |
| MLSE 18 (1) | URS, 2005 | <0.28 UJ | **0.54** | **23 J** | **0.12** | <0.28 | **29** | **2.5** | **1.5 J** | **11 J** | **0.024 J** | <1.1 | **12** | <0.28 | <0.28 | <0.28 | **16 J** | **12 J** |
| MLSE 18 (2) | URS, 2005 | <0.27 UJ | **2.4** | **61 J** | **0.31** | <0.27 | **59** | **11** | **8.2 J** | **2.4 J** | <0.023 | <1.1 | **33** | **0.52** | <0.27 | <0.27 | **46 J** | **24 J** |
| MLSE 18 (5) | URS, 2005 | <0.27 | **2.5** | **52 J** | **0.27** | <0.27 | **53** | **12** | **6.5 J** | **2.3 J** | **0.019 J** | <1.1 | **28** | **0.4** | <0.27 | <0.27 | **40 J** | **20 J** |
| MLSE 19 (1.5) | URS, 2005 | <0.26 | **2.1** | **54** | **0.29** | <0.26 | **70** | **7.5** | **7.9** | **2.9** | <0.022 | <1 | **27** | **1.4** | <0.26 | <0.26 | **53** | **30** |
| MLSE 19 (2.5) | URS, 2005 | <0.22 UJ | **2** | **55** | **0.32** | <0.22 | **63** | **7.7** | **7.7** | **2.5** | <0.024 | <0.9 | **28** | **1.2** | <0.22 | <0.22 | **52** | **23** |
| MLSE 19 (5) | URS, 2005 | <0.24 | **5.2** | **72** | **0.48** | <0.24 | **88** | **13** | **12** | **3.8** | <0.024 | <0.96 | **54** | **2** | <0.24 | <0.24 | **75** | **28** |
| MLSE 20 (1) | URS, 2005 | <0.32 | **1.3** | **93** | **0.35** | <0.32 | **120** | **10** | **14** | **28** | <0.025 | <1.3 | **140** | **1.9** | <0.32 | <0.32 | **53** | **43** |
| MLSE 20 (2) | URS, 2005 | <0.58 UJ | **2.7** | **99** | **0.42** | <0.58 | **140** | **12** | **13** | **10** | <0.058 | <2.3 | **90** | **2.3** | <0.58 | <0.58 | **77** | **47** |
| MLSE 20 (5) | URS, 2005 | <0.24 UJ | **1.8** | **53** | **0.26** | <0.24 | **60** | **12** | **7.5** | **2.4** | <0.027 | <0.97 | **32** | **1.1** | <0.24 | <0.24 | **48** | **22** |
| MLSE 21 (1) | URS, 2005 | **2.6 J** | **11** | **230** | **0.85** | **2.7** | **280** | **29** | **140** | **1,200** | **0.96** | <7.3 | **210** | **5.9** | <1.8 | <1.8 | **190** | **960** |
| MLSE 21 (2) | URS, 2005 | <0.48 | **3.7** | **45** | **0.23** | <0.48 | **120** | **9.9** | **24** | **130** | **0.14** | <1.9 | **95** | **1.4** | <0.48 | <0.48 | **65** | **160** |
| MLSE 21 (5) | URS, 2005 | <1.4 UJ | **52** | **94** | <0.55 | <1.4 | **110** | **32** | **13** | **3.2** | <0.13 | <5.5 | **110** | **12** | <1.4 | <1.4 | **90** | **57** |
| MLSE 21 (6) | URS, 2005 | - | **27** | - | - | - | - | - | - | - | - | - | - | **4.9** | - | - | - | - |
| MLSE 21 (7) | URS, 2005 | <0.23 | **12** | **27** | **0.1** | <0.23 | **26** | **6.1** | **1.2** | **0.72** | <0.02 | <0.91 | **21** | **0.25** | <0.23 | <0.23 | **23** | **10** |
| MLSE 21 (8) | URS, 2005 | - | **4.8** | - | - | - | - | - | - | - | - | - | - | <1.3 | - | - | - | - |
| MLSE 22 (1) | URS, 2005 | <0.22 UJ | **0.4** | **13** | <0.12 UJ | <0.22 | **42** | **4.8** | **1.7** | **0.96** | <0.023 | <0.9 | **19** | **0.74** | <0.22 | <0.22 | **38** | **15** |
| MLSE 22 (2) | URS, 2005 | <0.29 UJ | **0.57** | **16** | **0.13** | <0.29 | **50** | 4.9 | **2.2** | **1.1** | <0.023 | <1.1 | **20** | **0.73** | <0.29 | <0.29 | **41** | **16** |
| MLSE 22 (5) | URS, 2005 | <0.23 UJ | **1.1** | **11** | **0.18** | <0.23 | **33** | **4.3** | **2.7** | **1.4** | <0.024 | <0.94 | **21** | **0.4** | <0.23 | <0.23 | **24** | **15** |
| MLSE 23 (1) | URS, 2005 | <0.25 UJ | **0.83** | **21** | <0.18 UJ | <0.25 | **53** | **5.2** | **2.6** | **2.5** | <0.022 | <0.99 | **21** | <0.25 | <0.25 | <0.25 | **37** | **20** |
| MLSE 23 (2) | URS, 2005 | <0.25 UJ | **0.8** | **18** | <0.2 UJ | <0.25 | **41** | **4.9** | **2.5** | **1.5** | <0.021 | <1 | **23** | <0.25 | <0.25 | <0.25 | **29** | **17** |
| MLSE 23 (5) | URS, 2005 | <0.27 UJ | **1.5** | **15** | **0.26** | <0.27 | **62 J** | **6.1** | **3.4** | **1.7** | <0.02 | <1.1 | **25** | <0.27 | <0.27 | <0.27 | **52** | **22** |
| MLSE 24 (1) | URS, 2005 | <0.39 UJ | **2.4** | **34** | **0.22** | <0.39 | **48 J** | **4.2** | **12** | **82** | **0.05** | <1.6 | **29** | <0.39 | <0.39 | <0.39 | **36** | **50** |
| MLSE 24 (2.5) | URS, 2005 | <0.31 UJ | **2.2** | **47** | **0.27** | <0.31 | **63 J** | **7.2** | **7.9** | **22** | **0.046** | <1.3 | **53** | <0.31 | <0.31 | <0.31 | **39** | **42** |
| MLSE 24 (5) | URS, 2005 | <1.2 UJ | **16** | **79** | **0.47** | <1.2 | **94 J** | **29** | **15** | **2.8** | <0.1 | <4.6 | **110** | **2.2** | <1.2 | <1.2 | **69** | **63** |
| MLSE 25 (1) | URS, 2005 | <5.2 UJ | **0.74** | **25 J** | <0.43 | <0.43 | **29 J** | **4** | **6.4** | **36 J** | <0.048 | <2.2 UJ | **16 J** | <0.43 | <0.43 | <0.43 | **19 J** | **34 J** |
| MLSE 26 (1) | URS, 2005 | <14 | **4.4** | **110 J** | <1.1 | <1.1 | **66 J** | **9.4** | **32** | **91 J** | <0.097 | <5.7 | **84 J** | <1.1 | <1.1 | <1.1 | **62 J** | **100 J** |
| MLSE 26 (2) | URS, 2005 | <7.4 | **5.9** | **86 J** | <0.61 | <0.61 | **91 J** | **8.2** | **22** | **71 J** | **0.088** | <3.1 | **74 J** | <0.61 | <0.61 | <0.61 | **71 J** | **88 J** |
| MLSE 27 (1) | URS, 2005 | <0.28 UJ | **1.2** | **20** | <0.15 UJ | <0.28 | **51 J** | **4.3** | **3.1** | **22** | **0.02** | <1.1 | **25** | <0.28 | <0.28 | <0.28 | **27** | **32** |
| MLSE 27 (2) | URS, 2005 | <0.9 UJ | **7.1** | **160** | **0.79** | <0.9 | **230 J** | **23** | **23** | **57** | **0.18** | <3.6 | **260** | <0.9 | <0.9 | <0.9 | **120** | **99** |
| MLSE 27 (5) | URS, 2005 | <0.78 UJ | **15** | **60** | **0.39** | <0.78 | **110 J** | **31** | **9.2** | **5.6** | <0.064 | <3.1 | **93** | **0.81** | <0.78 | <0.78 | **94** | **64** |
| MLSE 27 (6) | URS, 2005 | <0.26 UJ | **4** | **15** | <0.16 UJ | <0.26 | **44 J** | **7.1** | **2.1** | **0.99** | <0.023 | <1 | **23** | <0.26 | <0.26 | <0.26 | **37** | **18** |
| MLSE 28 (1) | URS, 2005 | <0.42 UJ | **3.2** | **56** | **0.26** | <0.42 | **76 J** | **11** | **21** | **140** | **0.13** | <1.7 | **66** | <0.42 | <0.42 | <0.42 | **46** | **150** |
| MLSE 28 (2) | URS, 2005 | <0.43 UJ | **3.6** | **61** | **0.31** | <0.43 | **94 J** | **10** | **11** | **35** | **0.056** | <1.7 | **78** | <0.43 | <0.43 | <0.43 | **54** | **57** |
| MLSE 28 (5) | URS, 2005 | <1.5 UJ | **25** | **100** | <0.62 | <1.5 | **150 J** | **44** | **18** | **4** | <0.12 | <6.2 | **180** | **2.9** | <1.5 | <1.5 | **100** | **83** |
| MLSE 28 (6) | URS, 2005 | <0.39 UJ | **5.8** | **26** | <0.15 UJ | <0.39 | **36 J** | **9.8** | **4.6** | **1.4** | <0.02 | <1.5 | **40** | <0.39 | <0.39 | <0.39 | **26** | **21** |
| MLSE 29 (1) | URS, 2005 | - | - | - | - | **2** | - | - | - | **660** | - | - | - | - | - | - | - | - |
| MLSE 29 (2) | URS, 2005 | - | - | - | - | **1.6** | - | - | - | - | - | - | - | - | - | - | - | - |
| MLSE 29 (4) | URS, 2005 | <0.93 UJ | **11** | **280** | **0.97** | **1** | **250 J** | **32** | **66 J** | **240** | <0.19 UJ | <3.7 | **320** | <0.93 | <0.93 | <0.93 | <130 UJ | **260** |
| MLSE 29 (5) | URS, 2005 | - | - | - | - | <1.7 | | | | **7.8** | - | - | - | - | - | - | - | - |
| MLSE 29 (6) | URS, 2005 | - | - | - | - | <1.5 | - | - | - | **2.3** | - | - | - | - | - | - | - | - |
| MLSE 30 (1) | URS, 2005 | - | - | - | - | **1.8** | - | - | - | - | - | - | - | - | - | - | - | - |
| MLSE 30 (2) | URS, 2005 | - | - | - | - | **1.3** | - | - | - | - | - | - | - | - | - | - | - | - |
| MLSE 30 (4) | URS, 2005 | <1 UJ | **8** | **64** | <0.55 | <1 | **130 J** | **22** | **45 J** | <3 | <0.12 | <5.5 | **130** | <1.4 | <1.4 | <1.4 | **80** | **180** |

**TABLE 2**
**METALS RESULTS**
**PRESIDIO - MOUNTAIN LAKE**


| Sample Number | | Antimony | Arsenic | Barium | Beryllium | Cadmium | Chromium | Cobalt | Copper | Lead | Mercury | Molybdenum | Nickel | Selenium | Silver | Thallium | Vanadium | Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Freshwater Sediment Cleanup Level (mg/kg)** | **Source** | **3** | **19** | **3,100** | **7,200** | **1.1** | **140** | **50** | **114** | **82** | **0.62** | **522** | **110** | **1.6** | **1** | **3.7** | **90** | **230** |
| MLSE 30 (5) | URS, 2005 | - | - | - | - | <2.1 | - | - | - | **20** | - | - | - | - | - | - | - | - |
| MLSE 30 (6) | URS, 2005 | - | - | - | - | <1.7 | - | - | - | **16** | - | - | - | - | - | - | - | - |
| MLSE 31 (1) | URS, 2005 | - | - | - | - | **1.4** | - | - | - | - | - | - | - | - | - | - | - | - |
| MLSE 31 (2) MS/MSD | URS, 2005 | - | - | - | - | **0.74** | - | - | - | **120** | - | - | - | - | - | - | - | - |
| MLSE 31 (4) | URS, 2005 | <13 | **7.2** | **170** | **0.61** | <1 | <150 UJ | **20** | **42 J** | **100** | <0.3 UJ | <4.2 | **180** | <1.6 | <1 | <1 | <90 UJ | **190** |
| MLSE 31 (5) | URS, 2005 | - | - | - | - | <2 | - | - | - | **2.1** | - | - | - | - | - | - | - | - |
| MLSE 31 (6) | URS, 2005 | - | - | - | - | <1.3 | - | - | - | - | - | - | - | - | - | - | - | - |
| MLSE 32 (1) | URS, 2005 | - | - | - | - | <0.2 | - | - | - | - | - | - | - | - | - | - | - | - |
| MLSE 32 (2) MS/MSD | URS, 2005 | - | - | - | - | <0.23 | - | - | - | - | - | - | - | - | - | - | - | - |
| MLSE 32 (4) | URS, 2005 | <2.8 | **2.5** | **36** | **0.19** | <0.24 | <56 UJ | **6.7** | **5.2** | **2.9** | <0.024 UJ | <0.95 | **28** | <0.24 | <0.24 | <0.24 | **46** | **18** |
| MLSE 32 (5) | URS, 2005 | - | - | - | - | <0.2 | - | - | - | - | - | - | - | - | - | - | - | - |
| MLSE 32 (6) | URS, 2005 | - | - | - | - | <1 | - | - | - | - | - | | - | - | - | - | - | - |
| MLSE 33 (1) | URS, 2005 | - | - | - | - | <0.27 | - | - | - | - | - | - | - | - | - | - | - | - |
| MLSE 33 (2) | URS, 2005 | - | - | - | - | <1.7 | - | - | - | - | - | - | - | - | - | - | - | - |
| MLSE 33 (5) | URS, 2005 | - | - | - | - | <1.3 | - | - | - | - | - | - | - | - | - | - | - | - |
| MLSE 33 (6) | URS, 2005 | - | - | - | - | <0.23 | - | - | - | - | - | - | - | - | - | - | - | - |
| MLSE 37 (1) | URS, 2005 | <3.6 UJ | **1.4** | **25** | <0.12 UJ | <0.3 | **40 J** | **5.9** | **4.8 J** | **17** | <0.023 | <1.2 | **45** | <0.3 | <0.3 | <0.3 | **17** | **27** |
| MLSE 37 (2) | URS, 2005 | <8 | **6.3** | **160** | **0.61** | <0.67 | **170 J** | **22** | **24 J** | **59** | **0.17** | <2.7 | **210** | <0.67 | <0.67 | <0.67 | **94** | **75** |
| MLSE 37 (5) | URS, 2005 | <3.2 UJ | **3.7** | **31** | <0.2 UJ | <0.26 | **50J** | **9.3** | **5.1J** | **1.9** | <0.019 | <1.1 | **46** | <0.26 | <0.26 | <0.26 | **33** | **19** |
| MLSE 38 (1) | URS, 2005 | <3.3 UJ | **2** | **32** | **0.2** | <0.28 | **71 J** | **7.6** | **5.7 J** | **16** | <0.025 | <1.1 | **32** | <0.28 | <0.28 | <0.28 | **42** | **72** |
| MLSE 38 (2) | URS, 2005 | <3.2 UJ | **2.4** | **39** | **0.25** | <0.27 | **96 J** | **10** | **7.3 J** | **2.7** | **0.01 J** | **0.1 J** | **39** | <0.27 | <0.27 | <0.27 | **48** | **44** |
| MLSE 38 (5) | URS, 2005 | <3.1 UJ | **3.8** | **48** | **0.33** | <0.026 | **81 J** | **13** | **5.9 J** | **2.9** | <0.021 | <1 | **73** | <0.26 | <0.26 | <0.26 | **62** | **28** |
| MLSE 39 (1) | URS, 2005 | - | - | - | - | **1.2** | - | - | - | **280** | - | - | - | - | - | - | - | - |
| MLSE 39 (2) | URS, 2005 | - | - | - | - | <1.3 | - | - | - | - | - | - | - | - | - | - | - | - |
| MLSE 39 (4) | URS, 2005 | - | - | - | - | - | - | - | - | **92** | - | - | - | - | - | - | - | - |
| MLSE 39 (5) | URS, 2005 | - | - | - | - | <0.69 | - | - | - | **50** | - | - | - | - | - | - | - | - |
| MLSE 39 (6) | URS, 2005 | - | - | - | - | <1.6 | - | - | - | - | - | - | - | - | - | - | - | - |
| MLSE 40 (1) | URS, 2005 | - | - | - | - | <0.24 | - | - | - | **17** | - | - | - | - | - | - | - | - |
| MLSE 40 (2) | URS, 2005 | - | - | - | - | <0.25 | - | - | - | - | - | - | - | - | - | - | - | - |
| MLSE 40 (4) | URS, 2005 | - | - | - | - | - | - | - | - | **13** | - | - | - | - | - | - | - | - |
| MLSE 40 (5) | URS, 2005 | - | - | - | - | <0.79 | - | - | - | **54** | - | - | - | - | - | - | - | - |
| MLSE 40 (6) | URS, 2005 | - | - | - | - | <0.54 | - | - | - | - | - | - | - | - | - | - | - | - |
| DUP 100404-1 (1) [MLSE 31 (1)][a] | URS, 2005 | - | - | - | - | <1.5 | - | - | - | - | - | - | - | - | - | - | - | - |
| DUP 280904-1(1.5) [MLSE 19 (1.5)][a] | URS, 2005 | <0.28 | **1.8** | **51** | **0.27** | <0.28 | **67** | **7.5** | **7.6** | **3.1** | <0.024 | <1.1 | **27** | **1** | <0.28 | <0.28 | **51** | **25** |
| DUP092904-1(2.5) [MLSE 24 (2.5)][a] | URS, 2005 | <0.36 UJ | **2.6** | **43** | **0.28** | <0.36 | **60 J** | **8.5** | **10** | **32** | **0.11** | <1.4 | **62** | <0.36 | <0.36 | <0.36 | **41** | **61** |
| DUP093004-1(1) [MLSE 27 (1)][a] | URS, 2005 | <0.27 | **1.4** | **25** | <0.17 UJ | <0.27 | **47 J** | **5** | **3.5** | **24** | <0.019 | <1.1 | **31** | <0.27 | <0.27 | <0.27 | **34** | **35** |
| DUP093004-2(1) [MLSE 38 (1)][a] | URS, 2005 | <3.3 | **1.5** | **25** | <0.14 UJ | <0.27 | **49 J** | **5.4** | **4.3 J** | **23** | <0.025 | <1.1 | **23** | <0.27 | <0.27 | <0.27 | **32** | **68** |

**TABLE 2**
**METALS RESULTS**
**PRESIDIO - MOUNTAIN LAKE**


| Sample Number | | Antimony | Arsenic | Barium | Beryllium | Cadmium | Chromium | Cobalt | Copper | Lead | Mercury | Molybdenum | Nickel | Selenium | Silver | Thallium | Vanadium | Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Freshwater Sediment Cleanup Level (mg/kg)** | **Source** | **3** | **19** | **3,100** | **7,200** | **1.1** | **140** | **50** | **114** | **82** | **0.62** | **522** | **110** | **1.6** | **1** | **3.7** | **90** | **230** |
| DUP093004-3(2) [MLSE 38 (2)][a] | URS, 2005 | <3.2 UJ | **2.9** | **46** | **0.29** | <0.26 | **97 J** | **13** | **8.6 J** | **3.3** | <0.022 | <1.1 | **48** | <0.26 | <0.26 | <0.26 | **58** | **61** |
| DUP100104-1(1) [MLSE 30 (1)][a] | URS, 2005 | - | **-** | - | - | **2.1** | - | - | - | - | - | - | - | - | - | - | - | - |
| DUP100504-1(1) [MLSE 33 (1)][a] | URS, 2005 | - | **-** | - | - | <0.29 | - | - | - | - | - | - | - | - | - | - | - | - |
| DUP100504-2(1) [MLSE 32 (1)][a] | URS, 2005 | - | **-** | - | - | **0.38** | - | - | - | - | - | - | - | - | - | - | - | - |

**Legend:**
Results in milligrams per kilogram (mg/kg) . Results for URS, 2001 and URS, 2005 are reported in dry weight.

| | |
|---|---|
| J | Estimated Concentration |
| U | Non-Detect |
| UJ | Estimated Reporting Limit |
| ND | Non-Detect (see source report for reporting limits) |
| <2.50 | Non-Detect at a Reporting Limit of 2.50 mg/kg |
| - | Not Analyzed |
| NE | Not Established |
| [ ][a] | Indicates parent sample |

**Notes:**

1. Cleanup levels are based on ecological freshwater sediment criteria and backgrounds metals concentrations for the Colma formation. Of the chemicals detected in the lake sediments, special-status sediment criteria are only available for selenium and thallium (see Table 7-3 from Development of Presidio-wide Cleanup Levels for Soil, Sediment, Groundwater, and Surface Water by EKI dated October 2002).
2. Concentrations detected above the Reporting Limit are boldfaced.
3. Concentrations detected above the applicable Cleanup Level are boldfaced and highlighted.

**TABLE 3**
**STLC AND TCLP ANALYTICAL RESULTS**
**PRESIDIO - MOUNTAIN LAKE**

**Source: URS, 2005**

| Analyte | | Regulatory Limit | MLSE 29 (4.1) | MLSE 30 (4.1) | MLSE 31 (4.1) | MLSE 32 (4.1) | MLSE 33 (4.1) | MLSE 39 (4.1) | MLSE 40 (4.1) | DUP100604-1 (4.1) |
|---|---|---|---|---|---|---|---|---|---|---|
| Antimony | STLC | 15 | < 3 | < 3 | < 3 | **0.85 J** | **0.28 J** | **0.46 J** | < 3 | <0.43 |
| Arsenic | STLC | 5.0 | < 0.25 | 0.19 J | < 0.25 | **0.23 J** | **0.13 J** | < 0.25 | < 0.25 | < 0.25 |
| | TCLP | 5.0 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.06 |
| Barium | STLC | 100 | **2.4** | **0.89** | **2.1** | **2.7** | **1.1** | **3.8** | **2** | **3.4** |
| | TCLP | 100 | **0.63** | <0.28 | **0.7** | <0.85 | **0.34** | **1.2** | **0.78** | **0.73** |
| Beryllium | STLC | 0.75 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | <0.032 | < 0.1 | <0.046 |
| Cadmium | STLC | 1.0 | < 0.25 | < 0.25 | < 0.25 | < 0.25 | < 0.25 | < 0.25 | < 0.25 | < 0.25 |
| | TCLP | 1.0 | **0.0083 J** | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Chromium | STLC | 5.0 | **0.61** | **0.46 J** | **0.63** | **0.51** | **0.53** | **1.1** | **0.76** | **1.2** |
| | TCLP | 5.0 | TRUE | <0.0098 | <0.015 | <0.027 | < 0.1 | <0.036 | <0.019 | < 0.1 |
| Cobalt | STLC | 80 | **0.13 J** | **0.079 J** | **0.15 J** | **0.34 J** | **0.18 J** | **0.56 J** | **0.28 J** | **0.42** |
| Copper | STLC | 25 | **0.16 J** | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| Lead | STLC | 5.0 | **6.2** | **0.091 J** | **3.3** | < 0.15 | < 0.15 | **0.77** | **0.95** | **0.38** |
| | TCLP | 5.0 | **0.73** | <0.013 | **0.37** | < 0.03 | < 0.03 | **0.053** | **0.045** | < 0.03 |
| Mercury | STLC | 0.2 | < 0.001 | **0.00027 J** | <0.0011 | < 0.001 UJ | <0.00034 | <0.00059 | <0.0011 | **0.00024** |
| | TCLP | 0.2 | < 0.001 | < 0.001 | < 0.001 | < 0.001 U | < 0.001 | < 0.001 | < 0.001 | < 0.001 |
| Molybdenum | STLC | 350 | < 1 | < 1 | < 1 | **0.16 J** | < 1 | < 1 | < 1 | < 0.001 |
| Nickel | STLC | 20 | **0.83 J** | **0.76 J** | **1.1** | **0.78 J** | **0.8 J** | **2** | **6.4** | **2.5** |
| Selenium | STLC | 1.0 | < 0.25 | < 0.25 | < 0.25 | < 0.25 | < 0.25 | **0.18 J** | < 0.25 | < 0.25 |
| | TCLP | 1.0 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Silver | STLC | 5.0 | < 0.25 | < 0.25 | < 0.25 | < 0.25 | < 0.25 | < 0.25 | < 0.25 | < 0.25 |
| | TCLP | 5.0 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Thallium | STLC | 7.0 | < 0.25 | < 0.25 | < 0.25 | < 0.25 | < 0.25 | < 0.25 | < 0.25 | < 0.25 |
| Vanadium | STLC | 24 | **0.86** | **0.93** | **1** | **0.79** | **0.93** | **1.5** | **0.81** | **1.7** |
| Zinc | STLC | 250 | **5.3** | <0.58 | **4** | <0.33 | <0.44 | **4.4** | **1.3** | <1.4 |

**Legend:**
Results in milligrams per liter (mg/L)

| | |
|---|---|
| J | Concentration is estimated |
| U | Non-Detect |
| UJ | Estimated Reporting Limit |
| <0.25 | Non-Detect at a Reporting Limit of 0.25 mg/L |

**Notes:**
1 Concentrations detected above the Method Detection limit are boldfaced.
2 Concentrations detected above the applicable Regulatory Limit are boldfaced and highlighted.
3 TCLP results are presented only for analytes that have a TCLP regulatory standard.

**TABLE 4**
**PESTICIDES RESULTS**
**PRESIDIO - MOUNTAIN LAKE**


| Sample Number | | 4,4'-DDD | 4,4'-DDE | 4,4'-DDT | Aldrin | alpha-BHC | alpha-Chlordane | beta-BHC | delta-BHC | Dieldrin | Endosulfan I | Endosulfan II | Endosulfan sulfate | Endrin | Endrin aldehyde | Endrin ketone | gamma-BHC (Lindane) | gamma-Chlordane | Heptachlor | Heptachlor epoxide | Methoxychlor | Toxaphene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Freshwater Sediment Cleanup Level (µg/kg)** | **Source** | **16** | **16** | **32** | **5** | **8** | **10** | **13** | **7.5** | **32** | **5.4** | **5.4** | **5.4** | **100** | **100** | **100** | **3** | **10** | **8.3** | **8.3** | **19** | **NE** |
| MLSD01 | D&M, 1997 | ND | ND | ND | <1 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | **3** | ND | ND | ND | ND | ND |
| MLSD02 | D&M, 1997 | ND | ND | ND | **3** | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | <1 | ND | ND | ND | ND | ND |
| MLSD03 | D&M, 1997 | ND | ND | ND | <1 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | <1 | ND | ND | ND | ND | ND |
| MLSD04 | D&M, 1997 | ND | ND | ND | <1 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | <1 | ND | ND | ND | ND | ND |
| ML-1 (9.7-0.3)comp | EKI, 1998 | ND | ND | ND | ND | ND | ND | ND | <1 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| ML-2 (19.5-2)comp | EKI, 1998 | ND | ND | ND | ND | ND | ND | ND | <1 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| ML-3 (19.4-5)comp | EKI, 1998 | ND | ND | ND | ND | ND | ND | ND | <1 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| ML-4 (19.5-5)comp | EKI, 1998 | ND | ND | ND | ND | ND | ND | ND | **4.7** | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| ML-5 (14.7-0.3)comp | EKI, 1998 | ND | ND | ND | ND | ND | ND | ND | <1 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| MLSD 1 (0.1) | URS, 2001 | <16 | <16 | <16 | <1.33 | **5.4 J** | <1.38 | <4.06 | **8.0 J** | <16 | <1.67 | <16 | <16 | <16 | <16 | <16 | <1.11 | <1.41 | <2.32 | <1.72 | <16 | <780 |
| MLSD 1 (0.25) | URS, 2001 | <13 | <13 | <13 | <1.07 | **4.4 J** | <1.12 | <13 | **6.6 J** | <13 | <1.35 | <13 | <13 | <13 | <13 | **9.4 J** | **4.8 J** | <1.14 | <1.88 | <1.39 | <13 | <630 |
| MLSE 1 (0.5) | URS, 2001 | <5.3 | <5.3 | <5.3 | <5.3 | <5.3 | <5.3 | <5.3 | **3.8J** | <5.3 | <5.3 | <5.3 | <5.3 | <5.3 | <5.3 | **4.0 J** | <0.37 | <5.3 | <5.3 | <5.3 | <5.3 | <260 |
| MLSE 1 (2) | URS, 2001 | <4.7 | <4.7 | <4.7 | <4.7 | <4.7 | <4.7 | <4.7 | **2.4 J** | <4.7 | <4.7 | <4.7 | <4.7 | <4.7 | <4.7 | **3.5 J** | <0.33 | <4.7 | <4.7 | <4.7 | <4.7 | <240 |
| MLSE 4 (0.5) | URS, 2001 | <5.59 | <4.05 | <5.41 | <4.18 | <4.65 | <4.35 | <12.8 | **25 J** | <4.18 | <5.27 | <49 | <49 | <49 | <49 | <49 | <3.49 | <4.45 | <7.32 | <5.41 | <27.71 | <2500 |
| MLSE 4 (2) | URS, 2001 | <15 | **13 J** | <15 | <15 | **4.7 J** | **6.2 J** | <3.78 | **8.3 J** | <15 | <1.55 | <15 | <15 | <15 | <15 | <15 | **4.1 J** | **4.6 J** | **3.1 J** | **4.5 J** | <15 | <730 |
| MLSE5 (0.5) | URS, 2001 | **14 J** | <2.02 | <2.70 | <2.08 | <2.32 | <2.17 | **14 J** | **5.9 J** | <25 | <2.63 | <25 | <25 | <25 | <25 | **18 J** | **9.9 J** | <2.22 | <3.65 | <2.70 | <13.81 | <1200 |
| MLSE5 (2) | URS, 2001 | <4.60 | <3.34 | <4.54 | <3.44 | **10 J** | <3.58 | **12 J** | **8.1 J** | <3.44 | <4.33 | <41 | <41 | <41 | <41 | **28 J** | **6.1 J** | <3.66 | <6.02 | <4.45 | <22.80 | <2000 |
| MLSE10(0.5) | URS, 2001 | <12 | <12 | <12 | <12 | **3.5 J** | <1.09 | **5.9 J** | **3.8 J** | <12 | <1.32 | <12 | <12 | <12 | **42** | **9.1 J** | **4.2 J** | <1.12 | **1.4 J** | <1.36 | <12 | <620 |
| MLSE10(2) | URS, 2001 | <6.9 | <6.9 | <6.9 | <6.9 | **1.7 J** | **1.6 J** | <6.9 | <6.9 | <6.9 | <0.74 | <6.9 | <6.9 | <6.9 | <6.9 | <6.9 | **3.5 J** | <6.9 | <6.9 | **3.0 J** | <6.9 | <350 |
| MLSE15 (0.5) | URS, 2001 | <2.16 | **9.6 J** | <19 | <19 | **6.1 J** | <1.68 | <4.94 | **11 J** | <19 | <2.03 | <19 | <19 | <19 | <19 | <19 | **5.3 J** | <1.72 | **4.0 J** | <2.09 | <19 | <950 |
| MLSE15 (2) | URS, 2001 | **1.4 J** | **0.84 J** | **0.19 J** | **0.40 J** | **0.68 J** | **0.74 J** | **2.3 J** | **1.4 J** | **0.89 J** | **0.19 J** | **1.2 J** | **1.3 J** | <2.5 | <2.5 | **1.9 J** | **1.1 J** | <2.5 | <2.5 | **1.0 J** | <2.5 | <130 |
| DUP012401-1 [MLSD-1 (0.25)][a] | URS, 2001 | <13 | <13 | <13 | <13 | **4.2 J** | <1.10 | <13 | <1.08 | <13 | <1.34 | <13 | <13 | <13 | <13 | <13 | <0.89 | <1.13 | <1.86 | <1.37 | <13 | <630 |
| DUP012401-7 [MLSE-1 (0.5)][a] | URS, 2001 | <14 | <14 | <14 | <14 | <1.29 | <1.21 | <3.56 | **6.9 J** | <14 | <1.46 | <14 | <14 | <14 | <14 | <14 | <0.97 | <1.24 | <2.03 | <1.50 | <14 | <690 |
| MLSE 16(1) | URS, 2005 | <17 UJ | <17 UJ | <17 UJ | <8.6 UJ | <8.6 UJ | <8.6 UJ | <8.6 UJ | <8.6 UJ | <17 | <8.6 | <17 UJ | <17 UJ | <17 UJ | <17 UJ | - | <8.6 UJ | <8.6 UJ | <8.6 UJ | <8.6 UJ | <86 UJ | <300 UJ |
| MLSE 16(2) | URS, 2005 | <22 | <22 | <22 | <11 | <11 | <11 | <11 | <11 | <22 | <11 | <22 | <22 | <22 | <22 | - | <11 | <11 | <11 | <11 | <110 | <400 |
| MLSE 16(5) | URS, 2005 | <18 | <18 | <18 | <9 | <9 | <9 | <9 | <9 | <18 | <9 | <18 | <18 | <18 | <18 | - | <9 | <9 | <9 | <9 | <90 | <320 |
| MLSE 17(1) | URS, 2005 | <8.9 UJ | <8.9 UJ | <8.9 UJ | <4.6 UJ | <4.6 UJ | <4.6 UJ | <4.6 UJ | <4.6 UJ | <8.9 UJ | <4.6 UJ | <8.9 UJ | <8.9 UJ | <8.9 UJ | <8.9 UJ | - | <4.6 UJ | **10 J** | <4.6 UJ | <4.6 UJ | <46 UJ | <160 UJ |
| MLSE 17(2) | URS, 2005 | <4.1 | <4.1 | <4.1 | <2.1 | <2.1 | <2.1 | <2.1 | <2.1 | <4.1 | <2.1 | <4.1 | <4.1 | <4.1 | <4.1 | - | <2.1 | <2.1 | <2.1 | <2.1 | <21 | <74 |
| MLSE 17(5) | URS, 2005 | <14 | <14 | <14 | <7.1 | <7.1 | <7.1 | <7.1 | <7.1 | <14 | <7.1 | <14 | <14 | <14 | <14 | - | <7.1 | <7.1 | <7.1 | <7.1 | <71 | <250 |
| MLSE 18(1) | URS, 2005 | <4.3 | <4.3 | <4.3 | <2.2 | <2.2 | <2.2 | <2.2 | <2.2 | <4.3 | <2.2 | <4.3 | <4.3 | <4.3 | <4.3 | - | <2.2 | <2.2 | <2.2 | <2.2 | <22 | <78 |
| MLSE 18(2) | URS, 2005 | <4.2 | <4.2 | <4.2 | <2.2 | <2.2 | <2.2 | <2.2 | <2.2 | <4.2 | <2.2 | <4.2 | <4.2 | <4.2 | <4.2 | - | <2.2 | <2.2 | <2.2 | <2.2 | <22 | <76 |
| MLSE 18(5) | URS, 2005 | <3.8 | <3.8 | <3.8 | <2 | <2 | <2 | <2 | <2 | <3.8 | <2 | <3.8 | <3.8 | <3.8 | <3.8 | - | <2 | <2 | <2 | <2 | <20 | <69 |
| MLSE 19 (1.5) | URS, 2005 | <8.1 | <8.1 | <8.1 | <4.1 | <4.1 | <4.1 | <4.1 | <4.1 | <8.1 | <4.1 | <8.1 | <8.1 | <8.1 | <8.1 | - | <4.1 | <4.1 | <4.1 | <4.1 | <41 | <150 |
| MLSE 19 (2.5) | URS, 2005 | <8.3 | <8.3 | <8.3 | <4.3 | <4.3 | <4.3 | <4.3 | <4.3 | <8.3 | <4.3 | <8.3 | <8.3 | <8.3 | <8.3 | - | <4.3 | <4.3 | <4.3 | <4.3 | <43 | <150 |
| MLSE 19 (5) | URS, 2005 | <4 | <4 | <4 | <2.1 | <2.1 | <2.1 | <2.1 | <2.1 | <4 | <2.1 | <4 | <4 | <4 | <4 | - | <2.1 | <2.1 | <2.1 | <2.1 | <21 | <73 |
| MLSE 20 (1) | URS, 2005 | <4.5 | <4.5 | <4.5 | <2.3 | <2.3 | <2.3 | <2.3 | <2.3 | <4.5 | <2.3 | <4.5 | <4.5 | <4.5 | <4.5 | - | <2.3 | <2.3 | <2.3 | <2.3 | <23 | <83 |

**TABLE 4**
**PESTICIDES RESULTS**
**PRESIDIO - MOUNTAIN LAKE**


| Sample Number | | 4,4'-DDD | 4,4'-DDE | 4,4'-DDT | Aldrin | alpha-BHC | alpha-Chlordane | beta-BHC | delta-BHC | Dieldrin | Endosulfan I | Endosulfan II | Endosulfan sulfate | Endrin | Endrin aldehyde | Endrin ketone | gamma-BHC (Lindane) | gamma-Chlordane | Heptachlor | Heptachlor epoxide | Methoxychlor | Toxaphene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Freshwater Sediment Cleanup Level (µg/kg)** | **Source** | **16** | **16** | **32** | **5** | **8** | **10** | **13** | **7.5** | **32** | **5.4** | **5.4** | **5.4** | **100** | **100** | **100** | **3** | **10** | **8.3** | **8.3** | **19** | **NE** |
| MLSE 20 (2) | URS, 2005 | <8.1 | <8.1 | <8.1 | <4.2 | <4.2 | <4.2 | <4.2 | <4.2 | <8.1 | <4.2 | <8.1 | <8.1 | <8.1 | <8.1 | - | <4.2 | <4.2 | <4.2 | <4.2 | <42 | <150 |
| MLSE 20(5) | URS, 2005 | <3.9 | <3.9 | <3.9 | <2 | <2 | <2 | <2 | <2 | <3.9 | <2 | <3.9 | <3.9 | <3.9 | <3.9 | - | <2 | <2 | <2 | <2 | <20 | <71 |
| MLSE 21 (1) | URS, 2005 | <59 | <59 | <59 | <31 | <31 | <31 | <31 | <31 | <59 | <31 | <59 | <59 | <59 | <59 | - | <31 | **32** | <31 | <31 | <310 | <1100 |
| MLSE 21 (2) | URS, 2005 | <32 | <32 | <32 | <17 | <17 | <17 | <17 | <17 | <32 | <17 | <32 | <32 | <32 | <32 | - | <17 | <17 | <17 | <17 | <170 | <580 |
| MLSE 21 (5) | URS, 2005 | <35 | <35 | <35 | <18 | <18 | <18 | <18 | <18 | <35 | <18 | <35 | <35 | <35 | <35 | - | <18 | <18 | <18 | <18 | <180 | <630 |
| MLSE 22 (1) | URS, 2005 | <4 | <4 | <4 | <2 | <2 | <2 | <2 | <2 | <4 | <2 | <4 | <4 | <4 | <4 | - | <2 | <2 | <2 | <2 | <20 | <72 |
| MLSE 22 (2) | URS, 2005 | <3.9 | <3.9 | <3.9 | <2 | <2 | <2 | <2 | <2 | <3.9 | <2 | <3.9 | <3.9 | <3.9 | <3.9 | - | <2 | <2 | <2 | <2 | <20 | <71 |
| MLSE 22(5) | URS, 2005 | <4 | <4 | <4 | <2 | <2 | <2 | <2 | <2 | <4 | <2 | <4 | <2 | <4 | <4 | - | <2 | <2 | <2 | <2 | <20 | <72 |
| MLSE 23(1) | URS, 2005 | <3.8 | <3.8 | <3.8 | <2 | <2 | <2 | <2 | <2 | <3.8 | <2 | <3.8 | <3.8 | <3.8 | <3.8 | - | <2 | <2 | <2 | <2 | <20 | <70 |
| MLSE 23(2) | URS, 2005 | <3.9 | <3.9 | <3.9 | <2 | <2 | <2 | <2 | <2 | <3.9 | <2 | <3.9 | <3.9 | <3.9 | <3.9 | - | <2 | <2 | <2 | <2 | <20 | <70 |
| MLSE 23(5) | URS, 2005 | <3.8 | <3.8 | <3.8 | <2 | <2 | <2 | <2 | <2 | <3.8 | <2 | <3.8 | <3.8 | <3.8 | <3.8 | - | <2 | <2 | <2 | <2 | <20 | <70 |
| MLSE 24(1) | URS, 2005 | <5.8 | <5.8 | <5.8 | <3 | <3 | <3 | <3 | <3 | <5.8 | <3 | <5.8 | <5.8 | <5.8 | <5.8 | - | <3 | <3 | <3 | <3 | <30 | <110 |
| MLSE 24(2.5) | URS, 2005 | <4.4 | <4.4 | <4.4 | <2.2 | <2.2 | <2.2 | <2.2 | <2.2 | <4.4 | <2.2 | <4.4 | <4.4 | <4.4 | <4.4 | - | <2.2 | <2.2 | <2.2 | <2.2 | <22 | <79 |
| MLSE 24(5) | URS, 2005 | <33 | <33 | <33 | <17 | <17 | <17 | <17 | <17 | <33 | <17 | <33 | <33 | <33 | <33 | - | <17 | <17 | <17 | <17 | <170 | <610 |
| MLSE 25 (1) | URS, 2005 | <6.6 | <6.6 | <6.6 UJ | <3.4 UJ | <3.4 UJ | <3.4 | <3.4 UJ | <3.4 UJ | <6.6 UJ | <3.4 UJ | <6.6 | <6.6 | <6.6 UJ | <6.6 | - | <3.4 UJ | <3.4 | <3.4 UJ | <3.4 UJ | <34 | <120 |
| MLSE 26 (1) | URS, 2005 | <15 UJ | <15 UJ | <15 UJ | <7.7 UJ | <7.7 UJ | **91 J** | <7.7 UJ | <7.7 UJ | <15 UJ | <7.7 UJ | <15 UJ | <15 UJ | <15 UJ | <15 UJ | - | <7.7 UJ | **16 J** | <7.7 UJ | <7.7 UJ | <77 UJ | <270 UJ |
| MLSE 26 (2) | URS, 2005 | <44 | <44 | <44 UJ | <23 UJ | <23 | <23 | <23 | <23 | <44 UJ | <23 | <44 | <44 | <44 UJ | <44 | - | <23 UJ | <23 | <23 UJ | <23 | <230 | <800 |
| MLSE 27 (1) | URS, 2005 | <3.8 | <3.8 | <3.8 | <2 | <2 | <2 | <2 | <2 | <3.8 | <2 | <3.8 | <3.8 | <3.8 | <3.8 | - | <2 | <2 | <2 | <2 | <20 UJ | <70 |
| MLSE 27 (2) | URS, 2005 | <12 | <12 | <12 | <6.3 | <6.3 | <6.3 | <6.3 | <6.3 | <12 | <6.3 | <12 | <12 | <12 | <12 | - | <6.3 | <6.3 | <6.3 | <6.3 | <63 | <220 |
| MLSE 27 (5) | URS, 2005 | <12 | <12 | <12 | <6 | <6 | <6 | <6 | <6 | <12 | <6 | <12 | <12 | <12 | <12 | - | <6 | <6 | <6 | <6 | <60 UJ | <210 |
| MLSE 27 (6) | URS, 2005 | <4 | <4 | <4 | <2 | <2 | <2 | <2 | <2 | <4 | <2 | <4 | <4 | <4 | <4 | - | <2 | <2 | <2 | <2 | <20 UJ | <72 |
| MLSE 28 (1) | URS, 2005 | <6.2 | <6.2 | <6.2 | <3.2 | <3.2 | <3.2 | <3.2 | <3.2 | <6.2 | <3.2 | <6.2 | <6.2 | <6.2 | <6.2 | - | <3.2 | <3.2 | <3.2 | <3.2 | <32 UJ | <110 |
| MLSE 28 (2) | URS, 2005 | <6.6 | <6.6 | <6.6 | <3.4 | <3.4 | <3.4 | <3.4 | <3.4 | <6.6 | <3.4 | <6.6 | <6.6 | <6.6 | <6.6 | - | <3.4 | <3.4 | <3.4 | <3.4 | <34 UJ | <120 |
| MLSE 28 (5) | URS, 2005 | <22 | <22 | <22 | <11 | <11 | <11 | <11 | <11 | <22 | <11 | <22 | <22 | <22 | <22 | - | <11 | <11 | <11 | <11 | <110 UJ | <400 |
| MLSE 28 (6) | URS, 2005 | <5.5 | <5.5 | <5.5 | <2.9 | <2.9 | <2.9 | <2.9 | <2.9 | <5.5 | <2.9 | <5.5 | <5.5 | <5.5 | <5.5 | - | <2.9 | <2.9 | <2.9 | <2.9 | <29 UJ | <100 |
| MLSE 29 (1) | URS, 2005 | <19 | <19 | <19 | <9.9 | <9.9 | <9.9 | <9.9 | <9.9 | <19 | <9.9 | <19 | <19 | <19 | <19 | - | <9.9 | <9.9 | <9.9 | <9.9 | <99 UJ | <350 |
| MLSE 29 (2) | URS, 2005 | <16 | <16 | <16 | <8 | <8 | <8 | <8 | <8 | <16 | <8 | <16 | <16 | <16 | <16 | - | <8 | <8 | <8 | <8 | <80 UJ | <280 |
| MLSE 29 (5) | URS, 2005 | <26 | <26 | <26 | <13 | <13 | <13 | <13 | <13 | >26 | >13 | <26 | <26 | <26 | <26 | - | <13 | <13 | <13 | <13 | <130 | <460 |
| MLSE 29 (6) | URS, 2005 | <22 UJ | <22 UJ | <22 UJ | <11 UJ | <11 UJ | <11 UJ | <11 UJ | <11 UJ | <22 UJ | <11 UJ | <22 UJ | <22 UJ | <22 UJ | <22 UJ | - | <11 UJ | <11 UJ | <11 UJ | <11 UJ | <110 UJ | <400 UJ |
| MLSE 30(1) | URS, 2005 | <18 | <18 | <18 | <9.4 | <9.4 | <9.4 | <9.4 | <9.4 | <18 | <9.4 | <18 | <18 | <18 | <18 | - | <9.4 | <9.4 | <9.4 | <9.4 | <94 | <330 |
| MLSE 30(2) | URS, 2005 | <15 | <15 | <15 | <7.7 | <7.7 | <7.7 | <7.7 | <7.7 | <15 | <7.7 | <15 | <15 | <15 | <15 | - | <7.7 | <7.7 | <7.7 | <7.7 | <77 | <270 |
| MLSE 30(5) | URS, 2005 | <28 | <28 | <28 | <14 | <14 | <14 | <14 | <14 | <28 | <14 | <28 | <28 | <28 | <28 | - | <14 | <14 | <14 | <14 | <140 | <510 |
| MLSE 30(6) | URS, 2005 | <24 | <24 | <24 | <12 | <12 | <12 | <12 | <12 | <24 | <12 | <24 | <24 | <24 | <24 | - | <12 | <12 | <12 | <12 | <120 | <430 |
| MLSE 31 (1) | URS, 2005 | <18 UJ | <18 UJ | <18 UJ | <9.3 | <9.3 | <9.3 UJ | <9.3 | <9.3 | <18 UJ | <9.3 | <18 UJ | <18 UJ | <18 UJ | <18 UJ | - | <9.3 | <9.3 UJ | <9.3 | <9.3 | <93 UJ | <330 UJ |
| MLSE 31 (2) | URS, 2005 | <3.2 | <3.2 | <3.2 | <1.7 | <1.7 | <1.7 | <1.7 | <1.7 | <1.7 | <1.7 | <3.2 | <3.2 | <3.2 | <3.2 | - | <1.7 | <1.7 | <1.7 | <1.7 | <17 | <59 |
| MLSE 31 (5) | URS, 2005 | <28 UJ | <28 UJ | <28 UJ | <14 UJ | <14 UJ | <14 UJ | <14 UJ | <14 UJ | <28 UJ | <14 UJ | <28 UJ | <28 UJ | <28 UJ | <28 UJ | - | <14 UJ | <14 UJ | <14 UJ | <14 UJ | <140 UJ | <500 UJ |
| MLSE 31 (6) | URS, 2005 | <47 UJ | <47 UJ | <47 UJ | <24 UJ | <24 UJ | <24 UJ | <24 UJ | <24 UJ | <47 UJ | <24 UJ | <47 UJ | <47 UJ | <47 UJ | <47 UJ | - | <24 UJ | <24 UJ | <24 UJ | <24 UJ | <240 UJ | <860 UJ |
| MLSE 32 (1) | URS, 2005 | <4.6 | <4.6 | <4.6 | <2.3 | <2.3 | <2.3 | <2.3 | <2.3 | <4.6 | <2.3 | <4.6 | <4.6 | <4.6 | <4.6 | - | <2.3 | <2.3 | <2.3 | <2.3 | <23 | <83 |

**TABLE 4**
**PESTICIDES RESULTS**
**PRESIDIO - MOUNTAIN LAKE**


| Sample Number | | 4,4'-DDD | 4,4'-DDE | 4,4'-DDT | Aldrin | alpha-BHC | alpha-Chlordane | beta-BHC | delta-BHC | Dieldrin | Endosulfan I | Endosulfan II | Endosulfan sulfate | Endrin | Endrin aldehyde | Endrin ketone | gamma-BHC (Lindane) | gamma-Chlordane | Heptachlor | Heptachlor epoxide | Methoxychlor | Toxaphene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Freshwater Sediment Cleanup Level (µg/kg)** | **Source** | **16** | **16** | **32** | **5** | **8** | **10** | **13** | **7.5** | **32** | **5.4** | **5.4** | **5.4** | **100** | **100** | **100** | **3** | **10** | **8.3** | **8.3** | **19** | **NE** |
| MLSE 32 (2) | URS, 2005 | <3.9 | <3.9 | <3.9 | <2 | <2 | <2 | <2 | <2 | <3.9 | <2 | <3.9 | <3.9 | <3.9 | <3.9 | - | <2 | <2 | <2 | <2 | <20 | <71 |
| MLSE 32 (5) | URS, 2005 | <3.9 | <3.9 | <3.9 | <2 | <2 | <2 | <2 | <2 | <3.9 | <2 | <3.9 | <3.9 | <3.9 | <3.9 | - | <2 | <2 | <2 | <2 | <20 | <71 |
| MLSE 32 (6) | URS, 2005 | <17 | <17 | <17 | <8.5 | <8.5 | <8.5 | <8.5 | <8.5 | <17 | <8.5 | <17 | <17 | <17 | <17 | - | <8.5 | <8.5 | <8.5 | <8.5 | <85 | <300 |
| MLSE 33 (1) | URS, 2005 | **6** | <4.4 | <4.4 | <2.2 | <2.2 | <2.2 | <2.2 | <2.2 | <4.4 | <2.2 | <4.4 | <4.4 | <4.4 | <4.4 | - | <2.2 | <2.2 | <2.2 | <2.2 | <22 | <79 |
| MLSE 33 (2) | URS, 2005 | <23 | <23 | <23 | <12 | <12 | <12 | <12 | <12 | <23 | <12 | <23 | <23 | <23 | <23 | - | <12 | <12 | <12 | <12 | <120 | <430 |
| MLSE 33 (5) | URS, 2005 | <16 | <16 | <16 | <8 | <8 | <8 | <8 | <8 | <16 | <8 | <16 | <16 | <16 | <16 | - | <8 | <8 | <8 | <8 | <80 | <280 |
| MLSE 33 (6) | URS, 2005 | <4.5 | <4.5 | <4.5 | <2.3 | <2.3 | <2.3 | <2.3 | <2.3 | <4.5 | <2.3 | <4.5 | <4.5 | <4.5 | <4.5 | - | <2.3 | <2.3 | <2.3 | <2.3 | <23 | <81 |
| MLSE 37 (1) | URS, 2005 | <4.1 | <4.1 | <4.1 | <2.1 | <2.1 | **2.7 J** | <2.1 | <2.1 | <4.1 | <2.1 | <4.1 | <4.1 | <4.1 | <4.1 | - | <2.1 | <2.1 | <2.1 | <2.1 | <21 UJ | <75 |
| MLSE 37 (2) | URS, 2005 | <9.5 | <9.5 | <9.5 | <4.9 | <4.9 | <4.9 | <4.9 | <4.9 | <9.5 | <4.9 | <9.5 | <9.5 | <9.5 | <9.5 | - | <4.9 | <4.9 | <4.9 | <4.9 | <49 UJ | <170 |
| MLSE 37 (5) | URS, 2005 | <3.9 | <3.9 | <3.9 | <2 | <2 | <2 | <2 | <2 | <3.9 | <2 | <3.9 | <3.9 | <3.9 | <3.9 | - | <2 | <2 | <2 | <2 | <20 | <72 |
| MLSE 38 (1) | URS, 2005 | <8.2 | <8.2 | <8.2 | <4.2 | <4.2 | <4.2 | <4.2 | <4.2 | <8.2 | <4.2 | <8.2 | <8.2 | <8.2 | <8.2 | - | <4.2 | <4.2 | <4.2 | <4.2 | <42 | <150 |
| MLSE 38 (2) | URS, 2005 | <4 | <4 | <4 | <2.1 | <2.1 | <2.1 | <2.1 | <2.1 | <4 | <2.1 | <4 | <4 | <4 | <4 | - | <2.1 | <2.1 | <2.1 | <2.1 | <21 | <73 |
| MLSE 38 (5) | URS, 2005 | <4 | <4 | <4 | <2.1 | <2.1 | <2.1 | <2.1 | <2.1 | <4 | <2.1 | <4 | <4 | <4 | <4 | - | <2.1 | <2.1 | <2.1 | <2.1 | <21 | <73 |
| MLSE 39 (1) | URS, 2005 | **34** | <14 | <14 | <7.1 | <7.1 | <7.1 | <7.1 | <7.1 | <14 | <7.1 | <14 | <14 | <14 | <14 | - | <7.1 | <7.1 | <7.1 | <7.1 | <71 | <250 |
| MLSE 39 (2) | URS, 2005 | <16 | <16 | <16 | <8.1 | <8.1 | <8.1 | <8.1 | <8.1 | <16 | <8.1 | <16 | <16 | <16 | <16 | - | <8.1 | **13** | <8.1 | <8.1 | <81 | <290 |
| MLSE 39 (5) | URS, 2005 | <11 | <11 | <11 | <5.5 | <5.5 | <5.5 | <5.5 | <5.5 | <11 | <5.5 | <11 | <11 | <11 | <11 | - | <5.5 | <5.5 | <5.5 | <5.5 | <55 | <190 |
| MLSE 39 (6) | URS, 2005 | <23 | <23 | <23 | <12 | <12 | <12 | <12 | <12 | <23 | <12 | <23 | <23 | <23 | <23 | - | <12 | <12 | <12 | <12 | <120 | <420 |
| MLSE 40 (1) | URS, 2005 | <3.9 | <3.9 | <3.9 | <2 | <2 | <2 | <2 | <2 | <3.9 | <2 | <3.9 | <3.9 | <3.9 | <3.9 | - | <2 | <2 | <2 | <2 | <20 | <71 |
| MLSE 40 (2) | URS, 2005 | <3.8 | <3.8 | <3.8 | <2 | <2 | <2 | <2 | <2 | <3.8 | <2 | <3.8 | <3.8 | <3.8 | <3.8 | - | <2 | <2 | <2 | <2 | <20 | <69 |
| MLSE 40 (5) | URS, 2005 | <9.9 | <9.9 | <9.9 | <5.1 | <5.1 | <5.1 | <5.1 | <5.1 | <9.9 | <5.1 | <9.9 | <9.9 | <9.9 | <9.9 | - | <5.1 | <5.1 | <5.1 | <5.1 | <51 | <180 |
| MLSE 40 (6) | URS, 2005 | <7.8 | <7.8 | <7.8 | <4 | <4 | <4 | <4 | <4 | <7.8 | <4 | <7.8 | <7.8 | <7.8 | <7.8 | - | <4 | <4 | <4 | <4 | <40 | <140 |
| DUP 100404-1 (1) [MLSE 31 (1)][a] | URS, 2005 | <18 UJ | <18 UJ | <18 UJ | <9.4 UJ | <9.4 UJ | <9.4 UJ | <9.4 UJ | <9.4 UJ | <18 UJ | <9.4 UJ | <18 UJ | <18 UJ | <18 UJ | <18 UJ | - | <9.4 UJ | <9.4 UJ | <9.4 UJ | <9.4 UJ | <94 UJ | <330 UJ |
| DUP 280904-1(1.5) [MLSE 19 (1.5)][a] | URS, 2005 | <8.1 | <8.1 | <8.1 | <4.2 | <4.2 | <4.2 | <4.2 | <4.2 | <8.1 | <4.2 | <8.1 | <8.1 | <8.1 | <8.1 | - | <4.2 | <4.2 | <4.2 | <4.2 | <42 | <150 |
| DUP092904-1(2.5) [MLSE 24(2.5)][a] | URS, 2005 | <4.9 | <4.9 | <4.9 | <2.5 | <2.5 | <2.5 | <2.5 | <2.5 | <4.9 | <2.5 | <4.9 | <4.9 | <4.9 | <4.9 | - | <2.5 | <2.5 | <2.5 | <2.5 | <25 | <89 |
| DUP093004-1(1) [MLSE 27 (1)][a] | URS, 2005 | <3.9 | <3.9 | <3.9 | <2 | <2 | <2 | <2 | <2 | <3.9 | <2 | <3.9 | <3.9 | <3.9 | <3.9 | - | <2 | <2 | <2 | <2 | <20 UJ | <72 |
| DUP093004-2(1) [MLSE 38 (1)][a] | URS, 2005 | <4.2 | <4.2 | <4.2 | <2.2 | <2.2 | <2.2 | <2.2 | <2.2 | <4.2 | <2.2 | <4.2 | <4.2 | <4.2 | <4.2 | - | <2.2 | <2.2 | <2.2 | <2.2 | <22 UJ | <76 |
| DUP093004-3(2) [MLSE 38 (2)][a] | URS, 2005 | <4.1 | <4.1 | <4.1 | <2.1 | <2.1 | <2.1 | <2.1 | <2.1 | <4.1 | <2.1 | <4.1 | <4.1 | <4.1 | <4.1 | - | <2.1 | <2.1 | <2.1 | <2.1 | <21 UJ | <75 |
| DUP100104-1(1) [MLSE 30 (1)][a] | URS, 2005 | <18 | <18 | <18 | <9.5 | <9.5 | <9.5 | <9.5 | <9.5 | <18 | <9.5 | <18 | <18 | <18 | <18 | - | <9.5 | <9.5 | <9.5 | <9.5 | <95 | <330 |
| DUP100504-1(1) [MLSE 33 (1)][a] | URS, 2005 | <4.2 | <4.2 | <4.2 | <2.2 | <2.2 | <2.2 | <2.2 | <2.2 | <4.2 | <2.2 | <4.2 | <4.2 | <4.2 | <4.2 | - | <2.2 | <2.2 | <2.2 | <2.2 | <22 | <77 |
| DUP100504-2(1) [MLSE 32 (1)][a] | URS, 2005 | **5.2** | <4.6 | **4.7** | <2.4 | <2.4 | <2.4 | <2.4 | <2.4 | <4.6 | <2.4 | <4.6 | <4.6 | <4.6 | <4.6 | - | <2.4 | <2.4 | <2.4 | <2.4 | <24 | <84 |

**TABLE 4**
**PESTICIDES RESULTS**
**PRESIDIO - MOUNTAIN LAKE**


| Sample Number | | 4,4'-DDD | 4,4'-DDE | 4,4'-DDT | Aldrin | alpha-BHC | alpha-Chlordane | beta-BHC | delta-BHC | Dieldrin | Endosulfan I | Endosulfan II | Endosulfan sulfate | Endrin | Endrin aldehyde | Endrin ketone | gamma-BHC (Lindane) | gamma-Chlordane | Heptachlor | Heptachlor epoxide | Methoxychlor | Toxaphene |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Freshwater Sediment Cleanup Level (µg/kg)** | **Source** | **16** | **16** | **32** | **5** | **8** | **10** | **13** | **7.5** | **32** | **5.4** | **5.4** | **5.4** | **100** | **100** | **100** | **3** | **10** | **8.3** | **8.3** | **19** | **NE** |

**Legend:**
Results in milligrams per kilogram (mg/kg) . Results for URS, 2001 and URS, 2005 are reported in dry weight.

| | |
|---|---|
| J | Estimated Concentration |
| U | Non-Detect |
| UJ | Estimated Reporting Limit |
| ND | Non-Detect (see source report for reporting limits) |
| <2.50 | Non-Detect at a Reporting Limit of 2.50 µg/kg |
| - | Not Analyzed |
| NE | Not Established |
| [ ] [a] | Indicates parent sample |

**Notes:**

| | |
|---|---|
| 1 | Cleanup levels are based on ecological freshwater sediment criteria. |
| 2 | Concentrations detected above the Reporting Limit are boldfaced. |
| 3 | Concentrations detected above the applicable Cleanup Level are boldfaced and highlighted. |

**TABLE 5**
**TPH, BTEX, AND MTBE RESULTS**
**PRESIDIO - MOUNTAIN LAKE**


| Sample Name | | Motor Oil | Diesel | Gasoline | Benzene | Toluene | Ethyl benzene | Xylene(s) | MTBE |
|---|---|---|---|---|---|---|---|---|---|
| **Freshwater Sediment Cleanup Level (mg/kg)** | **Source** | **144** | **144** | **140** | **0.79** | **3** | **15** | **5.7** | **NE** |
| MLSD01 | D&M, 1997 | - | - | - | ND | ND | ND | ND | - |
| MLSD02 | D&M, 1997 | - | - | - | ND | ND | ND | ND | - |
| MLSD03 | D&M, 1997 | - | - | - | ND | ND | ND | ND | - |
| MLSD04 | D&M, 1997 | - | - | - | ND | ND | ND | ND | - |
| ML-1 (9.7-0.3)comp | EKI, 1998 | - | **48** (2) | <1.0 (1) | ND | ND | ND | <0.0050 | ND |
| ML-2 (19.5-2)comp | EKI, 1998 | - | **30** (2) | <1.0 (1) | ND | ND | ND | <0.0050 | ND |
| ML-3 (19.4-5)comp | EKI, 1998 | - | **39** (2) | <1.0 (1) | ND | ND | ND | <0.0050 | ND |
| ML-4 (19.5-5)comp | EKI, 1998 | - | **41** (2) | <1.0 (1) | ND | ND | ND | **0.01** | ND |
| ML-5 (14.7-0.3)comp | EKI, 1998 | - | **19** (2) | <1.0 (1) | ND | ND | ND | <0.0050 | ND |
| MLSD 1 (0.1) | URS, 2001 | **460** | **66 J** | <3.9 UJ | <0.020 UJ | <0.020 UJ | <0.020 UJ | <0.020 UJ | <0.020 UJ |
| MLSD 1 (0.25) | URS, 2001 | **130** | **18 J** | <1.3 | <0.0063 | <0.0063 | <0.0063 | <0.0063 | <0.0063 |
| MLSD 2 (0.1) | URS, 2001 | **130** | **16 J** | <2.0 UJ | <0.0099 UJ | <0.0099 UJ | <0.0099 UJ | <0.0099 UJ | <0.0099 UJ |
| MLSD 3 (0.5) | URS, 2001 | **440** | **72 J** | <1.4 | <0.0068 | <0.0068 | <0.0068 | <0.0068 | <0.0068 |
| MLSE 1 (0.5) | URS, 2001 | <66 | **2.3 J** | <1.3 | <0.0066 | <0.0066 | <0.0066 | <0.0066 | <0.0066 |
| MLSE 1 (1) | URS, 2001 | <64 | **14 J** | <1.3 | - | - | - | - | - |
| MLSE 1 (2) | URS, 2001 | <59 | **8.2 J** | <1.2 | - | - | - | - | - |
| MLSE2 (0.5) | URS, 2001 | **470** | **96 J** | <7.2 | <0.036 | **0.015J** | **0.0061J** | <0.036 | **0.0065J** |
| MLSE2 (1) | URS, 2001 | <250 | **52 J** | <5.0 UJ | - | - | - | - | - |
| MLSE2 (2) | URS, 2001 | <190 | **21 J** | <3.9 UJ | - | - | - | - | - |
| MLSE3 (0.5) | URS, 2001 | <220 | **31 J** | <4.4 | <0.022 | <0.022 | <0.022 | <0.022 | <0.022 |
| MLSE3 (1) | URS, 2001 | <180 | **6.9 J** | <3.6 UJ | - | - | - | - | - |
| MLSE3 (2) | URS, 2001 | <170 | **5.4 J** | <3.5 UJ | - | - | - | - | - |
| MLSE 4 (0.5) | URS, 2001 | **320** | **45 J** | <1.2 | <0.0062 | <0.0062 | <0.0062 | <0.0062 | <0.0062 |
| MLSE 4 (1) | URS, 2001 | **1400** | **150 J** | <1.7 | - | - | - | - | - |
| MLSE 4 (2) | URS, 2001 | **1500** | **160 J** | <1.5 | - | - | - | - | - |
| MLSE 4 (3) | URS, 2001 | **200 J** | **49 J** | - | - | - | - | - | - |
| MLSE 4 (5) | URS, 2001 | **200 J** | **62 J** | - | - | - | - | - | - |
| MLSE5 (0.5) | URS, 2001 | <120 | **59 J** | <2.5 | <0.012 | <0.012 | <0.012 | <0.012 | <0.012 |
| MLSE5 (1) | URS, 2001 | <70 | **12 J** | <1.4 UJ | - | - | - | - | - |
| MLSE5 (2) | URS, 2001 | <100 | **3.0 J** | <2.1 UJ | - | - | - | - | - |
| MLSE6 (0.5) | URS, 2001 | <290 | **42 J** | <5.8 | <0.029 | <0.029 | <0.029 | <0.029 | <0.029 |
| MLSE6 (1) | URS, 2001 | <220 | **34 J** | <4.4 UJ | - | - | - | - | - |
| MLSE6 (2) | URS, 2001 | <200 | **12 J** | <4.0 UJ | - | - | - | - | - |
| MLSE7 (0.5) | URS, 2001 | **110** | **20 J** | <1.8 | <0.0092 | <0.0092 | <0.0092 | <0.0092 | <0.0092 |
| MLSE7 (1) | URS, 2001 | <97 | **5.8 J** | <1.9 UJ | - | - | - | - | - |
| MLSE7 (2) | URS, 2001 | <170 | <3.4 | <3.4 UJ | - | - | - | - | - |
| MLSE 8 (0.5) | URS, 2001 | <180 | <3.6 | <3.6 | <0.018 | <0.018 | <0.018 | <0.018 | <0.018 |
| MLSE 8 (1) | URS, 2001 | <290 | <5.9 | <5.9 | - | - | - | - | - |
| MLSE 8 (2) | URS, 2001 | <370 | <7.3 | <7.3 | - | - | - | - | - |
| MLSE 9 (0.5) | URS, 2001 | <230 | <4.7 | <4.7 | <0.023 | <0.023 | <0.023 | <0.023 | <0.023 |
| MLSE 9 (1) | URS, 2001 | <230 | <4.5 | <4.5 | - | - | - | - | - |
| MLSE 9 (2) | URS, 2001 | <180 | **3.8 J** | <3.6 | - | - | - | - | - |
| MLSE10(0.5) | URS, 2001 | **96** | **15 J** | <1.2 | <0.0062 | <0.0062 | <0.0062 | <0.0062 | <0.0062 |
| MLSE10(1) | URS, 2001 | **1500** | **200 J** | <1.8 UJ | - | - | - | - | - |
| MLSE10(2) | URS, 2001 | <170 | <3.5 | <3.5 UJ | - | - | - | - | - |
| MLSE11(0.5) | URS, 2001 | <60 | <1.2 | <1.2 | <0.0060 | <0.0060 | <0.0060 | <0.0060 | <0.0060 |
| MLSE11(1) | URS, 2001 | <59 | <1.2 | <1.2 UJ | - | - | - | - | - |
| MLSE11(2) | URS, 2001 | <58 | <1.2 | <1.2 UJ | - | - | - | - | - |
| MLSE 12 (0.5) | URS, 2001 | <150 | <2.9 | <2.9 | <0.015 | <0.015 | <0.015 | <0.015 | <0.015 |

**TABLE 5**
**TPH, BTEX, AND MTBE RESULTS**
**PRESIDIO - MOUNTAIN LAKE**


| Sample Name | | Motor Oil | Diesel | Gasoline | Benzene | Toluene | Ethyl benzene | Xylene(s) | MTBE |
|---|---|---|---|---|---|---|---|---|---|
| **Freshwater Sediment Cleanup Level (mg/kg)** | **Source** | **144** | **144** | **140** | **0.79** | **3** | **15** | **5.7** | **NE** |
| MLSE 12 (1) | URS, 2001 | <130 | <2.5 | <2.5 | - | - | - | - | - |
| MLSE 12 (2) | URS, 2001 | <110 | <2.3 | **24** | - | - | - | - | - |
| MLSE13(0.5) | URS, 2001 | <160 | **11 J** | <3.2 | <0.016 | <0.016 | <0.016 | <0.016 | <0.016 |
| MLSE13(1) | URS, 2001 | <230 | **7.3 J** | <4.5 UJ | - | - | - | - | - |
| MLSE13(2) | URS, 2001 | <210 | <4.2 | <4.2 UJ | - | - | - | - | - |
| MLSE14 (0.5) | URS, 2001 | <310 | **52 J** | <6.3 | <0.031 | <0.031 | <0.031 | <0.031 | <0.031 |
| MLSE14 (1) | URS, 2001 | <230 | **32 J** | <4.6 UJ | - | - | - | - | - |
| MLSE14 (2) | URS, 2001 | **180** | **70 J** | <3.2 UJ | - | - | - | - | - |
| MLSE 14 (3) | URS, 2001 | <200 UJ | **13 J** | - | - | - | - | - | - |
| MLSE 14 (5) | URS, 2001 | <270 UJ | **15 J** | - | - | - | - | - | - |
| MLSE15 (0.5) | URS, 2001 | <95 | **7.0 J** | <1.9 | <0.0095 | <0.0095 | <0.0095 | <0.0095 | <0.0095 |
| MLSE15 (1) | URS, 2001 | <79 | **3.6J** | <1.6 UJ | - | - | - | - | - |
| MLSE15 (2) | URS, 2001 | <63 | <1.3 | <1.3 UJ | - | - | - | - | - |
| DUP012401-1 [MLSD-1 (0.25)]a | URS, 2001 | **200** | **18 J** | <1.3 | <0.0063 | <0.0063 | <0.0063 | <0.0063 | <0.0063 |
| DUP012401-6 [MLSE-4 (1)]a | URS, 2001 | **1300** | **200 J** | <1.5 | - | - | - | - | - |
| DUP012401-7 [MLSE-1 (0.5)]a | URS, 2001 | <69 | **13 J** | <1.4 | <0.0069 | <0.0069 | <0.0069 | <0.0069 | <0.0069 |
| DUP012401-8 [MLSE-1 (2)]a | URS, 2001 | <100 | **10 J** | <2.1 | - | - | - | - | - |

**Legend:**

Results in milligrams per kilogram (mg/kg) . Results for URS, 2001 and URS, 2005 are reported in dry weight.

| | |
|---|---|
| J | Estimated Concentration |
| U | Non-Detect |
| UJ | Estimated Reporting Limit |
| ND | Non-Detect (see Source Report for reporting limits). |
| <2.50 | Non-Detect at a Reporting Limit of 2.50 mg/kg |
| - | Not Analyzed |
| NE | Not Established |
| [ ] [a] | Indicates parent sample |

**Notes:**

1. TPPH = Total Purgeable Petroleum Hydrocarbons as Gasoline analyzed using EPA Method 8015M.
2. TEPH = Total Extractable Petroleum Hydrocarbons analyzed as Diesel using EPA Method 8015M. Chromatogram pattern does not match diesel range. Samples are unidentified hydrocarbons, C9 – C24 range.
3. Cleanup levels are based on ecological freshwater sediment criteria.
4. Concentrations detected above the method detection limit are boldfaced.
5. Concentrations detected above the applicable Cleanup Level are boldfaced and highlighted.

**TABLE 6**
**TOTAL CYANIDE AND NITRATE RESULTS**
**PRESIDIO - MOUNTAIN LAKE**


| Sample Location (Depth) | Source | Cyanide (mg/kg) | Nitrate (NO3) (mg/kg) |
|---|---|---|---|
| ML-1 (9.7-0.3) comp | EKI, 1998 | **-** | <1.0 |
| ML-2 (19.5-2) comp | EKI, 1998 | **-** | <1.0 |
| ML-3 (19.4-5) comp | EKI, 1998 | **-** | **6.5** |
| ML-4 (19.5-5) comp | EKI, 1998 | **-** | <1.0 |
| ML-5 (14.7-0.3) comp | EKI, 1998 | **-** | <1.0 |
| MLSD 1(0.25) | URS, 2001 | **80J** | - |
| MLSD 1(0.1) | URS, 2001 | **80** | - |
| MLSD 2(0.1) | URS, 2001 | **7.1** | - |
| MLSD 3(0.5) | URS, 2001 | <0.25 | - |
| MLSE 1(0.5) | URS, 2001 | <0.25 UJ | <1.0 |
| MLSE 1(1.0) | URS, 2001 | - | <1.0 |
| MLSE 2(0.5) | URS, 2001 | **12** | <1.0 |
| MLSE 2(1.0) | URS, 2001 | - | <1.0 |
| MLSE 3(0.5) | URS, 2001 | <0.25 | - |
| MLSE 4(0.5) | URS, 2001 | **13** | - |
| MLSE 4 (2) | URS, 2001 | **0.8** | - |
| MLSE 4 (4) | URS, 2001 | **0.4** | - |
| MLSE 5(0.5) | URS, 2001 | **1.4** | - |
| MLSE 6(0.5) | URS, 2001 | **4.7** | - |
| MLSE 6 (2) | URS, 2001 | <0.25 | - |
| MLSE 6 (4) | URS, 2001 | <0.25 | - |
| MLSE 7(0.5) | URS, 2001 | **0.69** | <1.0 |
| MLSE 7(1.0) | URS, 2001 | - | <1.0 |
| MLSE 8(0.5) | URS, 2001 | **1.6** | - |
| MLSE 9 (0.5) | URS, 2001 | <0.25 | - |
| MLSE 10 (0.5) | URS, 2001 | <0.25 | - |
| MLSE 11 (0.5) | URS, 2001 | <0.25 | - |
| MLSE 12 (0.5) | URS, 2001 | **2.2** | <1.0 |
| MLSE 12 (1.0) | URS, 2001 | NA | <1.0 |
| MLSE 13 (0.5) | URS, 2001 | <0.25 | <1.0 |
| MLSE 13 (1.0) | URS, 2001 | - | <1.0 |
| MLSE 14 (0.5) | URS, 2001 | **3.1** | - |
| MLSE 14 (2) | URS, 2001 | <0.25 | - |
| MLSE 14 (4) | URS, 2001 | <0.25 | - |

**TABLE 6**
**TOTAL CYANIDE AND NITRATE RESULTS**
**PRESIDIO - MOUNTAIN LAKE**


| Sample Location (Depth) | Source | Cyanide (mg/kg) | Nitrate (NO3) (mg/kg) |
|---|---|---|---|
| MLSE 15(0.5) | URS, 2001 | <0.25 | - |
| DUP012401-1 [MLSD-1 (0.25)][a] | URS, 2001 | **2.5J** | - |
| DUP012401-7 [MLSE-1 (0.5)][a] | URS, 2001 | **3.9 J** | <1.0 |
| MLSE 16 (1) | URS, 2005 | <5 | - |
| MLSE 16 (2) | URS, 2005 | <6.7 | - |
| MLSE 16 (5) | URS, 2005 | <5.3 | - |
| MLSE 17 (1) | URS, 2005 | <2.7 | - |
| MLSE 17 (2) | URS, 2005 | <1.2 | - |
| MLSE 17 (5) | URS, 2005 | <4.2 | - |
| MLSE 18 (1) | URS, 2005 | <1.3 | - |
| MLSE 18 (2) | URS, 2005 | <1.3 | - |
| MLSE 18 (5) | URS, 2005 | <1.1 | - |
| MLSE 19 (1.5) | URS, 2005 | <1.2 | - |
| MLSE 19 (2.5) | URS, 2005 | <1.3 | - |
| MLSE 19 (5) | URS, 2005 | <1.2 | - |
| MLSE 20 (1) | URS, 2005 | <1.4 | - |
| MLSE 20 (2) | URS, 2005 | <2.5 | - |
| MLSE 20 (5) | URS, 2005 | <1.2 | - |
| MLSE 21 (1) | URS, 2005 | <9.1 | - |
| MLSE 21 (2) | URS, 2005 | <1.9 | - |
| MLSE 21 (5) | URS, 2005 | <5.3 | - |
| MLSE 22 (1) | URS, 2005 | <1.2 | - |
| MLSE 22 (2) | URS, 2005 | <1.2 | - |
| MLSE 22 (5) | URS, 2005 | <1.2 | - |
| MLSE 23 (1) | URS, 2005 | <1.2 | - |
| MLSE 23 (2) | URS, 2005 | <1.2 | - |
| MLSE 23 (5) | URS, 2005 | <1.2 | - |
| MLSE 24 (1) | URS, 2005 | <1.8 | - |
| MLSE 24 (2.5) | URS, 2005 | <1.3 | - |
| MLSE 24 (5) | URS, 2005 | <5 | - |
| MLSE 25 (1) | URS, 2005 | <2 | - |
| MLSE 26 (1) | URS, 2005 | <4.5 | - |
| MLSE 26 (2) | URS, 2005 | <2.7 | - |
| MLSE 27 (1) | URS, 2005 | <1.2 | - |

**TABLE 6**
**TOTAL CYANIDE AND NITRATE RESULTS**
**PRESIDIO - MOUNTAIN LAKE**


| Sample Location (Depth) | Source | Cyanide (mg/kg) | Nitrate (NO3) (mg/kg) |
|---|---|---|---|
| MLSE 27 (2) | URS, 2005 | <3.7 | - |
| MLSE 27 (5) | URS, 2005 | <3.6 | - |
| MLSE 27 (6) | URS, 2005 | <1.2 | - |
| MLSE 28 (1) | URS, 2005 | <1.9 | - |
| MLSE 28 (2) | URS, 2005 | <2 | - |
| MLSE 28 (5) | URS, 2005 | <6.7 | - |
| MLSE 28 (6) | URS, 2005 | <1.7 | - |
| MLSE 29 (1) | URS, 2005 | <5.9 | - |
| MLSE 29 (2) | URS, 2005 | <4.8 | - |
| MLSE 29 (4) | URS, 2005 | <3.8 | - |
| MLSE 29 (5) | URS, 2005 | <7.7 | - |
| MLSE 29 (6) | URS, 2005 | <6.7 | - |
| MLSE 30 (1) | URS, 2005 | <5.6 | - |
| MLSE 30 (2) | URS, 2005 | <4.5 | - |
| MLSE 30 (4) | URS, 2005 | <6.7 | - |
| MLSE 30 (5) | URS, 2005 | <8.3 | - |
| MLSE 30 (6) | URS, 2005 | <7.1 | - |
| MLSE 31 (1) | URS, 2005 | <5.6 | - |
| MLSE 31 (2) | URS, 2005 | <4.8 | - |
| MLSE 31 (4) | URS, 2005 | <4 | - |
| MLSE 31 (5) | URS, 2005 | <8.3 | - |
| MLSE 31 (6) | URS, 2005 | <7.1 | - |
| MLSE 32 (1) | URS, 2005 | <1.4 | - |
| MLSE 32 (2) | URS, 2005 | <1.2 | - |
| MLSE 32 (4) | URS, 2005 | <1.2 | - |
| MLSE 32 (5) | URS, 2005 | <1.2 | - |
| MLSE 32 (6) | URS, 2005 | <5 | - |
| MLSE 33 (1) | URS, 2005 | <1.3 | - |
| MLSE 33 (2) | URS, 2005 | <7.1 | - |
| MLSE 33 (4) | URS, 2005 | <5.6 | - |
| MLSE 33 (5) | URS, 2005 | <4.8 | - |
| MLSE 33 (6) | URS, 2005 | <1.4 | - |
| MLSE 37 (1) | URS, 2005 | <1.3 | - |
| MLSE 37 (2) | URS, 2005 | <2.9 | - |

**TABLE 6**
**TOTAL CYANIDE AND NITRATE RESULTS**
**PRESIDIO - MOUNTAIN LAKE**


| Sample Location (Depth) | Source | Cyanide (mg/kg) | Nitrate (NO3) (mg/kg) |
|---|---|---|---|
| MLSE 37 (5) | URS, 2005 | <1.2 | - |
| MLSE 38 (1) | URS, 2005 | <1.2 | - |
| MLSE 38 (2) | URS, 2005 | <1.2 | - |
| MLSE 38 (5) | URS, 2005 | <1.2 | - |
| MLSE 39 (1) | URS, 2005 | <4.2 | - |
| MLSE 39 (2) | URS, 2005 | <4.8 | - |
| MLSE 39 (5) | URS, 2005 | <3.2 | - |
| MLSE 39 (6) | URS, 2005 | <7.1 | - |
| MLSE 40 (1) | URS, 2005 | <1.2 | - |
| MLSE 40 (2) | URS, 2005 | <1.1 | - |
| MLSE 40 (5) | URS, 2005 | <3 | - |
| MLSE 40 (6) | URS, 2005 | <2.4 | - |
| DUP 280904-1(1.5) [MLSE 19 (1.5)][a] | URS, 2005 | <1.2 | - |
| DUP 290904-1(2.5) [MLSE 24 (2.5)][a] | URS, 2005 | <1.5 | - |
| DUP 093004-1(1) [MLSE 27 (1)]a | URS, 2005 | <1.2 | - |
| DUP 093004-2 (1) [MLSE 38 (1)][a] | URS, 2005 | <1.3 | - |
| DUP 093004-3 (2) [MLSE 38 (2)][a] | URS, 2005 | <1.3 | - |
| DUP 100104-1(1) [MLSE 30 (1)][a] | URS, 2005 | <5.6 | - |
| DUP 100404-1 (1) [MLSE 31 (1)][a] | URS, 2005 | <5.6 | - |
| DUP 100504-1(1) [MLSE 33 (1)][a] | URS, 2005 | <1.3 | - |
| DUP 100504-2 (1) [MLSE 32 (1)][a] | URS, 2005 | <1.4 | - |

**Legend:**

Results in milligrams per kilogram (mg/kg) . Results for URS, 2001 and URS, 2005 are reported in dry weight.

| | |
|---|---|
| J | Estimated Concentration |
| U | Non-Detect |
| UJ | Estimated Reporting Limit |
| <2.50 | Non-Detect at a Reporting Limit of 2.50 mg/kg |
| - | Not Analyzed |
| [ ][a] | Indicates parent sample |

**Notes:**

| | |
|---|---|
| 1 | Concentrations detected above the method detection limit are boldfaced. |
| 2 | Cleanup Levels have not been established for cyanide and nitrate. |

**TABLE 9**
**ELUTRIATE RESULTS**
**PRESIDIO - MOUNTAIN LAKE**

**Source: URS, 2005**

| Sample Location (Depth) | Antimony | Arsenic | Barium | Beryllium | Cadmium | Chromium | Cobalt | Copper | Lead | Mercury | Molybdenum | Nickel | Selenium | Silver | Thallium | Vanadium | Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SFPUC Permit** | NE | 4,000 | NE | NE | 500 | 5,000 | NE | 4,000 | 1,500 | 50 | NE | 2,000 | NE | 600 | NE | NE | 7,000 |
| **AWQC** | NE | 150 | NE | NE | 0.25 | Cr III 74<br>Cr VI 11 | NE | 9 | 2.5 | 0.77 | NE | 52 | 5 | Max = 3.2 | NE | NE | 120 |
| MLSE 29 (4.1) | 0.98 J | 2.7 J | 120 | <2 | <1 | <1 | 1.4 J | 0.51 J | 0.13 J | <0.11 | 1.5 J | 6.7 J | <5 | <5 | <5 | <1.1 | 12 J |
| MLSE 30 (4.1) | 0.45 J | 2.1 J | 98 | <2 | <1 | <0.87 | 0.77 J | 1.5 J | 0.19 J | <0.2 | 1.7 J | 4.2 J | <5 | <5 | <5 | <1.1 | 13 J |
| MLSE 31 (4.1) | 0.55 J | 2.3 J | 110 | <2 | <1 | <1.1 | 1.1 J | 2.1 J | 0.52 J | <0.11 | 1.2 J | 6.2 J | <5 | <5 | <5 | <1.4 | <18 |
| MLSE 32 (4.1) | 0.64 J | 3.2 J | 130 | <2 | <1 | <1 | 1.2 J | 1.4 J | 0.14 J | <0.11 | 1.1 J | 3.7 J | <5 | <5 | <5 | <2.9 | <8.6 |
| MLSE 33 (4.1) | 0.39 J | 1.9 J | 62 | <2 | <1 | <1.2 | 0.74 J | 0.78 J | 0.12 J | <0.2 | 1.4 J | 4.6 J | <5 | <5 | <5 | <2.8 | <9.2 |
| MLSE 39 (4.1) | 0.51 J | 2.9 J | 110 | <2 | <1 | <1.2 | 1.3 J | 0.7 J | 0.16 J | <0.15 | 1.4 J | 5.5 J | <5 | <5 | <5 | <0.93 | <10 |
| MLSE 40 (4.1) | 0.83 J | 1.8 J | 120 | <2 | <1 | <0.92 | 0.95 J | 1.6 J | 0.21 J | 0.063 J | 1.5 J | 8.2 J | <5 | <5 | <5 | <3.4 | 17 J |
| DUP100604-1 (4.1)[a] | 1.3 | 2.4 J | 120 | <2 | <1 | <2.1 | 3.2 J | 3.4 J | 0.58 J | <0.12 | 1.8 J | 9.4 J | <5 | <5 | <5 | <2.1 | 34 J |

**Legend:**

Results in microgram (µg/L) per liter

| | |
|---|---|
| J | Estimated Concentration |
| U | Non-Detect |
| UJ | Estimated Reporting Limit |
| - | Not Analyzed |
| [ ][a] | Parent Sample MLSE 39 (4.1) |
| NE | Not Established |

**Notes:**

1 AWQC = EPA National Recommended Ambient Water Quality Criteria for Freshwater Aquatic Life Protection

2 SFPUC Permit = San Francisco Public Utilities Commission Industrial User Class II Wastewater Permit, No. 05-0246 (All Metals Permit levels are for Total Metals, µg/L).

## Table 1: Summary of Sediment Sample Analytical Results - Metals

| | | | Analytical Method: | EPA 6010B | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Analyte: | Antimony | Arsenic | Barium | Beryllium | Cadmium | Chromium | Cobalt | Copper | Lead | Mercury | Molybdenum | Nickel | Selenium | Silver | Thallium | Vanadium | Zinc |
| | | | Units: | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg | mg/kg |
| Residential Preliminary Remediation Goal[a] | | | | | | | | | | | | | | | | | | | | |
| Serpentinite | | | | 29 | 5.4[b] | 5,000 | 140 | 1.9[b] | 1,700[b] | 4,000 | -- | 400 | 20 | 360 | 4,500[b] | 360 | 360 | 5.7 | 650 | 22,000 |
| Colma | | | | 29 | 6.2[b] | 5,000 | 140 | 1.7 | 1,200 | 4,000 | -- | 400 | 20 | 360 | 1,400 | 360 | 360 | 5.7 | 650 | 22,000 |
| Beach Sand | | | | 29 | 5.9[b] | 5,000 | 140 | 1.7 | 1,200 | 4,000 | -- | 400 | 20 | 360 | 1,400 | 360 | 360 | 5.7 | 650 | 22,000 |
| Freshwater Sediment Cleanup Level[a] | | | | | | | | | | | | | | | | | | | | |
| Serpentinite | | | | 3.0[c] | 19 | 3,100 | 7,200 | 1.9[b] | 1,700[b] | 170[b] | 114 | 82 | 0.62 | 522 | 4,500[b] | 1.6 | 1.7[b] | 3.7 | 74[b] | 230 |
| Colma | | | | 3.0[c] | 19 | 3,100 | 7,200 | 1.1 | 140[b] | 50 | 114 | 82 | 0.62 | 522 | 110[b] | 1.6 | 1.0[b] | 3.7 | 90[b] | 230 |
| Beach Sand | | | | 3.0[c] | 19 | 3,100 | 7,200 | 1.7[b] | 120[b] | 50 | 114 | 82 | 0.62 | 522 | 70[b] | 1.6 | 1.0[b] | 3.7 | 92[b] | 230 |
| Boring | Sample Name | Sample Date | Sample depth (feet below sediment surface) | | | | | | | | | | | | | | | | | |
| MLSE 100 | MLSE 100(0.5) | 12/02/11 | 0.5 | <0.65[d][e] | 1.2 | 28 | <0.13 | <0.32 | 64 | 5.7 | 3 | 7.8 | <0.024 | <0.32 | 27 | <0.65 | <0.32 | <0.65 | 40 | 26 |
| MLSE 100 (Dup) | DUP 111202(0.5 | 12/02/11 | 0.5 | <0.6 | 0.98 | 27 | <0.12 | <0.3 | 60 | 5.7 | 3.1 | 8.8 | <0.024 | <0.3 | 28 | <0.6 | 0.32 | <0.6 | 42 | 27 |
| MLSE 100 | MLSE 100(1.5) | 12/02/11 | 1.5 | <0.63 | 1.2 | 29 | <0.13 | <0.32 | 58 | 4.7 | 2.7 | 2.4 | <0.024 | <0.32 | 24 | <0.63 | <0.32 | <0.63 | 33 | 21 |
| MLSE 101 | MLSE 101(0.5) | 12/02/11 | 0.5 | <0.6 | 0.95 | 21 | <0.12 | <0.3 | 62 | 5.6 | 3.1 | 9.1 | <0.024 | <0.3 | 29 | <0.6 | <0.3 | <0.6 | 43 | 25 |
| MLSE 101 | MLSE 101(1) | 12/02/11 | 1 | <0.59 | 0.97 | 24 | <0.12 | <0.29 | 55 | 4.6 | 3.6 | 13 | <0.023 | <0.29 | 23 | <0.59 | <0.29 | <0.59 | 35 | 31 |
| MLSE 102 | MLSE 102(0.5) | 12/02/11 | 1.5 | <0.61 | 0.99 | 22 | <0.12 | <0.3 | 59 | 5 | 5.1 | 26 | <0.024 | <0.3 | 28 | <0.61 | <0.3 | <0.61 | 42 | 30 |
| MLSE 102 | MLSE 102(1) | 12/02/11 | 1 | <0.63 | 0.93 | 23 | <0.13 | <0.32 | 61 | 5.7 | 4.9 | 23 | <0.024 | <0.32 | 29 | <0.63 | <0.32 | <0.63 | 44 | 30 |
| MLSE 103 | MLSE 103(0.5) | 12/02/11 | 0.5 | <0.63 | 1.3 | 31 | <0.13 | <0.32 | 62 | 6.1 | 3.6 | 9.6 | <0.024 | <0.32 | 41 | <0.63 | <0.32 | <0.63 | 38 | 27 |
| MLSE 103 | MLSE 103(2) | 12/02/11 | 2 | <0.6 | 0.92 | 25 | <0.12 | <0.3 | 73 | 6.6 | 4 | 1.9 | <0.024 | <0.3 | 32 | <0.6 | <0.3 | <0.6 | 44 | 23 |
| MLSE 103 | MLSE 103(4) | 12/02/11 | 4 | <0.66 | 1.1 | 20 | <0.13 | <0.33 | 63 | 6.8 | 4.5 | 1.3 | <0.025 | <0.33 | 31 | <0.66 | <0.33 | <0.66 | 52 | 20 |
| MLSE 104 | MLSE 104(0.5) | 12/02/11 | 0.5 | <0.6 | 1.1 | 20 | <0.12 | <0.3 | 66 | 5.9 | 3.3 | 5.6 | <0.024 | <0.3 | 37 | <0.6 | <0.3 | <0.6 | 53 | 29 |
| MLSE 104 | MLSE 104(2) | 12/02/11 | 2 | <0.6 | 0.91 | 20 | 0.12 | <0.3 | 46 | 6.2 | 4 | 1.8 | <0.024 | <0.3 | 31 | <0.6 | <0.3 | <0.6 | 49 | 18 |
| MLSE 104 | MLSE 104(4) | 12/02/11 | 4 | <0.58 | 0.94 | 18 | <0.12 | <0.29 | 50 | 5.7 | 3.6 | 1.6 | <0.023 | <0.29 | 27 | <0.58 | <0.29 | <0.58 | 43 | 17 |
| MLSE 105 | MLSE 105(0.5) | 12/02/11 | 0.5 | <0.6 | 1.2 | 23 | <0.12 | <0.3 | 55 | 5.5 | 3.3 | 6.8 | <0.024 | <0.3 | 26 | <0.6 | <0.3 | <0.6 | 53 | 24 |
| MLSE 105 | MLSE 105(2) | 12/02/11 | 2 | <0.59 | 1.5 | 25 | <0.12 | <0.29 | 76 | 7.7 | 5.6 | 3.8 | <0.024 | <0.29 | 36 | <0.59 | 0.36 | <0.59 | 72 | 28 |
| MLSE 105 | MLSE 105(4) | 12/02/11 | 4 | <0.58 | 1.2 | 23 | 0.12 | <0.29 | 80 | 7.3 | 5.1 | 1.5 | <0.023 | <0.29 | 33 | <0.58 | 0.32 | <0.58 | 68 | 23 |

Notes:

mg/kg = milligrams per kilogram

(a) Residential soil preliminary remediation goals (PRGs) and freshwater sediment cleanup levels from *Development of Presidio-Wide Cleanup Levels for Soil, Sediment, Groundwater, and Surface Water (EKI 2002).*

(b) EKI (2002) notes that "Cleanup level for this compound and this lithology is based on the background level in soil."

(c) EKI (2002) notes that "Cleanup level for this compound and this lithology is based on the background level in soil. Background level for this compound and this lithology is derived from the typical detection limit."

(d) <0.65 = Not detected above reporting limit

(e) All sample results are reported in dry weight.

## Table 2: Summary of Sediment Sample Analytical Results - Organic Compounds

| | | | | Petroleum Compounds | | | Pesticides[a] | | | | | | | | Moisture Content |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Analyte: | Gasoline Range Organics [C7-C12] | Diesel Range Organics [C10-C28] | Motor Oil Range Organics [C24-C36] | Alpha-BHC | Beta-BHC | Gamma-BHC (Lindane) | Delta-BHC | 4,4'-DDE | 4,4'-DDD | Alpha-Chlordane | Gamma-Chlordane | Percent Moisture |
| | | | Units: | mg/kg | mg/kg | mg/kg | ug/kg[c] | ug/kg | ug/kg | ug/kg | ug/kg | ug/kg | ug/kg | ug/kg | % |
| Residential Preliminary Remediation Goal[b] | | | | | | | | | | | | | | | |
| | | | Serpentinite | 1,030 | 1,380 | 1,900 | 180 | 320 | 440 | 180 | 1,400 | 2,000 | 370 | 370 | n/a |
| | | | Colma | 1,030 | 1,380 | 1,900 | 180 | 320 | 440 | 180 | 1,400 | 2,000 | 370 | 370 | n/a |
| | | | Beach Sand | 1,030 | 1,380 | 1,900 | 180 | 320 | 440 | 180 | 1,400 | 2,000 | 370 | 370 | n/a |
| Freshwater Sediment Cleanup Level[b] | | | | | | | | | | | | | | | |
| | | | Serpentinite | 140 | 144 | 144 | 8 | 13 | 3 | 7.5 | 16 | 16 | 10 | 10 | n/a |
| | | | Colma | 140 | 144 | 144 | 8 | 13 | 3 | 7.5 | 16 | 16 | 10 | 10 | n/a |
| | | | Beach Sand | 140 | 144 | 144 | 8 | 13 | 3 | 7.5 | 16 | 16 | 10 | 10 | n/a |
| Boring | Sample Name | Sample Date | Sample depth (feet below sediment surface) | | | | | | | | | | | | |
| MLSE 100 | MLSE 100(0.5) | 12/02/11 | 0.5 | <1.3[c][d] | 5.7 | 19 | <2 | <2 | <2 | <2 | <3.9 | <3.9 | <2 | <2 | 17 |
| MLSE 100 (Dup) | DUP 111202(0.5) | 12/02/11 | 0.5 | <1.3 | 4.5 | 21 | <2 | <2 | <2 | <2 | <3.9 | <3.9 | <2 | <2 | 16 |
| MLSE 100 | MLSE 100(1.5) | 12/02/11 | 1.5 | <1.1 | 2 Y[e] | 11 | <2 | <2 | <2 | <2 | <3.9 | <3.9 | <2 | <2 | 16 |
| MLSE 101 | MLSE 101(0.5) | 12/02/11 | 0.5 | <1.2 | 3.2 Y | 14 | <2.1 | <2.1 | <2.1 | <2.1 | <4 | <4 | <2.1 | <2.1 | 17 |
| MLSE 101 | MLSE 101(1) | 12/02/11 | 1 | <1.1 | 1.3 Y | 9 | <2 | <2 | <2 | <2 | <3.9 | <3.9 | <2 | <2 | 14 |
| MLSE 102 | MLSE 102(0.5) | 12/02/11 | 1.5 | <1.3 | 3.1 Y | 25 | <2 | <2 | <2 | <2 | <3.9 | <3.9 | <2 | <2 | 15 |
| MLSE 102 | MLSE 102(1) | 12/02/11 | 1 | <1.2 | 3.5 Y | 23 | <2.1 | <2.1 | <2.1 | <2.1 | <4 | <4 | <2.1 | <2.1 | 17 |
| MLSE 103 | MLSE 103(0.5) | 12/02/11 | 0.5 | <1.2 | 6.5 Y | 21 | <2 | <2 | <2 | <2 | <3.9 | <3.9 | <2 | <2 | 16 |
| MLSE 103 | MLSE 103(2) | 12/02/11 | 2 | <1.2 | <1.2 | <6 | <2 | <2 | <2 | <2 | <3.9 | <3.9 | <2 | <2 | 16 |
| MLSE 103 | MLSE 103(4) | 12/02/11 | 4 | <1.2 | <1.3 | <6.4 | <2.2 | <2.2 | <2.2 | <2.2 | <4.2 | <4.2 | <2.2 | <2.2 | 21 |
| MLSE 104 | MLSE 104(0.5) | 12/02/11 | 0.5 | <1.2 | 4 Y | 19 | <2 | <2 | <2 | <2 | <4 | <4 | <2 | <2 | 16 |
| MLSE 104 | MLSE 104(2) | 12/02/11 | 2 | <1.2 | <1.2 | <5.9 | <2 | <2 | <2 | <2 | <3.9 | <3.9 | <2 | <2 | 16 |
| MLSE 104 | MLSE 104(4) | 12/02/11 | 4 | <1.1 | <1.2 | <5.8 | <2 | <2 | <2 | <2 | <3.8 | <3.8 | <2 | <2 | 14 |
| MLSE 105 | MLSE 105(0.5) | 12/02/11 | 0.5 | <1.2 | 5.7 Y | 35 | <2.1 | <2.1 | <2.1 | <2.1 | <4 | <4 | <2.1 | <2.1 | 17 |
| MLSE 105 | MLSE 105(2) | 12/02/11 | 2 | <1.3 | 1.5 Y | 6.4 | <2 | <2 | <2 | <2 | <3.8 | <3.8 | <2 | <2 | 15 |
| MLSE 105 | MLSE 105(4) | 12/02/11 | 4 | <1.2 | <1.2 | <5.8 | <2 | <2 | <2 | <2 | <3.8 | <3.8 | <2 | <2 | 14 |

Notes:

mg/kg = milligrams per kilogram

ug/kg = micrograms per kilogram

(a) Results for pesticides shown for potential chemicals of concern (URS 2011) only. Laboratory report includes other organochlorine pesticides; none were detected above the respective reporting limits.

(b) Residential soil preliminary remediation goals (PRGs) and freshwater sediment cleanup levels from *Development of Presidio-Wide Cleanup Levels for Soil, Sediment, Groundwater, and Surface Water (EKI 2002).*

(c) < 1.3 = Not detected above reporting limit

(d) All sample results are reported in dry weight.

(e) Y = Laboratory reports: "Sample exhibits chromatographic pattern which does not resemble standard"

# TABLE B-95
## SUMMARY OF INORGANIC ANALYTICAL RESULTS FOR SURFACE WATER SAMPLES COLLECTED AT MOUNTAIN LAKE
Presidio of San Francisco, California

| Sample | Date | Units | Antimony, Total | Antimony, Dissolved | Arsenic, Total | Arsenic, Dissolved | Barium, Total | Barium, Dissolved | Beryllium, Total | Beryllium, Dissolved | Cadmium, Total | Cadmium, Dissolved |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MLSW01 | 10/29/90 | µg/L | <60 | NA (a) | <2.35 | NA | **56.4** | NA | <1.12 | NA | <6.78 | NA |
| | 4/17/92 | µg/L | <25.1 | NA | <2 | NA | **46.5** | NA | <2 | NA | <5 | NA |
| | 4/17/92 | µg/L | NA | <25.1 | NA | <2 | NA | **46.5** | NA | <2 | NA | <5 |
| MLSW100 | 6/22/00 | µg/L | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| MLSW101 | 6/22/00 | µg/L | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| MLSW102 | 6/22/00 | µg/L | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| MLSW100R | 8/31/00 | µg/L | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| MLSW101R | 8/31/00 | µg/L | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| MLSW102R | 8/31/00 | µg/L | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |

# TABLE B-95
## SUMMARY OF INORGANIC ANALYTICAL RESULTS FOR SURFACE WATER SAMPLES COLLECTED AT MOUNTAIN LAKE
Presidio of San Francisco, California

| Sample | Date | Units | Chromium, Total | Chromium, Dissolved | Cobalt, Total | Cobalt, Dissolved | Copper, Total | Copper, Dissolved | Cyanide, Total | Lead, Total | Lead, Dissolved | Mercury, Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MLSW01 | 10/29/90 | µg/L | <16.8 | NA | <25 | NA | <18.8 | NA | **8.14** | **9.09** | NA | <0.1 |
| | 4/17/92 | µg/L | <22.4 | NA | <10.8 | NA | <10 | NA | NA | <4.54 | NA | <0.5 |
| | 4/17/92 | µg/L | NA | <22.4 | NA | <10.8 | NA | <10 | NA | NA | <4.54 | <0.5 |
| MLSW100 | 6/22/00 | µg/L | NA | NA | NA | NA | NA | NA | <50 | <3 | NA | NA |
| MLSW101 | 6/22/00 | µg/L | NA | NA | NA | NA | NA | NA | <50 | <3 | NA | NA |
| MLSW102 | 6/22/00 | µg/L | NA | NA | NA | NA | NA | NA | <50 | <3 | NA | NA |
| MLSW100R | 8/31/00 | µg/L | NA | NA | NA | NA | NA | NA | <10 | NA | NA | NA |
| MLSW101R | 8/31/00 | µg/L | NA | NA | NA | NA | NA | NA | <10 | NA | NA | NA |
| MLSW102R | 8/31/00 | µg/L | NA | NA | NA | NA | NA | NA | <10 | NA | NA | NA |

# TABLE B-95
## SUMMARY OF INORGANIC ANALYTICAL RESULTS FOR SURFACE WATER SAMPLES COLLECTED AT MOUNTAIN LAKE
Presidio of San Francisco, California

| Sample | Date | Units | Mercury, Dissolved | Molybdenum, Total | Molybdenum, Dissolved | Nickel, Total | Nickel, Dissolved | Selenium, Total | Selenium, Dissolved | Silver, Total | Silver, Dissolved |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MLSW01 | 10/29/90 | µg/L | NA | NA | NA | <32.1 | NA | <2.53 | NA | <10 | NA |
| | 4/17/92 | µg/L | NA | NA | NA | <23.3 | NA | <2.54 | NA | <10 | NA |
| | 4/17/92 | µg/L | NA | NA | NA | NA | <23.3 | NA | <2.54 | NA | <10 |
| MLSW100 | 6/22/00 | µg/L | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| MLSW101 | 6/22/00 | µg/L | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| MLSW102 | 6/22/00 | µg/L | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| MLSW100R | 8/31/00 | µg/L | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| MLSW101R | 8/31/00 | µg/L | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| MLSW102R | 8/31/00 | µg/L | NA | NA | NA | NA | NA | NA | NA | NA | NA |

# TABLE B-95
# SUMMARY OF INORGANIC ANALYTICAL RESULTS FOR SURFACE WATER SAMPLES COLLECTED AT MOUNTAIN LAKE

Presidio of San Francisco, California

| Sample | Date | Units | Thallium, Total | Thallium, Dissolved | Vanadium, Total | Vanadium, Dissolved | Zinc, Total | Zinc, Dissolved |
|---|---|---|---|---|---|---|---|---|
| MLSW01 | 10/29/90 | µg/L | <125 | NA | <27.6 | NA | <18 | NA |
| | 4/17/92 | µg/L | <4.14 | NA | **13** | NA | <20 | NA |
| | 4/17/92 | µg/L | NA | <4.14 | NA | **13** | <20 | NA |
| MLSW100 | 6/22/00 | µg/L | NA | NA | NA | NA | NA | NA |
| MLSW101 | 6/22/00 | µg/L | NA | NA | NA | NA | NA | NA |
| MLSW102 | 6/22/00 | µg/L | NA | NA | NA | NA | NA | NA |
| MLSW100R | 8/31/00 | µg/L | NA | NA | NA | NA | NA | NA |
| MLSW101R | 8/31/00 | µg/L | NA | NA | NA | NA | NA | NA |
| MLSW102R | 8/31/00 | µg/L | NA | NA | NA | NA | NA | NA |

**Notes:**

(a) NA = Not Analyzed or Rejected Data.

# TABLE B-96
## SUMMARY OF ORGANIC COMPOUND ANALYTICAL RESULTS FOR SURFACE WATER SAMPLES COLLECTED AT MOUNTAIN LAKE (a)

Presidio of San Francisco, California

| Sample | Date | Units | Heptachlor | Diesel Range Petroleum Hydrocarbons | Total Petroleum Hydrocarbons (TPH) |
|---|---|---|---|---|---|
| MLSW01 | 10/29/1990 | µg/L | **0.009** | NA (b) | NA |
| | 12/18/1990 | µg/L | NA | NA | NA |
| | 4/17/1992 | µg/L | **0.042** (c) | NA | **1,040** |
| | 4/17/1992 | µg/L | <0.042 | NA | NA |
| MLSW02 | 1/4/1995 | µg/L | NA | **60** | NA |
| MLSW03 | 1/4/1995 | µg/L | NA | <50 | NA |
| MLSW04 | 1/4/1995 | µg/L | NA | <50 | NA |
| MLSW05 | 1/4/1995 | µg/L | NA | **51** | NA |
| MLSW100 | 6/22/2000 | µg/L | <0.1 | NA | NA |
| MLSW101 | 6/22/2000 | µg/L | <0.1 | NA | NA |
| MLSW102 | 6/22/2000 | µg/L | <0.1 | NA | NA |
| MLSW100R | 8/31/2000 | µg/L | <0.009 | NA | NA |
| MLSW101R | 8/31/2000 | µg/L | <0.009 | NA | NA |
| MLSW102R | 8/31/2000 | µg/L | <0.009 | NA | NA |

**Notes:**

(a) Only compounds detected are shown in this table.
(b) NA = Not Analyzed or Rejected Data.
(c) This sample was filtered prior to analysis.

# Appendix B

Administrative Record List

# Table B-1: Administrative Record List

## Mountain Lake Remedial Action Plan

| Date | Author | Recipient | Title of Document |
|---|---|---|---|
| March-2012 | Kennedy/Jenks | Trust | Draft Feasibility Study/Remedial Action Plan, Mountain Lake, Presidio of San Francisco, California |
| March-2012 | Bay Area Air Quality Management District (BAAQMD) | Public | Air Quality Standards and Attainment Status |
| February-2012 | Geosytec Consultants | Trust | Remedial Investigation Summary Report, Barnard Avenue Protected Range (BAPR), Presidio of San Francisco, California |
| January-2012 | California Historical Resources Information System (CHRIS) | Department of Toxic Substances Control (DTSC) | Record Search Results for the Proposed Mountain Lake Project/Remedial Action Plan |
| January-2012 | Presidio Trust (Trust) Archeology Lab | Trust Remediation | Archeological Management Assessment, Mountain Lake Remediation |
| January-2012 | Caltrans | Trust | Letter addressing dry excavation at Mountain Lake |
| January-2012 | Kennedy/Jenks | Trust | Letter Report - Sediment Sampling at Mountain Lake |
| December-2011 | Native American Heritage Commission (NAHC) | DTSC | Proposed San Francisco Mountain Lake Project, San Francisco County |
| October-2011 | URS Corporation | Trust | Remedial Investigation Summary and Risk Evaluation, Mountain Lake, Presidio of San Francisco, California |
| August-2011 | MACTEC, Inc. | Trust | Draft Revised Remedial Investigation Report, Baker Beach Disturbed Area 1A, Presidio of San Francisco, California |
| July-2011 | City and County of San Francisco Planning Department | Public | Draft Environmental Impact Report: The 34th America's Cup and James R Herman Cruise Terminal and Northeast Wharf Plaza |
| July-2011 | MACTEC, Inc. | Trust | Field Sampling Plan, Data Gaps Investigation, Baker Beach Disturbed Area 2, Presidio of San Francisco, California |
| January-2011 | State of California, The Natural Resources Agency, California Department of Fish and Game, Biogeographic Data Branch (CDFG) | Public | California Natural Diversity Database, Special Animals (898 taxa) |

# Table B-1: Administrative Record List

## Mountain Lake Remedial Action Plan

| Date | Author | Recipient | Title of Document |
|---|---|---|---|
| 2011 | U.S. Office of Management and Budget | Federal Agencies | Circular No. A94 ,Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs |
| November-2010 | Trust | Public | Final Supplemental Environmental Impact Statement, Presidio Trust Management Plan, Main Post Update |
| May-2011 | BAAQMD | Public | California Environmental Quality Act, Air Quality Guidelines |
| May-2010 | USEPA | Public | ProUCL Version 4.1 User Guide (Draft). Office of Research and Development. EPA/600/R-07/041 |
| May-2010 | Blankinship & Assoc. | Trust | Summary of Stormwater Sampling and Analysis 1996-2010, Presidio Golf Course, San Francisco, California |
| December-2009 | Department of Toxic Substances Control (DTSC) | Public | Interim Advisory for Green Remediation |
| July-2009 | DTSC | State of California Department of Transportation (Caltrans) | Variance V09HQSCD006 (regarding lead-contaminated soil) |
| March-2009 | Climate Action Team (CAT) | Public | Draft Biennial Report |
| February-2009 | Erler & Kalinowski, Inc. (EKI) | Trust | Final Remedial Action Plan for Landfills 8 and 10, PHSH Fill Site, and Four Small Arms Firing Ranges, Presidio of San Francisco, California |
| 2009 | V. Magar et al. | Public | Technical Guide: Monitored Natural Recovery at Contaminated Sediment Sites, Environmental Security Technology Certification Program (ESTCP), Project ER-0622 |
| December-2008 | California Air Resources Board (CARB) | Public | Climate Change Scoping Plan, Framework for Change |
| September-2008 | U.S. Army Corps of Engineers (USACE) | Public | Technical Guidelines for Environmental Dredging of Contaminated Sediments |
| September-2008 | Federal Highway Administration (FHWA) and San Francisco County Transportation Authority (FSCTA) | Public | Final Environmental Impact Statement/Report and Section 4(f) Evaluation, South Access to the Golden Gate Bridge: Doyle Drive |
| January-2008 | San Francisco Bay Conservation and Development Commission (BCDC) | Public | San Francisco Bay Plan |

# Table B-1: Administrative Record List

## Mountain Lake Remedial Action Plan

| Date | Author | Recipient | Title of Document |
|---|---|---|---|
| November-2007 | CARB | Public | California 1990 Greenhouse Gas Emissions Level and 2020 Emissions Limit |
| June-2007 | Association of State and Territorial Solid Waste Management Officials (ASTSWMO) | Public | Guide to the Assessment and Remediation of State-Managed Sediment Sites. Sediments Focus Group |
| May-2007 | Intergovernmental Panel on Climate Change (IPCC) | Public | Climate Change 2007: Synthesis Report, the Fourth IPCC Assessment Report |
| September-2006 | C. Feierabend | Trust | Mountain Lake East Arm Cultural Landscape Assessment, Final Report, Presidio of San Francisco, California |
| March-2006 | Climate Action Team (CAT) | Public | Climate Action Team Report to Governor Schwarzenegger and the Legislature |
| March-2006 | USACE | Trust | Chemical Warfare Investigation Work Plan |
| April-2005 | Arnold Palmer Golf Management, Inc. and Presidio Trust (Trust) | Internal | Presidio Golf Course Integrated Pest Management Program |
| 2005 | USEPA | Public | Contaminated Sediment Remediation Guidance for Hazardous Waste Sites, OSWER Publication 9355.0-85 |
| November-2003 | Curtis & Tompkins, Ltd. | Treadwell & Rollo, Inc. | Letter regarding cadmium interferences in data reported for the Presidio Firing Ranges. Letter from Steven Stanley, C&T Project Manager to Dorinda Shipman, Treadwell & Rollo. |
| July-2003 | NPS and Trust | Public | Presidio Trails and Bikeways Master Plan and Environmental Assessment |
| April-2003 | NPS & URS Corporation | Public | Presidio Wetland Resources: U.S. Army Corps of Engineers Potential Jurisdictional Wetlands and U.S. Fish and Wildlife Service Wetland Habitat on the Presidio of San Francisco |
| March-2003 | Severn Trent Laboratories | EKI | Letter regarding cadmium interferences in data reported for the Landfill E project. Letter from Tod Granicher, STL Project Manager, to Michelle King, Erler & Kalinowski |
| March-2003 | EKI | Trust | Presidio Trust Revised Feasibility Study, Main Installation Sites, Presidio of San Francisco, California |
| 2003 | RWQCB | Public | Water Board Order No. R2-2003- 0080 (Rescinding Order No. 96-070), San Francisco Bay Region |

# Table B-1: Administrative Record List

## Mountain Lake Remedial Action Plan

| Date | Author | Recipient | Title of Document |
|---|---|---|---|
| October-2002 | EKI | Trust | Development of Presidio-Wide Cleanup Levels for Soil, Sediment, Groundwater, and Surface Water, Presidio of San Francisco, California |
| May-2002 | Trust | Public | Presidio Trust Management Plan (PTMP), Land Use Policies for Area B of the Presidio of San Francisco, California |
| May-2002 | Trust | Public | Presidio Trust Management Plan (PTMP), Final Environmental Impact Statement |
| March-2002 | Trust, NPS, Advisory Council on Historic Preservation (ACHP), and the State Historic Preservation Office (SHPO) | -- | Programmatic Agreement Among the Presidio Trust, National Park Service, the Advisory Council on Historic Preservation, and the California State Historic Preservation Officer Regarding the Presidio Trust Implementation Plan and Various Operation and Maintenance Activities for Area "B" of the Presidio of San Francisco, Golden Gate National Recreation Area |
| October-2001 | DTSC | Public | Information Advisory – Clean Imported Fill Material |
| August-2001 | USACE | Public | Subaqueous Cap Design: Selection of Bioturbation Profiles, Depths, and Rates, DOER Technical Notes Collection. ERDC TN-DOER-C21 |
| July-2001 | CARB | Public | Resolution 01-28 |
| July-2001 | URS Corporation | Trust | Mountain Lake Sediment Investigation, Final Report |
| June-2001 | USEPA | Trust | Comprehensive Five-Year Review Guidance. EPA 540-R-01-007 |
| June-2001 | Trust | Public | Community Relations Plan, Presidio of San Francisco, California |
| December-2001 | Trust and NPS | Public | Vegetation Management Plan and Environmental Assessment for the Presidio of San Francisco |
| April-2001 | Tetra Tech, Inc. | Trust | Presidio-Wide Quality Assurance Project Plan, Sampling and Analysis Plan, Revision 1 |
| 2001 | L. Reidy | UC Berkeley | Evidence of Environmental Change Over the Last 20 Years at Mountain Lake, in the Northern San Francisco Peninsula |
| November-2000 | Erler & Kalinowski, Inc. (EKI) | Trust | Draft Sampling Results for Selected Public Health Hospital Sites, Presidio of San Francisco, California |
| October-2000 | Trust, NPS, and Golden Gate National Parks Assoc. (GGNPA) | Public | Mountain Lake Enhancement Plan and Environmental Assessment |
| September-2000 | Trust | Public | Renewing Mountain Lake, A Summary of the Mountain Lake Enhancement Plan |
| July-2000 | USEPA | Public | A Guide to Developing and Documenting Cost Estimates During the Feasibility Study |

# Table B-1: Administrative Record List

## Mountain Lake Remedial Action Plan

| Date | Author | Recipient | Title of Document |
|---|---|---|---|
| June-2000 | E. Buisson and L. Castellini | Trust | Mountain Lake Wetlands Delineation, Presidio of San Francisco, California |
| August-1999 | DTSC | Trust & NPS | Consent Agreement Between the California Department of Toxic Substances Control, the Presidio Trust, and the U.S. Department of the Interior, National Park Service for the Remediation of Hazardous Substances at the Presidio of San Francisco |
| May-1999 | U.S. Army, Trust, and NPS | Public | Memorandum of Agreement Regarding Environmental Remediation at the Presidio of San Francisco |
| November-1998 | EKI | Trust | Report of Sediment Sampling at Mountain Lake, The Presidio Trust, San Francisco, California |
| June-1998 | USACE | Public | Guidance for Subaqueous Dredged Material Capping, Dredging Operations and Environmental Research Program Technical Report DOER-1 |
| August-1997 | USEPA | Public | Rules of Thumb for Superfund Remedy Selection. EPA 540/R-97/013 |
| August-1997 | USEPA | Public | Clarification of the Role of Applicable or Relevant and Appropriate Requirements in Establishing Preliminary Remediation Goals under CERCLA, OSWER Directive No. 9200.4-23 |
| May-1997 | Dames & Moore, Inc. | Army | Final Feasibility Study Report, Presidio Main Installation, Presidio of San Francisco |
| January-1997 | Dames & Moore, Inc. | Army | Final Remedial Investigation Report, Presidio Main Installation, Presidio of San Francisco |
| December-1995 | DTSC | Public | Guidance Document No. EO -95 -007 -PP, Remedial Action Plan (RAP) Policy |
| 1995 | City and County of San Francisco | Public | Transportation: An Element of the General Plan of the city and County of San Francisco |
| 1994 | USEPA | Public | ARCS Remediation Guidance Document, EPA 905-B94-003 |
| 1993 | NPS | Public | National Historic Landmark District Update, Presidio of San Francisco, San Francisco, California |
| May-1992 | USEPA | Public | Supplemental Guidance to RAGS: Calculating the Concentration Term. Office of Solid Waste and Emergency Response. Publication 9285.7-081. |
| February-1992 | USEPA | USEPA | Permit and Permit “Equivalency” Processes for CERCLA On-Site Response Actions. OSWER Directive 9355.7-03. |
| June-1991 | USACE | Public | Dredging Research technical Notes - design requirements for capping, US Army Engineer Waterways Experiment Station, DRP-5-03 |

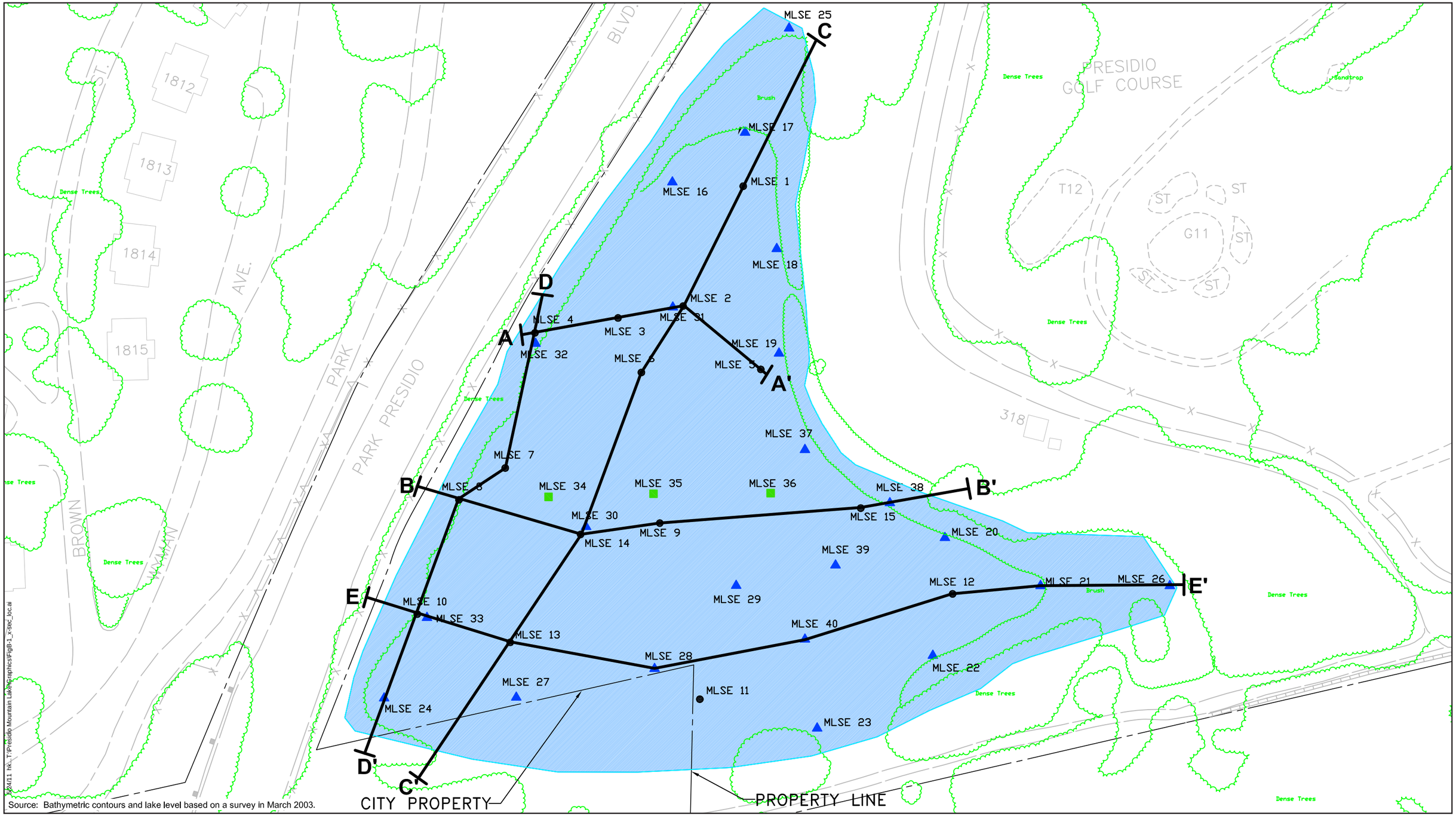
# Table B-1: Administrative Record List

## Mountain Lake Remedial Action Plan

| Date | Author | Recipient | Title of Document |
|---|---|---|---|
| April-1991 | USEPA | Public | Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions. OSWER Directive No. 9355.0-30 |
| 1990 | Ringden J. and M. Sitton, Environmental Photographic Interpretation Center, Environmental Monitoring Systems, USEPA | Public | Installation Assessment Army Base Closure Program, Presidio Military Reservation, San Francisco, CA |
| December-1991 | USEPA | Public | Risk Assessment Guidance for Superfund, Human Health Evaluation Manual, Part B. EPA/540/R-92/003 |
| December-1989 | USEPA | Public | Risk Assessment Guidance for Superfund, Human Health Evaluation Manual, Part A. EPA/540/1-89/002 |
| 1988 | USEPA | Public | Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA |
| 1974 | J. Schlocker | Public | Geology of the San Francisco North Quadrangle, CA |

# Appendix C

Mountain Lake Cross Sections
(Reproduced from URS 2011)




Source: Bathymetric contours and lake level based on a survey in March 2003.

LEGEND:

- FENCING
- MOUNTAIN LAKE
- MLSE 1 — 2001 SEDIMENT SAMPLING LOCATION
- MLSE 17 — 2004 CHEMICAL/PHYSICAL SAMPLING LOCATION
- MLSE 34 — 2004 ARCHAEOLOGICAL SAMPLING LOCATION
- BSS — BELOW SEDIMENT SURFACE

**NOTE:** SURVEY DATUM NGVD29/NAD88

0 40 80 160

Scale in Feet

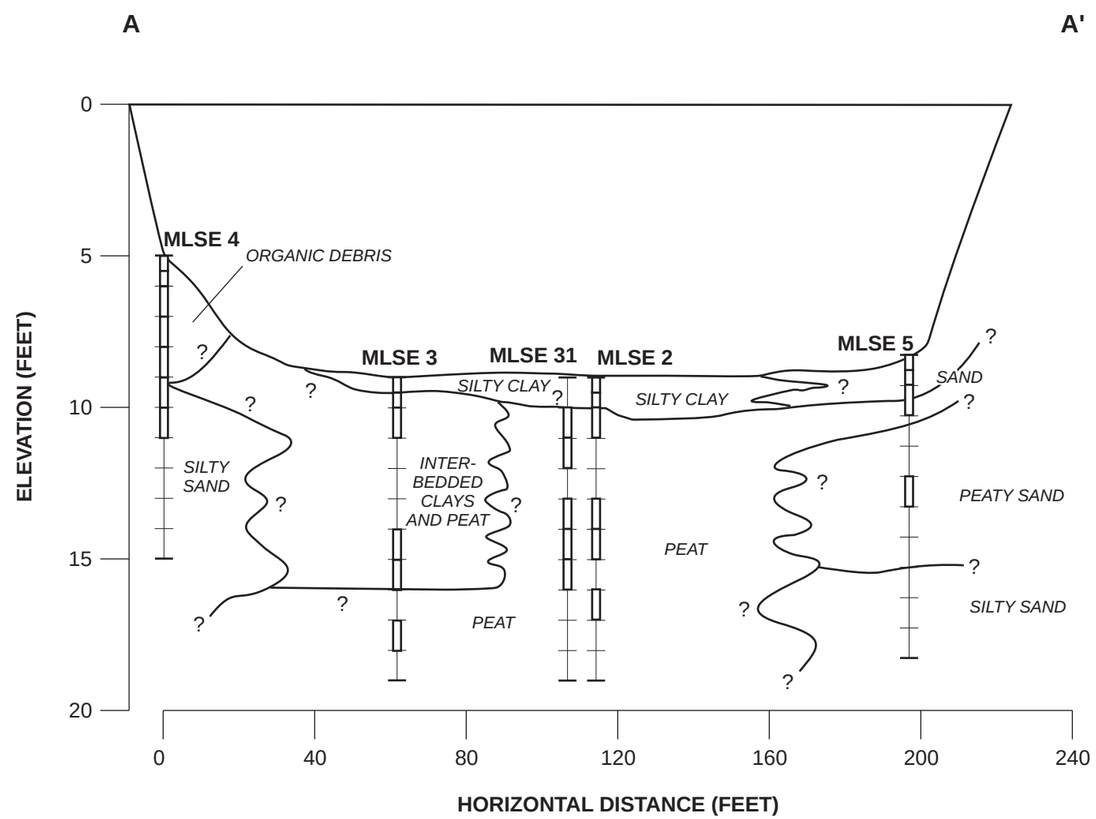
**CROSS-SECTION LOCATIONS**

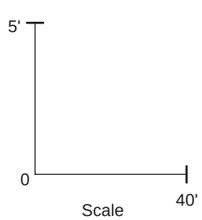
RI Summary & Risk Evaluation
Mountain Lake - Presidio Trust
San Francisco, California

June 2011
28067661

URS

**FIGURE B-1**




5/24/11 Nk...T:\Presidio Mountain Lake\Graphics\FigB-2_x-sec_aa.ai

**LEGEND**

[ ] Sample analyzed for chemical suite

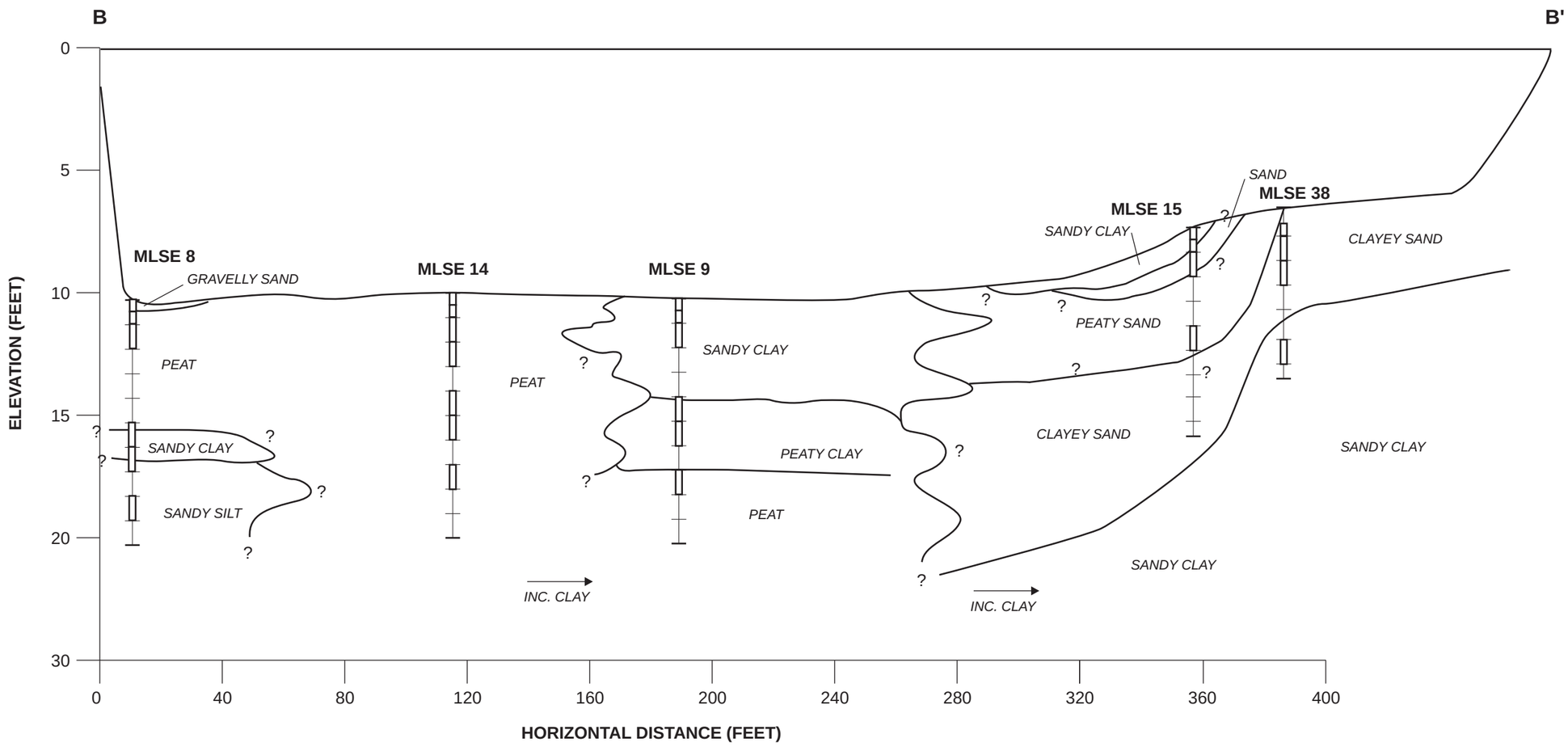
**CROSS-SECTION PROFILE A-A'**

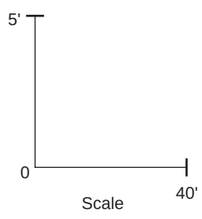
June 2011
28067661

RI Summary & Risk Evaluation
Mountain Lake - Presidio Trust
San Francisco, California

URS

**FIGURE B-2**




5/24/11 N:...T:\Presidio Mountain Lake\Graphics\FigB-3_x-sec_BB.ai

**LEGEND**

[] Sample analyzed for chemical suite

**CROSS-SECTION PROFILE B-B'**

RI Summary & Risk Evaluation
Mountain Lake - Presidio Trust
San Francisco, California

June 2011
28067661

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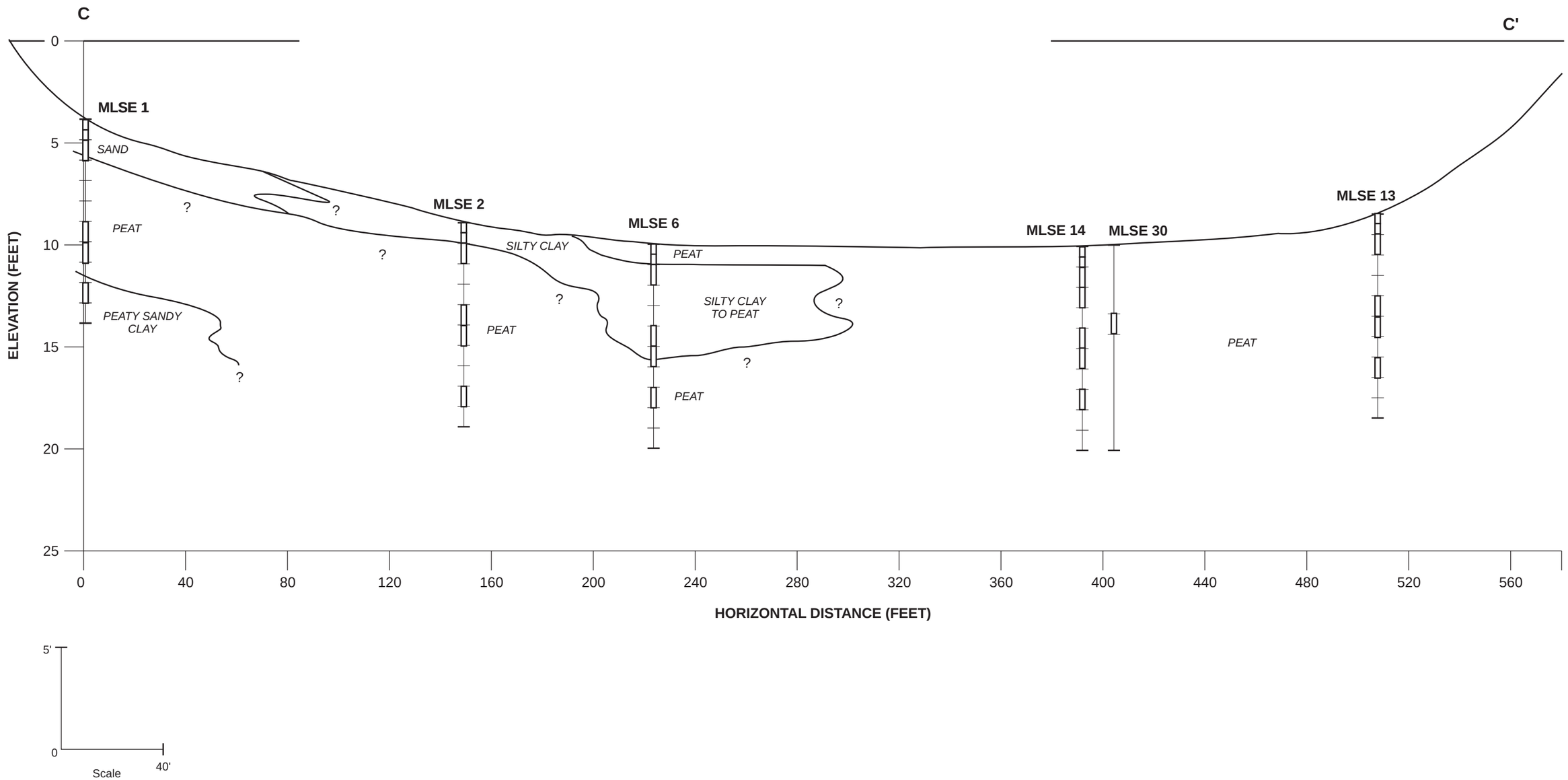
**FIGURE B-3**

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**LEGEND**

[] Sample analyzed for chemical suite

**CROSS-SECTION PROFILE C-C'**

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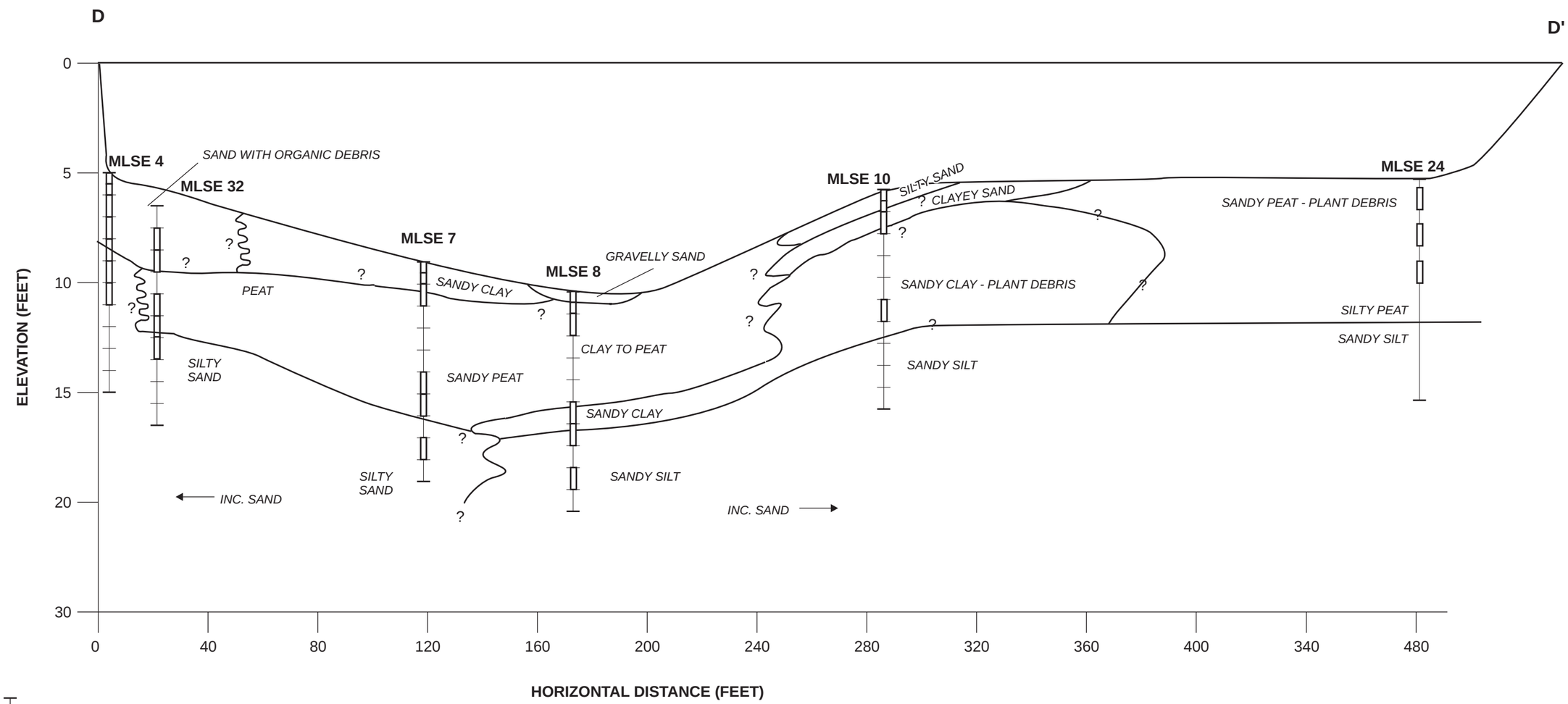
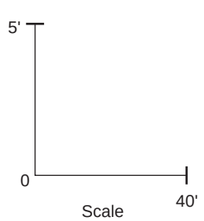
**FIGURE B-4**

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**LEGEND**

[ ] Sample analyzed for chemical suite

**CROSS-SECTION PROFILE D-D'**

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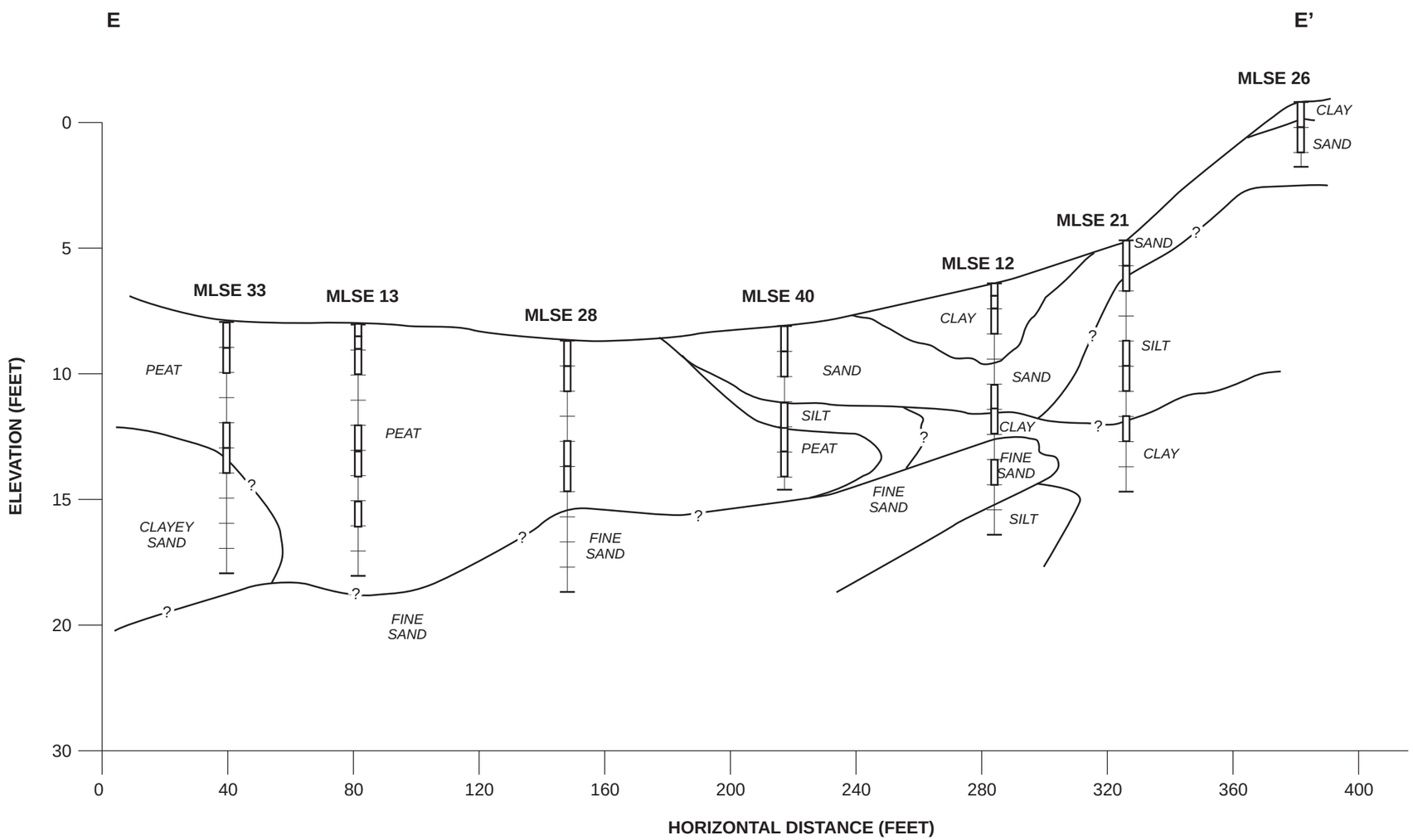
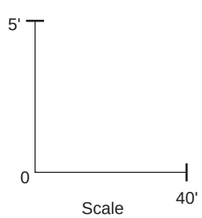
**FIGURE B-5**

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**LEGEND**

[] Sample analyzed for chemical suite

**CROSS-SECTION PROFILE E-E'**

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**FIGURE B-6**

# Appendix D

## 95 Percent UCL Calculations

# Appendix D: Calculation of 95 Percent Upper Confidence Limit on the Arithmetic Mean

This appendix presents the methods used to calculate the 95 percent upper confidence limit on the arithmetic mean (95 percent UCL) concentrations of the potential chemicals of concern (PCOCs) in Mountain Lake sediment in support of the Risk Evaluation in Section 3.5 of the Feasibility Study/Remedial Action Plan (FS/RAP). The 95 percent UCLs were calculated using ProUCL Version 4.1.00, which is the current version of the ProUCL statistical software available from the United States Environmental Protection Agency (USEPA). The ProUCL software is available for download from: http://www.epa.gov/osp/hstl/tsc/software.htm.

## D.1 Introduction

PCOCs in Mountain Lake sediment were identified in the *Remedial Investigation Summary and Risk Evaluation* (RI Summary; URS 2011). The PCOCs are the chemicals with a maximum detected concentration greater than the respective freshwater sediment criteria from the *Development of Presidio-Wide Cleanup Levels for Soil, Sediment, Groundwater and Surface Water* (EKI 2002). The PCOCs identified in the RI Summary are arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, vanadium, zinc, 4,4-DDD, alpha-BHC, beta-BHC, gamma-BHC (lindane), delta-BHC, alpha chlordane, gamma chlordane, and total petroleum hydrocarbons as diesel (TPHd) and motor oil (TPHmo).

While the use of the maximum detected concentration is appropriate for screening purposes, it is likely an overestimate of the concentration to which exposure would occur over time. Per USEPA guidance (1992), the 95 percent UCL of the arithmetic mean should be used to evaluate potential exposures to chemicals in environmental media. Therefore, the 95 percent UCL concentrations were calculated for the PCOCs.

## D.2 Data Used in Calculations

The analytical data that were used to calculate the 95 percent UCLs were obtained from Tables 2, 4, and 5 of the RI Summary (URS 2011; data tables are reproduced in Appendix A of this FS/RAP). The samples collected from the storm drain inlet are not representative of sediment concentrations in Mountain Lake and were excluded from the data set used in the calculations. The sediment core samples collected in 1998 represent data composited over multiple depths, including depths below the exposure interval for ecological receptors, and were also excluded from the data set used in the calculations (EKI 1998). Sediment samples collected from Mountain Lake beach area in December 2011 were also not included because this subset of samples was collected to assess human health risk and concentrations of PCOCs were found not to pose unacceptable risk to human health or the environment (Kennedy/Jenks 2012). All other sediment data in the tables were included in the data set used in the 95 percent UCL calculations.

Prior to calculating the 95 percent UCLs, the following criteria were used to determine the representative concentration for duplicate samples:

- If both samples were detected values, the two values were averaged, and the result was considered a detected value in the calculations.

- If one sample was a detected value and the other sample was a non-detect, the detected value was used in the calculations.
- If both samples were non-detects, the lower detection limit was used as a non-detect in the calculations.

### D.2.1 Cadmium Data

The concentrations of cadmium in the 2001 sampling event may be elevated due to analytical interference. These samples were analyzed for cadmium by Severn Trent Laboratories (STL) in Pleasanton, California. STL also analyzed cadmium in samples collected at Landfill E within the Presidio in 2002 with elevated cadmium concentrations. STL reviewed the cadmium data in those samples and concluded that the cadmium results reported could be elevated by as much as 1 to 2 milligrams per kilogram (mg/kg) as a result of iron interference (STL 2003). Curtis & Tompkins laboratory also had similar iron interference problems in cadmium analyses on samples collected from Presidio firing ranges (C&T 2003). In Mountain Lake sediment samples collected in close proximity to each other, the cadmium concentrations in samples collected in 2005 are consistently lower than in samples collected in 2001. For example, the cadmium concentration in MLSE2(1) is 4.1 mg/kg and the concentration in MLSE31(1) is 1.4 mg/kg. Similarly, the cadmium concentration in MLSE14(1) is 4.2 mg/kg and the concentration in MLSE30(1) is 1.8 mg/kg.

Due to the potential for analytical interference and uncertainty in the data quality, the cadmium data collected in 2001 were excluded from the data set used to calculate the 95 percent UCLs.

## D.3 Baseline Condition 95 Percent UCLs

To calculate the baseline condition 95 percent UCLs, all sediment data collected between 0 and 3 feet below sediment surface (bss), which represents the exposure interval for ecological receptors, were included in the data set. The data used in the baseline condition 95 percent UCL calculations, including the representative concentrations for duplicate samples, are presented in Table D-1.

The 95 percent UCLs were calculated in accordance with the ProUCL User Guide (USEPA 2010). The summary statistics, including the 95 percent UCL concentrations, are presented in Table D-2. The 95 percent UCL concentrations that are higher than the freshwater sediment cleanup levels for Mountain Lake, which are based on ecological freshwater sediment criteria, and background metals concentrations for the Colma formation (EKI 2002), are highlighted. These PCOCs are lead, nickel, and total petroleum hydrocarbons as motor oil (TPHmo).

The ProUCL output files are included as attachments.

## D.4 Post-Remediation 95 Percent UCLs

Post-remediation 95 percent UCLs were also calculated assuming sediment removal in the remedial action area defined in Section 3.6.3 of the main text. To calculate the post-remediation 95 percent UCLs, all sediment data below the remedial action area to a depth of 3.5 feet were included in the calculation. This data would represent the upper 3 feet of sediment that is considered bioavailable to ecological receptors following sediment removal. Data in the upper 3.5 feet of sediment after removal were included in the post-remediation data set because data do not exist at some locations for shallower depths and the inclusion of data to 3.5 feet provides a

more robust data set. The data used in the post-remediation 95 percent UCL calculations, including the representative concentrations for duplicate samples, are presented in Table D-3.

The summary statistics, including the 95 percent UCL concentrations, are presented in Table D-4. The 95 percent UCL concentrations that are higher than the freshwater sediment cleanup levels for Mountain Lake or background concentrations for Colma Formation are highlighted. Nickel has a 95 percent UCL concentration that is slightly above the cleanup level for Colma Formation but well below the cleanup level for the Serpentine Formation. All other PCOCs have 95 percent UCLs below freshwater sediment cleanup levels or background metal concentrations.

The ProUCL output files are included as attachments.

## D.5 References

Curtis & Tompkins, Ltd (C&T). 2003. Letter regarding cadmium interferences in data reported for the Presidio Firing Ranges. Letter from Steven Stanley, C&T Project Manager to Dorinda Shipman, Treadwell & Rollo. November 2003.

EKI. 2002. Development of Presidio-Wide Cleanup Levels for Soil, Sediment, Groundwater, and Surface Water, Presidio of San Francisco. October 2002. Revised 16 May 2006.

Erler & Kalinowski, Inc. (EKI). 1998. Report of Sediment Sampling at Mountain Lake. The Presidio Trust, San Francisco, California. November 1998.

Kennedy/Jenks Consultants. 2012. Letter Report – Sediment Sampling at Mountain Lake, The Presidio Trust, San Francisco, California. 11 January 2012.

Severn Trent Laboratories (STL). 2003. Letter regarding cadmium interferences in data reported for the Landfill E project. Letter from Tod Granicher, STL Project Manager, to Michelle King, Erler & Kalinowski. March 2003.

URS Corporation. 2011. Remedial Investigation Summary and Risk Evaluation, Mountain Lake, Presidio of San Francisco. Prepared for the Presidio Trust. October 2011.

USEPA. 1992. Supplemental Guidance to RAGS: Calculating the Concentration Term. Office of Solid Waste and Emergency Response. Publication 9285.7-081. May 1992.

USEPA. 2010. ProUCL Version 4.1 User Guide (Draft). Office of Research and Development. EPA/600/R-07/041. May 2010.

## Table D-1: Data Used in 95 Percent Upper Confidence Limit Calculations for Baseline Conditions[a]

| Source[b] | Sample Number[c] | As[d] mg/kg[e] | Cd[f] mg/kg | Cr[g] mg/kg | Cu[h] mg/kg | Pb[i] mg/kg | Hg[j] mg/kg | Ni[k] mg/kg | Se[l] mg/kg | V[n] mg/kg | Zn[m] mg/kg | 4,4'-DDD[o] µg/kg[p] | alpha-BHC[q] µg/kg | beta-BHC µg/kg | delta-BHC µg/kg | gamma-BHC (Lindane) µg/kg | alpha-Chlordane µg/kg | gamma-Chlordane µg/kg | Motor Oil mg/kg | Diesel mg/kg |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D&M[f], 1997 | MLSD01 | <2.50[s] | -[t] | 51.2 | 4.71 | 19.2 | <0.050 | 20.7 | - | 50.1 | 36.7 | ND[u] | ND | ND | ND | 3 | ND | ND | - | - |
| | MLSD02 | <2.50 | - | 73.9 | 6.09 | 25.3 | 0.069 | 21.6 | - | 44.8 | 24.1 | ND | ND | ND | ND | <1 | ND | ND | - | - |
| | MLSD03 | <2.50 | - | 50.1 | 5.16 | 34.4 | <0.050 | 19.1 | - | 36 | 21.5 | ND | ND | ND | ND | <1 | ND | ND | - | - |
| | MLSD04 | <2.50 | - | 74.3 | 6.85 | <7.44 | <0.050 | 21.3 | - | 66.3 | 21.2 | ND | ND | ND | ND | <1 | ND | ND | - | - |
| URS[v], 2001 | AVG MLSE1(0.5)[w] | <1.3 | (x) | 45 | 9.05 | 20.5 | <0.066 | 54.5 | <0.53 | 24.5 | 52 | <5.3 | <1.29 | <3.56 | 5.35 | <0.37 | <1.21 | <1.24 | <66 | 7.65 |
| | MLSE1(1) | <1.3 | (x) | 37 | 6.8 | 15 | <0.064 | 50 | <0.51 | 18 | 41 | - | - | - | - | - | - | - | <64 | 14 |
| | MLSE1(2) | - | - | - | - | - | - | - | - | - | - | <4.7 | <4.7 | <4.7 | 2.4 | <0.33 | <4.7 | <4.7 | - | - |
| | AVG MLSE1(2) | <1.2 | (x) | 56.5 | 10.6 | 11.6 | <0.059 | 56 | <0.47 | 32 | 41 | - | - | - | - | - | - | - | <59 | 9.1 |
| | MLSE2(0.5) | <7.2 | (x) | 150 | 130 | 1200 | 0.73 | 170 | <2.9 | 81 | 670 | - | - | - | - | - | - | - | 470 | 96 |
| | MLSE2(1) | <5.0 | (x) | 120 | 87 | 1000 | 0.55 | 150 | <2.0 | 70 | 530 | - | - | - | - | - | - | - | <250 | 52 |
| | MLSE2(2) | <3.9 | (x) | 110 | 47 | 290 | 0.28 | 140 | <1.5 | 68 | 220 | - | - | - | - | - | - | - | <190 | 21 |
| | MLSE3(0.5) | <4.4 | (x) | 92 | 67 | 630 | 0.39 | 120 | <1.8 | 68 | 320 | - | - | - | - | - | - | - | <220 | 31 |
| | MLSE3(1) | <3.6 | (x) | 130 | 44 | 140 | 0.24 | 160 | <1.4 | 82 | 150 | - | - | - | - | - | - | - | <180 | 6.9 |
| | MLSE3(2) | <3.5 | (x) | 150 | 38 | 65 | 0.2 | 200 | <1.4 | 90 | 97 | - | - | - | - | - | - | - | <170 | 5.4 |
| | MLSE4(0.5) | <1.2 | (x) | 27 | 22 | 100 | <0.062 | 30 | <0.49 | 14 | 190 | <5.59 | <4.65 | <12.8 | 25 | <3.49 | <4.35 | <4.45 | 320 | 45 |
| | AVG MLSE4(1) | <1.5 | (x) | 32 | 60 | 1465 | 0.12 | 28.5 | <0.59 | 19 | 185 | - | - | - | - | - | - | - | 1350 | 175 |
| | MLSE4(2) | <1.5 | (x) | 180 | 31 | 1200 | 0.12 | 24 | <0.58 | 18 | 99 | <15 | 4.7 | <3.78 | 8.3 | 4.1 | 6.2 | 4.6 | 1500 | 160 |
| | MLSE4(3) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 200 | 49 |
| | MLSE5(0.5) | <2.5 | (x) | 44 | 17 | 100 | 0.078 | 38 | <0.99 | 25 | 74 | 14 | <2.32 | 14 | 5.9 | 9.9 | <2.17 | <2.22 | <120 | 59 |
| | MLSE5(1) | <1.4 | (x) | 28 | 7 | 39 | <0.070 | 21 | <0.56 | 13 | 34 | - | - | - | - | - | - | - | <70 | 12 |
| | MLSE5(2) | <2.0 | (x) | 64 | 12 | 17 | <0.10 | 48 | <0.81 | 38 | 32 | <4.60 | 10 | 12 | 8.1 | 6.1 | <3.58 | <3.66 | <100 | 3 |
| | MLSE6(0.5) | <5.8 | (x) | 150 | 120 | 1000 | 0.72 | 150 | <2.3 | 86 | 530 | - | - | - | - | - | - | - | <290 | 42 |
| | MLSE6(1) | 2.1 | (x) | 130 | 68 | 590 | 0.73 | 140 | <1.8 | 81 | 320 | - | - | - | - | - | - | - | <220 | 34 |
| | MLSE6(2) | <4.0 | (x) | 130 | 48 | 180 | 0.28 | 160 | <1.6 | 79 | 190 | - | - | - | - | - | - | - | <200 | 12 |
| | MLSE7(0.5) | <1.8 | (x) | 35 | 17 | 150 | 0.097 | 46 | <0.73 | 23 | 92 | - | - | - | - | - | - | - | 110 | 20 |
| | MLSE7(1) | <1.9 | (x) | 59 | 9.6 | 36 | <0.097 | 55 | <0.78 | 32 | 43 | - | - | - | - | - | - | - | <97 | 5.8 |
| | MLSE7(2) | <3.4 | (x) | 140 | 23 | 12 | 0.074 | 140 | <1.4 | 97 | 48 | - | - | - | - | - | - | - | <170 | <3.4 |
| | MLSE8(0.5) | <3.6 | (x) | 150 | 26 | 7 | 0.091 | 120 | <1.4 | 97 | 45 | - | - | - | - | - | - | - | <180 | <3.6 |
| | AVG MLSE8(1) | <5.9 | (x) | 106.5 | 30 | 6 | 0.095 | 120 | <2.3 | 84 | 52 | - | - | - | - | - | - | - | - | - |
| | AVG MLSE8(2) | <7.0 | (x) | 96.5 | 30.5 | 6.1 | 0.053 | 120 | <2.8 | 72.5 | 55 | - | - | - | - | - | - | - | - | - |
| | MLSE8(1) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | <290 | <5.9 |
| | MLSE8(2) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | <370 | <7.3 |
| | MLSE9(0.5) | <4.7 | (x) | 170 | 88 | 510 | 0.52 | 190 | <1.9 | 97 | 360 | - | - | - | - | - | - | - | <230 | <4.7 |
| | MLSE9(1) | <4.5 | (x) | 160 | 75 | 290 | 0.44 | 190 | <1.8 | 90 | 270 | - | - | - | - | - | - | - | <230 | <4.5 |
| | MLSE9(2) | <3.6 | (x) | 180 | 46 | 94 | 0.4 | 230 | <1.5 | 97 | 190 | - | - | - | - | - | - | - | <180 | 3.8 |
| | MLSE10(0.5) | <1.2 | (x) | 30 | 13 | 23 | <0.062 | 31 | <0.50 | 22 | 32 | <12 | 3.5 | 5.9 | 3.8 | 4.2 | <1.09 | <1.12 | 96 | 15 |
| | MLSE10(1) | 13 | (x) | 36 | 64 | 690 | 0.23 | 35 | <0.72 | 25 | 200 | - | - | - | - | - | - | - | 1500 | 200 |
| | MLSE10(2) | <3.5 | (x) | 110 | 21 | 27 | 0.1 | 98 | <1.4 | 82 | 45 | <6.9 | 1.7 | <6.9 | <6.9 | 3.5 | 1.6 | <6.9 | <170 | <3.5 |
| | MLSE11(0.5) | <1.2 | (x) | 35 | 5.4 | 8.6 | <0.060 | 24 | <0.48 | 26 | 20 | - | - | - | - | - | - | - | <60 | <1.2 |
| | MLSE11(1) | <1.2 | (x) | 39 | 5.2 | 6.9 | <0.059 | 23 | <0.47 | 27 | 17 | - | - | - | - | - | - | - | <59 | <1.2 |
| | MLSE11(2) | <1.2 | (x) | 25 | 5.8 | 3.6 | <0.058 | 21 | <0.46 | 19 | 16 | - | - | - | - | - | - | - | <58 | <1.2 |
| | MLSE12(0.5) | <2.9 | (x) | 180 | 37 | 44 | 0.16 | 290 | <1.2 | 78 | 69 | - | - | - | - | - | - | - | <150 | <2.9 |
| | MLSE12(1) | <2.5 | (x) | 110 | 21 | 60 | 0.11 | 130 | <1.0 | 59 | 160 | - | - | - | - | - | - | - | <130 | <2.5 |
| | MLSE12(2) | <2.3 | (x) | 160 | 19 | 25 | 0.061 | 230 | <0.92 | 71 | 48 | - | - | - | - | - | - | - | <110 | <2.3 |
| | MLSE13(0.5) | <3.2 | (x) | 97 | 75 | 370 | 0.16 | 120 | <1.3 | 52 | 340 | - | - | - | - | - | - | - | <160 | 11 |
| | MLSE13(1) | <4.5 | (x) | 170 | 42 | 18 | 0.09 | 180 | <1.8 | 130 | 59 | - | - | - | - | - | - | - | <230 | 7.3 |
| | MLSE13(2) | <4.2 | (x) | 160 | 33 | 28 | 0.12 | 140 | <1.7 | 120 | 66 | - | - | - | - | - | - | - | <210 | <4.2 |
| | MLSE14(0.5) | <6.3 | (x) | 140 | 120 | 880 | 0.74 | 150 | <2.5 | 75 | 520 | - | - | - | - | - | - | - | <310 | 52 |
| | MLSE14(1) | 2.6 | (x) | 140 | 100 | 810 | 0.47 | 150 | <1.8 | 79 | 480 | - | - | - | - | - | - | - | <230 | 32 |
| | MLSE14(2) | <3.2 | (x) | 120 | 44 | 92 | 0.3 | 170 | <1.3 | 74 | 180 | - | - | - | - | - | - | - | 180 | 70 |
| | MLSE14(3) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | <200 | 13 |

## Table D-1: Data Used in 95 Percent Upper Confidence Limit Calculations for Baseline Conditions[a]

| Source[b] | Sample Number[c] | As[d] mg/kg[e] | Cd[f] mg/kg | Cr[g] mg/kg | Cu[h] mg/kg | Pb[i] mg/kg | Hg[j] mg/kg | Ni[k] mg/kg | Se[l] mg/kg | V[n] mg/kg | Zn[m] mg/kg | 4,4'-DDD[o] µg/kg[p] | alpha-BHC[q] µg/kg | beta-BHC µg/kg | delta-BHC µg/kg | gamma-BHC (Lindane) µg/kg | alpha-Chlordane µg/kg | gamma-Chlordane µg/kg | Motor Oil mg/kg | Diesel mg/kg |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| URS, 2001 (cont'd) | MLSE15(0.5) | <1.9 | (x) | 60 | 9.9 | 27 | 0.11 | 35 | <0.76 | 36 | 30 | <2.16 | 6.1 | <4.94 | 11 | 5.3 | <1.68 | <1.72 | <95 | 7 |
| | MLSE15(1) | 1.3 | (x) | 47 | 6.9 | 32 | <0.079 | 47 | <0.63 | 33 | 27 | - | - | - | - | - | - | - | <79 | 3.6 |
| | MLSE15(2) | <1.3 | (x) | 32 | 2.7 | 3.7 | <0.063 | 13 | <0.50 | 19 | 11 | 1.4 | 0.68 | 2.3 | 1.4 | 1.1 | 0.74 | <2.5 | <63 | <1.3 |
| URS, 2005 | MLSE16(1) | 4.7 | <1.1 | 57 | 13 | 120 | 0.53 | 52 | 1.4 | 37 | 70 | <17 | <8.6 | <8.6 | <8.6 | <8.6 | <8.6 | <8.6 | - | - |
| | MLSE16(2) | 11 | <1.5 | 89 | 12 | 7.5 | <0.12 | 77 | 3.6 | 68 | 45 | <22 | <11 | <11 | <11 | <11 | <11 | <11 | - | - |
| | MLSE17(1) | 4.7 | 0.8 | 57 | 24 | 440 | 0.13 | 62 | 0.83 | 33 | 210 | <8.9 | <4.6 | <4.6 | <4.6 | <4.6 | <4.6 | 10 | - | - |
| | MLSE17(2) | 2.5 | <0.27 | 55 | 5.5 | 9.3 | <0.022 | 68 | 0.35 | 27 | 43 | <4.1 | <2.1 | <2.1 | <2.1 | <2.1 | <2.1 | <2.1 | - | - |
| | MLSE18(1) | 0.54 | <0.28 | 29 | 1.5 | 11 | 0.024 | 12 | <0.28 | 16 | 12 | <4.3 | <2.2 | <2.2 | <2.2 | <2.2 | <2.2 | <2.2 | - | - |
| | MLSE18(2) | 2.4 | <0.27 | 59 | 8.2 | 2.4 | <0.023 | 33 | 0.52 | 46 | 24 | <4.2 | <2.2 | <2.2 | <2.2 | <2.2 | <2.2 | <2.2 | - | - |
| | AVG MLSE19(1.5) | 1.95 | <0.26 | 68.5 | 7.75 | 3 | <0.022 | 27 | 1.2 | 52 | 27.5 | <8.1 | <4.1 | <4.1 | <4.1 | <4.1 | <4.1 | <4.1 | - | - |
| | MLSE19(2.5) | 2 | <0.22 | 63 | 7.7 | 2.5 | <0.024 | 28 | 1.2 | 52 | 23 | <8.3 | <4.3 | <4.3 | <4.3 | <4.3 | <4.3 | <4.3 | - | - |
| | MLSE20(1) | 1.3 | <0.32 | 120 | 14 | 28 | <0.025 | 140 | 1.9 | 53 | 43 | <4.5 | <2.3 | <2.3 | <2.3 | <2.3 | <2.3 | <2.3 | - | - |
| | MLSE20(2) | 2.7 | <0.58 | 140 | 13 | 10 | <0.058 | 90 | 2.3 | 77 | 47 | <8.1 | <4.2 | <4.2 | <4.2 | <4.2 | <4.2 | <4.2 | - | - |
| | MLSE21(1) | 11 | 2.7 | 280 | 140 | 1200 | 0.96 | 210 | 5.9 | 190 | 960 | <59 | <31 | <31 | <31 | <31 | <31 | 32 | - | - |
| | MLSE21(2) | 3.7 | <0.48 | 120 | 24 | 130 | 0.14 | 95 | 1.4 | 65 | 160 | <32 | <17 | <17 | <17 | <17 | <17 | <17 | - | - |
| | MLSE22(1) | 0.4 | <0.22 | 42 | 1.7 | 0.96 | <0.023 | 19 | 0.74 | 38 | 15 | <4 | <2 | <2 | <2 | <2 | <2 | <2 | - | - |
| | MLSE22(2) | 0.57 | <0.29 | 50 | 2.2 | 1.1 | <0.023 | 20 | 0.73 | 41 | 16 | <3.9 | <2 | <2 | <2 | <2 | <2 | <2 | - | - |
| | MLSE23(1) | 0.83 | <0.25 | 53 | 2.6 | 2.5 | <0.022 | 21 | <0.25 | 37 | 20 | <3.8 | <2 | <2 | <2 | <2 | <2 | <2 | - | - |
| | MLSE23(2) | 0.8 | <0.25 | 41 | 2.5 | 1.5 | <0.021 | 23 | <0.25 | 29 | 17 | <3.9 | <2 | <2 | <2 | <2 | <2 | <2 | - | - |
| | MLSE24(1) | 2.4 | <0.39 | 48 | 12 | 82 | 0.05 | 29 | <0.39 | 36 | 50 | <5.8 | <3 | <3 | <3 | <3 | <3 | <3 | - | - |
| | AVG MLSE24(2.5) | 2.4 | <0.31 | 61.5 | 8.95 | 27 | 0.078 | 57.5 | <0.31 | 40 | 51.5 | <4.4 | <2.2 | <2.2 | <2.2 | <2.2 | <2.2 | <2.2 | - | - |
| | MLSE25(1) | 0.74 | <0.43 | 29 | 6.4 | 36 | <0.048 | 16 | <0.43 | 19 | 34 | <6.6 | <3.4 | <3.4 | <3.4 | <3.4 | <3.4 | <3.4 | - | - |
| | MLSE26(1) | 4.4 | <1.1 | 66 | 32 | 91 | <0.097 | 84 | <1.1 | 62 | 100 | <15 | <7.7 | <7.7 | <7.7 | <7.7 | 91 | 16 | - | - |
| | MLSE26(2) | 5.9 | <0.61 | 91 | 22 | 71 | 0.088 | 74 | <0.61 | 71 | 88 | <44 | <23 | <23 | <23 | <23 | <23 | <23 | - | - |
| | AVG MLSE27(1) | 1.3 | <0.27 | 49 | 3.3 | 23 | 0.02 | 28 | <0.27 | 30.5 | 33.5 | <3.8 | <2 | <2 | <2 | <2 | <2 | <2 | - | - |
| | MLSE27(2) | 7.1 | <0.9 | 230 | 23 | 57 | 0.18 | 260 | <0.9 | 120 | 99 | <12 | <6.3 | <6.3 | <6.3 | <6.3 | <6.3 | <6.3 | - | - |
| | MLSE28(1) | 3.2 | <0.42 | 76 | 21 | 140 | 0.13 | 66 | <0.42 | 46 | 150 | <6.2 | <3.2 | <3.2 | <3.2 | <3.2 | <3.2 | <3.2 | - | - |
| | MLSE28(2) | 3.6 | <0.43 | 94 | 11 | 35 | 0.056 | 78 | <0.43 | 54 | 57 | <6.6 | <3.4 | <3.4 | <3.4 | <3.4 | <3.4 | <3.4 | - | - |
| | MLSE29(1) | - | 2 | - | - | 660 | - | - | - | - | - | <19 | <9.9 | <9.9 | <9.9 | <9.9 | <9.9 | <9.9 | - | - |
| | MLSE29(2) | - | 1.6 | - | - | - | - | - | - | - | - | <16 | <8 | <8 | <8 | <8 | <8 | <8 | - | - |
| | AVG MLSE30(1) | - | 1.95 | - | - | - | - | - | - | - | - | <18 | <9.4 | <9.4 | <9.4 | <9.4 | <9.4 | <9.4 | - | - |
| | MLSE30(2) | - | 1.3 | - | - | - | - | - | - | - | - | <15 | <7.7 | <7.7 | <7.7 | <7.7 | <7.7 | <7.7 | - | - |
| | AVG MLSE31(1) | - | 1.4 | - | - | - | - | - | - | - | - | <18 | <9.3 | <9.3 | <9.3 | <9.3 | <9.3 | <9.3 | - | - |
| | MLSE31(2)MS/MSD | - | 0.74 | - | - | 120 | - | - | - | - | - | <3.2 | <1.7 | <1.7 | <1.7 | <1.7 | <1.7 | <1.7 | - | - |
| | AVG MLSE32(1) | - | 0.38 | - | - | - | - | - | - | - | - | 5.2 | <2.3 | <2.3 | <2.3 | <2.3 | <2.3 | <2.3 | - | - |
| | MLSE32(2)MS/MSD | - | <0.23 | - | - | - | - | - | - | - | - | <3.9 | <2 | <2 | <2 | <2 | <2 | <2 | - | - |
| | AVG MLSE33(1) | - | <0.27 | - | - | - | - | - | - | - | - | 6 | <2.2 | <2.2 | <2.2 | <2.2 | <2.2 | <2.2 | - | - |
| | MLSE33(2) | - | <1.7 | - | - | - | - | - | - | - | - | <23 | <12 | <12 | <12 | <12 | <12 | <12 | - | - |
| | MLSE37(1) | 1.4 | <0.3 | 40 | 4.8 | 17 | <0.023 | 45 | <0.3 | 17 | 27 | <4.1 | <2.1 | <2.1 | <2.1 | <2.1 | 2.7 | <2.1 | - | - |
| | MLSE37(2) | 6.3 | <0.67 | 170 | 24 | 59 | 0.17 | 210 | <0.67 | 94 | 75 | <9.5 | <4.9 | <4.9 | <4.9 | <4.9 | <4.9 | <4.9 | - | - |
| | AVG MLSE38(1) | 1.75 | <0.27 | 60 | 5 | 19.5 | <0.025 | 27.5 | <0.27 | 37 | 70 | <4.2 | <2.2 | <2.2 | <2.2 | <2.2 | <2.2 | <2.2 | - | - |
| | AVG MLSE38(2) | 2.65 | <0.26 | 96.5 | 7.95 | 3 | 0.01 | 43.5 | <0.26 | 53 | 52.5 | <4 | <2.1 | <2.1 | <2.1 | <2.1 | <2.1 | <2.1 | - | - |
| | MLSE39(1) | - | 1.2 | - | - | 280 | - | - | - | - | - | 34 | <7.1 | <7.1 | <7.1 | <7.1 | <7.1 | <7.1 | - | - |
| | MLSE39(2) | - | <1.3 | - | - | - | - | - | - | - | - | <16 | <8.1 | <8.1 | <8.1 | <8.1 | <8.1 | 13 | - | - |
| | MLSE40(1) | - | <0.24 | - | - | 17 | - | - | - | - | - | <3.9 | <2 | <2 | <2 | <2 | <2 | <2 | - | - |
| | MLSE40(2) | - | <0.25 | - | - | - | - | - | - | - | - | <3.8 | <2 | <2 | <2 | <2 | <2 | <2 | - | - |

## Table D-1: Data Used in 95 Percent Upper Confidence Limit Calculations for Baseline Conditions[a]

**Notes:**

(a) Data are from Tables 2, 4, and 5 of the RI Summary (URS 2011). Samples collected from 0 to 3 feet below sediment surface are included in the baseline conditions data set.
(b) Source of data as referenced in the RI Summary (URS 2011).
(c) The sample number. The parenthetical indicates sample depth.
(d) As = arsenic
(e) mg/kg = milligrams per kilogram
(f) Cd = cadmium
(g) Cr = chromium
(h) Cu = copper
(i) Pb = lead
(j) Hg = mercury
(k) Ni = nickel
(l) Se = selenium
(m) Zn = zinc
(n) V = vanadium
(o) DDD = dichlorodiphenyldichloroethane
(p) µg/kg = micrograms per kilogram
(q) BHC = Benzene hexachloride
(r) D&M = Dames and Moore.
(s) < = No detection above the stated laboratory detection limit.
(t) "-"= No data provided.
(u) ND = Non-detect with no stated detection limit. Results were not used in the 95 percent upper confidence limit calculations.
(v) URS = URS Corporation.
(w) AVG = Average of duplicate samples: if both values detect than it is an average of the results, if it there is one detect and one non-detect it is the value of the detect, and if they are both non-detects then it is the lower of the two non-detects.
(x) Due to potential analytical interference, cadmium data from the 2001 sampling event were not included in the calculations.

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Table D-2: Statistical Evaluation of Baseline Sediment Samples (0 to 3 feet below surface) from Mountain Lake[a]

| | | | | Summary Statistics[b] | | Detected Values[b] | | Goodness-of-Fit Test | Upper Confidence Limit (UCL) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Analyte | Unit | No. of Samples | Detection Rate | Arithmetic Mean[c] | Standard Deviation | Minimum Detected | Maximum Detected | Distribution | Method of UCL Calculation[d] | Assessed 95% UCL[e] | Cleanup Level[f] |
| Arsenic | mg/kg | 78 | 42% | 3.43 | 3.15 | 0.40 | 13 | Gamma | 95% KM (t) UCL | 2.6 | 19 |
| Cadmium[g] | mg/kg | 43 | 23% | 1.41 | 0.69 | 0.38 | 3 | Normal | 95% KM (t) UCL | 0.8 | 1.1 |
| Chromium | mg/kg | 78 | 100% | 91.6 | 54.3 | 25 | 280 | - [i] | 95% Chebyshev (Mean, Sd) UCL | 118 | 140 |
| Copper | mg/kg | 78 | 100% | 29.2 | 32.5 | 1.5 | 140 | Lognormal | Use 95% H-UCL | 42 | 114 |
| Lead | mg/kg | 82 | 99% | 199 | 343 | 0.96 | 1465 | Lognormal | 97.5% KM (Chebyshev) UCL | 432 | 82 |
| Mercury | mg/kg | 78 | 60% | 0.245 | 0.235 | 0.010 | 0.96 | Lognormal | 95% KM (Chebyshev) UCL | 0.26 | 0.62 |
| Nickel | mg/kg | 78 | 100% | 88.7 | 69.6 | 12 | 290 | - | 95% Chebyshev (Mean, Sd) UCL | 123 | 110 |
| Selenium | mg/kg | 74 | 18% | 1.70 | 1.53 | 0.35 | 6 | Gamma | 95% KM (t) UCL | 0.80 | 1.6 |
| Vanadium | mg/kg | 78 | 100% | 55.9 | 32.4 | 13 | 190 | Gamma | 95% Approximate Gamma UCL | 62 | 90 |
| Zinc | mg/kg | 78 | 100% | 127.9 | 170 | 11 | 960 | - | 95% Chebyshev (Mean, Sd) UCL | 212 | 230 |
| 4.4'-DDD | mg/kg | 54 | 11% | 0.013 | 0.012 | 0.001 | 0.034 | Normal | 95% KM (t) UCL | 0.0044 | 0.016 |
| Alpha-BHC | mg/kg | 54 | 13% | 0.0050 | 0.0033 | 0.00068 | 0.010 | Normal | 95% KM (t) UCL | 0.0022 | 0.0080 |
| Alpha-Chlordane | mg/kg | 54 | 11% | 0.019 | 0.036 | 0.00074 | 0.091 | Gamma | 95% KM (t) UCL | 0.0061 | 0.010 |
| Beta-BHC | mg/kg | 54 | 9% | 0.0094 | 0.0051 | 0.0023 | 0.014 | Normal | 95% KM (t) UCL | 0.0037 | 0.013 |
| Delta-BHC | mg/kg | 54 | 19% | 0.0079 | 0.0067 | 0.0014 | 0.025 | Gamma | 95% KM (t) UCL | 0.0038 | 0.0075 |
| Gamma-BHC(Lindane) | mg/kg | 58 | 16% | 0.0045 | 0.0025 | 0.0011 | 0.010 | Normal | 95% KM (t) UCL | 0.0023 | 0.0030 |
| Gamma-Chlordane | mg/kg | 54 | 11% | 0.014 | 0.009 | 0.0046 | 0.032 | Normal | 95% KM (t) UCL | 0.0068 | 0.010 |
| Motor Oil | mg/kg | 48 | 21% | 587 | 607 | 96 | 1500 | Gamma | 95% KM (t) UCL | 286 | 144 |
| Diesel | mg/kg | 48 | 69% | 43.0 | 53.2 | 3 | 200 | Lognormal | 95% KM (Chebyshev) UCL | 61 | 144 |

**Notes:**

a) Values calculated using ProUCL Version 4.1.00 (http://www.epa.gov/osp/hstl/tsc/software.htm)
b) Summary statistics and detected values were determined following data reduction
c) Arithmetic mean is calculated only for detects
d) Method is the statistic recommended by ProUCL based on the dataset for the given chemical
e) Nondetects are included in the 95% UCL in accordance with the ProUCL methods
f) Freshwater Sediment Cleanup Level from the Development of Presidio-Wide Cleanup Levels for Soil, Sediment, Groundwater, and Surface Water (EKI 2002)
g) Due to potential analytical interference in the 2001 dataset, only 2005 data were evaluated for cadmium
h) Highlighted cells are 95% UCLs that exceed the cleanup level
i) Data do not follow a discernible distribution

**Abbreviations:**

mg/kg - milligrams per kilogram
µg/kg - micrograms per kilogram
95% UCL - 95 percent upper confidence limit

## Table D-3: Data Used in Post-Remediation 95 Percent Upper Confidence Limit Calculations[a]

| Source[b] | Sample Number[c] | As[d] mg/kg[e] | Cd[f] mg/kg | Cr[g] mg/kg | Cu[h] mg/kg | Pb[i] mg/kg | Hg[j] mg/kg | Ni[k] mg/kg | Se[l] mg/kg | V[n] mg/kg | Zn[m] mg/kg | 4,4'-DDD[o] µg/kg[p] | alpha-BHC[q] µg/kg | beta-BHC µg/kg | delta-BHC µg/kg | gamma-BHC (Lindane) µg/kg | alpha-Chlordane µg/kg | gamma-Chlordane µg/kg | Motor Oil mg/kg | Diesel mg/kg |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D&M[f], 1997 | MLSD01 | <2.50[s] | -[t] | 51.2 | 4.71 | 19.2 | <0.050 | 20.7 | - | 50.1 | 36.7 | ND[u] | ND | ND | ND | 3 | ND | ND | - | - |
| | MLSD02 | <2.50 | - | 73.9 | 6.09 | 25.3 | 0.069 | 21.6 | - | 44.8 | 24.1 | ND | ND | ND | ND | <1 | ND | ND | - | - |
| URS[v], 2001 | MLSE1(6) | <3.9 | (w) | 140 | 31 | 32 | <0.20 | 150 | <1.6 | 100 | 74 | - | - | - | - | - | - | - | - | - |
| | MLSE2(8) | <6.5 | (w) | 110 | 18 | <6.5 | <0.32 | 120 | <2.6 | 78 | 55 | - | - | - | - | - | - | - | - | - |
| | MLSE3(7) | <6.9 | (w) | 190 | 32 | 7.4 | <0.35 | 210 | <2.8 | 140 | 100 | - | - | - | - | - | - | - | - | - |
| | MLSE3(9) | <6.2 | (w) | 110 | 19 | <6.2 | <0.31 | 120 | <2.5 | 76 | 61 | - | - | - | - | - | - | - | - | - |
| | MLSE5(5) | <1.5 | (w) | 50 | 10 | 2.9 | <0.076 | 20 | <0.61 | 39 | 23 | - | - | - | - | - | - | - | - | - |
| | MLSE6(8) | <3.5 | (w) | 190 | 28 | 36 | <0.17 | 200 | <1.4 | 110 | 68 | - | - | - | - | - | - | - | - | - |
| | MLSE7(6) | <6.1 | (w) | 93 | 17 | 3.3 | <0.30 | 96 | <2.4 | 73 | 48 | - | - | - | - | - | - | - | - | - |
| | MLSE8(6) | 2.1 | (w) | 160 | 30 | 11 | 0.094 | 81 | <1.5 | 120 | 79 | - | - | - | - | - | - | - | - | - |
| | MLSE9(5) | <3.4 | (w) | 200 | 40 | 67 | 0.2 | 280 | <1.4 | 93 | 110 | - | - | - | - | - | - | - | - | - |
| | MLSE9(6) | <7.0 | (w) | 100 | 23 | 30 | <0.35 | 120 | <2.8 | 76 | 75 | - | - | - | - | - | - | - | - | - |
| | MLSE10(6) | <1.4 | (w) | 50 | 11 | 3 | <0.069 | 27 | <0.55 | 36 | 24 | - | - | - | - | - | - | - | - | - |
| | MLSE11(0.5) | <1.2 | (w) | 35 | 5.4 | 8.6 | <0.060 | 24 | <0.48 | 26 | 20 | - | - | - | - | - | - | - | <60 | <1.2 |
| | MLSE11(1) | <1.2 | (w) | 39 | 5.2 | 6.9 | <0.059 | 23 | <0.47 | 27 | 17 | - | - | - | - | - | - | - | <59 | <1.2 |
| | MLSE11(2) | <1.2 | (w) | 25 | 5.8 | 3.6 | <0.058 | 21 | <0.46 | 19 | 16 | - | - | - | - | - | - | - | <58 | <1.2 |
| | MLSE12(5) | <5.1 | (w) | 120 | 21 | 7.9 | <0.26 | 110 | <2.0 | 84 | 62 | - | - | - | - | - | - | - | - | - |
| | MLSE12(6) | <4.6 | (w) | 87 | 17 | 11 | <0.23 | 120 | <1.8 | 64 | 72 | - | - | - | - | - | - | - | - | - |
| | MLSE13(5) | <8.0 | (w) | 93 | 42 | 19 | 0.058 | 110 | <3.2 | 67 | 72 | - | - | - | - | - | - | - | - | - |
| | MLSE13(6) | <7.0 | (w) | 96 | 19 | <7.0 | <0.35 | 110 | <2.8 | 70 | 60 | - | - | - | - | - | - | - | - | - |
| | MLSE14(3) | - | (w) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | <200 | 13 |
| | MLSE14(5) | <5.3 | (w) | 130 | 30 | 14 | 0.1 | 110 | <2.1 | 90 | 50 | - | - | - | - | - | - | - | <270 | 15 |
| | MLSE14(6) | <8.4 | (w) | 88 | 19 | <8.4 | <0.42 | 110 | <3.4 | 61 | 62 | - | - | - | - | - | - | - | - | - |
| | MLSE15(5) | 2.2 | (w) | 37 | 8.1 | 2.4 | <0.062 | 29 | <0.49 | 35 | 17 | - | - | - | - | - | - | - | - | - |
| URS, 2005 | MLSE16(5) | 20 | <1.3 | 98 | 15 | 2.6 | <0.11 | 110 | 4.9 | 63 | 64 | <18 | <9 | <9 | <9 | <9 | <9 | <9 | - | - |
| | MLSE16(6) | 20 | - | - | - | - | - | - | 5.6 | - | - | - | - | - | - | - | - | - | - | - |
| | MLSE17(5) | 5.7 | <0.89 | 150 | 18 | 11 | <0.08 | 140 | 2.8 | 110 | 45 | <14 | <7.1 | <7.1 | <7.1 | <7.1 | <7.1 | <7.1 | - | - |
| | MLSE17(6) | - | - | - | - | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | MLSE18(5) | 2.5 | <0.27 | 53 | 6.5 | 2.3 | 0.019 | 28 | 0.4 | 40 | 20 | <3.8 | <2 | <2 | <2 | <2 | <2 | <2 | - | - |
| | MLSE19(5) | 5.2 | <0.24 | 88 | 12 | 3.8 | <0.024 | 54 | 2 | 75 | 28 | <4 | <2.1 | <2.1 | <2.1 | <2.1 | <2.1 | <2.1 | - | - |
| | MLSE20(5) | 1.8 | <0.24 | 60 | 7.5 | 2.4 | <0.027 | 32 | 1.1 | 48 | 22 | <3.9 | <2 | <2 | <2 | <2 | <2 | <2 | - | - |
| | MLSE21(6) | 27 | - | - | - | - | - | - | 4.9 | - | - | - | - | - | - | - | - | - | - | - |
| | MLSE21(7) | 12 | <0.23 | 26 | 1.2 | 0.72 | <0.02 | 21 | 0.25 | 23 | 10 | - | - | - | - | - | - | - | - | - |
| | MLSE21(8) | 4.8 | - | - | - | - | - | - | <1.3 | - | - | - | - | - | - | - | - | - | - | - |
| | MLSE22(1) | 0.4 | <0.22 | 42 | 1.7 | 0.96 | <0.023 | 19 | 0.74 | 38 | 15 | <4 | <2 | <2 | <2 | <2 | <2 | <2 | - | - |
| | MLSE22(2) | 0.57 | <0.29 | 50 | 2.2 | 1.1 | <0.023 | 20 | 0.73 | 41 | 16 | <3.9 | <2 | <2 | <2 | <2 | <2 | <2 | - | - |
| | MLSE23(1) | 0.83 | <0.25 | 53 | 2.6 | 2.5 | <0.022 | 21 | <0.25 | 37 | 20 | <3.8 | <2 | <2 | <2 | <2 | <2 | <2 | - | - |
| | MLSE23(2) | 0.8 | <0.25 | 41 | 2.5 | 1.5 | <0.021 | 23 | <0.25 | 29 | 17 | <3.9 | <2 | <2 | <2 | <2 | <2 | <2 | - | - |
| | MLSE24(1) | 2.4 | <0.39 | 48 | 12 | 82 | 0.05 | 29 | <0.39 | 36 | 50 | <5.8 | <3 | <3 | <3 | <3 | <3 | <3 | - | - |
| | AVGMLSE24(2.5) | 2.4 | <0.31 | 61.5 | 8.95 | 27 | 0.078 | 57.5 | <0.31 | 40 | 51.5 | <4.4 | <2.2 | <2.2 | <2.2 | <2.2 | <2.2 | <2.2 | - | - |
| | MLSE25(1) | 0.74 | <0.43 | 29 | 6.4 | 36 | <0.048 | 16 | <0.43 | 19 | 34 | <6.6 | <3.4 | <3.4 | <3.4 | <3.4 | <3.4 | <3.4 | - | - |
| | AVGMLSE27(1) | 1.3 | <0.27 | 49 | 3.3 | 23 | 0.02 | 28 | <0.27 | 30.5 | 33.5 | <3.8 | <2 | <2 | <2 | <2 | <2 | <2 | - | - |
| | MLSE27(2) | 7.1 | <0.9 | 230 | 23 | 57 | 0.18 | 260 | <0.9 | 120 | 99 | <12 | <6.3 | <6.3 | <6.3 | <6.3 | <6.3 | <6.3 | - | - |
| | MLSE28(5) | 25 | <1.5 | 150 | 18 | 4 | <0.12 | 180 | 2.9 | 100 | 83 | <22 | <11 | <11 | <11 | <11 | <11 | <11 | - | - |
| | MLSE28(6) | 5.8 | <0.39 | 36 | 4.6 | 1.4 | <0.02 | 40 | <0.39 | 26 | 21 | <5.5 | <2.9 | <2.9 | <2.9 | <2.9 | <2.9 | <2.9 | - | - |
| | MLSE29(5) | - | <1.7 | - | - | 7.8 | - | - | - | - | - | <26 | <13 | <13 | <13 | <13 | <13 | <13 | - | - |
| | MLSE29(6) | - | <1.5 | - | - | 2.3 | - | - | - | - | - | <22 | <11 | <11 | <11 | <11 | <11 | <11 | - | - |
| | MLSE30(4) | 8 | <1 | 130 | 45 | <3 | <0.12 | 130 | <1.4 | 80 | 180 | - | - | - | - | - | - | - | - | - |
| | MLSE30(5) | - | <2.1 | - | - | 20 | - | - | - | - | - | <28 | <14 | <14 | <14 | <14 | <14 | <14 | - | - |
| | MLSE30(6) | - | <1.7 | - | - | 16 | - | - | - | - | - | <24 | <12 | <12 | <12 | <12 | <12 | <12 | - | - |
| | MLSE33(5) | - | <1.3 | - | - | - | - | - | - | - | - | <16 | <8 | <8 | <8 | <8 | <8 | <8 | - | - |

## Table D-3: Data Used in Post-Remediation 95 Percent Upper Confidence Limit Calculations[a]

| Source[b] | Sample Number[c] | As[d] mg/kg[e] | Cd[f] mg/kg | Cr[g] mg/kg | Cu[h] mg/kg | Pb[i] mg/kg | Hg[j] mg/kg | Ni[k] mg/kg | Se[l] mg/kg | V[n] mg/kg | Zn[m] mg/kg | 4,4'-DDD[o] µg/kg[p] | alpha-BHC[q] µg/kg | beta-BHC µg/kg | delta-BHC µg/kg | gamma-BHC (Lindane) µg/kg | alpha-Chlordane µg/kg | gamma-Chlordane µg/kg | Motor Oil mg/kg | Diesel mg/kg |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| URS, 2005 (cont'd) | MLSE33(6) | - | <0.23 | - | - | - | - | - | - | - | - | <4.5 | <2.3 | <2.3 | <2.3 | <2.3 | <2.3 | <2.3 | - | - |
| | MLSE37(5) | 3.7 | <0.26 | 50 | 5.1 | 1.9 | <0.019 | 46 | <0.26 | 33 | 19 | <3.9 | <2 | <2 | <2 | <2 | <2 | <2 | - | - |
| | MLSE38(5) | 3.8 | <0.026 | 81 | 5.9 | 2.9 | <0.021 | 73 | <0.26 | 62 | 28 | <4 | <2.1 | <2.1 | <2.1 | <2.1 | <2.1 | <2.1 | - | - |
| | MLSE39(5) | - | <0.69 | - | - | 50 | - | - | - | - | - | <11 | <5.5 | <5.5 | <5.5 | <5.5 | <5.5 | <5.5 | - | - |
| | MLSE39(6) | - | <1.6 | - | - | - | - | - | - | - | - | <23 | <12 | <12 | <12 | <12 | <12 | <12 | - | - |
| | MLSE40(1) | - | <0.24 | - | - | 17 | - | - | - | - | - | <3.9 | <2 | <2 | <2 | <2 | <2 | <2 | - | - |
| | MLSE40(2) | - | <0.25 | - | - | - | - | - | - | - | - | <3.8 | <2 | <2 | <2 | <2 | <2 | <2 | - | - |

**Notes:**

(a) Data are from Tables 2, 4, and 5 of the RI Summary (URS 2011).
(b) Source of data as referenced in the RI Summary (URS 2011).
(c) The sample number. The parenthetical indicates sample depth.
(d) As = arsenic
(e) mg/kg = milligrams per kilogram
(f) Cd = cadmium
(g) Cr = chromium
(h) Cu = copper
(i) Pb = lead
(j) Hg = mercury
(k) Ni = nickel
(l) Se = selenium
(m) Zn = zinc
(n) V = vanadium
(o) DDD = dichlorodiphenyldichloroethane
(p) µg/kg = micrograms per kilogram
(q) BHC = Benzene hexachloride
(r) D&M = Dames and Moore.
(s) < = No detection above the stated laboratory detection limit.
(t) "-"= No data provided.
(u) ND = Non-detect with no stated detection limit. Results were not used in the 95 percent upper confidence limit calculations.
(v) URS = URS Corporation.
(w) Due to potential analytical interference, cadmium data from the 2001 sampling event were not included in the calculations.
(x) AVG = Conditional average of two values: if both values detect than it is a simple average, if it there is one detect and one non-detect it is the value of the detect, and if they are both non-detects than it is the lower of the two non-detects.

Table D-4: Statistical Evaluation of Post-Remediation Sediment Samples (0 to 3.5 feet below post-remediation surface) from Mountain Lake[a]

| | | | | Summary Statistics[b] | | Detected Values[b] | | Goodness-of-Fit Test | Upper Confidence Limit (UCL) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Analyte | Unit | No. of Samples | Detection Rate | Arithmetic Mean[c] | Standard Deviation | Minimum Detected | Maximum Detected | Distribution | Method of UCL Calculation[d] | Assessed 95% UCL[e] | Cleanup Level[f] |
| Arsenic | mg/kg | 46 | 54% | 6.65 | 7.87 | 0.40 | 27 | Gamma | 95% KM (BCA) UCL | 6.1 | 19 |
| Cadmium[g] | mg/kg | 30 | 0% | - | - | - | - | - | - | - | 1.1 |
| Chromium | mg/kg | 43 | 100% | 88.2 | 52.5 | 25 | 230 | Gamma | 95% Approximate Gamma UCL | 103 | 140 |
| Copper | mg/kg | 43 | 100% | 15.0 | 11.7 | 1.2 | 45 | Gamma | 95% Approximate Gamma UCL | 19 | 114 |
| Lead | mg/kg | 50 | 90% | 15 | 19 | 0.72 | 82 | Lognormal | 95% KM (Chebyshev) UCL | 25 | 82 |
| Mercury | mg/kg | 43 | 23% | 0.087 | 0.061 | 0.019 | 0.20 | Normal | 95% KM (t) UCL | 0.06 | 0.62 |
| Nickel | mg/kg | 43 | 100% | 82.8 | 68.7 | 16 | 280 | Nonparametric | 95% Chebyshev (Mean, Sd) UCL | 129 | 110 |
| Selenium | mg/kg | 44 | 25% | 2.39 | 1.98 | 0.25 | 6 | Normal | 95% KM (t) UCL | 1.20 | 1.6 |
| Vanadium | mg/kg | 43 | 100% | 61.2 | 31.5 | 19 | 140 | Gamma | 95% Approximate Gamma UCL | 70 | 90 |
| Zinc | mg/kg | 43 | 100% | 48.4 | 34 | 10 | 180 | Lognormal | 95% H-UCL | 61 | 230 |
| 4.4'-DDD[j] | mg/kg | 28 | 0% | - | - | - | - | - | - | - | 0.016 |
| Alpha-BHC[j] | mg/kg | 28 | 0% | - | - | - | - | - | - | - | 0.0080 |
| Alpha-Chlordane[j] | mg/kg | 28 | 0% | - | - | - | - | - | - | - | 0.010 |
| Beta-BHC[j] | mg/kg | 28 | 0% | - | - | - | - | - | - | - | 0.013 |
| Delta-BHC[j] | mg/kg | 28 | 0% | - | - | - | - | - | - | - | 0.0075 |
| Gamma-BHC(Lindane)[j] | mg/kg | 30 | 3% | - | - | - | - | - | - | - | 0.0030 |
| Gamma-Chlordane | mg/kg | 28 | 0% | - | - | - | - | - | - | - | 0.010 |
| Motor Oil | mg/kg | 5 | 0% | - | - | - | - | - | - | - | 144 |
| Diesel | mg/kg | 5 | 40% | 14.0 | 1.4 | 13 | 15 | Nonparametric | 95% KM (t) UCL | 14 | 144 |

**Notes:**

a) Values calculated using ProUCL Version 4.1.00 (http://www.epa.gov/osp/hstl/tsc/software.htm)
b) Summary statistics and detected values were determined following data reduction
c) Arithmetic mean is calculated only for detects
d) Method is the statistic recommended by ProUCL based on the dataset for the given chemical
e) Nondetects are included in the 95% UCL in accordance with the ProUCL methods
f) Freshwater Sediment Cleanup Level from the Development of Presidio-Wide Cleanup Levels for Soil, Sediment, Groundwater, and Surface Water (EKI 2002)
g) Due to potential analytical interference in the 2001 dataset, only 2005 data were evaluated for cadmium
h) Data do not follow a discernible distribution
i) Highlighted cells are 95% UCLs that exceed the cleanup level
j) Too few detects (less than four) to calculate statistics.

**Abbreviations:**

mg/kg - milligrams per kilogram
µg/kg - micrograms per kilogram
95% UCL - 95 percent upper confidence limit

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | General UCL Statistics for Data Sets with Non-Detects - Baseline Metals | | | | | | | | |
| 2 | | | User Selected Options | | | | | | | | | |
| 3 | | | From File | Tbl 2 rev3.wst | | | | | | | | |
| 4 | | | Full Precision | OFF | | | | | | | | |
| 5 | | | Confidence Coefficient | 95% | | | | | | | | |
| 6 | | | Number of Bootstrap Operations | 2000 | | | | | | | | |
| 7 | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | |
| 9 | Arsenic | | | | | | | | | | | |
| 10 | | | | | | | | | | | | |
| 11 | | | | | | General Statistics | | | | | | |
| 12 | | | | | | Number of Valid Data | 78 | | | Number of Detected Data | | 33 |
| 13 | | | | | | Number of Distinct Detected Data | 29 | | | Number of Non-Detect Data | | 45 |
| 14 | | | | | | | | | | Percent Non-Detects | | 57.69% |
| 15 | | | | | | | | | | | | |
| 16 | | | | Raw Statistics | | | | | | Log-transformed Statistics | | |
| 17 | | | | | | Minimum Detected | 0.4 | | | Minimum Detected | | -0.916 |
| 18 | | | | | | Maximum Detected | 13 | | | Maximum Detected | | 2.565 |
| 19 | | | | | | Mean of Detected | 3.431 | | | Mean of Detected | | 0.87 |
| 20 | | | | | | SD of Detected | 3.149 | | | SD of Detected | | 0.883 |
| 21 | | | | | | Minimum Non-Detect | 1.2 | | | Minimum Non-Detect | | 0.182 |
| 22 | | | | | | Maximum Non-Detect | 7.2 | | | Maximum Non-Detect | | 1.974 |
| 23 | | | | | | | | | | | | |
| 24 | Note: Data have multiple DLs - Use of KM Method is recommended | | | | | | | | | Number treated as Non-Detect | | 75 |
| 25 | For all methods (except KM, DL/2, and ROS Methods), | | | | | | | | | Number treated as Detected | | 3 |
| 26 | Observations < Largest ND are treated as NDs | | | | | | | | | Single DL Non-Detect Percentage | | 96.15% |
| 27 | | | | | | | | | | | | |
| 28 | | | | | | UCL Statistics | | | | | | |
| 29 | | | | Normal Distribution Test with Detected Values Only | | | | | | Lognormal Distribution Test with Detected Values Only | | |
| 30 | | | | | | Shapiro Wilk Test Statistic | 0.79 | | | Shapiro Wilk Test Statistic | | 0.976 |
| 31 | | | | | | 5% Shapiro Wilk Critical Value | 0.931 | | | 5% Shapiro Wilk Critical Value | | 0.931 |
| 32 | | | | Data not Normal at 5% Significance Level | | | | | | Data appear Lognormal at 5% Significance Level | | |
| 33 | | | | | | | | | | | | |
| 34 | | | | Assuming Normal Distribution | | | | | | Assuming Lognormal Distribution | | |
| 35 | | | | | | DL/2 Substitution Method | | | | DL/2 Substitution Method | | |
| 36 | | | | | | Mean | 2.338 | | | Mean | | 0.532 |
| 37 | | | | | | SD | 2.324 | | | SD | | 0.764 |
| 38 | | | | | | 95% DL/2 (t) UCL | 2.776 | | | 95% H-Stat (DL/2) UCL | | 2.723 |
| 39 | | | | | | | | | | | | |
| 40 | | | | | | Maximum Likelihood Estimate(MLE) Method | N/A | | | Log ROS Method | | |
| 41 | | | | MLE method failed to converge properly | | | | | | Mean in Log Scale | | 0.324 |
| 42 | | | | | | | | | | SD in Log Scale | | 0.8 |
| 43 | | | | | | | | | | Mean in Original Scale | | 2.027 |
| 44 | | | | | | | | | | SD in Original Scale | | 2.38 |
| 45 | | | | | | | | | | 95% t UCL | | 2.476 |
| 46 | | | | | | | | | | 95% Percentile Bootstrap UCL | | 2.478 |
| 47 | | | | | | | | | | 95% BCA Bootstrap UCL | | 2.597 |
| 48 | | | | | | | | | | 95% H-UCL | | 2.301 |
| 49 | | | | | | | | | | | | |
| 50 | | | | Gamma Distribution Test with Detected Values Only | | | | | | Data Distribution Test with Detected Values Only | | |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 51 | | | | | k star (bias corrected) | 1.405 | Data appear Gamma Distributed at 5% Significance Level | | | | | |
| 52 | | | | | Theta Star | 2.442 | | | | | | |
| 53 | | | | | nu star | 92.73 | | | | | | |
| 54 | | | | | | | | | | | | |
| 55 | | | | | A-D Test Statistic | 0.457 | Nonparametric Statistics | | | | | |
| 56 | | | | | 5% A-D Critical Value | 0.765 | | | | | Kaplan-Meier (KM) Method | |
| 57 | | | | | K-S Test Statistic | 0.765 | | | | | Mean | 2.085 |
| 58 | | | | | 5% K-S Critical Value | 0.156 | | | | | SD | 2.4 |
| 59 | Data appear Gamma Distributed at 5% Significance Level | | | | | | | | | | SE of Mean | 0.288 |
| 60 | | | | | | | | | | | 95% KM (t) UCL | 2.565 |
| 61 | Assuming Gamma Distribution | | | | | | | | | | 95% KM (z) UCL | 2.56 |
| 62 | | | | Gamma ROS Statistics using Extrapolated Data | | | | | | | 95% KM (jackknife) UCL | 2.563 |
| 63 | | | | | Minimum | 0.000001 | | | | | 95% KM (bootstrap t) UCL | 2.712 |
| 64 | | | | | Maximum | 13 | | | | | 95% KM (BCA) UCL | 2.574 |
| 65 | | | | | Mean | 2.095 | | | | | 95% KM (Percentile Bootstrap) UCL | 2.575 |
| 66 | | | | | Median | 1.595 | | | | | 95% KM (Chebyshev) UCL | 3.342 |
| 67 | | | | | SD | 2.45 | | | | | 97.5% KM (Chebyshev) UCL | 3.886 |
| 68 | | | | | k star | 0.3 | | | | | 99% KM (Chebyshev) UCL | 4.955 |
| 69 | | | | | Theta star | 6.983 | | | | | | |
| 70 | | | | | Nu star | 46.8 | Potential UCLs to Use | | | | | |
| 71 | | | | | AppChi2 | 32.1 | | | | | 95% KM (t) UCL | 2.565 |
| 72 | | | | | 95% Gamma Approximate UCL (Use when n >= 40) | 3.054 | | | | | | |
| 73 | | | | | 95% Adjusted Gamma UCL (Use when n < 40) | 3.076 | | | | | | |
| 74 | Note: DL/2 is not a recommended method. | | | | | | | | | | | |
| 75 | | | | | | | | | | | | |
| 76 | Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | | | | | | | | | |
| 77 | These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | | | | | | | | | |
| 78 | For additional insight, the user may want to consult a statistician. | | | | | | | | | | | |
| 79 | | | | | | | | | | | | |
| 80 | | | | | | | | | | | | |
| 81 | Cadmium | | | | | | | | | | | |
| 82 | | | | | | | | | | | | |
| 83 | General Statistics | | | | | | | | | | | |
| 84 | | | | | Number of Valid Data | 43 | | | | | Number of Detected Data | 10 |
| 85 | | | | | Number of Distinct Detected Data | 10 | | | | | Number of Non-Detect Data | 33 |
| 86 | | | | | | | | | | | Percent Non-Detects | 76.74% |
| 87 | | | | | | | | | | | | |
| 88 | Raw Statistics | | | | | | Log-transformed Statistics | | | | | |
| 89 | | | | | Minimum Detected | 0.38 | | | | | Minimum Detected | -0.968 |
| 90 | | | | | Maximum Detected | 2.7 | | | | | Maximum Detected | 0.993 |
| 91 | | | | | Mean of Detected | 1.407 | | | | | Mean of Detected | 0.211 |
| 92 | | | | | SD of Detected | 0.689 | | | | | SD of Detected | 0.575 |
| 93 | | | | | Minimum Non-Detect | 0.22 | | | | | Minimum Non-Detect | -1.514 |
| 94 | | | | | Maximum Non-Detect | 1.7 | | | | | Maximum Non-Detect | 0.531 |
| 95 | | | | | | | | | | | | |
| 96 | Note: Data have multiple DLs - Use of KM Method is recommended | | | | | | | | | | Number treated as Non-Detect | 40 |
| 97 | For all methods (except KM, DL/2, and ROS Methods), | | | | | | | | | | Number treated as Detected | 3 |
| 98 | Observations < Largest ND are treated as NDs | | | | | | | | | | Single DL Non-Detect Percentage | 93.02% |
| 99 | | | | | | | | | | | | |
| 100 | UCL Statistics | | | | | | | | | | | |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 101 | **Normal Distribution Test with Detected Values Only** | | | | | | **Lognormal Distribution Test with Detected Values Only** | | | | | |
| 102 | | | | | Shapiro Wilk Test Statistic | 0.978 | | | | | Shapiro Wilk Test Statistic | 0.949 |
| 103 | | | | | 5% Shapiro Wilk Critical Value | 0.842 | | | | | 5% Shapiro Wilk Critical Value | 0.842 |
| 104 | **Data appear Normal at 5% Significance Level** | | | | | | **Data appear Lognormal at 5% Significance Level** | | | | | |
| 105 | | | | | | | | | | | | |
| 106 | **Assuming Normal Distribution** | | | | | | **Assuming Lognormal Distribution** | | | | | |
| 107 | | | | | DL/2 Substitution Method | | | | | | DL/2 Substitution Method | |
| 108 | | | | | Mean | 0.521 | | | | | Mean | -1.174 |
| 109 | | | | | SD | 0.613 | | | | | SD | 0.977 |
| 110 | | | | | 95% DL/2 (t) UCL | 0.678 | | | | | 95% H-Stat (DL/2) UCL | 0.708 |
| 111 | | | | | | | | | | | | |
| 112 | | | | | Maximum Likelihood Estimate(MLE) Method | | | | | | Log ROS Method | |
| 113 | | | | | Mean | 0.0706 | | | | | Mean in Log Scale | -1.182 |
| 114 | | | | | SD | 1.107 | | | | | SD in Log Scale | 0.875 |
| 115 | | | | | 95% MLE (t) UCL | 0.355 | | | | | Mean in Original Scale | 0.49 |
| 116 | | | | | 95% MLE (Tiku) UCL | 1.652 | | | | | SD in Original Scale | 0.605 |
| 117 | | | | | | | | | | | 95% t UCL | 0.645 |
| 118 | | | | | | | | | | | 95% Percentile Bootstrap UCL | 0.647 |
| 119 | | | | | | | | | | | 95% BCA Bootstrap UCL | 0.675 |
| 120 | | | | | | | | | | | 95% H UCL | 0.608 |
| 121 | | | | | | | | | | | | |
| 122 | **Gamma Distribution Test with Detected Values Only** | | | | | | **Data Distribution Test with Detected Values Only** | | | | | |
| 123 | | | | | k star (bias corrected) | 2.868 | **Data appear Normal at 5% Significance Level** | | | | | |
| 124 | | | | | Theta Star | 0.491 | | | | | | |
| 125 | | | | | nu star | 57.36 | | | | | | |
| 126 | | | | | | | | | | | | |
| 127 | | | | | A-D Test Statistic | 0.191 | **Nonparametric Statistics** | | | | | |
| 128 | | | | | 5% A-D Critical Value | 0.729 | | | | | Kaplan-Meier (KM) Method | |
| 129 | | | | | K-S Test Statistic | 0.729 | | | | | Mean | 0.627 |
| 130 | | | | | 5% K-S Critical Value | 0.268 | | | | | SD | 0.538 |
| 131 | **Data appear Gamma Distributed at 5% Significance Level** | | | | | | | | | | SE of Mean | 0.0874 |
| 132 | | | | | | | | | | | 95% KM (t) UCL | 0.774 |
| 133 | **Assuming Gamma Distribution** | | | | | | | | | | 95% KM (z) UCL | 0.771 |
| 134 | | | | | Gamma ROS Statistics using Extrapolated Data | | | | | | 95% KM (jackknife) UCL | 0.843 |
| 135 | | | | | Minimum | 0.000001 | | | | | 95% KM (bootstrap t) UCL | 0.789 |
| 136 | | | | | Maximum | 2.7 | | | | | 95% KM (BCA) UCL | 1.309 |
| 137 | | | | | Mean | 0.327 | | | | | 95% KM (Percentile Bootstrap) UCL | 1.095 |
| 138 | | | | | Median | 0.000001 | | | | | 95% KM (Chebyshev) UCL | 1.008 |
| 139 | | | | | SD | 0.681 | | | | | 97.5% KM (Chebyshev) UCL | 1.173 |
| 140 | | | | | k star | 0.0969 | | | | | 99% KM (Chebyshev) UCL | 1.496 |
| 141 | | | | | Theta star | 3.377 | | | | | | |
| 142 | | | | | Nu star | 8.332 | **Potential UCLs to Use** | | | | | |
| 143 | | | | | AppChi2 | 2.929 | | | | | 95% KM (t) UCL | 0.774 |
| 144 | | | | | 95% Gamma Approximate UCL (Use when n >= 40) | 0.931 | | | | | 95% KM (Percentile Bootstrap) UCL | 1.095 |
| 145 | | | | | 95% Adjusted Gamma UCL (Use when n < 40) | 0.967 | | | | | | |
| 146 | **Note: DL/2 is not a recommended method.** | | | | | | | | | | | |
| 147 | | | | | | | | | | | | |
| 148 | **Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.** | | | | | | | | | | | |
| 149 | **These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).** | | | | | | | | | | | |
| 150 | **For additional insight, the user may want to consult a statistician.** | | | | | | | | | | | |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 151 | | | | | | | | | | | | |
| 152 | | | | | | | | | | | | |
| 153 | **Chromium** | | | | | | | | | | | |
| 154 | | | | | | | | | | | | |
| 155 | | | | | | **General Statistics** | | | | | | |
| 156 | | | | | | Number of Valid Observations | 78 | | | | Number of Distinct Observations | 52 |
| 157 | | | | | | | | | | | | |
| 158 | | | | | | **Raw Statistics** | | | | | **Log-transformed Statistics** | |
| 159 | | | | | | Minimum | 25 | | | | Minimum of Log Data | 3.219 |
| 160 | | | | | | Maximum | 280 | | | | Maximum of Log Data | 5.635 |
| 161 | | | | | | Mean | 91.63 | | | | Mean of log Data | 4.341 |
| 162 | | | | | | Geometric Mean | 76.79 | | | | SD of log Data | 0.61 |
| 163 | | | | | | Median | 74.1 | | | | | |
| 164 | | | | | | SD | 54.32 | | | | | |
| 165 | | | | | | Std. Error of Mean | 6.151 | | | | | |
| 166 | | | | | | Coefficient of Variation | 0.593 | | | | | |
| 167 | | | | | | Skewness | 0.913 | | | | | |
| 168 | | | | | | | | | | | | |
| 169 | | | | | | **Relevant UCL Statistics** | | | | | | |
| 170 | | | | | | **Normal Distribution Test** | | | | | **Lognormal Distribution Test** | |
| 171 | | | | | | Lilliefors Test Statistic | 0.156 | | | | Lilliefors Test Statistic | 0.101 |
| 172 | | | | | | Lilliefors Critical Value | 0.1 | | | | Lilliefors Critical Value | 0.1 |
| 173 | | | | | | **Data not Normal at 5% Significance Level** | | | | | **Data not Lognormal at 5% Significance Level** | |
| 174 | | | | | | | | | | | | |
| 175 | | | | | | **Assuming Normal Distribution** | | | | | **Assuming Lognormal Distribution** | |
| 176 | | | | | | 95% Student's-t UCL | 101.9 | | | | 95% H-UCL | 105.7 |
| 177 | | | | | | **95% UCLs (Adjusted for Skewness)** | | | | | 95% Chebyshev (MVUE) UCL | 122.1 |
| 178 | | | | | | 95% Adjusted-CLT UCL (Chen-1995) | 102.4 | | | | 97.5% Chebyshev (MVUE) UCL | 135.1 |
| 179 | | | | | | 95% Modified-t UCL (Johnson-1978) | 102 | | | | 99% Chebyshev (MVUE) UCL | 160.5 |
| 180 | | | | | | | | | | | | |
| 181 | | | | | | **Gamma Distribution Test** | | | | | **Data Distribution** | |
| 182 | | | | | | k star (bias corrected) | 2.879 | | | | **Data do not follow a Discernable Distribution (0.05)** | |
| 183 | | | | | | Theta Star | 31.83 | | | | | |
| 184 | | | | | | MLE of Mean | 91.63 | | | | | |
| 185 | | | | | | MLE of Standard Deviation | 54 | | | | | |
| 186 | | | | | | nu star | 449.1 | | | | | |
| 187 | | | | | | Approximate Chi Square Value (.05) | 401 | | | | **Nonparametric Statistics** | |
| 188 | | | | | | Adjusted Level of Significance | 0.0469 | | | | 95% CLT UCL | 101.8 |
| 189 | | | | | | Adjusted Chi Square Value | 400.2 | | | | 95% Jackknife UCL | 101.9 |
| 190 | | | | | | | | | | | 95% Standard Bootstrap UCL | 101.6 |
| 191 | | | | | | Anderson-Darling Test Statistic | 1.166 | | | | 95% Bootstrap-t UCL | 102.7 |
| 192 | | | | | | Anderson-Darling 5% Critical Value | 0.759 | | | | 95% Hall's Bootstrap UCL | 102.4 |
| 193 | | | | | | Kolmogorov-Smirnov Test Statistic | 0.112 | | | | 95% Percentile Bootstrap UCL | 101.7 |
| 194 | | | | | | Kolmogorov-Smirnov 5% Critical Value | 0.102 | | | | 95% BCA Bootstrap UCL | 101.9 |
| 195 | | | | | | **Data not Gamma Distributed at 5% Significance Level** | | | | | 95% Chebyshev(Mean, Sd) UCL | 118.4 |
| 196 | | | | | | | | | | | 97.5% Chebyshev(Mean, Sd) UCL | 130 |
| 197 | | | | | | **Assuming Gamma Distribution** | | | | | 99% Chebyshev(Mean, Sd) UCL | 152.8 |
| 198 | | | | | | 95% Approximate Gamma UCL (Use when n >= 40) | 102.6 | | | | | |
| 199 | | | | | | 95% Adjusted Gamma UCL (Use when n < 40) | 102.9 | | | | | |
| 200 | | | | | | | | | | | | |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 201 | Potential UCL to Use | | | | | | Use 95% Chebyshev (Mean, Sd) UCL | | | | | 118.4 |
| 202 | | | | | | | | | | | | |
| 203 | Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | | | | | | | | | |
| 204 | These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) | | | | | | | | | | | |
| 205 | and Singh and Singh (2003). For additional insight, the user may want to consult a statistician. | | | | | | | | | | | |
| 206 | | | | | | | | | | | | |
| 207 | | | | | | | | | | | | |
| 208 | Copper | | | | | | | | | | | |
| 209 | | | | | | | | | | | | |
| 210 | General Statistics | | | | | | | | | | | |
| 211 | Number of Valid Observations | | | | | 78 | Number of Distinct Observations | | | | | 64 |
| 212 | | | | | | | | | | | | |
| 213 | Raw Statistics | | | | | | Log-transformed Statistics | | | | | |
| 214 | Minimum | | | | | 1.5 | Minimum of Log Data | | | | | 0.405 |
| 215 | Maximum | | | | | 140 | Maximum of Log Data | | | | | 4.942 |
| 216 | Mean | | | | | 29.21 | Mean of log Data | | | | | 2.803 |
| 217 | Geometric Mean | | | | | 16.5 | SD of log Data | | | | | 1.117 |
| 218 | Median | | | | | 17 | | | | | | |
| 219 | SD | | | | | 32.49 | | | | | | |
| 220 | Std. Error of Mean | | | | | 3.679 | | | | | | |
| 221 | Coefficient of Variation | | | | | 1.112 | | | | | | |
| 222 | Skewness | | | | | 1.786 | | | | | | |
| 223 | | | | | | | | | | | | |
| 224 | Relevant UCL Statistics | | | | | | | | | | | |
| 225 | Normal Distribution Test | | | | | | Lognormal Distribution Test | | | | | |
| 226 | Lilliefors Test Statistic | | | | | 0.218 | Lilliefors Test Statistic | | | | | 0.0599 |
| 227 | Lilliefors Critical Value | | | | | 0.1 | Lilliefors Critical Value | | | | | 0.1 |
| 228 | Data not Normal at 5% Significance Level | | | | | | Data appear Lognormal at 5% Significance Level | | | | | |
| 229 | | | | | | | | | | | | |
| 230 | Assuming Normal Distribution | | | | | | Assuming Lognormal Distribution | | | | | |
| 231 | 95% Student's-t UCL | | | | | 35.33 | 95% H-UCL | | | | | 41.71 |
| 232 | 95% UCLs (Adjusted for Skewness) | | | | | | 95% Chebyshev (MVUE) UCL | | | | | 51.06 |
| 233 | 95% Adjusted-CLT UCL (Chen-1995) | | | | | 36.06 | 97.5% Chebyshev (MVUE) UCL | | | | | 60 |
| 234 | 95% Modified-t UCL (Johnson-1978) | | | | | 35.46 | 99% Chebyshev (MVUE) UCL | | | | | 77.56 |
| 235 | | | | | | | | | | | | |
| 236 | Gamma Distribution Test | | | | | | Data Distribution | | | | | |
| 237 | k star (bias corrected) | | | | | 0.979 | Data appear Lognormal at 5% Significance Level | | | | | |
| 238 | Theta Star | | | | | 29.84 | | | | | | |
| 239 | MLE of Mean | | | | | 29.21 | | | | | | |
| 240 | MLE of Standard Deviation | | | | | 29.52 | | | | | | |
| 241 | nu star | | | | | 152.7 | | | | | | |
| 242 | Approximate Chi Square Value (.05) | | | | | 125.2 | Nonparametric Statistics | | | | | |
| 243 | Adjusted Level of Significance | | | | | 0.0469 | 95% CLT UCL | | | | | 35.26 |
| 244 | Adjusted Chi Square Value | | | | | 124.7 | 95% Jackknife UCL | | | | | 35.33 |
| 245 | | | | | | | 95% Standard Bootstrap UCL | | | | | 35.11 |
| 246 | Anderson-Darling Test Statistic | | | | | 1.153 | 95% Bootstrap-t UCL | | | | | 36.39 |
| 247 | Anderson-Darling 5% Critical Value | | | | | 0.781 | 95% Hall's Bootstrap UCL | | | | | 36.34 |
| 248 | Kolmogorov-Smirnov Test Statistic | | | | | 0.117 | 95% Percentile Bootstrap UCL | | | | | 35.32 |
| 249 | Kolmogorov-Smirnov 5% Critical Value | | | | | 0.104 | 95% BCA Bootstrap UCL | | | | | 36.35 |
| 250 | Data not Gamma Distributed at 5% Significance Level | | | | | | 95% Chebyshev(Mean, Sd) UCL | | | | | 45.25 |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 251 | | | | | | | | | | | 97.5% Chebyshev(Mean, Sd) UCL | 52.18 |
| 252 | | | | Assuming Gamma Distribution | | | | | | | 99% Chebyshev(Mean, Sd) UCL | 65.82 |
| 253 | | | | 95% Approximate Gamma UCL (Use when n >= 40) | | 35.64 | | | | | | |
| 254 | | | | 95% Adjusted Gamma UCL (Use when n < 40) | | 35.78 | | | | | | |
| 255 | | | | | | | | | | | | |
| 256 | | | | Potential UCL to Use | | | | | | | Use 95% H-UCL | 41.71 |
| 257 | | | | | | | | | | | | |
| 258 | | | | ProUCL computes and outputs H-statistic based UCLs for historical reasons only. | | | | | | | | |
| 259 | | | | H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide. | | | | | | | | |
| 260 | | | | It is therefore recommended to avoid the use of H-statistic based 95% UCLs. | | | | | | | | |
| 261 | | | | Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution. | | | | | | | | |
| 262 | | | | | | | | | | | | |
| 263 | | | | Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | | | | | | |
| 264 | | | | These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) | | | | | | | | |
| 265 | | | | and Singh and Singh (2003). For additional insight, the user may want to consult a statistician. | | | | | | | | |
| 266 | | | | | | | | | | | | |
| 267 | | | | | | | | | | | | |
| 268 | Lead | | | | | | | | | | | |
| 269 | | | | | | | | | | | | |
| 270 | | | | General Statistics | | | | | | | | |
| 271 | | | | Number of Valid Data | | 82 | | | | | Number of Detected Data | 81 |
| 272 | | | | Number of Distinct Detected Data | | 65 | | | | | Number of Non-Detect Data | 1 |
| 273 | | | | | | | | | | | Percent Non-Detects | 1.22% |
| 274 | | | | | | | | | | | | |
| 275 | | | | Raw Statistics | | | | | | | Log-transformed Statistics | |
| 276 | | | | Minimum Detected | | 0.96 | | | | | Minimum Detected | -0.0408 |
| 277 | | | | Maximum Detected | | 1465 | | | | | Maximum Detected | 7.29 |
| 278 | | | | Mean of Detected | | 198.9 | | | | | Mean of Detected | 3.806 |
| 279 | | | | SD of Detected | | 343.1 | | | | | SD of Detected | 1.877 |
| 280 | | | | Minimum Non-Detect | | 7.44 | | | | | Minimum Non-Detect | 2.007 |
| 281 | | | | Maximum Non-Detect | | 7.44 | | | | | Maximum Non-Detect | 2.007 |
| 282 | | | | | | | | | | | | |
| 283 | | | | | | | | | | | | |
| 284 | | | | UCL Statistics | | | | | | | | |
| 285 | | | | Normal Distribution Test with Detected Values Only | | | | | | | Lognormal Distribution Test with Detected Values Only | |
| 286 | | | | Lilliefors Test Statistic | | 0.322 | | | | | Lilliefors Test Statistic | 0.0779 |
| 287 | | | | 5% Lilliefors Critical Value | | 0.0984 | | | | | 5% Lilliefors Critical Value | 0.0984 |
| 288 | | | | Data not Normal at 5% Significance Level | | | | | | | Data appear Lognormal at 5% Significance Level | |
| 289 | | | | | | | | | | | | |
| 290 | | | | Assuming Normal Distribution | | | | | | | Assuming Lognormal Distribution | |
| 291 | | | | DL/2 Substitution Method | | | | | | | DL/2 Substitution Method | |
| 292 | | | | Mean | | 196.5 | | | | | Mean | 3.775 |
| 293 | | | | SD | | 341.7 | | | | | SD | 1.886 |
| 294 | | | | 95% DL/2 (t) UCL | | 259.3 | | | | | 95% H-Stat (DL/2) UCL | 506.5 |
| 295 | | | | | | | | | | | | |
| 296 | | | | Maximum Likelihood Estimate(MLE) Method | | | | | | | Log ROS Method | |
| 297 | | | | Mean | | 148.7 | | | | | Mean in Log Scale | 3.774 |
| 298 | | | | SD | | 389.9 | | | | | SD in Log Scale | 1.888 |
| 299 | | | | 95% MLE (t) UCL | | 220.4 | | | | | Mean in Original Scale | 196.5 |
| 300 | | | | 95% MLE (Tiku) UCL | | 218.5 | | | | | SD in Original Scale | 341.7 |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 301 | | | | | | | | | | | 95% t UCL | 259.3 |
| 302 | | | | | | | | | | | 95% Percentile Bootstrap UCL | 260.1 |
| 303 | | | | | | | | | | | 95% BCA Bootstrap UCL | 273.2 |
| 304 | | | | | | | | | | | 95% H UCL | 508.3 |
| 305 | | | | | | | | | | | | |
| 306 | | | | Gamma Distribution Test with Detected Values Only | | | | | | Data Distribution Test with Detected Values Only | | |
| 307 | | | | | k star (bias corrected) | 0.428 | | | | Data appear Lognormal at 5% Significance Level | | |
| 308 | | | | | Theta Star | 464.2 | | | | | | |
| 309 | | | | | nu star | 69.4 | | | | | | |
| 310 | | | | | | | | | | | | |
| 311 | | | | | A-D Test Statistic | 3.01 | | | | Nonparametric Statistics | | |
| 312 | | | | | 5% A-D Critical Value | 0.834 | | | | | Kaplan-Meier (KM) Method | |
| 313 | | | | | K-S Test Statistic | 0.834 | | | | | Mean | 196.5 |
| 314 | | | | | 5% K-S Critical Value | 0.106 | | | | | SD | 339.6 |
| 315 | | | | Data not Gamma Distributed at 5% Significance Level | | | | | | | SE of Mean | 37.73 |
| 316 | | | | | | | | | | | 95% KM (t) UCL | 259.3 |
| 317 | | | | Assuming Gamma Distribution | | | | | | | 95% KM (z) UCL | 258.6 |
| 318 | | | | | Gamma ROS Statistics using Extrapolated Data | | | | | | 95% KM (jackknife) UCL | 259.3 |
| 319 | | | | | Minimum | 0.000001 | | | | | 95% KM (bootstrap t) UCL | 268.1 |
| 320 | | | | | Maximum | 1465 | | | | | 95% KM (BCA) UCL | 269.3 |
| 321 | | | | | Mean | 196.5 | | | | | 95% KM (Percentile Bootstrap) UCL | 261.3 |
| 322 | | | | | Median | 34.7 | | | | | 95% KM (Chebyshev) UCL | 361 |
| 323 | | | | | SD | 341.7 | | | | | 97.5% KM (Chebyshev) UCL | 432.1 |
| 324 | | | | | k star | 0.385 | | | | | 99% KM (Chebyshev) UCL | 571.9 |
| 325 | | | | | Theta star | 510.7 | | | | | | |
| 326 | | | | | Nu star | 63.09 | | | | Potential UCLs to Use | | |
| 327 | | | | | AppChi2 | 45.82 | | | | | 97.5% KM (Chebyshev) UCL | 432.1 |
| 328 | | | | | 95% Gamma Approximate UCL (Use when n >= 40) | 270.5 | | | | | | |
| 329 | | | | | 95% Adjusted Gamma UCL (Use when n < 40) | 272.1 | | | | | | |
| 330 | Note: DL/2 is not a recommended method. | | | | | | | | | | | |
| 331 | | | | | | | | | | | | |
| 332 | | | | Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | | | | | | |
| 333 | | | | These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | | | | | | |
| 334 | | | | For additional insight, the user may want to consult a statistician. | | | | | | | | |
| 335 | | | | | | | | | | | | |
| 336 | | | | | | | | | | | | |
| 337 | Mercury | | | | | | | | | | | |
| 338 | | | | | | | | | | | | |
| 339 | | | | | General Statistics | | | | | | | |
| 340 | | | | | Number of Valid Data | 78 | | | | | Number of Detected Data | 47 |
| 341 | | | | | Number of Distinct Detected Data | 40 | | | | | Number of Non-Detect Data | 31 |
| 342 | | | | | | | | | | | Percent Non-Detects | 39.74% |
| 343 | | | | | | | | | | | | |
| 344 | | | | Raw Statistics | | | | | | Log-transformed Statistics | | |
| 345 | | | | | Minimum Detected | 0.01 | | | | | Minimum Detected | -4.605 |
| 346 | | | | | Maximum Detected | 0.96 | | | | | Maximum Detected | -0.0408 |
| 347 | | | | | Mean of Detected | 0.245 | | | | | Mean of Detected | -1.858 |
| 348 | | | | | SD of Detected | 0.235 | | | | | SD of Detected | 1.01 |
| 349 | | | | | Minimum Non-Detect | 0.021 | | | | | Minimum Non-Detect | -3.863 |
| 350 | | | | | Maximum Non-Detect | 0.12 | | | | | Maximum Non-Detect | -2.12 |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 351 | | | | | | | | | | | | |
| 352 | Note: Data have multiple DLs - Use of KM Method is recommended | | | | | | | | | | Number treated as Non-Detect | 50 |
| 353 | For all methods (except KM, DL/2, and ROS Methods), | | | | | | | | | | Number treated as Detected | 28 |
| 354 | Observations < Largest ND are treated as NDs | | | | | | | | | | Single DL Non-Detect Percentage | 64.10% |
| 355 | | | | | | | | | | | | |
| 356 | | | | | | UCL Statistics | | | | | | |
| 357 | | | | Normal Distribution Test with Detected Values Only | | | | | | Lognormal Distribution Test with Detected Values Only | | |
| 358 | | | | | Shapiro Wilk Test Statistic | 0.803 | | | | | Shapiro Wilk Test Statistic | 0.965 |
| 359 | | | | | 5% Shapiro Wilk Critical Value | 0.946 | | | | | 5% Shapiro Wilk Critical Value | 0.946 |
| 360 | | | | Data not Normal at 5% Significance Level | | | | | | Data appear Lognormal at 5% Significance Level | | |
| 361 | | | | | | | | | | | | |
| 362 | | | | Assuming Normal Distribution | | | | | | Assuming Lognormal Distribution | | |
| 363 | | | | | DL/2 Substitution Method | | | | | | DL/2 Substitution Method | |
| 364 | | | | | Mean | 0.158 | | | | | Mean | -2.623 |
| 365 | | | | | SD | 0.211 | | | | | SD | 1.276 |
| 366 | | | | | 95% DL/2 (t) UCL | 0.198 | | | | | 95% H-Stat (DL/2) UCL | 0.238 |
| 367 | | | | | | | | | | | | |
| 368 | | | | | Maximum Likelihood Estimate(MLE) Method | N/A | | | | | Log ROS Method | |
| 369 | | | | MLE yields a negative mean | | | | | | | Mean in Log Scale | -2.647 |
| 370 | | | | | | | | | | | SD in Log Scale | 1.276 |
| 371 | | | | | | | | | | | Mean in Original Scale | 0.157 |
| 372 | | | | | | | | | | | SD in Original Scale | 0.212 |
| 373 | | | | | | | | | | | 95% t UCL | 0.196 |
| 374 | | | | | | | | | | | 95% Percentile Bootstrap UCL | 0.197 |
| 375 | | | | | | | | | | | 95% BCA Bootstrap UCL | 0.198 |
| 376 | | | | | | | | | | | 95% H-UCL | 0.232 |
| 377 | | | | | | | | | | | | |
| 378 | | | | Gamma Distribution Test with Detected Values Only | | | | | | Data Distribution Test with Detected Values Only | | |
| 379 | | | | | k star (bias corrected) | 1.187 | | | | Data appear Lognormal at 5% Significance Level | | |
| 380 | | | | | Theta Star | 0.206 | | | | | | |
| 381 | | | | | nu star | 111.6 | | | | | | |
| 382 | | | | | | | | | | | | |
| 383 | | | | | A-D Test Statistic | 0.973 | | | | Nonparametric Statistics | | |
| 384 | | | | | 5% A-D Critical Value | 0.773 | | | | | Kaplan-Meier (KM) Method | |
| 385 | | | | | K-S Test Statistic | 0.773 | | | | | Mean | 0.156 |
| 386 | | | | | 5% K-S Critical Value | 0.132 | | | | | SD | 0.211 |
| 387 | | | | Data not Gamma Distributed at 5% Significance Level | | | | | | | SE of Mean | 0.0243 |
| 388 | | | | | | | | | | | 95% KM (t) UCL | 0.196 |
| 389 | | | | Assuming Gamma Distribution | | | | | | | 95% KM (z) UCL | 0.196 |
| 390 | | | | | Gamma ROS Statistics using Extrapolated Data | | | | | | 95% KM (jackknife) UCL | 0.196 |
| 391 | | | | | Minimum | 0.000001 | | | | | 95% KM (bootstrap t) UCL | 0.202 |
| 392 | | | | | Maximum | 0.96 | | | | | 95% KM (BCA) UCL | 0.198 |
| 393 | | | | | Mean | 0.147 | | | | | 95% KM (Percentile Bootstrap) UCL | 0.199 |
| 394 | | | | | Median | 0.0715 | | | | | 95% KM (Chebyshev) UCL | 0.261 |
| 395 | | | | | SD | 0.218 | | | | | 97.5% KM (Chebyshev) UCL | 0.307 |
| 396 | | | | | k star | 0.164 | | | | | 99% KM (Chebyshev) UCL | 0.397 |
| 397 | | | | | Theta star | 0.897 | | | | | | |
| 398 | | | | | Nu star | 25.61 | | | | Potential UCLs to Use | | |
| 399 | | | | | AppChi2 | 15.08 | | | | | 95% KM (Chebyshev) UCL | 0.261 |
| 400 | | | | | 95% Gamma Approximate UCL (Use when n >= 40) | 0.25 | | | | | | |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 401 | | | | 95% Adjusted Gamma UCL (Use when n < 40) | | 0.253 | | | | | | |
| 402 | Note: DL/2 is not a recommended method. | | | | | | | | | | | |
| 403 | | | | | | | | | | | | |
| 404 | Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | | | | | | | | | |
| 405 | These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | | | | | | | | | |
| 406 | For additional insight, the user may want to consult a statistician. | | | | | | | | | | | |
| 407 | | | | | | | | | | | | |
| 408 | | | | | | | | | | | | |
| 409 | Nickel | | | | | | | | | | | |
| 410 | | | | | | | | | | | | |
| 411 | General Statistics | | | | | | | | | | | |
| 412 | | | | | Number of Valid Observations | 78 | | | | Number of Distinct Observations | | 56 |
| 413 | | | | | | | | | | | | |
| 414 | Raw Statistics | | | | | | Log-transformed Statistics | | | | | |
| 415 | | | | | Minimum | 12 | | | | Minimum of Log Data | | 2.485 |
| 416 | | | | | Maximum | 290 | | | | Maximum of Log Data | | 5.67 |
| 417 | | | | | Mean | 88.67 | | | | Mean of log Data | | 4.143 |
| 418 | | | | | Geometric Mean | 62.99 | | | | SD of log Data | | 0.868 |
| 419 | | | | | Median | 59.75 | | | | | | |
| 420 | | | | | SD | 69.63 | | | | | | |
| 421 | | | | | Std. Error of Mean | 7.884 | | | | | | |
| 422 | | | | | Coefficient of Variation | 0.785 | | | | | | |
| 423 | | | | | Skewness | 0.868 | | | | | | |
| 424 | | | | | | | | | | | | |
| 425 | Relevant UCL Statistics | | | | | | | | | | | |
| 426 | Normal Distribution Test | | | | | | Lognormal Distribution Test | | | | | |
| 427 | | | | | Lilliefors Test Statistic | 0.173 | | | | Lilliefors Test Statistic | | 0.143 |
| 428 | | | | | Lilliefors Critical Value | 0.1 | | | | Lilliefors Critical Value | | 0.1 |
| 429 | Data not Normal at 5% Significance Level | | | | | | Data not Lognormal at 5% Significance Level | | | | | |
| 430 | | | | | | | | | | | | |
| 431 | Assuming Normal Distribution | | | | | | Assuming Lognormal Distribution | | | | | |
| 432 | | | | | 95% Student's-t UCL | 101.8 | | | | 95% H-UCL | | 113.5 |
| 433 | 95% UCLs (Adjusted for Skewness) | | | | | | | | | 95% Chebyshev (MVUE) UCL | | 136.2 |
| 434 | | | | | 95% Adjusted-CLT UCL (Chen-1995) | 102.5 | | | | 97.5% Chebyshev (MVUE) UCL | | 155.7 |
| 435 | | | | | 95% Modified-t UCL (Johnson-1978) | 101.9 | | | | 99% Chebyshev (MVUE) UCL | | 193.9 |
| 436 | | | | | | | | | | | | |
| 437 | Gamma Distribution Test | | | | | | Data Distribution | | | | | |
| 438 | | | | | k star (bias corrected) | 1.556 | Data do not follow a Discernable Distribution (0.05) | | | | | |
| 439 | | | | | Theta Star | 57 | | | | | | |
| 440 | | | | | MLE of Mean | 88.67 | | | | | | |
| 441 | | | | | MLE of Standard Deviation | 71.09 | | | | | | |
| 442 | | | | | nu star | 242.7 | | | | | | |
| 443 | | | | | Approximate Chi Square Value (.05) | 207.6 | Nonparametric Statistics | | | | | |
| 444 | | | | | Adjusted Level of Significance | 0.0469 | | | | 95% CLT UCL | | 101.6 |
| 445 | | | | | Adjusted Chi Square Value | 207 | | | | 95% Jackknife UCL | | 101.8 |
| 446 | | | | | | | | | | 95% Standard Bootstrap UCL | | 101.8 |
| 447 | | | | | Anderson-Darling Test Statistic | 1.72 | | | | 95% Bootstrap-t UCL | | 102.5 |
| 448 | | | | | Anderson-Darling 5% Critical Value | 0.769 | | | | 95% Hall's Bootstrap UCL | | 101.7 |
| 449 | | | | | Kolmogorov-Smirnov Test Statistic | 0.118 | | | | 95% Percentile Bootstrap UCL | | 101.6 |
| 450 | | | | | Kolmogorov-Smirnov 5% Critical Value | 0.103 | | | | 95% BCA Bootstrap UCL | | 103 |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 451 | Data not Gamma Distributed at 5% Significance Level | | | | | | 95% Chebyshev(Mean, Sd) UCL | | | | | 123 |
| 452 | | | | | | | 97.5% Chebyshev(Mean, Sd) UCL | | | | | 137.9 |
| 453 | Assuming Gamma Distribution | | | | | | 99% Chebyshev(Mean, Sd) UCL | | | | | 167.1 |
| 454 | 95% Approximate Gamma UCL (Use when n >= 40) | | | | | 103.6 | | | | | | |
| 455 | 95% Adjusted Gamma UCL (Use when n < 40) | | | | | 103.9 | | | | | | |
| 456 | | | | | | | | | | | | |
| 457 | Potential UCL to Use | | | | | | Use 95% Chebyshev (Mean, Sd) UCL | | | | | 123 |
| 458 | | | | | | | | | | | | |
| 459 | Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | | | | | | | | | |
| 460 | These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) | | | | | | | | | | | |
| 461 | and Singh and Singh (2003). For additional insight, the user may want to consult a statistician. | | | | | | | | | | | |
| 462 | | | | | | | | | | | | |
| 463 | | | | | | | | | | | | |
| 464 | Selenium | | | | | | | | | | | |
| 465 | | | | | | | | | | | | |
| 466 | General Statistics | | | | | | | | | | | |
| 467 | Number of Valid Data | | | | | 74 | Number of Detected Data | | | | | 13 |
| 468 | Number of Distinct Detected Data | | | | | 11 | Number of Non-Detect Data | | | | | 61 |
| 469 | | | | | | | Percent Non-Detects | | | | | 82.43% |
| 470 | | | | | | | | | | | | |
| 471 | Raw Statistics | | | | | | Log-transformed Statistics | | | | | |
| 472 | Minimum Detected | | | | | 0.35 | Minimum Detected | | | | | -1.05 |
| 473 | Maximum Detected | | | | | 5.9 | Maximum Detected | | | | | 1.775 |
| 474 | Mean of Detected | | | | | 1.698 | Mean of Detected | | | | | 0.236 |
| 475 | SD of Detected | | | | | 1.532 | SD of Detected | | | | | 0.776 |
| 476 | Minimum Non-Detect | | | | | 0.25 | Minimum Non-Detect | | | | | -1.386 |
| 477 | Maximum Non-Detect | | | | | 2.9 | Maximum Non-Detect | | | | | 1.065 |
| 478 | | | | | | | | | | | | |
| 479 | Note: Data have multiple DLs - Use of KM Method is recommended | | | | | | Number treated as Non-Detect | | | | | 72 |
| 480 | For all methods (except KM, DL/2, and ROS Methods), | | | | | | Number treated as Detected | | | | | 2 |
| 481 | Observations < Largest ND are treated as NDs | | | | | | Single DL Non-Detect Percentage | | | | | 97.30% |
| 482 | | | | | | | | | | | | |
| 483 | UCL Statistics | | | | | | | | | | | |
| 484 | Normal Distribution Test with Detected Values Only | | | | | | Lognormal Distribution Test with Detected Values Only | | | | | |
| 485 | Shapiro Wilk Test Statistic | | | | | 0.767 | Shapiro Wilk Test Statistic | | | | | 0.98 |
| 486 | 5% Shapiro Wilk Critical Value | | | | | 0.866 | 5% Shapiro Wilk Critical Value | | | | | 0.866 |
| 487 | Data not Normal at 5% Significance Level | | | | | | Data appear Lognormal at 5% Significance Level | | | | | |
| 488 | | | | | | | | | | | | |
| 489 | Assuming Normal Distribution | | | | | | Assuming Lognormal Distribution | | | | | |
| 490 | DL/2 Substitution Method | | | | | | DL/2 Substitution Method | | | | | |
| 491 | Mean | | | | | 0.727 | Mean | | | | | -0.687 |
| 492 | SD | | | | | 0.83 | SD | | | | | 0.829 |
| 493 | 95% DL/2 (t) UCL | | | | | 0.887 | 95% H-Stat (DL/2) UCL | | | | | 0.869 |
| 494 | | | | | | | | | | | | |
| 495 | Maximum Likelihood Estimate(MLE) Method | | | | | N/A | Log ROS Method | | | | | |
| 496 | MLE method failed to converge properly | | | | | | Mean in Log Scale | | | | | -1.632 |
| 497 | | | | | | | SD in Log Scale | | | | | 1.023 |
| 498 | | | | | | | Mean in Original Scale | | | | | 0.421 |
| 499 | | | | | | | SD in Original Scale | | | | | 0.863 |
| 500 | | | | | | | 95% t UCL | | | | | 0.588 |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 501 | | | | | | | | | | | 95% Percentile Bootstrap UCL | 0.585 |
| 502 | | | | | | | | | | | 95% BCA Bootstrap UCL | 0.638 |
| 503 | | | | | | | | | | | 95% H-UCL | 0.434 |
| 504 | | | | | | | | | | | | |
| 505 | | | | Gamma Distribution Test with Detected Values Only | | | | | | Data Distribution Test with Detected Values Only | | |
| 506 | | | | | k star (bias corrected) | 1.476 | | | | Data appear Gamma Distributed at 5% Significance Level | | |
| 507 | | | | | Theta Star | 1.15 | | | | | | |
| 508 | | | | | nu star | 38.37 | | | | | | |
| 509 | | | | | | | | | | | | |
| 510 | | | | | A-D Test Statistic | 0.39 | | | | Nonparametric Statistics | | |
| 511 | | | | | 5% A-D Critical Value | 0.745 | | | | | Kaplan-Meier (KM) Method | |
| 512 | | | | | K-S Test Statistic | 0.745 | | | | | Mean | 0.627 |
| 513 | | | | | 5% K-S Critical Value | 0.24 | | | | | SD | 0.808 |
| 514 | | | | Data appear Gamma Distributed at 5% Significance Level | | | | | | | SE of Mean | 0.101 |
| 515 | | | | | | | | | | | 95% KM (t) UCL | 0.795 |
| 516 | | | | Assuming Gamma Distribution | | | | | | | 95% KM (z) UCL | 0.793 |
| 517 | | | | | Gamma ROS Statistics using Extrapolated Data | | | | | | 95% KM (jackknife) UCL | 0.773 |
| 518 | | | | | Minimum | 0.000001 | | | | | 95% KM (bootstrap t) UCL | 0.885 |
| 519 | | | | | Maximum | 5.9 | | | | | 95% KM (BCA) UCL | 1.076 |
| 520 | | | | | Mean | 0.303 | | | | | 95% KM (Percentile Bootstrap) UCL | 0.957 |
| 521 | | | | | Median | 0.000001 | | | | | 95% KM (Chebyshev) UCL | 1.066 |
| 522 | | | | | SD | 0.899 | | | | | 97.5% KM (Chebyshev) UCL | 1.255 |
| 523 | | | | | k star | 0.0888 | | | | | 99% KM (Chebyshev) UCL | 1.628 |
| 524 | | | | | Theta star | 3.412 | | | | | | |
| 525 | | | | | Nu star | 13.15 | | | | Potential UCLs to Use | | |
| 526 | | | | | AppChi2 | 5.992 | | | | | 95% KM (t) UCL | 0.795 |
| 527 | | | | | 95% Gamma Approximate UCL (Use when n >= 40) | 0.665 | | | | | | |
| 528 | | | | | 95% Adjusted Gamma UCL (Use when n < 40) | 0.676 | | | | | | |
| 529 | Note: DL/2 is not a recommended method. | | | | | | | | | | | |
| 530 | | | | | | | | | | | | |
| 531 | | | | Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | | | | | | |
| 532 | | | | These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | | | | | | |
| 533 | | | | For additional insight, the user may want to consult a statistician. | | | | | | | | |
| 534 | | | | | | | | | | | | |
| 535 | | | | | | | | | | | | |
| 536 | Vanadium | | | | | | | | | | | |
| 537 | | | | | | | | | | | | |
| 538 | | | | | General Statistics | | | | | | | |
| 539 | | | | | Number of Valid Observations | 78 | | | | | Number of Distinct Observations | 50 |
| 540 | | | | | | | | | | | | |
| 541 | | | | Raw Statistics | | | | | | Log-transformed Statistics | | |
| 542 | | | | | Minimum | 13 | | | | | Minimum of Log Data | 2.565 |
| 543 | | | | | Maximum | 190 | | | | | Maximum of Log Data | 5.247 |
| 544 | | | | | Mean | 55.91 | | | | | Mean of log Data | 3.854 |
| 545 | | | | | Geometric Mean | 47.16 | | | | | SD of log Data | 0.606 |
| 546 | | | | | Median | 52 | | | | | | |
| 547 | | | | | SD | 32.42 | | | | | | |
| 548 | | | | | Std. Error of Mean | 3.67 | | | | | | |
| 549 | | | | | Coefficient of Variation | 0.58 | | | | | | |
| 550 | | | | | Skewness | 1.164 | | | | | | |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 551 | | | | | | | | | | | | |
| 552 | | | | | | Relevant UCL Statistics | | | | | | |
| 553 | | | | Normal Distribution Test | | | | | | Lognormal Distribution Test | | |
| 554 | | | | | | Lilliefors Test Statistic 0.12 | | | | | Lilliefors Test Statistic | 0.112 |
| 555 | | | | | | Lilliefors Critical Value 0.1 | | | | | Lilliefors Critical Value | 0.1 |
| 556 | | | | Data not Normal at 5% Significance Level | | | | | | Data not Lognormal at 5% Significance Level | | |
| 557 | | | | | | | | | | | | |
| 558 | | | | Assuming Normal Distribution | | | | | | Assuming Lognormal Distribution | | |
| 559 | | | | | | 95% Student's-t UCL 62.02 | | | | | 95% H-UCL | 64.73 |
| 560 | | | | 95% UCLs (Adjusted for Skewness) | | | | | | | 95% Chebyshev (MVUE) UCL | 74.72 |
| 561 | | | | | | 95% Adjusted-CLT UCL (Chen-1995) 62.46 | | | | | 97.5% Chebyshev (MVUE) UCL | 82.6 |
| 562 | | | | | | 95% Modified-t UCL (Johnson-1978) 62.1 | | | | | 99% Chebyshev (MVUE) UCL | 98.09 |
| 563 | | | | | | | | | | | | |
| 564 | | | | Gamma Distribution Test | | | | | | Data Distribution | | |
| 565 | | | | | | k star (bias corrected) 2.985 | | | | Data appear Gamma Distributed at 5% Significance Level | | |
| 566 | | | | | | Theta Star 18.73 | | | | | | |
| 567 | | | | | | MLE of Mean 55.91 | | | | | | |
| 568 | | | | | | MLE of Standard Deviation 32.36 | | | | | | |
| 569 | | | | | | nu star 465.7 | | | | | | |
| 570 | | | | | | Approximate Chi Square Value (.05) 416.7 | | | | Nonparametric Statistics | | |
| 571 | | | | | | Adjusted Level of Significance 0.0469 | | | | | 95% CLT UCL | 61.94 |
| 572 | | | | | | Adjusted Chi Square Value 415.8 | | | | | 95% Jackknife UCL | 62.02 |
| 573 | | | | | | | | | | | 95% Standard Bootstrap UCL | 62.03 |
| 574 | | | | | | Anderson-Darling Test Statistic 0.684 | | | | | 95% Bootstrap-t UCL | 62.63 |
| 575 | | | | | | Anderson-Darling 5% Critical Value 0.758 | | | | | 95% Hall's Bootstrap UCL | 62.73 |
| 576 | | | | | | Kolmogorov-Smirnov Test Statistic 0.0913 | | | | | 95% Percentile Bootstrap UCL | 61.92 |
| 577 | | | | | | Kolmogorov-Smirnov 5% Critical Value 0.102 | | | | | 95% BCA Bootstrap UCL | 62.72 |
| 578 | | | | Data appear Gamma Distributed at 5% Significance Level | | | | | | | 95% Chebyshev(Mean, Sd) UCL | 71.91 |
| 579 | | | | | | | | | | | 97.5% Chebyshev(Mean, Sd) UCL | 78.83 |
| 580 | | | | Assuming Gamma Distribution | | | | | | | 99% Chebyshev(Mean, Sd) UCL | 92.43 |
| 581 | | | | | | 95% Approximate Gamma UCL (Use when n >= 40) 62.49 | | | | | | |
| 582 | | | | | | 95% Adjusted Gamma UCL (Use when n < 40) 62.62 | | | | | | |
| 583 | | | | | | | | | | | | |
| 584 | | | | Potential UCL to Use | | | | | | | Use 95% Approximate Gamma UCL | 62.49 |
| 585 | | | | | | | | | | | | |
| 586 | | | | Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | | | | | | |
| 587 | | | | These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) | | | | | | | | |
| 588 | | | | and Singh and Singh (2003). For additional insight, the user may want to consult a statistician. | | | | | | | | |
| 589 | | | | | | | | | | | | |
| 590 | | | | | | | | | | | | |
| 591 | Zinc | | | | | | | | | | | |
| 592 | | | | | | | | | | | | |
| 593 | | | | | | General Statistics | | | | | | |
| 594 | | | | | | Number of Valid Observations 78 | | | | | Number of Distinct Observations | 57 |
| 595 | | | | | | | | | | | | |
| 596 | | | | Raw Statistics | | | | | | Log-transformed Statistics | | |
| 597 | | | | | | Minimum 11 | | | | | Minimum of Log Data | 2.398 |
| 598 | | | | | | Maximum 960 | | | | | Maximum of Log Data | 6.867 |
| 599 | | | | | | Mean 127.9 | | | | | Mean of log Data | 4.242 |
| 600 | | | | | | Geometric Mean 69.53 | | | | | SD of log Data | 1.065 |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 601 | | | | | Median | 52.25 | | | | | | |
| 602 | | | | | SD | 170.2 | | | | | | |
| 603 | | | | | Std. Error of Mean | 19.27 | | | | | | |
| 604 | | | | | Coefficient of Variation | 1.331 | | | | | | |
| 605 | | | | | Skewness | 2.633 | | | | | | |
| 606 | | | | | | | | | | | | |
| 607 | | | | | **Relevant UCL Statistics** | | | | | | | |
| 608 | | | | **Normal Distribution Test** | | | | | | **Lognormal Distribution Test** | | |
| 609 | | | | | Lilliefors Test Statistic | 0.27 | | | | | Lilliefors Test Statistic | 0.117 |
| 610 | | | | | Lilliefors Critical Value | 0.1 | | | | | Lilliefors Critical Value | 0.1 |
| 611 | | | | **Data not Normal at 5% Significance Level** | | | | | | | **Data not Lognormal at 5% Significance Level** | |
| 612 | | | | | | | | | | | | |
| 613 | | | | **Assuming Normal Distribution** | | | | | | **Assuming Lognormal Distribution** | | |
| 614 | | | | | 95% Student's-t UCL | 159.9 | | | | | 95% H-UCL | 162.7 |
| 615 | | | | **95% UCLs (Adjusted for Skewness)** | | | | | | | 95% Chebyshev (MVUE) UCL | 198.7 |
| 616 | | | | | 95% Adjusted-CLT UCL (Chen-1995) | 165.7 | | | | | 97.5% Chebyshev (MVUE) UCL | 232.2 |
| 617 | | | | | 95% Modified-t UCL (Johnson-1978) | 160.9 | | | | | 99% Chebyshev (MVUE) UCL | 298 |
| 618 | | | | | | | | | | | | |
| 619 | | | | **Gamma Distribution Test** | | | | | | **Data Distribution** | | |
| 620 | | | | | k star (bias corrected) | 0.925 | | | | **Data do not follow a Discernable Distribution (0.05)** | | |
| 621 | | | | | Theta Star | 138.3 | | | | | | |
| 622 | | | | | MLE of Mean | 127.9 | | | | | | |
| 623 | | | | | MLE of Standard Deviation | 133 | | | | | | |
| 624 | | | | | nu star | 144.3 | | | | | | |
| 625 | | | | | Approximate Chi Square Value (.05) | 117.5 | | | | **Nonparametric Statistics** | | |
| 626 | | | | | Adjusted Level of Significance | 0.0469 | | | | | 95% CLT UCL | 159.6 |
| 627 | | | | | Adjusted Chi Square Value | 117.1 | | | | | 95% Jackknife UCL | 159.9 |
| 628 | | | | | | | | | | | 95% Standard Bootstrap UCL | 159.1 |
| 629 | | | | | Anderson-Darling Test Statistic | 3.033 | | | | | 95% Bootstrap-t UCL | 171.2 |
| 630 | | | | | Anderson-Darling 5% Critical Value | 0.784 | | | | | 95% Hall's Bootstrap UCL | 172.6 |
| 631 | | | | | Kolmogorov-Smirnov Test Statistic | 0.177 | | | | | 95% Percentile Bootstrap UCL | 161.6 |
| 632 | | | | | Kolmogorov-Smirnov 5% Critical Value | 0.104 | | | | | 95% BCA Bootstrap UCL | 166.7 |
| 633 | | | | **Data not Gamma Distributed at 5% Significance Level** | | | | | | | 95% Chebyshev(Mean, Sd) UCL | 211.8 |
| 634 | | | | | | | | | | | 97.5% Chebyshev(Mean, Sd) UCL | 248.2 |
| 635 | | | | **Assuming Gamma Distribution** | | | | | | | 99% Chebyshev(Mean, Sd) UCL | 319.6 |
| 636 | | | | | 95% Approximate Gamma UCL (Use when n >= 40) | 157 | | | | | | |
| 637 | | | | | 95% Adjusted Gamma UCL (Use when n < 40) | 157.6 | | | | | | |
| 638 | | | | | | | | | | | | |
| 639 | | | | **Potential UCL to Use** | | | | | | | Use 95% Chebyshev (Mean, Sd) UCL | 211.8 |
| 640 | | | | | | | | | | | | |
| 641 | **Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.** | | | | | | | | | | | |
| 642 | **These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)** | | | | | | | | | | | |
| 643 | **and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.** | | | | | | | | | | | |
| 644 | | | | | | | | | | | | |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | General UCL Statistics for Data Sets with Non-Detects - Baseline Pesticides | | | | | | | | |
| 2 | | | User Selected Options | | | | | | | | | |
| 3 | | | From File | Tbl 4 rev3.wst | | | | | | | | |
| 4 | | | Full Precision | OFF | | | | | | | | |
| 5 | | | Confidence Coefficient | 95% | | | | | | | | |
| 6 | | | Number of Bootstrap Operations | 2000 | | | | | | | | |
| 7 | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | |
| 9 | 4,4'-DDD | | | | | | | | | | | |
| 10 | | | | | | | | | | | | |
| 11 | | | | | | General Statistics | | | | | | |
| 12 | | | | | | Number of Valid Data | 54 | | | Number of Detected Data | | 6 |
| 13 | | | | | | Number of Distinct Detected Data | 6 | | | Number of Non-Detect Data | | 48 |
| 14 | | | | | | | | | | Percent Non-Detects | | 88.89% |
| 15 | | | | | | | | | | | | |
| 16 | | | | Raw Statistics | | | | | | Log-transformed Statistics | | |
| 17 | | | | | | Minimum Detected | 1.4 | | | Minimum Detected | | 0.336 |
| 18 | | | | | | Maximum Detected | 34 | | | Maximum Detected | | 3.526 |
| 19 | | | | | | Mean of Detected | 12.77 | | | Mean of Detected | | 2.119 |
| 20 | | | | | | SD of Detected | 11.79 | | | SD of Detected | | 1.112 |
| 21 | | | | | | Minimum Non-Detect | 2.16 | | | Minimum Non-Detect | | 0.77 |
| 22 | | | | | | Maximum Non-Detect | 59 | | | Maximum Non-Detect | | 4.078 |
| 23 | | | | | | | | | | | | |
| 24 | Note: Data have multiple DLs - Use of KM Method is recommended | | | | | | | | | Number treated as Non-Detect | | 54 |
| 25 | For all methods (except KM, DL/2, and ROS Methods), | | | | | | | | | Number treated as Detected | | 0 |
| 26 | Observations < Largest ND are treated as NDs | | | | | | | | | Single DL Non-Detect Percentage | | 100.00% |
| 27 | | | | | | | | | | | | |
| 28 | | | | | | Warning: There are only 6 Detected Values in this data | | | | | | |
| 29 | | | | | | Note: It should be noted that even though bootstrap may be performed on this data set | | | | | | |
| 30 | | | | | | the resulting calculations may not be reliable enough to draw conclusions | | | | | | |
| 31 | | | | | | | | | | | | |
| 32 | | | | | | It is recommended to have 10-15 or more distinct observations for accurate and meaningful results. | | | | | | |
| 33 | | | | | | | | | | | | |
| 34 | | | | | | | | | | | | |
| 35 | | | | | | UCL Statistics | | | | | | |
| 36 | | | | Normal Distribution Test with Detected Values Only | | | | | | Lognormal Distribution Test with Detected Values Only | | |
| 37 | | | | | | Shapiro Wilk Test Statistic | 0.877 | | | Shapiro Wilk Test Statistic | | 0.963 |
| 38 | | | | | | 5% Shapiro Wilk Critical Value | 0.788 | | | 5% Shapiro Wilk Critical Value | | 0.788 |
| 39 | | | | | | Data appear Normal at 5% Significance Level | | | | Data appear Lognormal at 5% Significance Level | | |
| 40 | | | | | | | | | | | | |
| 41 | | | | | | Assuming Normal Distribution | | | | Assuming Lognormal Distribution | | |
| 42 | | | | | | DL/2 Substitution Method | | | | DL/2 Substitution Method | | |
| 43 | | | | | | Mean | 6.218 | | | Mean | | 1.444 |
| 44 | | | | | | SD | 6.703 | | | SD | | 0.83 |
| 45 | | | | | | 95% DL/2 (t) UCL | 7.745 | | | 95% H-Stat (DL/2) UCL | | 7.64 |
| 46 | | | | | | | | | | | | |
| 47 | | | | | | Maximum Likelihood Estimate(MLE) Method | N/A | | | Log ROS Method | | |
| 48 | | | | | | MLE method failed to converge properly | | | | Mean in Log Scale | | 0.455 |
| 49 | | | | | | | | | | SD in Log Scale | | 0.794 |
| 50 | | | | | | | | | | Mean in Original Scale | | 2.658 |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 51 | | | | | | | | | | | SD in Original Scale | 5.141 |
| 52 | | | | | | | | | | | 95% t UCL | 3.83 |
| 53 | | | | | | | | | | | 95% Percentile Bootstrap UCL | 3.994 |
| 54 | | | | | | | | | | | 95% BCA Bootstrap UCL | 4.437 |
| 55 | | | | | | | | | | | 95% H-UCL | 2.72 |
| 56 | | | | | | | | | | | | |
| 57 | | | **Gamma Distribution Test with Detected Values Only** | | | | | | **Data Distribution Test with Detected Values Only** | | | |
| 58 | | | | | k star (bias corrected) | 0.766 | | | **Data appear Normal at 5% Significance Level** | | | |
| 59 | | | | | Theta Star | 16.66 | | | | | | |
| 60 | | | | | nu star | 9.197 | | | | | | |
| 61 | | | | | | | | | | | | |
| 62 | | | | | A-D Test Statistic | 0.208 | | | **Nonparametric Statistics** | | | |
| 63 | | | | | 5% A-D Critical Value | 0.711 | | | | | Kaplan-Meier (KM) Method | |
| 64 | | | | | K-S Test Statistic | 0.711 | | | | | Mean | 2.99 |
| 65 | | | | | 5% K-S Critical Value | 0.339 | | | | | SD | 5.293 |
| 66 | | | **Data appear Gamma Distributed at 5% Significance Level** | | | | | | | | SE of Mean | 0.847 |
| 67 | | | | | | | | | | | 95% KM (t) UCL | 4.407 |
| 68 | | | **Assuming Gamma Distribution** | | | | | | | | 95% KM (z) UCL | 4.383 |
| 69 | | | | | Gamma ROS Statistics using Extrapolated Data | | | | | | 95% KM (jackknife) UCL | 5.358 |
| 70 | | | | | Minimum | 0.000001 | | | | | 95% KM (bootstrap t) UCL | 4.579 |
| 71 | | | | | Maximum | 34 | | | | | 95% KM (BCA) UCL | 14.47 |
| 72 | | | | | Mean | 2.366 | | | | | 95% KM (Percentile Bootstrap) UCL | 7.962 |
| 73 | | | | | Median | 0.000001 | | | | | 95% KM (Chebyshev) UCL | 6.68 |
| 74 | | | | | SD | 5.532 | | | | | 97.5% KM (Chebyshev) UCL | 8.277 |
| 75 | | | | | k star | 0.106 | | | | | 99% KM (Chebyshev) UCL | 11.41 |
| 76 | | | | | Theta star | 22.41 | | | | | | |
| 77 | | | | | Nu star | 11.41 | | | **Potential UCLs to Use** | | | |
| 78 | | | | | AppChi2 | 4.838 | | | | | 95% KM (t) UCL | 4.407 |
| 79 | | | | | 95% Gamma Approximate UCL (Use when n >= 40) | 5.578 | | | | | 95% KM (Percentile Bootstrap) UCL | 7.962 |
| 80 | | | | | 95% Adjusted Gamma UCL (Use when n < 40) | 5.717 | | | | | | |
| 81 | **Note: DL/2 is not a recommended method.** | | | | | | | | | | | |
| 82 | | | | | | | | | | | | |
| 83 | | | **Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.** | | | | | | | | | |
| 84 | | | **These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).** | | | | | | | | | |
| 85 | | | **For additional insight, the user may want to consult a statistician.** | | | | | | | | | |
| 86 | | | | | | | | | | | | |
| 87 | | | | | | | | | | | | |
| 88 | **alpha-BHC** | | | | | | | | | | | |
| 89 | | | | | | | | | | | | |
| 90 | | | | | **General Statistics** | | | | | | | |
| 91 | | | | | Number of Valid Data | 54 | | | | | Number of Detected Data | 7 |
| 92 | | | | | Number of Distinct Detected Data | 7 | | | | | Number of Non-Detect Data | 47 |
| 93 | | | | | | | | | | | Percent Non-Detects | 87.04% |
| 94 | | | | | | | | | | | | |
| 95 | | | **Raw Statistics** | | | | | | **Log-transformed Statistics** | | | |
| 96 | | | | | Minimum Detected | 0.68 | | | | | Minimum Detected | -0.386 |
| 97 | | | | | Maximum Detected | 10 | | | | | Maximum Detected | 2.303 |
| 98 | | | | | Mean of Detected | 4.954 | | | | | Mean of Detected | 1.305 |
| 99 | | | | | SD of Detected | 3.344 | | | | | SD of Detected | 0.946 |
| 100 | | | | | Minimum Non-Detect | 1.29 | | | | | Minimum Non-Detect | 0.255 |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 101 | | | | | Maximum Non-Detect | 31 | | | | | Maximum Non-Detect | 3.434 |
| 102 | | | | | | | | | | | | |
| 103 | Note: Data have multiple DLs - Use of KM Method is recommended | | | | | | | | | | Number treated as Non-Detect | 54 |
| 104 | For all methods (except KM, DL/2, and ROS Methods), | | | | | | | | | | Number treated as Detected | 0 |
| 105 | Observations < Largest ND are treated as NDs | | | | | | | | | | Single DL Non-Detect Percentage | 100.00% |
| 106 | | | | | | | | | | | | |
| 107 | | | | | Warning: There are only 7 Detected Values in this data | | | | | | | |
| 108 | | | | | Note: It should be noted that even though bootstrap may be performed on this data set | | | | | | | |
| 109 | | | | | the resulting calculations may not be reliable enough to draw conclusions | | | | | | | |
| 110 | | | | | | | | | | | | |
| 111 | | | | | It is recommended to have 10-15 or more distinct observations for accurate and meaningful results. | | | | | | | |
| 112 | | | | | | | | | | | | |
| 113 | | | | | | | | | | | | |
| 114 | | | | | UCL Statistics | | | | | | | |
| 115 | | | | | Normal Distribution Test with Detected Values Only | | | | | | Lognormal Distribution Test with Detected Values Only | |
| 116 | | | | | Shapiro Wilk Test Statistic | 0.974 | | | | | Shapiro Wilk Test Statistic | 0.921 |
| 117 | | | | | 5% Shapiro Wilk Critical Value | 0.803 | | | | | 5% Shapiro Wilk Critical Value | 0.803 |
| 118 | | | | | Data appear Normal at 5% Significance Level | | | | | | Data appear Lognormal at 5% Significance Level | |
| 119 | | | | | | | | | | | | |
| 120 | | | | | Assuming Normal Distribution | | | | | | Assuming Lognormal Distribution | |
| 121 | | | | | DL/2 Substitution Method | | | | | | DL/2 Substitution Method | |
| 122 | | | | | Mean | 3.084 | | | | | Mean | 0.778 |
| 123 | | | | | SD | 2.997 | | | | | SD | 0.807 |
| 124 | | | | | 95% DL/2 (t) UCL | 3.767 | | | | | 95% H-Stat (DL/2) UCL | 3.817 |
| 125 | | | | | | | | | | | | |
| 126 | | | | | Maximum Likelihood Estimate(MLE) Method | N/A | | | | | Log ROS Method | |
| 127 | | | | | MLE method failed to converge properly | | | | | | Mean in Log Scale | 0.0593 |
| 128 | | | | | | | | | | | SD in Log Scale | 0.694 |
| 129 | | | | | | | | | | | Mean in Original Scale | 1.47 |
| 130 | | | | | | | | | | | SD in Original Scale | 1.797 |
| 131 | | | | | | | | | | | 95% t UCL | 1.88 |
| 132 | | | | | | | | | | | 95% Percentile Bootstrap UCL | 1.906 |
| 133 | | | | | | | | | | | 95% BCA Bootstrap UCL | 2.003 |
| 134 | | | | | | | | | | | 95% H-UCL | 1.638 |
| 135 | | | | | | | | | | | | |
| 136 | | | | | Gamma Distribution Test with Detected Values Only | | | | | | Data Distribution Test with Detected Values Only | |
| 137 | | | | | k star (bias corrected) | 1.148 | | | | | Data appear Normal at 5% Significance Level | |
| 138 | | | | | Theta Star | 4.314 | | | | | | |
| 139 | | | | | nu star | 16.08 | | | | | | |
| 140 | | | | | | | | | | | | |
| 141 | | | | | A-D Test Statistic | 0.214 | | | | | Nonparametric Statistics | |
| 142 | | | | | 5% A-D Critical Value | 0.717 | | | | | Kaplan-Meier (KM) Method | |
| 143 | | | | | K-S Test Statistic | 0.717 | | | | | Mean | 1.598 |
| 144 | | | | | 5% K-S Critical Value | 0.316 | | | | | SD | 1.956 |
| 145 | | | | | Data appear Gamma Distributed at 5% Significance Level | | | | | | SE of Mean | 0.377 |
| 146 | | | | | | | | | | | 95% KM (t) UCL | 2.229 |
| 147 | | | | | Assuming Gamma Distribution | | | | | | 95% KM (z) UCL | 2.218 |
| 148 | | | | | Gamma ROS Statistics using Extrapolated Data | | | | | | 95% KM (jackknife) UCL | 2.307 |
| 149 | | | | | Minimum | 0.000001 | | | | | 95% KM (bootstrap t) UCL | 2.245 |
| 150 | | | | | Maximum | 10 | | | | | 95% KM (BCA) UCL | 4.915 |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 151 | | | | | Mean | 1.664 | | | | 95% KM (Percentile Bootstrap) UCL | | 4.089 |
| 152 | | | | | Median | 1.169 | | | | 95% KM (Chebyshev) UCL | | 3.242 |
| 153 | | | | | SD | 1.979 | | | | 97.5% KM (Chebyshev) UCL | | 3.954 |
| 154 | | | | | k star | 0.238 | | | | 99% KM (Chebyshev) UCL | | 5.352 |
| 155 | | | | | Theta star | 6.991 | | | | | | |
| 156 | | | | | Nu star | 25.71 | | | | **Potential UCLs to Use** | | |
| 157 | | | | | AppChi2 | 15.15 | | | | 95% KM (t) UCL | | 2.229 |
| 158 | | | | 95% Gamma Approximate UCL (Use when n >= 40) | | 2.823 | | | | 95% KM (Percentile Bootstrap) UCL | | 4.089 |
| 159 | | | | 95% Adjusted Gamma UCL (Use when n < 40) | | 2.865 | | | | | | |
| 160 | **Note: DL/2 is not a recommended method.** | | | | | | | | | | | |
| 161 | | | | | | | | | | | | |
| 162 | **Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.** | | | | | | | | | | | |
| 163 | **These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).** | | | | | | | | | | | |
| 164 | **For additional insight, the user may want to consult a statistician.** | | | | | | | | | | | |
| 165 | | | | | | | | | | | | |
| 166 | | | | | | | | | | | | |
| 167 | **alpha-Chlordane** | | | | | | | | | | | |
| 168 | | | | | | | | | | | | |
| 169 | **General Statistics** | | | | | | | | | | | |
| 170 | | | | | Number of Valid Data | 54 | | | | Number of Detected Data | | 6 |
| 171 | | | | | Number of Distinct Detected Data | 6 | | | | Number of Non-Detect Data | | 48 |
| 172 | | | | | | | | | | Percent Non-Detects | | 88.89% |
| 173 | | | | | | | | | | | | |
| 174 | **Raw Statistics** | | | | | | **Log-transformed Statistics** | | | | | |
| 175 | | | | | Minimum Detected | 0.74 | | | | Minimum Detected | | -0.301 |
| 176 | | | | | Maximum Detected | 91 | | | | Maximum Detected | | 4.511 |
| 177 | | | | | Mean of Detected | 18.71 | | | | Mean of Detected | | 1.633 |
| 178 | | | | | SD of Detected | 35.58 | | | | SD of Detected | | 1.689 |
| 179 | | | | | Minimum Non-Detect | 1.09 | | | | Minimum Non-Detect | | 0.0862 |
| 180 | | | | | Maximum Non-Detect | 31 | | | | Maximum Non-Detect | | 3.434 |
| 181 | | | | | | | | | | | | |
| 182 | Note: Data have multiple DLs - Use of KM Method is recommended | | | | | | | | | Number treated as Non-Detect | | 53 |
| 183 | For all methods (except KM, DL/2, and ROS Methods), | | | | | | | | | Number treated as Detected | | 1 |
| 184 | Observations < Largest ND are treated as NDs | | | | | | | | | Single DL Non-Detect Percentage | | 98.15% |
| 185 | | | | | | | | | | | | |
| 186 | **Warning: There are only 6 Detected Values in this data** | | | | | | | | | | | |
| 187 | **Note: It should be noted that even though bootstrap may be performed on this data set** | | | | | | | | | | | |
| 188 | **the resulting calculations may not be reliable enough to draw conclusions** | | | | | | | | | | | |
| 189 | | | | | | | | | | | | |
| 190 | **It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.** | | | | | | | | | | | |
| 191 | | | | | | | | | | | | |
| 192 | | | | | | | | | | | | |
| 193 | **UCL Statistics** | | | | | | | | | | | |
| 194 | **Normal Distribution Test with Detected Values Only** | | | | | | **Lognormal Distribution Test with Detected Values Only** | | | | | |
| 195 | | | | | Shapiro Wilk Test Statistic | 0.582 | | | | Shapiro Wilk Test Statistic | | 0.95 |
| 196 | | | | | 5% Shapiro Wilk Critical Value | 0.788 | | | | 5% Shapiro Wilk Critical Value | | 0.788 |
| 197 | **Data not Normal at 5% Significance Level** | | | | | | **Data appear Lognormal at 5% Significance Level** | | | | | |
| 198 | | | | | | | | | | | | |
| 199 | **Assuming Normal Distribution** | | | | | | **Assuming Lognormal Distribution** | | | | | |
| 200 | | | | | DL/2 Substitution Method | | | | | DL/2 Substitution Method | | |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 201 | | | | | Mean | 4.484 | | | | | Mean | 0.757 |
| 202 | | | | | SD | 12.35 | | | | | SD | 0.952 |
| 203 | | | | | 95% DL/2 (t) UCL | 7.297 | | | | | 95% H-Stat (DL/2) UCL | 4.517 |
| 204 | | | | | | | | | | | | |
| 205 | | | | Maximum Likelihood Estimate(MLE) Method | | N/A | | | | | Log ROS Method | |
| 206 | | | | **MLE method failed to converge properly** | | | | | | | Mean in Log Scale | -0.255 |
| 207 | | | | | | | | | | | SD in Log Scale | 1.006 |
| 208 | | | | | | | | | | | Mean in Original Scale | 2.711 |
| 209 | | | | | | | | | | | SD in Original Scale | 12.34 |
| 210 | | | | | | | | | | | 95% t UCL | 5.522 |
| 211 | | | | | | | | | | | 95% Percentile Bootstrap UCL | 5.981 |
| 212 | | | | | | | | | | | 95% BCA Bootstrap UCL | 7.956 |
| 213 | | | | | | | | | | | 95% H-UCL | 1.774 |
| 214 | | | | | | | | | | | | |
| 215 | | | | **Gamma Distribution Test with Detected Values Only** | | | | | | **Data Distribution Test with Detected Values Only** | | |
| 216 | | | | | k star (bias corrected) | 0.357 | | | | **Data appear Gamma Distributed at 5% Significance Level** | | |
| 217 | | | | | Theta Star | 52.41 | | | | | | |
| 218 | | | | | nu star | 4.283 | | | | | | |
| 219 | | | | | | | | | | | | |
| 220 | | | | | A-D Test Statistic | 0.578 | | | | **Nonparametric Statistics** | | |
| 221 | | | | | 5% A-D Critical Value | 0.737 | | | | | Kaplan-Meier (KM) Method | |
| 222 | | | | | K-S Test Statistic | 0.737 | | | | | Mean | 3.005 |
| 223 | | | | | 5% K-S Critical Value | 0.349 | | | | | SD | 12.19 |
| 224 | | | | **Data appear Gamma Distributed at 5% Significance Level** | | | | | | | SE of Mean | 1.829 |
| 225 | | | | | | | | | | | 95% KM (t) UCL | 6.067 |
| 226 | | | | **Assuming Gamma Distribution** | | | | | | | 95% KM (z) UCL | 6.013 |
| 227 | | | | | Gamma ROS Statistics using Extrapolated Data | | | | | | 95% KM (jackknife) UCL | 5.505 |
| 228 | | | | | Minimum | 0.000001 | | | | | 95% KM (bootstrap t) UCL | 17.19 |
| 229 | | | | | Maximum | 91 | | | | | 95% KM (BCA) UCL | 10 |
| 230 | | | | | Mean | 2.493 | | | | | 95% KM (Percentile Bootstrap) UCL | 7.77 |
| 231 | | | | | Median | 0.000001 | | | | | 95% KM (Chebyshev) UCL | 10.98 |
| 232 | | | | | SD | 12.51 | | | | | 97.5% KM (Chebyshev) UCL | 14.42 |
| 233 | | | | | k star | 0.0782 | | | | | 99% KM (Chebyshev) UCL | 21.2 |
| 234 | | | | | Theta star | 31.87 | | | | | | |
| 235 | | | | | Nu star | 8.449 | | | | **Potential UCLs to Use** | | |
| 236 | | | | | AppChi2 | 2.998 | | | | | 95% KM (t) UCL | 6.067 |
| 237 | | | | | 95% Gamma Approximate UCL (Use when n >= 40) | 7.027 | | | | | | |
| 238 | | | | | 95% Adjusted Gamma UCL (Use when n < 40) | 7.241 | | | | | | |
| 239 | **Note: DL/2 is not a recommended method.** | | | | | | | | | | | |
| 240 | | | | | | | | | | | | |
| 241 | | | | **Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.** | | | | | | | | |
| 242 | | | | **These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).** | | | | | | | | |
| 243 | | | | **For additional insight, the user may want to consult a statistician.** | | | | | | | | |
| 244 | | | | | | | | | | | | |
| 245 | | | | | | | | | | | | |
| 246 | **beta-BHC** | | | | | | | | | | | |
| 247 | | | | | | | | | | | | |
| 248 | | | | | **General Statistics** | | | | | | | |
| 249 | | | | | Number of Valid Data | 54 | | | | | Number of Detected Data | 5 |
| 250 | | | | | Number of Distinct Detected Data | 5 | | | | | Number of Non-Detect Data | 49 |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 251 | | | | | | | | | | | Percent Non-Detects | 90.74% |
| 252 | | | | | | | | | | | | |
| 253 | **Raw Statistics** | | | | | | **Log-transformed Statistics** | | | | | |
| 254 | | | | | Minimum Detected | 2.3 | | | | | Minimum Detected | 0.833 |
| 255 | | | | | Maximum Detected | 14 | | | | | Maximum Detected | 2.639 |
| 256 | | | | | Mean of Detected | 9.44 | | | | | Mean of Detected | 2.059 |
| 257 | | | | | SD of Detected | 5.088 | | | | | SD of Detected | 0.768 |
| 258 | | | | | Minimum Non-Detect | 1.7 | | | | | Minimum Non-Detect | 0.531 |
| 259 | | | | | Maximum Non-Detect | 31 | | | | | Maximum Non-Detect | 3.434 |
| 260 | | | | | | | | | | | | |
| 261 | Note: Data have multiple DLs - Use of KM Method is recommended | | | | | | | | | | Number treated as Non-Detect | 54 |
| 262 | For all methods (except KM, DL/2, and ROS Methods), | | | | | | | | | | Number treated as Detected | 0 |
| 263 | Observations < Largest ND are treated as NDs | | | | | | | | | | Single DL Non-Detect Percentage | 100.00% |
| 264 | | | | | | | | | | | | |
| 265 | **Warning: There are only 5 Detected Values in this data** | | | | | | | | | | | |
| 266 | **Note: It should be noted that even though bootstrap may be performed on this data set** | | | | | | | | | | | |
| 267 | **the resulting calculations may not be reliable enough to draw conclusions** | | | | | | | | | | | |
| 268 | | | | | | | | | | | | |
| 269 | **It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.** | | | | | | | | | | | |
| 270 | | | | | | | | | | | | |
| 271 | | | | | | | | | | | | |
| 272 | **UCL Statistics** | | | | | | | | | | | |
| 273 | **Normal Distribution Test with Detected Values Only** | | | | | | **Lognormal Distribution Test with Detected Values Only** | | | | | |
| 274 | | | | | Shapiro Wilk Test Statistic | 0.87 | | | | | Shapiro Wilk Test Statistic | 0.821 |
| 275 | | | | | 5% Shapiro Wilk Critical Value | 0.762 | | | | | 5% Shapiro Wilk Critical Value | 0.762 |
| 276 | **Data appear Normal at 5% Significance Level** | | | | | | **Data appear Lognormal at 5% Significance Level** | | | | | |
| 277 | | | | | | | | | | | | |
| 278 | **Assuming Normal Distribution** | | | | | | **Assuming Lognormal Distribution** | | | | | |
| 279 | | | | | DL/2 Substitution Method | | | | | | DL/2 Substitution Method | |
| 280 | | | | | Mean | 3.536 | | | | | Mean | 0.886 |
| 281 | | | | | SD | 3.591 | | | | | SD | 0.832 |
| 282 | | | | | 95% DL/2 (t) UCL | 4.354 | | | | | 95% H-Stat (DL/2) UCL | 4.384 |
| 283 | | | | | | | | | | | | |
| 284 | | | | | Maximum Likelihood Estimate(MLE) Method | N/A | | | | | Log ROS Method | |
| 285 | **MLE method failed to converge properly** | | | | | | | | | | Mean in Log Scale | -0.766 |
| 286 | | | | | | | | | | | SD in Log Scale | 1.115 |
| 287 | | | | | | | | | | | Mean in Original Scale | 1.253 |
| 288 | | | | | | | | | | | SD in Original Scale | 2.998 |
| 289 | | | | | | | | | | | 95% t UCL | 1.935 |
| 290 | | | | | | | | | | | 95% Percentile Bootstrap UCL | 2.005 |
| 291 | | | | | | | | | | | 95% BCA Bootstrap UCL | 2.137 |
| 292 | | | | | | | | | | | 95% H-UCL | 1.264 |
| 293 | | | | | | | | | | | | |
| 294 | **Gamma Distribution Test with Detected Values Only** | | | | | | **Data Distribution Test with Detected Values Only** | | | | | |
| 295 | | | | | k star (bias corrected) | 1.273 | **Data appear Normal at 5% Significance Level** | | | | | |
| 296 | | | | | Theta Star | 7.414 | | | | | | |
| 297 | | | | | nu star | 12.73 | | | | | | |
| 298 | | | | | | | | | | | | |
| 299 | | | | | A-D Test Statistic | 0.515 | **Nonparametric Statistics** | | | | | |
| 300 | | | | | 5% A-D Critical Value | 0.683 | | | | | Kaplan-Meier (KM) Method | |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 301 | | | | | K-S Test Statistic | 0.683 | | | | | Mean | 3.033 |
| 302 | | | | | 5% K-S Critical Value | 0.36 | | | | | SD | 2.576 |
| 303 | | | | **Data appear Gamma Distributed at 5% Significance Level** | | | | | | | SE of Mean | 0.409 |
| 304 | | | | | | | | | | | 95% KM (t) UCL | 3.717 |
| 305 | | | | **Assuming Gamma Distribution** | | | | | | | 95% KM (z) UCL | 3.705 |
| 306 | | | | Gamma ROS Statistics using Extrapolated Data | | | | | | | 95% KM (jackknife) UCL | 5.264 |
| 307 | | | | | Minimum | 0.000001 | | | | | 95% KM (bootstrap t) UCL | 3.487 |
| 308 | | | | | Maximum | 14 | | | | | 95% KM (BCA) UCL | 13.1 |
| 309 | | | | | Mean | 0.874 | | | | | 95% KM (Percentile Bootstrap) UCL | 13 |
| 310 | | | | | Median | 0.000001 | | | | | 95% KM (Chebyshev) UCL | 4.814 |
| 311 | | | | | SD | 3.095 | | | | | 97.5% KM (Chebyshev) UCL | 5.585 |
| 312 | | | | | k star | 0.0779 | | | | | 99% KM (Chebyshev) UCL | 7.099 |
| 313 | | | | | Theta star | 11.22 | | | | | | |
| 314 | | | | | Nu star | 8.412 | | | | | **Potential UCLs to Use** | |
| 315 | | | | | AppChi2 | 2.976 | | | | | 95% KM (t) UCL | 3.717 |
| 316 | | | | | 95% Gamma Approximate UCL (Use when n >= 40) | 2.471 | | | | | 95% KM (Percentile Bootstrap) UCL | 13 |
| 317 | | | | | 95% Adjusted Gamma UCL (Use when n < 40) | 2.546 | | | | | | |
| 318 | **Note: DL/2 is not a recommended method.** | | | | | | | | | | | |
| 319 | | | | | | | | | | | | |
| 320 | **Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.** | | | | | | | | | | | |
| 321 | **These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).** | | | | | | | | | | | |
| 322 | **For additional insight, the user may want to consult a statistician.** | | | | | | | | | | | |
| 323 | | | | | | | | | | | | |
| 324 | | | | | | | | | | | | |
| 325 | **delta-BHC** | | | | | | | | | | | |
| 326 | | | | | | | | | | | | |
| 327 | | | | | **General Statistics** | | | | | | | |
| 328 | | | | | Number of Valid Data | 54 | | | | | Number of Detected Data | 10 |
| 329 | | | | | Number of Distinct Detected Data | 10 | | | | | Number of Non-Detect Data | 44 |
| 330 | | | | | | | | | | | Percent Non-Detects | 81.48% |
| 331 | | | | | | | | | | | | |
| 332 | | | | **Raw Statistics** | | | | | | **Log-transformed Statistics** | | |
| 333 | | | | | Minimum Detected | 1.4 | | | | | Minimum Detected | 0.336 |
| 334 | | | | | Maximum Detected | 25 | | | | | Maximum Detected | 3.219 |
| 335 | | | | | Mean of Detected | 7.875 | | | | | Mean of Detected | 1.784 |
| 336 | | | | | SD of Detected | 6.685 | | | | | SD of Detected | 0.805 |
| 337 | | | | | Minimum Non-Detect | 1.7 | | | | | Minimum Non-Detect | 0.531 |
| 338 | | | | | Maximum Non-Detect | 31 | | | | | Maximum Non-Detect | 3.434 |
| 339 | | | | | | | | | | | | |
| 340 | Note: Data have multiple DLs - Use of KM Method is recommended | | | | | | | | | | Number treated as Non-Detect | 54 |
| 341 | For all methods (except KM, DL/2, and ROS Methods), | | | | | | | | | | Number treated as Detected | 0 |
| 342 | Observations < Largest ND are treated as NDs | | | | | | | | | | Single DL Non-Detect Percentage | 100.00% |
| 343 | | | | | | | | | | | | |
| 344 | | | | | **UCL Statistics** | | | | | | | |
| 345 | | | | **Normal Distribution Test with Detected Values Only** | | | | | | **Lognormal Distribution Test with Detected Values Only** | | |
| 346 | | | | | Shapiro Wilk Test Statistic | 0.782 | | | | | Shapiro Wilk Test Statistic | 0.974 |
| 347 | | | | | 5% Shapiro Wilk Critical Value | 0.842 | | | | | 5% Shapiro Wilk Critical Value | 0.842 |
| 348 | | | | **Data not Normal at 5% Significance Level** | | | | | | **Data appear Lognormal at 5% Significance Level** | | |
| 349 | | | | | | | | | | | | |
| 350 | | | | **Assuming Normal Distribution** | | | | | | **Assuming Lognormal Distribution** | | |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 351 | | | | | DL/2 Substitution Method | | | | | | DL/2 Substitution Method | |
| 352 | | | | | Mean | 3.844 | | | | | Mean | 0.936 |
| 353 | | | | | SD | 4.287 | | | | | SD | 0.87 |
| 354 | | | | | 95% DL/2 (t) UCL | 4.821 | | | | | 95% H-Stat (DL/2) UCL | 4.834 |
| 355 | | | | | | | | | | | | |
| 356 | | | | | Maximum Likelihood Estimate(MLE) Method | N/A | | | | | Log ROS Method | |
| 357 | | | | | **MLE method failed to converge properly** | | | | | | Mean in Log Scale | 0.493 |
| 358 | | | | | | | | | | | SD in Log Scale | 0.796 |
| 359 | | | | | | | | | | | Mean in Original Scale | 2.528 |
| 360 | | | | | | | | | | | SD in Original Scale | 3.793 |
| 361 | | | | | | | | | | | 95% t UCL | 3.392 |
| 362 | | | | | | | | | | | 95% Percentile Bootstrap UCL | 3.455 |
| 363 | | | | | | | | | | | 95% BCA Bootstrap UCL | 3.826 |
| 364 | | | | | | | | | | | 95% H-UCL | 2.832 |
| 365 | | | | | | | | | | | | |
| 366 | | | | | **Gamma Distribution Test with Detected Values Only** | | | | | | **Data Distribution Test with Detected Values Only** | |
| 367 | | | | | k star (bias corrected) | 1.423 | | | | | **Data appear Gamma Distributed at 5% Significance Level** | |
| 368 | | | | | Theta Star | 5.536 | | | | | | |
| 369 | | | | | nu star | 28.45 | | | | | | |
| 370 | | | | | | | | | | | | |
| 371 | | | | | A-D Test Statistic | 0.272 | | | | | **Nonparametric Statistics** | |
| 372 | | | | | 5% A-D Critical Value | 0.736 | | | | | Kaplan-Meier (KM) Method | |
| 373 | | | | | K-S Test Statistic | 0.736 | | | | | Mean | 2.837 |
| 374 | | | | | 5% K-S Critical Value | 0.27 | | | | | SD | 3.804 |
| 375 | | | | | **Data appear Gamma Distributed at 5% Significance Level** | | | | | | SE of Mean | 0.573 |
| 376 | | | | | | | | | | | 95% KM (t) UCL | 3.795 |
| 377 | | | | | **Assuming Gamma Distribution** | | | | | | 95% KM (z) UCL | 3.779 |
| 378 | | | | | Gamma ROS Statistics using Extrapolated Data | | | | | | 95% KM (jackknife) UCL | 3.688 |
| 379 | | | | | Minimum | 0.000001 | | | | | 95% KM (bootstrap t) UCL | 4.219 |
| 380 | | | | | Maximum | 25 | | | | | 95% KM (BCA) UCL | 6.243 |
| 381 | | | | | Mean | 1.838 | | | | | 95% KM (Percentile Bootstrap) UCL | 5.587 |
| 382 | | | | | Median | 0.000001 | | | | | 95% KM (Chebyshev) UCL | 5.333 |
| 383 | | | | | SD | 4.115 | | | | | 97.5% KM (Chebyshev) UCL | 6.413 |
| 384 | | | | | k star | 0.106 | | | | | 99% KM (Chebyshev) UCL | 8.535 |
| 385 | | | | | Theta star | 17.37 | | | | | | |
| 386 | | | | | Nu star | 11.43 | | | | | **Potential UCLs to Use** | |
| 387 | | | | | AppChi2 | 4.853 | | | | | 95% KM (t) UCL | 3.795 |
| 388 | | | | | 95% Gamma Approximate UCL (Use when n >= 40) | 4.329 | | | | | | |
| 389 | | | | | 95% Adjusted Gamma UCL (Use when n < 40) | 4.437 | | | | | | |
| 390 | **Note: DL/2 is not a recommended method.** | | | | | | | | | | | |
| 391 | | | | | | | | | | | | |
| 392 | | | | | **Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.** | | | | | | | |
| 393 | | | | | **These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).** | | | | | | | |
| 394 | | | | | **For additional insight, the user may want to consult a statistician.** | | | | | | | |
| 395 | | | | | | | | | | | | |
| 396 | | | | | | | | | | | | |
| 397 | **gamma-BHC(Lindane)** | | | | | | | | | | | |
| 398 | | | | | | | | | | | | |
| 399 | | | | | **General Statistics** | | | | | | | |
| 400 | | | | | Number of Valid Data | 58 | | | | | Number of Detected Data | 9 |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 401 | | | | | Number of Distinct Detected Data | 8 | | | | | Number of Non-Detect Data | 49 |
| 402 | | | | | | | | | | | Percent Non-Detects | 84.48% |
| 403 | | | | | | | | | | | | |
| 404 | | | | Raw Statistics | | | | | | Log-transformed Statistics | | |
| 405 | | | | | Minimum Detected | 1.1 | | | | | Minimum Detected | 0.0953 |
| 406 | | | | | Maximum Detected | 9.9 | | | | | Maximum Detected | 2.293 |
| 407 | | | | | Mean of Detected | 4.467 | | | | | Mean of Detected | 1.351 |
| 408 | | | | | SD of Detected | 2.491 | | | | | SD of Detected | 0.604 |
| 409 | | | | | Minimum Non-Detect | 0.33 | | | | | Minimum Non-Detect | -1.109 |
| 410 | | | | | Maximum Non-Detect | 31 | | | | | Maximum Non-Detect | 3.434 |
| 411 | | | | | | | | | | | | |
| 412 | Note: Data have multiple DLs - Use of KM Method is recommended | | | | | | | | | | Number treated as Non-Detect | 58 |
| 413 | For all methods (except KM, DL/2, and ROS Methods), | | | | | | | | | | Number treated as Detected | 0 |
| 414 | Observations < Largest ND are treated as NDs | | | | | | | | | | Single DL Non-Detect Percentage | 100.00% |
| 415 | | | | | | | | | | | | |
| 416 | | | | Warning: There are only 9 Detected Values in this data | | | | | | | | |
| 417 | | | | Note: It should be noted that even though bootstrap may be performed on this data set | | | | | | | | |
| 418 | | | | the resulting calculations may not be reliable enough to draw conclusions | | | | | | | | |
| 419 | | | | | | | | | | | | |
| 420 | | | | It is recommended to have 10-15 or more distinct observations for accurate and meaningful results. | | | | | | | | |
| 421 | | | | | | | | | | | | |
| 422 | | | | | | | | | | | | |
| 423 | | | | UCL Statistics | | | | | | | | |
| 424 | | | | Normal Distribution Test with Detected Values Only | | | | | | Lognormal Distribution Test with Detected Values Only | | |
| 425 | | | | | Shapiro Wilk Test Statistic | 0.906 | | | | | Shapiro Wilk Test Statistic | 0.936 |
| 426 | | | | | 5% Shapiro Wilk Critical Value | 0.829 | | | | | 5% Shapiro Wilk Critical Value | 0.829 |
| 427 | | | | Data appear Normal at 5% Significance Level | | | | | | Data appear Lognormal at 5% Significance Level | | |
| 428 | | | | | | | | | | | | |
| 429 | | | | Assuming Normal Distribution | | | | | | Assuming Lognormal Distribution | | |
| 430 | | | | | DL/2 Substitution Method | | | | | | DL/2 Substitution Method | |
| 431 | | | | | Mean | 2.917 | | | | | Mean | 0.666 |
| 432 | | | | | SD | 2.895 | | | | | SD | 0.934 |
| 433 | | | | | 95% DL/2 (t) UCL | 3.553 | | | | | 95% H-Stat (DL/2) UCL | 3.984 |
| 434 | | | | | | | | | | | | |
| 435 | | | | | Maximum Likelihood Estimate(MLE) Method | N/A | | | | | Log ROS Method | |
| 436 | | | | MLE method failed to converge properly | | | | | | | Mean in Log Scale | -0.0402 |
| 437 | | | | | | | | | | | SD in Log Scale | 0.748 |
| 438 | | | | | | | | | | | Mean in Original Scale | 1.371 |
| 439 | | | | | | | | | | | SD in Original Scale | 1.654 |
| 440 | | | | | | | | | | | 95% t UCL | 1.734 |
| 441 | | | | | | | | | | | 95% Percentile Bootstrap UCL | 1.761 |
| 442 | | | | | | | | | | | 95% BCA Bootstrap UCL | 1.853 |
| 443 | | | | | | | | | | | 95% H-UCL | 1.561 |
| 444 | | | | | | | | | | | | |
| 445 | | | | Gamma Distribution Test with Detected Values Only | | | | | | Data Distribution Test with Detected Values Only | | |
| 446 | | | | | k star (bias corrected) | 2.47 | | | | Data appear Normal at 5% Significance Level | | |
| 447 | | | | | Theta Star | 1.809 | | | | | | |
| 448 | | | | | nu star | 44.46 | | | | | | |
| 449 | | | | | | | | | | | | |
| 450 | | | | | A-D Test Statistic | 0.278 | | | | Nonparametric Statistics | | |

| | A–E | F | G–K | L |
|---|---|---|---|---|
| 451 | 5% A-D Critical Value | 0.726 | Kaplan-Meier (KM) Method | |
| 452 | K-S Test Statistic | 0.726 | Mean | 1.818 |
| 453 | 5% K-S Critical Value | 0.281 | SD | 1.671 |
| 454 | **Data appear Gamma Distributed at 5% Significance Level** | | SE of Mean | 0.265 |
| 455 | | | 95% KM (t) UCL | 2.261 |
| 456 | **Assuming Gamma Distribution** | | 95% KM (z) UCL | 2.254 |
| 457 | Gamma ROS Statistics using Extrapolated Data | | 95% KM (jackknife) UCL | 2.874 |
| 458 | Minimum | 0.000001 | 95% KM (bootstrap t) UCL | 2.316 |
| 459 | Maximum | 9.9 | 95% KM (BCA) UCL | 3.891 |
| 460 | Mean | 0.693 | 95% KM (Percentile Bootstrap) UCL | 3.669 |
| 461 | Median | 0.000001 | 95% KM (Chebyshev) UCL | 2.973 |
| 462 | SD | 1.88 | 97.5% KM (Chebyshev) UCL | 3.473 |
| 463 | k star | 0.0832 | 99% KM (Chebyshev) UCL | 4.455 |
| 464 | Theta star | 8.327 | | |
| 465 | Nu star | 9.655 | **Potential UCLs to Use** | |
| 466 | AppChi2 | 3.728 | 95% KM (t) UCL | 2.261 |
| 467 | 95% Gamma Approximate UCL (Use when n >= 40) | 1.795 | 95% KM (Percentile Bootstrap) UCL | 3.669 |
| 468 | 95% Adjusted Gamma UCL (Use when n < 40) | 1.842 | | |
| 469 | **Note: DL/2 is not a recommended method.** | | | |
| 470 | | | | |
| 471 | **Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.** | | | |
| 472 | **These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).** | | | |
| 473 | **For additional insight, the user may want to consult a statistician.** | | | |
| 474 | | | | |
| 475 | | | | |
| 476 | **gamma-Chlordane** | | | |
| 477 | | | | |
| 478 | **General Statistics** | | | |
| 479 | Number of Valid Data | 54 | Number of Detected Data | 6 |
| 480 | Number of Distinct Detected Data | 5 | Number of Non-Detect Data | 48 |
| 481 | | | Percent Non-Detects | 88.89% |
| 482 | | | | |
| 483 | **Raw Statistics** | | **Log-transformed Statistics** | |
| 484 | Minimum Detected | 4.6 | Minimum Detected | 1.526 |
| 485 | Maximum Detected | 32 | Maximum Detected | 3.466 |
| 486 | Mean of Detected | 14.27 | Mean of Detected | 2.489 |
| 487 | SD of Detected | 9.476 | SD of Detected | 0.638 |
| 488 | Minimum Non-Detect | 1.12 | Minimum Non-Detect | 0.113 |
| 489 | Maximum Non-Detect | 23 | Maximum Non-Detect | 3.135 |
| 490 | | | | |
| 491 | Note: Data have multiple DLs - Use of KM Method is recommended | | Number treated as Non-Detect | 53 |
| 492 | For all methods (except KM, DL/2, and ROS Methods), | | Number treated as Detected | 1 |
| 493 | Observations < Largest ND are treated as NDs | | Single DL Non-Detect Percentage | 98.15% |
| 494 | | | | |
| 495 | **Warning: There are only 6 Detected Values in this data** | | | |
| 496 | **Note: It should be noted that even though bootstrap may be performed on this data set** | | | |
| 497 | **the resulting calculations may not be reliable enough to draw conclusions** | | | |
| 498 | | | | |
| 499 | **It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.** | | | |
| 500 | | | | |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 501 | | | | | | | | | | | | |
| 502 | | | | | | UCL Statistics | | | | | | |
| 503 | | | | Normal Distribution Test with Detected Values Only | | | | | | Lognormal Distribution Test with Detected Values Only | | |
| 504 | | | | | Shapiro Wilk Test Statistic | 0.853 | | | | | Shapiro Wilk Test Statistic | 0.965 |
| 505 | | | | | 5% Shapiro Wilk Critical Value | 0.788 | | | | | 5% Shapiro Wilk Critical Value | 0.788 |
| 506 | | | | Data appear Normal at 5% Significance Level | | | | | | Data appear Lognormal at 5% Significance Level | | |
| 507 | | | | | | | | | | | | |
| 508 | | | | Assuming Normal Distribution | | | | | | Assuming Lognormal Distribution | | |
| 509 | | | | | DL/2 Substitution Method | | | | | | DL/2 Substitution Method | |
| 510 | | | | | Mean | 3.695 | | | | | Mean | 0.791 |
| 511 | | | | | SD | 5.183 | | | | | SD | 0.928 |
| 512 | | | | | 95% DL/2 (t) UCL | 4.876 | | | | | 95% H-Stat (DL/2) UCL | 4.515 |
| 513 | | | | | | | | | | | | |
| 514 | | | | | Maximum Likelihood Estimate(MLE) Method | N/A | | | | | Log ROS Method | |
| 515 | | | | MLE method failed to converge properly | | | | | | | Mean in Log Scale | 0.0598 |
| 516 | | | | | | | | | | | SD in Log Scale | 1.031 |
| 517 | | | | | | | | | | | Mean in Original Scale | 2.389 |
| 518 | | | | | | | | | | | SD in Original Scale | 5.166 |
| 519 | | | | | | | | | | | 95% t UCL | 3.566 |
| 520 | | | | | | | | | | | 95% Percentile Bootstrap UCL | 3.634 |
| 521 | | | | | | | | | | | 95% BCA Bootstrap UCL | 4.246 |
| 522 | | | | | | | | | | | 95% H-UCL | 2.522 |
| 523 | | | | | | | | | | | | |
| 524 | | | | Gamma Distribution Test with Detected Values Only | | | | | | Data Distribution Test with Detected Values Only | | |
| 525 | | | | | k star (bias corrected) | 1.67 | | | | Data appear Normal at 5% Significance Level | | |
| 526 | | | | | Theta Star | 8.542 | | | | | | |
| 527 | | | | | nu star | 20.04 | | | | | | |
| 528 | | | | | | | | | | | | |
| 529 | | | | | A-D Test Statistic | 0.297 | | | | Nonparametric Statistics | | |
| 530 | | | | | 5% A-D Critical Value | 0.701 | | | | | Kaplan-Meier (KM) Method | |
| 531 | | | | | K-S Test Statistic | 0.701 | | | | | Mean | 5.705 |
| 532 | | | | | 5% K-S Critical Value | 0.334 | | | | | SD | 4.208 |
| 533 | | | | Data appear Gamma Distributed at 5% Significance Level | | | | | | | SE of Mean | 0.631 |
| 534 | | | | | | | | | | | 95% KM (t) UCL | 6.762 |
| 535 | | | | Assuming Gamma Distribution | | | | | | | 95% KM (z) UCL | 6.744 |
| 536 | | | | | Gamma ROS Statistics using Extrapolated Data | | | | | | 95% KM (jackknife) UCL | 9.019 |
| 537 | | | | | Minimum | 0.000001 | | | | | 95% KM (bootstrap t) UCL | 7.068 |
| 538 | | | | | Maximum | 32 | | | | | 95% KM (BCA) UCL | 13.76 |
| 539 | | | | | Mean | 1.585 | | | | | 95% KM (Percentile Bootstrap) UCL | 13.06 |
| 540 | | | | | Median | 0.000001 | | | | | 95% KM (Chebyshev) UCL | 8.458 |
| 541 | | | | | SD | 5.381 | | | | | 97.5% KM (Chebyshev) UCL | 9.649 |
| 542 | | | | | k star | 0.0767 | | | | | 99% KM (Chebyshev) UCL | 11.99 |
| 543 | | | | | Theta star | 20.67 | | | | | | |
| 544 | | | | | Nu star | 8.281 | | | | Potential UCLs to Use | | |
| 545 | | | | | AppChi2 | 2.899 | | | | | 95% KM (t) UCL | 6.762 |
| 546 | | | | | 95% Gamma Approximate UCL (Use when n >= 40) | 4.528 | | | | | 95% KM (Percentile Bootstrap) UCL | 13.06 |
| 547 | | | | | 95% Adjusted Gamma UCL (Use when n < 40) | 4.668 | | | | | | |
| 548 | Note: DL/2 is not a recommended method. | | | | | | | | | | | |
| 549 | | | | | | | | | | | | |
| 550 | Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | | | | | | | | | |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 551 | These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | | | | | | | | | |
| 552 | For additional insight, the user may want to consult a statistician. | | | | | | | | | | | |
| 553 | | | | | | | | | | | | |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | General UCL Statistics for Data Sets with Non-Detects - Baseline Petroleum Hydrocarbons | | | | | | | | |
| 2 | | | User Selected Options | | | | | | | | | |
| 3 | | | From File | Tbl 5 rev3.wst | | | | | | | | |
| 4 | | | Full Precision | OFF | | | | | | | | |
| 5 | | | Confidence Coefficient | 95% | | | | | | | | |
| 6 | | | Number of Bootstrap Operations | 2000 | | | | | | | | |
| 7 | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | |
| 9 | Motor Oil | | | | | | | | | | | |
| 10 | | | | | | | | | | | | |
| 11 | | | | | | General Statistics | | | | | | |
| 12 | | | | | | Number of Valid Data | 48 | | | Number of Detected Data | | 10 |
| 13 | | | | | | Number of Distinct Detected Data | 9 | | | Number of Non-Detect Data | | 38 |
| 14 | | | | | | | | | | Percent Non-Detects | | 79.17% |
| 15 | | | | | | | | | | | | |
| 16 | | | | Raw Statistics | | | | | | Log-transformed Statistics | | |
| 17 | | | | | | Minimum Detected | 96 | | | Minimum Detected | | 4.564 |
| 18 | | | | | | Maximum Detected | 1500 | | | Maximum Detected | | 7.313 |
| 19 | | | | | | Mean of Detected | 587 | | | Mean of Detected | | 5.848 |
| 20 | | | | | | SD of Detected | 606.9 | | | SD of Detected | | 1.091 |
| 21 | | | | | | Minimum Non-Detect | 58 | | | Minimum Non-Detect | | 4.06 |
| 22 | | | | | | Maximum Non-Detect | 370 | | | Maximum Non-Detect | | 5.914 |
| 23 | | | | | | | | | | | | |
| 24 | Note: Data have multiple DLs - Use of KM Method is recommended | | | | | | | | | Number treated as Non-Detect | | 44 |
| 25 | For all methods (except KM, DL/2, and ROS Methods), | | | | | | | | | Number treated as Detected | | 4 |
| 26 | Observations < Largest ND are treated as NDs | | | | | | | | | Single DL Non-Detect Percentage | | 91.67% |
| 27 | | | | | | | | | | | | |
| 28 | | | | | | UCL Statistics | | | | | | |
| 29 | | | | Normal Distribution Test with Detected Values Only | | | | | | Lognormal Distribution Test with Detected Values Only | | |
| 30 | | | | | | Shapiro Wilk Test Statistic | 0.736 | | | Shapiro Wilk Test Statistic | | 0.87 |
| 31 | | | | | | 5% Shapiro Wilk Critical Value | 0.842 | | | 5% Shapiro Wilk Critical Value | | 0.842 |
| 32 | | | | Data not Normal at 5% Significance Level | | | | | | Data appear Lognormal at 5% Significance Level | | |
| 33 | | | | | | | | | | | | |
| 34 | | | | Assuming Normal Distribution | | | | | | Assuming Lognormal Distribution | | |
| 35 | | | | | | DL/2 Substitution Method | | | | DL/2 Substitution Method | | |
| 36 | | | | | | Mean | 187.5 | | | Mean | | 4.603 |
| 37 | | | | | | SD | 338.7 | | | SD | | 0.94 |
| 38 | | | | | | 95% DL/2 (t) UCL | 269.5 | | | 95% H-Stat (DL/2) UCL | | 212.1 |
| 39 | | | | | | | | | | | | |
| 40 | | | | | | Maximum Likelihood Estimate(MLE) Method | N/A | | | Log ROS Method | | |
| 41 | | | | MLE yields a negative mean | | | | | | Mean in Log Scale | | 3.335 |
| 42 | | | | | | | | | | SD in Log Scale | | 1.516 |
| 43 | | | | | | | | | | Mean in Original Scale | | 137 |
| 44 | | | | | | | | | | SD in Original Scale | | 353.7 |
| 45 | | | | | | | | | | 95% t UCL | | 222.7 |
| 46 | | | | | | | | | | 95% Percentile Bootstrap UCL | | 226.5 |
| 47 | | | | | | | | | | 95% BCA Bootstrap UCL | | 247.2 |
| 48 | | | | | | | | | | 95% H-UCL | | 169.9 |
| 49 | | | | | | | | | | | | |
| 50 | | | | Gamma Distribution Test with Detected Values Only | | | | | | Data Distribution Test with Detected Values Only | | |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 51 | | | | | k star (bias corrected) | 0.826 | **Data Follow Appr. Gamma Distribution at 5% Significance Level** | | | | | |
| 52 | | | | | Theta Star | 710.3 | | | | | | |
| 53 | | | | | nu star | 16.53 | | | | | | |
| 54 | | | | | | | | | | | | |
| 55 | | | | | A-D Test Statistic | 0.779 | **Nonparametric Statistics** | | | | | |
| 56 | | | | | 5% A-D Critical Value | 0.747 | | | | | Kaplan-Meier (KM) Method | |
| 57 | | | | | K-S Test Statistic | 0.747 | | | | | Mean | 201.9 |
| 58 | | | | | 5% K-S Critical Value | 0.273 | | | | | SD | 329.1 |
| 59 | **Data follow Appr. Gamma Distribution at 5% Significance Level** | | | | | | | | | | SE of Mean | 50.16 |
| 60 | | | | | | | | | | | 95% KM (t) UCL | 286 |
| 61 | | | **Assuming Gamma Distribution** | | | | | | | | 95% KM (z) UCL | 284.4 |
| 62 | | | | Gamma ROS Statistics using Extrapolated Data | | | | | | | 95% KM (jackknife) UCL | 275.1 |
| 63 | | | | | Minimum | 0.000001 | | | | | 95% KM (bootstrap t) UCL | 315.3 |
| 64 | | | | | Maximum | 1500 | | | | | 95% KM (BCA) UCL | 319.6 |
| 65 | | | | | Mean | 122.3 | | | | | 95% KM (Percentile Bootstrap) UCL | 306.9 |
| 66 | | | | | Median | 0.000001 | | | | | 95% KM (Chebyshev) UCL | 420.5 |
| 67 | | | | | SD | 358.6 | | | | | 97.5% KM (Chebyshev) UCL | 515.1 |
| 68 | | | | | k star | 0.0695 | | | | | 99% KM (Chebyshev) UCL | 700.9 |
| 69 | | | | | Theta star | 1760 | | | | | | |
| 70 | | | | | Nu star | 6.669 | **Potential UCLs to Use** | | | | | |
| 71 | | | | | AppChi2 | 1.991 | | | | | 95% KM (t) UCL | 286 |
| 72 | | | | 95% Gamma Approximate UCL (Use when n >= 40) | | 409.7 | | | | | | |
| 73 | | | | 95% Adjusted Gamma UCL (Use when n < 40) | | 426.4 | | | | | | |
| 74 | **Note: DL/2 is not a recommended method.** | | | | | | | | | | | |
| 75 | | | | | | | | | | | | |
| 76 | **Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.** | | | | | | | | | | | |
| 77 | **These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).** | | | | | | | | | | | |
| 78 | **For additional insight, the user may want to consult a statistician.** | | | | | | | | | | | |
| 79 | | | | | | | | | | | | |
| 80 | | | | | | | | | | | | |
| 81 | **Diesel** | | | | | | | | | | | |
| 82 | | | | | | | | | | | | |
| 83 | | | | | **General Statistics** | | | | | | | |
| 84 | | | | | Number of Valid Data | 48 | | | | | Number of Detected Data | 33 |
| 85 | | | | | Number of Distinct Detected Data | 31 | | | | | Number of Non-Detect Data | 15 |
| 86 | | | | | | | | | | | Percent Non-Detects | 31.25% |
| 87 | | | | | | | | | | | | |
| 88 | | | | **Raw Statistics** | | | **Log-transformed Statistics** | | | | | |
| 89 | | | | | Minimum Detected | 3 | | | | | Minimum Detected | 1.099 |
| 90 | | | | | Maximum Detected | 200 | | | | | Maximum Detected | 5.298 |
| 91 | | | | | Mean of Detected | 42.99 | | | | | Mean of Detected | 3.083 |
| 92 | | | | | SD of Detected | 53.19 | | | | | SD of Detected | 1.203 |
| 93 | | | | | Minimum Non-Detect | 1.2 | | | | | Minimum Non-Detect | 0.182 |
| 94 | | | | | Maximum Non-Detect | 7.3 | | | | | Maximum Non-Detect | 1.988 |
| 95 | | | | | | | | | | | | |
| 96 | Note: Data have multiple DLs - Use of KM Method is recommended | | | | | | | | | | Number treated as Non-Detect | 22 |
| 97 | For all methods (except KM, DL/2, and ROS Methods), | | | | | | | | | | Number treated as Detected | 26 |
| 98 | Observations < Largest ND are treated as NDs | | | | | | | | | | Single DL Non-Detect Percentage | 45.83% |
| 99 | | | | | | | | | | | | |
| 100 | | | | | **UCL Statistics** | | | | | | | |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 101 | **Normal Distribution Test with Detected Values Only** | | | | | | **Lognormal Distribution Test with Detected Values Only** | | | | | |
| 102 | | | | | Shapiro Wilk Test Statistic | 0.723 | | | | | Shapiro Wilk Test Statistic | 0.954 |
| 103 | | | | | 5% Shapiro Wilk Critical Value | 0.931 | | | | | 5% Shapiro Wilk Critical Value | 0.931 |
| 104 | **Data not Normal at 5% Significance Level** | | | | | | **Data appear Lognormal at 5% Significance Level** | | | | | |
| 105 | | | | | | | | | | | | |
| 106 | **Assuming Normal Distribution** | | | | | | **Assuming Lognormal Distribution** | | | | | |
| 107 | | | | | DL/2 Substitution Method | | | | | | DL/2 Substitution Method | |
| 108 | | | | | Mean | 30.07 | | | | | Mean | 2.229 |
| 109 | | | | | SD | 47.98 | | | | | SD | 1.654 |
| 110 | | | | | 95% DL/2 (t) UCL | 41.69 | | | | | 95% H-Stat (DL/2) UCL | 77.51 |
| 111 | | | | | | | | | | | | |
| 112 | | | | | Maximum Likelihood Estimate(MLE) Method | | | | | | Log ROS Method | |
| 113 | | | | | Mean | 5.553 | | | | | Mean in Log Scale | 2.243 |
| 114 | | | | | SD | 71.95 | | | | | SD in Log Scale | 1.613 |
| 115 | | | | | 95% MLE (t) UCL | 22.98 | | | | | Mean in Original Scale | 30.04 |
| 116 | | | | | 95% MLE (Tiku) UCL | 26.2 | | | | | SD in Original Scale | 47.99 |
| 117 | | | | | | | | | | | 95% t UCL | 41.66 |
| 118 | | | | | | | | | | | 95% Percentile Bootstrap UCL | 41.87 |
| 119 | | | | | | | | | | | 95% BCA Bootstrap UCL | 43.25 |
| 120 | | | | | | | | | | | 95% H UCL | 71.38 |
| 121 | | | | | | | | | | | | |
| 122 | **Gamma Distribution Test with Detected Values Only** | | | | | | **Data Distribution Test with Detected Values Only** | | | | | |
| 123 | | | | | k star (bias corrected) | 0.808 | **Data appear Lognormal at 5% Significance Level** | | | | | |
| 124 | | | | | Theta Star | 53.18 | | | | | | |
| 125 | | | | | nu star | 53.35 | | | | | | |
| 126 | | | | | | | | | | | | |
| 127 | | | | | A-D Test Statistic | 0.921 | **Nonparametric Statistics** | | | | | |
| 128 | | | | | 5% A-D Critical Value | 0.782 | | | | | Kaplan-Meier (KM) Method | |
| 129 | | | | | K-S Test Statistic | 0.782 | | | | | Mean | 30.52 |
| 130 | | | | | 5% K-S Critical Value | 0.159 | | | | | SD | 47.21 |
| 131 | **Data not Gamma Distributed at 5% Significance Level** | | | | | | | | | | SE of Mean | 6.919 |
| 132 | | | | | | | | | | | 95% KM (t) UCL | 42.13 |
| 133 | **Assuming Gamma Distribution** | | | | | | | | | | 95% KM (z) UCL | 41.9 |
| 134 | | | | | Gamma ROS Statistics using Extrapolated Data | | | | | | 95% KM (jackknife) UCL | 41.93 |
| 135 | | | | | Minimum | 0.000001 | | | | | 95% KM (bootstrap t) UCL | 45.03 |
| 136 | | | | | Maximum | 200 | | | | | 95% KM (BCA) UCL | 43.1 |
| 137 | | | | | Mean | 29.55 | | | | | 95% KM (Percentile Bootstrap) UCL | 42.3 |
| 138 | | | | | Median | 8.375 | | | | | 95% KM (Chebyshev) UCL | 60.68 |
| 139 | | | | | SD | 48.29 | | | | | 97.5% KM (Chebyshev) UCL | 73.73 |
| 140 | | | | | k star | 0.144 | | | | | 99% KM (Chebyshev) UCL | 99.37 |
| 141 | | | | | Theta star | 204.8 | | | | | | |
| 142 | | | | | Nu star | 13.86 | **Potential UCLs to Use** | | | | | |
| 143 | | | | | AppChi2 | 6.473 | | | | | 95% KM (Chebyshev) UCL | 60.68 |
| 144 | | | | | 95% Gamma Approximate UCL (Use when n >= 40) | 63.26 | | | | | | |
| 145 | | | | | 95% Adjusted Gamma UCL (Use when n < 40) | 64.83 | | | | | | |
| 146 | **Note: DL/2 is not a recommended method.** | | | | | | | | | | | |
| 147 | | | | | | | | | | | | |
| 148 | **Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.** | | | | | | | | | | | |
| 149 | **These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).** | | | | | | | | | | | |
| 150 | **For additional insight, the user may want to consult a statistician.** | | | | | | | | | | | |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 151 | | | | | | | | | | | | |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | General UCL Statistics for Data Sets with Non-Detects - Post-Remediation Metals | | | | | | | | |
| 2 | | | User Selected Options | | | | | | | | | |
| 3 | | | From File | Tbl 2 rev6.wst | | | | | | | | |
| 4 | | | Full Precision | OFF | | | | | | | | |
| 5 | | | Confidence Coefficient | 95% | | | | | | | | |
| 6 | | | Number of Bootstrap Operations | 2000 | | | | | | | | |
| 7 | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | |
| 9 | Arsenic | | | | | | | | | | | |
| 10 | | | | | | | | | | | | |
| 11 | | | | | | General Statistics | | | | | | |
| 12 | | | | | | Number of Valid Data | 46 | | | Number of Detected Data | | 25 |
| 13 | | | | | | Number of Distinct Detected Data | 24 | | | Number of Non-Detect Data | | 21 |
| 14 | | | | | | | | | | Percent Non-Detects | | 45.65% |
| 15 | | | | | | | | | | | | |
| 16 | | | | Raw Statistics | | | | | | Log-transformed Statistics | | |
| 17 | | | | | | Minimum Detected | 0.4 | | | Minimum Detected | | -0.916 |
| 18 | | | | | | Maximum Detected | 27 | | | Maximum Detected | | 3.296 |
| 19 | | | | | | Mean of Detected | 6.646 | | | Mean of Detected | | 1.25 |
| 20 | | | | | | SD of Detected | 7.871 | | | SD of Detected | | 1.2 |
| 21 | | | | | | Minimum Non-Detect | 1.2 | | | Minimum Non-Detect | | 0.182 |
| 22 | | | | | | Maximum Non-Detect | 8.4 | | | Maximum Non-Detect | | 2.128 |
| 23 | | | | | | | | | | | | |
| 24 | Note: Data have multiple DLs - Use of KM Method is recommended | | | | | | | | | Number treated as Non-Detect | | 41 |
| 25 | For all methods (except KM, DL/2, and ROS Methods), | | | | | | | | | Number treated as Detected | | 5 |
| 26 | Observations < Largest ND are treated as NDs | | | | | | | | | Single DL Non-Detect Percentage | | 89.13% |
| 27 | | | | | | | | | | | | |
| 28 | | | | | | UCL Statistics | | | | | | |
| 29 | | | | Normal Distribution Test with Detected Values Only | | | | | | Lognormal Distribution Test with Detected Values Only | | |
| 30 | | | | | | Shapiro Wilk Test Statistic | 0.736 | | | Shapiro Wilk Test Statistic | | 0.966 |
| 31 | | | | | | 5% Shapiro Wilk Critical Value | 0.918 | | | 5% Shapiro Wilk Critical Value | | 0.918 |
| 32 | | | | Data not Normal at 5% Significance Level | | | | | | Data appear Lognormal at 5% Significance Level | | |
| 33 | | | | | | | | | | | | |
| 34 | | | | Assuming Normal Distribution | | | | | | Assuming Lognormal Distribution | | |
| 35 | | | | | | DL/2 Substitution Method | | | | DL/2 Substitution Method | | |
| 36 | | | | | | Mean | 4.627 | | | Mean | | 0.957 |
| 37 | | | | | | SD | 6.218 | | | SD | | 1.04 |
| 38 | | | | | | 95% DL/2 (t) UCL | 6.167 | | | 95% H-Stat (DL/2) UCL | | 6.459 |
| 39 | | | | | | | | | | | | |
| 40 | | | | | | Maximum Likelihood Estimate(MLE) Method | N/A | | | Log ROS Method | | |
| 41 | | | | | | MLE method failed to converge properly | | | | Mean in Log Scale | | 0.748 |
| 42 | | | | | | | | | | SD in Log Scale | | 1.075 |
| 43 | | | | | | | | | | Mean in Original Scale | | 4.184 |
| 44 | | | | | | | | | | SD in Original Scale | | 6.365 |
| 45 | | | | | | | | | | 95% t UCL | | 5.761 |
| 46 | | | | | | | | | | 95% Percentile Bootstrap UCL | | 5.759 |
| 47 | | | | | | | | | | 95% BCA Bootstrap UCL | | 6.222 |
| 48 | | | | | | | | | | 95% H-UCL | | 5.535 |
| 49 | | | | | | | | | | | | |
| 50 | | | | Gamma Distribution Test with Detected Values Only | | | | | | Data Distribution Test with Detected Values Only | | |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 51 | | | | | k star (bias corrected) | 0.825 | Data appear Gamma Distributed at 5% Significance Level | | | | | |
| 52 | | | | | Theta Star | 8.058 | | | | | | |
| 53 | | | | | nu star | 41.24 | | | | | | |
| 54 | | | | | | | | | | | | |
| 55 | | | | | A-D Test Statistic | 0.636 | Nonparametric Statistics | | | | | |
| 56 | | | | | 5% A-D Critical Value | 0.777 | | | | | Kaplan-Meier (KM) Method | |
| 57 | | | | | K-S Test Statistic | 0.777 | | | | | Mean | 4.286 |
| 58 | | | | | 5% K-S Critical Value | 0.18 | | | | | SD | 6.305 |
| 59 | | Data appear Gamma Distributed at 5% Significance Level | | | | | | | | | SE of Mean | 0.96 |
| 60 | | | | | | | | | | | 95% KM (t) UCL | 5.898 |
| 61 | | | Assuming Gamma Distribution | | | | | | | | 95% KM (z) UCL | 5.865 |
| 62 | | | | Gamma ROS Statistics using Extrapolated Data | | | | | | | 95% KM (jackknife) UCL | 5.885 |
| 63 | | | | | Minimum | 0.000001 | | | | | 95% KM (bootstrap t) UCL | 6.499 |
| 64 | | | | | Maximum | 27 | | | | | 95% KM (BCA) UCL | 6.089 |
| 65 | | | | | Mean | 4.079 | | | | | 95% KM (Percentile Bootstrap) UCL | 5.904 |
| 66 | | | | | Median | 1.792 | | | | | 95% KM (Chebyshev) UCL | 8.471 |
| 67 | | | | | SD | 6.459 | | | | | 97.5% KM (Chebyshev) UCL | 10.28 |
| 68 | | | | | k star | 0.219 | | | | | 99% KM (Chebyshev) UCL | 13.84 |
| 69 | | | | | Theta star | 18.62 | | | | | | |
| 70 | | | | | Nu star | 20.15 | Potential UCLs to Use | | | | | |
| 71 | | | | | AppChi2 | 10.96 | | | | | 95% KM (BCA) UCL | 6.089 |
| 72 | | | | | 95% Gamma Approximate UCL (Use when n >= 40) | 7.498 | | | | | | |
| 73 | | | | | 95% Adjusted Gamma UCL (Use when n < 40) | 7.652 | | | | | | |
| 74 | Note: DL/2 is not a recommended method. | | | | | | | | | | | |
| 75 | | | | | | | | | | | | |
| 76 | | | Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | | | | | | | |
| 77 | | | These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | | | | | | | |
| 78 | | | For additional insight, the user may want to consult a statistician. | | | | | | | | | |
| 79 | | | | | | | | | | | | |
| 80 | | | | | | | | | | | | |
| 81 | Cadmium | | | | | | | | | | | |
| 82 | | | | | | | | | | | | |
| 83 | | | | | General Statistics | | | | | | | |
| 84 | | | | | Number of Valid Data | 30 | | | | | Number of Detected Data | 0 |
| 85 | | | | | Number of Distinct Detected Data | 0 | | | | | Number of Non-Detect Data | 30 |
| 86 | | | | | | | | | | | Percent Non-Detects | 100.00% |
| 87 | | | | | | | | | | | | |
| 88 | | | Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs! | | | | | | | | | |
| 89 | | | Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit! | | | | | | | | | |
| 90 | | | The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV). | | | | | | | | | |
| 91 | | | | | | | | | | | | |
| 92 | | | The data set for variable Cadmium was not processed! | | | | | | | | | |
| 93 | | | | | | | | | | | | |
| 94 | | | | | | | | | | | | |
| 95 | | | | | | | | | | | | |
| 96 | Chromium | | | | | | | | | | | |
| 97 | | | | | | | | | | | | |
| 98 | | | | | General Statistics | | | | | | | |
| 99 | | | | | Number of Valid Observations | 43 | | | | | Number of Distinct Observations | 33 |
| 100 | | | | | | | | | | | | |

| | A–E | F | G–K | L |
|---|---|---|---|---|
| 101 | **Raw Statistics** | | **Log-transformed Statistics** | |
| 102 | Minimum | 25 | Minimum of Log Data | 3.219 |
| 103 | Maximum | 230 | Maximum of Log Data | 5.438 |
| 104 | Mean | 88.22 | Mean of log Data | 4.31 |
| 105 | Geometric Mean | 74.46 | SD of log Data | 0.595 |
| 106 | Median | 81 | | |
| 107 | SD | 52.45 | | |
| 108 | Std. Error of Mean | 7.998 | | |
| 109 | Coefficient of Variation | 0.595 | | |
| 110 | Skewness | 0.961 | | |
| 111 | | | | |
| 112 | **Relevant UCL Statistics** | | | |
| 113 | **Normal Distribution Test** | | **Lognormal Distribution Test** | |
| 114 | Shapiro Wilk Test Statistic | 0.896 | Shapiro Wilk Test Statistic | 0.96 |
| 115 | Shapiro Wilk Critical Value | 0.943 | Shapiro Wilk Critical Value | 0.943 |
| 116 | **Data not Normal at 5% Significance Level** | | **Data appear Lognormal at 5% Significance Level** | |
| 117 | | | | |
| 118 | **Assuming Normal Distribution** | | **Assuming Lognormal Distribution** | |
| 119 | 95% Student's-t UCL | 101.7 | 95% H-UCL | 106.5 |
| 120 | **95% UCLs (Adjusted for Skewness)** | | 95% Chebyshev (MVUE) UCL | 125.8 |
| 121 | 95% Adjusted-CLT UCL (Chen-1995) | 102.6 | 97.5% Chebyshev (MVUE) UCL | 142 |
| 122 | 95% Modified-t UCL (Johnson-1978) | 101.9 | 99% Chebyshev (MVUE) UCL | 173.7 |
| 123 | | | | |
| 124 | **Gamma Distribution Test** | | **Data Distribution** | |
| 125 | k star (bias corrected) | 2.903 | **Data Follow Appr. Gamma Distribution at 5% Significance Level** | |
| 126 | Theta Star | 30.39 | | |
| 127 | MLE of Mean | 88.22 | | |
| 128 | MLE of Standard Deviation | 51.78 | | |
| 129 | nu star | 249.6 | | |
| 130 | Approximate Chi Square Value (.05) | 214.1 | **Nonparametric Statistics** | |
| 131 | Adjusted Level of Significance | 0.0444 | 95% CLT UCL | 101.4 |
| 132 | Adjusted Chi Square Value | 212.9 | 95% Jackknife UCL | 101.7 |
| 133 | | | 95% Standard Bootstrap UCL | 101.1 |
| 134 | Anderson-Darling Test Statistic | 0.628 | 95% Bootstrap-t UCL | 103.4 |
| 135 | Anderson-Darling 5% Critical Value | 0.755 | 95% Hall's Bootstrap UCL | 102.8 |
| 136 | Kolmogorov-Smirnov Test Statistic | 0.154 | 95% Percentile Bootstrap UCL | 101.4 |
| 137 | Kolmogorov-Smirnov 5% Critical Value | 0.136 | 95% BCA Bootstrap UCL | 102.7 |
| 138 | **Data follow Appr. Gamma Distribution at 5% Significance Level** | | 95% Chebyshev(Mean, Sd) UCL | 123.1 |
| 139 | | | 97.5% Chebyshev(Mean, Sd) UCL | 138.2 |
| 140 | **Assuming Gamma Distribution** | | 99% Chebyshev(Mean, Sd) UCL | 167.8 |
| 141 | 95% Approximate Gamma UCL (Use when n >= 40) | 102.9 | | |
| 142 | 95% Adjusted Gamma UCL (Use when n < 40) | 103.4 | | |
| 143 | | | | |
| 144 | **Potential UCL to Use** | | Use 95% Approximate Gamma UCL | 102.9 |
| 145 | | | | |
| 146 | **Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.** | | | |
| 147 | **These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)** | | | |
| 148 | **and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.** | | | |
| 149 | | | | |
| 150 | | | | |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 151 | Copper | | | | | | | | | | | |
| 152 | | | | | | | | | | | | |
| 153 | General Statistics | | | | | | | | | | | |
| 154 | Number of Valid Observations | | | | | 43 | Number of Distinct Observations | | | | | 35 |
| 155 | | | | | | | | | | | | |
| 156 | Raw Statistics | | | | | | Log-transformed Statistics | | | | | |
| 157 | Minimum | | | | | 1.2 | Minimum of Log Data | | | | | 0.182 |
| 158 | Maximum | | | | | 45 | Maximum of Log Data | | | | | 3.807 |
| 159 | Mean | | | | | 14.97 | Mean of log Data | | | | | 2.351 |
| 160 | Geometric Mean | | | | | 10.5 | SD of log Data | | | | | 0.925 |
| 161 | Median | | | | | 12 | | | | | | |
| 162 | SD | | | | | 11.69 | | | | | | |
| 163 | Std. Error of Mean | | | | | 1.782 | | | | | | |
| 164 | Coefficient of Variation | | | | | 0.781 | | | | | | |
| 165 | Skewness | | | | | 0.939 | | | | | | |
| 166 | | | | | | | | | | | | |
| 167 | Relevant UCL Statistics | | | | | | | | | | | |
| 168 | Normal Distribution Test | | | | | | Lognormal Distribution Test | | | | | |
| 169 | Shapiro Wilk Test Statistic | | | | | 0.891 | Shapiro Wilk Test Statistic | | | | | 0.956 |
| 170 | Shapiro Wilk Critical Value | | | | | 0.943 | Shapiro Wilk Critical Value | | | | | 0.943 |
| 171 | Data not Normal at 5% Significance Level | | | | | | Data appear Lognormal at 5% Significance Level | | | | | |
| 172 | | | | | | | | | | | | |
| 173 | Assuming Normal Distribution | | | | | | Assuming Lognormal Distribution | | | | | |
| 174 | 95% Student's-t UCL | | | | | 17.97 | 95% H-UCL | | | | | 22.3 |
| 175 | 95% UCLs (Adjusted for Skewness) | | | | | | 95% Chebyshev (MVUE) UCL | | | | | 27.1 |
| 176 | 95% Adjusted-CLT UCL (Chen-1995) | | | | | 18.18 | 97.5% Chebyshev (MVUE) UCL | | | | | 31.95 |
| 177 | 95% Modified-t UCL (Johnson-1978) | | | | | 18.01 | 99% Chebyshev (MVUE) UCL | | | | | 41.48 |
| 178 | | | | | | | | | | | | |
| 179 | Gamma Distribution Test | | | | | | Data Distribution | | | | | |
| 180 | k star (bias corrected) | | | | | 1.462 | Data appear Gamma Distributed at 5% Significance Level | | | | | |
| 181 | Theta Star | | | | | 10.24 | | | | | | |
| 182 | MLE of Mean | | | | | 14.97 | | | | | | |
| 183 | MLE of Standard Deviation | | | | | 12.38 | | | | | | |
| 184 | nu star | | | | | 125.7 | | | | | | |
| 185 | Approximate Chi Square Value (.05) | | | | | 100.8 | Nonparametric Statistics | | | | | |
| 186 | Adjusted Level of Significance | | | | | 0.0444 | 95% CLT UCL | | | | | 17.9 |
| 187 | Adjusted Chi Square Value | | | | | 100.1 | 95% Jackknife UCL | | | | | 17.97 |
| 188 | | | | | | | 95% Standard Bootstrap UCL | | | | | 17.89 |
| 189 | Anderson-Darling Test Statistic | | | | | 0.427 | 95% Bootstrap-t UCL | | | | | 18.32 |
| 190 | Anderson-Darling 5% Critical Value | | | | | 0.766 | 95% Hall's Bootstrap UCL | | | | | 18.15 |
| 191 | Kolmogorov-Smirnov Test Statistic | | | | | 0.108 | 95% Percentile Bootstrap UCL | | | | | 17.97 |
| 192 | Kolmogorov-Smirnov 5% Critical Value | | | | | 0.137 | 95% BCA Bootstrap UCL | | | | | 18.17 |
| 193 | Data appear Gamma Distributed at 5% Significance Level | | | | | | 95% Chebyshev(Mean, Sd) UCL | | | | | 22.74 |
| 194 | | | | | | | 97.5% Chebyshev(Mean, Sd) UCL | | | | | 26.1 |
| 195 | Assuming Gamma Distribution | | | | | | 99% Chebyshev(Mean, Sd) UCL | | | | | 32.7 |
| 196 | 95% Approximate Gamma UCL (Use when n >= 40) | | | | | 18.67 | | | | | | |
| 197 | 95% Adjusted Gamma UCL (Use when n < 40) | | | | | 18.81 | | | | | | |
| 198 | | | | | | | | | | | | |
| 199 | Potential UCL to Use | | | | | | Use 95% Approximate Gamma UCL | | | | | 18.67 |
| 200 | | | | | | | | | | | | |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 201 | Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | | | | | | | | | |
| 202 | These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) | | | | | | | | | | | |
| 203 | and Singh and Singh (2003). For additional insight, the user may want to consult a statistician. | | | | | | | | | | | |
| 204 | | | | | | | | | | | | |
| 205 | | | | | | | | | | | | |
| 206 | Lead | | | | | | | | | | | |
| 207 | | | | | | | | | | | | |
| 208 | General Statistics | | | | | | | | | | | |
| 209 | | | | | Number of Valid Data | 50 | | | | Number of Detected Data | | 45 |
| 210 | | | | | Number of Distinct Detected Data | 39 | | | | Number of Non-Detect Data | | 5 |
| 211 | | | | | | | | | | Percent Non-Detects | | 10.00% |
| 212 | | | | | | | | | | | | |
| 213 | Raw Statistics | | | | | | Log-transformed Statistics | | | | | |
| 214 | | | | | Minimum Detected | 0.72 | | | | Minimum Detected | | -0.329 |
| 215 | | | | | Maximum Detected | 82 | | | | Maximum Detected | | 4.407 |
| 216 | | | | | Mean of Detected | 15.33 | | | | Mean of Detected | | 2.007 |
| 217 | | | | | SD of Detected | 18.75 | | | | SD of Detected | | 1.272 |
| 218 | | | | | Minimum Non-Detect | 3 | | | | Minimum Non-Detect | | 1.099 |
| 219 | | | | | Maximum Non-Detect | 8.4 | | | | Maximum Non-Detect | | 2.128 |
| 220 | | | | | | | | | | | | |
| 221 | Note: Data have multiple DLs - Use of KM Method is recommended | | | | | | | | | Number treated as Non-Detect | | 29 |
| 222 | For all methods (except KM, DL/2, and ROS Methods), | | | | | | | | | Number treated as Detected | | 21 |
| 223 | Observations < Largest ND are treated as NDs | | | | | | | | | Single DL Non-Detect Percentage | | 58.00% |
| 224 | | | | | | | | | | | | |
| 225 | UCL Statistics | | | | | | | | | | | |
| 226 | Normal Distribution Test with Detected Values Only | | | | | | Lognormal Distribution Test with Detected Values Only | | | | | |
| 227 | | | | | Shapiro Wilk Test Statistic | 0.752 | | | | Shapiro Wilk Test Statistic | | 0.95 |
| 228 | | | | | 5% Shapiro Wilk Critical Value | 0.945 | | | | 5% Shapiro Wilk Critical Value | | 0.945 |
| 229 | Data not Normal at 5% Significance Level | | | | | | Data appear Lognormal at 5% Significance Level | | | | | |
| 230 | | | | | | | | | | | | |
| 231 | Assuming Normal Distribution | | | | | | Assuming Lognormal Distribution | | | | | |
| 232 | | | | | DL/2 Substitution Method | | | | | DL/2 Substitution Method | | |
| 233 | | | | | Mean | 14.1 | | | | Mean | | 1.914 |
| 234 | | | | | SD | 18.15 | | | | SD | | 1.243 |
| 235 | | | | | 95% DL/2 (t) UCL | 18.41 | | | | 95% H-Stat (DL/2) UCL | | 23.39 |
| 236 | | | | | | | | | | | | |
| 237 | | | | | Maximum Likelihood Estimate(MLE) Method | | | | | Log ROS Method | | |
| 238 | | | | | Mean | 1.196 | | | | Mean in Log Scale | | 1.904 |
| 239 | | | | | SD | 30.88 | | | | SD in Log Scale | | 1.246 |
| 240 | | | | | 95% MLE (t) UCL | 8.517 | | | | Mean in Original Scale | | 14.06 |
| 241 | | | | | 95% MLE (Tiku) UCL | 11.25 | | | | SD in Original Scale | | 18.18 |
| 242 | | | | | | | | | | 95% t UCL | | 18.37 |
| 243 | | | | | | | | | | 95% Percentile Bootstrap UCL | | 18.66 |
| 244 | | | | | | | | | | 95% BCA Bootstrap UCL | | 19.46 |
| 245 | | | | | | | | | | 95% H UCL | | 23.29 |
| 246 | | | | | | | | | | | | |
| 247 | Gamma Distribution Test with Detected Values Only | | | | | | Data Distribution Test with Detected Values Only | | | | | |
| 248 | | | | | k star (bias corrected) | 0.779 | Data appear Lognormal at 5% Significance Level | | | | | |
| 249 | | | | | Theta Star | 19.67 | | | | | | |
| 250 | | | | | nu star | 70.12 | | | | | | |

| | A–E | F | G–K | L |
|---|---|---|---|---|
| 251 | | | | |
| 252 | A-D Test Statistic | 1.054 | **Nonparametric Statistics** | |
| 253 | 5% A-D Critical Value | 0.786 | Kaplan-Meier (KM) Method | |
| 254 | K-S Test Statistic | 0.786 | Mean | 14.04 |
| 255 | 5% K-S Critical Value | 0.137 | SD | 18.01 |
| 256 | **Data not Gamma Distributed at 5% Significance Level** | | SE of Mean | 2.577 |
| 257 | | | 95% KM (t) UCL | 18.36 |
| 258 | **Assuming Gamma Distribution** | | 95% KM (z) UCL | 18.28 |
| 259 | Gamma ROS Statistics using Extrapolated Data | | 95% KM (jackknife) UCL | 18.36 |
| 260 | Minimum | 0.000001 | 95% KM (bootstrap t) UCL | 19.44 |
| 261 | Maximum | 82 | 95% KM (BCA) UCL | 18.57 |
| 262 | Mean | 13.82 | 95% KM (Percentile Bootstrap) UCL | 18.34 |
| 263 | Median | 5.45 | 95% KM (Chebyshev) UCL | 25.27 |
| 264 | SD | 18.34 | 97.5% KM (Chebyshev) UCL | 30.13 |
| 265 | k star | 0.343 | 99% KM (Chebyshev) UCL | 39.68 |
| 266 | Theta star | 40.32 | | |
| 267 | Nu star | 34.28 | **Potential UCLs to Use** | |
| 268 | AppChi2 | 21.89 | 95% KM (Chebyshev) UCL | 25.27 |
| 269 | 95% Gamma Approximate UCL (Use when n >= 40) | 21.65 | | |
| 270 | 95% Adjusted Gamma UCL (Use when n < 40) | 21.94 | | |
| 271 | **Note: DL/2 is not a recommended method.** | | | |
| 272 | | | | |
| 273 | **Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.** | | | |
| 274 | **These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).** | | | |
| 275 | **For additional insight, the user may want to consult a statistician.** | | | |
| 276 | | | | |
| 277 | | | | |
| 278 | **Mercury** | | | |
| 279 | | | | |
| 280 | **General Statistics** | | | |
| 281 | Number of Valid Data | 43 | Number of Detected Data | 10 |
| 282 | Number of Distinct Detected Data | 10 | Number of Non-Detect Data | 33 |
| 283 | | | Percent Non-Detects | 76.74% |
| 284 | | | | |
| 285 | **Raw Statistics** | | **Log-transformed Statistics** | |
| 286 | Minimum Detected | 0.019 | Minimum Detected | -3.963 |
| 287 | Maximum Detected | 0.2 | Maximum Detected | -1.609 |
| 288 | Mean of Detected | 0.0868 | Mean of Detected | -2.693 |
| 289 | SD of Detected | 0.0609 | SD of Detected | 0.791 |
| 290 | Minimum Non-Detect | 0.019 | Minimum Non-Detect | -3.963 |
| 291 | Maximum Non-Detect | 0.42 | Maximum Non-Detect | -0.868 |
| 292 | | | | |
| 293 | Note: Data have multiple DLs - Use of KM Method is recommended | | Number treated as Non-Detect | 43 |
| 294 | For all methods (except KM, DL/2, and ROS Methods), | | Number treated as Detected | 0 |
| 295 | Observations < Largest ND are treated as NDs | | Single DL Non-Detect Percentage | 100.00% |
| 296 | | | | |
| 297 | **UCL Statistics** | | | |
| 298 | **Normal Distribution Test with Detected Values Only** | | **Lognormal Distribution Test with Detected Values Only** | |
| 299 | Shapiro Wilk Test Statistic | 0.887 | Shapiro Wilk Test Statistic | 0.929 |
| 300 | 5% Shapiro Wilk Critical Value | 0.842 | 5% Shapiro Wilk Critical Value | 0.842 |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 301 | Data appear Normal at 5% Significance Level | | | | | | Data appear Lognormal at 5% Significance Level | | | | | |
| 302 | | | | | | | | | | | | |
| 303 | Assuming Normal Distribution | | | | | | Assuming Lognormal Distribution | | | | | |
| 304 | | | | | DL/2 Substitution Method | | | | | | DL/2 Substitution Method | |
| 305 | | | | | Mean | 0.0713 | | | | | Mean | -3.1 |
| 306 | | | | | SD | 0.0629 | | | | | SD | 1.031 |
| 307 | | | | | 95% DL/2 (t) UCL | 0.0874 | | | | | 95% H-Stat (DL/2) UCL | 0.112 |
| 308 | | | | | | | | | | | | |
| 309 | | | | | Maximum Likelihood Estimate(MLE) Method | N/A | | | | | Log ROS Method | |
| 310 | MLE method failed to converge properly | | | | | | | | | | Mean in Log Scale | -3.748 |
| 311 | | | | | | | | | | | SD in Log Scale | 0.767 |
| 312 | | | | | | | | | | | Mean in Original Scale | 0.0343 |
| 313 | | | | | | | | | | | SD in Original Scale | 0.0411 |
| 314 | | | | | | | | | | | 95% t UCL | 0.0448 |
| 315 | | | | | | | | | | | 95% Percentile Bootstrap UCL | 0.0451 |
| 316 | | | | | | | | | | | 95% BCA Bootstrap UCL | 0.0471 |
| 317 | | | | | | | | | | | 95% H-UCL | 0.0407 |
| 318 | | | | | | | | | | | | |
| 319 | Gamma Distribution Test with Detected Values Only | | | | | | Data Distribution Test with Detected Values Only | | | | | |
| 320 | | | | | k star (bias corrected) | 1.577 | Data appear Normal at 5% Significance Level | | | | | |
| 321 | | | | | Theta Star | 0.055 | | | | | | |
| 322 | | | | | nu star | 31.54 | | | | | | |
| 323 | | | | | | | | | | | | |
| 324 | | | | | A-D Test Statistic | 0.274 | Nonparametric Statistics | | | | | |
| 325 | | | | | 5% A-D Critical Value | 0.735 | | | | | Kaplan-Meier (KM) Method | |
| 326 | | | | | K-S Test Statistic | 0.735 | | | | | Mean | 0.0422 |
| 327 | | | | | 5% K-S Critical Value | 0.27 | | | | | SD | 0.0445 |
| 328 | Data appear Gamma Distributed at 5% Significance Level | | | | | | | | | | SE of Mean | 0.00841 |
| 329 | | | | | | | | | | | 95% KM (t) UCL | 0.0563 |
| 330 | Assuming Gamma Distribution | | | | | | | | | | 95% KM (z) UCL | 0.056 |
| 331 | | | | | Gamma ROS Statistics using Extrapolated Data | | | | | | 95% KM (jackknife) UCL | 0.0555 |
| 332 | | | | | Minimum | 0.000001 | | | | | 95% KM (bootstrap t) UCL | 0.0608 |
| 333 | | | | | Maximum | 0.2 | | | | | 95% KM (BCA) UCL | 0.0727 |
| 334 | | | | | Mean | 0.0231 | | | | | 95% KM (Percentile Bootstrap) UCL | 0.0681 |
| 335 | | | | | Median | 0.000001 | | | | | 95% KM (Chebyshev) UCL | 0.0789 |
| 336 | | | | | SD | 0.0471 | | | | | 97.5% KM (Chebyshev) UCL | 0.0947 |
| 337 | | | | | k star | 0.141 | | | | | 99% KM (Chebyshev) UCL | 0.126 |
| 338 | | | | | Theta star | 0.164 | | | | | | |
| 339 | | | | | Nu star | 12.14 | Potential UCLs to Use | | | | | |
| 340 | | | | | AppChi2 | 5.321 | | | | | 95% KM (t) UCL | 0.0563 |
| 341 | | | | | 95% Gamma Approximate UCL (Use when n >= 40) | 0.0527 | | | | | 95% KM (Percentile Bootstrap) UCL | 0.0681 |
| 342 | | | | | 95% Adjusted Gamma UCL (Use when n < 40) | 0.0543 | | | | | | |
| 343 | Note: DL/2 is not a recommended method. | | | | | | | | | | | |
| 344 | | | | | | | | | | | | |
| 345 | Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | | | | | | | | | |
| 346 | These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | | | | | | | | | |
| 347 | For additional insight, the user may want to consult a statistician. | | | | | | | | | | | |
| 348 | | | | | | | | | | | | |
| 349 | | | | | | | | | | | | |
| 350 | Nickel | | | | | | | | | | | |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 351 | | | | | | | | | | | | |
| 352 | | | | | | General Statistics | | | | | | |
| 353 | | | | | Number of Valid Observations | 43 | | | | | Number of Distinct Observations | 29 |
| 354 | | | | | | | | | | | | |
| 355 | | | | Raw Statistics | | | | | | Log-transformed Statistics | | |
| 356 | | | | | Minimum | 16 | | | | | Minimum of Log Data | 2.773 |
| 357 | | | | | Maximum | 280 | | | | | Maximum of Log Data | 5.635 |
| 358 | | | | | Mean | 82.81 | | | | | Mean of log Data | 4.06 |
| 359 | | | | | Geometric Mean | 57.96 | | | | | SD of log Data | 0.879 |
| 360 | | | | | Median | 57.5 | | | | | | |
| 361 | | | | | SD | 68.69 | | | | | | |
| 362 | | | | | Std. Error of Mean | 10.47 | | | | | | |
| 363 | | | | | Coefficient of Variation | 0.829 | | | | | | |
| 364 | | | | | Skewness | 1.138 | | | | | | |
| 365 | | | | | | | | | | | | |
| 366 | | | | | | Relevant UCL Statistics | | | | | | |
| 367 | | | | Normal Distribution Test | | | | | | Lognormal Distribution Test | | |
| 368 | | | | | Shapiro Wilk Test Statistic | 0.841 | | | | | Shapiro Wilk Test Statistic | 0.889 |
| 369 | | | | | Shapiro Wilk Critical Value | 0.943 | | | | | Shapiro Wilk Critical Value | 0.943 |
| 370 | | | | Data not Normal at 5% Significance Level | | | | | | Data not Lognormal at 5% Significance Level | | |
| 371 | | | | | | | | | | | | |
| 372 | | | | Assuming Normal Distribution | | | | | | Assuming Lognormal Distribution | | |
| 373 | | | | | 95% Student's-t UCL | 100.4 | | | | | 95% H-UCL | 115.5 |
| 374 | | | | 95% UCLs (Adjusted for Skewness) | | | | | | | 95% Chebyshev (MVUE) UCL | 140.3 |
| 375 | | | | | 95% Adjusted-CLT UCL (Chen-1995) | 102 | | | | | 97.5% Chebyshev (MVUE) UCL | 164.5 |
| 376 | | | | | 95% Modified-t UCL (Johnson-1978) | 100.7 | | | | | 99% Chebyshev (MVUE) UCL | 212.1 |
| 377 | | | | | | | | | | | | |
| 378 | | | | Gamma Distribution Test | | | | | | Data Distribution | | |
| 379 | | | | | k star (bias corrected) | 1.454 | | | | Data do not follow a Discernable Distribution (0.05) | | |
| 380 | | | | | Theta Star | 56.93 | | | | | | |
| 381 | | | | | MLE of Mean | 82.81 | | | | | | |
| 382 | | | | | MLE of Standard Deviation | 68.66 | | | | | | |
| 383 | | | | | nu star | 125.1 | | | | | | |
| 384 | | | | | Approximate Chi Square Value (.05) | 100.3 | | | | Nonparametric Statistics | | |
| 385 | | | | | Adjusted Level of Significance | 0.0444 | | | | | 95% CLT UCL | 100 |
| 386 | | | | | Adjusted Chi Square Value | 99.48 | | | | | 95% Jackknife UCL | 100.4 |
| 387 | | | | | | | | | | | 95% Standard Bootstrap UCL | 99.78 |
| 388 | | | | | Anderson-Darling Test Statistic | 1.727 | | | | | 95% Bootstrap-t UCL | 102.1 |
| 389 | | | | | Anderson-Darling 5% Critical Value | 0.766 | | | | | 95% Hall's Bootstrap UCL | 102.2 |
| 390 | | | | | Kolmogorov-Smirnov Test Statistic | 0.19 | | | | | 95% Percentile Bootstrap UCL | 99.65 |
| 391 | | | | | Kolmogorov-Smirnov 5% Critical Value | 0.137 | | | | | 95% BCA Bootstrap UCL | 100.8 |
| 392 | | | | Data not Gamma Distributed at 5% Significance Level | | | | | | | 95% Chebyshev(Mean, Sd) UCL | 128.5 |
| 393 | | | | | | | | | | | 97.5% Chebyshev(Mean, Sd) UCL | 148.2 |
| 394 | | | | Assuming Gamma Distribution | | | | | | | 99% Chebyshev(Mean, Sd) UCL | 187 |
| 395 | | | | | 95% Approximate Gamma UCL (Use when n >= 40) | 103.3 | | | | | | |
| 396 | | | | | 95% Adjusted Gamma UCL (Use when n < 40) | 104.1 | | | | | | |
| 397 | | | | | | | | | | | | |
| 398 | | | | Potential UCL to Use | | | | | | | Use 95% Chebyshev (Mean, Sd) UCL | 128.5 |
| 399 | | | | | | | | | | | | |
| 400 | | | | Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | | | | | | |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 401 | These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) | | | | | | | | | | | |
| 402 | and Singh and Singh (2003). For additional insight, the user may want to consult a statistician. | | | | | | | | | | | |
| 403 | | | | | | | | | | | | |
| 404 | | | | | | | | | | | | |
| 405 | Selenium | | | | | | | | | | | |
| 406 | | | | | | | | | | | | |
| 407 | General Statistics | | | | | | | | | | | |
| 408 | | | | | Number of Valid Data | 44 | | | | Number of Detected Data | | 11 |
| 409 | | | | | Number of Distinct Detected Data | 10 | | | | Number of Non-Detect Data | | 33 |
| 410 | | | | | | | | | | Percent Non-Detects | | 75.00% |
| 411 | | | | | | | | | | | | |
| 412 | Raw Statistics | | | | | | Log-transformed Statistics | | | | | |
| 413 | | | | | Minimum Detected | 0.25 | | | | Minimum Detected | | -1.386 |
| 414 | | | | | Maximum Detected | 5.6 | | | | Maximum Detected | | 1.723 |
| 415 | | | | | Mean of Detected | 2.393 | | | | Mean of Detected | | 0.442 |
| 416 | | | | | SD of Detected | 1.979 | | | | SD of Detected | | 1.072 |
| 417 | | | | | Minimum Non-Detect | 0.25 | | | | Minimum Non-Detect | | -1.386 |
| 418 | | | | | Maximum Non-Detect | 3.4 | | | | Maximum Non-Detect | | 1.224 |
| 419 | | | | | | | | | | | | |
| 420 | Note: Data have multiple DLs - Use of KM Method is recommended | | | | | | | | | Number treated as Non-Detect | | 41 |
| 421 | For all methods (except KM, DL/2, and ROS Methods), | | | | | | | | | Number treated as Detected | | 3 |
| 422 | Observations < Largest ND are treated as NDs | | | | | | | | | Single DL Non-Detect Percentage | | 93.18% |
| 423 | | | | | | | | | | | | |
| 424 | UCL Statistics | | | | | | | | | | | |
| 425 | Normal Distribution Test with Detected Values Only | | | | | | Lognormal Distribution Test with Detected Values Only | | | | | |
| 426 | | | | | Shapiro Wilk Test Statistic | 0.876 | | | | Shapiro Wilk Test Statistic | | 0.925 |
| 427 | | | | | 5% Shapiro Wilk Critical Value | 0.85 | | | | 5% Shapiro Wilk Critical Value | | 0.85 |
| 428 | Data appear Normal at 5% Significance Level | | | | | | Data appear Lognormal at 5% Significance Level | | | | | |
| 429 | | | | | | | | | | | | |
| 430 | Assuming Normal Distribution | | | | | | Assuming Lognormal Distribution | | | | | |
| 431 | | | | | DL/2 Substitution Method | | | | | DL/2 Substitution Method | | |
| 432 | | | | | Mean | 1.096 | | | | Mean | | -0.465 |
| 433 | | | | | SD | 1.296 | | | | SD | | 1.078 |
| 434 | | | | | 95% DL/2 (t) UCL | 1.424 | | | | 95% H-Stat (DL/2) UCL | | 1.682 |
| 435 | | | | | | | | | | | | |
| 436 | | | | | Maximum Likelihood Estimate(MLE) Method | N/A | | | | Log ROS Method | | |
| 437 | MLE method failed to converge properly | | | | | | | | | Mean in Log Scale | | -1.435 |
| 438 | | | | | | | | | | SD in Log Scale | | 1.295 |
| 439 | | | | | | | | | | Mean in Original Scale | | 0.707 |
| 440 | | | | | | | | | | SD in Original Scale | | 1.373 |
| 441 | | | | | | | | | | 95% t UCL | | 1.055 |
| 442 | | | | | | | | | | 95% Percentile Bootstrap UCL | | 1.071 |
| 443 | | | | | | | | | | 95% BCA Bootstrap UCL | | 1.163 |
| 444 | | | | | | | | | | 95% H-UCL | | 0.942 |
| 445 | | | | | | | | | | | | |
| 446 | Gamma Distribution Test with Detected Values Only | | | | | | Data Distribution Test with Detected Values Only | | | | | |
| 447 | | | | | k star (bias corrected) | 1.009 | Data appear Normal at 5% Significance Level | | | | | |
| 448 | | | | | Theta Star | 2.371 | | | | | | |
| 449 | | | | | nu star | 22.2 | | | | | | |
| 450 | | | | | | | | | | | | |

| | A–E | F | G–K | L |
|---|---|---|---|---|
| 451 | A-D Test Statistic | 0.361 | **Nonparametric Statistics** | |
| 452 | 5% A-D Critical Value | 0.746 | Kaplan-Meier (KM) Method | |
| 453 | K-S Test Statistic | 0.746 | Mean | 0.846 |
| 454 | 5% K-S Critical Value | 0.261 | SD | 1.32 |
| 455 | **Data appear Gamma Distributed at 5% Significance Level** | | SE of Mean | 0.213 |
| 456 | | | 95% KM (t) UCL | 1.204 |
| 457 | **Assuming Gamma Distribution** | | 95% KM (z) UCL | 1.196 |
| 458 | Gamma ROS Statistics using Extrapolated Data | | 95% KM (jackknife) UCL | 1.144 |
| 459 | Minimum | 0.000001 | 95% KM (bootstrap t) UCL | 1.282 |
| 460 | Maximum | 5.6 | 95% KM (BCA) UCL | 1.487 |
| 461 | Mean | 0.602 | 95% KM (Percentile Bootstrap) UCL | 1.366 |
| 462 | Median | 0.000001 | 95% KM (Chebyshev) UCL | 1.775 |
| 463 | SD | 1.416 | 97.5% KM (Chebyshev) UCL | 2.177 |
| 464 | k star | 0.0964 | 99% KM (Chebyshev) UCL | 2.966 |
| 465 | Theta star | 6.245 | | |
| 466 | Nu star | 8.484 | **Potential UCLs to Use** | |
| 467 | AppChi2 | 3.019 | 95% KM (t) UCL | 1.204 |
| 468 | 95% Gamma Approximate UCL (Use when n >= 40) | 1.692 | 95% KM (Percentile Bootstrap) UCL | 1.366 |
| 469 | 95% Adjusted Gamma UCL (Use when n < 40) | 1.756 | | |
| 470 | **Note: DL/2 is not a recommended method.** | | | |
| 471 | | | | |
| 472 | **Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.** | | | |
| 473 | **These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).** | | | |
| 474 | **For additional insight, the user may want to consult a statistician.** | | | |
| 475 | | | | |
| 476 | | | | |
| 477 | **Vanadium** | | | |
| 478 | | | | |
| 479 | **General Statistics** | | | |
| 480 | Number of Valid Observations | 43 | Number of Distinct Observations | 35 |
| 481 | | | | |
| 482 | **Raw Statistics** | | **Log-transformed Statistics** | |
| 483 | Minimum | 19 | Minimum of Log Data | 2.944 |
| 484 | Maximum | 140 | Maximum of Log Data | 4.942 |
| 485 | Mean | 61.15 | Mean of log Data | 3.977 |
| 486 | Geometric Mean | 53.37 | SD of log Data | 0.54 |
| 487 | Median | 61 | | |
| 488 | SD | 31.5 | | |
| 489 | Std. Error of Mean | 4.804 | | |
| 490 | Coefficient of Variation | 0.515 | | |
| 491 | Skewness | 0.64 | | |
| 492 | | | | |
| 493 | **Relevant UCL Statistics** | | | |
| 494 | **Normal Distribution Test** | | **Lognormal Distribution Test** | |
| 495 | Shapiro Wilk Test Statistic | 0.928 | Shapiro Wilk Test Statistic | 0.957 |
| 496 | Shapiro Wilk Critical Value | 0.943 | Shapiro Wilk Critical Value | 0.943 |
| 497 | **Data not Normal at 5% Significance Level** | | **Data appear Lognormal at 5% Significance Level** | |
| 498 | | | | |
| 499 | **Assuming Normal Distribution** | | **Assuming Lognormal Distribution** | |
| 500 | 95% Student's-t UCL | 69.23 | 95% H-UCL | 72.51 |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 501 | 95% UCLs (Adjusted for Skewness) | | | | | | 95% Chebyshev (MVUE) UCL | | | | | 84.82 |
| 502 | 95% Adjusted-CLT UCL (Chen-1995) | | | | | 69.55 | 97.5% Chebyshev (MVUE) UCL | | | | | 94.9 |
| 503 | 95% Modified-t UCL (Johnson-1978) | | | | | 69.31 | 99% Chebyshev (MVUE) UCL | | | | | 114.7 |
| 504 | | | | | | | | | | | | |
| 505 | Gamma Distribution Test | | | | | | Data Distribution | | | | | |
| 506 | k star (bias corrected) | | | | | 3.583 | Data appear Gamma Distributed at 5% Significance Level | | | | | |
| 507 | Theta Star | | | | | 17.07 | | | | | | |
| 508 | MLE of Mean | | | | | 61.15 | | | | | | |
| 509 | MLE of Standard Deviation | | | | | 32.31 | | | | | | |
| 510 | nu star | | | | | 308.1 | | | | | | |
| 511 | Approximate Chi Square Value (.05) | | | | | 268.4 | Nonparametric Statistics | | | | | |
| 512 | Adjusted Level of Significance | | | | | 0.0444 | 95% CLT UCL | | | | | 69.05 |
| 513 | Adjusted Chi Square Value | | | | | 267.2 | 95% Jackknife UCL | | | | | 69.23 |
| 514 | | | | | | | 95% Standard Bootstrap UCL | | | | | 68.95 |
| 515 | Anderson-Darling Test Statistic | | | | | 0.545 | 95% Bootstrap-t UCL | | | | | 69.44 |
| 516 | Anderson-Darling 5% Critical Value | | | | | 0.753 | 95% Hall's Bootstrap UCL | | | | | 69.79 |
| 517 | Kolmogorov-Smirnov Test Statistic | | | | | 0.13 | 95% Percentile Bootstrap UCL | | | | | 69.58 |
| 518 | Kolmogorov-Smirnov 5% Critical Value | | | | | 0.135 | 95% BCA Bootstrap UCL | | | | | 69.91 |
| 519 | Data appear Gamma Distributed at 5% Significance Level | | | | | | 95% Chebyshev(Mean, Sd) UCL | | | | | 82.09 |
| 520 | | | | | | | 97.5% Chebyshev(Mean, Sd) UCL | | | | | 91.15 |
| 521 | Assuming Gamma Distribution | | | | | | 99% Chebyshev(Mean, Sd) UCL | | | | | 108.9 |
| 522 | 95% Approximate Gamma UCL (Use when n >= 40) | | | | | 70.18 | | | | | | |
| 523 | 95% Adjusted Gamma UCL (Use when n < 40) | | | | | 70.52 | | | | | | |
| 524 | | | | | | | | | | | | |
| 525 | Potential UCL to Use | | | | | | Use 95% Approximate Gamma UCL | | | | | 70.18 |
| 526 | | | | | | | | | | | | |
| 527 | Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | | | | | | | | | |
| 528 | These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) | | | | | | | | | | | |
| 529 | and Singh and Singh (2003). For additional insight, the user may want to consult a statistician. | | | | | | | | | | | |
| 530 | | | | | | | | | | | | |
| 531 | | | | | | | | | | | | |
| 532 | Zinc | | | | | | | | | | | |
| 533 | | | | | | | | | | | | |
| 534 | General Statistics | | | | | | | | | | | |
| 535 | Number of Valid Observations | | | | | 43 | Number of Distinct Observations | | | | | 34 |
| 536 | | | | | | | | | | | | |
| 537 | Raw Statistics | | | | | | Log-transformed Statistics | | | | | |
| 538 | Minimum | | | | | 10 | Minimum of Log Data | | | | | 2.303 |
| 539 | Maximum | | | | | 180 | Maximum of Log Data | | | | | 5.193 |
| 540 | Mean | | | | | 48.41 | Mean of log Data | | | | | 3.657 |
| 541 | Geometric Mean | | | | | 38.76 | SD of log Data | | | | | 0.683 |
| 542 | Median | | | | | 45 | | | | | | |
| 543 | SD | | | | | 33.78 | | | | | | |
| 544 | Std. Error of Mean | | | | | 5.151 | | | | | | |
| 545 | Coefficient of Variation | | | | | 0.698 | | | | | | |
| 546 | Skewness | | | | | 1.602 | | | | | | |
| 547 | | | | | | | | | | | | |
| 548 | Relevant UCL Statistics | | | | | | | | | | | |
| 549 | Normal Distribution Test | | | | | | Lognormal Distribution Test | | | | | |
| 550 | Shapiro Wilk Test Statistic | | | | | 0.859 | Shapiro Wilk Test Statistic | | | | | 0.954 |

| | A–E | F | G–K | L |
|---|---|---|---|---|
| 551 | Shapiro Wilk Critical Value | 0.943 | Shapiro Wilk Critical Value | 0.943 |
| 552 | **Data not Normal at 5% Significance Level** | | **Data appear Lognormal at 5% Significance Level** | |
| 553 | | | | |
| 554 | **Assuming Normal Distribution** | | **Assuming Lognormal Distribution** | |
| 555 | 95% Student's-t UCL | 57.08 | 95% H-UCL | 60.72 |
| 556 | **95% UCLs (Adjusted for Skewness)** | | 95% Chebyshev (MVUE) UCL | 72.6 |
| 557 | 95% Adjusted-CLT UCL (Chen-1995) | 58.23 | 97.5% Chebyshev (MVUE) UCL | 82.97 |
| 558 | 95% Modified-t UCL (Johnson-1978) | 57.29 | 99% Chebyshev (MVUE) UCL | 103.4 |
| 559 | | | | |
| 560 | **Gamma Distribution Test** | | **Data Distribution** | |
| 561 | k star (bias corrected) | 2.25 | **Data appear Lognormal at 5% Significance Level** | |
| 562 | Theta Star | 21.52 | | |
| 563 | MLE of Mean | 48.41 | | |
| 564 | MLE of Standard Deviation | 32.28 | | |
| 565 | nu star | 193.5 | | |
| 566 | Approximate Chi Square Value (.05) | 162.3 | **Nonparametric Statistics** | |
| 567 | Adjusted Level of Significance | 0.0444 | 95% CLT UCL | 56.89 |
| 568 | Adjusted Chi Square Value | 161.3 | 95% Jackknife UCL | 57.08 |
| 569 | | | 95% Standard Bootstrap UCL | 56.81 |
| 570 | Anderson-Darling Test Statistic | 0.838 | 95% Bootstrap-t UCL | 58.48 |
| 571 | Anderson-Darling 5% Critical Value | 0.758 | 95% Hall's Bootstrap UCL | 59.54 |
| 572 | Kolmogorov-Smirnov Test Statistic | 0.143 | 95% Percentile Bootstrap UCL | 57.66 |
| 573 | Kolmogorov-Smirnov 5% Critical Value | 0.136 | 95% BCA Bootstrap UCL | 59.44 |
| 574 | **Data not Gamma Distributed at 5% Significance Level** | | 95% Chebyshev(Mean, Sd) UCL | 70.87 |
| 575 | | | 97.5% Chebyshev(Mean, Sd) UCL | 80.58 |
| 576 | **Assuming Gamma Distribution** | | 99% Chebyshev(Mean, Sd) UCL | 99.66 |
| 577 | 95% Approximate Gamma UCL (Use when n >= 40) | 57.71 | | |
| 578 | 95% Adjusted Gamma UCL (Use when n < 40) | 58.07 | | |
| 579 | | | | |
| 580 | **Potential UCL to Use** | | Use 95% H-UCL | 60.72 |
| 581 | | | | |
| 582 | **ProUCL computes and outputs H-statistic based UCLs for historical reasons only.** | | | |
| 583 | **H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.** | | | |
| 584 | **It is therefore recommended to avoid the use of H-statistic based 95% UCLs.** | | | |
| 585 | **Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.** | | | |
| 586 | | | | |
| 587 | **Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.** | | | |
| 588 | **These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)** | | | |
| 589 | **and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.** | | | |
| 590 | | | | |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | General UCL Statistics for Data Sets with Non-Detects - Post-Remediation Hydrocarbons | | | | | | | | |
| 2 | | | User Selected Options | | | | | | | | | |
| 3 | | | From File | Tbl 5 rev6.wst | | | | | | | | |
| 4 | | | Full Precision | OFF | | | | | | | | |
| 5 | | | Confidence Coefficient | 95% | | | | | | | | |
| 6 | | | Number of Bootstrap Operations | 2000 | | | | | | | | |
| 7 | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | |
| 9 | Motor Oil | | | | | | | | | | | |
| 10 | | | | | | | | | | | | |
| 11 | | | | | | General Statistics | | | | | | |
| 12 | | | | | | Number of Valid Data | 5 | | | Number of Detected Data | | 0 |
| 13 | | | | | | Number of Distinct Detected Data | 0 | | | Number of Non-Detect Data | | 5 |
| 14 | | | | | | | | | | Percent Non-Detects | | 100.00% |
| 15 | | | | | | | | | | | | |
| 16 | | | | | | Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs! | | | | | | |
| 17 | | | | | | Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit! | | | | | | |
| 18 | | | | | | The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV). | | | | | | |
| 19 | | | | | | | | | | | | |
| 20 | | | | | | The data set for variable Motor Oil was not processed! | | | | | | |
| 21 | | | | | | | | | | | | |
| 22 | | | | | | | | | | | | |
| 23 | | | | | | | | | | | | |
| 24 | Diesel | | | | | | | | | | | |
| 25 | | | | | | | | | | | | |
| 26 | | | | | | General Statistics | | | | | | |
| 27 | | | | | | Number of Valid Data | 5 | | | Number of Detected Data | | 2 |
| 28 | | | | | | Number of Distinct Detected Data | 2 | | | Number of Non-Detect Data | | 3 |
| 29 | | | | | | | | | | Percent Non-Detects | | 60.00% |
| 30 | | | | | | | | | | | | |
| 31 | | | | | | Raw Statistics | | | | Log-transformed Statistics | | |
| 32 | | | | | | Minimum Detected | 13 | | | Minimum Detected | | 2.565 |
| 33 | | | | | | Maximum Detected | 15 | | | Maximum Detected | | 2.708 |
| 34 | | | | | | Mean of Detected | 14 | | | Mean of Detected | | 2.636 |
| 35 | | | | | | SD of Detected | 1.414 | | | SD of Detected | | 0.101 |
| 36 | | | | | | Minimum Non-Detect | 1.2 | | | Minimum Non-Detect | | 0.182 |
| 37 | | | | | | Maximum Non-Detect | 1.2 | | | Maximum Non-Detect | | 0.182 |
| 38 | | | | | | | | | | | | |
| 39 | | | | | | | | | | | | |
| 40 | | | | | | Warning: Data set has only 2 Distinct Detected Values. | | | | | | |
| 41 | | | | | | This may not be adequate enough to compute meaningful and reliable test statistics and estimates. | | | | | | |
| 42 | | | | | | The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV). | | | | | | |
| 43 | | | | | | | | | | | | |
| 44 | | | | | | Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations. | | | | | | |
| 45 | | | | | | | | | | | | |
| 46 | | | | | | The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods. | | | | | | |
| 47 | | | | | | Those methods will return a 'N/A' value on your output display! | | | | | | |
| 48 | | | | | | | | | | | | |
| 49 | | | | | | It is necessary to have 4 or more Distinct Values for bootstrap methods. | | | | | | |
| 50 | | | | | | However, results obtained using 4 to 9 distinct values may not be reliable. | | | | | | |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 51 | It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates. | | | | | | | | | | | |
| 52 | | | | | | | | | | | | |
| 53 | | | | | | | | | | | | |
| 54 | UCL Statistics | | | | | | | | | | | |
| 55 | Normal Distribution Test with Detected Values Only | | | | | | Lognormal Distribution Test with Detected Values Only | | | | | |
| 56 | | | | | Shapiro Wilk Test Statistic | N/A | | | | Shapiro Wilk Test Statistic | | N/A |
| 57 | | | | | 5% Shapiro Wilk Critical Value | N/A | | | | 5% Shapiro Wilk Critical Value | | N/A |
| 58 | Data not Normal at 5% Significance Level | | | | | | Data not Lognormal at 5% Significance Level | | | | | |
| 59 | | | | | | | | | | | | |
| 60 | Assuming Normal Distribution | | | | | | Assuming Lognormal Distribution | | | | | |
| 61 | | | | | DL/2 Substitution Method | | | | | DL/2 Substitution Method | | |
| 62 | | | | | Mean | 5.96 | | | | Mean | | 0.748 |
| 63 | | | | | SD | 7.373 | | | | SD | | 1.725 |
| 64 | | | | | 95% DL/2 (t) UCL | 12.99 | | | | 95% H-Stat (DL/2) UCL | | 10403 |
| 65 | | | | | | | | | | | | |
| 66 | | | | | Maximum Likelihood Estimate(MLE) Method | N/A | | | | Log ROS Method | | |
| 67 | MLE method failed to converge properly | | | | | | | | | Mean in Log Scale | | N/A |
| 68 | | | | | | | | | | SD in Log Scale | | N/A |
| 69 | | | | | | | | | | Mean in Original Scale | | N/A |
| 70 | | | | | | | | | | SD in Original Scale | | N/A |
| 71 | | | | | | | | | | 95% t UCL | | N/A |
| 72 | | | | | | | | | | 95% Percentile Bootstrap UCL | | N/A |
| 73 | | | | | | | | | | 95% BCA Bootstrap UCL | | N/A |
| 74 | | | | | | | | | | 95% H-UCL | | N/A |
| 75 | | | | | | | | | | | | |
| 76 | Gamma Distribution Test with Detected Values Only | | | | | | Data Distribution Test with Detected Values Only | | | | | |
| 77 | | | | | k star (bias corrected) | N/A | Data do not follow a Discernable Distribution (0.05) | | | | | |
| 78 | | | | | Theta Star | N/A | | | | | | |
| 79 | | | | | nu star | N/A | | | | | | |
| 80 | | | | | | | | | | | | |
| 81 | | | | | A-D Test Statistic | N/A | Nonparametric Statistics | | | | | |
| 82 | | | | | 5% A-D Critical Value | N/A | | | | Kaplan-Meier (KM) Method | | |
| 83 | | | | | K-S Test Statistic | N/A | | | | Mean | | 13.4 |
| 84 | | | | | 5% K-S Critical Value | N/A | | | | SD | | 0.8 |
| 85 | Data not Gamma Distributed at 5% Significance Level | | | | | | | | | SE of Mean | | 0.506 |
| 86 | | | | | | | | | | 95% KM (t) UCL | | 14.48 |
| 87 | Assuming Gamma Distribution | | | | | | | | | 95% KM (z) UCL | | 14.23 |
| 88 | | | | | Gamma ROS Statistics using Extrapolated Data | | | | | 95% KM (jackknife) UCL | | N/A |
| 89 | | | | | Minimum | N/A | | | | 95% KM (bootstrap t) UCL | | N/A |
| 90 | | | | | Maximum | N/A | | | | 95% KM (BCA) UCL | | N/A |
| 91 | | | | | Mean | N/A | | | | 95% KM (Percentile Bootstrap) UCL | | N/A |
| 92 | | | | | Median | N/A | | | | 95% KM (Chebyshev) UCL | | 15.61 |
| 93 | | | | | SD | N/A | | | | 97.5% KM (Chebyshev) UCL | | 16.56 |
| 94 | | | | | k star | N/A | | | | 99% KM (Chebyshev) UCL | | 18.43 |
| 95 | | | | | Theta star | N/A | | | | | | |
| 96 | | | | | Nu star | N/A | Potential UCLs to Use | | | | | |
| 97 | | | | | AppChi2 | N/A | | | | 95% KM (t) UCL | | 14.48 |
| 98 | | | | | 95% Gamma Approximate UCL (Use when n >= 40) | N/A | | | | 95% KM (% Bootstrap) UCL | | N/A |
| 99 | | | | | 95% Adjusted Gamma UCL (Use when n < 40) | N/A | | | | | | |
| 100 | Note: DL/2 is not a recommended method. | | | | | | | | | | | |

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 101 | | | | | | | | | | | | |
| 102 | Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | | | | | | | | | |
| 103 | These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | | | | | | | | | |
| 104 | For additional insight, the user may want to consult a statistician. | | | | | | | | | | | |
| 105 | | | | | | | | | | | | |

SEVERN TRENT STL

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MAR - 6 2003
ERLER & KALINOWSKI, INC

March 4, 2003

Ms. Michelle King
Erler & Kalinowski, Inc.
1870 Ogden Drive
Burlingame, CA 94010-5306

Dear Ms. King:

Thank you for your patience while STL San Francisco has reviewed your questions regarding the Presidio of San Francisco site investigation. The purpose of this letter is to address your issues regarding Cadmium data reported for this project.

Erler & Kalinowski (EKI) noted and communicated to STL San Francisco that Cadmium levels reported for this project were slightly elevated with respect to previous data. Based on that observation, EKI requested that STL SF review the metals data associated with this project. All QC measurements and supporting documentation were reviewed by STL San Francisco. It was determined that the performance of the instrumentation and procedures used at the time of data generation were in accordance with the SW-846 protocol. Since iron is known to cause positive interference for Cadmium by ICP technology, a specific focus was made on that issue during our review.

STL-San Francisco analyzes Interference Correction Samples (ICSAB) at a minimum of twice daily in order to assure that the Interelement Correction Factors previously established produce results within control limits when the check is performed. In the case of the data produced for Presidio, the results of the ICSAB check standard are well within control limits for this QC check. However, due to our focus on the interference caused by iron for cadmium, it was noted that there is a slightly low bias for the correction applied to Cadmium in the presence of Iron. In solid samples, that low bias for correcting for iron interference with Cadmium translates to between 1 and 2 PPM in the sample. We feel this may account for the slight elevation observed for the Presidio project. ICP technology may not be not well-suited to the tighter requirements needed at Presidio when analyzing samples very close to the detection limit of the technology.

Due to the complexity of interelement correction in ICP technology, it is not possible to state with certainty exactly how much Cadmium in each sample is due to interference from other elements, including iron. However, it is not unreasonable to assume that the amounts of Cadmium reported by the laboratory in this project could be elevated by as much as 1 to 2 PPM as a result of Iron interference and the data can be qualified as such.

We greatly appreciate the opportunity to work with EKI on this important project and hope that this discussion addresses your concerns. Please do not hesitate to contact me should you have any additional questions or concerns regarding this project.

Regards,
Severn Trent Laboratories

Tod Granicher
Project Manager

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (510) 486-0900

04 November 2003

Ms. Dorinda Shipman
Treadwell & Rollo
555 Montgomery St.
Suite 1300
San Francisco, CA 94111

Subject: Cadmium Data for Presidio Firing Ranges (C&T Reports 166460, 166561, 166566, 166624, 166682)

Dear Ms. Shipman:

Curtis & Tompkins has investigated the cadmium results reported above 0.8 mg/Kg in the sample delivery groups (SDGs) listed above based upon a request by Dave Kleesattel of Treadwell & Rollo. The request was made September 18, 2003; the original analyses were completed on August 8, 2003.

These analyses were performed by ICP-AES (EPA 6010B), a technique that measures the presence of elements via their characteristic light spectra emitted when burned in a torch. Many elements have overlapping spectra that cause a well understood method bias toward false positives and over-limit error. C&T routinely implements procedures to minimize the effects of inter-element interferences in environmental measurements.

These samples contain reasonably high levels of Iron, an element that potentially interferes with low level Cadmium measurements. After discussion discussion between Treadwell & Rollo and C&T about the original analysis performed in August, the original digestates still available in September were screened for cadmium using ICP-MS (EPA 6020) in order to remove the potential interference. All samples analyzed by ICP-MS produced ND (none detected) results for cadmium. The screen results were inserted into the table provided at the original request which is included as an attachment. Based on these observations, C&T is implementing additional procedures designed to reduce this type of inter-element interference.

I hope this addresses your concerns regarding this issue. If you have any questions or would like to discuss this information, please call me at (510)-486-0925 x 104.

Sincerely,

Steven Stanley
Project Manager

Curtis & Tompkins, Ltd.

| Sample ID (T&R) | Lab ID (C&T) | Cadmium (mg/kg) | Cadmium (mg/kg) |
|---|---|---|---|
| | | ICP | ICP-MS |
| MGBSB06[1] | 166460-017 | 1.2 | <0.25 |
| MGBSB16[1] | 166460-001 | 1.7 | <0.25 |
| | | | |
| CHPSB02[0.3] | 166624-041 | 1.1 | No digest |
| CHPSB08[1] | 166624-011 | 0.81 | No digest |
| CHPSB12[2] | 166624-037 | 0.97 | No digest |
| CHPSB12[3] | 166624-038 | 1.9 | No digest |
| CHPSB22[0.3] | 166561-042 | 1 | <0.25 |
| CHPSB25[1] | *** | 1 | No digest |
| | | | |
| BAPSB10[1]MSD | 166682-013 | 1.2 | <0.25 |
| BAPSB12[1] | 166682-004 | 1.1 | <0.25 |
| BAPSB13[0.3] | 166566-004 | 1.7 | <0.25 |
| BAPSB13[1] | 166566-005 | 1.3 | <0.25 |
| | | | |
| DUP072503A | 166561-029 | 1 | <0.25 |
| DUP08103C | 166682-005 | 1.2 | <0.25 |

"No digest" indicates the original digest has already been discarded

# Appendix E

## Evaluation of Background Metals in Mountain Lake Sediment

# Appendix E: Evaluation of Background Metals in Mountain Lake Sediment

The purpose of the evaluation of background metals is to assess whether certain metals detected in Mountain Lake sediment are likely associated with native soil, fill material, or sedimentation versus contamination due to run-off. This appendix presents the background soil types that exist in Mountain Lake sediment and evaluates whether metals concentrations detected in Mountain Lake sediment are consistent with concentrations associated with background material. Bivariate scatter plots for metals data were prepared for sediment samples collected from Mountain Lake to assist in the evaluation. The data for Mountain Lake are compared with data representing background at the Presidio for serpentinite and the Colma formation and with regional background data for greenstone. This evaluation demonstrates that Mountain Lake sediment is likely a mix of Colma formation and greenstone. As such, concentrations of chromium, nickel, and vanadium in Mountain Lake sediment are likely representative of background in the native soil, fill material, and sedimentation in Mountain Lake.

## E.1 Introduction

Mountain Lake overlies the Colma formation (Trust et.al. 2000). However, the Lake was filled in 1939 with cuttings and materials from construction of Park Presidio Boulevard and the associated MacArthur Tunnel. Boring logs for Mountain Lake show the presence of olive/gray fines, which indicates the possible presence of greenstone materials (URS 2011). Sediments have also built up in the lake over time through natural sedimentation processes. Therefore, sediment in the Lake contains imported materials from nearby areas in the Presidio and built-up sediment and is not necessarily representative of the underlying Colma formation.

Bivariate scatter plots have been used previously at the Presidio to evaluate soil metals data (EKI 2002, MACTEC 2009). The bivariate scatter plots present pairs of metal concentrations (e.g. chromium and nickel) for site data and background data sets. The scatter plots can be visually examined to assess whether the site data are consistent with one or more background data sets, which would indicate that the site data are representative of background conditions and not contamination.

The cleanup levels that were used as screening levels in the *Remedial Investigation Summary and Risk Evaluation* are based upon background metals concentrations characterized for the Colma formation (RI Summary; URS 2011). Following the proposed remedial action in the FS/RAP, several metals (chromium, nickel, and vanadium) would remain at concentrations above Colma formation background levels.

Bivariate scatter plots were prepared for chromium, nickel, and vanadium to evaluate whether the concentrations in Mountain Lake sediment are representative of background conditions associated with either serpentinite or the Colma formation. Scatter plots were not prepared for the greenstone formation because a Presidio background data set is not available for greenstone.

## E.2 Data Used for Scatter Plots

The analytical data that were used in the bivariate scatter plots are presented in Table E-1. The analytical data for chromium, nickel, and vanadium in Mountain Lake sediment are presented in Appendix A of this FS/RAP and were obtained from Table 2 of the RI Summary (URS 2011). To

focus on the data that might be associated with contamination, all existing data for only those locations where concentrations would exceed cleanup levels following removal of sediment from the remedial action area (main text, Section 3.6.3) were used. The analytical data for chromium, nickel, and vanadium that represent background concentrations in serpentinite and the Colma formation were obtained from Appendix C of the *Development of Presidio-Wide Cleanup Levels for Soil, Sediment, Groundwater and Surface Water* (EKI 2002).

For non-detect results, the reporting limit was used in the bivariate plots.

## E.3 Evaluation and Results of Scatter Plots

Initially, bivariate scatter plots were prepared for the three metals (chromium, nickel, and vanadium) for background serpentinite, background Colma formation, and Mountain Lake sediment. These scatter plots are presented in Figure E-1. Overall, the Mountain Lake data appear to be more closely correlated with the Colma formation data.

To better evaluate the Mountain Lake data relative to the Colma formation background, bivariate scatter plots were prepared for chromium, nickel, and vanadium in Mountain Lake sediment and Colma formation samples. These scatter plots are presented in Figure E-2. Overall, the relationship between the paired metals appears to be consistent between the Mountain Lake and Colma formation; however, the overall concentrations are generally higher in the Mountain Lake samples.

## E.4 Evidence of Greenstone Formation and Background Metals Concentrations in Mountain Lake Sediment

Greenstone is a native, secondary geologic unit that occurs at the Presidio (Schlocker 1974; EKI 2002). It is a dark greenish gray to gray olive colored basaltic rock that is interbedded with the Jurassic/Cretaceous sedimentary rocks and the Chert/Shale of the Franciscan Formation (EKI 2002). Greenstone has been identified in fill at Graded Area 9, which is in the vicinity of Mountain Lake at the Presidio, and at the Transfer Station, which is located above the MacArthur Tunnel from which the cuttings were placed in Mountain Lake during construction of Park Presidio Boulevard (EKI 2002).

A Presidio background data set is not available for greenstone. However, concentrations in greenstone are reported to range from 15 to 300 milligrams per kilogram (mg/kg) for chromium, 150 to 300 mg/kg for nickel, and 150 to 300 mg/kg for vanadium (EKI 2002) based on the chemical compositions of greenstone in the San Francisco Quadrangle (Schlocker 1974). Greenstone is geochemically similar to serpentinite in that it naturally contains higher concentrations of chromium and nickel than other geologic units. It is distinctive from serpentine in that it contains nickel and chromium in the hundreds of parts per million (ppm) instead of thousands of ppm, and greenstone typically contains several hundred ppm of vanadium (EKI 2002).

The following evidence supports that greenstone is present in sediment of Mountain Lake, and concentrations of chromium, nickel, and vanadium in Mountain Lake sediment are indicative of this soil type:

- Samples collected from Lake sediment contain concentrations of chromium, nickel, and vanadium within the expected range for greenstone in the San Francisco Quadrangle. Detected concentrations in the Mountain Lake samples range from 36 to 230 mg/kg for chromium, 23 to 280 mg/kg for nickel, and 26 to 140 mg/kg for vanadium.

- The concentration distribution of metals in the Mountain Lake sediment compare with the distribution of metals in the Colma and serpentinite data sets as expected for greenstone. As shown on the scatter plots, the sediment samples in Mountain Lake contain levels of nickel and chromium that are higher than in the Colma formation background data set, but lower than in the serpentinite data set. The Mountain Lake sediment samples also contain higher concentrations of vanadium than both the Colma and serpentinite background data sets. These metal distributions in Lake sediment are characteristic of greenstone.

- The relationships between chromium, nickel, and vanadium concentrations in Mountain Lake sediment are consistent, which suggests a similar source for these metals.

- Olive/gray fines were noted in logs from Lake cores (URS 2011). These fines are consistent with the characterization of moderately altered greenstone; whereas, exposed and weathered greenstone would likely be moderate brown, dark yellowish-brown, or moderate reddish-brown in color (Schlocker 1974).

## E.5 Conclusion

Mountain Lake sediment appears to contain native materials and fill at the Presidio that are likely a mix of Colma formation and greenstone. The concentrations of chromium, nickel, and vanadium detected in Mountain Lake sediment are consistent with the presence of greenstone, which is further supported by the boring logs for Mountain Lake and the history of fill placement in the Lake.

## E.6 References

EKI. 2002. Development of Presidio-Wide Cleanup Levels for Soil, Sediment, Groundwater, and Surface Water, Presidio of San Francisco. October 2002. Revised 16 May 2006.

MACTEC. 2009. Field Data Report, Data Gaps Investigation for Fill Site 1 and Landfill 2.

Schlocker, J. 1974. Geology of the San Francisco North Quadrangle, CA.

URS Corporation. 2011. Remedial Investigation Summary and Risk Evaluation, Mountain Lake, Presidio of San Francisco. Prepared for the Presidio Trust. October 2011.

# Table E-1: Metals Data for Scatter Plots

| Data Set | Sample ID | Depth (ft)[a] | Sample Date | Chromium (mg/kg) | Nickel (mg/kg) | Vanadium (mg/kg) |
|---|---|---|---|---|---|---|
| **Mountain Lake Sediment[b]** | | | | | | |
| | MLSE - 1 | 6 | 01/24/01 | 140 | 150 | 100 |
| | | 7 | 01/24/01 | 110 | 110 | 70 |
| | | 9 | 01/24/01 | 53 | 25 | 43 |
| | MLSE - 2 | 8 | 01/25/01 | 110 | 120 | 78 |
| | MLSE - 3 | 7 | 01/25/01 | 190 | 210 | 140 |
| | | 9 | 01/25/01 | 110 | 120 | 76 |
| | MLSE - 6 | 8 | 01/25/01 | 190 | 200 | 110 |
| | MLSE - 7 | 6 | 01/25/01 | 93 | 96 | 73 |
| | | 7 | 01/25/01 | 110 | 120 | 84 |
| | | 9 | 01/25/01 | 80 | 88 | 57 |
| | MLSE - 8 | 6 | 01/24/01 | 160 | 81 | 120 |
| | | 7 | 01/24/01 | 44 | 26 | 37 |
| | | 9 | 01/24/01 | 48 | 26 | 41 |
| | MLSE - 9 | 5 | 01/24/01 | 200 | 280 | 93 |
| | | 6 | 01/24/01 | 100 | 120 | 76 |
| | | 8 | 01/24/01 | 82 | 90 | 68 |
| | MLSE - 12 | 5 | 01/24/01 | 120 | 110 | 84 |
| | | 6 | 01/24/01 | 87 | 120 | 64 |
| | | 8 | 01/24/01 | 60 | 33 | 56 |
| | MLSE - 17 | 5 | 09/28/04 | 150 | 140 | 110 |
| | | 6 | 09/28/04 | -[c] | - | - |
| | MLSE - 27 | 1 | 09/30/04 | 51 | 25 | 27 |
| | | 2 | 09/30/04 | 230 | 260 | 120 |
| | | 5 | 09/30/04 | 110 | 93 | 94 |
| | | 6 | 09/30/04 | 44 | 23 | 37 |
| | MLSE - 28 | 5 | 09/30/04 | 150 | 180 | 100 |
| | | 6 | 09/30/04 | 36 | 40 | 26 |
| | MLSE - 30 | 4 | 10/01/04 | 130 | 130 | 80 |
| | | 5 | 10/01/04 | - | - | - |
| | | 6 | 10/01/04 | - | - | - |
| **Background Serpentinite[d]** | | | | | | |
| | 1a | NA | 10/16/96 | 1380 | 2590 | 29.3 |
| | 1b | NA | 10/16/96 | 1310 | 2290 | 34.7 |
| | 1c | NA | 10/16/96 | 1520 | 2210 | 38.6 |
| | 1d | NA | 10/16/96 | 1680 | 2290 | 39.7 |
| | BKGDSB04 | 0 | 09/02/92 | 750 | 1120 | 27.7 |
| | BKGDSB10 | 18 | 12/07/94 | 1290 | 1940 | 36.2 |
| | BKGDSB14 | 1.5 | 12/08/94 | 1050 | 3670 | 27 |
| | BKGDSB15 | 14.5 | 12/08/94 | 672 | 3950 | 40.2 |
| | BKGDSB15 | 20.5 | 12/08/94 | 910 | 2530 | 34.2 |
| | BKGDSO03A | 0.3 | 11/27/90 | 812 | 2190 | 11.8 |
| | UBR01SB02 | NA | 02/24/99 | 1160 | 2070 | 35.2 |
| | UBR02SB02 | NA | 02/25/99 | - | 1950 | 10.4 |
| | 1261 WEST | 10 | 06/21/93 | 493 | 1430 | 50.2 |
| | 1351SO01B | 17 | 10/26/90 | 753 | 2600 | 28.4 |
| | 1351SO02B | 15 | 10/29/90 | 1270 | 2530 | 56 |
| | GCEX01 | 3 | 10/19/98 | 1350 | 3510 | 48.7 |
| | GCEX02 | 3 | 10/19/98 | 1090 | 4290 | 28.8 |
| | GCEX03 | 3 | 10/19/98 | 586 | 2880 | 25.3 |
| | GCEX05 | 2 | 08/07/92 | 556 | 1020 | 84.4 |
| | TRENCH II | 1 | 09/16/93 | 914 | 1430 | 35.8 |
| | UST 1221.3 EAST | 14 | 09/29/93 | 786 | 882 | 61 |
| | UST 1221.4 EAST | 14 | 09/29/93 | 527 | 686 | 54.4 |

# Table E-1: Metals Data for Scatter Plots

| Data Set | Sample ID | Depth (ft)[(a)] | Sample Date | Chromium (mg/kg) | Nickel (mg/kg) | Vanadium (mg/kg) |
|---|---|---|---|---|---|---|
| **Background Colma[(d)]** | | | | | | |
| | BKGDSB01 | 2 | 08/21/92 | 100 | 97.5 | 63.3 |
| | BKGDSB01 | 5 | 08/21/92 | 90.2 | 89.1 | 55.4 |
| | BKGDSB11 | 5 | 12/07/94 | 78.3 | 34.6 | 64.9 |
| | BKGDSB12 | 5 | 12/07/94 | 51.8 | 63 | 37.2 |
| | BKGDSB12 | 9.5 | 12/07/94 | 64.6 | 69.3 | 43.3 |
| | BKGDSB13 | 5 | 12/07/94 | 78.4 | 78.5 | 43.7 |
| | BKGDSB13 | 9.5 | 12/07/94 | 67.8 | 38.5 | 41.6 |
| | LF10BK01 | 21.5 | 09/06/94 | 55.6 | 34.1 | 43.4 |
| | LF10BK03 | 57.5 | 09/06/94 | 103 | 123 | 49.4 |
| | LF10BK1BDUP | 0 | 09/06/94 | 41.4 | 40.6 | 42.6 |
| | CFLSSB01 | 4 | 11/18/94 | 58 | 31.2 | 42.4 |
| | CFLSSB02 | 3 | 11/18/94 | 58.3 | 48.1 | 35 |
| | DAEGW04 | 8 | 10/19/92 | 96.9 | 67.8 | 43.1 |
| | DAESB03 | 28 | 08/26/92 | 58.9 | 59.1 | 40.3 |
| | LF6SB01 | 20 | 11/20/94 | 24 | 37.2 | 12 |
| | LF6SB01 | 9 | 11/20/94 | 43.7 | 43.7 | 34.7 |
| | LF6SB02 | 20 | 11/20/94 | 30.5 | 43.6 | 19.6 |
| | LF6SB02 | 3 | 11/20/94 | 49.7 | 61 | 31.6 |
| | LF6SB02 | 8 | 11/20/94 | 41.8 | 53.9 | 27.5 |
| | LF6SB03 | 20 | 11/20/94 | 51.5 | 64 | 29.2 |
| | LF6SB03 | 3 | 11/20/94 | 81 | 72.1 | 49.9 |
| | LF6SB03 | 8 | 11/20/94 | 50.2 | 50.2 | 32.7 |
| | LF6SB04 | 20.5 | 11/20/94 | 41.8 | 32.5 | 29 |
| | LF6SB04 | 8 | 11/20/94 | 26.4 | 37.4 | 16.5 |
| | LF6SB05 | 20 | 11/20/94 | 28 | 40.3 | 19 |
| | LF6SB05 | 3.5 | 11/20/94 | 41.4 | 51.5 | 29.1 |
| | LF6SB05 | 8.5 | 11/20/94 | 42.1 | 42.1 | 23.8 |
| | LF6SB06 | 20 | 11/20/94 | 36.9 | 47.6 | 31 |
| | LF6SB06 | 3 | 11/20/94 | 91.8 | 71.7 | 54.9 |
| | LF6SB06 | 8 | 11/20/94 | 52.3 | 62.2 | 48 |
| | LF6SO03B | 7.5 | 11/08/90 | 149 | 77.4 | - |
| | LF8SO02B | 19 | 10/01/90 | 79.2 | 77 | 73.1 |
| | LF8SO03B | 19 | 10/02/90 | 120 | 84.2 | 85 |
| | NKSB13 | 10 | 12/05/94 | 40.2 | - | 34.1 |
| | NKSB14 | 1.5 | 12/07/94 | 53.6 | 31.2 | 45.8 |
| | NKSB15 | 5 | 12/07/94 | 53.8 | 51.8 | 44.8 |

**Notes:**

(a) Depths are below sediment surface for Mountain Lake sediment and below ground surface for background serpentinite and Colma data.

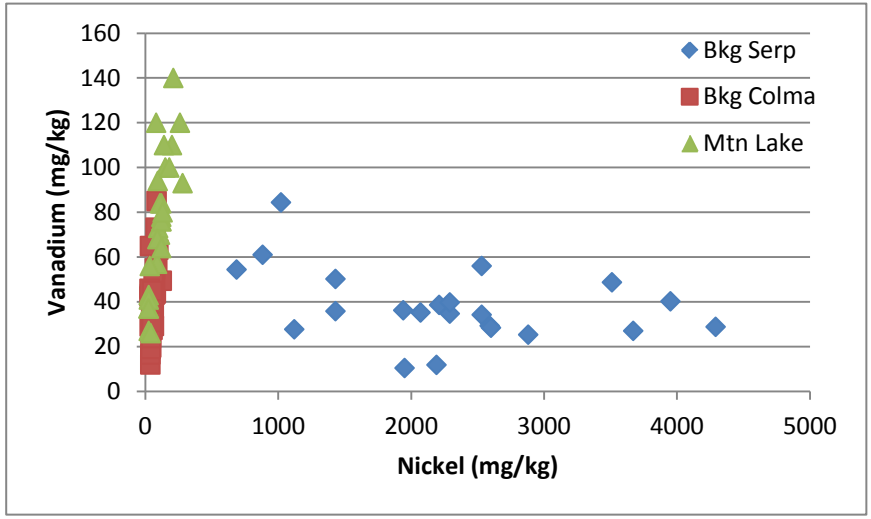
(b) Mountain Lake sediment data were obtained from Table 2 of the Remedial Investigation Summary and Risk Evaluation (URS 2011). Only those locations in Option 4 where metal concentrations exceed cleanup levels following remediation are included.

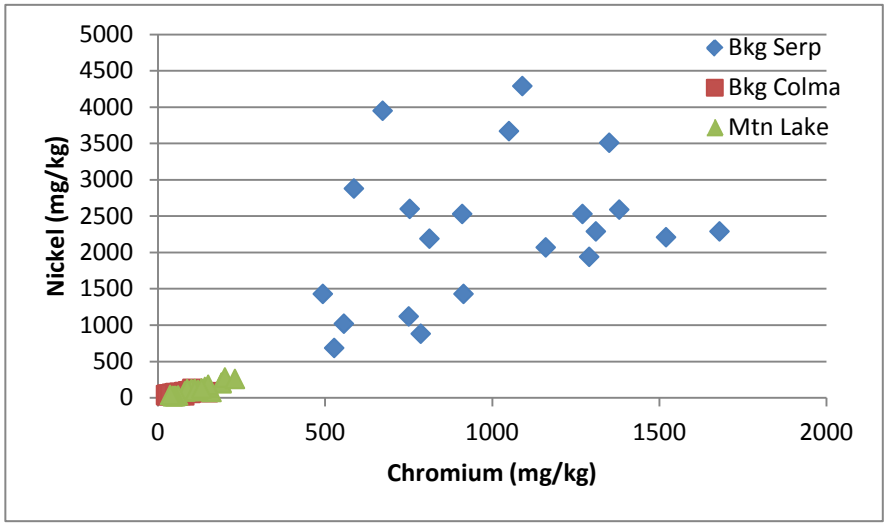
(c) '-' indicates that the sample was not analyzed for the metal.

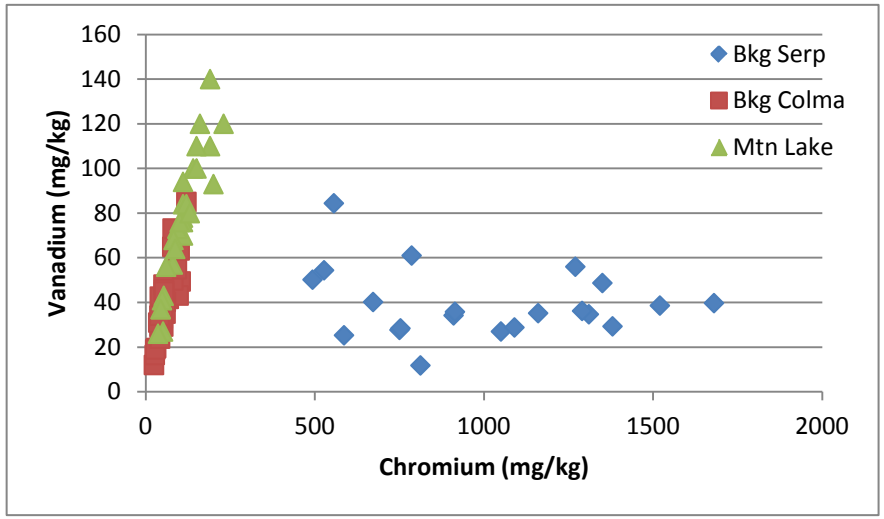
(d) Background serpentinite and Colma data were obtained from Table I2 of the Field Data Report for Fill Site 1 and Landfill 2 (MACTEC 2009).

**Abbreviations:**

ft - feet
mg/kg - milligrams per kilogram
NA - not available

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San Francisco, California

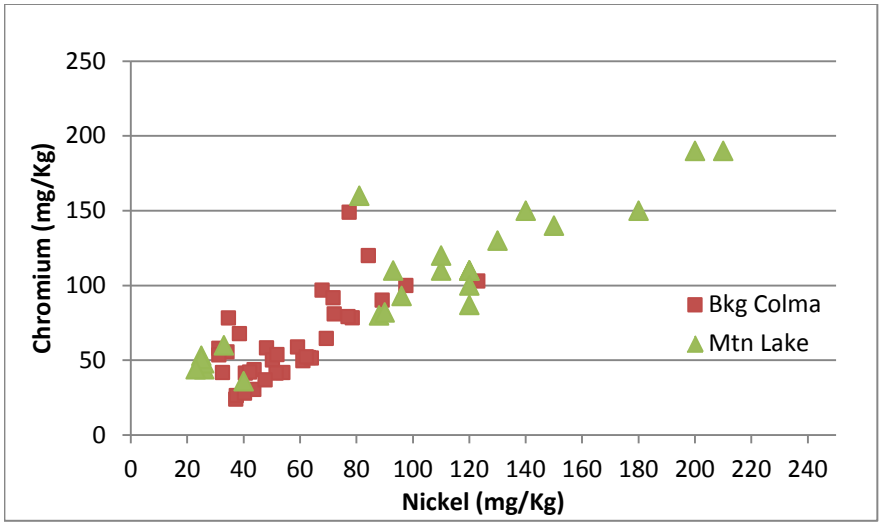
Mountain Lake - Feasibility Study/Remedial Action Plan

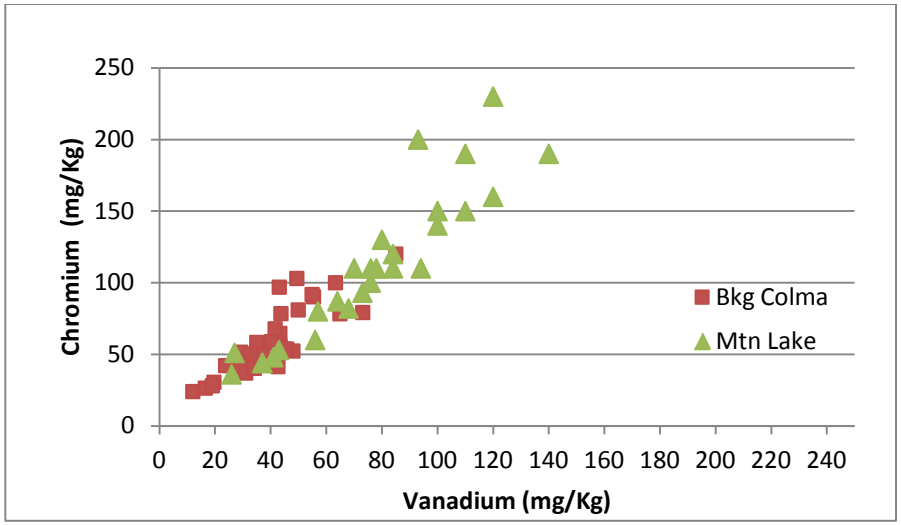
**Mountain Lake versus Background Data**

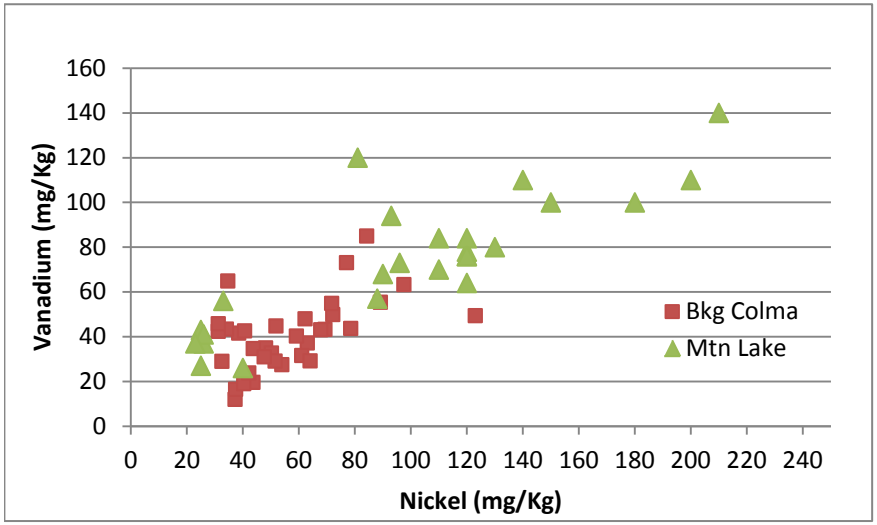
K/J 1165014*00

May 2012

**Figure E-1**

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**Background Colma versus Mountain Lake**

K/J 1165014*00

May 2012

**Figure E-2**

# Appendix F

## Green Remediation Evaluation Matrices

# Table F-1: Green Remediation Evaluation Matrix (GREM)[a]
## Alternative 1: No Action

| Stressors | Affected Media | Mechanism/ Effect | Y/N | Score[b] |
|---|---|---|---|---|
| **Substance Release/Production** | | | | |
| Airborne NOx & SOx | Air | Acid rain & photochemical smog | N | This remedial alternative is not a source of substantial airborne NOx and SOx emissions. |
| Chloro-fluorocarbon vapors | Air | Ozone depletion | N | This remedial alternative is not a source of substantial chloro-fluorocarbon vapors. |
| Greenhouse gas emissions | Air | Atmospheric warming | N | This remedial alternative is not a source of greenhouse gas emissions. |
| Airborne particulates, toxic vapors, gases, water vapor | Air | General air pollution, toxic air, humidity increase | N | This remedial alternative is not a source of substantial airborne particulates, toxic vapors, gases, or water vapor. |
| Liquid waste production | Water | Water toxicity, sediment toxicity, sediment | N | This remedial alternative is not a source of substantial liquid waste production. |
| Solid waste production | Land | Land use, toxicity | N | This remedial alternative is not a source of substantial solid waste production. |
| **Thermal Releases** | | | | |
| Warm water | Water | Habitat warming | N | This remedial alternative is not a source of substantial warm water. |
| Warm vapor | Air | Atmospheric humidity | N | This remedial alternative is not a source of substantial warm vapor. |
| **Physical Disturbances/Disruptions** | | | | |
| Soil structure disruption | Land | Habitat destruction/ soil Infertility | N | This remedial alternative is not a source of substantial soil structure disruption. |
| Noise, odor, vibration, aesthetics | General environment | Nuisance & safety | N | This remedial alternative is not a source of substantial noise, odor, vibration, or aesthetic disruptions. |
| Traffic | Land; general environment | Nuisance & safety | N | This remedial alternative is not a source of traffic disruption. |
| Land stagnation | Land; general environment | Remediation time; cleanup efficiency; re-development | Y | The primary land stagnation issue in this remedial alternative is due to the loss of beneficial use of Mountain Lake sediments for support of ecological resources, as the No Action alternative has been deemed to be insufficiently protective of ecological receptors. |

# Table F-1: Green Remediation Evaluation Matrix (GREM)[a]
## Alternative 1: No Action

| Stressors | Affected Media | Mechanism/ Effect | Y/N | Score[b] |
|---|---|---|---|---|
| **Resource Depletion/Gain (Recycling)** | | | | |
| Petroleum (energy) | Subsurface | Consumption | N | This remedial alternative is not a source of substantial petroleum or energy depletion or gain. |
| Mineral | Subsurface | Consumption | N | This remedial alternative is not a source of substantial mineral depletion or gain. |
| Construction materials (soil, concrete, plastic) | Land | Consumption, reuse | N | This remedial alternative is not a source of substantial construction materials depletion or gain. |
| Land & space | Land | Impoundment, reuse | Y | The primary land & space depletion in this remedial alternative is due to the reduced of beneficial use of Mountain Lake for ecological habitat. |
| Surface water & groundwater | Water, land (subsidence) | Impoundment, sequester, reuse | Y | The primary land & space depletion in this remedial alternative is due to the reduced of beneficial use of Mountain Lake for ecological habitat. |
| Biology resources (plants, trees, animals, microorganisms) | Air, water, land, forest, subsurface | Species disappearance, diversity reduction regenerative ability reduction | Y | This remedial alternative is not a source of substantial biological depletion or gain during remedy implementation, but has the potential to stress biology resources through the risk of continued exposure, due to the current sediment quality. |

**Notes:**

(a) Template provided by DTSC's "Interim Advisory for Green Remediation" (December 2009).

(b) Advisory Instructions: "The impacts associated with physical, chemical, or biological stressors are evaluated for each alternative and then assembled into the GREM, a matrix of applicable environmental stress factors and their consequences, constituting a qualitative framework for comparing remedial options" (pg. 2). According to the advisory, qualitative scoring is the most practical approach to rendering the GREM matrix useful as a tool in evaluating opportunities for optimization of remedial alternatives (pg. 23).

# Table F-2: Green Remediation Evaluation Matrix (GREM)[a] Alternative 2: Capping

| Stressors | Affected Media | Mechanism/ Effect | Y/N | Score[b] |
|---|---|---|---|---|
| **Substance Release/Production** | | | | |
| Airborne NOx & SOx | Air | Acid rain & photochemical smog | Y | The primary emissions from this remedial alternative are due to engine exhaust from material handling. This alternative requires importing and placing approximately 10,390 cubic yards of material. New materials would be obtained from local sources where possible. |
| Chloro-fluorocarbon vapors | Air | Ozone depletion | N | This remedial alternative is not a source of substantial chloro-fluorocarbon vapors. |
| Greenhouse gas emissions | Air | Atmospheric warming | Y | The primary emissions from this remedial alternative are due to engine exhaust from material handling. This alternative requires importing and placing approximately 10,390 cubic yards of material. New materials would be obtained from local sources where possible. |
| Airborne particulates, toxic vapors, gases, water vapor | Air | General air pollution, toxic air, humidity increase | Y | The primary airborne particulate emissions from this remedial alternative are due to fugitive dust from material handling. This alternative requires importing and placing approximately 10,390 cubic yards of material. New materials would be obtained from local sources where possible. |
| Liquid waste production | Water | Water toxicity, sediment toxicity, sediment | Y | The primary source of liquid waste production in this remedial alternative is due to stormwater during an estimated half a year of construction activities. A Stormwater Pollution Prevention Plan is being developed for upcoming construction activities to minimize stormwater runoff from staging areas, and construction activities would be phased primarily in the dry season to minimize stormwater effects. |
| Solid waste production | Land | Land use, toxicity | N | This remedy focuses on on-site placement of clean material such that offhaul of sediments would not be required. The primary source of solid waste production in this remedial alternative is expected to be from general construction debris, over-ordering of engineered cover materials, etc. |

# Table F-2: Green Remediation Evaluation Matrix (GREM)[a] Alternative 2: Capping

| Stressors | Affected Media | Mechanism/ Effect | Y/N | Score[b] |
|---|---|---|---|---|
| **Thermal Releases** | | | | |
| Warm water | Water | Habitat warming | N | This remedial alternative is not a source of substantial warm water. |
| Warm vapor | Air | Atmospheric humidity | Y | The primary warm vapor release from this remedial alternative is due to engine exhaust from material handling. This alternative requires importing and placing approximately 6,500 cubic yards of material. New materials would be obtained from local sources where possible. |
| **Physical Disturbances/Disruptions** | | | | |
| Soil structure disruption | Land | Habitat destruction, soil Infertility | Y | The primary soil structure disruption from this remedial alternative would occur as dredge and barge equipment is mobilized to the site and places approximately 10,390 cubic yards of new cover material in the lake. |
| Noise, odor, vibration, aesthetics | General environment | Nuisance & safety | Y | The primary aesthetic disruption in this remedial alternative is due to the noise, odor, vibration and aesthetic impact of importing and placing approximately 10,390 cubic yards of material. This process is expected to require approximately half a year of active construction. |
| Traffic | Land; general environment | Nuisance & safety | Y | The primary traffic disruption in this remedial alternative is due to the import of approximately 10,390 cubic yards of locally-obtained material for capping, over approximately half a year. |
| Land stagnation | Land; general environment | Remediation time; cleanup efficiency; re-development | Y | The primary land stagnation issue in this remedial alternative is due to the loss of beneficial use of Mountain Lake sediments for ecological habitat. This alternative involves permanent stagnation of the intended future land use outlined in the 2002 Presidio Trust Management Plan, since Alternative 2 involves capping existing sediments and deepening the lake water depth. |
| **Resource Depletion/Gain (Recycling)** | | | | |
| Petroleum (energy) | Subsurface | Consumption | Y | The primary petroleum depletion in this remedial alternative is due to the engine fuel demands of material handling. This alternative requires importing and placing approximately 10,390 cubic yards of material. New materials would be obtained from local sources where possible. |
| Mineral | Subsurface | Consumption | N | This remedial alternative is not a source of substantial mineral depletion or gain. |

# Table F-2: Green Remediation Evaluation Matrix (GREM)[a] Alternative 2: Capping

| Stressors | Affected Media | Mechanism/ Effect | Y/N | Score[b] |
|---|---|---|---|---|
| Construction materials (soil, concrete, plastic) | Land | Consumption, reuse | Y | The primary construction materials depletion in this remedial alternative is due to the consumption of approximately 10,390 cubic yards of imported clean cap material. |
| Land & space | Land | Impoundment, reuse | Y | The primary land & space depletion in this remedial alternative is due to the reduced of beneficial use of Mountain Lake for ecological habitat. |
| Surface water & groundwater | Water, land (subsidence) | Impoundment, sequester, reuse | Y | The primary land & space depletion in this remedial alternative is due to the reduced of beneficial use of Mountain Lake for ecological habitat. |
| Biology resources (plants, trees, animals, microorganisms) | Air, water, land, forest, subsurface | Species disappearance, diversity reduction regenerative ability reduction | Y | The primary biological gain in this remedial alternative is due to the protection against contact with Mountain Lake sediment. |

**Notes:**

(a) Template provided by DTSC's "Interim Advisory for Green Remediation" (December 2009).

(b) Advisory Instructions: "The impacts associated with physical, chemical, or biological stressors are evaluated for each alternative and then assembled into the GREM, a matrix of applicable environmental stress factors and their consequences, constituting a qualitative framework for comparing remedial options" (pg. 2). According to the advisory, qualitative scoring is the most practical approach to rendering the GREM matrix useful as a tool in evaluating opportunities for optimization of remedial alternatives (pg. 23).

# Table F-3: Green Remediation Evaluation Matrix (GREM)[a]
## Alternative 3: Dredging with Limited Capping

| Stressors | Affected Media | Mechanism/ Effect | Y/N | Score[b] |
|---|---|---|---|---|
| **Substance Release/Production** | | | | |
| Airborne NOx & SOx | Air | Acid rain & photochemical smog | Y | The primary emissions from this remedial alternative are due to engine exhaust from material handling. This alternative requires dredging and transport of approximately 15,600 cubic yards of sediment for disposal at a regional disposal facility located hundreds of miles from the site. |
| Chloro-fluorocarbon vapors | Air | Ozone depletion | N | This remedial alternative is not a source of substantial chloro-fluorocarbon vapors. |
| Greenhouse gas emissions | Air | Atmospheric warming | Y | The primary greenhouse gas emissions from this remedial alternative are due to engine exhaust from material handling. This alternative requires dredging and transport of approximately 15,600 cubic yards of sediment for disposal at a regional disposal facility located hundreds of miles from the site. |
| Airborne particulates, toxic vapors, gases, water vapor | Air | General air pollution, toxic air, humidity increase | Y | The primary airborne particulate emissions from this remedial alternative are due to odors from dredged material handling. This alternative requires dredging and transport of approximately 15,600 cubic yards of sediment for disposal at a regional disposal facility located hundreds of miles from the site. |
| Liquid waste production | Water | Water toxicity, sediment toxicity, sediment | Y | The primary source of liquid waste production in this remedial alternative is elutriate from the sediment dewatering operations. It is anticipated that the elutriate would meet water quality standards for discharge back into the lake. However, confirmation testing and contingent treatment would be implemented as needed. |
| Solid waste production | Land | Land use, toxicity | Y | By far, the primary source of solid waste production in this remedial alternative is the approximately 15,600 cubic yards of dredged sediment requiring off-site disposal. |
| **Thermal Releases** | | | | |
| Warm water | Water | Habitat warming | N | This remedial alternative is not a source of substantial warm water. |
| Warm vapor | Air | Atmospheric humidity | Y | The primary warm vapor release from this remedial alternative is due to engine exhaust from material handling. This alternative requires dredging and transport of approximately 15,600 cubic yards of sediment for disposal at a regional disposal facility located hundreds of miles from the site. |

# Table F-3: Green Remediation Evaluation Matrix (GREM)[a]
## Alternative 3: Dredging with Limited Capping

| Stressors | Affected Media | Mechanism/ Effect | Y/N | Score[b] |
|---|---|---|---|---|
| **Physical Disturbances/Disruptions** | | | | |
| Soil structure disruption | Land | Habitat destruction, soil Infertility | Y | This remedial alternative involves extensive sediment structure disruption as dredging progresses and equipment is mobilized to the staging area to process the approximately 15,600 cubic yards of sediment. |
| Noise, odor, vibration, aesthetics | General environment | Nuisance & safety | Y | The primary aesthetic disruption in this remedial alternative is due to the noise, odor, vibration and aesthetic impact of dredging, processing, and off-hauling approximately 15,600 cubic yards of sediment. This process is expected to require approximately 6 months of active construction. |
| Traffic | Land; general environment | Nuisance & safety | Y | The primary traffic disruption in this remedial alternative is due to the offhauling of approximately 15,600 cubic yards of sediment to a facility located hundreds of miles from the site, over approximately 6 months. |
| Land stagnation | Land; general environment | Remediation time; cleanup efficiency; re-development | Y | The primary land stagnation issue in this remedial alternative is due to the loss of beneficial use of Mountain Lake sediment for ecological habitat during the anticipated 6-month construction period. |
| **Resource Depletion/Gain (Recycling)** | | | | |
| Petroleum (energy) | Subsurface | Consumption | N | The primary petroleum depletion in this remedial alternative is due to the engine fuel demands of material handling. This alternative requires dredging and transport of approximately 15,600 cubic yards of sediment for disposal at a regional disposal facility located hundreds of miles from the site. |
| Mineral | Subsurface | Consumption | N | This remedial alternative is not a source of substantial mineral depletion or gain. |
| Construction materials (soil, concrete, plastic) | Land | Consumption, reuse | N | This remedial alternative is not a source of substantial consumption of construction materials. |
| Land & space | Land | Impoundment, reuse | Y | The primary land & space gain in this remedial alternative is due to the reinstated beneficial use of Mountain Lake sediment for ecological habitat. |
| Surface water & groundwater | Water, land (subsidence) | Impoundment, sequester, reuse | Y | The primary water resource gain in this remedial alternative is due to the deepening of the lake, which contributes to water quality and ecological habitat enrichment. |

# Table F-3: Green Remediation Evaluation Matrix (GREM)[a]
## Alternative 3: Dredging with Limited Capping

| Stressors | Affected Media | Mechanism/ Effect | Y/N | Score[b] |
|---|---|---|---|---|
| Biology resources (plants, trees, animals, microorganisms) | Air, water, land, forest, subsurface | Species disappearance, diversity reduction regenerative ability reduction | Y | The primary biological gain in this remedial alternative is due to the protection against contact with Mountain Lake contaminated sediments. |

**Notes:**

(a) Template provided by DTSC's "Interim Advisory for Green Remediation" (December 2009).

(b) Advisory Instructions: "The impacts associated with physical, chemical, or biological stressors are evaluated for each alternative and then assembled into the GREM, a matrix of applicable environmental stress factors and their consequences, constituting a qualitative framework for comparing remedial options" (pg. 2). According to the advisory, qualitative scoring is the most practical approach to rendering the GREM matrix useful as a tool in evaluating opportunities for optimization of remedial alternatives (pg. 23).

# Appendix G

## Summary of Cost Opinions

# Table G-1: Summary of Costs - Alternative 2 Capping

**Site:** Mountain Lake
**Location:** The Presidio of San Francisco, California
**Phase:** Feasibility Study (-30% to +50%)
**Base Year:** 2012
**Date:** 03/06/12

**Description:** Alternative 2 consists of capping nearly the entire footprint of the Lake to eliminate exposure to contaminated sediments. Capital costs occur in Year 0. Annual O&M costs occur in Years 1 - 30. Periodic costs occur in Years 5, 10, 15, 20, 25, and 30.

**CAPITAL COSTS:**

| DESCRIPTION | QUANTITY | UNIT | RATE | TOTAL | NOTES |
|---|---|---|---|---|---|
| **Mobilization/Demobilization** | | | | | |
| Mobilization/Div 0&1 Submittals | 1 | LS | $214,000 | $214,000 | Say approximately 7.5% of other costs. |
| Demobilization | 1 | LS | $71,000 | $71,000 | Say approximately 2.5% of other costs. |
| SUBTOTAL | | | | **$285,000** | |
| **Site Preparation and Access** | | | | | |
| Brush and Tree Removal | 1 | LS | $160,000 | $160,000 | Staging area, western slope, north arm |
| Temporary Security Fencing | 1,800 | LF | $18 | $32,400 | Chain link, 6' high, cost per RS Means |
| Plastic Net Fencing | 1,800 | LF | $3.00 | $5,400 | High visibility plastic ESA type |
| Utility Service (Electrical and Water) | 1 | LS | $100,000 | $100,000 | POC 1,200' to west, costs per other Presidio sites |
| Access Roads | 800 | SY | $11 | $8,800 | Temporary access to dock, ~485' x 14', costs per RS Means |
| Shoreline Access | 800 | SF | $73 | $58,400 | Wooden pier on piles; 20'x40', costs per RS Means |
| Clear and Grub | 5 | AC | $10,000 | $50,000 | Staging area and north arm of Lake, costs per contractor input |
| Class III T&D | 900 | TON | $60 | $54,000 | Disposal of green waste, costs per other Presidio sites |
| Site Grading to Prepare Level Laydown Areas | 24,200 | SY | $6.00 | $145,200 | Staging area and north arm of Lake, costs per contractor input |
| SUBTOTAL | | | | **$614,200** | |
| **Construction Stormwater Management and Erosion Control** | | | | | |
| Linear Erosion Control | 900 | LF | $5.00 | $4,500 | e.g. silt fence, costs per other Presidio sites |
| Linear Sediment Control | 7,500 | LF | $4.00 | $30,000 | e.g. fiber rolls, costs per other Presidio sites |
| Aerial Erosion Control | 24,200 | SY | $5.00 | $121,000 | e.g. erosion control blankets, cost per other Presidio sites |
| Stockpile Management | 28,100 | CY | $4.00 | $112,400 | Cover and berm/fiber roll perimeter, costs per contractor input |
| Other SW Mngmnt & Erosion Control Measures | 1 | LS | $27,500 | $27,500 | Allowance for general SW housekeeping |
| SWPPP Documentation | 1 | LS | $27,500 | $27,500 | Includes initial prep and SMARTs updates |
| SUBTOTAL | | | | **$322,900** | |
| **Transport, Storage, and Placement of Cap Materials** | | | | | |
| Purchase and Deliver | 10,400 | CY | $58 | $603,200 | 24-in clean sand section, costs per RS Means |
| Loading from Staging Area to Short Haul Truck | 10,400 | CY | $7.00 | $72,800 | Excavator or front end loader, costs per RS Means |
| Short Haul from Staging Area to Barge | 10,400 | CY | $6.00 | $62,400 | Small dump truck, <0.5mi, costs per RS Means |
| Loading from Short Haul Truck to Barge | 10,400 | CY | $7.00 | $72,800 | Excavator or front end loader, costs per RS Means |
| Capping Operation | 10,400 | CY | $40 | $416,000 | Barge and tremie placement, costs per contractor input |
| SUBTOTAL | | | | **$1,227,200** | |
| **Construction Monitoring** | | | | | |
| Bathymetric Surveying | 4 | EA | $5,600 | $22,400 | Initial, two progress, final, cost per surveyor quote |
| Cap Cores | 20 | EA | $570 | $11,400 | 10 locations during progress then final |
| Natural Resource Monitoring | 1 | LS | $33,000 | $33,000 | During initial staging operations, cost per other Presidio sites |
| SUBTOTAL | | | | **$66,800** | |
| **Environmental Monitoring** | | | | | |
| Turbidity Monitoring | 60 | DAY | $280 | $16,800 | 4 locations per day, 12 weeks |
| Water Quality Sampling | 48 | EA | $570 | $27,360 | 4 locations, 1 sample/location/week |
| Suspended Solids Analysis | 48 | EA | $26 | $1,248 | 1 analysis per sample, costs per lab fee sheet |
| Total Dissolved Solids Analysis | 48 | EA | $26 | $1,248 | 1 analysis per sample, costs per lab fee sheet |
| Title 22 Metals Analysis | 48 | EA | $166 | $7,968 | 1 analysis per sample, costs per lab fee sheet |
| SUBTOTAL | | | | **$54,624** | |
| **Post-Construction Stormwater Management and Erosion Control** | | | | | |
| Linear Erosion Control | 900 | LF | $5.00 | $4,500 | e.g. silt fence, costs per other Presidio sites |
| Linear Sediment Control | 7,500 | LF | $4.00 | $30,000 | e.g. fiber rolls, costs per other Presidio sites |
| Aerial Erosion Control | 24,200 | SY | $5.00 | $121,000 | e.g. erosion control blankets, cost per other Presidio sites |
| Other Stormwater Management and Erosion Control Measures | 1 | LS | $27,500 | $27,500 | Allowance for general SW housekeeping |
| SUBTOTAL | | | | **$183,000** | |

# Table G-1: Summary of Costs - Alternative 2 Capping

**CAPITAL COSTS (cont'd):**

| DESCRIPTION | QUANTITY | UNIT | RATE | TOTAL | NOTES |
|---|---|---|---|---|---|
| **Site Restoration** | | | | | |
| Grading to Restore Drainage | 24,200 | SY | $3.00 | $72,600 | Staging area and north arm of Lake, costs per RS Means |
| Soil Preparation for Planting | 220 | MSF | $66 | $14,520 | Raking to accept amendments, costs per RS Means |
| Soil Amendments | 24,200 | SY | $0.12 | $2,904 | Common fertilizer, costs per RS Means |
| Temporary Irrigation | 1 | LS | $150,000 | $150,000 | May be required for forest/landscape, cost per other Presidio sites |
| Planting | 1 | LS | $150,000 | $150,000 | In accordance with VMP, cost per other Presidio sites |
| SUBTOTAL | | | | **$390,024** | |
| **SUBTOTAL** | | | | **$3,143,748** | |
| Contingency | 25% | | | $785,937 | 10% scope + 15% bid contingencies per USEPA 2000 |
| **SUBTOTAL** | | | | **$3,929,685** | |
| Project Management | 5% | | | $196,484 | 5% for $2M-$10M size projects per USEPA 2000 |
| Remedial Design | 8% | | | $314,375 | 8% for $2M-$10M size projects per USEPA 2000 |
| Construction Management | 6% | | | $235,781 | 6% for $2M-$10M size projects per USEPA 2000 |
| Construction Completion Report | | | | $50,000 | |
| Institutional Controls | | | | | |
| Land Use Covenant | | | | $10,000 | Required by DTSC |
| Operation and Management Plan | | | | $10,000 | Required by DTSC |
| Site Information Database | | | | $5,000 | Required by DTSC |
| **SUBTOTAL** | | | | **$821,640** | |
| **TOTAL CAPITAL COST** | | | | **$3,965,388** | |

**O&M COSTS:**

| DESCRIPTION | QUANTITY | UNIT | RATE | TOTAL | NOTES |
|---|---|---|---|---|---|
| **Site Maintenance** | | | | | |
| Annual Inspection | 1 | EA | $1,100 | $1,100 | Prep and 1-day site visit by tech |
| Annual Reporting | 1 | EA | $3,800 | $3,800 | Report includes updated mapping/photos |
| SUBTOTAL | | | | **$4,900** | |
| **Environmental Monitoring** | | | | | |
| Bathymetric Survey and Camera | 1 | EA | $5,600 | $5,600 | Thickness monitored for integrity, cost per surveyor quote |
| Sediment Sampling | 10 | EA | $570 | $5,700 | 10 locations annually |
| Title 22 Metals Analysis | 10 | EA | $155 | $1,550 | 1 analysis per sample, costs per lab fee sheet |
| Water Quality Sampling | 10 | EA | $570 | $5,700 | 10 locations annually |
| Title 22 Metals Analysis | 10 | EA | $155 | $1,550 | 1 analysis per sample, costs per lab fee sheet |
| Annual Reporting | 1 | EA | $3,800 | $3,800 | Report includes updated figures/tables |
| SUBTOTAL | | | | **$23,900** | |
| **SUBTOTAL** | | | | **$28,800** | |
| Contingency | 30% | | | $8,640 | 10% scope + 20% bid contingencies per USEPA 2000 |
| **SUBTOTAL** | | | | **$37,440** | |
| Project Management | 5% | | | $1,872 | 5% per USEPA 2000 |
| Technical Support | 10% | | | $3,744 | 10% per USEPA 2000 |
| Institutional Controls | | | | | |
| Update Site Information Database | | | | $1,000 | Update and maintain database |
| **SUBTOTAL** | | | | **$6,616** | |
| **TOTAL ANNUAL O&M COST** | | | | **$72,856** | |

# Table G-1: Summary of Costs - Alternative 2 Capping

**PERIODIC COSTS:**

| DESCRIPTION | QUANTITY | UNIT | RATE | TOTAL | NOTES |
|---|---|---|---|---|---|
| **Year 5** | | | | | |
| Special Inspection | 1 | EA | $1,800 | $1,800 | 1-day site visit per inspection by PE |
| Five Year Review Report | 1 | EA | $7,200 | $7,200 | 56 hours per report by PE and staff eng |
| Update Institutional Control Plans | 1 | EA | $5,000 | $5,000 | |
| SUBTOTAL | | | | **$14,000** | |
| **Year 10** | | | | | |
| Special Inspection | 1 | EA | $1,800 | $1,800 | 1-day site visit per inspection by PE |
| Five Year Review Report | 1 | EA | $7,200 | $7,200 | 56 hours per report by PE and staff eng |
| Update Institutional Control Plans | 1 | EA | $5,000 | $5,000 | |
| SUBTOTAL | | | | **$14,000** | |
| **Year 15** | | | | | |
| Special Inspection | 1 | EA | $1,800 | $1,800 | 1-day site visit per inspection by PE |
| Five Year Review Report | 1 | EA | $7,200 | $7,200 | 56 hours per report by PE and staff eng |
| Update Institutional Control Plans | 1 | EA | $5,000 | $5,000 | |
| SUBTOTAL | | | | **$14,000** | |
| **Year 20** | | | | | |
| Special Inspection | 1 | EA | $1,800 | $1,800 | 1-day site visit per inspection by PE |
| Five Year Review Report | 1 | EA | $7,200 | $7,200 | 56 hours per report by PE and staff eng |
| Update Institutional Control Plans | 1 | EA | $5,000 | $5,000 | |
| SUBTOTAL | | | | **$14,000** | |
| **Year 25** | | | | | |
| Special Inspection | 1 | EA | $1,800 | $1,800 | 1-day site visit per inspection by PE |
| Five Year Review Report | 1 | EA | $7,200 | $7,200 | 56 hours per report by PE and staff eng |
| Update Institutional Control Plans | 1 | EA | $5,000 | $5,000 | |
| SUBTOTAL | | | | **$14,000** | |
| **Year 30** | | | | | |
| Special Inspection | 1 | EA | $1,800 | $1,800 | 1-day site visit per inspection by PE |
| Five Year Review Report | 1 | EA | $7,200 | $7,200 | 56 hours per report by PE and staff eng |
| Update Institutional Control Plans | 1 | EA | $5,000 | $5,000 | |
| SUBTOTAL | | | | **$14,000** | |

**PRESENT VALUE ANALYSIS:**

| YEAR | COST TYPE | TOTAL COST | TOTAL COST PER YEAR | DISCOUNT FACTOR (7%) | PRESENT VALUE | NOTES |
|---|---|---|---|---|---|---|
| 0 | Capital Cost | $3,965,388 | $3,965,388 | 1.000 | $3,965,388 | |
| 1 - 30 | Annual O&M Cost | $2,185,680 | $72,856 | 12.409 | $904,073 | |
| 5 | Periodic Cost | $14,000 | $14,000 | 0.713 | $9,982 | Five year review |
| 10 | Periodic Cost | $14,000 | $14,000 | 0.508 | $7,117 | Five year review |
| 15 | Periodic Cost | $14,000 | $14,000 | 0.362 | $5,074 | Five year review |
| 20 | Periodic Cost | $14,000 | $14,000 | 0.258 | $3,618 | Five year review |
| 25 | Periodic Cost | $14,000 | $14,000 | 0.184 | $2,579 | Five year review |
| 30 | Periodic Cost | $14,000 | $14,000 | 0.131 | $1,839 | Five year review |
| | | | | | $4,899,671 | |
| **TOTAL PRESENT VALUE OF ALTERNATIVE** | | | | | **$4,899,671** | |

# Table G-1: Summary of Costs - Alternative 2 Capping

**Notes:**

(a) The information in this cost estimate summary table is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative.

(b) These are planning level costs and are developed to minus 30 percent to plus 50 percent accuracy.

(c) These costs have not been developed based on engineering designs, but rather represent a general opinion of cost based on estimates from similar projects, standard costing guidance documents, professional judgment, and information provided by the client.

(d) Excluded from the cost estimate are costs for labor, materials, and fees associated with permits and access agreements, construction bonds, construction insurance, permits, responses and revisions based on permit requirements, legal fees, and other administrative fees, unless otherwise noted.

(e) Assumed capping production rate equals 100 cubic yards per hour.

**(f) Periodic costs do not include potential costs associated with cap repairs, which would be substantial (i.e. scope of work similar to initial cap installation).**

(g) USEPA 1994 - EPA 905-B94-003: ARCS Remediation Guidance Document. Chicago, Ill.: Great Lakes National Program Office.

(h) USEPA 2000 - EPA 540-R-00-002: A Guide to Developing and Documenting Cost Estimates During the Feasibility Study. July 2000.

(i) USEPA 2002 - Explanation of Significant Differences, Middle Waterway Commencement Bay Nearshore/Tidelflats Superfund Site. Office of Environmental Cleanup. February 2002.

# Table G-2: Summary of Costs - Alternative 3 Dredging

**Site:** Mountain Lake
**Location:** The Presidio of San Francisco, California
**Phase:** Feasibility Study (-30% to +50%)
**Base Year:** 2012
**Date:** 03/06/12

**Description:** Alternative 3 consists of dredging nearly the entire footprint of the Lake to a depth ranging from 2.5 to 6.5 feet, off site disposal, and limited capping where slope stability prevents removal. Capital costs occur in Year 0. There are no annual O&M or periodic costs associated with this alternative.

**CAPITAL COSTS:**

| DESCRIPTION | QUANTITY | UNIT | RATE | TOTAL | NOTES |
|---|---|---|---|---|---|
| **Mobilization/Demobilization** | | | | | |
| Mobilization/Div 0&1 Submittals | 1 | LS | $418,000 | $418,000 | Say approximately 7.5% of other costs. |
| Demobilization | 1 | LS | $139,000 | $139,000 | Say approximately 2.5% of other costs. |
| SUBTOTAL | | | | **$557,000** | |
| **Site Preparation and Access** | | | | | |
| Brush and Tree Removal | 1 | LS | $160,000 | $160,000 | Staging area, western slope, north arm |
| Temporary Security Fencing | 1,800 | LF | $18 | $32,400 | Chain link, 6' high, cost per RS Means |
| Plastic Net Fencing | 1,800 | LF | $3.00 | $5,400 | High visibility plastic ESA type |
| Utility Service (Electrical and Water) | 1 | LS | $100,000 | $100,000 | POC 1,200' to west, costs per other Presidio sites |
| Access Roads | 800 | SY | $11 | $8,800 | Temporary access to dock, ~485' x 14', costs per RS Means |
| Shoreline Access | 800 | SF | $73 | $58,400 | Wooden pier on piles; 20'x40', costs per RS Means |
| Clear and Grub | 5 | AC | $10,000 | $50,000 | Staging area and north arm of Lake, costs per contractor input |
| Class III T&D | 900 | TON | $60 | $54,000 | Disposal of green waste, costs per other Presidio sites |
| Site Grading to Prepare Level Laydown Areas | 24,200 | SY | $6.00 | $145,200 | Staging area and north arm of Lake, costs per contractor input |
| Temporary Sediment Storage | 1 | LS | $20,000 | $20,000 | 3x20,000gal tanks, 60-day rental, costs per vendor quote |
| Sediment Transport Pipe | 1,200 | LF | $21 | $25,200 | 12" diameter metal pipe, cost per RS Means |
| Elutriate Discharge Pipe | 1,200 | LF | $21 | $25,200 | 12" diameter metal pipe, cost per RS Means |
| SUBTOTAL | | | | **$684,600** | |
| **Construction Stormwater Management and Erosion Control** | | | | | |
| Linear Erosion Control | 900 | LF | $5.00 | $4,500 | e.g. silt fence, costs per other Presidio sites |
| Linear Sediment Control | 7,500 | LF | $4.00 | $30,000 | e.g. fiber rolls, costs per other Presidio sites |
| Aerial Erosion Control | 24,200 | SY | $5.00 | $121,000 | e.g. erosion control blankets, cost per other Presidio sites |
| Stockpile Management | 9,900 | CY | $4.00 | $39,600 | Cover and berm/fiber roll perimeter, costs per contractor input |
| Other SW Mngmnt & Erosion Control Measures | 1 | LS | $27,500 | $27,500 | Allowance for general SW housekeeping |
| SWPPP Documentation | 1 | LS | $27,500 | $27,500 | Includes initial prep and SMARTs updates |
| SUBTOTAL | | | | **$250,100** | |
| **Dredging** | | | | | |
| Dredging Operation | 15,600 | CY | $29 | $452,400 | Hydraulic, 12" pipeline, soft sediments, costs per contractor input |
| Lake Bottom Recontouring | 3,000 | CY | $25 | $75,000 | Dragline to smooth bottom, costs per contractor input |
| Dewatering Operation | 4,400 | DRY TON | $366 | $1,610,400 | Belt filter press, 15% solids feed, costs per contractor input |
| SUBTOTAL | | | | **$2,137,800** | |
| **Transport, Storage, and Placement of Slope Stabilization Materials** | | | | | |
| Purchase and Deliver | 1,500 | CY | $78 | $117,000 | Rip rap backfill along Park Presidio, costs per RS Means |
| Loading from Staging Area to Short Haul Truck | 1,500 | CY | $7.00 | $10,500 | Excavator or front end loader, costs per RS Means |
| Short Haul from Staging Area to Barge | 1,500 | CY | $6.00 | $9,000 | Small dump truck, <0.5mi, costs per RS Means |
| Loading from Short Haul Truck to Barge | 1,500 | CY | $7.00 | $10,500 | Excavator or front end loader, costs per RS Means |
| Placing | 1,500 | CY | $40 | $60,000 | Barge and tremie placement, costs per contractor input |
| SUBTOTAL | | | | **$207,000** | |
| **Waste Profiling** | | | | | |
| Sediment Sampling | 40 | EA | $45 | $1,800 | 1 sample per 250 cy |
| Title 22 Metals Analysis | 40 | EA | $183 | $7,320 | 1 analysis per sample, costs per lab fee sheet |
| WET Analysis | 40 | EA | $88 | $3,520 | 2 metals, 50% of samples, costs per lab fee sheet |
| TCLP Analysis | 40 | EA | $88 | $3,520 | 2 metals, 50% of samples, costs per lab fee sheet |
| TPH Analysis | 40 | EA | $118 | $4,720 | 1 analysis per sample, costs per lab fee sheet |
| Pesticides Analysis | 40 | EA | $159 | $6,360 | 1 analysis per sample, costs per lab fee sheet |
| SUBTOTAL | | | | **$27,240** | |

# Table G-2: Summary of Costs - Alternative 3 Dredging

**CAPITAL COSTS (cont'd):**

| DESCRIPTION | QUANTITY | UNIT | RATE | TOTAL | NOTES |
|---|---|---|---|---|---|
| **Sediment Transport and Disposal** | | | | | |
| Loading for Off-Haul | 9,900 | CY | $7.00 | $69,300 | Excavator or front end loader, costs per RS Means |
| RCRA Class I Transport and Disposal | 900 | TON | $200 | $180,000 | 10% of dewatered material, 50% solids, cost per other Presidio sites |
| non-RCRA Class I Transport and Disposal | 8,000 | TON | $150 | $1,200,000 | 90% of dewatered material, 50% solids, cost per other Presidio sites |
| Class II Transport and Disposal | 0 | TON | $50 | $0 | No Class II material |
| Generator Fees | 1 | LS | $77,000 | $77,000 | Per Trust program costs |
| SUBTOTAL | | | | **$1,526,300** | |
| **Construction Monitoring** | | | | | |
| Bathymetric Surveying | 4 | EA | $5,600 | $22,400 | Initial, two progress, final, cost per surveyor quote |
| Elutriate Sampling | 20 | EA | $45 | $900 | 2 per day for 2 weeks |
| Total Suspended Solids Analysis | 20 | EA | $28 | $560 | 1 analysis per sample, costs per lab fee sheet |
| Total Dissolved Solids Analysis | 20 | EA | $28 | $560 | 1 analysis per sample, costs per lab fee sheet |
| Title 22 Metals Analysis | 20 | EA | $183 | $3,660 | 1 analysis per sample, costs per lab fee sheet |
| TPH Analysis | 20 | EA | $118 | $2,360 | 1 analysis per sample, costs per lab fee sheet |
| Pesticides Analysis | 20 | EA | $159 | $3,180 | 1 analysis per sample, costs per lab fee sheet |
| Natural Resource Monitoring | 1 | LS | $33,000 | $33,000 | During initial staging operations, cost per other Presidio sites |
| SUBTOTAL | | | | **$66,620** | |
| **Environmental Monitoring** | | | | | |
| Turbidity Monitoring | 60 | DAY | $280 | $16,800 | 4 locations per day, 12 weeks |
| Water Quality Sampling | 48 | EA | $400 | $19,200 | 4 locations, 1 sample/location/week |
| Suspended Solids Analysis | 48 | EA | $26 | $1,248 | 1 analysis per sample, costs per lab fee sheet |
| Total Dissolved Solids Analysis | 48 | EA | $26 | $1,248 | 1 analysis per sample, costs per lab fee sheet |
| Title 22 Metals Analysis | 48 | EA | $166 | $7,968 | 1 analysis per sample, costs per lab fee sheet |
| SUBTOTAL | | | | **$46,464** | |
| **Confirmation Testing** | | | | | |
| Sediment Sampling | 56 | EA | $570 | $31,977 | 50'x50' grid, vibracorer |
| Title 22 Metals Analysis | 56 | EA | $166 | $9,313 | 1 analysis per sample, costs per lab fee sheet |
| TPH Analysis | 56 | EA | $107 | $6,003 | 1 analysis per sample, costs per lab fee sheet |
| Pesticides Analysis | 56 | EA | $145 | $8,135 | 1 analysis per sample, costs per lab fee sheet |
| SUBTOTAL | | | | **$55,427** | |
| **Post-Construction Stormwater Management and Erosion Control** | | | | | |
| Linear Erosion Control | 900 | LF | $5.00 | $4,500 | e.g. silt fence, costs per other Presidio sites |
| Linear Sediment Control | 7,500 | LF | $4.00 | $30,000 | e.g. fiber rolls, costs per other Presidio sites |
| Aerial Erosion Control | 24,200 | SY | $5.00 | $121,000 | e.g. erosion control blankets, cost per other Presidio sites |
| Other Stormwater Management and Erosion Control Measures | 1 | LS | $27,500 | $27,500 | Allowance for general SW housekeeping |
| SUBTOTAL | | | | **$183,000** | |
| **Site Restoration** | | | | | |
| Grading to Restore Drainage | 24,200 | SY | $3.00 | $72,600 | Staging area and north arm of Lake, costs per RS Means |
| Soil Preparation for Planting | 220 | MSF | $66 | $14,520 | Raking to accept amendments, costs per RS Means |
| Soil Amendments | 24,200 | SY | $0.12 | $2,904 | Common fertilizer, costs per RS Means |
| Temporary Irrigation | 1 | LS | $150,000 | $150,000 | May be required for forest/landscape, cost per other Presidio sites |
| Planting | 1 | LS | $150,000 | $150,000 | In accordance with VMP, cost per other Presidio sites |
| SUBTOTAL | | | | **$390,024** | |
| **SUBTOTAL** | | | | **$6,131,575** | |
| Contingency | 25% | | | $1,532,894 | 10% scope + 15% bid contingencies per USEPA 2000 |
| **SUBTOTAL** | | | | **$7,664,469** | |

# Table G-2: Summary of Costs - Alternative 3 Dredging

**CAPITAL COSTS (cont'd):**

| DESCRIPTION | QUANTITY | UNIT | RATE | TOTAL | NOTES |
|---|---|---|---|---|---|
| Project Management | 5% | | | $383,223 | 5% for $2M-$10M size projects per USEPA 2000 |
| Remedial Design | 8% | | | $613,157 | 8% for $2M-$10M size projects per USEPA 2000 |
| Construction Management | 6% | | | $459,868 | 6% for $2M-$10M size projects per USEPA 2000 |
| Construction Completion Report | | | | $50,000 | |
| **SUBTOTAL** | | | | **$1,506,249** | |
| **TOTAL CAPITAL COST** | | | | **$9,170,718** | |

**O&M COSTS:**

There are no annual O&M costs associated with this alternative. However, if limited capping is required, annual monitoring and reporting costs may be applicable.

**PERIODIC COSTS:**

There are no periodic costs associated with this alternative. However, if limited capping is required, five-year reviews may be required as described for the Capping Alternative.

**PRESENT VALUE ANALYSIS:**

| YEAR | COST TYPE | TOTAL COST | TOTAL COST PER YEAR | DISCOUNT FACTOR (7%) | PRESENT VALUE | NOTES |
|---|---|---|---|---|---|---|
| 0 | Capital Cost | $9,170,718 | $9,170,718 | 1.000 | $9,170,718 | |
| 1 - 30 | Annual O&M Cost | $0 | $0 | 12.409 | $0 | |
| 5 | Periodic Cost | $0 | $0 | 0.713 | $0 | |
| 10 | Periodic Cost | $0 | $0 | 0.508 | $0 | |
| 15 | Periodic Cost | $0 | $0 | 0.362 | $0 | |
| 20 | Periodic Cost | $0 | $0 | 0.258 | $0 | |
| 25 | Periodic Cost | $0 | $0 | 0.184 | $0 | |
| 30 | Periodic Cost | $0 | $0 | 0.131 | $0 | |
| | | | | | $9,170,718 | |
| **TOTAL PRESENT VALUE OF ALTERNATIVE** | | | | | **$9,170,718** | |

**Notes:**

(a) The information in this cost estimate summary table is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative.
(b) These are planning level costs and are developed to minus 30 percent to plus 50 percent accuracy.
(c) These costs have not been developed based on engineering designs, but rather represent a general opinion of cost based on estimates from similar projects, standard costing guidance documents, professional judgment, and information provided by the client.
(d) Excluded from the cost estimate are costs for labor, materials, and fees associated with permits and access agreements, construction bonds, construction insurance, permits, responses and revisions based on permit requirements, legal fees, and other administrative fees, unless otherwise noted.
(e) Assumed dredging production rate equals 100 cubic yards per hour.
(f) Assumed dewatering production rate equals 100 gallons per minute.
**(g) Assumes treatment of elutriate will not be required.**
**(h) Additional dredging, dewatering, transportation, and disposal costs that may be required based on confirmation sampling and analysis are not included.**
**(i) Costs associated with limited capping in areas where complete sediment removal is infeasible are not included as these areas are not yet know. One possible area of the site that may require limited capping is the area along Park Boulevard at the submerged toe of the embankment slope. However, this area will likely require slope stabilization and the costs included for slope stabilization are considered inclusive of the limited capping that may be required in this area.**
(j) USEPA 1994 - EPA 905-B94-003: ARCS Remediation Guidance Document. Chicago, Ill.: Great Lakes National Program Office.
(k) USEPA 2000 - EPA 540-R-00-002: A Guide to Developing and Documenting Cost Estimates During the Feasibility Study. July 2000.
(l) USEPA 2002 - Explanation of Significant Differences, Middle Waterway Commencement Bay Nearshore/Tidelflats Superfund Site. Office of Environmental Cleanup. February 2002.

# Table G-3: Cost Comparison of Remedial Alternatives

**Site:** Mountain Lake
**Location:** The Presidio of San Francisco, California
**Phase:** Feasibility Study (-30% to +50%)
**Base Year:** 2012
**Date:** 03/06/12

| DESCRIPTION | ALTERNATIVE 1<br>NO ACTION | ALTERNATIVE 2<br>CAPPING | ALTERNATIVE 3<br>DREDGING |
|---|---|---|---|
| Total Project Duration (Years) | 0 | 30 | 1 |
| Capital Cost | $0 | $3,965,388 | $9,170,718 |
| Annual O&M cost | $0 | $72,856 | $0 |
| Total Periodic Costs | $0 | $84,000 | $0 |
| **TOTAL PRESENT VALUE OF ALTERNATIVE** | **$0** | **$4,899,671** | **$9,170,718** |

**Notes:**

(a) The information in this cost estimate summary table is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative.

(b) These are planning level costs and are developed to minus 30 percent to plus 50 percent accuracy.

(c) These costs have not been developed based on engineering designs, but rather represent a general opinion of cost based on estimates from similar projects, standard costing guidance documents, professional judgment, and information provided by the client.

(d) Excluded from the cost estimate are costs for labor, materials, and fees associated with permits and access agreements, construction bonds, construction insurance, permits, responses and revisions based on permit requirements, legal fees, and other administrative fees, unless otherwise noted.

# Appendix H

## Project Controls to Minimize Potential Impacts to Human Health and Resources

# Table H-1: Project Controls to Minimize Potential Impacts to Human Health and Resources[a]

| Resources | Potential Impact to Resource from Proposed Remedial Action | Project Controls to Minimize Potential Impacts to Human Health and Resources |
|---|---|---|
| Aesthetics | Construction activities will temporarily degrade the existing visual character or quality of the site and its immediate surroundings. | The scope of the construction activities will be limited to approximately five acres and will be short-term, lasting approximately 54 weeks. Post-project restoration activities to be undertaken by others are expected to improve the visual character and quality of the site and its surroundings. |
| Air Quality | During the construction activities, dust (particulate matter) may become airborne at loading operations, during grading, at soil stockpiles, and from vehicles transporting soils.<br><br>Odors may be generated during the sediment processing operations. | Best management practices (BMPs), including application of vapor suppressing agents, placing tarps over stockpiled material, covering materials during transport, and minimizing construction equipment usage at all times (e.g., shutting off idle equipment as appropriate) will be implemented to reduce emissions. Construction equipment will be maintained and operated in a manner to minimize particulate emissions with best available control technologies (BACTs). Air quality monitoring will be implemented during sediment dewatering, stockpiling, transportation, and other earthwork operations, as necessary. In addition, truck loads and traffic will be scheduled and coordinated, to the extent possible, to minimize the vehicle loads per day traveling through the area. |

# Table H-1: Project Controls to Minimize Potential Impacts to Human Health and Resources[a]

| Resources | Potential Impact to Resource from Proposed Remedial Action | Project Controls to Minimize Potential Impacts to Human Health and Resources |
|---|---|---|
| Biological Resources | The remedial actions will involve transportation of materials and grading. | No federal or California threatened or endangered species reside at the site. Areas with native habitat and species of concern will be avoided during site operations, to the extent practicable.<br><br>Vegetation was removed from the site in late 2011 in compliance with the Presidio Vegetation Management Plan (VMP) and Tennessee Hollow Environmental Assessment (THEA) and to avoid bird nesting season. Additional vegetation removal will be coordinated with natural resource staff to avoid potential disruption to nesting or migrating birds. Specifically, efforts will be made to schedule vegetation removal outside of bird nesting season (January 1st - July 31st for raptors and hummingbirds; March 1 - July 31st for songbirds), as dictated by the Migratory Bird Treaty Act. However, vegetation removal may occur during bird nesting season provided a nesting survey indicates no disruption to nesting birds (including ground nesting birds) and approval is obtained from Trust natural resource staff. Nest surveys are not 100% accurate, therefore activities requiring nest surveys during nesting season will be avoided whenever practicable.<br><br>If nesting birds are found near the project site, a Trust natural resource specialist will be notified. If required, the specialist may require protection measures to be implemented, such as setting up a buffer zone around the nest and installation of fencing or other barriers.<br><br>Wetlands around the perimeter of the lake will be restored following remediation. |
| Cultural Resources | The remedial actions may involve removal of historic sediment layers. | The Presidio Archeology Department has prepared an Archeological Monitoring Assessment (AMA) for the Project to describe procedures for treating and handling archeological features during Project activities. These protocols include stopping work and notifying the Presidio archaeologist of any discoveries. Prior to dredging activities, the Trust will take measures to ensure that the record of lake sediments are preserved for future scientific research by extracting cores through a direct push technique and submitting the preserved samples to the National Lacustrine Core Facility. |

# Table H-1: Project Controls to Minimize Potential Impacts to Human Health and Resources[(a)]

| Resources | Potential Impact to Resource from Proposed Remedial Action | Project Controls to Minimize Potential Impacts to Human Health and Resources |
|---|---|---|
| Geology and Soils | Once site grading associated with the staging area is underway, soil and fill materials will be susceptible to erosion, down slope movement, and landslides. | Erosion control measures will be implemented during and after construction for any work performed between October 15 and April 15 to minimize runoff from the site. A construction Storm Water Pollution Prevent Plan (SWPPP) will be prepared prior to construction to establish storm water goals and controls that will be applied during construction. Staging for the remedial activities will not result in significant soil erosion or loss of topsoil, as erosion control measures will be implemented. Earthwork and sediment processing activities will not be conducted during severe wet weather and soil disturbance will be limited to work areas. Grading plans will be designed to protect natural resources.<br><br>There are several potential sources of surface water runoff from the remediation area during and after the work is performed. Project control measures include stabilization practices such as wattles, silt fences, berms, and temporary outlet protection that may be employed, if needed. The method chosen will depend on the planned activities and erosion potential of the area in question. |
| Greenhouse Gas (GHG) Emissions | The remedial actions will generate GHG emissions through the use of vehicles and equipment. | The period of construction will be short-term, and construction-phase GHG emissions will occur directly from the over-water dredging equipment, off-road heavy-duty equipment, and the on-road motor vehicles needed to mobilize crew, equipment, and materials, and to grade and restore the site. Levels of GHG emissions caused by construction equipment use will not occur in significant quantities. |
| Hazards and Hazardous Materials | The remedial actions will involve transportation of materials, disposal of significant quantities of waste materials offsite, and grading. | The remedial actions are designed to protect the public and environment from existing hazards. These remedial actions include sediment dredging and disposal at on offsite regulated landfill. The remedial actions will be conducted in accordance with the federal and state regulations identified in the RAP, as well as Trust Management Policies, as applicable. During site work, access to the site will be restricted to prevent potential public exposure to health or safety risks. Further, potential exposure of workers and public to contaminated materials during dredged material handling activities will be controlled through the air quality control measures and engineering and dust and odor control measures, including application of vapor suppressants to control odors from the exposed materials. Workers implementing the remedial activities will have appropriate training and will use personal protective equipment to minimize exposure to contaminants. Transport of hazardous materials will occur along authorized haul routes within the Presidio and along major thoroughfares outside the Presidio. |

# Table H-1: Project Controls to Minimize Potential Impacts to Human Health and Resources[(a)]

| Resources | Potential Impact to Resource from Proposed Remedial Action | Project Controls to Minimize Potential Impacts to Human Health and Resources |
|---|---|---|
| Hydrology and Water Quality | The remedial actions will include sediment removal and bathymetric changes from dredging operations and may temporarily alter drainage patterns and potentially increase runoff to the lake. | During processing of dredged material at the staging area, existing local drainage patterns may be temporarily altered. Elutriate from the dewatering activities may be allowed to gravity drain back to the lake depending on water quality testing and possibly water treatment. In accordance with the erosion control plans to be developed during remedial design, post-construction erosion monitoring and erosion control measures will be implemented, as necessary. Examples of stabilization measures include installation of wattles, stabilization matting, fabric, and blankets on newly exposed soil and after work is completed on short, steep, and/or sparsely vegetated slopes. The rate or amount of surface runoff potentially could increase slightly during grading activities. |
| Noise | Highway stabilization, dredging, material processing, and off-hauling operations will increase noise levels. Noise generated by project activities will be temporary, intermittent, and dispersed. Nighttime noise will be generated. | Control measures will include, but not be limited to, proper maintenance and tuning of equipment, placement of noisy equipment away from sensitive receptors as practicable, noise-control mufflers, and scheduling noisier operations during periods of low visitor use, to the extent feasible. In addition, construction will be scheduled to limit impacts on wildlife and bird nesting activity in consultation with Trust natural resource specialists. Within the Presidio, transport of equipment and waste materials will occur along routes approved by the Trust. Outside of the Presidio, haul routes will follow major thoroughfares and signed routes approved for truck traffic. |
| Recreation | Public access will be redirected away from work zones during project activities. | During construction, the site will be fenced, as necessary, to restrict and redirect public access. The remedial design will include pedestrian and traffic detours designed to keep visitors out of active work areas while permitting full use of other park areas and facilities. |
| Traffic and Transportation | The remedial actions will temporarily redirect traffic and public access away from the work zones during project activities. One lane of northbound Highway 1 will be closed during highway work. | Within the Presidio, transport of equipment and waste materials will occur along routes approved by the Trust. Outside of the Presidio, haul routes will follow major thoroughfares and signed routes approved for truck traffic. Because work areas will be temporarily closed during construction, pedestrians (hikers) and bicyclists will be temporarily detoured. Work on Highway 1 will be limited to nighttime during low-use hours. |

**Note:**

(a) Potential impacts to resources from the proposed remedial action area evaluated in detail in the California Environmental Quality Act (CEQA) Initial Study in Appendix I. This table presents the controls incorporated into the project, as identified in the CEQA Initial Study. The project controls presented in this table will be implemented as part of the remedial actions to reduce the potential impacts to resources to less than significant.

# Appendix I

California Environmental Quality Act (CEQA) Documentation

# NOTICE OF DETERMINATION

To: Office of Planning and Research
State Clearinghouse
P.O. Box 3044, 1400 Tenth Street, Room 212
Sacramento, CA 95812-3044

From: Department of Toxic Substances Control
Brownfields and Environmental Restoration Program
700 Heinz Avenue
Berkeley, California 94710-2721

Subject: FILING OF NOTICE OF DETERMINATION IN COMPLIANCE WITH SECTION 21108 OR 21152 OF THE PUBLIC RESOURCES CODE

Project Title: Remedial Action Plan for Mountain Lake at Presidio of San Francisco

State Clearinghouse No.: 2012032037

Project Location: Presidio of San Francisco

County: San Francisco

Project Description:

The Department of Toxic Substances Control (DTSC) is approving a final Remedial Action Plan (RAP) for Mountain Lake pursuant to authority granted under Chapter 6.8, Division 20, California Health & Safety Code (H&SC). The purpose of the RAP is to implement remedial actions for Mouintian Lake that is protective of public health and safety and the environment. Mountain Lake is a natural lake located at the southern edgee of the Presidio of San Francisco. Sediment at Mountain Lake was contaminated with metals and petroleum chemicals from roadway surface water runoff. The selected remedial alternative for Mountain Lake is sediment removal and offsite disposal.

As ☒ Lead Agency ☐ a Responsible Agency under the California Environmental Quality Act (CEQA), DTSC approved the above-described project on [date] and has made the following determinations:

1. The project ☐ will ☒ will not have a significant effect on the environment.
2. A ☒ Negative Declaration ☐ Mitigated Negative Declaration ☐ Environmental Impact Report was prepared for this project pursuant to the provisions of CEQA.
3. Mitigation measures ☐ were ☒ were not made a condition of project approval.
4. A mitigation reporting or monitoring plan ☐ was ☒ was not adopted for this project.
5. A Statement of Overriding Considerations ☐ was ☐ was not adopted for this project.
6. Findings ☒ were ☐ were not made pursuant to the provisions of CEQA.

This is to certify that the final environmental document, comments and responses, and the record of project approval are available to the public at the following location: DTSC, 700 Heinz Avenue, Berkeley, California 94710-2721

| Remedios V. Sunga | Project Manager | 510-540-3840 |
|---|---|---|
| Contact Person Name | Contact Person Title | Phone # |

Barbara J. Cook — 5/17/2012
Supervisor/Team Leader Signature — Date

| Barbara J. Cook, P.E. | Hazardous Substances Engineer Supervisor II | 510-540-3843 |
|---|---|---|
| Supervisor/Team Leader | Supervisor/Team Leader Title | Phone # |

TO BE COMPLETED BY OPR ONLY

Date Received For Filing and Posting at OPR:

# CALIFORNIA ENVIRONMENTAL QUALITY ACT
# NEGATIVE DECLARATION

Department of Toxic Substances Control
Brownfields and Environmental Restoration Program
700 Heinz Avenue
Berkeley, California 94710

Subject: ☐ **DRAFT** ☒ FINAL ☐ MITIGATED

Project Title: Remedial Action Plan for Mountain Lake at Presidio of San Francisco

State Clearinghouse No.:

Project Location: Presidio of San Francisco

County: San Francisco

Project Description:

The project is implementation of the Remedial Action Plan (RAP) for Mountain Lake that is protective of public health and safety and the environment. Mountain Lake is approximately 4 acres located on the southern edge of the Presidio of San Francisco. Park Presidio Blvd (Highway 1) is immediately west of the lake and is separated from the lake by a narrow band of vegetation and a chainlink fence. Lead is the primary contaminant in lake sediment, and the presumed source is storm water runoff and drainage from the adjoining Park Presidio Blvd. Elevated concentrations of total petroleum hydrocarbon as motor oil tend to be co-located with elevated concentrations of lead, suggesting a common source.

The proposed actions to implement the RAP entail: 1) Caltrans stabilizing the Park Presidio Blvd roadway and treating runoff to the lake and 2) the Trust establishing site access, dredging sediment from the lake, sequestering the sediment onsite during dewatering, returning the water to the lake, trucking the dewatered sediment to an appropriately licensed landfill, and restoring the area disturbed by the Project. Approximately 15,600 cubic yards of sediment will be dredged from the lake at depths of 2 to 6 feet below sediment surface. As a contingency measure, a sand cover would be placed over contamination that is infeasible to dredge that could occur along Park Presidio Blvd.

Finding Of Significant Effect On Environment: *(An Initial Study supporting this finding is attached.)*

After conducting an Initial Study of the potential environmental impacts of the proposed project, DTSC has determined that implementation of the project will not result in any significant environmental impacts.

Mitigation Measures:

DTSC has determined that no additional mitigation measures would be required beyond those incorporated as part of the project.

| | | |
|---|---|---|
| Barbara J. Cook | | 5/17/2012 |
| Supervisor/Team Leader Signature | | Date |
| Barbara J. Cook, P.E. | Branch Chief | 510-540-3843 |
| Supervisor/Team Leader | Supervisor/Team Leader Title | Phone # |

# CALIFORNIA ENVIRONMENTAL QUALITY ACT
# INITIAL STUDY

The Department of Toxic Substances Control (DTSC) has completed the following document for this project in accordance with the California Environmental Quality Act (CEQA) [Pub. Resources Code, div. 13, § 21000 et seq] and accompanying Guidelines [Cal. Code Regs., tit. 14, § 15000 et seq].

| PROJECT TITLE:<br>Remedial Action Plan – Mountain Lake, Presidio of San Francisco | | CALSTARS CODING:<br>201239-11 |
|---|---|---|
| PROJECT ADDRESS:<br>Presidio of San Francisco. | CITY:<br>San Francisco | COUNTY:<br>San Francisco |
| PROJECT SPONSOR:<br>The Presidio Trust | CONTACT:<br>Ms. Eileen Fanelli | PHONE:<br>415-561-4259 |

APPROVAL ACTION UNDER CONSIDERATION BY DTSC:

☐ Initial Permit Issuance ☐ Permit Renewal ☐ Permit Modification ☐ Closure Plan
☐ Removal Action Workplan ☒ Remedial Action Plan ☐ Interim Removal ☐ Regulations
☐ Other (specify):

STATUTORY AUTHORITY:

☐ California H&SC, Chap. 6.5 ☒ California H&SC, Chap. 6.8 ☐ Other (specify):

| DTSC PROGRAM/ ADDRESS:<br>Brownfields and Environmental Restoration Program<br>700 Heinz Avenue<br>Berkeley, California 94710-2721 | CONTACT:<br>Remedios Sunga | PHONE:<br>510-540-3840 |
|---|---|---|

***PROJECT DESCRIPTION***

**Introduction**

The California Department of Toxic Substances Control (DTSC) is proposing to approve a draft Initial Study (IS) on a Remedial Action Plan (RAP) pursuant to authority granted under Chapter 6.8, Division 20 of the California Health and Safety Code (H&SC) for Mountain Lake (Lake) at the Presidio of San Francisco (Figure 1). The RAP [*Draft Feasibility Study/Remedial Action Plan (FS/RAP), Mountain Lake, Presidio of San Francisco, San Francisco, California* (Draft FS/RAP; (Kennedy/Jenks, 2012b)] is incorporated by reference. If approved, the RAP would allow for the removal by dredging of approximately 15,600 cubic yards (cy) of sediments contaminated with lead and total petroleum hydrocarbons as motor oil from Mountain Lake which would be transported to a permitted, off-site landfill. As part of the work activities, the California Department of Transportation (Caltrans) will stabilize the State Highway 1 roadbed and upgrade the drainage system of the roadway (originally installed in 1939) adjacent to the lake prior to dredging work. These activities are collectively referred to as the "Project" in this IS. It will take approximately 15 months to complete this Project.

The Presidio occupies 1,491 acres at the northernwestern tip of the San Francisco peninsula. It is bounded on the north by San Francisco Bay and on the west by Golden Gate Strait, which connects the Bay and the Pacific Ocean. Densely populated residential areas abut its southern and eastern boundaries. Figure 1 shows overall the location of the Project within the Presidio and its location relative to the City. Figure 2 shows the land uses and roads around the site. Figure 3 shows the relationship between the dredging operation and the primary staging area where dewatering would occur. (Figures referenced in the text are provided in Appendix B of this Initial Study.)

**Background**

For 146 years, from 1848 through 1994, the Presidio was a U.S. Army (Army) installation. On October 1, 1994, the Presidio was transferred to the National Park Service (NPS) and became part of the Golden Gate National Recreation Area (GGNRA). In 1998, The Presidio Trust (Trust), a single-purpose federal agency, was granted jurisdiction over 1,168 acres of the Presidio. This area (know as Area B) is managed by the Trust in accordance with the *Presidio Trust Management Plan* (PTMP)(Trust, 2002a). Mountain Lake is in Area B and is under the management of the Trust. NPS has jurisdiction over approximately 320 acres, the balance of the Presidio; this acreage is known as Area A and is along the Presidio's shore front and Lobos Creek. However, the Trust has the authority and responsibility to manage the remediation of contamination throughout the Presidio, in both Trust and NPS jurisdictional areas.

Mountain Lake is the only lake on the Presidio. The name of the lake is derived from its Spanish name, "Luguna de Loma Alta" (Lake of the High Mount). Early Spanish-era maps also identify it as "Luguna del Presidio" (Lake of the Presidio).

The lake is located near the midpoint of the Presidio's southern boundary and has a surface area of approximately 4.2 acres. The lake is situated adjacent to the east side of Park Presidio Blvd (Highway 1) and north of Lake St, in San Francisco's Richmond District. The watershed draining to the lake is small, estimated to be about 192 acres. Groundwater from the ongoing dewatering of the MacArthur Tunnel for Park Presidio Blvd is discharged to the Lake at the northern shore of the lake. In addition, storm water runoff from Park Presidio Blvd and adjacent Trust land enters Mountain Lake through three drainage structures located in the western bank of the Lake and a northern structure that discharges tunnel groundwater. A large portion of the watershed is occupied by the Presidio Golf Course.

At present, there are no natural surface outlets from the lake; water loss is through evaporation and seepage. Discharge by way of subsurface (groundwater) flow likely is westward to Lobos Creek. At times in the historic past, the lake overflowed its basin and drained via Lobos Creek to the Pacific Ocean, about 1 mile to the west. The lake is subject to seasonal water level fluctuations; in the past century the level has varied by as much as 8 feet (Riedy 2001). An overflow pipe, constructed in 1939 during construction of Park Presidio Blvd (Highway 1), runs from the southwest corner of the lake under Highway 1 to a City storm/sewer inlet in the Lobos Creek drainage. The overflow pipe elevation is set at 134 feet and controls the maximum water level in the lake so as to protect the adjacent highway. The pipe is damaged and in need of replacement. Replacement of the pipe is not part of the proposed Project.

This IS presents this Project that is proposed in the RAP for Mountain Lake, followed by an analysis of its impacts. Cumulative impacts are evaluated assuming a worst-case scenario, where the proposed Project, and other planned Presidio projects would be implemented concurrently.

The environmental impact analyses and sections of the Initial Study are presented on the following pages:


| | |
|---|---|
| Project Description | Page 3 |
| 1. Aesthetics | Page 15 |
| 2. Agricultural and Forest Resources | Page 18 |
| 3. Air Quality | Page 19 |
| 4. Biological Resources | Page 25 |
| 5. Cultural Resources | Page 30 |
| 6. Geology and Soils | Page 33 |
| 7. Greenhouse Gas Emissions | Page 36 |
| 8. Hazards and Hazardous Materials | Page 39 |
| 9. Hydrology and Water Quality | Page 43 |
| 10. Land Use and Planning | Page 46 |
| 11. Mineral Resources | Page 48 |
| 12. Noise | Page 49 |
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| 15. Recreation | Page 55 |
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| 17. Utilities and Service Systems | Page 62 |
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| Appendices | |
| A: List of Acronyms | |
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C: Stone Column Construction Process
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**Project Activities**

Current Site Setting and Future Land Use

Mountain Lake is on the southern edge of the Presidio of San Francisco (Presidio). Park Presidio Blvd (Highway 1) is immediately west of the lake and is separated from the lake by a narrow band of vegetation and a chainlink fence. The highway roadbed at this location was created in 1939 by partially filling the lake, thereby reducing the lake surface area by approximately 40 percent. To the west of Park Presidio Blvd is the Public Health Service district, where buildings now provide housing and office/institutional uses. The Presidio Golf Course is to the east and north of the lake and is separated from the lake by an existing trail/road and chainlink fence. South of the lake are a City park, beyond which are private residences and apartments in the City and County of San Francisco. The residences are located on east-west running Lake St, which is parallel to the Presidio boundary, and at the northern termini of 9th, 10th, 11th, 12th Avenues, and Funston St, which deadend at the Presidio boundary.

The residences nearest the Project site to the south are separated from the lake and the Presidio by Mountain Lake Park, a small City-owned park. Formerly part of the Presidio reservation, the parkland was granted to San Francisco in 1874. While the lake is not used for swimmming and fishing; however, wading at the southern beach area may occur occasionally. The City park provides tennis courts and other recreational amenities in the adjacent upland. The south shore of Mountain Lake is within the City park and includes a small beach. Approximately 0.3 acre of City property lies within the lake itself; the balance of the lake is on Presidio property. Residences on the Presidio are found to the north along Washington Blvd and to the east along Wyman Ave.

There is no public vehicle access to Mountain Lake or the land surrounding the lake. From the City, pedestrian access to the lake and park is by way of trails leading from the termini of the adjacent numbered Avenues and from Funston St. From within the Presidio, pedestrian access from the west is by way of Mountain Lake Trail, which crosses under Highway 1 on West Pacific Ave at the north end of the lake. Access from the east is by way of West Pacific Ave, which runs between Arguello Blvd and the lake, inside the southern boundary wall of the Presidio. The west end of West Pacific Ave is closed to public vehicles and serves as a segment of Mountain Lake Trail between the lake and Arguello Blvd. The park, lake, and trails are popular recreation facilities, particularily for neighborhood residents and pedestrians and bicyclists who use the facilities or pass through.

The surface of the lake is approximately 134 feet above sea level. Northeast of the lake and at a higher elevation is the Presidio Golf Course, which opened over 110 years ago, in 1897. Low hills to the north, the highest of which is approximately 300 feet above sea level, are incorporated into the golf course. Highway 1 passes under the golf course by way of the MacArthur Tunnel.

During the mid- and late-19th century, various plans were made and partially executed to tap Mountain Lake as a water supply for the City. However, it was determined that the amount of water that could be obtained from the watershed was inadequate to meet the City's needs and plans for it to be a water supply were eventually abandoned. The Army diverted water from Mountain Lake for domestic purposes within the Presidio in 1897, and lake water was used for irrigating the Presidio Golf Course until 1964.

The lake is inhabited by non-native exotic species, including bullfrog, carp, and catfish. Over the past decade the east and southeast shores of the lake have been restored with native plants.

From November 2011 through January 2012, in advance of the proposed Project, the Trust cleared some vegetation around Mountain Lake consistent with the Vegetation Management Plan (VMP; Trust and NPS, 2001). The purpose of the clearing was to gain access to areas to complete a topographic map, conduct geotechnical studies of Park Presidio Blvd (Highway 1) adjacent to the lake, and evaluate access routes for the Project. Brush was cleared from a 15-foot wide corridor along the east side of Park Presidio Blvd. Some brush clearing occurred on the Presidio in the proposed staging area. Some clearing also was conducted in the northern arm of the lake. Plants removed were primarily non-native species. No trees were removed. In addition, in December 2011 through February 2012, in advance of the proposed Project, Caltrans performed initial geotechnical studies along the roadway.

Following remediation and restoration of the area disturbed by the Project, more extensive restoration in the area is planned under the Mountain Lake Enhancement Plan and Environmental Assessment (Trust, NPS, and GGNPA, 2000) and the VMP (Trust and NPS, 2001).

Extent of Project Area

The RAP is focused on removal of the contaminated sediment and control of highway storm water discharges. The area included in the RAP consists of the following: Mountain Lake; land required to access the site, stage

equipment, and manage dredged material; and the portion of Highway 1 adjacent to the lake to be stabilized. This area is shown in Figures 2 and 3.

Runoff from three storm water culverts along Park Presidio Blvd (Highway 1) discharges to Mountain Lake. Elevated concentrations of the chemicals of concern (COCs) in lake sediment have been attributed to highway drainage and other contributing storm water sources. These COCs are primarily lead and other metals and petroleum hydrocarbons. The Presidio Golf Course discharges runoff to the lake through culverts at the eastern and northern edges of the Lake. In the past, runoff from the golf course was a source of pesticide contamination to the Lake. However, the golf course now operates under an Integrated Pest Management Program which controls pesticide and fertilizer use at the golf course in a manner that minimizes risks to human health, ecological species, and the environment (Arnold Palmer Golf Management and Trust 2005). Pesticides are only used in very limited quantities when non-chemical methods have been ineffective at keeping pest levels below action thresholds. The golf course has annually monitored metals, pesticides, and/or general chemistry parameters in storm water since 1996 (Blankinship 2010). The data indicate that contaminants are not present at levels of concern in storm water from the golf course. Thus, the golf course is not a significant continuing source of contaminants to Mountain Lake.

This natural lake is roughly triangular in shape, with a north-south length of about 610 feet and a width of about 650 feet at its widest. The lake has been altered substantially from its original size and depth. The greatest change occurred when the lake was partially filled during construction of Park Presidio Blvd and the MacArthur Tunnel, which opened in 1940. The construction reduced the lake's area by 40 percent from its original size. Today, the lake's surface area is slightly over 4 acres. In addition to the reduction in surface area, the lake has shallowed considerablly from its original 30-foot depth; it now has an average depth of 6 feet and a maximum depth of about 10 feet.

Site Investigations

Over 185 samples of sediment have been collected from the lake during remedial investigations conducted between 1990 and 2011. Four samples have also been collected from sediment in Park Presidio Blvd storm drains that feed into the lake. Twelve surface water samples and seven sediment elutriate (i.e., liquid expressed during sample dewatering) samples have also been collected and analyzed.

The following reports document the methodology and outcomes of various investigations of the sediments and surface water of Mountain Lake:

- Final Remedial Investigation Report (Dames and Moore, January 1997);
- Report of Sediment Sampling at Mountain Lake (Erler & Kalinowski, Inc., (EKI) November 1998);
- Draft Sampling Results for Selected Public Health Service Hospital Sites (EKI, November 2000);
- Evidence of Environmental Change over the last 20 years at Mountain Lake, in the northern San Francisco Peninsula, thesis for Master of Arts in Geography (L. Riedy, 2001) [An independent study not completed as part of remedial investigations];
- Mountain Lake Sediment Investigation, Final Report (URS, July 2001);
- Remedial Investigation Summary and Risk Evaluation, Mountain Lake (URS, October 2011);
- Letter Report – Sediment Sampling at Mountain Lake (Kennedy/Jenks, 2012a); and
- Draft Feasibility Study/Remedial Action Plan (FS/RAP), Mountain Lake, Presidio of San Francisco, San Francisco, California (Kennedy/Jenks, 2012b).

The following are potential chemicals of concern (PCOCs) in Lake sediment that were detected at least once above a cleanup level or background concentration for the Colma formation (URS 2011):

- Metals, including arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, and zinc.
- Pesticides, including 4,4-DDD, 4,4-DDE, alpha-BHC, beta-BHC, gamma-BHC (lindane), delta-BHC, alpha chlordane, and gamma chlordane).
- Total petroleum hydrocarbons as diesel (TPHd) and as motor oil (TPHmo).

Site Risks and Chemicals of Concern

A human health and ecological risk evaluation of PCOCs in Lake sediment is presented in the Draft FS/RAP (Kennedy/Jenks, 2012b).

The current and planned future use of Mountain Lake is as wildlife habitat. Fishing and swimming are not

permitted in the Lake. Visitors to Mountain Lake typically engage in activities where there is no exposure to sediment. Wading may occur occasionally at the southern beach area; however, human exposure to sediments during wading is expected to be infrequent and of limited duration. Furthermore, concentrations of lead and other PCOCs in sediment samples collected from the southern beach area are below human health cleanup levels (Kennedy/Jenks 2012a). Also, the ecological-based cleanup level for lead, which is the primary PCOC, is lower than the cleanup level for human health, so remediation of sediment to address risk to ecological receptors would be protective of potential human exposures.

Previous evaluations of surface water in Mountain Lake concluded that contaminants in surface water meet water quality criteria for aquatic life and drinking water standards (e.g., maximum contaminant levels). Therefore, ecological risk from surface water exposure and domestic use of surface water in Mountain Lake are not exposure pathways of concern and were not evaluated further in the risk evaluation.

Ecological receptors could be exposed to PCOCs found in sediment at Mountain Lake. Common species of fish, amphibians, waterfowl, and mammals that occupy the Lake and surrounding area may be exposed to sediment at Mountain Lake. Exposure pathways for aquatic species living in the water column or sediment are direct contact with or uptake of PCOCs in sediment and dietary exposure to PCOCs. For aquatic-dependent wildlife, the primary exposure pathway of concern is dietary exposure to PCOCs. There are no sensitive species (i.e., species on federal or state lists of threatened and endangered species) residing in the Lake but these species could occupy the area after future lake enhancement activities.

Risks to ecological receptors were evaluated in the FS/RAP for baseline (existing) conditions at Mountain Lake, which assumed no remediation of sediments. To evaluate risk, the 95 percent upper confidence limit on the arithmetic mean (95 percent UCL) concentrations in sediment were determined for each of the PCOCs and compared with cleanup levels. The risk evaluation concluded that baseline conditions present an unacceptable risk to the ecosystem in and around Mountain Lake (Kennedy/Jenks, 2012b). Two contaminants, lead and total TPHmo were selected as chemicals of concern (COCs) in Mountain Lake sediment because they pose a potential risk to ecological receptors.

Remedial Action Area

Approximately 15,600 cubic yards (cy) of sediment in the lake are contaminated with COCs above cleanup levels, covering nearly the entire footprint of the lake to a depth of 2.5 feet below the sediment surface (bss), and some areas extend to 4.5 to 6.5 feet bss. This defines the remedial action area.

Remedial Action Objectives

The Draft FS/RAP identifies the following remedial action objectives (RAOs) for Mountain Lake:

- General RAOs:
  - Protection of human health and the environment.
  - Protection of water quality and ecological resources.
  - Remediation of contaminant mass (primarily lead) in the Lake sediment, and elimination or reduction in further accumulation of contaminant mass.
  - Preference for permanent remedies, whenever practicable, cost effective, and consistent with planned use of the Lake.

- Site-Specific RAOs:
  - Remediation of sediment in a manner that would not further impair Lake health or habitat quality.
  - Planning, design and performance of the sediment remediation activities in a manner that maintains structural stability of western shore and adjoining Park Presidio Blvd. Undermining or destabilization of Park Presidio Blvd is an unacceptable consequence of the sediment remediation activities.
  - Control of future chemical release to the Lake associated with stormwater discharges from Park Presidio Blvd.

Proposed Remedial Action (Project)

The proposed Project provides for the removal of sediment containing COCs above cleanup levels by wet removal (dredging) methods. Although mechanical and hydraulic dredging are both feasible, the sequence of work described herein includes hydraulic dredging as representative of wet removal operations. Similarly, there are multiple feasible dewatering processes that could be applied for the Project, but mechanical dewatering is described herein as representative of dewatering processes. The contractor would have flexibility with respect to means and methods to facilitate removal operations within constraints of the site space and schedule and without posing a threat to the integrity of Park Presidio Blvd.

Dredging would be done using a barge, and dredged material would be pumped through a temporary pipeline or other similar transport to the dewatering area approximately 600 feet north of the lake. Depending on staging at

the dewatering area, dredged material could temporarily be stored within a diked lagoon or tanks prior to dewatering. Dewatering of the excavated sediment would occur at the staging area. When sufficiently dewatered, the solids would be be trucked offsite to a landfill licensed to receive the material. If there are areas in the lake where dredging is infeasible, clean sand would be deposited over these locations to cap them in place. With the completion of dewatering, the lagoon or tanks would be removed.

The preferred cleanup method would:

- Stabilize Park Presidio Blvd (Highway 1) prior to sediment dredging
- Treat Park Presidio Blvd runoff entering the lake
- Dredge approximately 15,600 cubic yards of in situ sediment to meet ecological cleanup levels
    - Dredge top 2.5 feet of sediment across most of lake bottom
    - Dredge down 5.5 feet in locations where needed
    - Collect sediment confirmation samples during dredging
    - Over-dredge in areas where sediment confirmation samples indicate an unacceptable ecological risk
    - (If necessary) place sand cap where dredging is technically infeasible
    - Re-contour lake bottom to form stable/functional slopes
- Dewater sediment onsite
- Test and discharge water back to the lake
- Transport and dispose of sediment at an offsite facility licensed to accept the material

Site restoration would be conducted in areas disturbed by the Project to facilitate habitat and recreational development under the Mountain Lake Enhancement Plan and Environmental Assessment (Trust, NPS, and GGNPA, 2000) and the VMP (Trust and NPS, 2001). Following remediation of the lake and restoration of the disturbed area, the area would be used for wildlife habitat, passive recreation and education, as occurs at present. The City park would continue to be used for both active and passive recreation.

<u>Proposed Project Activities</u>:

The proposed actions to implement the RAP for Mountain Lake entail: 1) Caltrans stabilizing the Park Presidio Blvd roadway and treating runoff to the lake and 2) the Trust establishing site access, dredging sediment from the lake, sequestering the sediment onsite during dewatering, returning the water to the lake, trucking the dewatered sediment to an appropriately licensed landfill, and restoring the area disturbed by the Project.

*Caltrans Stabilization and Drainage Work (2012)*

Before dredging of the lake can begin, Highway 1 (Park Presidio Blvd) adjacent to the lake must be stabilized to alleviate the risk that dredging could compromise the integrity of the roadway. Runoff from the highway must also be controlled and treated prior to completion of remediation so that the potential for lake contamination is minimized after remediation.

The stabilization and runoff management work is estimated to take about 90 active working days over a 18 week period. The stabilization work would occur at night; however, the runoff improvements may occur either at night or during the day. Some of the runoff improvements could be concurrent with the installation of stone columns to stabilize the road. The Caltrans work is planned for completion in 2012.

Stone columns in the ground would be used to stabilize the road. Figure 4 provides typical plan and section views of how stone columns would be arrayed to provide the necessary stabilization. Figure 5 provides an illustration of the process of soil displacement and stone placement during column construction. Appendix C describes the column construction process and provides references to online videos illustrating this type of construction. Construction of each column would involve using a crane and vibratory probe to create a shaft that would then be filled with stone. The stone is compacted in place as the probe is withdrawn. The columns would be 3-feet in diameter and an estimated 450 columns would be installed. Half are assumed to be 60 feet deep and half 40 feet deep. It is estimated that 5,900 cy of aggregate would be required to create the columns. The rock would be delivered at night in sufficient quantity to support that shift's work, which is estimated to require 8 trucks per night. It would be temporarily stored on the shoulder of Highway 1. Other equipment required for the stabilization work includes a front loader, air compressor, generator, flatbed trailer, trucks for hauling aggregate to the site and spoil material off site, and two portable pole-mounted light plants for illumination. The amount of spoil to be hauled off is unknown, but is not expected to be large. As it works its way into the earth, the vibratory probe pushes the fill material aside, compacting the displaced soil at the sides of the shaft as it is formed. The stone columns will be installed through groundwater.

Appropriate traffic controls and worker protection would be in place during the work. A northbound lane of

Highway 1 would be closed during nighttime stabilization work. At the end of each nightshift, the closed northbound lane of Highway 1 would be reopened for morning traffic.

As a result of the Caltrans work, runoff from the highway would be managed so that it is controlled and treated prior to entering the lake. Figure 6 shows the location of the highway runoff controls. Approximately 685 linear feet (LF) of 18-inch reinforced concrete drainage pipe and 475 LF of 36-inch reinforced concrete pipe would be installed underground along the highway. Approximately 100 feet of 15-inch ductile iron pipe would be installed on the West Pacific Ave Bridge (which supports Park Presidio Blvd as it crosses over Mountain Lake trail/West Pacific Ave at the north end of the lake). Existing culverts and drainage inlets along the highway between the MacArthur Tunnel and the Mountain Lake overflow pipe would be upgraded by installing storm water treatment devices that remove pollutants and particulates. Three existing 18-inch cross culverts would be spiral lined. In addition, 3 manholes and 3 new inlets would be installed and 2 existing inlets would be removed and replaced. Approximately 18 storm water treatment devices would be installed in all new and existing inlets from the MacArthur Tunnel to the Mountain Lake Overflow Pipeline. Approximately 1,000 linear feet of chain link fence would be installed between the highway and lake and 1,000 LF of asphalt concrete dike 6-inches high would be installed along the shoulder between the highway and lake. This dike would prevent untreated runoff from entering the lake and would direct flow to the drainage inlets. To prevent erosion on the site until vegetation is reestablished, disturbed areas would be covered with erosion control materials and, depending on slopes, appropriate temporary degradable barriers would be installed to control water flow over disturbed areas.

*Trust Access Construction Work (2012)*

If determined to be needed and if permitted by Caltrans, temporary ramps to Park Presidio Blvd, these would be constructed in 2012. The ramps would consist of clean fill trucked to the site, where it would be deposited and compacted. A suitable tire cleaning mechanism would be installed to prevent soil from being tracked onto the public roadway. Although the specific location of the ramps, it is estimated that 3,700 cy of fill delivered to the site in roughly 200 truckloads. It is assumed it would take approximately 8 weeks to clear the ramp site of vegetation and construct the ramp. The fill to construct the ramps would need to be delivered by way of either West Pacific Ave or Park Blvd (through the golf course).

*Trust Remediation Work (2013)*

In 2013, subsequent to the Caltrans stabilization and drainage work and construction of the ramps, the Trust would begin remediation. If not previously developed, access to the remediation site and to the staging area for dewatering would be established. A floating dredge would be placed in the lake. Piping or other similar transport system would be installed between the dredge and the staging area north of the lake. This would allow dredged material to be pumped as a sediment/water slurry directly from the dredge to the dewatering site without additional handling. During dredging, samples would be taken of bottom sediments to ensure that cleanup levels are achieved. The final lake bottom surface would be contoured as needed to prevent excessive slumping of final slopes. At the dewatering site, a temporary basin (lagoon) or temporarily tanks would be installed to receive the slurry. The slurry from the holding basin or tanks would be put through a mechanical dewatering process, such as a belt press, which would mechanically press the water out of the slurry, leaving a sediment cake and the separated water. The water from the dewatering process would be tested before being piped back to the lake. The dewatered cake would be stockpiled temporarily until a sufficient amount is available for hauling. The dewatered solids would be hauled to a landfill facility licensed to accept the material. Depending on the rate of production from the dredge to the holding facility and the rate of production of dewatered sediment cake, the dredging and hauling aspects of the Project may be intermittent, so as to maintain a steady flow of material between the dredge, the holding facility, the press, the stockpile, and the landfill.

If constructed, the ramps would provide ingress and egress at the site. However, for safety, use of the ramps may require a lane closure on northbound Highway 1 during their use. Because of traffic volume, Caltrans would allow lane closure on Park Presidio Blvd only at night. Therefore, hauling by this route likely would need to be a nighttime operation and would require safety barriers on the road and appropriate lighting for the work area. Portable pole-mounted units with generators, such as those used on highway projects, would be used. Consistent with safety and operational needs, the lighting would be focused away from residences.

Alternative routes are available for site ingress and egress. One route would use West Pacific Ave from the remediation site to Arguello Blvd and then proceed from there through the Main Post to US 101 on the east side of the Presidio. The other route would pass under Park Presidio Blvd by way of West Pacific Ave and proceed north on the extension of Park Blvd that connects to Washington Ave at the northern edge of the golf course. This route would follow Washington Ave west to Lincoln Blvd and continue north to US 101 near the Golden Gate Bridge. Variations of the Park Blvd route would be to follow Washington Ave west to its intersection with Lincoln Blvd, continuing north to US 101/Doyle Drive, or follow Washington Ave east to its intersection with Arguello Blvd, continuing to US 101/Lombard St. Potential routes are shown in Figure 7. No final decision has been made on

the route to use; therefore, the potential route alternatives are evaluated in this Initial Study.

Dredging and mechanical dewatering would occur during the day. The dewatering site would be 1,500 feet from the nearest residences on Lake St (to the south) and Washington Blvd (to the north), 1,300 feet from the nearest residences at the terminus of 7th Ave, and 1,000 feet from the nearest residences on Wyman Ave west of Park Presidio Blvd. Intervening topography, vegetation, and structures between the site and these residences help screen the staging area from the residences. Figure 8 shows the location of the dewatering site relative to residences.

Areas disturbed by the Project would be restored to support habitat enhancement and recreational uses of the area, consistent with the Mountain Lake Enhancement Plan and Environmental Assessment (Trust, NPS, and GGNPA, 2000), the VMP (Trust and NPS, 2001), and site-specific planting and restoration plans to be developed. Future site restoration and activities envisioned in the Mountain Lake Enhancement Plan and Environmental Assessment (Trust, NPS, and GGNPA, 2000) that are not within the disturbed area are not considered a part of the remedial action described herein. Limited vegetation removal related to the Project occurred in early 2012. This was to accommodate data collection and mapping required for the Project. When implementing the remediation project in 2012-2013, between 50 and 100 trees along with brush would be removed to prepare the staging area and provide access to the lake for the barge, if needed. The removal would be consistent with the VMP, which calls for restoration and rehabilitation of the historic forest zone north of the lake. The vegetation may be chipped on site as mulch for erosion control or placed elsewhere in the Presidio.

Construction activities associated with the proposed remedial action would consist of the following:

*Pre-Remediation Construction Activities*

- Highway Stabilization and Runoff Management Installation by Caltrans
    - Installation of approximately 450 stone columns within the shoulder (and perhaps one lane) to stabilize the highway to prevent movement toward the lake.
- Installation of piping, culverts, and inlets to capture, manage, and treat runoff before entering the lake.
- Establishment of Site Access (Alternatives)
    - <u>Ramps</u>: Construct and use temporary earthen ramps between the remediation site and northbound Highway 1 for direct site ingress and egress.
    - <u>West Pacific Ave</u>: Use West Pacific Ave to Arguello Blvd through the Main Post to the Lombard, Marina, or Gorgas Gates on the east side of the Presidio.
    - <u>Park Blvd</u>: Use Park Blvd through the Presidio Golf Course. Pass under Park Presidio Blvd via West Pacific Ave and continue on Park Blvd between West Pacific Ave and Washington Blvd From that point, trucks could continue
        - north on Park Blvd to Lincoln Blvd and on to Highway 101
        - west on Washington Blvd to Lincoln Blvd and on to Highway 101
        - east on Washington Blvd to Arguello Blvd, and north on Arguello Blvd, continuing through the Main Post, to the Lombard, Marina, or Gorgas Gates on the east side of the Presidio.
    - <u>Combination of Routes</u>: Depending on Project needs, ingress and egress at the site could be by way of a combination of these routes, with ingress along one route and egress along another or with the routes changing based on the activity taking place.

*Remediation Construction Activities*

- Dredging
    - Site preparation and additional clearing and grubbing
    - Preparation of access point(s) for dredging barge and equipment (if not able to lift onto lake by crane)
    - Setting up wet sediment handling area and installing temporary piping/transport to move dredged material to dewatering site and to return water to lake
    - Preparation of dredged material temporary holding facilities (diked lagoon or tanks), setting up dewatering equipment, and establishing temporary dewatered sediment cake stockpile.
    - Dredging and pumping of slurry to dewatering site.
    - Dewatering by belt press or similar mechanical means
    - Trucking of dewatered sediment to appropriate landfill
    - Returning water to lake
- Environmental Protection and Public Safety
    - Installation of Best Management Practices on site, including surface water runoff and erosion controls and means of keeping soil off paved roads.
    - Installation of temporary exclusion fencing around the active work areas of the site and, if

necessary, along West Pacific Ave.
    - Establishment of traffic control signage and devices as needed at points of entry to public roadway.
- Sampling and Testing
    - Sampling and testing of the lake bottom during dredging to confirm cleanup levels are attained.
    - Sampling and testing of return water from dewatering prior to release to lake.

*Post-Remediation Site Restoration*

- Site restoration of areas disturbed by the Project, consistent with the Mountain Lake Enhancement Plan and Environmental Assessment (Trust, NPS, and GGNPA, 2000), VMP (Trust and NPS, 2001), and site-specific planting and restoration plans yet to be developed. Future post-remediation restoration activities envisioned in the Enhancement Plan and falling outside of the Project area would be implemented by others and is not part of the proposed Project although foreseeable activity is evaluated herein. The following may be required:
    - Removal of ramp (if installed) and grading to stabilize slopes and establish drainage.
    - Installation of post-construction erosion control to protect site during vegetation re-establishment.
    - Potentially install drainage features (swales, culverts, sediment basins) and temporary irrigation to facilitate revegetation.
    - Plant vegetation to restore site, consistent with VMP.

Specific Project construction activities are detailed below.

Contractor Mobilization

In 2012, there would be two contractor mobilizations in support of the Project: one by Caltrans contractors engaged in stabilizing Highway 1 and performing drainage work; the other by Trust contractors constructing access ramps and removing remaining trees and brush. In each case, the construction contractor would mobilize its equipment to the respective work areas. Equipment would remain at the sites as long as needed and would then be removed.

In 2013, the Trust remediation contractor would mobilize equipment and personnel to complete site preparation and undertake remediation.

Pre-Remediation Actions

Before remediation can be undertaken, a number of preparatory actions must occur. These include Caltrans stabilizing the section of Highway 1 adjacent to the lake and performing drainage work and the Trust constructing an access ramp between Highway 1 and the staging area (if feasibile and permitted by Caltrans), and, as needed, removing selected vegetation not previously removed. If construction of the ramps is not feasible, or if approval to construct the access ramp cannot be obtained or cannot be obtained in a timely manner, access would be via West Pacific Ave, between Arguello Blvd and the Mountain Lake site, or between Washington Blvd and the site.

- Highway Stabilization: Dredging of the lake would remove sediment adjacent to Highway 1, which is at a higher elevation than the lake. Based on the nature of the soils supporting the highway, there is a risk that dredging the lake would create an unstable condition along the highway's east side. To address this concern, rock columns would be constructed down through the road fill, to a depth of 40 to 60 feet below the surface. These columns would require 3-foot diameter wells being constructed using vibrating equipment that would compact the displaced material to the sides of the well, densifying the well walls and creating the well shaft. The final depth of each well would depend on the nature of the subsurface material encountered and its engineering characteristics. Upon its completion, each well would be backfilled with rock, creating a rock column. The rock would have a maximum diameter of 3-inches, but most rocks would be between ¼ to ½-inch in diameter. (See Figures 4 & 5 and Appendix C.) An estimated 450 such wells would be required, arrayed in a staggered grid pattern. Completion of this aspect of the pre-remediation construction would take approximately 90 active working days over a 18 week period during 2012. It would be done primarily at night, to reduce impacts on highway traffic. The work would require closure of one northbound lane of Highway 1 during off-peak (nighttime) hours throughout the construction duration.
- Highway Runoff Management Installation: Contaminated sediment has accumulated in Mountain Lake due to runoff from Highway 1. Performing The drainage work by Caltrans would manage, control, and treat storm water that would still enter the lake following lake remediation. The drainage work would be

undertaken concurrent with the highway stabilization activity.

- Site Access
  - Construct access ramps (2012). If access ramps are to be used, a lane on northbound Park Presidio Blvd may need to be closed during their use. If so, ramp use may be restricted to nighttime hours. Clean fill would need to be imported to construct the ramps. When no longer needed, the fill would be graded over the disturbed remediation site or hauled offsite. This would ensure all Project traffic is on Highway 1, minimizing disturbance to the Lake St and Presidio neighborhoods and the land uses surrounding the lake. This would keep work activity at the north end of the lake, leaving most other park and Presidio areas open to public use. Ramp construction would involve the removal of vegetation, ground preparation to receive the ramps, import of geotechnically suitable material, earthwork to form the ramps, and grading to integrate the ramps with the surrounding area. The earthen ramps would be removed when no longer required for site access. It is anticipated that the ramp material would be graded into the surrounding area and no offhaul would be required.
  - Designate haul route on existing roads (2013)(1)A West Pacific Ave route would be from the site along West Pacific Ave to Arguello Blvd, then north through the Main Post to the Lombard, Gorgas, or Marina Gates and out to U.S 101 (Lombard St). This route passes along the partially paved West Pacific Ave right of way, passing between the golf course and the southern Presidio boundary wall, then through Presido Golf Club parking area to Arguello Ave. Public access to Mountain Lake trail (located on West Pacific Ave) would be restricted during hauling. Periodic restrictions also may be in place at the north end of the lake depending on construction and remediation activities. (2) A Park Ave route would be lead from the site under Park Presidio Blvd (Hwy 1), then north on the closed portion of Park Ave the divides the Presidio Golf Course. At Washington Ave the route could: (a) continue north on Park Ave to Lincoln Blvd and from there to US 101 at the Bridge Toll Plaza, (b) continue west on Washington Ave to Lincoln and from there to US 101 at the Bridge Toll Plaza, or (c) continue east on Washington Ave to Arguello Blvd and from there through the Main Post ot an exit on the east side of the Presidio onto US 101 (Lombard St). Depending on Project needs, a circular route could be established, using either Park Ave and West Pacific Ave for ingress and the other for egress. Depending on Project needs, the designated route may change from time to time (e.g., one route for daily worker access, another for equipment and material delivery, and another for hauling.)

Site Preparation, Clearing, and Grubbing

The work area would be fenced and posted for no entry. Vegetation not previously cleared would be removed from areas west and north of the lake to gain access to the lake, construct the pipeline/transport system, and clear the staging area. Approximately 50 to 100 trees would be removed to clear the staging area and north arm of the lake to lay piping. If feasible, the barge would be directly loaded onto the lake from Highway 1, along the west side of the lake. Limited vegetation occurred in this area between November 2011 and January 2012 to facilitate surveying and development of topographic mapping to support access assessments and detailed design. Additional brush vegetation and tree removal would be performed in 2012 to prepare the staging area and north arm shoreline access prior to the remediation action. Placement of the dredge barge from Highway 1 would likely require a lane or shoulder closure of Highway 1 and may need to be conducted at night. Alternatively, the barge would be directly loaded from the north arm of the lake. Areas along the eastern shore of the lake would be avoided, to the extent practicable, to avoid damaging native plants. At the same time, a previously disturbed upland site northeast of the lake would be set up as the staging area to handle the sediment-water slurry that would be removed from the lake bottom. This would involve removal of vegetation not previously removed and the creation of a temporary lagoon or placement of temporary holding tanks.

Dredging and Dewatering

Approximately 15,600 cy of in situ sediment would be dredged from the lake bottom. This volume is estimated based on an average removal of 2.5 feet of sediment throughout the bottom, with some portions of the lake being dredged to 5.5 feet. Previous studies suggest that this removal would achieve appropriate remediation. Deeper sediment in the lake contains constituents that are below cleanup levels or are naturally occurring. Confirmation sampling during dredging would ensure that COCs at concentrations above cleanup levels in sediment are removed.

Dredging would be done using a barge with floating hydraulic dredging equipment. The dredged material would be pumped through a temporary pipeline (or other transport system) to the dewatering area 600 feet north of the lake. Removal of 15,600 cy of in situ sediment (compacted) would produce approximately 34,480 cy of discharged volume (sediment and water slurry) over an active dredging duration of approximately two weeks.

Depending on staging at the dewatering area, interim dredged material could temporarily be stored within a diked lagoon or tanks prior to dewatering. At the upslope staging area, the dredged sediment would dewater by mechanical belt press or other mechanic dewatering process. Following an active dewatering duration of approximately 10 weeks, approximately 9,850 cy of dewatered cake solids would be produced. The cake solids would be temporarily stockpiled and then hauled by truck to the offsite disposal facility. Water from the dewatering process would be tested before being returned to the lake via temporary piping. No additional treatment of the water generated during sediment drying is expected to be necessary (Kennedy/Jenks, 2012b).

Storm water best management practices (BMP) would be employed to prevent erosion of disturbed areas and migration of sediment in runoff to areas outside the work area. Soil stabilization measures would be installed along the Project perimeter to address soil erosion and prevent offsite migration. Soil stabilization measures would include use of silt fences, binders, straw, biodegradable mats, and other methods as necessary, taking into consideration the soil conditions and slope. Additionally, standard storm water pollution prevention plan (SWPPP) BMPs used at the Presidio would be implemented. These include but are not limited to sediment tracking controls such as tire sweeping/washing and road sweeping; erosion controls such as silt fencing and straw wattles in disturbed areas; dust control including vehicle speed restrictions and the use of water on access routes; and drainage inlet protection as needed, including sand bags around drainage inlets and filter fabric within inlets.

Transport of Sediment to Landfill

If trucks haul the dewatered sediment cake from the dewatering site by way of a temporary access ramp to Highway 1, the trucks would head north on Highway 1 through the MacArthur Tunnel to Highway 101. From there they would continue to the designated disposal site. Empty trucks returning from the landfill would enter the site from northbound Highway 1 by way of a temporary ramp. To ensure safe vehicle movements between the ramp and the highway, traffic controls and warning signs would be employed. A temporary lane closure would be needed. This may require that the hauling occur at night, when traffic volume is low.

If existing roads are used in lieu of ramps, these would be (1) West Pacific Ave east to Arguello Blvd and then north, exiting the east side of the Presidio to Highway 101 (Lombard St) or (2) by way of Park Blvd (a) north to Lincoln Blvd or (b) west on Washington Blvd to Lincoln Blvd or (c) east on Washington Blvd to Arguello Blvd. Figure 7 shows the alternative routes.

If the West Pacific Ave to Arguello Blvd route is used, loaded trucks leaving the staging area (dewatering site would travel south on West Pacific Ave to the point where it turns east and continue on the gravelled and paved portions of the road to Arguello Blvd, 0.4 miles east of the lake. From that point trucks would turn north (left) onto Arguello Blvd and from that point proceeed through the Main Post to Presidio Blvd and out the Lombard, Gorgas, or Marina Gates. The trucks would enter Highway 101 (Lombard St) and continue to the disposal site. Returning trucks would reverse this route.

If the Park Blvd route is used, trucks would exit the dewatering site by passing under Park Presidio Blvd on West Pacific Ave north of the lake, turn north onto the extension of Park Blvd through the golf course to Washington Blvd, then turn west (left) onto Washington Blvd and continue to Lincoln Blvd. At Lincoln Blvd, trucks would continue north to Highway 101. Variations on this route would have the trucks go west on Washington Ave to Lincoln Blvd or east on Washington Blvd to Arguello Blvd, and continue north to US 101 from there.

Any and all of these routes potentially could be used at various times, depending on the nature of Project needs.

Depending on the size of truck (10 cy or 18 cy), hauling approximately 9,850 cy of dewatered sediment would require about 550 to 990 truck round trips between the dewatering site and the disposal facility. Trucks of a relatively low capacity (10 cy) might be required to navigate steep ramps and narrow turns to Highway 1 or along one of the Park Blvd to Lincoln Blvd options. Larger trucks (18 cy) might be viable if the transport route is along West Pacific Ave to Arguello Blvd. Based on turn angles at Arguello Blvd, it is assumed that the Park Blvd/Washington Ave route east to Arguello would rely on smaller trucks. It is assumed that 25 trucks of either size would be available. Given the distance to a landfill in the Central Valley, no more than 25 round trips per day would occur over a 4 to 8 week period when dewatered sediment off-hauling would occur. Allowing for filling of the trucks, this would average 3 trucks per hour leaving the site and 3 trucks per hour entering the site. However, it is likely that most trucks would have departed by early afternoon in order to reach the disposal site before it closes, unless arrangements can be made for later delivery.

For this environmental analysis, the ultimate disposal site is assumed to be the Buttonwillow Landfill in Kern County. The one-way trip distance from the Presidio to the facility in Kings County is approximately 265 miles. However, depending on the constituents in the dewatered sediment, some or all of it may be suitable for disposal at a closer landfill. This would be determined by testing of the dewatered sediment. A small number of additional truck round trips may be required to transport equipment, construction fencing, and other materials to the site from suppliers and construction yards in the region. The number of workers at the site would be small; therefore, the number of personal vehicles would result in a negligible increase in Presidio and local automobile traffic.

Recontouring, Soil Stabilization, and Site Restoration

The lake bottom would settle to a new profile at the conclusion of dredging. Following removal of sediment, the new lake bottom would be contoured as needed to enhance slope stability and for proper lake functioning. Any disturbed dry land would be graded and the soil stabilized in accordance with the final site design. Measures to stabilize the soil would include using binders, straw, biodegradable mats, and other methods as necessary, taking into consideration the nature of the soil and slope.

Site restoration of areas impacted by the Project would be conducted to facilitate habitat and recreational development. Given the anticipated scope of impacts in the staging area and north arm, it is likely that the following site restoration activities may be required:

- Ramp removal (if installed) and grading to stabilize slopes and establish proper drainage. It is anticipated that imported soil used for the ramp would be retained on site, but graded into the surrounding topography.
- Installation of post-construction erosion control to protect the site during revegetation establishment.
- Potentially the installation of drainage features such as swales, culverts, and/or sedimentation basins to properly manage stormwater flows during the revegetation period and minimize sedimentation to the Lake.
- Potentially temporary irrigation infrastructure to facilitate revegetation. Irrigation requirements are not yet known.
- Plantings to restore vegetation removed during remedial action operations. Planting requirements are not yet known.

Site restoration would be implemented consistent with the Mountain Lake Enhancement Plan and Environmental Assessment (Trust, NPS, and GGNPA, 2000), VMP (Trust and NPS, 2001) and site-specific planting and restoration plans yet to be developed. Revegetation of the lake shores and upland areas would include use of native plant species, historic or native tree species, and landscape vegetation appropriate to the site's future uses. For this site restoration work, a small number of additional truck trips would be required to haul equipment, fencing, erosion control material, irrigation piping, and plants to the site.

Schedule

The Project would be in three primary phases. For phase one, pre-remediation construction performed by Caltrans (highway stabilization and highway runoff controls installation by Caltrans and construction of access ramps by the Trust) would take place in 2012 and is expected to take 90 active working days, over an approximately 18 week period. Because the Caltrans work is in and adjacent to the highway, it would occur primarily at night, generally between 9:00 p.m. and 5:00 a.m., Monday through Friday, with limited weekend and daytime work as necessary.

| ***Pre-Remediation Construction Activity (Anticipated 2012)*** | ***Duration*** | ***Period*** |
|---|---|---|
| Highway Stabilization [Caltrans] | 18 weeks | Week 0 to 18 |
| Highway Runoff Management Installation [Caltrans] | 18 weeks | Week 0 to 18 |

Pre-remediation and site preparation construction performed by the Trust in the staging and access areas to the north of the lake (tree removal, ramp construction, and surveying) would occur in 2012 and is expected to take approximatley 9 weeks. Construction of the access ramps would occur during the day, with limited nighttime work possible.

| ***Pre-Remediation Construction Activity (Anticipated 2012)*** | ***Duration*** | ***Period*** |
|---|---|---|
| Tree Removal | 4 weeks | Week 0 to 4 |
| Ramp Construction | 4 weeks | Week 4 to 8 |
| Pre-Remediation Base Line Surveying | 1 week | Week 8 to 9 |

For the next phase, the remediation contractor is scheduled to mobilize to the site in March 2013, and the remedial action is expected to be complete by October 2013, requiring approximately 28 weeks of activity. Site preparation and dredging would occur in the initial 4 weeks of remediation. Subsequent dewatering would occur over about 10 weeks, during which time some off-hauling would occur for up to 8 weeks. Based on the rate of dredging and subsequent dewatering, it is likely that some hauling can occur even while dredging is taking place. The general schedule of remediation activities is presented below.

| ***Remediation Construction Activity (Anticipated 2013)*** | ***Duration*** | ***Period*** |
|---|---|---|
| Mobilization and Site Preparation | 6 weeks | Week 0 to 6 |
| Dredging and Depositing Sediment at Dewatering Site | 2 weeks | Week 7 to 8 |
| Dewatering Sediment | 10 weeks | Week 7 to 16 |
| Transport of Sediment to Landfill | 4 *(to 8)* weeks | Week 17 to 20 *(or 17 to 24)* |
| Site Restoration | 7 weeks | Week 21 to 27 *(or 25 to 31)* |
| Demobilization | 2 weeks | Week 28 to 29 (*or 32 to 33)* |
| Duration | 29 to 33 weeks | |

Cumulative Impacts

CEQA requires consideration of the cumulative impacts of a proposed project in combination of impacts of other projects or activities that have the potential to combine with impacts of the proposed project. Although impacts of each project may be less than significant, the cumulative effect of all projects may be significant.

*America's Cup:* Major sailing regatta events are planned on San Francisco Bay for the summer of 2012 and 2013. These events are planned to take place in August and September 2012 and from July through September 2013. The events culminate with the America's Cup final in September 2013. Most events are planned for Thursday through Sunday each week, with the greatest attendance expected on Saturday and Sunday. Because of local wind conditions, events are planned primarily for afternoons. As with any major regional event, such as New Year's Eve, 4th of July, and Fleet Week, roadways may become highly congested, particularly main arteries and streets near the waterfront. Based on the sailing schedule and the Project construction schedule, both the Caltrans pre-remediation work and the Trust pre-remediation and remediation work have the potential to overlap with the Thursday and Friday events. However, the 2012 Caltrans work would occur primarily at night and, therefore, would not coincide with daytime traffic. The 2012 Trust work is limited in scope and primarily would involve delivery of fill for the ramps, if built, and the hauling of vegetation. However, the vegetation would be chipped or composed on the Presidio, and would not require hauling on local highways or streets. The 2013 Trust remediation work anticipates a 4 to 8 week period of hauling dried sediment from the site. Depending on when this hauling occurs and how it is scheduled, it would be possible to avoid the race-related heavy congestion periods. In particular, given that trucks would be traveling up to 265 miles to a disposal site, they would leave early in the day, before traffic associated with the afternoon events began to arrive. In addition, a contractor typically schedules hauling to make the most efficient use of drivers and trucks. Therefore, it is reasonable that a contractor would schedule around congested periods, when trucks could be caught in traffic. Given that there is no overlap of 2012 construction with race events, and that the 2013 hauling schedule can be adjusted to minimize contributing to congestion, the America's Cup events were not considered in the cumulative analysis.

*2012 Cumulative Scenario:* There are five known construction projects on or near the Presidio that would or may overlap with the Caltrans work in 2012. These are the ongoing 5-year Doyle Drive replacement project, the Presidio's Main Post update projects, a remediation project above Baker Beach (RAP BB1A), a remediation project northeast of the Golden Gate bridge toll plaza at the CHP Range, and a remediation project in the Main Post at the Bernard Avenue Protected Range (RAP 6C). Their locations are shown in Figure 9.

The Doyle Drive project is on the north side of the Presidio; the Mountain Lake remediation Project is on the south side, over one mile away. Detours and road closures would be required during the duration of the complex Doyle Drive work, and would change from time to time as the work progresses. The Doyle Drive project EIS concluded that implementation of the Transportation Management Plan (TMP) for that project would ensure that there are no significant transportation/traffic related impacts (FHWA & SFCTA, 2008)). Although the Mountain Lakes remediation work was not considered during the analysis of the Doyle Drive project and in the PTMP, the number of truck trips and the period over which they would occur are minor as compared to the Doyle Drive project. They would not contribute to a worsening of traffic conditions below the level of service attributable to the Doyle Drive work. Level of Service (LOS) is used to describe delay at intersections due to traffic volume and other conditions. In 2011, the level of service (LOS) at intersections on Lombard Street (US 101) during weekday peak hours was LOS C at Lombard St/ Divisadero St and Lombard St/ Fillmore St and LOS D at Lombard St/ Van Ness Ave. (San Francisco Planning Department, 2011) These levels reflect the Doyle Drive related construction traffic during that period. LOS C is described by traffic engineers as "acceptable delays"; LOS D as "tolerable delays". It is assumed that the contribution of construction-related traffic from the Doyle Drive project would remain similar in 2012 and 2013 to what is was in 2011.

The Main Post update project is within the Main Post of the Presidio, approximately 4,500 feet northeast of the Mountain Lake site. The Main Post upgrade project includes reconstruction of existing buildings, structural improvements and other seismic work, roadway and utility upgrades, and other infrastructure enhancements. The Main Post work is ongoing and does not occur all at once. Specific projects are fairly small. The Final

Supplemental EIS for the Main Post Update indicates that construction vehicle traffic would vary depending on the specific construction activity and schedule. Construction vehicles for the Main Post would generally enter the Presidio via Richardson Ave, Doyle Dr., or the Golden Gate bridge toll plaza (Trust, 2010).

Baker Beach site BB1A work would occur in approximately the same period as the Caltrans work on Highway 1 adjacent to Mountain Lake. The Baker Beach site is approximately 7,000 feet north-northwest of Mountain Lake and only 400 feet south of the Golden Gate Bridge toll plaza. An estimated 3,800 cy of fill would be removed from the site (MACTEC, 2011b). Access to the Baker Beach site is off Lincoln Blvd. Trucks would likely reach Highway 101 at the Golden Gate Bridge by way of Lincoln Blvd and Merchant Rd. Once on Highway 101, the Baker Beach trucks potentially would use similar off-Presidio routes as the Caltrans trucks if they are on Highway 101.

The CHP Range work would occur in approximately the same period as the Caltrans work on Highway 1 adjacent to Mountain Lake. The CHP site is approximately 8,000 feet north-northwest of Mountain Lake and only 700 feet northwest of the Golden Gate Bridge toll plaza. An estimated 600 cy of fill would be removed from the site. Access to the CHP Range site is off Lincoln Blvd. Trucks would reach Highway 101 at the Golden Gate Bridge by way of Lincoln Blvd and Merchant Rd. Once on Highway 101, the CHP Range trucks potentially would use similar off-Presidio routes as the Caltrans trucks if they are on Highway 101 (EKI, 2009).

The Bernard Avenue Protected Range (BAPR) site is south of Presidio Blvd, between Barnard Ave and Quarry Rd, south of Fernandez St. The range now is largely covered by Landfill E, which is a remediated site. However, a portion of BAPR is not covered by the landfill. It is estimated that 2,500 cy of material would be hauled from the site during remediation (Geosyntec, 2012). The haul route is likely to be via Presidio Blvd to Lombard Gate and onto US 101 (Lombard St).

The projects are a considerable distance from each other. In most respects the Mountain Lake site is isolated from the other projects in terms of the potential to contribute to cumulative effects. The only area in which the 2012 Caltrans work near Mountain Lake could contribute to a cumulative effect is in its use of trucks and equipment during construction and when hauling aggregate and material. This part of the construction activity has the potential to contribute to a cumulative impact on traffic congestion and, therefore, on air quality. All other potential impacts identified for the Caltrans work are specific to the site or the immediate vicinity. Most of this work would occur at night. The other projects identified as occurring in 2012 would occur primarily during the day. In addition, all impacts from the projects are short-term impacts that are associated with construction. There are no ongoing impacts once construction is finished. Consequently, the only resource topics for which cumulative impacts are considered in detail are Air Quality and Traffic/Transportation.

*2013 Cumulative Scenario:* There are three known construction projects on or near the Presidio that would or may overlap with the Trust's Mountain Lake remediation work in 2013. These are the ongoing 5-year Doyle Drive replacement project and the Presidio's Main Post update, discussed above for 2012, and another remediation project above Baker Beach (RAP 5C BB2). Their locations are shown in Figure 9.

The ongoing Doyle Drive and Main Post update projects are discussed above and are not repeated here. Baker Beach BB2 site is near the Baker Beach BB1A site that will be remediated in 2012. It is estimated that about 4,000 cy of fill material would be hauled from the BB2 site (MACTEC, 2011a). This is similar in volume to the BB1A work. This second Baker Beach project would use the same travel routes as the prior year's BB1A project. For purposes of understanding cumulative impacts, the two projects are very similar, with one occurring in 2012 and the other in 2013.

ENVIRONMENTAL IMPACT ANALYSIS:

## 1. Aesthetics

*Project activities likely to create an impact:*

- Night lighting for road work,
- Vegetation clearing
- Presence of equipment and materials on site
- Temporary storage of sediment during dewatering
- Potentially night dewatering operations.

*Description of Environmental Setting:*

The Project area shares its western boundary with Park Presidio Blvd (Highway 1) and its southern boundary with the City and County of San Francisco's Mountain Lake Park. To the north and east is the Presidio Golf Course, located within the Presidio. A fence marks the western edge of the golf course, approximately 120 to 160 feet from the lake. The residential areas near the lake are to the south and southeast of Mountain Lake Park, on 9th, 10th, 11th, and 12th Avenues and Fulton and Lake Streets; and to the west-northwest on Wyman Ave in the Presidio. The distance from the lake shore to residential buildings varies from approximately 600 feet at 9th Ave to approximately 200 feet at 12th Ave and Fulton St. The distance from Highway 1 to Wyman Ave is approximately 200 feet. If West Pacific Ave is used (Alternative Access), the route would pass residences located south of the Presidio boundary wall along West Pacific Ave. The nearest residences to West Pacific Ave are found between Arguello Blvd and 7th Ave. For about 1,000 feet, from Arguello Blvd to approximately 5th Ave, the West Pacific Ave route is paved and open to vehicles. For remainder of the route to the lake, a distance of 1,600 feet, the wide right of way is crushed rock with a paved path along the golf course side. Two trails pass through the area. From the south, Juan Bautista De Anza National Historic Trail (De Anza Trail) enters Mountain Lake Park at Fulton St and passes along the south side of the lake, approximately along the boundary between the City park and the Presidio. The trail then turns north-northwest on a paved roadbed, passing approximately 100 feet from the northeast shore of the lake. The De Anza Trail continues north on the roadbed before crossing under Park Presidio Blvd and continuing north. From the east, Mountain Lake Trail is co-located with West Pacific Ave. At the lake, the Mountain Lake Trail joins the De Anza Trail, and is co-located with the DeAnza trail past the lake and under Park Presidio Blvd. If Park Blvd is used, the route would pass under Park Presidio Blvd (Hwy 1) and proceed north on the extension of Park Blvd that crosses the western part of the golf course en route to Washington Blvd. Refer to Pages 3 - 14.

**Analysis as to whether project activities would:**
**a. Have a substantial adverse effect on a scenic vista**.

Less than significant. As a result of implementing the proposed highway work and remediation at Mountain Lake, temporary visual changes would occur. Temporary changes are associated with roadbed stabilization, dredging, dewatering, and trucking of sediment and include the presence of equipment used in the roadwork, dredging and sediment handling, trucks transporting material offsite, site fencing, and worker activity. Removal of vegetation for site access and clearing of the staging area would also temporarily change the landscape. The scope of the construction activities during 2012 would be limited primarily to Highway 1 work by Caltrans and ramp and site preparation work by the Trust. In 2013, activities would be limited to dredging in the lake and dewatering at a site in a wooded area north of the lake. Trucks would haul sediment from the site by way of an access ramp directly to Highway 1. If the ramp is not available, the haul route would be by way of West Pacific Ave to Arguello Blvd and through the Presidio or by way of Park Blvd to Washington Ave and through the Presidio. The impacts would be short-term, lasting about 18 weeks in 2012 and about 28 weeks in 2012. Owing to its topographic location relative to surrounding land and the presence of surrounding vegetation and nearby buildings, the overall site is not visible from a great distance. The lake and highway are visible from some residences to the south, but the view is moderated by trees in Mountain Lake Park. The lake also is visible from a few vantage points on the golf course, which sits at a higher elevation. Here the view also is moderated by trees and vegetation. Vegetation removed for preparation of the staging area for dewatering would open up this area to being viewed from various locations on and off the Presidio. Site areas impacted by the vegetation removals and site operations would be restored, which would include replanting consistent with the existing Vegetation Management Plan (VMP). The vegetation would take a number of years to mature, but this impact was considered in the Environmental Assessment of the VMP. Given the short duration of the work, the surrounding conditions, and post-remediation site restoration, the Project would not have an adverse effect on a scenic vista.

Changes attributable to the remediation would result in a visual environment not noticeably different from existing conditions. The stone columns stabilizing the highway and the runoff controls would be below ground. The sediment is

not visible in the lake. Following remediation, shrubs and trees would be restored consistent with the Mountain Lake Enhancement Plan, VMP and specific site plans, but would take a number of years to reach a mature size. The visual effects of construction and site restoration would be temporary, and the visual qualities of the site would be enhanced in the long term; therefore, impacts to any scenic vistas would be less than significant.

**b. Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings and historic Buildings within a state scenic highway.**

Less than significant. The Project is not near a designated state scenic highway. (While some portions of Highway 1 south of San Francisco are designated as scenic; Highway 1 in San Francisco is eligible but is not officially designated as a California Scenic Highway). Because the proposed actions are expected to retain or improve existing visual qualities, and would not have a lasting visual effect, there would be a less than significant impact on scenic resources. Installation of the pipe on the West Pacific Ave Bridge would be encapsulated in a soffit that would blend in with the existing structure. Views of the pipe would be minimal and limited primarily to people on the trail. Refer to 1.a.

**c. Substantially degrade the existing visual character or quality of the site and its surroundings.**

Less than significant. There would be short-term impacts that would degrade the existing visual character or quality of the site and its immediate surroundings due to vegetation removals, construction activities, and the presence of needed equipment, fencing, and safety devices. These impacts would not be substantial because they are temporary in nature and limited in geographic extent. Subsequent to remediation, restoration activities to be undertaken in the area disturbed by the Project and would be consistent with the VMP. This would improve the visual character and quality of the site and its surroundings. Impacts on the visual character and quality of the site would be less than significant.

**d. Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area**.

Less than significant. Work required to stabilize Highway 1 would occur primarily at night so as to minimize daytime traffic disruption. This work would require the use of temporary mobile lighting to illuminate the work area. The lighting would be down-focused on the work area. As part of traffic control and safety, an electric arrow panel would be used to direct motorists to merge left. The lighting would be visible to motorists on Highway 1 and to residences with windows facing the lake. The lighting would be temporary and would be removed upon completion of the stabilization work, which is expected to take approximately 18 weeks. Because of the somewhat higher elevation of the residences, the distance of the residences from the work site, and the relatively few residences affected, and the presence of existing street lighting, the effect of the night lighting would be less than significant.

If access ramps are permitted by Caltrans between the site and Park Presidio Blvd, they may be limited to nighttime use if they require a lane closure. In this case, temporary lighting similar to that required for the Caltrans highway stabilization work would be used. To the extent feasible, consistent with operating and safety needs, the lights would be directed away from residential areas and toward the immediate work area. Other remediation activities would be performed during daylight hours, as would the hauling if the ramps are not constructed. Glare may be visible during daytime as a reflection from glass and metal surfaces on vehicles and equipment. However, the remediation construction period would be temporary. Because construction vehicles would be constantly moving, any glare that might occur from vehicles would be transitory for viewers. It is possible that night hauling of sediment would occur if the access ramp to Highway 1 were available. This would require lighting of the temporary stockpile area in the staging area. However, the dewatering site is in a wooded area that is 1000 feet from the nearest residences, and there is additional vegetation between the wooded site and the residences. Depending on the rate of production of sediment/water slurry from dredging, it may be feasible and desirable to have mechanical (belt press) dewatering occur at night as well as in the day. If this is the case, lighting would be required for safety and would consist of either portable trailer pole-mounted lights or lights installed at the site and hooked into the electrical system. The lights would be down-focused and aimed away from residences, consistent with safe operating requirements. Based on this and the distances between residences and the dewatering site, night lighting would not create a significant impact. As a result of the duration and limited nature of the effects, the remediation would not produce permanent new sources of light or glare that would adversely affect day or nighttime views, resulting in a less-than-significant impact.

*Specific References:*

Kennedy/Jenks, 2012b. *Draft Feasibility Study/Remedial Action Plan, Mountain Lake, Presidio of San Francisco, California*. March.

NPS and Trust, 2003. *Presidio Trails and Bikeways Master Plan and Environmental Assessment*. July.

Trust, 2002a. *Presidio Trust Management Plan: Land Use Policies for Area B of the Presidio of San Francisco*. May.

Trust, 2002b. *Presidio Trust Management Plan: Final Environmental Impact Statement*. May.

Trust and NPS, 2001. *Vegetation Management Plan and Environmental Assessment for the Presidio of San Francisco.* December.

Trust, NPS and Golden Gate National Parks Association (GGNPA), 2000. *Mountain Lake Enhancement Plan and Environmental Assessment.* October.

*Findings of Significance:*

☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

## 2. Agricultural and Forest Resources

*Project activities likely to create an impact:*

None. There are no farmlands or areas zoned as forest land or timber land within the Presidio. The Presidio is zoned for recreational use,. Therefore, no impact on agricultural resources would occur. For this reason, no further analysis of impacts to this resource category is necessary.

*Description of Environmental Setting:*
**Analysis as to whether or not project activities would:**
**a. Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland) as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use.**

**b. Conflict with existing zoning or agriculture use, or Williamson Act contract.**

**c. Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?**

**d. Result in the loss of forest land or conversion of forest land to non-forest use?**

**e. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use.**

*Specific References:*

Kennedy/Jenks, 2012b. *Draft Feasibility Study/Remedial Action Plan, Mountain Lake, Presidio of San Francisco, California*. March.

Trust, 2002a. *Presidio Trust Management Plan: Land Use Policies for Area B of the Presidio of San Francisco*. May.

Trust, 2002b. *Presidio Trust Management Plan: Final Environmental Impact Statement*. May.

Trust and NPS, 2001. *Vegetation Management Plan and Environmental Assessment for the Presidio of San Francisco.* December.

Trust, NPS and Golden Gate National Parks Association (GGNPA)], 2000. *Mountain Lake Enhancement Plan and Environmental Assessment.* October.

*Findings of Significance:*

☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☐ No Impact

## 3. Air Quality

*Project activities likely to create an impact:*

- Emissions from use of heavy equipment, trucks, and other vehicles for roadbed stabilization, dredging, dewatering, and transportation.

*Description of Environmental Setting:*

The Presidio is located within the San Francisco Bay Area air basin, which is under the jurisdiction of the Bay Area Air Quality Management District (BAAQMD). The nine-county air basin is a nonattainment area for the State ambient air quality standards for ozone and inhalable particulate matter 10 microns or less in diameter (PM10) and less than 2.5 microns in diameter (PM2.5). Additionally, the air basin is a nonattainment area for the federal ambient air quality standards for ozone and PM2.5. Air circulation in the vicinity of the site is excellent, as it is located in close proximity to air flow from San Francisco Bay and the Pacific Ocean. Refer to Pages 3 to 14.

The State CEQA Guidelines allow lead agencies, in making determinations of significance for air quality impacts, to rely on criteria recommended by the local air district. Table 3-1 shows each of the ambient air quality standards and the attainment designation of the BAAQMD with respect to each standard.

**Table 3-1. National and California Ambient Air Quality Standards**

| Pollutant | Averaging Time | California Standards | State-Level Attainment Status | National Standards | Federal Attainment Status |
|---|---|---|---|---|---|
| Ozone | 1-hour | 0.09 ppm | Nonattainment | — | |
| | 8-hour | 0.070 ppm | Nonattainment | 0.075 ppm | Nonattainment |
| Respirable Particulate Matter (PM10) | 24-hour | 50 µg/m$^3$ | Nonattainment | 150 µg/m$^3$ | Unclassified |
| | Annual Mean | 20 µg/m$^3$ | Nonattainment | — | |
| Fine Particulate Matter (PM2.5) | 24-hour | — | | 35 µg/m$^3$ | Nonattainment |
| | Annual Mean | 12 µg/m$^3$ | Nonattainment | 15 µg/m$^3$ | Attainment |
| Carbon Monoxide (CO) | 1-hour | 20 ppm | Attainment | 35 ppm | Attainment |
| | 8-hour | 9.0 ppm | Attainment | 9.0 ppm | Attainment |
| Nitrogen Dioxide (NO2) | 1-hour | 0.18 ppm | Attainment | 0.100 ppm | Unclassified |
| | Annual Mean | 0.030 ppm | Attainment | 0.053 ppm | Attainment |
| Sulfur Dioxide (SO2) | 1-hour | 0.25 ppm | Attainment | 0.075 ppm | Attainment |
| | 24-hour | 0.04 ppm | Attainment | 0.14 ppm | Attainment |
| | Annual Mean | — | | 0.03 ppm | Attainment |
| Lead | 30-day Average | 1.5 µg/m$^3$ | Unclassified | — | |
| | Calendar Quarter | — | | 1.5 µg/m$^3$ | Attainment |

Notes: ppm=parts per million; µg/m3= micrograms per cubic meter; "—" =no standard
Source: BAAQMD, 2012; http://hank.baaqmd.gov/pln/air_quality/ambient_air_quality.htm.

The BAAQMD has established standard measures to reduce impacts to air quality resulting from construction activities (BAAQMD, 2011). For PM10 and PM2.5 related to construction fugitive dust, BAAQMD specifies that projects include best management practices rather than achieve specific emissions thresholds. The BAAQMD thresholds for criteria air pollutant emissions specify that a project during construction may cause a significant impact if it would:

- Emit more than 54 pounds per day (lb/day) of reactive organic gases (ROG);
- Emit more than 54 lb/day of nitrogen oxides (NOx);
- Emit more than 82 lb/day of PM10 from exhaust; or
- Emit more than 52 lb/day of PM2.5 from exhaust.

The BAAQMD thresholds for community risk and hazards specify that a project may cause a significant impact if the emissions create:

- Increased incremental cancer risk greater than 10.0 in a million;
- Increased non-cancer hazard greater than 1.0 Hazard Index for chronic or acute hazards;

- Incremental increase of annual average PM2.5 concentration greater than 0.3 µg/m$^3$ from a single source.

The City's Mountain Lake Park is adjacent to the south side of the Project site. The Presidio Golf Course fence is 120 to 160 feet east and northeast of the Project site, with the nearest green approximately 300 feet from the lake. Residential apartments and houses are located on 5th through 12th Avenues, and Fulton Ave, which terminate at the Presidio boundary, and on Lake St, which parallels the boundary. Within the Presidio, residential houses are located on Wyman Ave, within approximately 250 feet west of Highway 1. Highway 1 forms the western boundary of the site. The distance between the southern part of the highway work and the nearest residential units is approximately 300 feet, at the end of Fulton St. If temporary ramps are used, residences south of Mountain Lake Park would be approximately 1,500 feet away from trucks entering and exiting the site; residents on Wyman Ave would be approximately 450 feet away, but would be separated by heavily travelled Park Presidio Blvd (Highway 1). If West Pacific Ave is used for site access (Alternative Access option), trucks hauling sediment on West Pacific Ave would pass within approximately 20 to 30 feet of residences located south of the Presidio's southern boundary wall. These residences are located at the termini of 5th, 6th, and 7th Avenues and on the north side of the Presidio Terrace circle. If the Park Blvd route is used, trucks would pass residences on Washington Blvd either to the west (en route to Lincoln Blvd) or to the east (en route to Arguello Blvd). The closest children's educational or care facility to the remediation site is the Lone Mountain Children's Center, located on the Presidio approximately 600 feet northwest of the lake. The Center is separated from the Project site by heavy traffic on Park Presidio Blvd (Highway 1), dense vegetation on the west side of Highway 1, and buildings in the Public Health Services Hospital district. The only other sensitive receptor within 0.25 mile of the lake is the SF Free Clinic. Two schools, Sutro Elementary School, and St. James Preschool are just over 0.25 mile from the site.

Sensitive facilities within 0.5 mile of the Project Site (lake) are listed below. Sediment dewatering and stockpiling site is about 1,000 feet farther from these facilities.

| | | |
|---|---|---|
| Lone Mountain Children's Center | 0.11 mi | 1806 Belles St (on Presidio) |
| San Francisco Free Clinic | 0.21 mi | 4900 California St |
| Sutro Elementary School | 0.26 mi | 235 12th Ave |
| St James Preschool | 0.26 mi | 4620 California |
| Presidio Preschool | 0.37 mi | 143 Clement St |
| St. Anne's Home (elder's residence) | 0.38 mi | 300 Lake St |
| George Peabody Elementary School | 0.39 mi | 251 6th Ave |
| Laurel School | 0.42 mi | 350 9th Ave |
| Purple Canyon Art Studio | 0.46 mi | 301 Cornwall St |
| Star of the Sea School | 0.48 mi | 360 9th Ave |

**Analysis as to whether or not project activities would:**
**a. Conflict with or obstruct implementation of the applicable air quality plan.**

Less than significant. The planned highway construction and remedial actions would not conflict with applicable air quality plans or regulations. Highway stabilization activity would involve use of a crane, vibratory probe, and other equipment including generators, lights, loaders, and approximately 8 trucks daily to bring aggregate and remove spoils, over 90 active working days during an 18 week period. Remediation activity would result in use of the dredging and pumping equipment, along with approximately 25 heavy-duty truck round trips per day for removal of dewatered sediment. Measures to address potential air emissions and control dust and odors would be incorporated into the designs, consistent with BAAQMD standards and requirements. Dust control measures would be implemented wherever the soil or sediment is exposed (e.g., exposed surfaces watered two times per day). Best Available Control Technologies (BACTs) would be adopted to maintain the site and operate equipment in a manner that would minimize air emissions. Typical BACTs would include measures such as keeping equipment tuned and in good working order, limiting idling times to 5 minutes or less, using equipment that has lower emissions (e.g., electric-powered dredging motor, other off-road diesel equipment certified to achieve Tier 3 standards), providing gravel access ramps to paved roads, and not operating equipment at times that would exacerbate wind erosion (e.g., avoiding handling of dewatered materials when average wind speeds exceed 20 mph). Over the course of activity, the average daily emissions (see Appendix D) caused by the construction and remediation would be a fraction of thresholds recommended by BAAQMD for construction-phase emissions (BAAQMD, 2011). Table 3-2 summarizes the average daily emissions over the duration of the construction activity and the applicable BAAQMD thresholds. Due to the limited nature of the activities and the implementation of control measures into the construction and remediation design, this impact would be less than significant.

**Table 3-2. Construction-Related Emissions of Criteria Air Pollutants (lb/day)**

| | NOx | PM10 | PM2.5 | CO | ROG | SOx |
|---|---|---|---|---|---|---|
| Off-Road Equipment | 18.22 | 1.30 | 1.19 | 13.27 | 3.66 | 0.02 |
| On-Road Crew and Workers | 5.85 | 0.25 | 0.20 | 8.73 | 1.11 | 0.01 |
| On-Road Diesel Trucks | 25.07 | 1.21 | 1.05 | 8.28 | 2.05 | 0.03 |
| Fugitive Dust | --- | 96.58 | 21.95 | --- | --- | --- |
| Total Exhaust Only | 49.14 | 2.76 | 2.44 | 30.27 | 6.82 | 0.07 |
| BAAQMD Significance Threshold | 54 | 82 | 54 | None | 54 | None |

Notes: Thresholds for PM10 and PM2.5 apply to construction exhaust only, excluding fugitive dust.
Source: BAAQMD, 2012; also see detailed calculations in Appendix D.

**b. Violate any air quality standard or contribute substantially to an existing or projected air quality violation.**

Less than significant. During the highway construction and remedial actions, dust (particulate matter) may become airborne from disturbed soil near the highway or lake and from vehicles transporting materials. However, only a small area would be disturbed by equipment. Trucks transporting sediment would travel on a ramp to Highway 1, or on West Pacific Ave or Park Blvd/Washington Blvd through the Presidio. Except for the staging area (dewatering site) vicinity, the route is paved in crushed rock, concrete, or asphalt. BACTs would be used to reduce dust emissions, including watering all exposed surfaces as required, covering materials during transport, and minimizing construction equipment usage at all times, including shutting off idle equipment, as appropriate. Construction equipment would be maintained and operated in a manner to minimize particulate emissions consistent with BACTs. The BAAQMD reports that these types of management practices are effective at reducing dust emissions to levels that would not be expected to violate or contribute substantially to an air quality violation, and the resulting impact would be less than significant.

Mountain Lake overlies the Colma formation, which is primarily composed of sand and silty sand with some clay. The Franciscan Formation bedrock containing serpentine underlies the Colma Formation. However, data and boring logs from samples of accumulated sediment in the Lake indicate contributions from serpentinite and other Presidio native formations. Also, the Lake was filled in 1939 with cuttings and materials during construction of Park Presidio Blvd and the associated MacArthur Tunnel. Therefore, sediment in the Lake appears to contain imported materials from nearby areas in the Presidio. The top layer of the imported fill would be removed from the lake. Because the sediment likely contains some serpentine, some asbestos may be encountered in the sediment. Even when dewatered, the sediment cake would retain moisture. No friable asbestos is expected to become airborne from the minor amount of serpentinite that may be present in the sediment. Dust would also be controlled by watering any spoils extracted from the shafts created by the vibratory equipment, if needed. With these measures, it is anticipated that the Project would not violate air quality standards.

**c. Result in cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors).**

Less than significant. Roadbed stabilization, dredging, dewatering, and trucking of sediment would result in emissions from heavy equipment, trucks, and other vehicles for the duration of activities at the site. Highway work would require delivery of 5,900 cy of aggregate; however, delivery would be at a rate of 8 trucks per night. The crane supporting the vibratory probe and a front loader to move aggregate to the shafts would also create emissions. This highway work would not overlap with the remediation work. The lake remediation would require removal and off-site transport of approximately 9,850 cy of dewatered solids from the site. Equipment used to dredge the sediment from the lake bottom and deposit it at the dewatering site would complete this phase of the work prior to the hauling phase. However, dredging and some hauling may occur simultaneously, depending on the rate of dewatering. Hauling the dewatered sediment offsite would require approximately 25 truck round trips per 10-hour day, extending over a 4 to 8 week period. The number of personal worker vehicles is expected to result in a negligible increase to the remediation traffic totals. This level of on-road traffic activity is nominal when compared to traffic on the adjacent Highway 1 through the Presidio and on nearby roadways.

Pre-remediation construction on Highway 1 (stabilization and drainage) and on the Presidio (access ramps and vegetation removal) is scheduled for 2012. Remediation at Mountain Lake itself is scheduled for 2013. During both periods, other unrelated construction projects would also occur in the area. There are five known projects of substantial size that would occur during the 2012 that could overlap with the highway work. These are the Doyle Drive replacement project on the north side of the Presidio, the Presidio's Main Post upgrade project approximately 4,500 feet northeast of the remediation Project, remediation work at Baker Beach, remediation work at the CHP Range, and remediation work at Bernard Avenue Protected Range in the Main Post. These are shown in Figure 9.

- According to the Doyle Drive project Final Environmental Impact Statement/Environmental Impact Report (EIS/EIR) (FHWA & SFCTA, 2008), vehicles involved in Doyle Drive construction will include trucks hauling debris and delivering construction materials and supplies, commuter vehicles driven by construction workers, and vehicles used for construction such as graders and heavy earthmoving and paving equipment. Travel volumes would vary depending on the specific construction activity and scheduling.
- The Main Post upgrade project includes reconstruction of existing buildings, structural improvements and other seismic work, roadway and utility upgrades, and other infrastructure enhancements. The Final Supplemental EIS for the Main Post Update indicates that construction vehicle traffic will vary depending on the specific construction activity and schedule (Trust, 2010). Construction vehicles for the Main Post will generally enter the Presidio via Richardson Ave, Doyle Drive, or the Golden Gate bridge toll plaza (Trust, 2010).
- Baker Beach site BB1A work would occur in approximately the same period as the Caltrans work on Highway 1 adjacent to Mountain Lake. The Baker Beach site is approximately 7,000 feet north-northwest of Mountain Lake and only 400 feet south of the Golden Gate Bridge toll plaza. An estimated 3,800 cubic yards of fill would be removed from the site (MACTEC, 2011b). Access to the Baker Beach site is off Lincoln Blvd. Trucks would likely reach Highway 101 at the Golden Gate Bridge by way of Lincoln Blvd and Merchant Rd. Once on Highway 101, the Baker Beach trucks potentially would use similar off-Presidio routes as the Caltrans trucks if they are on Highway 101.
- The CHP Range work would occur in approximately the same period as the Caltrans work on Highway 1 adjacent to Mountain Lake. The CHP site is approximately 8,000 feet north-northwest of Mountain Lake and only 700 feet northwest of the Golden Gate Bridge toll plaza. An estimated 600 cy of fill would be removed from the site. Access to the CHP Range site is off Lincoln Blvd. Trucks would reach Highway 101 at the Golden Gate Bridge by way of Lincoln Blvd and Merchant Rd. Once on Highway 101, the CHP Range trucks potentially would use similar off-Presidio routes as the Caltrans trucks if they are on Highway 101 (EKI, 2009).
- The Bernard Avenue Protected Range (BAPR) site is south of Presidio Blvd, between Barnard Ave and Quarry Rd, south of Fernandez St. The range now is largely covered by Landfill E, which is a remediated site. However, a portion of BAPR is not covered by the landfill. It is estimated that 2,500 cu yds of material will be hauled from the site during remediation (Geosyntec, 2012). The likely haul route would be via Presidio Blvd to Lombard Gate and onto US 101 (Lombard St).

Mountain Lake remediation would occur in 2013 and would result in emissions from equipment and vehicles (see description in Section 3a). There are three known construction projects on or near the Presidio that would or may overlap with the Mountain Lake remediation in 2013. These are the ongoing 5-year Doyle Drive replacement project and the Presidio's Main Post update, discussed above for 2012, and another remediation project above Baker Beach (RAP 5C BB2). Their locations are shown in Figure 9.

The ongoing Doyle Drive and Main Post update projects are discussed above and are not repeated here. Baker Beach BB2 site is near the Baker Beach BB1A site that will be remediated in 2012. It is estimated that about 4,000 cy of fill material would be hauled from the BB2 site (MACTEC, 2011a). This is similar in volume to the BB1A work. This second Baker Beach project would likely use the same travel routes as the prior year's BB1A project. For purposes of understanding cumulative impacts, the two projects are very similar, with one occurring in 2012 and the other in 2013.

Measures to address emissions and control dust and odors would be incorporated into the remedial designs as BACTs. The Trust will coordinate with Caltrans and the local transportation agency to ensure compliance with state and local transportation requirements or ordinances. Based on these factors, the Project activities would not result in cumulatively considerable net increase of any criteria pollutant for which the region is non-attainment under an applicable federal or state ambient air quality standard (including emissions that exceed quantitative thresholds for ozone precursors).

**d. Expose sensitive receptors to substantial pollutant concentrations.**

Less than significant. Sensitive receptors, including residences and other sensitive facilities, are present, near, or in the general vicinity of the work site. The construction and remediation activities of the Project would occur adjacent to Highway 1, which is a source of traffic-related air pollutants. The dust control measures identified in item 3b above would be employed to control particulate dust. Dredged material would be wet and is not expected to emit any hazardous gas. Even when dewatered and loaded for offsite transport and disposal, the material would remain damp and cohesive. In addition, air quality monitoring would be performed at the site for dust. Dust-generating activities would be halted if particulate concentrations exceed action levels identified in the Health and Safety Plan (HSP) developed prior to construction. Due to the temporary nature of impacts and the implementation of air quality BACTs, Project activities are not anticipated to expose sensitive receptors to substantial pollutant concentrations that could lead to incremental cancer risk, non-cancer hazards, or concentrations of PM2.5 exceeding the BAAQMD thresholds.

**e. Create objectionable odors affecting a substantial number of people.**

Less than significant. The Project activities including dewatering the sediment may produce objectionable odors. The sediment is rich in organic matter, which is a typical usual source of odor. However, the dewatering site is nearly 1,000 feet from the nearest residence (on Wyman Ave) and is separated from the residences by Highway 1. The residents south of the site are over 1,300 feet from the dewatering site. If necessary, treatments could be applied to exposed wet sediment to reduce objectionable odors. These products would be subject to Trust approval. The contractor would be required to prepare an Odor and Dust Control Plan and comply with BAAQMD Best Management Practices (BMPs). Diesel vapors created by equipment onsite would be minimal and would not affect sensitive receptors due to the temporary nature of construction, the limited work area, and the limited number of daily truck trips necessary to transport equipment and materials including rock or dewatered sediment. All diesel equipment would use ultra-low sulfur diesel fuel as it is mandatory in California. Impacts related to odors would be less than significant. Because of the distance of residents to the dewatering site and Project controls to reduce odors, this impact would be less than significant.

**f. Result in human exposure to Naturally Occurring Asbestos.**

Less than significant. Mountain Lake overlies the Colma formation, which is primarily composed of sand and silty sand with some clay. The Franciscan Formation bedrock containing serpentine underlies the Colma Formation. However, data and boring logs from samples of accumulated sediment in the Lake indicate contributions from serpentinite and other Presidio native formations. Also, the Lake was filled in 1939 with cuttings and materials during construction of Park Presidio Blvd and the associated MacArthur Tunnel. Therefore, sediment in the Lake appears to contain imported materials from nearby areas in the Presidio. The top layer of imported fill would be removed from the lake. Also, the Franciscan Formation bedrock may be encountered during the roadway stabilization portion of the Project and could be generated in spoils from the Project. Because the sediment and any spoils likely contain some serpentine, some asbestos may be encountered in the material. Even when dewatered, the sediment cake would retain moisture. Likewise, any spoil related to the stabilization work will be wet. Therefore, no friable asbestos is expected to become airborne from the minor amount of serpentinite that may be present in the sediment. With these Project controls, significant human exposure to naturally occurring asbestos is not anticipated.

*Specific References*:

Bay Area Air Quality Management District (BAAQMD), 2011. *California Environmental Quality Act, Air Quality Guidelines*. May.

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EKI, 2009. *Final Remedial Action Plan for Landfills 8 and 10, PHSH Fill Site, and Four Small Arms Firing Ranges, Presidio of San Francisco, California*. February.

Federal Highway Administration (FHWA) and San Francisco County Transportation Authority (SFCTA), 2008. Final Environmental Impact Statement/Report and Section 4(f) Evaluation, South Access to the Golden Gate Bridge: Doyle Drive. September.

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Trust, 2002a. *Presidio Trust Management Plan: Land Use Policies for Area B of the Presidio of San Francisco*. May.

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Trust, 2007. *Tennessee Hollow Upper Watershed Revitalization Project Environmental Assessment*. August.

Trust, 2010. *Final Supplemental Environmental Impact Statement, Presidio Trust Management Plan, Main Post Update*. November.

*Findings of Significance:*

☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

## 4. Biological Resources

*Project activities likely to create an impact:*

- Operation of equipment
- Dredging
- Transportation of dredged materials.

*Description of Environmental Setting:*

Mountain Lake and the surrounding area contain a mosaic of native and exotic plant and animal species. Within the lake, the only vertebrate species are non-native fish such as carp and spotted bass. Non-native bullfrogs and turtles predominate in the lake. Some native benthic invertebrates inhabit the lake.

Upland areas around the lake include remnant native wetland and riparian woodland. Native bird species frequent the upland habitats. These native habitats at Mountain Lake have been severely impacted by the spread of weeds and trees and weeds. The Mountain Lake Enhancement Plan, prepared in 2000, proposed the following enhancement work: remove the top few feet of nutrient-laden sediment from the Lake; deepen the Lake to prevent the rapid invasion of emergent vegetation and increase oxygen content; and increase the water volume to dilute nutrients and better regulate the temperature of the Lake. The Enhancement Plan also proposed habitat enhancement work, including removal of invasive exotic species, revegetation with appropriate native species, and public access improvements, such as trail development and the installation of benches. Some of the habitat enhancement and public access improvement work envisioned under the Enhancement Plan has been completed. Over 100 non-native trees have been removed in the lake area and over 11,500 native plants have been planted, generally along the eastern shore of the lake.

The Project area contains three vegetation management zones as specified in the Presidio VMP (Trust and NPS, 2001). The entire perimeter of the lake, including areas east of Highway 1 and west of the Mountain Lake trail, is a Native Plant Communities Zone. The northern part of the north arm of the Lake and the southern half of the dewatering site is a Historic Forest Management Zone. The northern half of the dewatering site is a Landscape Vegetation Management Zone.

Consistent with the VMP, some vegetation between Highway 1 and the lake and around portions of the lake was cleared during site investigations between November 2011 and January 2012 in advance of the road stabilization and sediment remediation work. Brush vegetation was cleared within a 15-foot wide corridor along the east side of Park Presidio Blvd. Vegetation and trees were cleared in the proposed dewatering site. Some clearing also was conducted in the northern arm of the Lake. Plants removed were primarily non-native species. No vegetation was removed from areas planted under the Enhancement Plan. The majority of vegetation on the site was unaffected, including the plantings on the east side of the lake, on both sides of Mountain Lake trail.

The potentially disturbed area for the Project includes the highway shoulder where stabilization would occur, the Lake bottom from which sediment would be dredged, the upland staging area adjacent to the Lake, and the upslope staging and dewatering area. Where feasible, the planted areas would be avoided and fenced to protect them. Dredging would temporarily disturb contaminant-laden sediment resting on the lake bottom, temporarily reintroducing some sediment into the water column.

Based on wildlife inventories, three species of bats have been documented in the Mountain Lake vicinity. All are identified as a “species of concern” by the U.S. Fish and Wildlife Service (USFWS) or CDFG. These are Yuma myotis, California myotis, and western red bat. Bats typically forage for insects near water bodies, but roost in treed areas. Based on past experience in the Presidio with tree removal, bats are expected to relocate to new roosts in the vicinity, if their roost tree is removed (Thomas, 2012a). Given this, it is unlikely that vegetation affected by the dredging would affect any roosting habitat for bats.

Table 4-1 lists special-status species protected under the Federal or California Endangered Species Act that have been recorded as casual visitors to the Presidio and vicinity, or have been identified at various locations at the Presidio. The table also shows whether the species have been documented at Mountain Lake in wildlife inventories.

**Table 4-1: Special-Status Species Known to Occur at the Presidio**

| Species | Status | Documented at Mountain Lake in Inventories |
|---|---|---|
| Marbled murrulet (bird) | FT, CE | No |
| Snowy plover (bird) | FT | No |
| Bald eagle (bird) | CE | No |
| Willow flycatcher (bird) | CE | Casual visitor in summer and fall |
| Raven's Manzanita (plant) | FE, CE | No |
| Presidio clarkia (plant) | FE, CE | No |
| Marin dwarf flax (plant) | FT, CT | No |
| San Francisco Lessingia (plant) | FE, CE | No |

FE – Federally endangered; FT – Federally threatened; CE – California endangered; CT – California threatened
Sources:
Species list: Mountain Lake RAP ARARs (Table 5-1 of the Draft FS/RAP)
Wildlife Inventories: Trust, NPS, and GGNPA, 2000; Pollak, 2010; Thomas, 2012b; California Natural Diversity Database (CNDDB) search (DTSC, 2011)

There are no known federally or state listed species that reside or nest at Mountain Lake. The California endangered willow flycatcher is a summer and fall migrant that may use the Mountain Lake area on a seasonal basis. Willow habitat at the edge of the lake is used for summer roosting. Removal of vegetation for the Project outside of bird nesting season would occur prior to the presence of flycatchers. The song sparrow and common yellowthroat, both California "species of concern," have been documented in inventories of Mountain Lake. Other birds that use the general Mountain Lake area (such as Anna's and Allen's hummingbirds) are on the Partner in Flight watch list. This is not a listing by any state or federal agency, but is maintained by a consortium of research groups (such as Point Reyes Bird Observatory Conservation Science) to indicate a species that may be losing habitat or experiencing a decline in numbers.

Although Mountain Lake once supported the endangered California red-legged frog, habitat alteration and predation by introduced bullfrogs is thought to have eliminated this species from the lake area. The Trust will coordinate with the CDFG, as applicable, to ensure state requirements are met.

Many bird species in the Presidio are protected under the Migratory Bird Treaty Act. It is possible that ground or tree nesting birds protected under the Migratory Bird Treaty Act could occur in the perimeter vegetation during nesting season (January 1st - July 31st for raptors and hummingbirds; March 1st - July 31st for songbirds).

Wetlands have been mapped around the perimeter of Mountain Lake (Buisson and Castellini, 2000; NPS and URS, 2003). Potential U.S. Army Corps of Engineers (USACE) jurisdictional wetlands cover 2.10 acres around the perimeter of the lake. At total of 3.13 acres around the perimeter of the Lake contains wetland habitat as defined by the U.S. Fish and Wildlife Service. Mountain Lake was identified as "waters of the U.S." in the Presidio Wetlands Report; however, although the site was once hydraulically connected to Lobos Creek, it is now an isolated water of the U.S. (NPS and URS, 2003). Refer to Page 10, *Site Preparation, Clearing, and Grubbing*

**Analysis as to whether project activities would:**

**a. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service.**

Less than significant. No threatened or endangered species protected under the U.S. Endangered Species Act or California Endangered Species Act reside at Mountain Lake (Pollak, 2010; Thomas, 2012b). The willow flycatcher, a state-endangered species roosts in willow habitat at the edge of the lake during summer months. Removal of vegetation outside of bird nesting season would occur prior to the presence of flycatchers. Removal of vegetation outside of bird nesting season is also unlikely to affect other sensitive bird species as the species would relocate to other nearby habitat for the project duration.

Three species of bats have been documented in the Mountain Lake vicinity. All are identified as a "species of concern" by USFWS or CDFG. These are Yuma myotis, California myotis, and western red bat. Bats typically forage for insects near water bodies, but roost in treed areas. As noted, past experience with tree removal in the Presidio suggests that bats relocate to new roosting trees in the vicinity. Given this, it is unlikely that vegetation removed for the remediation would have a significant impact on bats.

Some vegetation was removed from the site in late 2011-early 2012 to complete site investigation work, in compliance with the Presidio VMP and the Migratory Bird Treaty Act. Additional vegetation removal would be required for the Project to clear work areas and access routes. Approximately 50 to 100 trees would be removed from the staging and upland areas to clear work areas. Vegetation removals would be coordinated with natural resource staff to avoid potential disruption to nesting or migrating birds. Specifically, efforts would be made to schedule vegetation removal outside of bird nesting seasons (January 1st - July 31st for raptors and hummingbirds; March 1 - July 31st for songbirds). However, vegetation removal may occur during bird nesting season provided a nesting survey indicates no disruption to nesting birds (including ground nesting birds) and approval is obtained from Trust natural resource staff. Nest surveys are not 100% accurate, therefore activities requiring nest surveys during nesting season would be avoided whenever practicable.

Although no special status species are known to nest at the Mountain Lake site, it is possible that ground-nesting birds could occur during nesting season. If nesting birds are found near the Project site, a Trust natural resource specialist would be notified. If required, the specialist may require protection measures to be implemented, such as setting up a buffer zone around the nest and installation of fencing or other barriers. Because there are no listed species residing or nesting at the site and the site would be restored consistent with the VMP, proposed Project activities would not have a substantial direct or indirect adverse effect on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the CDFG or USFWS.

**b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service.**

Less than significant. As described above in Section 4a, some site vegetation has been removed. Additional vegetation would be removed to clear work and site access areas. Vegetation removal would primarily consist of exotic plant species and contain no known habitat for special-status species. Areas planted under the Enhancement Plan (primarily along the eastern shore of the lake) would be fenced and avoided, to the extent practicable. Areas cleared for Project implementation would be restored consistent with the VMP and the Enhancement Plan.

As discussed above in 4a above, no special-status plant species or habitats occur on the Project site. Due to remedial goals at the site, some wetland habitat around the perimeter of the lake would be impacted by the Project. Wetland and shoreline habitat at the Project site would be enhanced overall through restoration of areas impacted by the Project as well as future lake enhancement work under the Enhancement Plan.

Therefore, Project activities would not substantially affect any sensitive natural community identified in local or regional plans, policies, regulations, or by the CDFG or USFWS.

**c. Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.**

Less than significant. Due to remedial goals at the site, some wetland habitat around the perimeter of the Lake would be impacted by the Project. Wetland and shoreline habitat at the Project site would be enhanced overall through restoration of areas impacted by the Project as well as future lake enhancement work under the Enhancement Plan.

As a CERCLA project, remediation of Mountain Lake is exempt from acquiring a permit to dredge or fill waters of the United States under Section 404 of the Clean Water Act but substantive permit requirements would be followed. EPA's OSWER Directive 9355.7-03 states: "CERCLA response actions are exempted by law from the requirement to obtain Federal, State, or local permits related to any activities conducted completely on-site…. However, this does not remove the requirement to meet (or waive) the substantive provisions of permitting regulations that are applicable or relevant and appropriate requirements (ARARs)." As such, no certification or permits would be sought under Sections 401 and 404 of the Clean Water Act. However, the substantive standards for the statute would be met, as specified in the ARARs for the Project, listed in Table 5-1 of the Draft FS/RAP (Kennedy Jenks, 2012b).

As Federal property, Mountain Lake by definition is excluded from the coastal zone. Further, removal of sediment from Mountain Lake would not have effects on the coastal zone since the Lake is an isolated water of the U.S. and is located approximately 1 mile inland from the Pacific Ocean (ARARs, Table 5-1, Kennedy/Jenks 2012b). However, the project meets substantive provisions of the San Francisco Bay Conservation and Development Commission (BCDC)'s San Francisco Bay Plan (BCDC, 2008). The final remedial action would be consistent with park use. There would be no permanent impacts on public access to the Lake. The biological health of Mountain Lake would be enhanced, and the visitor experience improved, as a result of the Project by removing contaminants from the Lake and restricting pollutants from reaching the Lake in the future.

Therefore, the Project would not have substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.

**d. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.**

Less than significant. Federal and state-listed bird species have been known to migrate through the Presidio. As stated in Section 4a, vegetation removals would be coordinated with natural resource staff to avoid potential disruption to nesting or migrating birds. Specifically, efforts would be made to schedule vegetation removal outside of bird nesting seasons (January 1st - July 31st for raptors and hummingbirds; March 1 - July 31st for songbirds). However, vegetation removal may occur during bird nesting season provided a nesting survey indicates no disruption to nesting birds (including ground nesting birds) and approval is obtained from Trust natural resource staff. Therefore, Project activities would not interfere substantially with the movement of any native resident or migratory wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.

**e. Conflict with local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.**

No impact. The Project would not conflict with provisions of any local policies or ordinances regarding biological resources at the Presidio. Vegetation removal would occur in compliance with the objectives and practices outlined in the VMP, as approved by the Trust's Natural Resource staff, Landscape Management staff or Forestry Manager, as applicable. To address forest management concerns, the Forestry Manager would review all Project plans with regard to tree impacts and, if necessary, provide further measures to protect trees remaining around the site. Also, the biological health of Mountain Lake would be enhanced, and the visitor experience improved, as a result of the project by removing contaminants from the Lake and restricting pollutants from reaching the Lake in the future. Based on the implementation of these standards, the remedial action would not conflict with local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.

**f. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.**

No impact. The Project is consistent with the VMP, Enhancement Plan, and PTMP. With implementation of the Project measures, the remedial action would not conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

*Specific References:*

BCDC (San Francisco Bay Conservation and Development Commission), 2008. *San Francisco Bay Plan*. January.

Buisson, E. and L. Castellini, 2000. *Mountain Lake Wetlands Delineation, Presidio of San Francisco, California*. June.

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Pollak T., 2010. Personal communication regarding Mountain Lake special-status species from Tania Pollak, Natural Resource Specialist, Presidio Trust to Genevieve Coyle, Environmental Remediation Project Manager, Presidio Trust. June 24.

Thomas, T. 2012a. Personal communication regarding bats from Terri Thomas, Director of Conservation and Stewardship, Presidio Trust to Fritts Golden, Aspen Environmental Group. January 12.

Thomas, T. 2012b. Personal communication regarding Mountain Lake species from Terri Thomas, Director of Conservation and Stewardship, Presidio Trust to Genevieve Coyle, Environmental Remediation Project Manager, Presidio Trust. February.

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Trust, NPS and Golden Gate National Parks Association (GGNPA), 2000. *Mountain Lake Enhancement Plan and Environmental Assessment.* October.

U.S. Environmental Protection Agency (EPA), 1992. Permit and Permit "Equivalency" Processes for CERCLA On-Site Response Actions. OSWER Directive 9355.7-03. February 19, 1992.

*Findings of Significance:*

☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

## 5. Cultural Resources

*Project activities likely to create an impact:*

- Tree removal
- Sediment removal.

*Description of Environmental Setting:*

Mountain Lake is historically significant and is a contributing feature to the Presidio of San Francisco National Historic Landmark District (NHLD) (NPS, 1993a,b). The period of historical significance extends from 1776 to 1945. As a federal agency, the Trust is required to comply with the National Historic Preservation Act (NHPA). The Trust has entered into a programmatic agreement (PA) with the NPS, the Advisory Council on Historic Preservation (ACHP), and the State Historic Preservation Officer (SHPO) (Trust, NPS, ACHP, and SHPO, 2002). The PA details how the Trust would comply with its obligations under Section 106 of the NHPA. Key to that process is identification of historic resources that may be affected by an action. As the PA recognizes, numerous surveys and evaluations have been conducted to identify National Register (NR) eligible and NHLD contributing properties for the entire Presidio landmark district.

The Lake itself is estimated to be approximately 2000 years old. Previous studies (Reidy, 2003) have shown that the incremental sedimentation of the lake over thousands of years has preserved a singular record of changes in the ecological system over a long period of time. The material preserved includes pollen, phytoliths, and possibly charcoal from Native American use of fire to control and influence vegetation in the area. The manner in which these materials were deposited over time in the lake bottom has a demonstrated chronology that is of particular scientific value. Refer to Page 2, *Background*

On December 27, 2011, the Native American Heritage Commission (NAHC) provided the results of the Sacred Land file search for the San Francisco Presidio area (NAHC, 2011). The NAHC did not locate resources in the Sacred Land file; however, the NAHC provided a list of Native American contacts who may have an interest in the Project. The tribal contacts will receive notice of the Initial Study and Negative Declaration for review during the public comment period for this Project.

On January 26, 2012, the California Historical Resources Information System (CHRIS) provided their results from a records search which specified there is no record of any formal cultural resource surveys that cover the Mountain Lake Project area and contained no recorded archaeological resources. But they recommended a qualified archaeologist conduct further archival and field studies (CHRIS, 2012).

Native people today referred to as Ohlone/Costanoans were the earliest human inhabitants of the area now know as the Presidio and likely used Mountain Lake as a freshwater resource. A 1776 diary entry of Father Pedro Font, a member of the de Anza expedition, contains the earliest written record of the Mountain Lake area. The lake is believed to be the site of March 1776 Spanish encampment. The Presidio was established as a military post in the same year. From 1821 to 1846, the Mexican government occupied the Presidio. When California became part of the U.S., the Presidio became an American military installation. Beginning in 1883, trees were planted in the upland areas of the Mountain Lake watershed as part of the forestation plan for the Presidio (Trust, NPS and GGNPA, 2000). In the 19$^{th}$ century, various plans to use the lake as a water supply for the City were either not implemented or were abandoned when it was determined the supply was insufficient. In 1897, the Army began to use the lake as a domestic water source. The most dramatic change at the lake came in 1939, when 40 percent of the lake was filled to accommodate construction of Park Presidio Blvd.

The southern half of the Project dewatering area and a portion of the area upslope of the lake is within a Historic Forest Management Zone (Trust and NPS, 2001). A historic pump (#316) was formerly located in a fenced enclosure east of the lake; this pump was removed as part of the Enhancement Plan (Trust, NPS and GGNPA, 2000).

**Analysis as to whether or not project activities would:**
**a. Cause a substantial adverse change in the significance of a historical resource as defined in 15064.5.**

Less than significant. The highway work would occur in existing disturbed fill. The remediation would involve dredging and transporting offsite sediment that has accumulated in the Lake. The Presidio Archeology Department has prepared an Archeological Monitoring Assessment (AMA) for the Project to describe procedures for treating and handling archeological features during Project activities (Trust, 2012). Prior to implementing a dredging remedy that would disturb the sediment, the Trust would take measures to ensure that the record of lake sediments are preserved for future scientific research by extracting cores through a direct push technique and submitting the preserved samples to the National Lacustrine Core

Facility (Trust, 2011). Also, the proposed remedial action would be conducted in accordance with the regulations governing cultural resources, including the National Historic Preservation Act, the Archaeological Resources Protection Act, the Archaeological and Historic Preservation Act, and the Native American Graves Protection and Repatriation Act. A Cultural Resource Specialist would review Project plans and, if necessary, approve a qualified historical/cultural monitor to be present on site during excavation activities that may encounter cultural artifacts. This would ensure that historical resource features are handled appropriately to minimize impacts. If a previously unknown historic resource is discovered, all work activities would be halted until a Cultural Resource Specialist can make a determination regarding the resource and the proper measures are implemented in accordance with the regulations governing cultural resources preservation and/or protection.

Trees within the Historic Forest would be cleared to make space for work areas (e.g., dewatering, staging, and pipeline transport). Approximately 50 to 100 trees are anticipated to be removed from the Historic Forest. Historic Forest impacted by the Project would be replanted consistent with the VMP (Trust and NPS, 2001).

If human skeletal remains are encountered during proposed activities, protocols under federal law would apply. All work would stop in the vicinity of the discovery, and the find would be secured and protected in place. The San Francisco County coroner and Trust Archaeologists would be notified immediately. If a determination finds that the remains are Native American, and that no further coroner investigation of the cause of death is required, the coroner would contact the NAHC (pursuant to Section 7050.5[c] of the California Health and Safety Code) and the County Coordinator of Indian Affairs for informational purposes only. Disposition of the human remains would be treated in accordance with the Native American Graves Protection and Repatriation Regulations at 43 CFR 10.4 (Inadvertent discoveries).

Because the Project activities would be conducted in accordance with the regulations governing cultural resources, including the National Historic Preservation Act, the Archaeological Resources Protection Act, the Archaeological and Historic Preservation Act, and the Native American Graves Protection and Repatriation Act, they are not expected to cause a substantial adverse change in the significance of a historical resource.

**b. Cause a substantial adverse change in the significance of an Archaeological resource pursuant to 15064.5.**

Less than significant. The Presidio Archeology Department has prepared an Archeological Monitoring Assessment (AMA) for the Project to describe procedures for treating and handling archeological features during Project activities (Trust, 2012). Based on the extent of archaeological resources identified at the Presidio in the National Register of Historic Places document, the proposed remediation would not produce substantial adverse changes to Archaeological resources. The measures discussed above in Section 5a and in the AMA would be implemented to reduce the impact of the Project to less-than-significant.

**c. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.**

Less than significant. Previous coring of the Lake (Reidy 2001) determined the first 6 feet of lake-bottom sediments to post-date 1776. The likelihood of dredging activities to intentionally disturb prehistoric deposits is, therefore, considered low. As required in the AMA, prior to implementing a dredging remedy that may disturb natural sediments, the Trust will take measures to ensure that the record of these lake sediments are preserved for future scientific research by extracting cores through a direct push technique and submitting the preserved samples to the National Lacustrine Core Facility. The measures discussed above in Section 5a and in the AMA would be implemented to reduce the impact of the Project on unique paleontological resources to less-than-significant.

**d. Disturb any human remains, including those interred outside of formal cemeteries.**

Less than significant. If human skeletal remains are encountered, protocols under federal law would apply. All work would stop in the vicinity of the discovery, and the find would be secured and protected in place. The San Francisco County coroner and Trust Archaeologists would be immediately notified. If a determination finds that the remains are Native American, and that no further coroner investigation of the cause of death is required, the coroner would contact the NAHC (pursuant to Section 7050.5[c] of the California Health and Safety Code) and the County Coordinator of Indian Affairs for informational purposes only. Disposition of the human remains would be treated in accordance with the Native American Graves Protection and Repatriation Regulations at 43 CFR 10.4 (Inadvertent discoveries).

Because of the limited potential to encounter human remains or associated artifacts, and the degree of oversight being provided at these sites, it is unlikely that the proposed Project would disturb any human remains, including those interred outside of formal cemeteries.

*Specific References:*

Anthropological Studies Center, Sonoma State University (ASC), 2005. *Protocols for Archaeological Artifacts on Presidio Park Lands*. October 2005.

California Historical Resources Information System (CHRIS) 2012. *Record Search Results for the Proposed Mountain Lake Project/Remedial Action Plan*. January 26.

Feierabend, C., 2006. *Mountain Lake East Arm Cultural Landscape Assessment, Final Report, Presidio of San Francisco, California*. September.

Kennedy/Jenks, 2012b. *Draft Feasibility Study/Remedial Action Plan, Mountain Lake, Presidio of San Francisco, California*. March.

Native American Heritage Commission (NAHC), 2011. *Proposed San Francisco Mountain Lake Project, San Francisco County*. December.

NPS, 1993a. *National Register of Historic Places Registration Form for the Presidio of San Francisco.* March.

NPS, 1993b*. National Historic Landmark District Update, The Presidio of San Francisco, San Francisco, California.*

Reidy, L., 2001. *Evidence of Environmental Change Over the Last 20 Years at Mountain Lake, in the Northern San Francisco Peninsula*. Thesis for Master of Arts in Geography.

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Trust, NPS, Advisory Council on Historic Preservation (ACHP), and the State Historic Preservation Office (SHPO), 2002. *Programmatic Agreement among the Presidio Trust, National Park Service, the Advisory Council on Historic Preservation, and the California State Historic Preservation Officer Regarding the Presidio Trust Implementation Plan and Various Operation and Maintenance Activities for Area "B" of the Presidio of San Francisco, Golden Gate National Recreation Area*. March.

*Findings of Significance:*

☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

## 6. Geology and Soils

*Project activities likely to create an impact:*

- Dredging and removal of sediment.

*Description of Environmental Setting:*

The Presidio lies in the western part of the Coast Ranges near the west edge of the North American crustal plate. The region is subject to a high degree of tectonic activity. Major faults within a 25-mile radius of the Presidio include the San Andreas Fault, the Hayward Fault, and the Calaveras Fault. The bedrock underlying the San Francisco peninsula consists of ocean-floor ultramafic basalts and sediments of the Mesozoic-age Franciscan Complex, which has been subjected to multiple episodes of shearing and faulting, resulting in intensive deformation and fracturing. The Franciscan bedrock at the Presidio is part of a major northwest-trending shear zone called the Fort Point-Potrero Hill-Hunters Point Shear Zone, which is part of the San Andreas Fault system. Quaternary age sediments, including sands of the Colma Formation, dune and beach sands, slope debris, bay mud, and artificial fill overlie the bedrock at the Presidio. In the Presidio, the older rocks are covered by younger deposits of the Colma Formation and more broadly by sand dune deposits of the late Pleistocene and Holocene.

Mountain Lake is located behind the foredunes of this coastal sand complex, with the sandy Colma Formation near the surface. The lake likely was formed by wind erosion of the dunes down to the water table, creating a dune hollow. The lake is probably 1,700 years old. The bedrock underlying the Presidio includes large percentages of serpentinite, a metamorphosed form of ultramafic rock (oceanic crust).

Mountain Lake is a natural lake with an original depth of approximately 30 feet. Large-scale filling during road construction has reduced the area of the lake to about 4 acres (a loss of about 40% of its original area). The various human activities around the lake and storm drainage to the lake have brought the lake bottom to within about 10 feet of the surface. The lake bottom is composed primarily of silt and clay to a depth of approximately 6 to 10 feet. Below this level, the subsurface is composed of a mixture of sands, silt, and clay (Trust, NPS, and GGNPA, 2000). Data and boring logs from samples of accumulated sediment in the Lake indicate contributions from serpentinite and other Presidio native formations.

Because the adjacent section of Highway 1 required filling part of the lake, the conditions described for the lake also apply to the highway, except that a substantial amount of fill now overlays the former lake bottom sediments under the road. Refer to Pages 3 to 10.

**Analysis as to whether or not project activities would:**
**a. Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:**

- **Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault. (Refer to Division of Mines and Geology Special Publication 42).**

  Less than significant. The proposed activities would be limited in scope and of relative short duration so that the geologic/seismic hazards at the sites or exposure of people and/or structures to adverse impacts related to geologic and seismic hazards would be less than significant. No known active faults cross through the Project site (Hart, 1999). Fault ground rupture is normally associated with zones of active faulting and/or planes of weakness adjacent to active fault zones. The closest active fault is the offshore section of the San Andreas Fault to the west. The highway stabilization work would serve to decrease future risk due to earthquakes. Because recognized active faults do not cross through and are not adjacent to the site, the fault rupture hazard at the sites is considered to be negligible and, therefore, less than significant.

- **Strong seismic ground shaking.**

  Less than significant. The proposed activities are unlikely to be affected by the geological and seismic conditions, including potential seismic ground shaking. The pre-remediation construction and remediation would be of relatively short duration, limited in nature, and involve few workers.

- **Seismic-related ground failure, including liquefaction.**

Less than significant. Liquefaction is the phenomenon in which loose, saturated, granular materials experience a sudden loss of shear strength due to seismic shaking. Soil liquefaction can induce sand boils, differential settlement, lateral spread, and ground failure. The Susceptibility Map of the San Francisco Bay Area shows the Project area to have a Moderate to Very Low potential for liquefaction (USGS, 2005). Installing the proposed highway stabilization features and rock columns along Highway 1 would reduce risk to this section of the highway.

- **Landslides.**

  Less than significant. Once remediation is underway, soil in the on-shore work area would be susceptible to limited disturbance. However, the areas adjacent to north, east, and south shore of the lake are flat, so landslides and unstable slopes would not occur. The Trust is conducting geotechnical studies of the western bank of the lake. This bank would be stabilized, as necessary, to prevent landslides during dredging operations. Caltrans is implementing stabilization work prior to dredging to prevent failure of the roadway. An erosion control plan would be developed as discussed below in Section 6b. The stabilization work proposed by Caltrans would not require cutting of slopes or other work that could trigger or increase the probability of landslides.

**b. Result in substantial soil erosion or the loss of topsoil.**

Less than significant. The Project involves dredging of a lake bottom and stabilizing the adjacent highway. The Caltrans column construction and runoff management work on Highway 1 is in the existing nearly level shoulder. These actions would not result in substantial soil erosion or loss of topsoil. In any dry land disturbed by equipment, erosion control measures would be implemented during and after construction for any work performed between October 15 and April 15 to minimize runoff from the site. The activities associated with remediation would not result in significant soil erosion or loss of topsoil, as erosion control measures would be implemented. Project activity would not be conducted during extreme wet weather and soil disturbance would be limited to work areas.

There are potential sources of surface water runoff from the work area during and after the work is performed. Project BMPs include stabilization practices such as wattles, silt fences, berms, and temporary outlet protection may be employed, if needed. The method chosen would depend on the planned activities and erosion potential of the area in question. By implementing the prescribed erosion and stabilization measures, the potential for substantial soil erosion or the loss of topsoil is considered less than significant.

**c. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on or off-site landslide, lateral spreading, subsidence, liquefaction or collapse.**

Less than significant. The stabilization work along the highway and western bank of the lake would reduce the potential for failure of the subsoil due to landslide, lateral spreading, subsidence, liquefaction, or collapse. Slopes created in the lake bottom as a result of dredging would be susceptible to downslope movement as disturbed material establishes its final angle of repose. This would be internal to the lake and any slope movement would be minor. This would not pose a risk to people or the environment. In addition, as part of the dredging activity, the bottom surface would be contoured to minimize unplanned slope movement.

**d. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property.**

No Impact. Project activities would not place structures or require personnel to be located on expansive soils. Therefore the remedial activities would not create any risk to life or property as a result of being located on expansive soils.

**e. Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of water.**

No Impact. The Project would not involve the installation of septic tanks or alternative wastewater disposal systems. Portable toilets would be used during construction.

**f. Be located in an area containing naturally occurring asbestos (see also Air Quality, f.).**

Less than significant. The Franciscan Formation bedrock containing serpentine underlies the Colma Formation, which underlies the lake. Removal of sediment overlying older sediment would not result in reaching bedrock. However, data and boring logs from samples of accumulated sediment in the Lake indicate contributions from serpentinite and other Presidio native formations. Also, the Lake was filled in 1939 with cuttings and materials during construction of Park Presidio Blvd and the associated MacArthur Tunnel. Therefore, sediment in the Lake appears to contain imported

materials from nearby areas in the Presidio. Also, the Franciscan Formation bedrock may be encountered during the roadway stabilization portion of the Project and could be generated in spoils from the Project. Because the sediment and any spoils likely contain some serpentine, some asbestos may be encountered in the material. Even when dewatered, the sediment cake would retain moisture. Likewise, any spoil related to the stabilization work will be wet. Therefore, no friable asbestos is expected to become airborne from the minor amount of serpentinite that may be present in the sediment.

*Specific References:*

CDMG, 1988. *Major Faults and Earthquake Epicenters in the San Francisco Bay Area. International Conference of Building Officials*. February.

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Hart, E.W., 1999. Fault Rupture Hazard Zones in California, California Division of Mines and Geology Special Publication 42, (1997 revision).

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Trust, NPS and Golden Gate National Parks Association (GGNPA), 2000. *Mountain Lake Enhancement Plan and Environmental Assessment.* October.

USGS, 1978. *Historic Ground Failures in Northern California Associated with Earthquakes*. Geological Survey Professional Paper 993.

USGS, 2000. *Preliminary Maps of Quaternary Deposits and Liquefaction Susceptibility, Nine-County San Francisco Bay Region, California*.

USGS, 2005. Susceptibility Map of the San Francisco Bay Area. Website: http://geomaps.wr.usgs.gov/sfgeo/liquefaction/susceptibility.html. Accessed December 12, 2011.

*Findings of Significance:*

☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

## 7. Greenhouse Gas Emissions

*Project activities likely to create an impact:*

- Emissions from use of heavy equipment, trucks, and other vehicles for roadbed stabilization, dredging, dewatering, and transportation.

*Description of Environmental Setting:*

The setting for climate change and the analysis of greenhouse gas (GHG) emissions is defined by world-wide emissions and their global effects. The baseline conditions include the natural and anthropogenic drivers of global climate change, such as world-wide GHG emissions from human activities that have grown more than 70 percent between 1970 and 2004 (IPCC, 2007). The State of California is leading the nation in managing GHG emissions. Accordingly, the impact analysis relies on guidelines, analyses, policy, and plans for reducing GHG emissions established by the California Air Resources Board (CARB). This is a cumulative impact assessment because, by their nature, any GHG emissions contribute to the adverse environmental impacts of global climate change on a cumulative basis.

Globally, temperatures, precipitation, sea levels, ocean currents, wind patterns, and storm activity are all affected by the presence of GHGs. The global climate depends on the presence of GHGs to naturally provide the "greenhouse effect." The greenhouse effect is driven mainly by water vapor, aerosols, carbon dioxide ($CO_2$), methane ($CH_4$), nitrous oxide ($N_2O$), and other GHGs that trap heat radiated from the Earth's surface. The global surface temperature would be about 34°C (61°F) colder than it is now if it were not for the natural heat trapping effect of natural climate change pollutants (CAT, 2006).

California currently emits approximately 500 million metric tonnes of $CO_2$ equivalent (500 MMTCO2e) each year, or between one and two percent of about 49,000 MMTCO2e emitted globally (CARB, 2007). The California Global Warming Solutions Act of 2006, Assembly Bill 32 (AB 32), requires that California's GHG emissions be reduced to 1990 levels by 2020. The reduction will be accomplished through an enforceable statewide cap on global warming emissions to be phased in beginning in 2012. AB 32 directs the CARB to develop regulations and a mandatory reporting system to track and monitor global warming emissions levels (AB 32, Chapter 488, Statutes of 2006). The CARB Climate Change Scoping Plan, approved December 2008, provides the framework for achieving California's goals.

In passing AB 32, the California Legislature found that:

*"Global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California. The potential adverse impacts of global warming include the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems."*

The regulations implementing AB 32 are being developed in phases. Implementation of the AB 32 Climate Change Scoping Plan requires careful coordination of the State's energy and transportation policies. The Scoping Plan provides strong support for reducing emissions from all manners of vehicle and air travel, because travel is a large portion of California GHG emissions.

Determining significance of GHG emissions relies upon available guidelines from State or local air quality management agencies, where available. The effects of Project-related direct and indirect GHG emissions are characterized against a GHG emissions level of 10,000 metric tons per year (10,000 MTCO2e/yr) for stationary sources, with construction activities not being subject to a quantitative threshold (BAAQMD, 2011). At a level of less than 10,000 MTCO2e/yr, an industrial project would not be expected to substantially conflict with existing California legislation adopted to reduce statewide GHG emissions. Global climate change is a cumulative impact that would be affected by GHG emissions. However, relatively small scale projects, if found to be less than significant, would not be anticipated to result in cumulatively considerable GHG emissions. Refer to Pages 3 – 14.

**Analysis as to whether or not project activities would:**

**a. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.**

Less than significant. The construction and remediation would generate GHG emissions through the use of vehicles and equipment during construction and remediation. The period of construction and remedial action would be short-term and

would occur over two years. Construction-phase GHG emissions would occur directly from the off-road heavy-duty equipment and the on-road trucks and motor vehicles needed to transport materials, including aggregate and dewatered sediment, mobilize crews, and bring equipment to and from the site. Highway stabilization activity would involve use of a crane, vibratory probe, and other equipment including generators, lights, loaders, and 8 trucks daily to bring aggregate to the site and remove spoils, over an approximately 18 week period.

The remediation activity would approximately 25 heavy-duty truck round trips per day over 4 to 8 weeks with other equipment and vehicle activity. Construction-related air quality BACTs would minimize unnecessary equipment use and reduce GHG emissions. Emissions caused by the construction and remediation would be a fraction of 10,000 MTCO2e (see Appendix D), although the BAAQMD has determined that construction activities are not subject to any quantitative threshold (BAAQMD, 2011). Table 7-1 summarizes the total GHG emissions over the duration of the construction activity and the applicable BAAQMD thresholds. In summary, levels of GHG emissions caused by construction equipment use would not occur in significant quantities. The GHG emissions due to construction and remedial action would be less than significant.

**Table 7-1. Construction-Related Emissions of GHG, Duration of Construction**

| | Carbon Dioxide (ton $CO_2$) | CO2-equivalent (ton CO2e) | CO2-equivalent (MTCO2e) |
|---|---|---|---|
| Off-Road Equipment | 200.92 | 211.50 | 191.87 |
| On-Road Crew and Workers | 142.65 | 150.16 | 136.23 |
| On-Road Diesel Trucks | 341.74 | 359.73 | 326.34 |
| Total Construction-Related GHG | 685.32 | 721.39 | 654.44 |
| BAAQMD Significance Threshold | None | None | 10,000 MT/yr (for stationary sources) |

Notes: Motor vehicle emissions of CO2-equivalent are approximately 95 percent CO2.
One metric tonne (MT) equals 1.1 short tons or 2,204.6 pounds or 1,000 kilograms.
Source: BAAQMD, 2011; also see detailed calculations in Appendix D.

**b. Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases.**

Less than significant. The Project would be consistent with the CARB Climate Change Scoping Plan. The Climate Change Scoping Plan depends on coordinating energy and transportation policies, with a focus on reducing emissions from all manners of motor vehicle travel. The planned construction and remedial action would include air quality BACTs to minimize unnecessary equipment use. As such, the Project activities would not conflict with plans, policies, or regulations adopted for the purpose of reducing GHG emissions.

*Specific References:*

Bay Area Air Quality Management District (BAAQMD), 2011. *California Environmental Quality Act, Air Quality Guidelines*. May.

CARB (California Air Resources Board). 2008. Climate Change Scoping Plan, Framework for Change, as Approved December 2008, Pursuant to AB32.

CARB. 2007. California 1990 Greenhouse Gas Emissions Level and 2020 Emissions Limit. November.

CAT (Climate Action Team). 2009. Draft Biennial Report. March.

CAT. 2006. Climate Action Team and California Environmental Protection Agency. Climate Action Team Report to Governor Schwarzenegger and the Legislature. March.

IPCC (Intergovernmental Panel on Climate Change). 2007. Climate Change 2007: Synthesis Report, the Fourth IPCC Assessment Report. May.

Kennedy/Jenks, 2012b. *Draft Feasibility Study/Remedial Action Plan, Mountain Lake, Presidio of San Francisco, California*. March.

*Findings of Significance:*

☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

## 8. Hazards and Hazardous Materials

*Project activities likely to create an impact:*

- Transportation and disposal of contaminated sediment.

*Description of Environmental Setting:*

Over 185 samples of sediment have been collected from the lake during remedial investigations conducted between 1990 and 2011. Four samples have also been collected from sediment in Park Presidio storm drains that feed into the lake. Twelve surface water and seven sediment elutriate (liquid expressed during dewatering) samples have also been collected and analyzed. Metals, pesticides, and total petroleum hydrocarbons (TPH) have been detected above ecological cleanup levels in lake sediment. No chemicals have been detected above water quality criteria for aquatic life and drinking water standards (e.g., maximum contaminant levels) in lake water. A human health and ecological risk evaluation was completed for Mountain Lake (Kennedy/Jenks 2012b). The current and planned future use of Mountain Lake is wildlife habitat. Fishing and swimming are not permitted in the Lake. Visitors to Mountain Lake typically engage in activities where there is no exposure to sediment. Wading may occur occasionally at the southern beach area; however, human exposure to sediments during wading is expected to be infrequent and of limited duration. Furthermore, concentrations of contaminants in sediment samples collected from the southern beach area are below human health cleanup levels (Kennedy/Jenks, 2012a).

Previous evaluations of water concentrations in Mountain Lake concluded that surface water data meet for aquatic life criteria and drinking water standards (e.g., maximum contaminant levels). Therefore, ecological risk from surface water exposure and domestic use of surface water in Mountain Lake are not exposure pathways of concern

Ecological receptors could be exposed to chemicals in sediment at Mountain Lake. Common species of fish, amphibians, waterfowl, and mammals that occupy the Lake and surrounding area may be exposed to sediment at Mountain Lake. Complete exposure pathways for aquatic species living in the water column or sediment are direct contact with or uptake of chemicals in sediment and dietary exposure to chemicals. For aquatic-dependent wildlife, the primary exposure pathway of concern is dietary exposure to chemicals. There are no sensitive species (i.e., species on federal or state lists of threatened and endangered species) residing at the Lake but these species could occupy the area after future lake enhancement activities.

Risks to ecological receptors were evaluated for baseline conditions at Mountain Lake, which assumed no remediation of sediments. To evaluate risk, the 95 percent upper confidence limit on the arithmetic mean (95 percent UCL) concentrations in sediment were estimated for each of the PCOCs and compared with cleanup levels. The risk evaluation concluded that baseline conditions present an unacceptable risk to the ecosystem in and around Mountain Lake (URS 2011).

The chemicals of concern (COCs) in lake sediment that pose an ecological risk are lead and TPHmo (motor oil). The COCs are those chemicals in lake sediment with concentrations that exceed an ecological cleanup level, pose a potential risk to ecological receptors, and are not assumed to be associated with native fill material. Lead is the primary COC in Mountain Lake sediment due to the high number and widespread distribution of sediment samples containing lead at concentrations exceeding its cleanup level.

**Table 8-1: Summary of COC Concentrations and Cleanup Levels in Sediment**

| | Maximum Detected Concentration in Soil (mg/kg) | Cleanup Level – Freshwater Sediment (mg/kg)[(a)] |
|---|---|---|
| Lead | 2,000 | 82 |
| TPH as motor oil | 1,500 | 144 |

(a) Cleanup levels are based upon ecological freshwater sediment criteria and background metals concentrations for the Colma and Serpentinite formations. Colma formation and serpentinite formations are considered likely, based upon previous sediment sampling, to be encountered during sediment remediation of Mountain Lake. Other soil types, such as greenstone, are also expected to be encountered during remediation.

There is a low probability of encoutnering unexploded ordnance (UXO) or chemical warfare agents at the site. The site is not within an area of concern identified in the U.S. Army's Draft Chemical Warfare Investigation Work Plan (U.S. Army, 2006).

For work conducted along Park Presidio Blvd, there is a potential for Caltrans to encounter lead-contaminated soils from aerially-deposited lead from vehicle exaust emissions. These lead-contaminated soils would be managed and handled in accordance with DTSC's Variance to Caltrans for waste considered to be hazardous (DTSC, 2009). Refer to Pages 4 – 6.

**Analysis as to whether or not project activities would:**

**a. Create a significant hazard to the public or the environment throughout the routine transport, use or disposal of hazardous materials.**

Less than significant. The proposed remedial action is designed to protect the public and environment from existing hazards. These activities include dredging bottom sediment from Mountain Lake, dewatering the sediment, transporting it to an appropriate disposal site, and testing water quality before the water is released back into the lake. Project implementation would not require the transport, use, or disposal of hazardous materials, except for dewatered sediment material that would be hauled offsite.

The remediation would be conducted in accordance with the RAP and the federal and State regulations identified in the RAP, as well as Trust Management Policies, as applicable. During remediation activities, access to the site would be restricted to prevent potential public exposure to health or safety risks. Further, potential exposure of workers and public to contaminated materials during dredging and dewatering activities would be controlled through the air quality, dust, and runoff control measures. Workers implementing the remedial activities would have appropriate training and would use personal protective equipment as necessary to minimize exposure to contaminants.

If required, transport of hazardous materials would occur along authorized haul routes within the Presidio and along major thoroughfares outside the Presidio. No approval is required from the City and County of San Francisco or other agency for transport along major thoroughfares and signed truck routes.

For work conducted along Park Presidio Blvd, Caltrans would manage and handle lead-contaminated soils from aerially-deposited lead from vehicle exaust emissions in accordance with DTSC's Variance to Caltrans for waste considered to be hazardous (DTSC, 2009).

Based on the implementation of the Project measures identified above, the Project would not create a significant hazard to the public.

**b. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.**

Less than significant. Sediment removed during dredging would be limited to material that has been identified as being contaminated and requiring remediation. Such material would be semi-liquid, non-flammable, non-corrosive and non-explosive and would not present a significant health risk or environmental threat. It would be temporarily stored until sufficiently dewatered to transport to a landfill licensed to receive the material. For work conducted along Park Presidio Blvd, Caltrans would manage and handle lead-contaminated soils from aerially-deposited lead from vehicle exaust emissions in accordance with DTSC's Variance to Caltrans for waste considered to be hazardous (DTSC, 2009). Therefore, the Project would not create a significant hazard to the public due to foreseeable upset or accident conditions resulting in a release of hazardous substances.

**c. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances or waste within one-quarter mile of an existing or proposed school.**

Less than significant. The nearest children's educational or care facility is the Lone Mountain Children's Center, located on the Presidio, approximately 600 feet northwest of the Project site. The Center is separated from the Project site by heavily traveled Park Presidio Blvd, dense vegetation along the highway, and buildings. The only other sensitive receptor within 0.25 mile is the SF Free Clinic. Two schools, Sutro Elementary School and St. James Preschool, are just over 0.25 mile from the site. Dredged material and any spoils from the stabilization work would be wet and is not expected to emit any hazardous gas. Even when dewatered and loaded for offsite transport and disposal, the material would remain damp and cohesive. The engineering and dust control measures identified above in 6a would be employed to ensure that hazardous emissions do not impact the schools. For work conducted along Park Presidio Blvd, Caltrans would manage and handle lead-contaminated soils from aerially-deposited lead from vehicle exaust emissions in accordance with DTSC's Variance to Caltrans for waste considered to be hazardous (DTSC, 2009). The Project is not expected to release significant quantities of hazardous emissions.

**d. Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to public or the environment.**

Less than significant. The Presidio of San Francisco is not on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 because it is owned by the Federal government.[1] However, the proposed remedial action is designed to reduce long-term hazards to human health and the environment and would not create a significant hazard to the public or the environment. Short-term hazards during construction would be controlled by the engineering and dust control measures identified above in 7a.

**e. Impair implementation of, or physically interfere with, an adopted emergency response plan or emergency evacuation plan.**

Less than significant. Execution of the RAP, including intermittent hauling of sediment from the site along established truck routes, would not impair implementation of or physically interfere with emergency response or evacuation plans. To ensure safety, a site-specific Health and Safety Plan (HSP) would be prepared. The HSP describes the controls and procedures to be implemented to minimize the incidents, injury, and health risks associated with the activities to be conducted at the site. The HSP would be prepared according to the applicable requirements of 29 CFR 1910.120 (Federal workers and contractors), and CCR Title 8 General Industrial Safety Order (GISO) 5192 (contractors), for work at hazardous waste sites. The HSP would contain, at a minimum, the following elements:

- A hazard evaluation;
- Names of key personnel and the site safety coordinator;
- A statement that personnel have completed required training;
- Medical surveillance requirements and personal protective equipment to be used by site personnel;
- The types and frequency of personal and area air monitoring, instrumentation and sampling techniques for monitoring of health and safety;
- Site control measures, including the designation of work zones (e.g., exclusion, contamination-reduction and support zones) and safe work procedures for work near structures or topographic breaks, slopes, wall, etc;
- Management of wastes and decontamination procedures for personnel and equipment;
- Noise and dust control procedures and action levels;
- Site transportation procedures;
- Contingency plans including telephone numbers and contact names; and
- Location and routes to the nearest emergency and non-emergency medical care facilities.

*Specific References:*

DTSC, 2009. Variance V09HQSCD006 to Caltrans. July 1.

Kennedy/Jenks, 2012a. *Letter Report – Sediment Sampling at Mountain Lake.* January.

Kennedy/Jenks, 2012b. *Draft Feasibility Study/Remedial Action Plan, Mountain Lake, Presidio of San Francisco, California*. March.

Trust, 2002a. *Presidio Trust Management Plan: Land Use Policies for Area B of the Presidio of San Francisco*. May.

Trust, 2002b. *Presidio Trust Management Plan: Environmental Impact Statement*. May.

URS, 2011. *Remedial Investigation Summary and Risk Evaluation, Mountain Lake, Presidio of San Francisco, California*. October.

U.S. Army (Corps of Engineers, Sacramento District), 2006. *Chemical Warfare Investigation Work Plan.* March.

[1] DTSC's sites listed pursuant to HSC § 25356 are subject to listing under the Government Code Section 65962.5. However, sites owned by the Federal Government are excluded from listing. The implementing regulations provide that sites may be listed pursuant to HSC § 25356 if (a) they are not owned by the Federal Government and (b) a release or threatened release of hazardous substances has been confirmed by on-site sampling. (California Code of Regulations, Title 22, Section 67400.1). The Mountain Lake remediation site also does not meet other requirements for listing under Government Code Section 65962.5.

*Findings of Significance:*

☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

## 9. Hydrology and Water Quality

*Project activities likely to create an impact:*

- Installation of stone columns for roadway stabilization
- Suspension of sediment during dredging
- Return of dewatering water to lake.

*Description of Environmental Setting:*

Mountain Lake has a drainage area of approximately 192 acres. Natural inflow to Mountain Lake is primarily by way of groundwater, with some overland flow from adjacent areas including West Pacific Avenue and the East Arm to the east of the lake. The primary sources of artificial inflow are from three storm drains on Park Presidio Blvd (Highway 1) that empty into the lake and a pipe that empties groundwater from the MacArthur Tunnel dewatering system and a portion of Highway 1 runoff into the lake on the north side. Mountain Lake has no surface outlet. It is above the headwaters of Lobos Creek but has no outlet to the creek. Except when the lake overflows its basin into a pipe under Highway 1, water leaves the lake by way of groundwater flow (likely to Lobos Creek) and through evaporation. Water no longer is withdrawn from the lake for domestic or other uses.

The dynamics and function of the lake has been substantially altered by the loss of 40 percent of its area to filling and the raising of the remaining lake bottom from 30 feet to about 10 feet. Sunlight now penetrates to the lake bottom and the lake water is warmer than it was in the past.

Trees planted in the previously barren uplands around the lake have contributed organic matter to the lake in excess of what occurred previously. With no outlet, material introduced to the lake remains in the lake -- silt settles to the bottom and organic matter decays, releasing nutrients. As a consequence of these changes, the lake suffers algae blooms, periodic fish kills, eutrophication (where a high nutrient content results in low dissolved oxygen levels) (Trust, NPS and GGNPA, 2000). In a eutrophic lake, suspended algae and humic acids from decaying plants reduce the clarity of the water.

Sedimentation rates have increased over the past century, from and estimated 'normal' sedimentation rate of 0.1 mm/year to 19 mm/year. A 1902 record indicates that the slopes between the Lake and the golf course and Public Health Services Hospital were eroding, washing sediment into the lake. The 1939 filling of 40 percent of the lake for Park Presidio Blvd construction likely contributed sediment to the rest of the lake (Trust, NPS and GGNPA, 2000).

Since construction of Highway 1, road runoff has discharged to Mountain Lake from the roadway, carrying sediment and chemicals with it. This is the major source of contaminated sediment to be removed. Investigations of surface water in Mountain Lake have shown that there are no chemicals in surface water above water quality criteria for aquatic life and drinking water standards (e.g., maximum contaminant levels). Refer to Pages 1 – 6.

**Analysis as to whether or not project activities would:**
**a. Violate any water quality standards or waste discharge requirements.**

Less than significant. The proposed new inlets and sediment/pollution control devices be installed to treat roadway runoff entering the lake. This would not result in violation of water quality standards or any waste discharge requirements.

The proposed remediation would not violate water quality standards or waste discharge requirements. For disturbed areas greater than one acre, the Water Board has prepared a National Pollution Discharge Elimination System (NPDES) General Permit for Construction Activity. Terrestrial disturbance would be less than one acre. Disturbance of the lake bottom during dredging would re-suspend some sediment, temporarily lowering water quality. However, the re-suspended material would settle after dredging is completed. If necessary, a treatment would be applied to the lake water following dredging to increase water clarity. As a CERCLA project, the Project is exempt from acquiring a permit from the Water Board (EPA OSWER Directive 9355.7-03). However, the work would be conducted pursuant to the substantive requirements of the General Permit for Construction Activity. The Project would include implementation of BMPs for construction site planning and management, erosion and sediment control, and pollution prevention, which would be contained in the SWPPP document. The SWPPP would include Project specific measures to reduce surface runoff and erosion. To uphold water quality standards that are presented in the Clean Water Act and administered by the Water Board, the remedial design plans for the Project would include an erosion control plan to address onsite erosion, sedimentation, and pollution control concerns for work performed between October 15 and April 15. As a CERCLA project, remediation of Mountain Lake, including disturbance of shoreline wetlands, is exempt from acquiring a permit to fill waters of the United States under Section 404 of the Clean Water Act (EPA OSWER Directive 9355.7-03).

With the implementation and maintenance of the sedimentation and pollution control measures described above, the Project would not violate any water quality standards.

**b. Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficient in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted).**

Less than significant. The vibratory equipment would compact the walls of the shaft, reducing groundwater inflow to the shaft. However, some groundwater likely would be extracted during the construction of the rock columns along Highway 1, either as water or as saturated soil. This groundwater extraction would be minimal, and would consist of any water that may accumulate in the shaft and be displaced by the aggregate. One temporary piezometer recently installed to measure groundwater levels underneath the roadway would be removed. Any water extracted would be from a shallow depth (no more than 60 feet below the surface). The rock columns would not prevent groundwater recharge.

No groundwater would be extracted by the proposed Project. The Project would be limited to removal of accumulated sediment, there would be a less than significant impact to groundwater resources and the Project activities would not substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficient in aquifer volume or a lowering of the local groundwater table level.

**c. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on or off-site.**

Less than significant. The construction of the stone columns would stabilize the road by reinforcing the soil under the road. However, water would be able to pass through and around the columns. There would be no change in groundwater flow that may contribute to nearby Lobos Creek.

The Project would remove sediment from the lake bottom. No existing drainage pattern would be affected. No erosion or siltation would occur. In accordance with the erosion control plans to be developed during remedial design, lakeside areas potentially disturbed by equipment would be stabilized and protected from erosion and sediment transport. Upon completion of dredging, the disturbed bottom of the lake would be left in a stable state. The upland dewatering area would be configured to prevent erosion or siltation. Stabilization measures might include: installation of wattles, stabilization matting, fabric, and blankets on exposed soil. With the implementation of these controls, the proposed remedial action would not alter the existing drainage pattern of the site and would not result in substantial erosion or siltation on or off-site.

**d. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on or off-site.**

Less than significant. The rate or amount of surface runoff would be unaffected by the Project. During construction, the temporary drainage conditions would be managed with engineering controls included in the remedial design and described above in 9.c. The proposed remedial action would not alter the existing drainage pattern of the site in a manner which would result in flooding on or off site.

**e. Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff.**

Less than significant. The Caltrans runoff control aspect of the Project would add and improve existing drainage facilities but would not increase the volume of water managed. The Project remediation work would not require use of storm water drainage systems. Water from the dewatering process would be captured, tested, and returned to the lake. The Project would not exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff.

**f. Otherwise substantially degrade water quality.**

Less than significant. Levels of chemicals detected in water samples from the Lake are less than water quality criteria for aquatic organisms and drinking water standards (e.g., maximum contaminant levels). However, water quality of the lake has deteriorated over time from sediment deposition, increased nutrient flow to the lake, lowered oxygen levels, and growth of emergent vegetation. Treating the continued introduction of sediment and chemical laden runoff would improve water quality. Removal of contaminated sediment would have a long-term positive effect on water quality by removing a source of contaminants. During dredging, bottom sediments may be re-suspended, but would settle. If necessary, a treatment would be added to the lake water to increase water clarity. By deepening the lake, the volume of water would

be increased and water quality related to water temperature and algae blooms is expected to improve. Therefore, the proposed activities would not substantially degrade water quality.

**g. Place within a 100-year flood hazard area structures which would impede or redirect flood flows.**

No impact. The site is not within a 100-year flood hazard area and would not install structures that would impede or redirect flood flows.

**h. Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam.**

Less than significant. There are no levees or dams as part of the Project. None of the proposed activities would expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam.

**i. Inundation by sieche, tsunami or mudflow.**

Less than significant. Based on the geographic location and elevation of the Project site, the Project would not be inundated by the occurrence of a sieche or tsunami. Upslope areas from the sites are vegetated; these areas would be unaffected by the Project and mudflows from these areas onto the site are unlikely. Any disturbed area in the Project area would be appropriately mulched or otherwise stabilized to prevent erosion and control runoff pending final replanting. Sediment slurry loss from any holding tank or pond would not be of sufficient quantity to reach Mountain Lake Trail or the lake. There are no structures downslope of this area and trail users are mobile and passing through.

*Specific References:*

Kennedy/Jenks, 2012b. *Draft Feasibility Study/Remedial Action Plan, Mountain Lake, Presidio of San Francisco, California*. March.

Trust, 2002a. *Presidio Trust Management Plan: Land Use Policies for Area B of the Presidio of San Francisco*. May.

Trust, 2002b. *Presidio Trust Management Plan: Environmental Impact Statement*. May.

Trust, NPS and Golden Gate National Parks Association (GGNPA), 2000. *Mountain Lake Enhancement Plan and Environmental Assessment.* October.

U.S. Environmental Protection Agency (EPA), 1992. Permit and Permit “Equivalency” Processes for CERCLA On-Site Response Actions. OSWER Directive 9355.7-03. February 19, 1992.

*Findings of Significance:*

☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

## 10. Land Use and Planning

*Project activities likely to create an impact:*

- Temporary site fencing to redirect public access away from work zone.

*Description of Environmental Setting:*

Mountain Lake is on the southern edge of the Presidio. Immediately west of the Lake is Park Presidio Blvd (Highway 1). The Presidio Golf Course is to the immediate east and north of the lake and is separated by an existing trail/road and fence. South of the lake are private residences and apartments on Lake St, which runs parallel to the Presidio boundary, and at the termini of 9th, 10th, 11th, 12th Avenues, and Funston St, which deadend at the Presidio boundary. These residences are separated from the lake and the Presidio by Mountain Lake Park,a small City-owned park. To the casual observer, the boundary between the park and the Presidio is indistinguishable. Swimming is not permitted, but passive recreation such as bird watching and feeding occurs. Picnic and tennis facilities are located within the park, which has paths that merge with Presidio trails.

The stabilazition and runoff control work on Highway 1 would require nighttime closure of a traffic lane on the northbound side of the highway; however, traffic volume is low at night and a lane would remain open for northbound vehicles. The southbound lanes would be unaffected, except if there is a need to temporarily close one during installation of water management devices on the west side of the highway.

The primary staging area for the Project would be at the area to be used for dewatering. The site would be fenced and closed to public access. The dredge would be on the lake and would not result in closure of any area once it is afloat. The dredged sediment/water slurry would be pumped by temporary pipe from the dredge to the shore and continue across Mountain Lake Trail at the north end of the lake to the upslope sediment dewatering site. At the trail, the pipe could be covered or trenched so as to not impeded trail users. During the hauling of dewatered sediment off site, access would be restricted or controlled to ensure that equipment was not operated so as to put pedestrians and cyclists at risk. Refer to Page 3.

**Analysis as to whether or not project activities would:**

**a. Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect.**

No impact. Neither the pre-remediation highway work nor the remediation would conflict with any applicable land use plan, policy, or regulation, including those related to land use and habitat/community conservation. Public access to the highway work area would be restricted at night for 90 active work days over a 18 week period. Access to the area required for remediation would be restricted or controlled for 28 weeks during remediation and subsequent restoration. The remediated site and upland areas affected would be restored for future use consistent with the VMP (Trust and NPS, 2001), PTMP (Trust 2002a,b), and the Enhancement Plan (Trust, NPS and GGNPA, 2000). The proposed remedial action at Mountain Lake would improve the environmental conditions in lake and would be in keeping with long-term plans for the area.

As Federal property, Mountain Lake by definition is excluded from the coastal zone. Further, removal of sediment from Mountain Lake would not have effects on the coastal zone since the lake is an isolated water of the U.S. and is located approximately 1 mile inland from the Pacific Ocean (ARARs, Table 5-1, Kennedy/Jenks 2012b). However, the project meets substantive provisions of the San Francisco Bay Conservation and Development Commission (BCDC)'s San Francisco Bay Plan (BCDC, 2008). The final remedial action would be consistent with park use. There would be no permanent impacts on public access to the lake. The biological health of Mountain Lake would be enhanced, and the visitor experience improved, as a result of the project by removing contaminants from the lake and restricting pollutants from reaching the lake in the future.

Therefore, the Project would not conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect.

**b. Conflict with any applicable habitat conservation plan or natural community conservation plan.**

No impact. None of the proposed highway or remediation activities would conflict with any habitat conservation plan or natural community conservation plan.

*Specific References:*

BCDC (San Francisco Bay Conservation and Development Commission), 2008. *San Francisco Bay Plan*. January.

City and County of San Francisco, 2012. San Francisco Zoning Map, http://sfplanning.org/index.aspx?page=1569. February.

Kennedy/Jenks, 2012b. *Draft Feasibility Study/Remedial Action Plan, Mountain Lake, Presidio of San Francisco, California*. March.

NPS and Trust, 2003. *Presidio Trails and Bikeways Master Plan and Environmental Assessment*. July.

Trust, 2002a. *Presidio Trust Management Plan: Land Use Policies for Area B of the Presidio of San Francisco*. May.

Trust, 2002b. *Presidio Trust Management Plan: Environmental Impact Statement.* May.

Trust and NPS, 2001. *Vegetation Management Plan and Environmental Assessment for the Presidio of San Francisco*. December.

Trust, NPS and Golden Gate National Parks Association (GGNPA), 2000. *Mountain Lake Enhancement Plan and Environmental Assessment.* October.

U.S. Environmental Protection Agency (EPA), 1992. Permit and Permit "Equivalency" Processes for CERCLA On-Site Response Actions. OSWER Directive 9355.7-03. February 19, 1992.

*Findings of Significance:*

☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

## 11. Mineral Resources

*Project activities likely to create an impact:*

None. There are no known significant occurrences of mineral resources at the Presidio. Therefore, no impacts would occur. For this reason, no further analysis of impacts to this resource category is necessary.

*Description of Environmental Setting:*

**Analysis as to whether or not project activities would:**
**a. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state.**

*Specific References:*

Kennedy/Jenks, 2012b. *Draft Feasibility Study/Remedial Action Plan, Mountain Lake, Presidio of San Francisco, California*. March.

Trust, 2002a. *Presidio Trust Management Plan: Land Use Policies for Area B of the Presidio of San Francisco*. May.

Trust, 2002b. *Presidio Trust Management Plan: Environmental Impact Statement.* May.

Trust and NPS, 2001. *Vegetation Management Plan and Environmental Assessment for the Presidio of San Francisco*. December.

*Findings of Significance:*

☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☐ No Impact

## 12. Noise

*Project activities likely to create an impact:*

- Noise from heavy equipment, trucks, and other vehicles for roadbed stabilization, installation of drainage pipe, lake dredging and slurry pumping, dewatering, and transportation of excavated sediment.

*Description of Environmental Setting:*

The noise environment within and outside the Presidio is largely a function of the proximity to motor vehicle traffic, with the quietest areas located farthest from major transportation corridors such as Doyle Drive (US 101) and Park Presidio Blvd (Highway 1). In the vicinity of Highway 1 and U.S. Highway 101 (including Doyle Drive and Richardson Ave), existing traffic noise levels commonly are above 67 dBA (A-weighted decibels), which is the Federal Highway Administration (FHWA) Noise Abatement Criterion (NAC) for recreation areas, parks, and residences. Noise-sensitive areas within the Presidio that could be affected by the planned construction and remediation include the Mountain Lake and De Anza National Historic trails, Mountain Lake Park, the Presidio Golf Course, and residences near the site and along the site access routes.

As a matter of policy, the Presidio endeavors to meet local standards when feasible. The San Francisco Noise Ordinance (Article 29 of the San Francisco Police Code, 1994) addresses noise in the community. The noise ordinance regulates construction noise, fixed-source noise, and unnecessary, excessive, or offensive noise disturbances within the City. The construction noise regulations in Sections 2907 and 2908 of the San Francisco Police Code provide that:

1. Construction noise is limited to 80 A-weighted decibels (dBA) at 100 feet from the equipment during daytime hours (7 a.m. to 8 p.m.). Impact tools are exempt provided that they are equipped with intake and exhaust mufflers, and
2. Nighttime construction (8 p.m. to 7 a.m.) that would increase ambient noise levels by 5 dBA or more at the Presidio of San Francisco property line is prohibited unless a permit is granted by the Director of Public Works.

Noise levels are generally considered low when below 45 dBA, moderate in the 45 to 60 dBA range, and high above 60 dBA. For comparison, levels around 75 dBA are common in busy urban areas and levels up to 85 dBA occur near major freeways and airports.

**Analysis as to whether or not project activities would:**
**a. Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.**

Less than significant. Noise generated by the planned construction and remediation activities would be intermittent and spread over two years. Noise impacts would be generally limited to nearby sensitive receptors (residents), intermittent users, such as trail hikers and park users, and other visitors.

The principal noise from the Caltrans night work would be the generators needed to power lights, up to 8 trucks delivering aggregate, the engine on the vibratory rig, and a front loader deposing aggregate into shafts. If mechanical (belt press) dewatering were to occur at night, the noise would be a steady sound of the belt in operation. If instituted, nighttime dewatering would comply with the San Francisco ordinance on nighttime noise levels.

The proposed Project would temporarily increase daytime noise levels from use of equipment and vehicles for site preparation, the dredge and pump, the dewatering press, and the off-hauling of dewatered sediment.

Most construction activities are capable of causing routine noise levels of approximately 79 to 84 dBA measured 100 feet from the activity if noise control is not used, or 69 to 74 dBA with noise control.

Table12-1 shows typical noise levels of typical construction equipment, based on the Federal Highway Administration (FHWA) Roadway Construction Noise Model. Noise levels in this inventory are expressed in terms of maximum instantaneous levels (Lmax) with a usage factor for the intermittent nature of construction. The acoustical usage factor estimates the fraction of time each piece of construction equipment might operate at full power (i.e., its loudest condition) while in use.

**Table 12-1: Noise Levels and Usage Factors for Construction Equipment**

| Equipment | Acoustical Usage Factor (%) | Measured Lmax (dBA at 50 feet) |
|---|---|---|
| Auger Drill Rig | 20 | 84 |
| Backhoe | 40 | 78 |
| Compactor (ground) | 20 | 83 |
| Compressor (air) | 40 | 78 |
| Concrete Mixer Truck | 40 | 79 |
| Concrete Pump Truck | 20 | 81 |
| Crane | 16 | 81 |
| Dozer | 40 | 82 |
| Drill Rig Truck | 20 | 79 |
| Drum Mixer | 50 | 80 |
| Dump Truck | 40 | 76 |
| Excavator | 40 | 81 |
| Flat Bed Truck | 40 | 74 |
| Front End Loader | 40 | 79 |
| Generator | 50 | 81 |
| Grader | 40 | 85 |
| Pickup Truck | 40 | 75 |
| Pneumatic Tools | 50 | 85 |
| Pump | 50 | 81 |
| Welder/Torch | 40 | 74 |

Source: FHWA, 2006.
Notes: Lmax – maximum A-weighted sound level

Noise would be generated by equipment for highway stabilization, dredging equipment, generators, pumps, loaders, and trucks hauling materials including aggregate and dewatered sediment to and from the site. Noise for installing highway stabilization and rock columns would occur at night. At its closest, the work would be approximately 200 feet from the nearest residences. Dredging would occur in the daytime and at its closest would be about 400 feet from the nearest residences.

Because the proposed pre-remediation roadway stabilization activities would occur primarily at night, to avoid potential noise impacts, the activities for highway stabilization and runoff management would include reasonable and feasible noise abatement features to ensure that nighttime noise levels do not substantially increase. However, sound walls or acoustic panels may not be feasible due to the steep grade between the highway shoulder and residences.

During dredging and hauling, noise levels for receptors near the remediation site or along roads providing access to the site could be considerable. Hydraulic dredging equipment and pumps for moving dredged material to the dewatering area would be likely to cause between 70 and 80 dBA at the dredging barge. At the dewatering site, sediment dewatering equipment would be less noisy, operating at levels under 70 dBA, and a backhoe or loader generates about 80 dBA. The large dump trucks used to transport the sediment would be the primary source of noise. The site-specific Health and Safety Plan (HSP) would describe the controls and procedures to be implemented to minimize the incidents, injury, and risks for workers associated with excessive noise.

If ramp access between the site and Highway 1 is constructed, trucks hauling sediment would not pass near local residences. However, they likely would operate at night between the dewatering area and the entrance to Highway 1. This would be because of the need for a temporary lane closure for safe movement of trucks onto and off the highway. A lane closure for daytime hauling would create congestion and backups on this busy roadway. The dewatering area would be approximately 1,000 feet from the nearest residences on Wyman Ave and the Highway 1 exit ramp would be approximately 450 feet from Wyman Ave. residents. Both the dewatering site and ramps would be separated from the residents by Highway 1. The dewatering site is approximately 1,300 feet from the nearest residences to the south of the lake. These distances would provide sufficient attenuation of noise levels to ensure that nighttime noise levels do not substantially increase.

If trucks travel to and from the site along West Pacific Ave, they would operate in the daytime and pass within approximately 20 to 30 feet of residences having side yards or rear yards along the Presidio's southern boundary. These residences are located at the termini of 5th, 6th and 7th Avenues and on Presidio Terrace. If used for ingress and egress, approximately 25 loaded trucks, and the same number of returning empty trucks, would pass near the residences during a work day as they transit between the site and Arguello Blvd. For a period of 4 to 8 weeks during the overall 28-week remediation portion of the Project, about 6 heavy-duty haul truck passes per hour would occur. Construction trucks generate peak noise levels of about 80 dBA, and for locations beyond 100 feet, distance would attenuate the level to less than 74 dBA. Inside buildings, noise from outside sources is reduced by about 15 to 20 dBA due to the attenuating effect

of the structural components of the dwelling. Trucks passing along West Pacific Ave could result in indoor sound levels for the nearest residences of about 60 dBA during each pass-by. The threshold for speech interference indoors is 55 dBA for fluctuating noise. As a result, trucks along West Pacific Ave would briefly disturb the nearest residences. Noise along this route would occur only during the day, when people are less sensitive to noise (as compared to night), and would be intermittent rather than constant. If trucks use the Park Blvd route, they would pass residences located on Washington Blvd either eastbound or west bound. The distance between the curb and the residences varies from approximately 40 to 50 feet. As with West Pacific Ave, trucks passing along Washington Blvd would briefly disturb the nearest residences with resulting indoor sound levels of about 60 dBA.

During construction, contractors and other equipment operators would comply with the San Francisco noise ordinance, which requires that each piece of powered equipment, other than impact tools, emit noise levels no higher than 80 dBA measured at 100 feet from the equipment during daytime hours (7 a.m. to 8 p.m.). Trucks used for on-highway transport and other motor vehicles are not subject to this limitation.

PTMP Mitigation Measure NR-23 for General Construction/Demolition Noise, requires that "During construction, construction contractors and other equipment operators would be required to comply with the San Francisco Noise Ordinance (San Francisco Municipal Code, Section 2907b), which requires that each piece of powered equipment, other than impact tools, emit noise levels of not more than 80 A-weighted decibels (dBA) at 100 feet. To reduce noise impacts, barriers would be erected around construction sites and stationary such as compressors; this would reduce noise by as much as 5 dBA. To further reduce noise impacts on visitors, some construction sites would be temporarily closed, and appropriate barriers placed at a distance of 250 feet from the sites" (Trust, 2002a,b). This measure is incorporated into the Project, as required by the PTMP.

Reasonable and feasible noise abatement features measures would be implemented to manage construction noise. Control measures would include, but not be limited to, proper maintenance and tuning of equipment, placement of noisy equipment away from sensitive receptors as practicable, noise-control mufflers, and scheduling noisier operations during periods of low visitor use (weekdays), to the extent feasible. In addition, construction would be scheduled to limit impacts on wildlife and bird nesting activity in consultation with Trust natural resource specialists. Within the Presidio, transport of equipment and sediment would occur along routes approved by the Trust (see Section 15). Outside of the Presidio, haul routes would follow major thoroughfares and signed routes approved for truck traffic. Because of these controls, the activities would not result in exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

**b. Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.**

Less than significant. Vibration from equipment would be perceptible in the immediate vicinity of the equipment or activity. Tamping of ground surfaces and the passing of heavy trucks on uneven surfaces would create perceptible vibration in the immediate vicinity of the activity. The level of groundborne vibration that could reach sensitive receptors depends on the distance to the receptor, the equipment creating vibration, and the soil conditions surrounding the construction site. The impact from construction-related groundborne vibration would be short-term and confined to only the immediate area around the activity (within about 25 feet). Because construction of roadbed stabilization would occur approximately 200 feet away from residences, no excessive groundborne vibration or noise level would occur at the residences. Because vibration related to remediation and transportation of sediment would be temporary, intermittent, and far from residences, impacts related to groundborne vibration and noise would be less than significant. If trucks use the West Pacific Ave route, they would be travelling at a reduced speed and are not likely to create vibration in the houses.

**c. A substantial permanent increase in ambient noise levels in the vicinity above levels existing without the project.**

No Impact. Activity and increased ambient noise levels would occur intermittently over two years for the highway stabilization and subsequent lake remediation. Upon completing the work, no permanent noise source would remain. Because the noise would be limited to the duration of activity, the Project would not result in a permanent increase in noise levels in the vicinity.

**d. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.**

Less than significant. Temporary and periodic increases in ambient noise levels in the Project vicinity would occur above levels existing without the Project. Construction of the highway stabilization and highway runoff features would occur 200 feet away from noise-sensitive residences, at the closest. Construction would include reasonable and feasible noise abatement features to ensure that nighttime noise levels do not substantially increase.

Dredging would be limited to during daylight hours, when receptors are less sensitive. With the exception of ramp use for ingress and egress and, potentially, night dewatering operations, noise would occur during daylight hours and would be perceived, at worst, as a temporary passing impact. If ramps are used, the nighttime noise of trucks operating between

Highway 1 and the dewatering site would occur 450 feet or more from the nearest residences and would be separated from the residents by heavily travelled Park Presidio Blvd. This is a distance that would provide sufficient attenuation. All activity would employ noise control measures to ensure that the increase in noise would not be substantial (described in Section 12a), such as placement of noisy equipment away from sensitive receptors as practicable and using noise-control mufflers. As a consequence, temporary increases in the ambient noise levels would not be substantial and would be less than significant.

*Specific References:*

Kennedy/Jenks, 2012b. *Draft Feasibility Study/Remedial Action Plan, Mountain Lake, Presidio of San Francisco, California*. March.

FHWA (Federal Highway Administration). 2006. FHWA Highway Construction Noise Handbook. (FHWA-HEP 06 015; DOT VNTSC FHWA 06 02). August. http://www.fhwa.dot.gov/environment/noise/handbook/index.htm.

Trust, 2002a. *Presidio Trust Management Plan: Land Use Policies for Area B of the Presidio of San Francisco*. May.

Trust, 2002b. *Presidio Trust Management Plan: Environmental Impact Statement*. May.

*Findings of Significance:*

☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

## 13. Population and Housing

*Project activities likely to create an impact:*

None. The Presidio currently has over 1,000 occupied multifamily and single-family housing units and a residential population of just under 3,000 persons. The Project would not create a demand for housing nor increase local population. Construction workers, equipment operators, and truck drivers would be from the local labor pool and would maintain their current residences. Therefore, no impacts would occur. For this reason, no further analysis of impacts to this resource category is necessary.

*Description of Environmental Setting:*

**Analysis as to whether or not project activities would:**

**a. Induce substantial population growth in area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure).**

**b. Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere**.

**c. Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere**.

*Specific References:*

Trust, 2002a. *Trust Management Plan: Land Use Policies for Area B of the Presidio of San Francisco*. May.

Trust, 2002b. *Trust Management Plan: Final Environmental Impact Statement*. May.

*Findings of Significance:*

☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☐ No Impact

## 14. Public Services

*Project activities likely to create an impact:*

- Stabilization of Highway 1
- Dredging of lake
- Sediment processing.

*Description of baseline environmental conditions:*

During Highway 1 stabilization work, a northbound lane would be closed. This would occur at night.

The Presidio is jointly administered by the NPS and the Trust. The Project would be located within the area of the Presidio administered by the Trust. Police services are provided by the Park Service Police. Fire and emergency response services are provided by the San Francisco Fire Department. Project dredging would occur in an area where there are no public roads. West Pacific Ave west of 5th Ave is closed to private vehicles, but if required would be available for use in hauling sediment from the site, and would remain available for emergency access, as it is now. The Project would not increase population or the use of public services.

**Analysis as to whether or not project activities would:**
**a. Result in substantial adverse physical impacts associated with the provision of new or physically altered government facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the following public services:**

- **Fire protection**
  No impact. The Project would not require new or altered fire protection facilities. The Trust would coordinate with the San Francisco Fire Department who would respond in emergencies. The proposed activities would not block access of routes used for emergency access vehicles. No additional fire protection facilities would be required as a result of Project implementation.

- **Police protection**
  No impact. The Project would not require new or altered police protection facilities. The Trust would coordinate with Park Service Police who would continue to patrol the general areas throughout the Presidio and respond to on-site emergencies. No additional services would be required as a result of the Project. Fencing and signage would be provided as needed to restrict public access to the site.

- **Schools**
  No impact. The Project would not require new or altered school facilities.

- **Parks**
  No impact. The Project would not require new or altered park facilities.

- **Other public facilities**
  No impact. The Project would not require new or altered public facilities.

*Specific References:*

Trust, 2002a. *Presidio Trust Management Plan: Land Use Policies for Area B of the Presidio of San Francisco*. May.

Trust, 2002b. *Presidio Trust Management Plan: Environmental Impact Statement*. May.

*Findings of Significance:*

☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☐ Less Than Significant Impact
☒ No Impact

## 15. Recreation

*Project activities likely to create an impact:*

- Temporary site fencing to redirect public access away from work zones.

*Description of Environmental Setting:*

There would be no recreational facility affected by the Caltrans highway work.

The Presidio is a National Park. The Project would be located within the area of the Presidio administered by the Trust. The PTMP (Trust 2002a and 2002b) is the land use guidance document. Recreational uses of the Presidio vary from passive activities, such as walking and bird watching, to active sports such as baseball, tennis, and bicycling. Activities associated with Mountain Lake are primarily trail walking and nature observation. A portion of the south shore of the lake, as well as land immediately outside the Presidio boundary is a City park. This area supports active recreation, including picnicking, a playground, and tennis courts. During remediation, these facilities would be unaffected. The construction area for the remediation work would be fenced. The staging area would be at the north end of the lake and would require either period or complete closure of the trail at the end of the lake. This would preclude through pedestrian and bicycle traffic. If trucks need to use West Pacific Ave for site access, the route would have to be closed during hauling.

**Analysis as to whether or not project activities would:**
**a. Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.**

Less than significant. The highway work would not affect any park or recreational facility. It would occur at night. During implementation of the remediation portion of the Project, the site would be fenced to restrict and redirect public access. This is standard practice at all Presidio remediation sites during construction. The remedial design would include pedestrian detours designed to keep visitors out of active work areas while permitting full use of other park areas and facilities to the extent feasible and safe. Use of most of the City's Mountain Lake Park would be unaffected. Following remediation, site restoration would be conducted consistent with the VMP (Trust and NPS, 2001) and Mountain Lake Enhancement Plan (Trust, NPS and GGNPA, 2000). Revegetation of the shore and near shore would include use of native plant species, historic or native tree species, and landscape vegetation appropriate to its future uses.

The Project action would be consistent with park use. There would be no permanent impacts on public access to the lake. The biological health of Mountain Lake would be enhanced, and the visitor experience improved, as a result of the project by removing contaminants from the lake and restricting pollutants from reaching the lake in the future.

Temporary and permanent effects on recreational facilities would be less than significant, and would be enhanced in the long term by post-remediation restoration. Although some passive recreational use of the Presidio would be diverted during the construction period, the proposed remedial action would not increase the use of existing parks or recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.

**b. Include recreational facilities or require construction or expansion of recreational facilities which might have an adverse physical effect on the environment.**

Less than significant. Site restoration would be conducted to facilitate habitat and recreational development. Ultimately, the site vicinity would be landscaped consistent with the VMP Trust and NPS, 2001) and Mountain Lake Enhancement Plan (Trust, NPS and GGNPA, 2000). The proposed remediation activities would not require construction of additional recreation facilities, and thus, it would not have an adverse physical effect on the environment.

*Specific References:*

Kennedy/Jenks, 2012b. *Draft Feasibility Study/Remedial Action Plan, Mountain Lake, Presidio of San Francisco, California*. March.

NPS and Trust, 2003. *Presidio Trails and Bikeways Master Plan and Environmental Assessment*. July.

Trust, 2002a. *Presidio Trust Management Plan: Land Use Policies for Area B of the Presidio of San Francisco*. May.

Trust, 2002b. *Presidio Trust Management Plan: Environmental Impact Statement*. May.

Trust and NPS, 2001. *Vegetation Management Plan and Environmental Assessment for the Presidio of San Francisco.* December.

Trust, NPS and Golden Gate National Parks Association (GGNPA), 2000. *Mountain Lake Enhancement Plan and Environmental Assessment.* October.

*Findings of Significance:*

☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

## 16. Transportation and Traffic

*Project activities likely to create an impact:*

- Delivering aggregate and equipment to the highway stabilization site
- Delivering equipment to the remediation site
- Hauling dewatered sediment to an offsite permitted facility.

*Description of Environmental Setting:*

With the exception U.S. 101 and Highway 1 passing through the Presidio, roads on the Presidio serve mostly local traffic heading to and from on-Presidio destinations or passing through the Presidio to nearby City districts. Traffic speeds are low, and congestion occurs intermittently at principal (four-way stop sign controlled) intersections. Traffic in city neighborhoods surrounding the Presidio varies from very light (in residential neighborhoods), to heavy (along Park Presidio Blvd, for example). The nearest elementary schools are just over 1,320 feet (0.25 mile) from the site. A preschool and care facility is approximately 600 feet northwest of the site, but is separated from the site by Park Presidio Blvd. There is no public vehicle access to Mountain Lake. Access can be achieved by use of West Pacific Ave, a wide paved road from Arguello Blvd to approximately 800 feet west of the Presidio Golf Club, where a locked gate and bollards prevent vehicles from continuing. Between the bollards and the Lake, the right of way continues at the same width as the road. Only 15-foot width of the north side of the right of way is a paved path; the right side is a crush stone roadbed. The overall right of way is approximately 40 feet wide. It is sufficiently wide to allow equipment and truck access to the lake. The Mountain Lake Trail makes use of the West Pacific Ave right of way for part of its length. On the east side of Mountain Lake, the De Anza National Historic Trail and the Mountain Lake Trail share a common path. This path is paved around the Lake up to the staging area (dewatering site). Given the location of the trails relative to the Lake and to the dewatering site, the trails adjacent to the Lake would need to be restricted or closed during certain construction activities.

The proposed pre-remediation work and highway stabilization would generate the following truck trips during approximately 90 active work days over 18 weeks:

- Approximately 8 truck round trips per shift for delivering aggregate and a similar or lesser number for removing spoils.
- Approximately 200 truck round trips to deliver fill for ramp construction
- Additional truck trips for mobilizing and demobilizing highway construction equipment and delivering pipe and other material.

The proposed remediation would generate the following truck trips during approximately 28 weeks of activity:

- Approximately 550 to 990 truck round trips to transport dewatered sediment from the site for disposal over a 4 to 8 week period.
- A small number of additional truck round trips to deliver equipment, fencing, and other materials to the site and to haul vegetation offsite. (Logs and branches may be chipped and left on site as erosion control mulch.)
- A small number of additional truck round trips to deliver plants, mulch, erosion control, and irrigation tubing.

Sediment removal would require off-site transport of approximately 9,850 cy of dewatered solids, which would generate approximately 25 truck round-trips per day during a 4 to 8 week period. This would average 6 trips per hour (3 outbound, 3 inbound); however, there may be more per hour earlier in the day if the material is hauled to landfills at a considerable distance, such as Buttonwillow landfill, 265 miles away. The number of personal vehicles from Project workers would be negligible compared to the existing traffic levels in the Presidio and nearby streets. The Trust will coordinate with Caltrans and the local transportation agency to ensure compliance with state and local transportation requirements or ordinances.

**Analysis as to whether or not project activities would:**

**a. Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit.**

Less than significant. For safety, the Project may require closure of the trails on the north side of the lake for the duration of construction and intermittent closures of trails on the south and east sides of the lake. If ramp access to the site is used, vehicles entering the site would approach from the south, on Highway 1. Exiting vehicles would leave the site heading north on Highway 1, toward the MacArthur Tunnel under the golf course. Trucks would continuing north on Highway 1 to U.S. Highway 101, then proceed either north across the Golden Gate Bridge or south on U.S. 101, depending on the location of the disposal site. Vehicles entering the site would approach from the south on Highway 1 and travel down the temporary ramp into the site. Alternatively, traffic to and from the site would be along West Pacific Ave, between the lake and Arguello Blvd. Arguello Blvd is moderately used during the day, and can be somewhat heavily used during morning and evening rush hours and weekends, when it is used as a short-cut between the Marina/Cow Hollow and Presidio

Heights areas or to avoid Highway 1. Congestion can occur at stop signs, but does not generally result in long queuing times. However, during a 10-hour work day, a maximum of 25 truck round-trips per day would use the Arguello-Presidio Blvd route between West Pacific Ave and the eastern gates to the Presidio (i.e., Lombard Gate, Gorgas Gate, and Marina Gate). This would result in about 3 trucks per hour in each direction. This low volume would have a less than significant impact on local traffic within the Presidio and on designated truck routes outside the Presidio en route to the disposal site(s). The Park Blvd to Washington Blvd routes to either Lincoln Blvd or Arguello Blvd would have similar conditions and outcomes as the West Pacific Ave to Arguello Blvd route.

Cumulative Impacts:

CEQA requires consideration of the cumulative impacts of a proposed project in combination of impacts of other projects or activities that have the potential to combine with impacts of the proposed project. Although impacts of each project may be less than significant, the cumulative effect of all projects may be significant.

*America's Cup:* Major sailing regatta events are planned on San Francisco Bay for the summer of 2012 and 2013. These events are planned to take place in August and September 2012 and from July through September 2013. The events culminate with the America's Cup final in September 2013. Most events are planned for Thursday through Sunday each week, with the greatest attendance expected on Saturday and Sunday. Because of local wind conditions, events are planned primarily for afternoons. As with any major regional event, such as New Year's Eve, 4th of July, and Fleet Week, roadways may become highly congested, particularly main arteries and streets near the waterfront. Based on the sailing schedule and the Project construction schedule, both the Caltrans pre-remediation work and the Trust remediation work have the potential to overlap with the Thursday and Friday events. However, the 2012 Caltrans work would occur primarily at night and, therefore, would not coincide with daytime traffic. The 2013 Trust remediation work anticipates a 4 to 8 week period of hauling sediment from the site. Depending on when this hauling occurs and how it is scheduled, it would be possible to avoid the race-related heavy congestion periods. In particular, given that trucks would be traveling up to 265 miles to a disposal site, they would leave early in the day, before traffic associated with the afternoon events began to arrive. In addition, a contractor typically schedules hauling to make the most efficient use of drivers and trucks. Therefore, it is reasonable that a contractor would schedule around congested periods, when trucks could be caught in traffic. Given that there is no overlap of 2012 construction with race events, and that the 2013 hauling schedule can be adjusted to minimize contributing to congestion, the America's Cup events were not considered in the cumulative analysis.

*2012 Cumulative Scenario:* There are five known construction projects on or near the Presidio that would or may overlap with Project work in 2012. These are the ongoing 5-year Doyle Drive replacement project, the Presidio's Main Post update projects, a remediation project above Baker Beach (RAP BB1A), a remediation project northeast of the Golden Gate bridge toll plaza at the CHP Range, and a remediation project in the Main Post at the Bernard Avenue Protected Range (RAP 6C). Their locations are shown in Figure 9.

The Doyle Drive project is on the north side of the Presidio; the Mountain Lake remediation Project is on the south side, over a mile away. Detours and road closures would be required during the duration of the complex Doyle Drive work, and would change from time to time as the work progresses. The Doyle Drive project EIS concluded that implementation of the Transportation Management Plan for that project would ensure that there are no significant transportation/traffic related impacts (FHWA & SFCTA, 2008).

The Main Post update project is within the Main Post of the Presidio, approximately 4,500 feet northeast of the Mountain Lake site. The Main Post upgrade project includes reconstruction of existing buildings, structural improvements and other seismic work, roadway and utility upgrades, and other infrastructure enhancements. The Main Post work is ongoing and does not occur all at once. Specific projects are fairly small and would involve only nominal amounts of material delivery or hauling. The Supplemental EIS for the Main Post Update indicates that construction vehicle traffic will vary depending on the specific construction activity and schedule. Construction vehicles for the Main Post will generally enter the Presidio via Richardson Ave, Doyle Drive, or the Golden Gate bridge toll plaza (Trust, 2010).

Baker Beach site BB1A work would occur in approximately the same period as the Caltrans work on Highway 1 adjacent to Mountain Lake. The Baker Beach site is approximately 7,000 feet north-northwest of Mountain Lake and only 400 feet south of the Golden Gate Bridge toll plaza. An estimated 3,800 cy of fill would be removed from the site (MACTEC, 2011b), and clean material would be imported, resulting in approximately 500 round-trip truck trips. Access to the Baker Beach site is likely off Lincoln Blvd. Trucks would reach Highway 101 at the Golden Gate Bridge by way of Lincoln Blvd and Merchant Rd. Once on Highway 101, the Baker Beach trucks potentially would use similar off-Presidio routes as the Caltrans trucks if they are on Highway 101.

The CHP Range work would occur in approximately the same period as the Caltrans work on Highway 1 adjacent to Mountain Lake. The CHP site is approximately 8,000 feet north-northwest of Mountain Lake and only 700 feet northwest of the Golden Gate Bridge toll plaza. An estimated 600 cy of fill would be removed from the site and clean material would be imported, resulting in approximately 160 round-trip truck trips. Access to the CHP Range site is likely off Lincoln Blvd. Trucks would reach Highway 101 at the Golden Gate Bridge by way of Lincoln Blvd and Merchant Rd. Once on Highway 101, the CHP Range trucks potentially would use similar off-Presidio routes as the Caltrans trucks if they are on Highway 101 (EKI, 2009).

The Bernard Avenue Protected Range (BAPR) site is south of Presidio Blvd, between Barnard Ave and Quarry Rd, south of Fernandez St. The range now is largely covered by Landfill E, which is a remediated site. However, a portion of BAPR is not covered by the landfill. It is estimated that 2,500 cy of material will be hauled from the site during remediation (Geosynec, 2011), and clean material would be imported, resulting in approximately 340 round-trip truck trips. The haul route is likely to be via Presidio Blvd to Lombard Gate and onto US 101 (Lombard St).

The projects are a considerable distance from each other. In most respects the Mountain Lake site is isolated from the other projects in terms of the potential to contribute to cumulative effects. The only area in which the 2012 Project work near Mountain Lake could contribute to a cumulative effect is in its use of trucks and equipment during construction and when hauling aggregate and material. This part of the construction activity has the potential to contribute to a cumulative impact on traffic congestion.

Level of Service (LOS) is used to describe delay at intersections due to traffic volume and other conditions. Table 6-1 shows existing LOS at intersections along the haul route in the City of San Francisco before trucks merge with traffic on major highways.

**Table 16-1: Haul Route Intersection Level of Service**

| Existing (2011) Intersection Level of Service | Traffic Control | Level of Service (LOS) |
|---|---|---|
| Lombard St./Divisadero St. | Signal | C |
| Lombard St./Fillmore St. | Signal | C |
| Lombard St./Van Ness Ave. | Signal | D |

Source: San Francisco Planning Department, 2011

The levels shown in Table 16-1 include any Doyle Drive related construction traffic. LOS C is described by traffic engineers as “acceptable delays”; LOS D as “tolerable delays”. It is assumed that the contribution of construction-related traffic from the Doyle Drive project would remain similar in 2012 and 2013 to what is was in 2011. The cumulative impact of Project-related truck traffic in 2012 would not change the existing LOS.

All other potential impacts identified for the Caltrans work are specific to the site or the immediate vicinity. Most of this work would occur at night. The other projects identified as occurring in 2012 would occur primarily during the day. In addition, all impacts from the projects are short-term impacts that are associated with construction. There are no ongoing impacts once construction is finished. Consequently, the only resource topics for which cumulative impacts are considered in detail are Air Quality and Traffic/Transportation.

*2013 Cumulative Scenario:* There are three known construction projects on or near the Presidio that would or may overlap with the Trust’s Mountain Lake remediation work in 2013. These are the ongoing 5-year Doyle Drive replacement project and the Presidio’s Main Post update, discussed above for 2012, and another remediation project above Baker Beach (RAP 5C BB2). Their locations are shown in Figure 9.

The ongoing Doyle Drive and Main Post update projects are discussed above and are not repeated here. Baker Beach BB2 site is near the Baker Beach BB1A site that will be remediated in 2012. It is estimated that about 4,000 cy of fill material would be hauled from the BB2 site (MACTEC, 2011a), and clean material would be imported, resulting in approximately 530 truck trips. This is similar in volume to the BB1A work. This second Baker Beach project would use the same travel routes as the prior year’s BB1A project. For purposes of understanding cumulative impacts, the two projects are very similar, with one occurring in 2012 and the other in 2013.

Based on existing LOS estimates in Table 6-1 above, the cumulative impact of Project-related truck traffic in 2012 would not change the existing LOS.

**b. Conflict with an applicable congestion management plan, including but not limited to level of service standards and travel demand measures, or other standards established by the country congestion management agency for designated roads or highway.**

Less than significant. The level of traffic generated by the Project would be low. For the nighttime work on Highway 1, there would be up to 8 trucks per night. Hauling dewatered sediment would require about 25 trucks per day. During rush hours, when the level of service (LOS) on roads at its lowest, the Project would add about 6 heavy-duty trucks to traffic on Lombard St and Van Ness St (i.e., US 101). Truck operators would tend to avoid travel during morning and evening peak hours, or across the Golden Gate Bridge on northbound US 101. This level of travel demand would not cause the current LOS to change, would not conflict with any applicable congestion management plan, and would be less than significant.

**c. Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).**

Less than significant. The Caltrans staging area would be on the shoulder of the highway. Ample warning will be provided to drivers regarding the nighttime lane closure. During the day no material or equipment would be in the roadway. During the day, equipment will be staged and protected on the shoulder. The staging area for the Project would be onsite and would not increase any hazard due to a design feature or incompatible uses. The designated truck routes are designed to minimize traffic hazards (no sharp curves or dangerous intersections). If West Pacific Ave is the truck route, it would be restricted during truck hauling. This may involve closure or, possibly, demarking the truck lane with construction fencing to separate it from the portion of the ROW remaining open to pedestrians and cyclists. Traffic control would be in place on Highway 1 when trucks are entering or exiting the site by way of the temporary ramp. If trucks are required to use the West Pacific Ave route, traffic would be controlled and signed, as necessary, along the haul route to minimize hazards.

**d. Result in inadequate emergency access.**

Less than significant. The proposed Project would not result in inadequate emergency access. Project equipment would be stored onsite and would not obstruct any transportation route used for emergency access vehicles. Emergency access to the Project site via either Highway 1 or West Pacific Ave would be unimpeded. The site also is readily accessible by foot from Lake St at Funston, 8th, and 9th Avenues.

**e. Result in inadequate parking capacity.**

Less than significant. Haul trucks would travel to the job site from remote locations and would not require parking. If necessary, trucks may park onsite within a fenced construction area. Personnel private vehicles and some equipment would require parking. These vehicles and equipment would be staged at the Project site and along West Pacific Ave or in the golf course parking lots. A limited number of contractor employees are expected to be working at the Project site and would park in the vicinity of the site. Given City street parking restrictions, it is assumed that parking would be within the construction area, along West Pacific Ave, or in the golf course parking lot. There would be adequate space on the Presidio to accommodate parked vehicles. Impacts on parking capacity would not be considered significant due to the temporary nature of the activities and the availability of adequate parking.

**e. Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance of safety of such facilities.**

Less than significant. The Project would not significantly alter local traffic patterns in ways conflicting with adopted policies, plans, or programs that support alternative transportation. Because work areas would be temporarily closed during construction, pedestrians (hikers), birdwatchers, and bicyclists would be temporarily detoured. However, the effects are not considered significant because of the relatively short duration of the Project and the availability of alternate trails within the Presidio.

*Specific References:*

City and County of San Francisco Planning Department,2011. *Draft Environmental Impact Report: The 34th America's Cup and James R Herman Cruise Terminal and Northeast Wharf Plaza.* July.

City and County of San Francisco Planning Department, 1995*. Transportation: An Element of the General Plan of the City and County of San Francisco.*

EKI, 2009. *Final Remedial Action Plan for Landfills 8 and 10, PHSH Fill Site, and Four Small Arms Firing Ranges, Presidio of San Francisco, California*. February.

FHWA and SFCTA, 2008. Final Environmental Impact Statement/Report and Section 4(f) Evaluation, South Access to the Golden Gate Bridge: Doyle Drive. September.

Geosyntec, 2012. *Draft Remedial Investigation Summary Report, Barnard Avenue Protected Range, Presidio of San Francisco, California*. February.

Kennedy/Jenks, 2012b. *Draft Feasibility Study/Remedial Action Plan, Mountain Lake, Presidio of San Francisco, California*. March.

MACTEC, 2011a. *Field Sampling Plan, Data Gaps Investigation, Baker Beach Disturbed Area 2, Presidio of San Francisco, California*. July.

MACTEC, 2011b. *Draft Revised Remedial Investigation Report, Baker Beach Disturbed Area 1A, Presidio of San Francisco, California*. August.

NPS and Trust, 2003. *Presidio Trails and Bikeways Master Plan and Environmental Assessment*. July.

Trust, 2002a. *Presidio Trust Management Plan, Land Use Policies for Area B of the Presidio of San Francisco.* May.

Trust, 2002b. *Presidio Trust Management Plan: Final Environmental Impact Statement*. May.

Trust, 2010. *Supplemental Environmental Impact Statement, Presidio Trust Management Plan, Main Post Update*. November.

*Findings of Significance:*
☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

## 17. Utilities and Service Systems

*Project activities likely to create an impact:*

- Highway stabilization, dredging of lake
- Sediment processing
- Expansion of electrical lines to the staging area (dewatering site) and lake.

*Description of Environmental Setting:*

Electric, water supply, and communications are provided by the Trust. Electrical lines would be expanded to bring power to the dewatering site and lake for operations. Caltrans would use existing electrical facilities on the highway or from the City. Gas is provided by PG&E. The Trust's Permit No. 05-0246 from the San Francisco Public Utilities Commission allows water to be tested and discharged to the sanitary sewer. Water for dust control would be obtained from an existing hydrant, a water truck, or the lake.

**Analysis as to whether or not project activities would:**

**a. Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board.**

No impact. The Project would have no wastewater treatment needs.

**b. Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.**

No impact. The proposed activities would not require new wastewater treatment facilities. The Project would not increase or significantly change the amount of rainwater or runoff entering or leaving the Project site.

**c. Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.**

Less than significant. For lake remediation, temporary pipelines or other transport would be constructed from the lake to the dewatering area for transport of sediment and water. These pipelines are temporary and would be disabled at the end of the Project. Caltrans would perform work to the existing drainage system to manage, control and treat roadway runoff prior to entering the lake. The existing facilities would still be in use. Existing culverts and drainage inlets between the MacArthur Tunnel and the Mountain Lake overflow pipe would be upgraded by installing storm water treatment devices that remove pollutants and particulates. In addition, 3 manholes and 3 new inlets would be installed. Approximately 685 linear feet (LF) of 18-inch reinforced concrete drainage pipe and 475 LF of 36-inch reinforced concrete pipe would be installed underground along the highway. Approximately 100 feet of 15-inch ductile iron pipe would be installed on the West Pacific Ave Bridge. Existing culverts and drainage inlets between the MacArthur Tunnel and the Mountain Lake overflow pipe would be upgraded by installing storm water treatment devices that remove pollutants and particulates. Three existing 18-inch cross culverts would be spiral lined. In addition, 3 manholes and 3 new inlets will be installed and 2 existing inlets would be removed and replaced. Approximately 18 Storm water treatment devices would be installed in all new and existing inlets from the MacArthur Tunnel to the Mt. Lake Overflow Pipeline. Approximately 1,000 linear feet of chain link fence would be installed between the highway and lake and 1,000 LF of asphalt concrete dike 6-inches high would be installed along the shoulder between the highway and lake. This dike would prevent runoff to the lake and direct flow to the drainage inlets. These Project activities would not significantly alter or expand storm water drainage facilities. Also, erosion control measures would be used to minimize onsite runoff. Refer to Section 9.

**d. Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed.**

No impact. No new or expanded water services would be required during or following remediation. Only minor amounts of water would be used for dust control during Project implementation.

**e. Result in determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the projects projected demand in addition to the providers existing commitments.**

No impact. The Project would have no wastewater treatment needs.

**f. Be served by a landfill with sufficient permitted capacity to accommodate the projects solid waste disposal needs.**

Less than significant. Dewatered contaminated sediment would be transported off site to an appropriately permitted facility designed to manage the solid waste. Approximately 15,600 cubic yards of in situ sediment would be removed, resulting in approximately 9,850 cy of dewatered solids to be hauled away. In addition, Caltrans would have a limited amount of spoils from the column installation work. The landfills selected would have sufficient permitted capacity to accommodate the sediment and spoils.

**g. Comply with federal, state, and local statutes and regulations related to solid waste.**

No impact. The Project activities would be conducted in accordance with federal, State, and local statutes and regulations related to solid waste.

*Specific References:*

Kennedy/Jenks, 2012b. *Draft Feasibility Study/Remedial Action Plan, Mountain Lake, Presidio of San Francisco, California*. March.

Trust, 2002a. *Trust Management Plan, Land Use Policies for Area B of the Presidio of San Francisco*. May.

Trust, 2002b. *Trust Management Plan: Final Environmental Impact Statement*. May.

*Findings of Significance:*

☐ Potentially Significant Impact
☐ Potentially Significant Unless Mitigated
☒ Less Than Significant Impact
☐ No Impact

## 18. Mandatory Findings of Significance

Based on evidence provided in this Initial Study, DTSC makes the following findings:

a. The Project ☐ has ☒ does not have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory.

b. The Project ☐ has ☒ does not have impacts that are individually limited but cumulatively considerable. ("Cumulatively considerable" means that the incremental effects of an individual project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)

c. The Project ☐ has ☒ does not have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly.

Determination of Appropriate Environmental Document:
Based on evidence provided in this Initial Study, DTSC makes the following determination:

☒ The proposed Project COULD NOT HAVE a significant effect on the environment. A **Negative Declaration** would be prepared.

☐ The proposed Project COULD HAVE a significant effect on the environment. However, there would not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A **Mitigated Negative Declaration** would be prepared.

☐ The proposed Project MAY HAVE a significant effect on the environment. An **Environmental Impact Report** is required.

☐ The proposed Project MAY HAVE a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An **Environmental Impact Report** is required, but it must analyze only the effects that remain to be addressed.

☐ The proposed Project COULD HAVE a significant effect on the environment. However, all potentially significant effects (a) have been analyzed adequately in an earlier Environmental Impact Report or Negative Declaration pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier Environmental Impact Report or Negative Declaration, including revisions or mitigation measures that are imposed upon the proposed project. Therefore, nothing further is required.

## Certification:

I hereby certify that the statements furnished above and in the attached exhibits, present the data and information required for this initial study evaluation to the best of my ability and that the facts, statements and information presented are true and correct to the best of my knowledge and belief.

| | | |
|---|---|---|
| RVSunga | | 3/13/12 |
| Preparer's Signature | | Date |
| Remedios V. Sunga | Project Manager | 510-540-3840 |
| Preparer's Name | Preparer's Title | Phone # |
| DMTsuji | | 3/13/12 |
| Team Leader Signature | | Date |
| Denise M. Tsuji | Unit Chief | 510-540-3824 |
| Team Leader Name | Team Leader Title | Phone # |

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# Appendix A: Acronyms and Abbreviations

| | |
|---|---|
| µg | microgram |
| AB | Assembly Bill |
| ACHP | Advisory Council on Historic Preservation |
| AMA | Archeological Monitoring Assessment |
| ARARs | applicable or relevant and appropriate requirements |
| BAAQMD | Bay Area Air Quality Management District |
| BACT | Best Available Control Technology |
| BAPR | Bernard Avenue Protected Range |
| BBDA | Baker Beach Disturbed Area |
| BCDC | Bay Conservation and Development Commission |
| BMP | best management practice |
| bss | below sediment surface |
| CARB | California Air Resources Board |
| CCR | California Code of Regulations |
| CDFG | California Department of Fish and Game |
| CEQA | California Environmental Quality Act |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFR | Code of Federal Regulations |
| CH4 | methane |
| CHP | California Highway Patrol |
| CO | carbon monoxide |
| $CO_2$ | carbon dioxide |
| CO2e | carbon dioxide equivalent |
| COC | Chemicals of Concern |
| cy | cubic yard |
| dBA | A-weighted decibels |
| DTSC | Department of Toxic Substances Control |
| FHWA | Federal Highway Administration |
| FS/RAP | Feasibility Study/Remedial Action Plan |
| GGNRA | Golden Gate National Recreation Area |
| GHG | greenhouse gas |
| HSC | Health and Safety Code (California) |
| HSP | Health and Safety Plan |
| IS | Initial Study |
| LF | linear feet |
| Lmax | maximum instantaneous level [noise] |
| LOS | level of service [road intersections] |

| | |
|---|---|
| $m^3$ | cubic meters |
| mi | mile |
| MMT | million metric tonnes |
| N2O | nitrous oxide |
| NAC | Noise Abatement Criterion |
| NAHC | Native American Heritage Commission |
| NHLD | National Historic Landmark District |
| NHPA | National Historic Preservation Act |
| NO2 | nitrogen dioxide |
| NOx | nitrogen oxides |
| NPDES | National Pollution Discharge Elimination System |
| NPS | National Park Service |
| NR | National Register |
| PA | Programmatic Agreement |
| PCOC | Potential Chemical of Concern |
| PM10 | particulate matter 10 microns or less in diameter |
| PM2.5 | particulate matter less than 2.5 microns in diameter |
| ppm | parts per million |
| PT | Presidio Trust |
| PTMP | Presidio Trust Management Plan |
| RAO | Remedial action objective |
| ROG | reactive organic gas |
| ROW | right of way |
| SHPO | State Historic Preservation Office |
| SO2 | sulfur dioxide |
| SOx | sulfur oxides |
| SWPPP | Storm Water Pollution Prevention Plan |
| THP | total petroleum hydrocarbons |
| TMP | Transportation Management Plan |
| TPHd | Total petroleum hydrocarbons as diesel |
| TPHmo | Total petroleum hydrocarbons as motor oil |
| UCL | Upper confidence limit |
| USFWS | US Fish and Wildlife Service |
| UXO | unexploded ordnance |
| VMP | Vegetation Management Plan |
| yr | year |

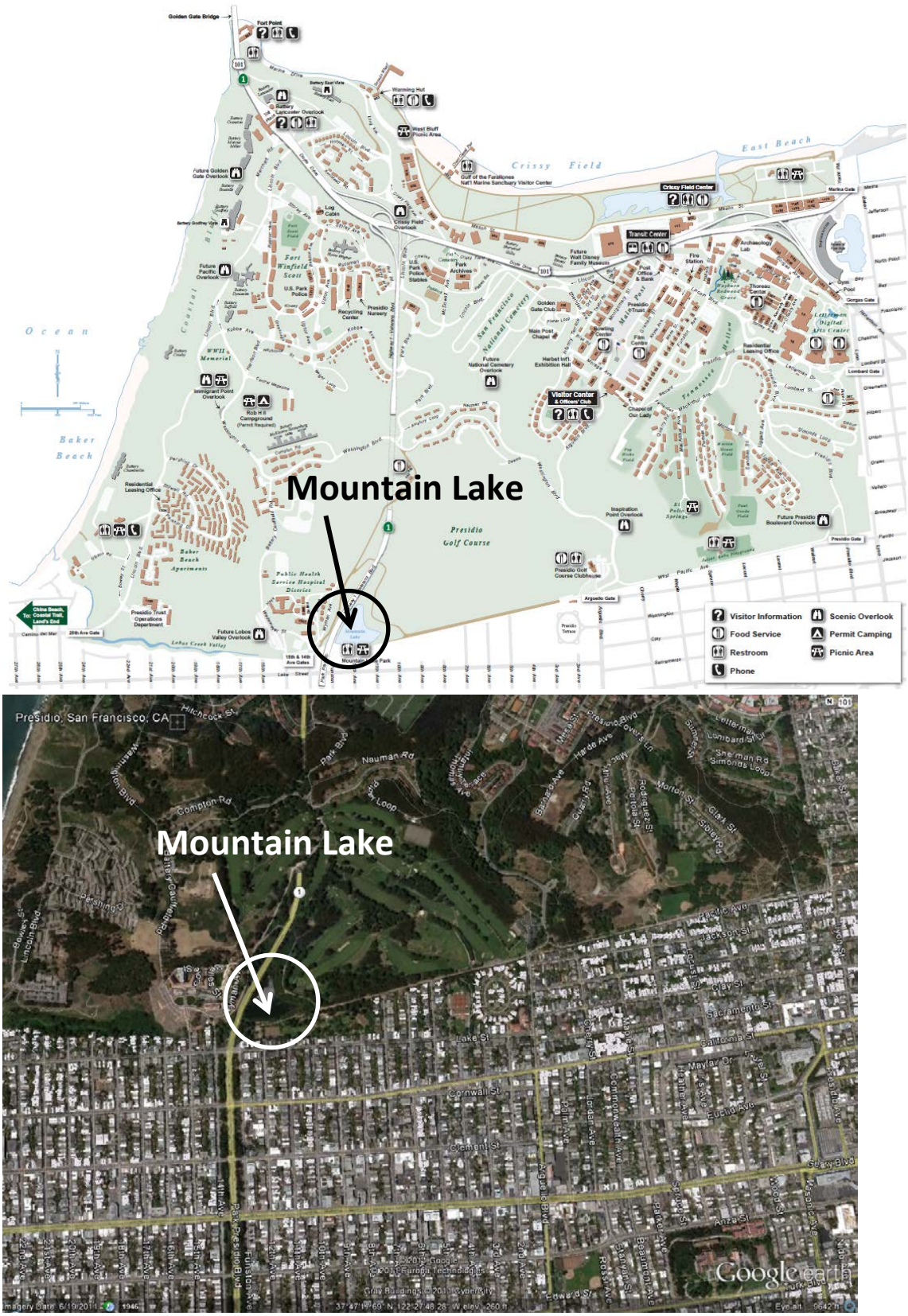



**Figure 1: Project Location in the Presidio and Relative to the City**

**Figure 2: Adjacent Land Uses and Roads**

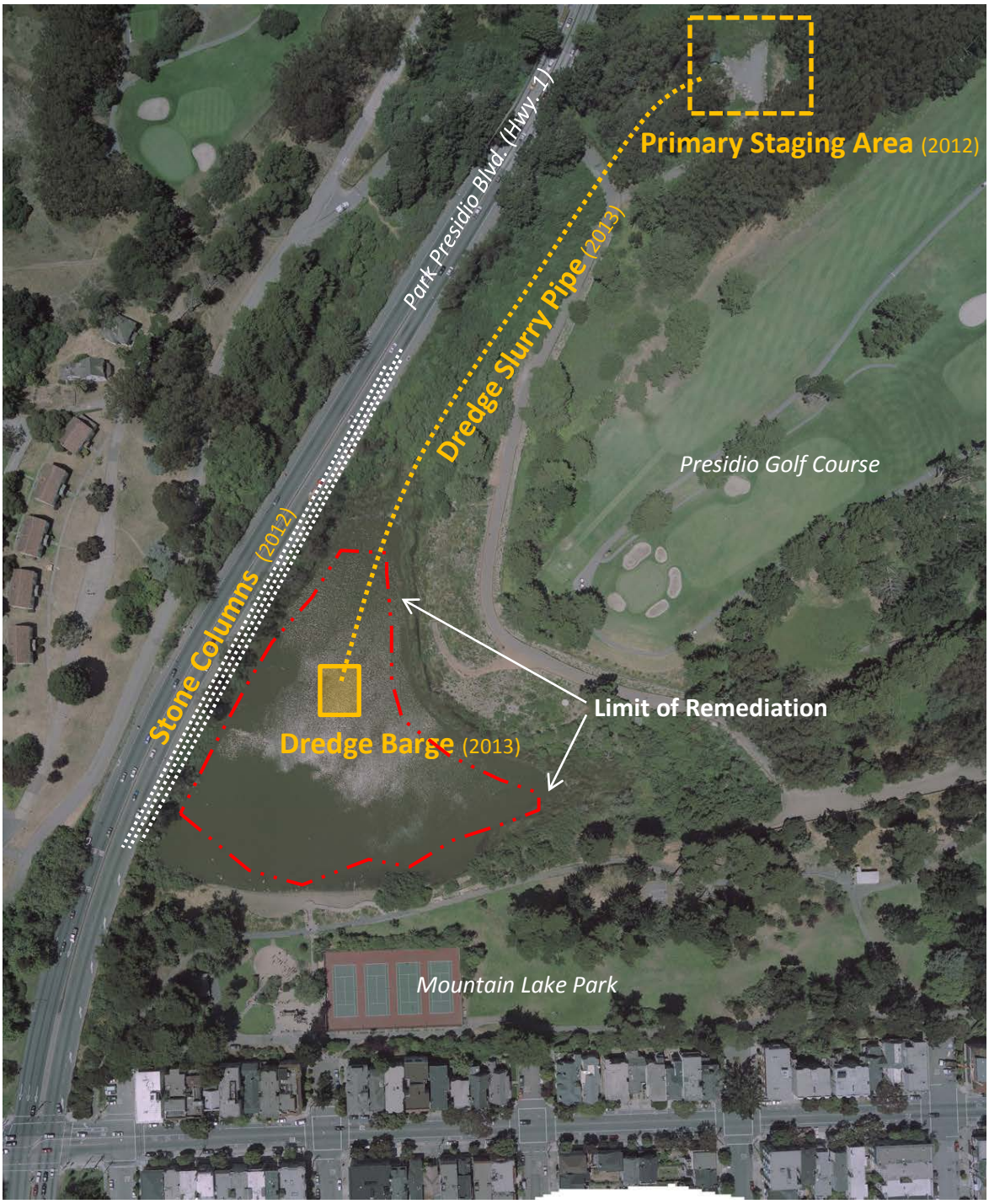



**Figure 3: Primary Construction Elements – 2012 & 2013**

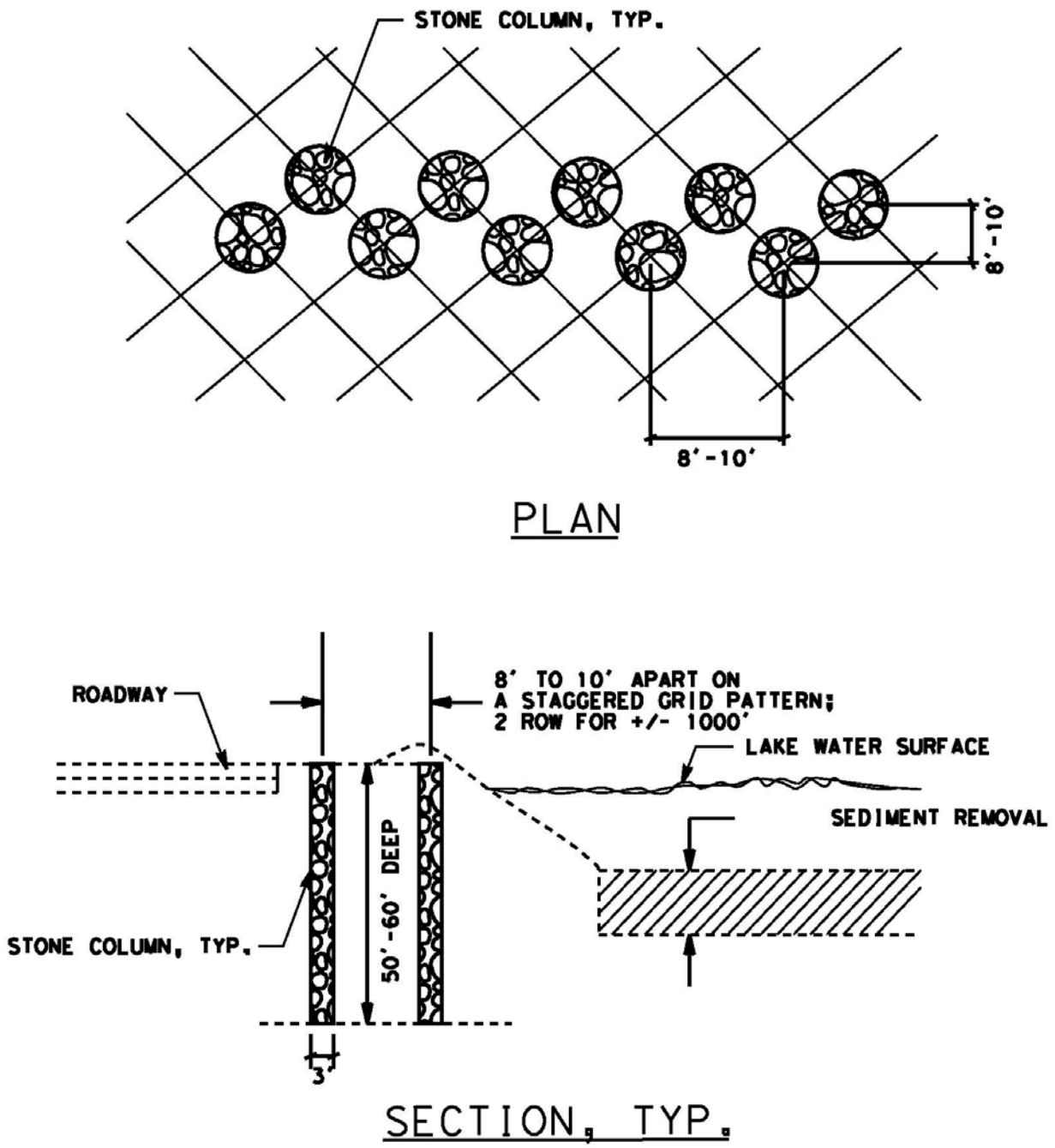
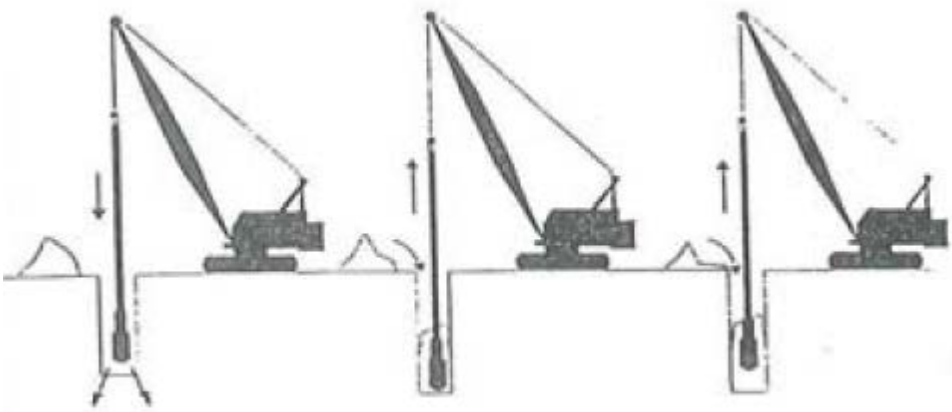



**Figure 4: Illustration of Stabilization Using Stone Columns**
(Note: Dimensions are illustrative only. Final dimensions and arrangement to be determined.)

**Top Feed Vibro Displacement**



**Bottom Feed Vibro Displacement**

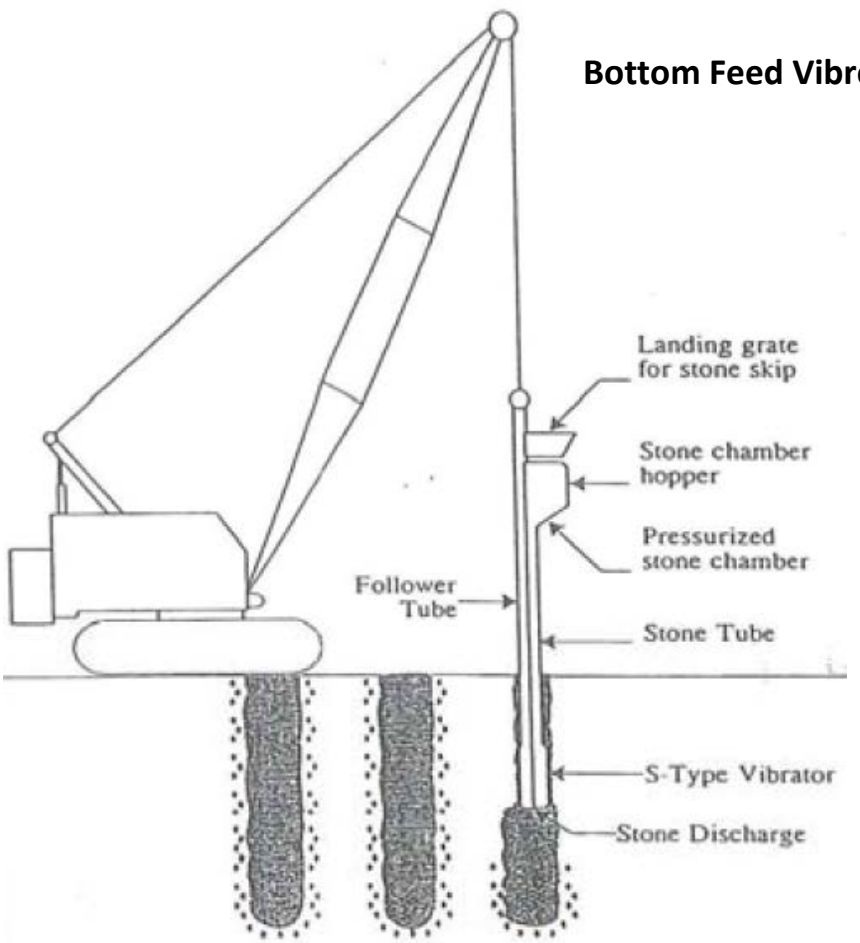



**Figure 5: Vibro Soil Displacement Followed by Stone Placement in Column Construction**
**(See Appendix B for description of construction process)**

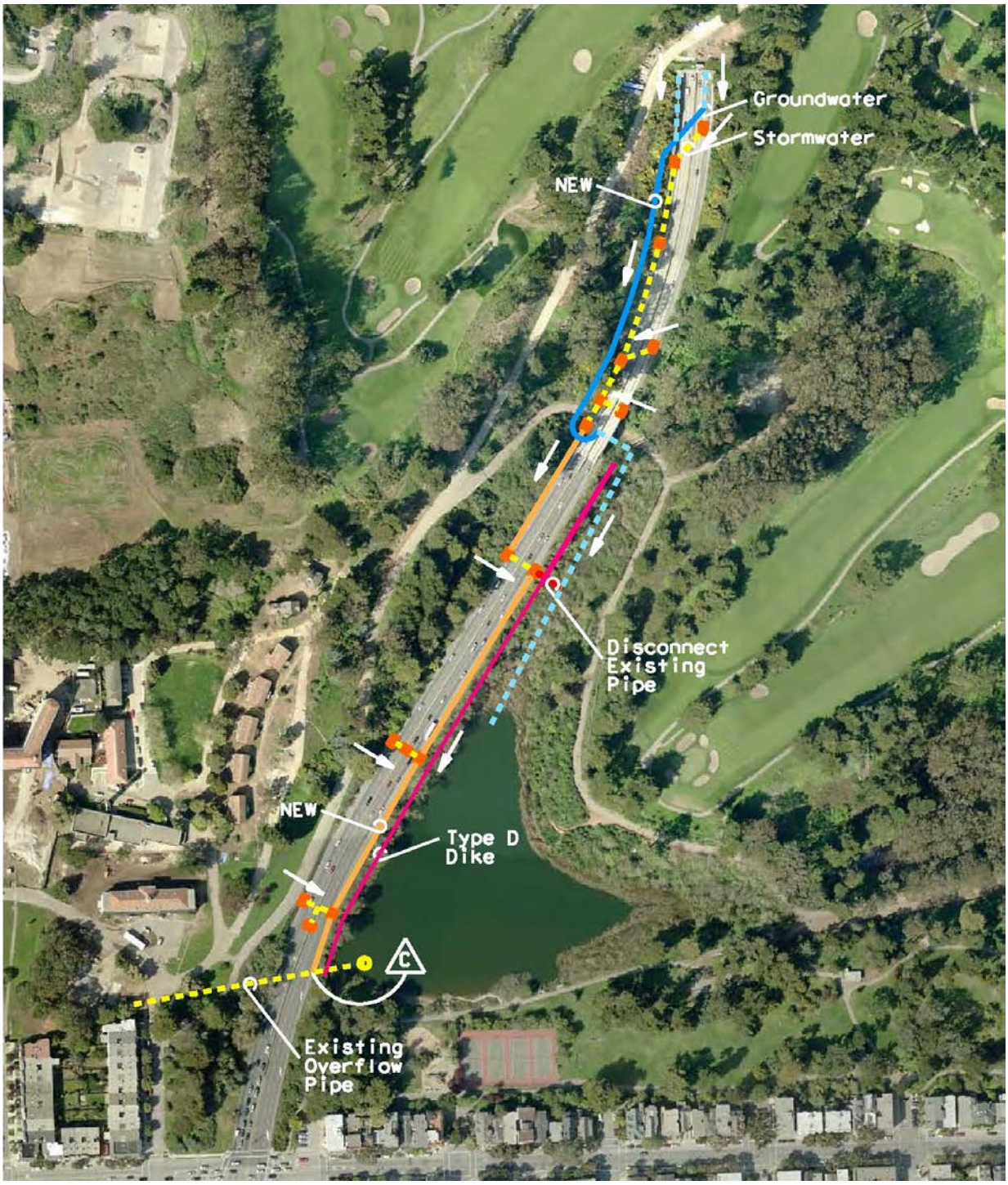



**Figure 6: Highway 1 Stormwater Management Elements**

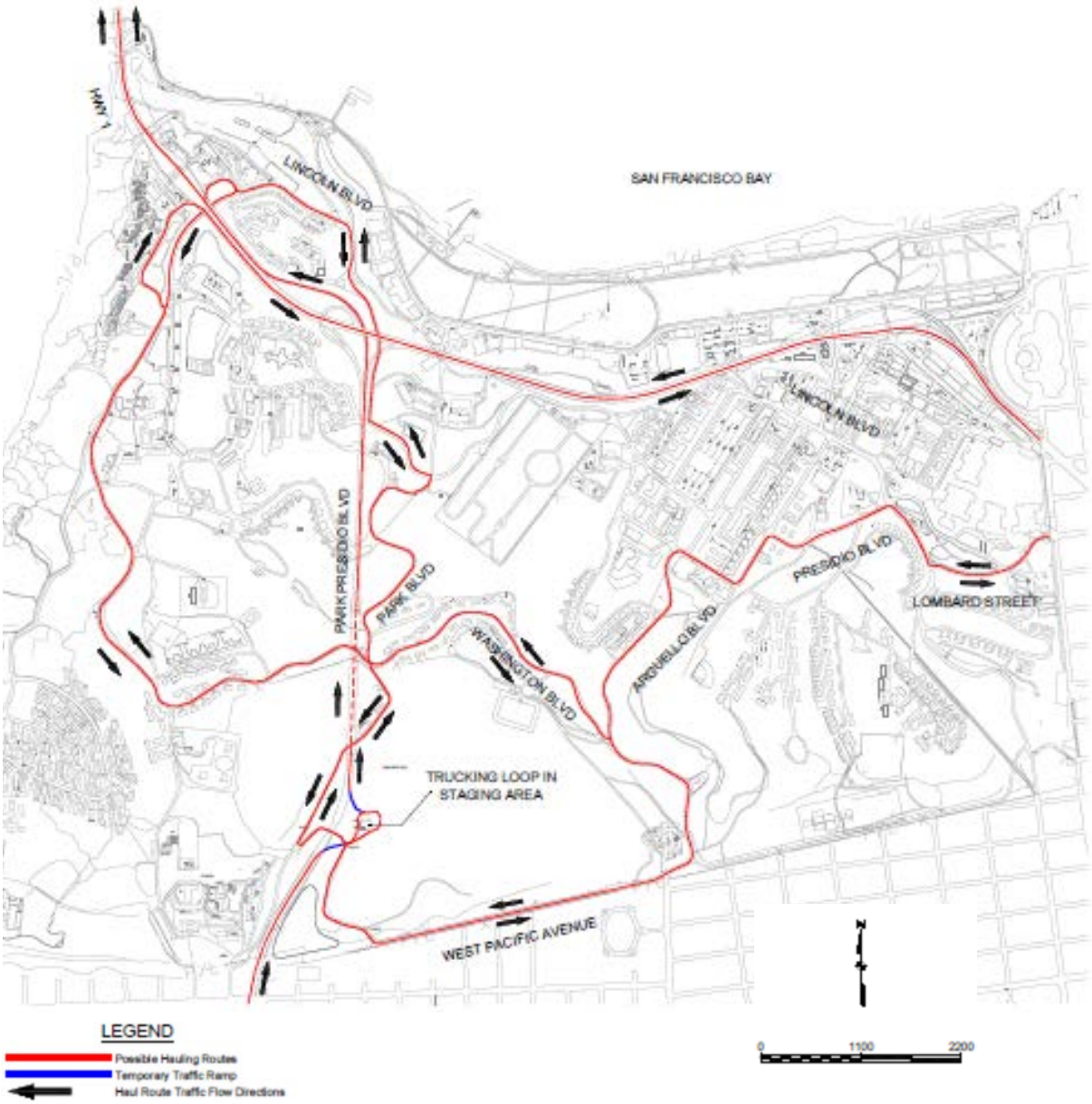



**Figure 7: Possible Haul Routes within the Presidio**

**Figure 8: Distances Between Dewatering Site and Nearest Residences**

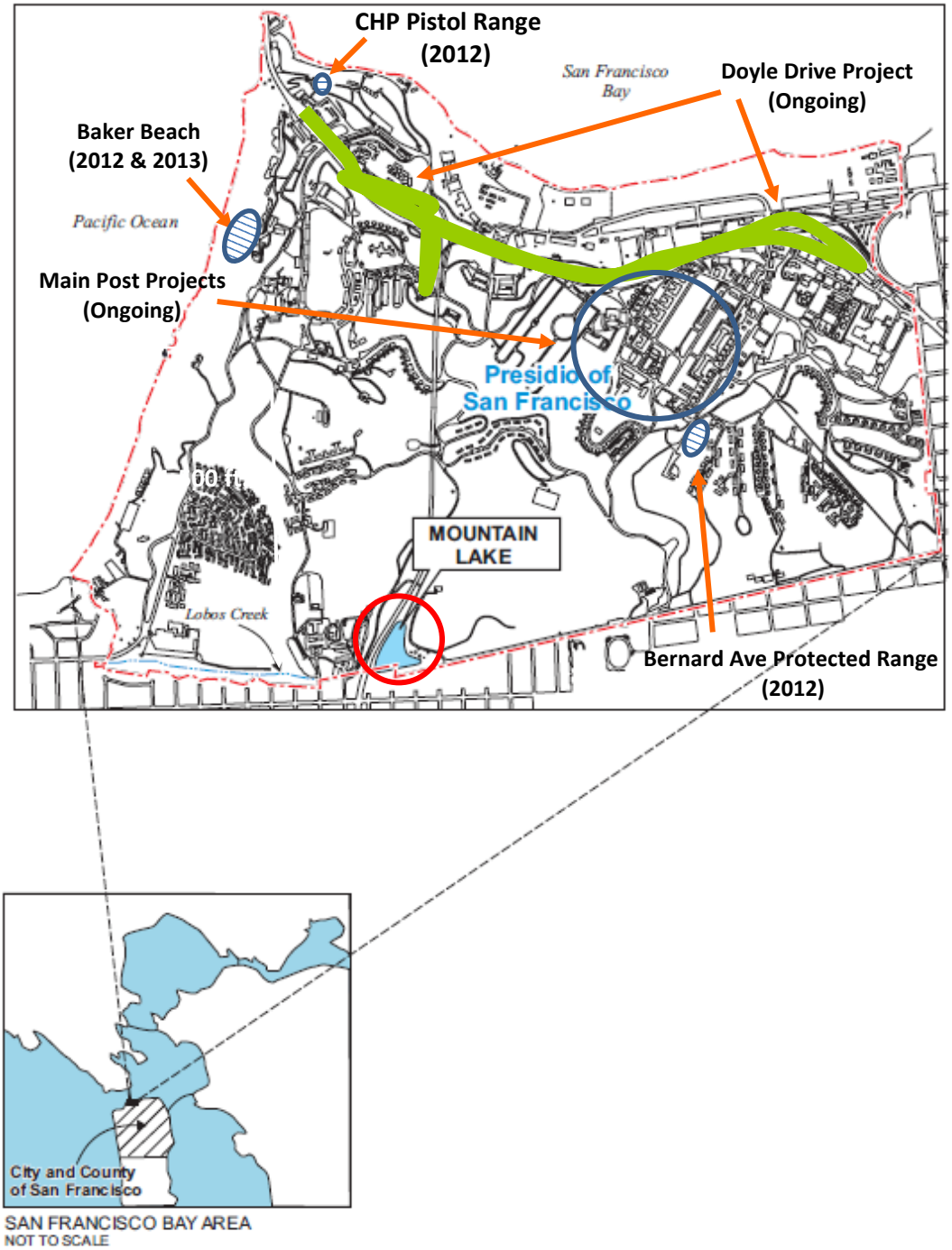



**Figure 9. Locations of Projects in Presidio for Cumulative Analysis**

## Stone Column Installation

### The Vibro Stone Column Installation Process

Vibro Stone Columns (VSCs) are installed using a high-energy vibratory poker (called a vibroflot) to penetrate the ground, displacing the soil laterally as it is advanced. This technique is called vibro-displacement. Aggregate is added to the bottom of the hole in lifts (layers that are worked before the next layer is added). The stone can be added by being pushed into the whole or by use of a hopper. The vibroflot compacts each lift with high-frequency vibration and down pressure, resulting in very stiff, high density stone columns. In some situations, the hole is augured before the vibroflot is employed.

Vibro stone columns are applicable for use in many different weak ground conditions, including soft, cohesive in-situ soils, poorly compacted fills, and loose granular soils in which seismic liquefaction is a concern. VSCs used in cohesive soils result in increased soil stiffness, reduced drainage paths, and reduction in pore water pressure. Typical design bearing pressures range from 4,000 to 6,000 pounds per square foot.

### Dry Top Feed Vibro Stone Columns

In predominantly cohesive soils, a hydraulically-powered vibroflot is advanced into the ground with significant down pressure, laterally displacing the soil and creating an open hole down to the design depth. Aggregate material is dumped from the ground surface into the hole in approximately one to two foot lifts. The lifts are compacted with vibration and down pressure from the vibroflot. This is called the Dry Top Feed Method.

### Dry Bottom Feed Vibro Stone Columns

When soil conditions consists of unstable, fine-grained soils such as silts and clays that may be below the water table, it may be necessary to bottom-feed the aggregate material, alleviating the possibility of hole collapse. With this technique, a rig-mounted hopper is used to carry aggregate to the bottom of the hole. As the vibroflot is raised, stone empties into the hole below the vibroflot. The stone compacts in lifts in a continuous process until the vibro stone column is complete.

### Illustrations

Videos of the construction process are on the web (the sites were available 12/13/2011). For examples, see:

http://www.youtube.com/watch?v=F_kI6vQ5_gE&feature=related

http://www.youtube.com/watch?v=quQWt1Ft_kE&feature=related

http://www.youtube.com/watch?NR=1&v=5zt50aOM84A&feature=endscreen

http://www.youtube.com/watch?feature=endscreen&NR=1&v=JgY7FJRTbe4

Reference to a website is not an endorsement of a particular vendor or product shown. It is strictly to aid the reader in better understanding the process of column construction.

# Lake Dredging

### Hydraulic Dredging

Most hydraulic dredges have a cutting head to dislodge the contaminated sediment, which is immediately suctioned into a pipe, much like a vacuum cleaner. This slurry of diluted sediment is pumped through a flexible, floating pipe to a covered floating barge or directly to an on-land dewatering facility.

With a hydraulic dredge, the dredge discharge line (and possibly a water return line) is the only disturbance to the area. These lines can easily be run to the shore and across the land to a dewatering facility or site. If needed, the pipe can be put in a trench on the shore to allow passage over it. The hydraulic dredge, which is not much larger than a boat, is the only piece of equipment visible. This dredging method does not require disturbing the shoreline and requires one trip in to put the dredge in the water and one trip to remove the dredge when the project is completed.

### Mechanical Dredging from Barge

An excavator can be mounted on a barge to give it access to the entire water body to be dredged. In the case of Mountain Lake, which is 10 feet deep at most, a barge-mounted mechanical dredge would be able to reach all areas needing dredging. Sediment excavated from the lake bottom would be deposited in a second barge, which would be hauled to the shore where the collected saturated sediment water would be pumped (or trucked) to the upland dewatering site.

### Mechanical Dredging from Shore

Mechanical dredging from the shore would employ a dragline or long reach excavator. Most mechanical excavators have a reach of 40 to 50 feet, limiting the size of water body they can excavate from shore. In this type of dredging, heavy excavation equipment is hauled to the shoreline and trees and other obstructions are removed and leveled for the equipment to work safely.

### Illustrations

Videos and other information on dredging processes are on the web (the sites were available 12/13/2011). The examples illustrate dredging in general and do not necessarily show the process that will be used at Mountain Lake. These examples of dredging were selected at random:

http://www.youtube.com/watch?v=tBvlsAjsaUk

http://www.lakeservices.com/LakeSevicesMovie.php

http://www.epa.gov/hudson/dredge_truth.htm

http://www.clearwater.org/news/dredging.html

http://www.youtube.com/watch?v=5NcZ-77uul4

Reference to a website is not an endorsement of a particular vendor or product shown. It is strictly to aid the reader in better understanding the process of dredging.

# Appendix D: Air Quality Calculations

## AIR QUALITY ATTACHMENT

**Mountain Lake Project - Highway Improvements + Remediation**

**SUMMARY (Total Daily Emissions shown, but not all activity would overlap)**

| | NOx (lb/day) | PM10 (lb/day) | PM2.5 (lb/day) | CO (lb/day) | ROG (lb/day) | SOx (lb/day) | CO2 (lb/day) |
|---|---|---|---|---|---|---|---|
| Off-Road Equipment | 45.95 | 2.65 | 2.43 | 27.56 | 7.10 | 0.06 | 5,301.46 |
| On-Road Crew and Workers | 7.40 | 0.31 | 0.25 | 10.78 | 1.37 | 0.02 | 1,767.43 |
| On-Road Diesel Trucks | 100.50 | 4.86 | 4.20 | 33.20 | 8.21 | 0.13 | 13,701.70 |
| Fugitive Dust | --- | 201.04 | 44.71 | --- | --- | --- | --- |
| Total Exhaust Only | 153.85 | 7.82 | 6.89 | 71.53 | 16.69 | 0.21 | 20,770.58 |

**SUMMARY (Total Emissions for Duration of Construction Activity)**

| | NOx (ton) | PM10 (ton) | PM2.5 (ton) | CO (ton) | ROG (ton) | SOx (ton) | CO2 (ton) |
|---|---|---|---|---|---|---|---|
| Off-Road Equipment | 1.82 | 0.13 | 0.12 | 1.33 | 0.37 | 0.00 | 200.92 |
| On-Road Crew and Workers | 0.58 | 0.02 | 0.02 | 0.87 | 0.11 | 0.00 | 142.65 |
| On-Road Diesel Trucks | 2.51 | 0.12 | 0.10 | 0.83 | 0.20 | 0.00 | 341.74 |
| Fugitive Dust | --- | 9.66 | 2.20 | --- | --- | --- | --- |
| Total Exhaust Only | 4.91 | 0.28 | 0.24 | 3.03 | 0.68 | 0.01 | 685.32 |

**SUMMARY (Average Daily Emissions for Duration of Construction Activity)**

| | |
|---|---|
| 200 | days duration |

| | NOx (lb/day) | PM10 (lb/day) | PM2.5 (lb/day) | CO (lb/day) | ROG (lb/day) | SOx (lb/day) | CO2 (lb/day) |
|---|---|---|---|---|---|---|---|
| Off-Road Equipment | 18.22 | 1.30 | 1.19 | 13.27 | 3.66 | 0.02 | 2,009.24 |
| On-Road Crew and Workers | 5.85 | 0.25 | 0.20 | 8.73 | 1.11 | 0.01 | 1,426.55 |
| On-Road Diesel Trucks | 25.07 | 1.21 | 1.05 | 8.28 | 2.05 | 0.03 | 3,417.41 |
| Fugitive Dust | --- | 96.58 | 21.95 | --- | --- | --- | --- |
| Total Exhaust Only | 49.14 | 2.76 | 2.44 | 30.27 | 6.82 | 0.07 | 6,853.20 |

**AIR QUALITY ATTACHMENT - 1091.007**

**: Highway Improvements + Remediation**

**CONSTRUCTION Mobile Source, Equipment and Vehicles**

# Appendix C: Air Quality Calculations

**OFF-ROAD Equipment**

| Parameter | Units | Drill Rig | Aerial Lift | Crane | Loader | Skid Steer Loader | Generator | Dredge | Pump | Compressor |
|---|---|---|---|---|---|---|---|---|---|---|
| Number of Equipment Units | | 1 | 2 | 1 | 2 | 2 | 2 | 1 | 1 | 1 |
| Operating sched. | (hr/day) | 6 | 6 | 6 | 4 | 4 | 6 | 12 | 6 | 6 |
| Months active (21 workdays) | | 3 | 8 | 4 | 8 | 8 | 6 | 1 | 6 | 6 |
| Typical Rated Horsepower | (hp) | 209 | 43 | 194 | 79 | 48 | 72 | 210 | 99 | 43 |
| Emission Factor | (lb/hr) | | | | | | | | | |
| NOx | | 0.804245 | 0.164769 | 0.888059 | 0.380915 | 0.230497 | 0.457910 | 1.512915 | 0.676670 | 0.203729 |
| PM10 | | 0.032172 | 0.013706 | 0.045639 | 0.033519 | 0.017133 | 0.037593 | 0.058796 | 0.055793 | 0.019617 |
| CO | | 0.567783 | 0.145625 | 0.439835 | 0.340930 | 0.219623 | 0.343249 | 0.599075 | 0.449379 | 0.212328 |
| ROG | | 0.079016 | 0.051673 | 0.109217 | 0.090402 | 0.056537 | 0.103662 | 0.143218 | 0.122161 | 0.080709 |
| SOx | | 0.001827 | 0.000221 | 0.000995 | 0.000481 | 0.000318 | 0.000559 | 0.001898 | 0.000773 | 0.000259 |
| CO2 | | 162.394612 | 17.190000 | 88.404213 | 39.204907 | 24.581148 | 45.497008 | 168.704832 | 64.865044 | 20.080252 |
| **Daily Emissions** | (lb/day) | | | | | | | | | |
| NOx | | 4.83 | 1.98 | 5.33 | 3.05 | 1.84 | 5.49 | 18.15 | 4.06 | 1.22 |
| PM10 | | 0.19 | 0.16 | 0.27 | 0.27 | 0.14 | 0.45 | 0.71 | 0.33 | 0.12 |
| CO | | 3.41 | 1.75 | 2.64 | 2.73 | 1.76 | 4.12 | 7.19 | 2.70 | 1.27 |
| ROG | | 0.47 | 0.62 | 0.66 | 0.72 | 0.45 | 1.24 | 1.72 | 0.73 | 0.48 |
| SOx | | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 | 0.01 | 0.02 | 0.00 | 0.00 |
| CO2 | | 974.37 | 206.28 | 530.43 | 313.64 | 196.65 | 545.96 | 2024.46 | 389.19 | 120.48 |
| **Total Emissions, Duration** | (ton) | | | | | | | | | |
| NOx | | 0.152 | 0.166 | 0.224 | 0.256 | 0.155 | 0.346 | 0.191 | 0.256 | 0.077 |
| PM10 | | 0.006 | 0.014 | 0.012 | 0.023 | 0.012 | 0.028 | 0.007 | 0.021 | 0.007 |
| CO | | 0.107 | 0.147 | 0.111 | 0.229 | 0.148 | 0.259 | 0.075 | 0.170 | 0.080 |
| ROG | | 0.015 | 0.052 | 0.028 | 0.061 | 0.038 | 0.078 | 0.018 | 0.046 | 0.031 |
| SOx | | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| CO2 | | 30.693 | 17.328 | 22.278 | 26.346 | 16.519 | 34.396 | 21.257 | 24.519 | 7.590 |

**ON-ROAD Vehicles**

| Parameter | Units | Crew - Commuter | 3/4 ton Pickup Trucks | Material Delivery / Removal | | Material Delivery / Removal | Water Trucks | Haul Trucks, Rock | Haul Trucks, Sediment | Flatbed Trucks |
|---|---|---|---|---|---|---|---|---|---|---|
| **Class** | | **Passenger** | **Delivery** | **Delivery** | | **HHDT** | **HHDT** | **HHDT** | **HHDT** | **HHDT** |
| Miles per day | (mi/day) | 50 | 50 | 50 | | 50 | 10 | 50 | 100 | 20 |
| Vehicles per day | | 12 | 6 | 2 | | 6 | 1 | 8 | 25 | 2 |
| Months active | | 8 | 8 | 6 | | 4 | 8 | 3 | 2 | 6 |
| Paved Miles per vehicle trip | (mi) | 49.5 | 49.5 | 49.5 | | 49.5 | 9.5 | 49.5 | 99.5 | 19.5 |
| Total Miles per day | (mi/day) | 594 | 297 | 99 | | 297 | 9.5 | 396 | 2487.5 | 39 |
| Total Miles, Duration | (mi) | 99,792 | 49,896 | 12,474 | | 24,948 | 1,596 | 24,948 | 104,475 | 4,914 |
| Unpaved Miles per vehicle trip | (mi) | 0.5 | 0.5 | 0.5 | | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| Total Miles per day | (mi/day) | 6 | 3 | 1 | | 3 | 0.5 | 4 | 12.5 | 1 |
| Total Miles, Duration | (mi) | 1008 | 504 | 126 | | 252 | 84 | 252 | 525 | 126 |
| Emission Factor | (lb/mile) | | | | | | | | | |
| NOx | | 0.00078 | 0.01732 | 0.01732 | | 0.03092 | 0.03092 | 0.03092 | 0.03092 | 0.03092 |
| PM10 | | 0.00009 | 0.00065 | 0.00065 | | 0.00150 | 0.00150 | 0.00150 | 0.00150 | 0.00150 |
| PM2.5 | | 0.00006 | 0.00055 | 0.00055 | | 0.00129 | 0.00129 | 0.00129 | 0.00129 | 0.00129 |
| CO | | 0.00765 | 0.01546 | 0.01546 | | 0.01022 | 0.01022 | 0.01022 | 0.01022 | 0.01022 |
| ROG | | 0.00080 | 0.00224 | 0.00224 | | 0.00253 | 0.00253 | 0.00253 | 0.00253 | 0.00253 |
| SOx | | 0.00001 | 0.00003 | 0.00003 | | 0.00004 | 0.00004 | 0.00004 | 0.00004 | 0.00004 |
| CO2 | | 1.10153 | 2.76628 | 2.76628 | | 4.21591 | 4.21591 | 4.21591 | 4.21591 | 4.21591 |

| Daily Emissions (lb/day) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| NOx | 0.47 | 5.20 | 1.73 | | 9.28 | 0.31 | 12.37 | 77.31 | 1.24 |
| PM10 | 0.05 | 0.19 | 0.06 | | 0.45 | 0.01 | 0.60 | 3.74 | 0.06 |
| PM2.5 | 0.03 | 0.16 | 0.05 | | 0.39 | 0.01 | 0.52 | 3.23 | 0.05 |
| CO | 4.59 | 4.64 | 1.55 | | 3.06 | 0.10 | 4.09 | 25.54 | 0.41 |
| ROG | 0.48 | 0.67 | 0.22 | | 0.76 | 0.03 | 1.01 | 6.32 | 0.10 |
| SOx | 0.01 | 0.01 | 0.00 | | 0.01 | 0.00 | 0.02 | 0.10 | 0.00 |
| CO2 | 660.92 | 829.89 | 276.63 | | 1264.77 | 42.16 | 1686.36 | 10539.77 | 168.64 |
| **Total Emissions, Duration** (ton) | | | | | | | | | |
| NOx | 0.039 | 0.437 | 0.109 | | 0.390 | 0.026 | 0.390 | 1.623 | 0.078 |
| PM10 | 0.005 | 0.016 | 0.004 | | 0.019 | 0.001 | 0.019 | 0.079 | 0.004 |
| PM2.5 | 0.003 | 0.014 | 0.003 | | 0.016 | 0.001 | 0.016 | 0.068 | 0.003 |
| CO | 0.386 | 0.390 | 0.097 | | 0.129 | 0.009 | 0.129 | 0.536 | 0.026 |
| ROG | 0.040 | 0.056 | 0.014 | | 0.032 | 0.002 | 0.032 | 0.133 | 0.006 |
| SOx | 0.001 | 0.001 | 0.000 | | 0.001 | 0.000 | 0.001 | 0.002 | 0.000 |
| CO2 | 55.517 | 69.710 | 17.428 | | 53.120 | 3.541 | 53.120 | 221.335 | 10.624 |

**SUMMARY OF MOBILE SOURCE EMISSIONS (Total Daily Emissions shown, but not all activity would overlap)**

| Sources | NOx (lb/day) | PM10 (lb/day) | PM2.5 (lb/day) | CO (lb/day) | ROG (lb/day) | SOx (lb/day) | CO2 (lb/day) |
|---|---|---|---|---|---|---|---|
| Off-Road Equipment | 45.95 | 2.65 | 2.43 | 27.56 | 7.10 | 0.06 | 5,301.46 |
| On-Road Crew and Workers | 7.40 | 0.31 | 0.25 | 10.78 | 1.37 | 0.02 | 1,767.43 |
| On-Road Diesel Trucks | 100.50 | 4.86 | 4.20 | 33.20 | 8.21 | 0.13 | 13,701.70 |

**SUMMARY OF MOBILE SOURCE EMISSIONS (Total Emissions for Duration of Construction Activity)**

| Sources | NOx (ton) | PM10 (ton) | PM2.5 (ton) | CO (ton) | ROG (ton) | SOx (ton) | CO2 (ton) |
|---|---|---|---|---|---|---|---|
| Off-Road Equipment | 1.82 | 0.13 | 0.12 | 1.33 | 0.37 | 0.00 | 200.92 |
| On-Road Crew and Workers | 0.58 | 0.02 | 0.02 | 0.87 | 0.11 | 0.00 | 142.65 |
| On-Road Diesel Trucks | 2.51 | 0.12 | 0.10 | 0.83 | 0.20 | 0.00 | 341.74 |

Activity Estimates: based on Caltrans 12/15/2011 email & KennedyJenks 12/13/2011 email.

**: Highway Improvements + Remediation**

**CONSTRUCTION Fugitive Dust Emissions**

**Emission Categories**

1) Earthmoving

2) Road Dust Paved/Unpaved

**1) Earthmoving**

**1.1) Material Loading/Handling**

$E = (k)(0.0032)[(U/5)^{1.3}]/[(M/2)^{1.4}]$

Ref: USEPA AP-42, p. 13.2.4-4 (11/06 version)

E = lb/ton

k = Particle Size Constant (0.35 for PM10 and 0.053 for PM2.5)

U = average wind speed = 25 MPH worst day, 10 MPH avg

M = moisture content = 4.8% (standard dust control)

Approximately 5900 cy hwy rock, 4800 cy hwy drainage, 4000 cy hwy access, 9900 cy dewatered solids.

Daily max (dewatered solids) = 25 truck/day x 18 cy/truck x 1 ton/cy x 2 drops = 900 tons

Duration (aggregate, spoils, other) = 24000 cy x 1.4 ton/cy x 2 drops = 67200 tons

| | | |
|---|---|---|
| daily rate | 900 | tons of material loading/handling |
| duration | 67,200 | tons of material loading/handling |

Emission Factors and Emissions

Emission Factor (lb/ton)

| PM10 Daily | PM2.5 Daily |
|---|---|
| 0.00287 | 0.00044 |

| PM10 Annual | PM2.5 Annual |
|---|---|
| 0.00081 | 0.00012 |

Emissions (lb/day)

| Material Handling | PM10 | PM2.5 |
|---|---|---|
| daily rate | 2.59 | 0.39 |

Emissions (ton)

| Material Handling | PM10 | PM2.5 |
|---|---|---|
| duration | 0.109 | 0.016 |

**CONSTRUCTION Fugitive Dust Emissions**

**2) Road Dust**

**2.1) Paved Road Dust**

$E = [k \times (sL/2)^{0.65} \times (W/3)^{1.5} - C] \times (1-P/4N)$

Ref: USEPA AP-42 Section 13.2.1, p. 6 (11/06 version)

k = Constant (0.016 for PM10 and 0.0040 for PM2.5)

sL = Silt Loading (assumed to be 0.1 g/m2 for high ADT of Table 13.2.1-3 average for all traffic)

W = Average weight of vehicles in tons (calculated below)

C = Correction for exhaust, break wear, tire wear (0.00047 lb/VMT for PM10, 0.00036 lb/VMT for PM2.5)

No correction for number of wet days due to assumption of working in dry season

Average Vehicle Weight Calculation

Assumptions

Passenger Vehicles = 2 tons average

Midsize "Delivery" Vehicles = 8 ton average

Heavy-Heavy Duty Trucks = 30 tons average (loaded 40 tons, unloaded 20 tons)

(VMT/day)

| | |
|---|---|
| 594 | Passenger Vehicles |
| 396 | Delivery/Work Vehicles |
| 3229 | Heavy-Heavy Duty Vehicles |
| 4219 | Daily Paved VMT |

Daily Avg Weight = 24.0 ton/veh

| Duration Paved (VMT) | Passenger Vehicles | Delivery/Work Vehicles | Heavy-Heavy Duty Vehicles | Total Paved VMT | Duration Avg Weight (ton/veh) |
|---|---|---|---|---|---|
| duration | 99,792 | 62,370 | 160,881 | 323,043 | 17.1 |

Emission Factor (lb/VMT)

| PM10 Daily | PM2.5 Daily |
|---|---|
| 0.03657 | 0.00890 |

| PM10 Annual | PM2.5 Annual |
|---|---|
| 0.0483 | 0.0118 |

Emissions (lb/day)

| Paved Roads | PM10 | PM2.5 |
|---|---|---|
| daily rate | 154.30 | 37.55 |

Emissions (ton)

| Paved Roads | PM10 | PM2.5 |
|---|---|---|
| duration | 7.799 | 1.911 |

**CONSTRUCTION Fugitive Dust Emissions**

**2.2) Unpaved Road Dust**

$E = (k)*[(s/12)^{0.9}][(W/3)^{0.45}]*[(365-P)/365]$

Ref: USEPA AP-42 Section 13.2.2, p. 4-5, 7 (11/06 version)

k = constant = 1.5 lb/VMT for PM10 and 0.23 lb/VMT for PM2.5

s = Silt Content (assumed to be 16% - SCAQMD Handbook for Farm Roads)

W = avg. vehicle weight = calculated below

No correction for number of wet days due to assumption of working in dry season

Average Vehicle Weight Calculation

Assumptions

Personal/Professionals/inspection Vehicles = 2 tons average

Midsize "Delivery" Vehicles = 8 ton average

Heavy-Heavy Duty Trucks = 30 tons average (loaded 40 tons, unloaded 20 tons)

Worst Case Day VMT

| | |
|---|---|
| 6 | Passenger Vehicles |
| 4 | Delivery/Work Vehicles |
| 21 | Heavy-Heavy Duty Vehicles |
| 31 | Daily Unpaved VMT |

Daily Avg Weight = 21.8 ton/veh

| Duration Paved (VMT) | Passenger Vehicles | Delivery/Work Vehicles | Heavy-Heavy Duty Vehicles | Total Unpaved VMT | Duration Avg Weight (ton/veh) |
|---|---|---|---|---|---|
| duration | 1,008 | 630 | 1,239 | 2,877 | 15.4 |

Emission Factor (lb/VMT)

| PM10 Daily | PM2.5 Daily |
|---|---|
| 4.75 | 0.73 |

| PM10 Annual | PM2.5 Annual |
|---|---|
| 4.05 | 0.62 |

Emissions (lb/day)

| Unpaved Roads | PM10 | PM2.5 |
|---|---|---|
| daily rate | 147.18 | 22.57 |

Emissions (ton)

| Unpaved Roads | PM10 | PM2.5 |
|---|---|---|
| duration | 5.831 | 0.894 |

Controlled Emissions

| standard dust control |
|---|
| 70% |

Emissions (lb/day)

| Unpaved Roads | PM10 | PM2.5 |
|---|---|---|
| daily rate | 44.15 | 6.77 |

Emissions (ton)

| Unpaved Roads | PM10 | PM2.5 |
|---|---|---|
| duration | 1.749 | 0.268 |

**CONSTRUCTION Fugitive Dust Emissions**

**SUMMARY OF FUGITIVE DUST EMISSIONS (Total Daily Emissions shown, but not all activity would overlap)**

Emissions (lb/day)

| | PM10 | PM2.5 |
|---|---|---|
| Material Handling | 2.59 | 0.39 |
| Paved Roads | 154.30 | 37.55 |
| Unpaved Roads | 44.15 | 6.77 |
| daily rate | 201.04 | 44.71 |

**SUMMARY OF FUGITIVE DUST EMISSIONS (Total Emissions for Duration of Construction Activity)**

Emissions (ton)

| | PM10 | PM2.5 |
|---|---|---|
| Material Handling | 0.11 | 0.02 |
| Paved Roads | 7.80 | 1.91 |
| Unpaved Roads | 1.75 | 0.27 |
| duration | 9.66 | 2.20 |

## Highest (Most Conservative) EMFAC2007 (version 2.3)
## Emission Factors for On-Road Passenger Vehicles & Delivery Trucks

Projects in the SCAQMD (Scenario Years 2007 - 2026)

Derived from Peak Emissions Inventory (**Winter**, **Annual**, **Summer**)

**Vehicle Class:**

**Passenger Vehicles (<8500 pounds) & Delivery Trucks (>8500 pounds)**

Scenario Year: **2011**

All model years in the range 1967 to 2011

| Passenger Vehicles (pounds/mile) | | Delivery Trucks (pounds/mile) | |
|---|---|---|---|
| CO | 0.00826276 | CO | 0.01693242 |
| NOx | 0.00084460 | NOx | 0.01893366 |
| ROG | 0.00085233 | ROG | 0.00241868 |
| SOx | 0.00001077 | SOx | 0.00002728 |
| PM10 | 0.00008879 | PM10 | 0.00070097 |
| PM2.5 | 0.00005653 | PM2.5 | 0.00059682 |
| CO2 | 1.10235154 | CO2 | 2.75180822 |
| CH4 | 0.00007678 | CH4 | 0.00011655 |

Scenario Year: **2012**

All model years in the range 1968 to 2012

| Passenger Vehicles (pounds/mile) | | Delivery Trucks (pounds/mile) | |
|---|---|---|---|
| CO | 0.00765475 | CO | 0.01545741 |
| NOx | 0.00077583 | NOx | 0.01732423 |
| ROG | 0.00079628 | ROG | 0.00223776 |
| SOx | 0.00001073 | SOx | 0.00002667 |
| PM10 | 0.00008979 | PM10 | 0.00064975 |
| PM2.5 | 0.00005750 | PM2.5 | 0.00054954 |
| CO2 | 1.10152540 | CO2 | 2.76628414 |
| CH4 | 0.00007169 | CH4 | 0.00010668 |

Scenario Year: **2013**

All model years in the range 1969 to 2013

| Passenger Vehicles (pounds/mile) | | Delivery Trucks (pounds/mile) | |
|---|---|---|---|
| CO | 0.00709228 | CO | 0.01407778 |
| NOx | 0.00071158 | NOx | 0.01577311 |
| ROG | 0.00074567 | ROG | 0.00206295 |
| SOx | 0.00001072 | SOx | 0.00002682 |
| PM10 | 0.00009067 | PM10 | 0.00059956 |
| PM2.5 | 0.00005834 | PM2.5 | 0.00050174 |
| CO2 | 1.10087435 | CO2 | 2.78163459 |
| CH4 | 0.00006707 | CH4 | 0.00009703 |

Scenario Year: **2014**

All model years in the range 1970 to 2014

| Passenger Vehicles (pounds/mile) | | Delivery Trucks (pounds/mile) | |
|---|---|---|---|
| CO | 0.00660353 | CO | 0.01284321 |
| NOx | 0.00065484 | NOx | 0.01425162 |
| ROG | 0.00070227 | ROG | 0.00189649 |
| SOx | 0.00001069 | SOx | 0.00002754 |
| PM10 | 0.00009185 | PM10 | 0.00054929 |
| PM2.5 | 0.00005939 | PM2.5 | 0.00045519 |
| CO2 | 1.10257205 | CO2 | 2.79845465 |
| CH4 | 0.00006312 | CH4 | 0.00008798 |

Scenario Year: **2015**

All model years in the range 1971 to 2015

| Passenger Vehicles (pounds/mile) | | Delivery Trucks (pounds/mile) | |
|---|---|---|---|
| CO | 0.00614108 | CO | 0.01169445 |
| NOx | 0.00060188 | NOx | 0.01285026 |
| ROG | 0.00066355 | ROG | 0.00173890 |
| SOx | 0.00001070 | SOx | 0.00002741 |
| PM10 | 0.00009259 | PM10 | 0.00050307 |
| PM2.5 | 0.00006015 | PM2.5 | 0.00041268 |
| CO2 | 1.10192837 | CO2 | 2.81247685 |
| CH4 | 0.00005923 | CH4 | 0.00008076 |

Scenario Year: **2016**

All model years in the range 1972 to 2016

| Passenger Vehicles (pounds/mile) | | Delivery Trucks (pounds/mile) | |
|---|---|---|---|
| CO | 0.00575800 | CO | 0.01080542 |
| NOx | 0.00055658 | NOx | 0.01172881 |
| ROG | 0.00063254 | ROG | 0.00161521 |
| SOx | 0.00001071 | SOx | 0.00002767 |
| PM10 | 0.00009392 | PM10 | 0.00046606 |
| PM2.5 | 0.00006131 | PM2.5 | 0.00037868 |
| CO2 | 1.10677664 | CO2 | 2.83134285 |
| CH4 | 0.00005623 | CH4 | 0.00007355 |

## Highest (Most Conservative) EMFAC2007 (version 2.3)
## Emission Factors for On-Road Heavy-Heavy-Duty Diesel Trucks

Projects in the SCAQMD (Scenario Years 2007 - 2026)

Derived from Peak Emissions Inventory (**Winter**, **Annual**, **Summer**)

**Vehicle Class:**

**Heavy-Heavy-Duty Diesel Trucks (33,001 to 60,000 pounds)**

Scenario Year: **2011**

All model years in the range 1967 to 2011

| (pounds/mile) | |
|---|---|
| CO | 0.01112463 |
| NOx | 0.03455809 |
| ROG | 0.00279543 |
| SOx | 0.00003972 |
| PM10 | 0.00166087 |
| PM2.5 | 0.00144489 |
| CO2 | 4.22045680 |
| CH4 | 0.00012910 |

| (pounds/mile) | |
|---|---|
| PM10 | 0.00151936 |
| PM2.5 | 0.00139772 |

Scenario Year: **2012**

All model years in the range 1968 to 2012

| (pounds/mile) | |
|---|---|
| CO | 0.01021519 |
| NOx | 0.03092379 |
| ROG | 0.00252764 |
| SOx | 0.00004042 |
| PM10 | 0.00149566 |
| PM2.5 | 0.00129354 |
| CO2 | 4.21590774 |
| CH4 | 0.00011651 |

| (pounds/mile) | |
|---|---|
| PM10 | 0.00135537 |
| PM2.5 | 0.00124837 |

Scenario Year: **2013**

All model years in the range 1969 to 2013

| (pounds/mile) | |
|---|---|
| CO | 0.00931790 |
| NOx | 0.02742935 |
| ROG | 0.00226308 |
| SOx | 0.00004086 |
| PM10 | 0.00133697 |
| PM2.5 | 0.00114629 |
| CO2 | 4.21518556 |
| CH4 | 0.00010441 |

| (pounds/mile) | |
|---|---|
| PM10 | 0.00119623 |
| PM2.5 | 0.00109863 |

Scenario Year: **2014**

All model years in the range 1970 to 2014

| (pounds/mile) | |
|---|---|
| CO | 0.00846435 |
| NOx | 0.02418049 |
| ROG | 0.00201594 |
| SOx | 0.00004092 |
| PM10 | 0.00118458 |
| PM2.5 | 0.00100582 |
| CO2 | 4.21279345 |
| CH4 | 0.00009261 |

| (pounds/mile) | |
|---|---|
| PM10 | 0.00104243 |
| PM2.5 | 0.00096059 |

Scenario Year: **2015**

All model years in the range 1971 to 2015

| (pounds/mile) | |
|---|---|
| CO | 0.00766891 |
| NOx | 0.02122678 |
| ROG | 0.00178608 |
| SOx | 0.00004082 |
| PM10 | 0.00104715 |
| PM2.5 | 0.00087977 |
| CO2 | 4.20902225 |
| CH4 | 0.00008369 |

| (pounds/mile) | |
|---|---|
| PM10 | 0.00090631 |
| PM2.5 | 0.00083282 |

Scenario Year: **2016**

All model years in the range 1972 to 2016

| (pounds/mile) | |
|---|---|
| CO | 0.00704604 |
| NOx | 0.01887374 |
| ROG | 0.00161035 |
| SOx | 0.00003952 |
| PM10 | 0.00094448 |
| PM2.5 | 0.00078443 |
| CO2 | 4.21063031 |
| CH4 | 0.00007508 |

| (pounds/mile) | |
|---|---|
| PM10 | 0.00080419 |
| PM2.5 | 0.00073898 |

## SCAB Fleet Average Emission Factors (Diesel)

**2012**

| Air Basin | SC |
|---|---|

| Equipment | MaxHP | ROG (lb/hr) | CO (lb/hr) | NOX (lb/hr) | SOX (lb/hr) | PM (lb/hr) | CO2 (lb/hr) | CH4 (lb/hr) |
|---|---|---|---|---|---|---|---|---|
| Aerial Lifts | 15 | 0.0102 | 0.0528 | 0.0642 | 0.0001 | 0.0030 | 8.7 | 0.0009 |
| | 25 | 0.0175 | 0.0517 | 0.0957 | 0.0001 | 0.0055 | 11.0 | 0.0016 |
| | 50 | 0.0650 | 0.1822 | 0.1916 | 0.0003 | 0.0169 | 19.6 | 0.0059 |
| | 120 | 0.0607 | 0.2451 | 0.4012 | 0.0004 | 0.0324 | 38.1 | 0.0055 |
| | 500 | 0.1276 | 0.4941 | 1.6553 | 0.0021 | 0.0491 | 213 | 0.0115 |
| | 750 | 0.2379 | 0.8930 | 3.0795 | 0.0039 | 0.0903 | 385 | 0.0215 |
| Aerial Lifts Composite | | 0.0576 | 0.1976 | 0.3249 | 0.0004 | 0.0219 | 34.7 | 0.0052 |
| Air Compressors | 15 | 0.0129 | 0.0494 | 0.0768 | 0.0001 | 0.0052 | 7.2 | 0.0012 |
| | 25 | 0.0286 | 0.0779 | 0.1337 | 0.0002 | 0.0087 | 14.4 | 0.0026 |
| | 50 | 0.1010 | 0.2646 | 0.2310 | 0.0003 | 0.0239 | 22.3 | 0.0091 |
| | 120 | 0.0891 | 0.3287 | 0.5333 | 0.0006 | 0.0492 | 47.0 | 0.0080 |
| | 175 | 0.1135 | 0.5074 | 0.8954 | 0.0010 | 0.0512 | 88.5 | 0.0102 |
| | 250 | 0.1066 | 0.3052 | 1.2194 | 0.0015 | 0.0379 | 131 | 0.0096 |
| | 500 | 0.1709 | 0.5726 | 1.9077 | 0.0023 | 0.0623 | 232 | 0.0154 |
| | 750 | 0.2681 | 0.8849 | 3.0371 | 0.0036 | 0.0980 | 358 | 0.0242 |
| | 1000 | 0.4533 | 1.5617 | 5.4098 | 0.0049 | 0.1589 | 486 | 0.0409 |
| Air Compressors Composite | | 0.0984 | 0.3445 | 0.6494 | 0.0007 | 0.0469 | 63.6 | 0.0089 |
| Bore/Drill Rigs | 15 | 0.0120 | 0.0632 | 0.0754 | 0.0002 | 0.0029 | 10.3 | 0.0011 |
| | 25 | 0.0194 | 0.0658 | 0.1233 | 0.0002 | 0.0054 | 16.0 | 0.0017 |
| | 50 | 0.0351 | 0.2335 | 0.2768 | 0.0004 | 0.0149 | 31.0 | 0.0032 |
| | 120 | 0.0514 | 0.4724 | 0.5026 | 0.0009 | 0.0328 | 77.1 | 0.0046 |
| | 175 | 0.0750 | 0.7538 | 0.7479 | 0.0016 | 0.0366 | 141 | 0.0068 |
| | 250 | 0.0838 | 0.3435 | 0.8722 | 0.0021 | 0.0268 | 188 | 0.0076 |
| | 500 | 0.1354 | 0.5526 | 1.3152 | 0.0031 | 0.0437 | 311 | 0.0122 |
| | 750 | 0.2685 | 1.0916 | 2.6320 | 0.0062 | 0.0865 | 615 | 0.0242 |
| | 1000 | 0.4491 | 1.6773 | 6.6123 | 0.0093 | 0.1699 | 928 | 0.0405 |
| Bore/Drill Rigs Composite | | 0.0854 | 0.5068 | 0.9013 | 0.0017 | 0.0367 | 165 | 0.0077 |
| Cement and Morta | 15 | 0.0075 | 0.0386 | 0.0475 | 0.0001 | 0.0023 | 6.3 | 0.0007 |
| | 25 | 0.0293 | 0.0852 | 0.1548 | 0.0002 | 0.0091 | 17.6 | 0.0026 |
| Cement and Mortar Mixers Compo | | 0.0093 | 0.0425 | 0.0564 | 0.0001 | 0.0029 | 7.2 | 0.0008 |
| Concrete/Industria | 25 | 0.0199 | 0.0678 | 0.1261 | 0.0002 | 0.0050 | 16.5 | 0.0018 |
| | 50 | 0.1047 | 0.3015 | 0.2972 | 0.0004 | 0.0268 | 30.2 | 0.0094 |
| | 120 | 0.1155 | 0.4880 | 0.7625 | 0.0009 | 0.0639 | 74.1 | 0.0104 |
| | 175 | 0.1685 | 0.8723 | 1.4507 | 0.0018 | 0.0767 | 160 | 0.0152 |
| Concrete/Industrial Saws Compos | | 0.1090 | 0.4148 | 0.5910 | 0.0007 | 0.0491 | 58.5 | 0.0098 |
| Cranes | 50 | 0.1101 | 0.2979 | 0.2478 | 0.0003 | 0.0258 | 23.2 | 0.0099 |
| | 120 | 0.0982 | 0.3650 | 0.5844 | 0.0006 | 0.0533 | 50.1 | 0.0089 |
| | 175 | 0.1089 | 0.4838 | 0.8259 | 0.0009 | 0.0479 | 80.3 | 0.0098 |
| | 250 | 0.1103 | 0.3103 | 1.0712 | 0.0013 | 0.0388 | 112 | 0.0100 |
| | 500 | 0.1635 | 0.5691 | 1.5327 | 0.0018 | 0.0571 | 180 | 0.0148 |
| | 750 | 0.2767 | 0.9554 | 2.6486 | 0.0030 | 0.0974 | 303 | 0.0250 |
| | 9999 | 0.9905 | 3.5715 | 10.9484 | 0.0098 | 0.3384 | 971 | 0.0894 |
| Cranes Composite | | 0.1425 | 0.4946 | 1.2753 | 0.0014 | 0.0553 | 129 | 0.0129 |
| Crawler Tractors | 50 | 0.1262 | 0.3333 | 0.2713 | 0.0003 | 0.0289 | 24.9 | 0.0114 |
| | 120 | 0.1374 | 0.4906 | 0.8120 | 0.0008 | 0.0729 | 65.8 | 0.0124 |
| | 175 | 0.1758 | 0.7491 | 1.3245 | 0.0014 | 0.0765 | 121 | 0.0159 |
| | 250 | 0.1854 | 0.5225 | 1.7044 | 0.0019 | 0.0667 | 166 | 0.0167 |
| | 500 | 0.2659 | 1.0217 | 2.3914 | 0.0025 | 0.0942 | 259 | 0.0240 |
| | 750 | 0.4784 | 1.8248 | 4.3817 | 0.0047 | 0.1705 | 465 | 0.0432 |
| | 1000 | 0.7229 | 2.8959 | 7.7626 | 0.0066 | 0.2503 | 658 | 0.0652 |
| Crawler Tractors Composite | | 0.1671 | 0.6051 | 1.2309 | 0.0013 | 0.0752 | 114 | 0.0151 |
| Crushing/Proc. Eq | 50 | 0.1927 | 0.5215 | 0.4545 | 0.0006 | 0.0462 | 44.0 | 0.0174 |
| | 120 | 0.1525 | 0.5829 | 0.9172 | 0.0010 | 0.0851 | 83.1 | 0.0138 |
| | 175 | 0.2088 | 0.9654 | 1.6343 | 0.0019 | 0.0946 | 167 | 0.0188 |
| | 250 | 0.1953 | 0.5592 | 2.1896 | 0.0028 | 0.0682 | 245 | 0.0176 |
| | 500 | 0.2733 | 0.8961 | 2.9457 | 0.0037 | 0.0972 | 374 | 0.0247 |
| | 750 | 0.4361 | 1.3892 | 4.8387 | 0.0059 | 0.1560 | 589 | 0.0394 |
| | 9999 | 1.2112 | 4.0327 | 14.2648 | 0.0131 | 0.4203 | 1,308 | 0.1093 |
| Crushing/Proc. Equipment Compo | | 0.1872 | 0.6911 | 1.2633 | 0.0015 | 0.0819 | 132 | 0.0169 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Dumpers/Tenders | 25 | 0.0100 | 0.0324 | 0.0614 | 0.0001 | 0.0031 | 7.6 | 0.0009 |
| Dumpers/Tenders Composite | | 0.0100 | 0.0324 | 0.0614 | 0.0001 | 0.0031 | 7.6 | 0.0009 |
| Excavators | 25 | 0.0198 | 0.0677 | 0.1253 | 0.0002 | 0.0048 | 16.4 | 0.0018 |
| | 50 | 0.0912 | 0.2933 | 0.2568 | 0.0003 | 0.0237 | 25.0 | 0.0082 |
| | 120 | 0.1183 | 0.5220 | 0.7300 | 0.0009 | 0.0657 | 73.6 | 0.0107 |
| | 175 | 0.1288 | 0.6678 | 0.9613 | 0.0013 | 0.0569 | 112 | 0.0116 |
| | 250 | 0.1301 | 0.3630 | 1.2438 | 0.0018 | 0.0415 | 159 | 0.0117 |
| | 500 | 0.1805 | 0.5493 | 1.6112 | 0.0023 | 0.0574 | 234 | 0.0163 |
| | 750 | 0.3013 | 0.9096 | 2.7605 | 0.0039 | 0.0969 | 387 | 0.0272 |
| Excavators Composite | | 0.1300 | 0.5401 | 0.9817 | 0.0013 | 0.0536 | 120 | 0.0117 |
| Forklifts | 50 | 0.0514 | 0.1682 | 0.1488 | 0.0002 | 0.0136 | 14.7 | 0.0046 |
| | 120 | 0.0489 | 0.2195 | 0.3017 | 0.0004 | 0.0277 | 31.2 | 0.0044 |
| | 175 | 0.0624 | 0.3304 | 0.4664 | 0.0006 | 0.0278 | 56.1 | 0.0056 |
| | 250 | 0.0595 | 0.1638 | 0.5872 | 0.0009 | 0.0187 | 77.1 | 0.0054 |
| | 500 | 0.0806 | 0.2241 | 0.7257 | 0.0011 | 0.0252 | 111 | 0.0073 |
| Forklifts Composite | | 0.0585 | 0.2257 | 0.4330 | 0.0006 | 0.0231 | 54.4 | 0.0053 |
| Generator Sets | 15 | 0.0157 | 0.0698 | 0.1063 | 0.0002 | 0.0061 | 10.2 | 0.0014 |
| | 25 | 0.0276 | 0.0951 | 0.1632 | 0.0002 | 0.0096 | 17.6 | 0.0025 |
| | 50 | 0.0959 | 0.2734 | 0.2966 | 0.0004 | 0.0255 | 30.6 | 0.0087 |
| | 120 | 0.1206 | 0.4956 | 0.8099 | 0.0009 | 0.0640 | 77.9 | 0.0109 |
| | 175 | 0.1460 | 0.7413 | 1.3131 | 0.0016 | 0.0644 | 142 | 0.0132 |
| | 250 | 0.1372 | 0.4502 | 1.8047 | 0.0024 | 0.0508 | 213 | 0.0124 |
| | 500 | 0.1952 | 0.7617 | 2.5896 | 0.0033 | 0.0756 | 337 | 0.0176 |
| | 750 | 0.3257 | 1.2296 | 4.3019 | 0.0055 | 0.1241 | 544 | 0.0294 |
| | 9999 | 0.8673 | 3.0642 | 10.8871 | 0.0105 | 0.3104 | 1,049 | 0.0783 |
| Generator Sets Composite | | 0.0832 | 0.3121 | 0.5779 | 0.0007 | 0.0351 | 61.0 | 0.0075 |
| Graders | 50 | 0.1182 | 0.3365 | 0.2882 | 0.0004 | 0.0286 | 27.5 | 0.0107 |
| | 120 | 0.1348 | 0.5355 | 0.8223 | 0.0009 | 0.0740 | 75.0 | 0.0122 |
| | 175 | 0.1554 | 0.7363 | 1.1931 | 0.0014 | 0.0688 | 124 | 0.0140 |
| | 250 | 0.1575 | 0.4508 | 1.5344 | 0.0019 | 0.0547 | 172 | 0.0142 |
| | 500 | 0.1947 | 0.6639 | 1.8193 | 0.0023 | 0.0671 | 229 | 0.0176 |
| | 750 | 0.4147 | 1.4022 | 3.9602 | 0.0049 | 0.1439 | 486 | 0.0374 |
| Graders Composite | | 0.1533 | 0.6129 | 1.2503 | 0.0015 | 0.0649 | 133 | 0.0138 |
| Off-Highway Tract | 120 | 0.2224 | 0.7269 | 1.2964 | 0.0011 | 0.1143 | 93.7 | 0.0201 |
| | 175 | 0.2135 | 0.8404 | 1.6085 | 0.0015 | 0.0923 | 130 | 0.0193 |
| | 250 | 0.1718 | 0.4896 | 1.5282 | 0.0015 | 0.0644 | 130 | 0.0155 |
| | 750 | 0.6814 | 3.0883 | 6.1417 | 0.0057 | 0.2515 | 568 | 0.0615 |
| | 1000 | 1.0246 | 4.8137 | 10.5080 | 0.0082 | 0.3620 | 814 | 0.0924 |
| Off-Highway Tractors Composite | | 0.2170 | 0.7878 | 1.7969 | 0.0017 | 0.0871 | 151 | 0.0196 |
| Off-Highway Truck | 175 | 0.1533 | 0.7593 | 1.1072 | 0.0014 | 0.0666 | 125 | 0.0138 |
| | 250 | 0.1469 | 0.3944 | 1.3513 | 0.0019 | 0.0461 | 167 | 0.0133 |
| | 500 | 0.2263 | 0.6661 | 1.9463 | 0.0027 | 0.0705 | 272 | 0.0204 |
| | 750 | 0.3695 | 1.0792 | 3.2612 | 0.0044 | 0.1164 | 442 | 0.0333 |
| | 1000 | 0.5790 | 1.7854 | 6.4025 | 0.0063 | 0.1933 | 625 | 0.0522 |
| Off-Highway Trucks Composite | | 0.2241 | 0.6635 | 2.0158 | 0.0027 | 0.0715 | 260 | 0.0202 |
| Other Constructior | 15 | 0.0118 | 0.0617 | 0.0737 | 0.0002 | 0.0028 | 10.1 | 0.0011 |
| | 25 | 0.0160 | 0.0544 | 0.1019 | 0.0002 | 0.0044 | 13.2 | 0.0014 |
| | 50 | 0.0842 | 0.2740 | 0.2707 | 0.0004 | 0.0228 | 28.0 | 0.0076 |
| | 120 | 0.1104 | 0.5320 | 0.7540 | 0.0009 | 0.0633 | 80.9 | 0.0100 |
| | 175 | 0.1008 | 0.5880 | 0.8599 | 0.0012 | 0.0467 | 107 | 0.0091 |
| | 500 | 0.1517 | 0.5426 | 1.6573 | 0.0025 | 0.0545 | 254 | 0.0137 |
| Other Construction Equipment Co | | 0.0925 | 0.3847 | 0.8599 | 0.0013 | 0.0366 | 123 | 0.0083 |
| Other General Indu | 15 | 0.0066 | 0.0391 | 0.0466 | 0.0001 | 0.0018 | 6.4 | 0.0006 |
| | 25 | 0.0185 | 0.0632 | 0.1170 | 0.0002 | 0.0045 | 15.3 | 0.0017 |
| | 50 | 0.1085 | 0.2856 | 0.2332 | 0.0003 | 0.0253 | 21.7 | 0.0098 |
| | 120 | 0.1274 | 0.4542 | 0.7277 | 0.0007 | 0.0703 | 62.0 | 0.0115 |
| | 175 | 0.1349 | 0.5757 | 1.0001 | 0.0011 | 0.0599 | 95.9 | 0.0122 |
| | 250 | 0.1235 | 0.3281 | 1.2983 | 0.0015 | 0.0417 | 136 | 0.0111 |
| | 500 | 0.2232 | 0.6772 | 2.2367 | 0.0026 | 0.0758 | 265 | 0.0201 |
| | 750 | 0.3707 | 1.1162 | 3.8016 | 0.0044 | 0.1273 | 437 | 0.0334 |
| | 1000 | 0.5621 | 1.8453 | 6.4018 | 0.0056 | 0.1947 | 560 | 0.0507 |
| Other General Industrial Equipmer | | 0.1635 | 0.5362 | 1.4520 | 0.0016 | 0.0632 | 152 | 0.0148 |
| Other Material Har | 50 | 0.1506 | 0.3950 | 0.3243 | 0.0004 | 0.0352 | 30.3 | 0.0136 |
| | 120 | 0.1239 | 0.4423 | 0.7103 | 0.0007 | 0.0684 | 60.7 | 0.0112 |
| | 175 | 0.1703 | 0.7292 | 1.2706 | 0.0014 | 0.0759 | 122 | 0.0154 |
| | 250 | 0.1305 | 0.3496 | 1.3863 | 0.0016 | 0.0443 | 145 | 0.0118 |
| | 500 | 0.1590 | 0.4876 | 1.6124 | 0.0019 | 0.0545 | 192 | 0.0143 |
| | 9999 | 0.7467 | 2.4395 | 8.4619 | 0.0073 | 0.2565 | 741 | 0.0674 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Other Material Handling Equipmer | | 0.1566 | 0.5108 | 1.4125 | 0.0015 | 0.0613 | 141 | 0.0141 |
| Pavers | 25 | 0.0255 | 0.0811 | 0.1531 | 0.0002 | 0.0080 | 18.7 | 0.0023 |
| | 50 | 0.1451 | 0.3680 | 0.3038 | 0.0004 | 0.0327 | 28.0 | 0.0131 |
| | 120 | 0.1467 | 0.5107 | 0.8788 | 0.0008 | 0.0776 | 69.2 | 0.0132 |
| | 175 | 0.1864 | 0.7833 | 1.4495 | 0.0014 | 0.0819 | 128 | 0.0168 |
| | 250 | 0.2182 | 0.6365 | 2.0698 | 0.0022 | 0.0818 | 194 | 0.0197 |
| | 500 | 0.2383 | 0.9957 | 2.2418 | 0.0023 | 0.0883 | 233 | 0.0215 |
| Pavers Composite | | 0.1596 | 0.5445 | 0.8980 | 0.0009 | 0.0642 | 77.9 | 0.0144 |
| Paving Equipment | 25 | 0.0153 | 0.0520 | 0.0974 | 0.0002 | 0.0042 | 12.6 | 0.0014 |
| | 50 | 0.1239 | 0.3124 | 0.2591 | 0.0003 | 0.0279 | 23.9 | 0.0112 |
| | 120 | 0.1150 | 0.3997 | 0.6897 | 0.0006 | 0.0610 | 54.5 | 0.0104 |
| | 175 | 0.1455 | 0.6114 | 1.1384 | 0.0011 | 0.0640 | 101 | 0.0131 |
| | 250 | 0.1349 | 0.3946 | 1.2976 | 0.0014 | 0.0507 | 122 | 0.0122 |
| Paving Equipment Composite | | 0.1204 | 0.4365 | 0.8114 | 0.0008 | 0.0570 | 68.9 | 0.0109 |
| Plate Compactors | 15 | 0.0050 | 0.0263 | 0.0314 | 0.0001 | 0.0013 | 4.3 | 0.0005 |
| Plate Compactors Composite | | 0.0050 | 0.0263 | 0.0314 | 0.0001 | 0.0013 | 4.3 | 0.0005 |
| Pressure Washers | 15 | 0.0075 | 0.0334 | 0.0509 | 0.0001 | 0.0029 | 4.9 | 0.0007 |
| | 25 | 0.0112 | 0.0385 | 0.0662 | 0.0001 | 0.0039 | 7.1 | 0.0010 |
| | 50 | 0.0349 | 0.1074 | 0.1339 | 0.0002 | 0.0102 | 14.3 | 0.0032 |
| | 120 | 0.0332 | 0.1458 | 0.2385 | 0.0003 | 0.0172 | 24.1 | 0.0030 |
| Pressure Washers Composite | | 0.0173 | 0.0635 | 0.0921 | 0.0001 | 0.0063 | 9.4 | 0.0016 |
| Pumps | 15 | 0.0133 | 0.0508 | 0.0790 | 0.0001 | 0.0054 | 7.4 | 0.0012 |
| | 25 | 0.0386 | 0.1051 | 0.1803 | 0.0002 | 0.0117 | 19.5 | 0.0035 |
| | 50 | 0.1155 | 0.3229 | 0.3362 | 0.0004 | 0.0299 | 34.3 | 0.0104 |
| | 120 | 0.1250 | 0.5036 | 0.8226 | 0.0009 | 0.0669 | 77.9 | 0.0113 |
| | 175 | 0.1498 | 0.7431 | 1.3164 | 0.0016 | 0.0664 | 140 | 0.0135 |
| | 250 | 0.1357 | 0.4345 | 1.7375 | 0.0023 | 0.0501 | 201 | 0.0122 |
| | 500 | 0.2089 | 0.8032 | 2.6861 | 0.0034 | 0.0803 | 345 | 0.0188 |
| | 750 | 0.3557 | 1.3279 | 4.5700 | 0.0057 | 0.1350 | 571 | 0.0321 |
| | 9999 | 1.1456 | 4.0641 | 14.2305 | 0.0136 | 0.4081 | 1,355 | 0.1034 |
| Pumps Composite | | 0.0813 | 0.2983 | 0.4999 | 0.0006 | 0.0351 | 49.6 | 0.0073 |
| Rollers | 15 | 0.0074 | 0.0386 | 0.0461 | 0.0001 | 0.0018 | 6.3 | 0.0007 |
| | 25 | 0.0162 | 0.0549 | 0.1029 | 0.0002 | 0.0045 | 13.3 | 0.0015 |
| | 50 | 0.1105 | 0.2994 | 0.2677 | 0.0003 | 0.0263 | 26.0 | 0.0100 |
| | 120 | 0.1054 | 0.4098 | 0.6619 | 0.0007 | 0.0574 | 59.0 | 0.0095 |
| | 175 | 0.1320 | 0.6220 | 1.0725 | 0.0012 | 0.0591 | 108 | 0.0119 |
| | 250 | 0.1347 | 0.4083 | 1.4103 | 0.0017 | 0.0498 | 153 | 0.0122 |
| | 500 | 0.1755 | 0.6752 | 1.8093 | 0.0022 | 0.0652 | 219 | 0.0158 |
| Rollers Composite | | 0.1038 | 0.4107 | 0.6936 | 0.0008 | 0.0488 | 67.1 | 0.0094 |
| Rough Terrain For | 50 | 0.1315 | 0.3910 | 0.3455 | 0.0004 | 0.0330 | 33.9 | 0.0119 |
| | 120 | 0.1038 | 0.4364 | 0.6425 | 0.0007 | 0.0585 | 62.4 | 0.0094 |
| | 175 | 0.1444 | 0.7268 | 1.1204 | 0.0014 | 0.0652 | 125 | 0.0130 |
| | 250 | 0.1353 | 0.3896 | 1.4082 | 0.0019 | 0.0458 | 171 | 0.0122 |
| | 500 | 0.1894 | 0.5985 | 1.8577 | 0.0025 | 0.0642 | 257 | 0.0171 |
| Rough Terrain Forklifts Composite | | 0.1093 | 0.4680 | 0.6995 | 0.0008 | 0.0587 | 70.3 | 0.0099 |
| Rubber Tired Doze | 175 | 0.2209 | 0.8528 | 1.6304 | 0.0015 | 0.0945 | 129 | 0.0199 |
| | 250 | 0.2545 | 0.7124 | 2.1985 | 0.0021 | 0.0942 | 183 | 0.0230 |
| | 500 | 0.3345 | 1.5220 | 2.8822 | 0.0026 | 0.1210 | 265 | 0.0302 |
| | 750 | 0.5042 | 2.2809 | 4.4100 | 0.0040 | 0.1832 | 399 | 0.0455 |
| | 1000 | 0.7807 | 3.6654 | 7.7816 | 0.0060 | 0.2729 | 592 | 0.0704 |
| Rubber Tired Dozers Composite | | 0.3114 | 1.2491 | 2.6866 | 0.0025 | 0.1137 | 239 | 0.0281 |
| Rubber Tired Load | 25 | 0.0205 | 0.0697 | 0.1295 | 0.0002 | 0.0052 | 16.9 | 0.0018 |
| | 50 | 0.1315 | 0.3756 | 0.3242 | 0.0004 | 0.0319 | 31.1 | 0.0119 |
| | 120 | 0.1045 | 0.4187 | 0.6404 | 0.0007 | 0.0576 | 58.9 | 0.0094 |
| | 175 | 0.1312 | 0.6288 | 1.0135 | 0.0012 | 0.0583 | 106 | 0.0118 |
| | 250 | 0.1330 | 0.3838 | 1.3129 | 0.0017 | 0.0462 | 149 | 0.0120 |
| | 500 | 0.1961 | 0.6755 | 1.8555 | 0.0023 | 0.0677 | 237 | 0.0177 |
| | 750 | 0.4044 | 1.3812 | 3.9115 | 0.0049 | 0.1408 | 486 | 0.0365 |
| | 1000 | 0.5480 | 1.9543 | 6.3337 | 0.0060 | 0.1909 | 594 | 0.0494 |
| Rubber Tired Loaders Composite | | 0.1272 | 0.4855 | 1.0034 | 0.0012 | 0.0558 | 109 | 0.0115 |
| Scrapers | 120 | 0.1990 | 0.7011 | 1.1749 | 0.0011 | 0.1054 | 93.9 | 0.0180 |
| | 175 | 0.2172 | 0.9158 | 1.6429 | 0.0017 | 0.0945 | 148 | 0.0196 |
| | 250 | 0.2367 | 0.6699 | 2.1849 | 0.0024 | 0.0859 | 209 | 0.0214 |
| | 500 | 0.3333 | 1.3000 | 3.0162 | 0.0032 | 0.1190 | 321 | 0.0301 |
| | 750 | 0.5779 | 2.2380 | 5.3231 | 0.0056 | 0.2075 | 555 | 0.0521 |
| Scrapers Composite | | 0.2916 | 1.0984 | 2.5680 | 0.0027 | 0.1087 | 262 | 0.0263 |
| Signal Boards | 15 | 0.0072 | 0.0377 | 0.0450 | 0.0001 | 0.0017 | 6.2 | 0.0006 |
| | 50 | 0.1270 | 0.3587 | 0.3564 | 0.0005 | 0.0324 | 36.2 | 0.0115 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 120 | 0.1284 | 0.5269 | 0.8360 | 0.0009 | 0.0703 | 80.2 | 0.0116 |
| | 175 | 0.1661 | 0.8370 | 1.4268 | 0.0017 | 0.0750 | 155 | 0.0150 |
| | 250 | 0.1746 | 0.5516 | 2.1599 | 0.0029 | 0.0639 | 255 | 0.0158 |
| Signal Boards Composite | | 0.0203 | 0.0940 | 0.1470 | 0.0002 | 0.0083 | 16.7 | 0.0018 |
| Skid Steer Loaders | 25 | 0.0211 | 0.0635 | 0.1189 | 0.0002 | 0.0067 | 13.8 | 0.0019 |
| | 50 | 0.0596 | 0.2332 | 0.2402 | 0.0003 | 0.0180 | 25.5 | 0.0054 |
| | 120 | 0.0482 | 0.2769 | 0.3536 | 0.0005 | 0.0286 | 42.8 | 0.0043 |
| Skid Steer Loaders Composite | | 0.0534 | 0.2360 | 0.2686 | 0.0004 | 0.0207 | 30.3 | 0.0048 |
| Surfacing Equipme | 50 | 0.0513 | 0.1441 | 0.1411 | 0.0002 | 0.0128 | 14.1 | 0.0046 |
| | 120 | 0.1040 | 0.4251 | 0.6895 | 0.0007 | 0.0557 | 63.8 | 0.0094 |
| | 175 | 0.0950 | 0.4745 | 0.8195 | 0.0010 | 0.0422 | 85.8 | 0.0086 |
| | 250 | 0.1095 | 0.3526 | 1.1993 | 0.0015 | 0.0413 | 135 | 0.0099 |
| | 500 | 0.1631 | 0.6813 | 1.7819 | 0.0022 | 0.0622 | 221 | 0.0147 |
| | 750 | 0.2601 | 1.0660 | 2.8642 | 0.0035 | 0.0986 | 347 | 0.0235 |
| Surfacing Equipment Composite | | 0.1362 | 0.5467 | 1.3678 | 0.0017 | 0.0512 | 166 | 0.0123 |
| Sweepers/Scrubbe | 15 | 0.0124 | 0.0729 | 0.0870 | 0.0002 | 0.0034 | 11.9 | 0.0011 |
| | 25 | 0.0237 | 0.0808 | 0.1501 | 0.0002 | 0.0060 | 19.6 | 0.0021 |
| | 50 | 0.1195 | 0.3565 | 0.3179 | 0.0004 | 0.0302 | 31.6 | 0.0108 |
| | 120 | 0.1233 | 0.5204 | 0.7534 | 0.0009 | 0.0706 | 75.0 | 0.0111 |
| | 175 | 0.1575 | 0.8008 | 1.2212 | 0.0016 | 0.0717 | 139 | 0.0142 |
| | 250 | 0.1205 | 0.3447 | 1.3019 | 0.0018 | 0.0402 | 162 | 0.0109 |
| Sweepers/Scrubbers Composite | | 0.1278 | 0.5215 | 0.7403 | 0.0009 | 0.0576 | 78.5 | 0.0115 |
| Tractors/Loaders/B | 25 | 0.0199 | 0.0662 | 0.1250 | 0.0002 | 0.0061 | 15.9 | 0.0018 |
| | 50 | 0.1006 | 0.3305 | 0.3030 | 0.0004 | 0.0267 | 30.3 | 0.0091 |
| | 120 | 0.0760 | 0.3557 | 0.4910 | 0.0006 | 0.0432 | 51.7 | 0.0069 |
| | 175 | 0.1058 | 0.5866 | 0.8294 | 0.0011 | 0.0478 | 101 | 0.0095 |
| | 250 | 0.1264 | 0.3755 | 1.2813 | 0.0019 | 0.0415 | 172 | 0.0114 |
| | 500 | 0.2386 | 0.7714 | 2.2621 | 0.0039 | 0.0784 | 345 | 0.0215 |
| | 750 | 0.3611 | 1.1563 | 3.5105 | 0.0058 | 0.1199 | 517 | 0.0326 |
| Tractors/Loaders/Backhoes Comp | | 0.0862 | 0.3824 | 0.5816 | 0.0008 | 0.0435 | 66.8 | 0.0078 |
| Trenchers | 15 | 0.0099 | 0.0517 | 0.0617 | 0.0001 | 0.0024 | 8.5 | 0.0009 |
| | 25 | 0.0398 | 0.1355 | 0.2519 | 0.0004 | 0.0101 | 32.9 | 0.0036 |
| | 50 | 0.1656 | 0.4176 | 0.3536 | 0.0004 | 0.0374 | 32.9 | 0.0149 |
| | 120 | 0.1354 | 0.4732 | 0.8257 | 0.0008 | 0.0709 | 64.9 | 0.0122 |
| | 175 | 0.2050 | 0.8694 | 1.6306 | 0.0016 | 0.0901 | 144 | 0.0185 |
| | 250 | 0.2483 | 0.7418 | 2.3854 | 0.0025 | 0.0951 | 223 | 0.0224 |
| | 500 | 0.3135 | 1.4011 | 3.0220 | 0.0031 | 0.1190 | 311 | 0.0283 |
| | 750 | 0.5949 | 2.6307 | 5.8034 | 0.0059 | 0.2259 | 587 | 0.0537 |
| Trenchers Composite | | 0.1507 | 0.4749 | 0.6995 | 0.0007 | 0.0582 | 58.7 | 0.0136 |
| Welders | 15 | 0.0111 | 0.0425 | 0.0660 | 0.0001 | 0.0045 | 6.2 | 0.0010 |
| | 25 | 0.0224 | 0.0609 | 0.1044 | 0.0001 | 0.0068 | 11.3 | 0.0020 |
| | 50 | 0.1071 | 0.2854 | 0.2637 | 0.0003 | 0.0260 | 26.0 | 0.0097 |
| | 120 | 0.0708 | 0.2687 | 0.4376 | 0.0005 | 0.0387 | 39.5 | 0.0064 |
| | 175 | 0.1183 | 0.5475 | 0.9688 | 0.0011 | 0.0531 | 98.2 | 0.0107 |
| | 250 | 0.0909 | 0.2704 | 1.0791 | 0.0013 | 0.0329 | 119 | 0.0082 |
| | 500 | 0.1154 | 0.4072 | 1.3538 | 0.0016 | 0.0431 | 168 | 0.0104 |
| Welders Composite | | 0.0703 | 0.2150 | 0.2702 | 0.0003 | 0.0243 | 25.6 | 0.0063 |

# Appendix J

Statement of Reasons
Including Non-Binding Preliminary Allocation of Responsibility

# DEPARTMENT OF TOXIC SUBSTANCES CONTROL

# STATEMENT OF REASONS

## for Final Feasibility Study/Remediation Action Plan
## Mountain Lake
## Presidio of San Francisco, California

Pursuant to California Health and Safety Code (HSC), section 25356.1(d), the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) has prepared this Statement of Reasons as part of the Final Feasibility Study/Remedial Action Plan (FS/RAP) for Mountain Lake located at the Presidio of San Francisco, California (the Site).

This FS/RAP presents a summary of the investigations that have identified contaminants of concern (COCs) in sediment at the Site. These COCs include both inorganics and organics and are summarized in Section 3.6.2 of the FS/RAP. The sediment cleanup levels for the COCs are included in Table 3-1 of the FS/RAP. The cleanup levels have been approved by DTSC and are protective of human health and the environment. The FS/RAP also provides a discussion of the feasible remedial alternatives. The FS/RAP selects a remedial alternative that will meet the objectives of protecting public health and the environment. The FS/RAP has selected dredging with partial capping for the Site. This alternative includes dredging and offsite disposal with contingent capping in areas of potential slope instability that may limit sediment removal activities.

The DTSC believes that the attached FS/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 for 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. A brief summary of each factor follows. The selected remedial action is consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), the federal Superfund regulations. The attached FS/RAP has addressed all these factors in detail. 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 COCs for the Site include both inorganics and organics in sediment and are presented in Section 3.6.2 of the FS/RAP.

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

   The Basin Plan adopted by the California Regional Water Quality Control Board, San Francisco Bay Region (RWQCB) recognizes that beneficial uses of surface water at the Presidio include municipal or potable water supply and ecological and recreational uses. Surface water in the Lake is not currently used for drinking water purposes.

3. Effect of the Remedial Actions on Groundwater Resources

   Available technologies were evaluated to meet the overall remedial action objective of restoring the Lake to its potential beneficial uses identified by the RWQCB's Basin Plan. A variety of scientific engineering approaches and technologies were considered. The selected remedy offers the best combination of effective removal for the protection of human health and the environment and level of cost certainty compared to the other alternatives. Long-term monitoring will not be required.

4. Site-Specific Characteristics – Sections 25356.1(d)(4)

   Chemicals in sediment and surface water have been extensively characterized during site investigations and monitoring programs. The selected remedial alternative would remove sediment that has COCs above cleanup levels and is compatible with the Trust's intended land uses. Results of surface water sampling support conclusions that significant leaching of COCs from sediment into the overlying surface water is not occurring. Through sediment removal, contingent capping in select areas, and source control implemented by Caltrans, the selected remedial alternative provides an increased level of protection for minimizing the exposure of COCs to receptors and meets all of the ARARs.

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

   The selected remedial alternative includes dredging and offsite disposal with contingent capping in areas of potential slope instability that may limit sediment removal activities. The selected remedial action is the most cost-effective alternative to meet the cleanup objectives.

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

   The selected remedial alternative will not create any significant environmental impacts. Because of this, a Final Negative Declaration was prepared pursuant to the California Environmental Quality Act (CEQA) for the remedial alternative. An Environmental Study Checklist was completed for the Site, which discusses potential environmental impacts of the recommended alternative, as well as actions that will be taken to reduce or eliminate these potential environmental impacts during implementation. The CEQA Environmental Study Checklist and Final Negative Declaration are included in Appendix I of the FS/RAP.

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

   The current NBAR for the Site, as issued by the DTSC, is presented on the next page.

## PRELIMINARY NONBINDING ALLOCATION OF RESPONSIBILITY

California 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 (NBAR) among all identifiable potentially responsible parties (PRPs). California 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 PRPs 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 to 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(c) 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 the 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 Mountain Lake:**
**The U.S. Army is allocated 40 percent responsibility and the California Department of Transportation (Caltrans) is allocated 60 percent responsibility.**

# Appendix K

## Responsiveness Summary

**Responsiveness Summary**
**Feasibility Study/Remedial Action Plan and Initial Study/Negative Declaration**
**Mountain Lake**
**Presidio of San Francisco, California**

**May 2012**

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**LIST OF ATTACHMENTS**

**Attachment A** List of Public Comments and Comment Number Key

**Attachment B** Written and Oral Comments Received on the Draft FS/RAP and IS/ND

**Attachment C** Public Meeting, Draft Remedial Action Plan (RAP) –Reporter's Transcript of Proceedings, Thursday, April 19, 2012, Golden Gate Club, Presidio, San Francisco, California

**Attachment D** Concentrations of Chromium, Nickel, and Vanadium in Deeper Sediments

**Attachment E** Highway 1 Storm Water System As-builts, circa 1938

**Responsiveness Summary**
**Feasibility Study/Remedial Action Plan and Initial Study/Negative Declaration**
**Mountain Lake**
**Presidio of San Francisco, California**

**May 2012**

In March 2012, the California Department of Toxic Substances Control (DTSC) released for public comment a Draft Feasibility Study/Remedial Action Plan (FS/RAP) and accompanying Initial Study/Negative Declaration (IS/ND) for Mountain Lake (or the site), located at the Presidio of San Francisco, California. The Draft FS/RAP, prepared by Kennedy/Jenks Consultants on behalf of the Presidio Trust (Trust), addresses contamination at the site. DTSC prepared the IS/ND for the remediation project pursuant to the California Environmental Quality Act (CEQA). This summary responds to written and oral comments received during the public comment period on the Draft FS/RAP and IS/ND.

DTSC invited public and agency comments on the Draft FS/RAP and IS/ND for 45 days from March 19 through May 3, 2012. The public was notified of the comment period and the public meeting by an announcement placed in the *San Francisco Chronicle* on March 19, 2012. Notices were also placed on DTSC's EnviroStor website, the Trust's public website, and the *Presidio E-News*, a circulation for Presidio tenants. A fact sheet entitled *Proposed Draft Feasibility Study and Remedial Action Plan for Mountain Lake, Presidio of San Francisco* was prepared to provide information on Mountain Lake, describe the evaluation of cleanup alternatives, describe the proposed alternative, and invite public comment on the Draft FS/RAP and IS/ND. The fact sheet was mailed or e-mailed to approximately 1,600 contacts, including Presidio residents near the project site, offsite residents near the project site, neighborhood associations, environmental agencies, and other interested parties.

During the public comment period, the Draft FS/RAP, IS/ND, and supporting documents were included in the Administrative Record for the Draft FS/RAP. The Administrative Record for the Draft FS/RAP was available for public review at the Presidio Library and DTSC's office. The Draft FS/RAP and IS/ND were also posted on the Trust's public website and DTSC's EnviroStor website.

On April 19, 2012, DTSC held a public meeting at the Presidio on the Draft FS/RAP and IS/ND. At the public meeting, DTSC, the Trust, and California Department of Transportation (Caltrans) provided information on the Draft FS/RAP and IS/ND, including an overview of the remedial investigations and proposed cleanup actions. The public had the opportunity to offer oral comments on the proposed remedial actions in the Draft FS/RAP and the environmental analysis of the proposed remediation project in the IS/ND.

A list of written and oral comments received on the Draft FS/RAP and IS/ND, with a comment number key, is in Attachment A of this Responsiveness Summary. A copy of the written comments with a comment number key are provided in Attachment B of this

Responsiveness Summary. The transcript from the April 19, 2012 public meeting is included in Attachment C of this Responsiveness Summary. Oral comments from the transcript with a comment number key are also included in Appendix B of this Responsiveness Summary.

The Draft FS/RAP, IS/ND, this Responsiveness Summary, written public comments, the public meeting transcript, and other documentation regarding approval of the final remedy are included in the Administrative Record for the Final FS/RAP. Copies of the Final FS/RAP and the entire Administrative Record are available for review at the Presidio Library, 34 Graham Street, Presidio of San Francisco, weekdays between the hours of 8:30 a.m. and 4:30 p.m. Documents are also available for review at DTSC's Berkeley Regional Office file room, 700 Heinz Avenue, Berkeley.

The comments received during the public comment period were categorized into the following topic areas based on their content:

- A – Support of Proposed Remedial Alternative
- B – Evaluation of Background Metals
- C – Chemicals of Concern and Sediment Confirmation Sampling
- D – Extent of Sediment Removal (East Arm)
- E – Water Supply Quality
- F – Highway 1 Activities – Roadway Stabilization and Storm Water Treatment
- G – Haul Routes and Traffic Management
- H – Contractor Selection and Waste Disposal
- I – Miscellaneous
- J – California Department of Fish and Game Comments on the Initial Study/Negative Declaration

Many of the comments received were similar in nature. In these instances, the comments were consolidated into one comment which captures the intent of the individual comments. A response to the consolidated comment then follows.

The responses below indicate where revisions to the FS/RAP document were made in response to a comment. In addition, Section K describes edits that were made to correct minor errors in the Draft FS/RAP.

# A. Support of Proposed Remedial Alternative

**Comment A1:** Several commenters expressed support for the remedial alternative proposed in the FS/RAP that calls for sediment dredging and offsite disposal.

[*Commenters*: Jay Levy – written comment; Doug Kern – oral and written comments; Sam Berman – oral comment; Paul Epstein – oral comment; Eleanor Johns – oral comment; Catherine Stefani (legislative aide for Supervisor Mark Ferrell) – oral

comment; Vanh Dong – oral comment; Jan Blum – oral comment; Lake Street Residents Assoc. (LSRA) – written comment; Mark Youngkin – written comment].

**Response:** This comment is noted.

## B. Evaluation of Background Metals

**Comment B1:** *Section 3.6.1, Evaluation of Background Metals:* My correlation analysis of the XRF data for metals in sediment cores presented in the 2001 Reidy thesis suggest a strong correlation between two groups of metals: chromium-vanadium-nickel correlate together in one group and lead-zinc-copper correlate together in another. Chromium, nickel and vanadium have mean concentrations from modern sediments (post 1938) similar to the mean of concentrations in historical sediments (1776-1938). Chromium, nickel, vanadium, lead, copper and zinc all show mean concentrations in historical sediments (1776-1938) above prehistoric sediment concentrations. Background concentrations of chromium, nickel and vanadium are only present in prehistoric sediments below a depth of six feet. The Reidy data suggest that chromium, nickel and vanadium occur above freshwater ecological cleanup levels in prehistoric sediments prior to 1776. However, this does not appear to have been verified in the FS/RAP.

[*Commenter*: Mark Youngkin – written comment].

**Response:** The data reported in the Reidy thesis provide qualitative information to inform the understanding of sedimentation over time in Mountain Lake. However, the Reidy data are not useable quantitatively for purposes of remedial investigations and cleanup decisions in the FS/RAP. The Reidy thesis was completed by a graduate student for the purpose of understanding the paleoecological history of Mountain Lake. It was not conducted under regulatory agency oversight or by a registered geologist. The testing procedures did not follow quality assurance/quality control (QA/QC) procedures for conducting remedial investigations under regulatory guidelines. Also, the XRF is a field screening tool, which is not a state-certified laboratory analysis.

Following U.S. Environmental Protection Agency (USEPA) guidance, the definition of "background" includes both naturally occurring and anthropogenic substances (USEPA, 2002). Applying this definition, background material at Mountain Lake is comprised of the "prehistoric" sediments, as well as both natural sedimentation and fill placed from nearby areas during construction of Highway 1 in 1938.[1] Using data collected during remedial investigations (URS, 2011), the bivariate scatter plots in Appendix E of the FS/RAP also show that chromium, nickel, and vanadium data are correlated. The evaluation of background metals in the FS/RAP concludes that chromium, nickel, and vanadium are representative of background in native materials, fill, and natural sedimentation.

[1] This definition is also consistent with the definition of "background" at other Presidio remediation sites. At Fill Site 1, fill without debris was shown to contain background levels of metals (MACTEC, 2010).

The suggestion in the comment that prehistoric background sediment should be "verified" in the FS/RAP is not relevant to the issue of distinguishing contaminated sediment from background. However, for purposes of comparison only, chromium, nickel, and vanadium data for samples collected at depths greater than 6 feet below the sediment surface from the remedial investigations have been compiled in Attachment D of this Responsiveness Summary. As shown in Attachment D, the minimum, maximum, and average concentrations for chromium, nickel, and vanadium in deeper sediment are similar to the concentrations representing the top 3 feet of sediment. Further, the concentrations in deeper (below 6 feet) and shallower (top 3 feet) samples both exceed the freshwater sediment cleanup levels. This comparison further supports the conclusion that the concentrations of chromium, nickel, and vanadium in lake sediment are representative of background.

**Comment B2:** Correlation analysis for the Mountain Lake data shown on Table 2 (provided by Doug Kern) indicates strong correlations between two groups of metals similar to the Reidy thesis data: chromium-vanadium-nickel correlate together and lead-mercury-cadmium-zinc-copper correlate together. Cadmium and mercury are clearly shown in this analysis as related to modern contaminants and not correlated with background metals.

[*Commenter*: Mark Youngkin – written comment].

**Response:** The correlation analysis referred to in the comment has not been provided. However, Appendix E of the FS/RAP confirms that chromium, vanadium, and nickel are correlated and are attributable to background soil conditions (see also Response to Comment B1). Lead, mercury, cadmium, and zinc may or may not be correlated in lake sediment; this type of analysis was not completed in the FS/RAP as it is not relevant to assess whether concentrations of the contaminants are present at levels that pose a risk. Mercury, cadmium, and zinc were not retained as COCs in lake sediment because the 95 percent upper confidence limit on the arithmetic mean (UCL) concentrations (representative of the concentration to which an ecological receptor would be exposed) did not exceed cleanup levels. Therefore, these three metals do not pose a risk to ecological receptors in lake sediment.

**Comment B3:** The discussion in Appendix E using sediment color, historical reports, and scatter plots is not convincing and appears unnecessary as the 2001 Reidy thesis data clearly shows elevated chromium, nickel and vanadium concentrations in prehistoric sediments. The RI and FS documents indicate that the Colma background data set is utilized on this project. The FS document expends considerable effort to establish that the Mtn. Lake sediments contain a mixture of Colma and greenstone compromising the use of Colma background. The document does not identify a substitute set of background samples at Mtn. Lake to replace the Colma data or calculate appropriate concentrations for background metals. The Reidy thesis clearly indicates that prehistoric age sediments

occur beneath a depth of six feet in lake sediments. All samples recovered from prehistoric sediments below a depth of six feet should be indicated in the document / Table 2 as background samples. The speculation in this appendix should not replace a calculation of background concentrations from site specific prehistoric samples.

[*Commenter*: Mark Youngkin – written comment].

> **Response:** See Response to Comment B1, which clarifies that "background" includes both naturally occurring and anthropogenic substances. As such, background material at Mountain Lake is not limited to material below a 6-foot depth, but is comprised of the "prehistoric" sediments, natural sedimentation, and fill placed from nearby areas during construction of Highway 1 in 1938. Although the Reidy thesis is useful for qualitative purposes only (see Response to Comment B1), the findings of the background evaluation in Appendix E of the FS/RAP are consistent with the findings of the Reidy thesis. The bivariate scatter plots demonstrate that chromium, nickel, and vanadium data are correlated, indicating that they are derived from a similar material, and the concentrations are consistent with a mix of Colma formation and greenstone. Further, the table compiling data collected below a depth of 6 feet (Attachment D of this Responsiveness Summary) also supports that these three metals are present at background concentrations in lake sediment.

**Comment B4:** *Section 3.3, Conceptual Site Model:* The section labeled Conceptual Site Model presents only background information. The conceptual site model as presented on Figure 3-1 is simply an illustration of potential exposure pathways. The document Evidence of Environmental change over the last 2000 years at Mountain Lake, in the northern San Francisco Peninsula, California by Liam Reidy, 2001 Master Thesis at Mountain Lake, University of California at Berkeley provides ample information to develop a conceptual site model. The thesis describes a modern period beginning in 1938 with rapid sedimentation rates and elevated metals (lead, copper, zinc) attributed to runoff from the Presidio golf course and roadway. The highest concentrations of lead, copper, zinc are found in the upper 55 cm (<2 feet) during the modern period. Between 1776 (about 200 cm) and 1937 (about 90 cm), historical concentrations of chromium, nickel, lead, zinc and copper are elevated above prehistoric background in lake sediments. The Reidy thesis attributes the lead-zinc contamination to increased agricultural runoff (vegetation removal and grazing) along with other activities at the Public Health Service Hospital. Lead exceeds the freshwater ecological cleanup concentration beginning circa 1900 (about 5 feet deep). Metal concentrations first increase above prehistoric background with the arrival of European settlers beginning after 1776. Prehistoric background metal concentrations are first encountered at a depth of approximately 200 cm (about 1776) and extend down to 580 cm (about AD 100). It is clear from this data that prehistoric background should be represented in prehistoric sediment samples below a depth of 6 feet. There is no evidence in the core data for significant disturbance of the sediment except for the 1938 construction event that is clearly indicated in cores as a light grey laminated layer up to 10 cm thick at a depth of around 2½ feet.

[*Commenter*: Mark Youngkin – written comment].

**Response:** The discussion in Section 3.3 and Figure 3-1 present a complete Conceptual Site Model, as defined by the USEPA under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Per the USEPA's *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*, "the Conceptual Site Model should include known and suspected sources of contamination, types of contaminants and affected media, known and potential routes of migration, and known or potential human and environmental receptors" (USEPA, 1998). Section 3.3 and Figure 3-1 include known and suspected sources of contamination (e.g., storm water runoff and Presidio golf course), types of contaminants and affected media (e.g., metals and pesticides in sediment and surface water), known and potential routes of migration (e.g., storm drains and uptake by ingestion), and potential human and environmental receptors (e.g., recreational receptors and aquatic species). The history of sedimentation over time in Mountain Lake is not a required component of a Conceptual Site Model per the USEPA's guidance.

**Comment B5:** The conceptual site model utilized in the FS/RAP does not include sediment age data (as developed in the 2001 Reidy thesis). By combining contaminant data from modern shallow sediments with deeper prehistoric sediment, the UCL calculation apparently incorporates a large number of background samples. By including prehistoric samples in the analysis, the 95% UCL calculation is biased towards the lower background concentrations. Please clarify if it was the intention of the UCL calculation to include prehistoric background sample data. In my opinion, the 95% UCL calculation should only be applied to modern sediments impacted by runoff contamination. The background samples should be separated from the data set and analyzed for the range of concentrations typical of the background metals chromium, nickel and vanadium (as these potentially exceed freshwater ecological cleanup levels in prehistoric samples).

[*Commenter*: Mark Youngkin – written comment].

**Response:** See Response to Comment B4 on the Conceptual Site Model. The methodology used to calculate the 95 percent UCL concentrations is presented in Appendix D of the FS/RAP. The baseline 95 percent UCL concentrations for all chemicals were calculated using data from the upper three feet of sediment. This is the depth interval to which ecological receptors are exposed. The sediment age is irrelevant in evaluating potential ecological exposures.

**Comment B6:** Text from FS/RAP: *"However, as discussed in Section 3.6.1 and Appendix E, nickel in Lake sediment is representative of background concentrations in native and fill material. Therefore, nickel is not a COC in Lake Sediment:"* The distinction between native and fill material (as used here) is confusing in regard to background. The concept of a background concentration in both native and fill material appears contradictory and not adequate justification for removing nickel as a COC. The

document fails to define what samples represent background and therefore neglects to separate background samples from the data set shown on Table 2. I believe that a commonly accepted definition of background would include the native prehistoric sediments below six feet with no historic or modern metal contamination and naturally occurring metal concentrations. If the document is using another definition(s), please clarify.

[*Commenter*: Mark Youngkin – written comment].

> **Response:** See Response to Comment B1, which clarifies that "background" includes both naturally occurring and anthropogenic substances. As such, background material at Mountain Lake is not limited to material below a 6-foot depth, but is comprised of the "prehistoric" sediments, natural sedimentation, and fill placed from nearby areas during construction of Highway 1 in 1938. This definition has been added to Appendix E of the FS/RAP.

**Comment B7:** Although chromium, nickel and vanadium may be naturally occurring above the freshwater ecological cleanup value in prehistoric sediments (subject to verification), these metals are common runoff pollutants and may have impacted the lake above prehistoric background. At Mtn. Lake, the only sediments containing naturally occurring metal concentrations are prehistoric sediments (pre-1776) greater than six feet deep. A significant number of deeper sediment samples are shown on Table 2 and the estimation of prehistoric background (pre-1776) concentrations does not appear to be difficult. No matter how small the background data set from Table 2 is – this data would be preferable to the analysis presented in Appendix E. Until the concentrations of the background metals chromium, nickel and vanadium are determined from the existing Mtn. Lake data set, the document will continue to arbitrarily ignore these metals and not determine appropriate cleanup values for them.

[*Commenter*: Mark Youngkin – written comment].

> **Response:** See Response to Comments B1 through B3.

**Comment B8:** *Appendix E: Evaluation of Background Metals in Mountain Lake Sediment*: The use of color to assign an origin of greenstone to these sediments is speculative. Since the sediments are derived from a combination of windblown and runoff material, it cannot be determined from these scatter plots if the origin of the metal contamination is from greenstone, serpentine or both. Because the sample data mixes sediment from modern, historic and prehistoric ages, then sediments known to be contaminated (post-1776) have been included on the scatter plots and any conclusions drawn from this data are suspect. It is interesting to compare Mountain Lake values to regional studies with a large range of values. But this data is not site specific and potentially misleading. The Reidy thesis data clearly shows that chromium, nickel and vanadium concentrations are elevated in prehistoric sediments. An analysis including only prehistoric samples greater than six feet deep could determine the range of concentrations typical of prehistoric background. A cursory examination of deeper

samples shown on Table E-1 suggests that the prehistoric (below 6 feet) background concentration (if calculated) may be below the freshwater ecological cleanup level for chromium, nickel and vanadium. Please clarify why the document avoided calculating background concentrations for these metals from the data set on Table 2.

[*Commenter*: Mark Youngkin – written comment].

> **Response:** See Response to Comments B1 through B3. Also, color is commonly used by geologists to characterize and distinguish soil types (Schlocker, 1974). Color was used as one line of evidence in Appendix E of the FS/RAP to distinguish greenstone from other soil types at Mountain Lake.

## C. Chemicals of Concern and Sediment Confirmation Sampling

**Comment C1:** The lake contains metals and pesticides. Many of these metals were found in drop inlets where roadway runoff enters the lake. The pesticides were coming from the golf course. In the risk assessment in the FS/RAP, through a process of statistical analysis, the remaining contaminants are now lead and motor oil, and cadmium and antimony will be tested. Only these four contaminants will be tested in confirmation samples. Aquatic species are really susceptible to pesticides; pesticides may be contributing to the deformities in frogs due to the estrogen receptor-like characteristics of the pesticides. Copper is very toxic to aquatic organisms. I recommend that all metals and pesticides be tested in the confirmation sampling. This way, we'll know if the lake is really clean after remediation and we will not just rely on what we think we know. We cannot know unless we actually test for them.

The averaging techniques used to screen out various potential COCs are inappropriate when used over wide areas or include points outside the known contaminant detection areas. These techniques are not in the public interest and do not provide adequate reassurance that all toxic contaminants will be removed properly from Mountain Lake. I request that all Title 22 metals and pesticides be returned to the COC list and be tested for during confirmation sampling so that the cleanup process for Mountain Lake, that began for many of us nearly 20 years ago, be concluded with assurance that we have removed hazardous levels of contamination.

[*Commenters*: Doug Kern – oral and written comments; Sam Berman – oral comment; Jan Blum – oral comment].

> **Response:** The potential for aquatic species at Mountain Lake to be adversely affected by metal and pesticide exposure in lake sediments, both under current (baseline) conditions and post-remediation surface conditions, was evaluated in the FS/RAP based on an extensive remedial investigation data set. Over 145 sediment samples have been collected for metals from the surface to a depth of 9 feet below sediment surface (Appendix A of the FS/RAP, Table 2). Over 95 sediment samples were collected for pesticides from the surface to a depth of 9 feet below sediment surface (Appendix A of the FS/RAP, Table 4). These

samples were all collected from lake sediment within the known and expected areas of contamination.

The "averaging techniques" used in the risk assessment are appropriate and consistent with USEPA (1992) protocols and guidance for ecological risk assessment. Consistent with USEPA (1992), the 95 percent UCL concentrations were calculated for all metals and pesticides detected above cleanup levels in lake sediment. The 95 percent UCL is an upper-bound average concentration to which ecological species would be exposed and is recommended by USEPA (1992) to evaluate contaminant exposure and risk.

The freshwater sediment cleanup levels developed in the Presidio-wide Cleanup Level Document (EKI, 2002) and applied in the FS/RAP are considered to be safe concentrations of contaminants that are protective of aquatic species. If the 95 percent UCL concentrations in Mountain Lake sediments are below the cleanup levels, then toxic effects to aquatic species are not expected to occur. Except for lead, motor oil, and the metals associated with background, the 95 percent UCL concentrations of all metals and pesticides detected in lake sediment are below cleanup levels that are protective of aquatic species under current (baseline) conditions (Appendix D of the FS/RAP). Thus, these contaminants in lake sediment do not pose an adverse risk to aquatic receptors and were not selected as COCs.

Furthermore, pesticides were only sporadically detected in lake sediment. Only 13 of over 95 sediment samples collected throughout the lake footprint contained a pesticide above its cleanup level (Appendix A of the FS/RAP, Table 4). Also, pesticides were only detected in sediment samples collected from the upper 2 feet of sediment (Appendix A of the FS/RAP, Table 4). The dredging of the majority of the lake footprint to a minimum of 2.5 feet will further reduce pesticide concentrations.

The potential for metals and pesticides to remain in residual sediment following remediation has also been shown to be very low based on a robust sampling data set. Over 43 samples for metals and 28 samples for pesticides have been collected at deeper depths that are representative of the post-remediation surface (see Appendix D of the FS/RAP, Table D-4). Because there are data quality issues associated with the cadmium and antimony data, these metals are included in the confirmation sampling program. The same data quality uncertainties do not exist for the other metals and pesticides. Therefore, confirmation sampling of the full suite of metals and pesticides is not warranted.

However, to further confirm residual concentrations of metals that are most likely associated with automobile use of Highway 1, a subset of confirmation samples will also be analyzed for copper and zinc. Details of the confirmation sampling and analyses will be provided in the Remedial Design Implementation Plan (RDIP). Pesticides will not be analyzed in the confirmation samples due to infrequency of detection and detected concentrations that were not significantly above the cleanup levels.

**Comment C2:** I am grateful to see that the Department has required that sampling be done for cadmium. Cadmium was found in the storm-drain samples and in the lake sediment. However, cadmium should be returned to the COC list. According to the document in App. D, pg. D-2, cadmium may be elevated due to analytical interference. However, eliminating cadmium data on the possibility that it may be in error, without proof that it is in error, is not in the public interest. In fact, cadmium is a constituent used in the vulcanization of rubber and is a very likely contaminant from roadway runoff and windblown dust to Mountain Lake. The 1938 patent for the vulcanization of rubber is included for your reference and likewise shows that zinc is similarly associated with the making of automobile tires. Cadmium and zinc should be returned to the COC list and tested for during confirmation sampling.

[*Commenter*: Doug Kern – written comment].

> **Response**: See Response to Comment C1, which shows that the robust data set does not support retaining cadmium and zinc as COCs in Mountain Lake sediment. While zinc is associated with roadway use, results from over 145 sediment samples collected from the lake indicate that the metal is not present at concentrations that pose a risk to ecological receptors. The 95 percent UCL concentrations of zinc under both current (baseline) conditions and post-remediation conditions are below the cleanup level. Therefore, zinc is not a COC in lake sediment. There are 43 sediment samples in the post-remediation data set to demonstrate that zinc will not remain in sediment with a 95 percent UCL concentration above the cleanup level after remediation. However, as described in Response to Comment C1, a subset of the confirmation samples will be analyzed for zinc to confirm that the 95 percent UCL concentration does not exceed the cleanup level.
>
> The cadmium data collected in 2001 is highly suspect, given that sample results reported in 2005 were much lower and below the cleanup level. Laboratory interferences are known to occur for cadmium (see Appendix D of the FS/RAP). A COC should not be selected based on suspect data. Because there are uncertainties with the data, cadmium will be sampled in confirmation sediment samples.

**Comment C3:** There are many significant detections of copper in lake sediment. Copper is highly toxic to aquatic organisms. Copper is also widely distributed in uses where it might have contaminated Mountain Lake. The most notable and most likely way for copper to enter Mountain Lake is through roadway runoff and windblown dust generated from the copper in brake pads. The problem of copper contamination from brake pads caused California to pass SB346 in 2010, requiring manufacturers to reduce the level of copper in brake pads to less than 5% by 2021 and to less than 0.5% by 2025. Copper should be returned to the COC list and tested during confirmation sampling.

[*Commenter*: Doug Kern – written comment].

**Response**: See Response to Comment C1, which shows that the robust data set does not support retaining copper as a COC in Mountain Lake sediment. While copper is associated with roadway use, results from over 145 sediment samples collected from the lake indicate that the metal is not present at concentrations that pose a risk to ecological receptors. The 95 percent UCL concentrations of copper under both current (baseline) conditions and post-remediation conditions are below the cleanup level. Therefore, copper is not a COC in lake sediment. There are 43 sediment samples in the post-remediation data set to demonstrate that copper will not remain in sediment with a 95 percent UCL concentration above the cleanup level after remediation. However, as described in Response to Comment C1, a subset of the confirmation samples will be analyzed for copper to confirm that the 95 percent UCL concentration does not exceed the cleanup level.

**Comment C4:** Pesticides have been detected above cleanup limits in lake sediments. Pesticides are widely harmful to amphibians, likely future inhabitants of the lake, and have been linked to delayed metamorphosis, immunosuppression, hermaphroditism, sex reversal, and mortality. In humans, pesticides may be carcinogenic and lead to hormone and endocrine disorders. Since pesticides have been detected around the lake in sediment they should remain a COC and be tested for during confirmation sampling. The averaging process used during screening is inappropriate considering the known pesticide contamination and the future safety of the lake to aquatic organisms.

[*Commenter*: Doug Kern – written comment].

**Response**: See Response to Comment C1, which shows that the robust data set does not support retaining pesticides as COCs in Mountain Lake sediment. Pesticides have been infrequently detected in the over 95 sediment samples collected throughout the lake and the 95 percent UCL concentrations are well below cleanup levels protective of aquatic species. The "averaging process" used in the risk assessment is appropriate and consistent with USEPA (1992) protocols and guidance for ecological risk assessment. The 95 percent UCL is an upper-bound average concentration to which ecological species would be exposed and is recommended by USEPA (1992) to evaluate contaminant exposure and risk. Therefore, pesticides are not COCs in lake sediment. There are 28 sediment samples in the post-remediation data set to demonstrate that pesticides will not remain in sediment with 95 percent UCL concentrations above the cleanup level after remediation, so confirmation sampling for pesticides is not warranted.

**Comment C5:** We urge DTSC and the Trust to carefully consider any input from the Restoration Advisory Board of the Presidio of San Francisco and its members. We share their concerns and support their comments about the adequacy of the treatment of cadmium and antimony. Whether naturally present or by-products of materials that have been flushed or dumped into the lake, we urge that these elements be thoroughly removed with wide margins. Likewise, we urge that pesticides, whether from the golf course or other sources, be identified and removed through the dredging process with sufficiently

wide margins to ensure that they do not persist after completion of this remediation project.

[*Commenter*: LSRA – written comment].

**Response:** See Response to Comments C1 through C4.

**Comment C6:** What is the ecological effect of leaving chromium exposed in sediment at the bottom of the excavated surface of the lake at 200 to 400 parts per million? This information is not in the Remedial Investigation or Feasibility Study.

[*Commenter*: Mark Youngkin – written comment].

**Response:** The cleanup level for chromium, based on ecological effects to aquatic species, is 140 mg/kg (parts per million) (EKI, 2002). Based on existing data comprised of 43 samples, chromium will remain in sediment at the post-remediation surface at concentrations ranging from 25 to 230 mg/kg (Appendix D of the FS/RAP, Table D-4). The calculated 95 percent UCL concentration in post-remediation sediment is 103 mg/kg which is below the cleanup level (Appendix D of the FS/RAP, Table D-4). Furthermore, the analysis in Appendix E demonstrates that chromium is present at background concentrations in lake sediment.

**Comment C7:** *Page 8, PCOCs in Sediment*: Antimony does not appear as a PCOC even though it is present in several samples of lake sediment above cleanup levels. The drop inlet storm-drain samples 1 and 2 contain antimony at an elevated concentration. DTSC has requested that post-remediation sediment confirmation samples be collected for antimony. The removal of antimony appears arbitrary and antimony should be listed as a PCOC in this section.

[*Commenter*: Mark Youngkin – written comment].

**Response:** As discussed in Section 3.4 of the FS/RAP, potential chemicals of concern (PCOCs) were selected based on a comparison of contaminant concentrations in sediment with screening (cleanup) levels from the Remedial Investigation Summary (URS, 2011). Antimony was detected above its cleanup level in only two of more than 145 sediment samples collected from the lake. The only other detections of antimony above the cleanup level were in samples collected from storm drain drop inlets, which are not lake sediment samples and are not relevant for potential ecological exposures. Due to the infrequency of antimony detections in lake sediment, it was not retained as a PCOC. However, since some of the laboratory detections limits are elevated, DTSC requested analysis of antimony in the confirmation samples to confirm residual concentrations will not pose a threat to aquatic receptors.

**Comment C8:** *Page 9, "Lead is the primary PCOC in lake sediment due to the high number and widespread distribution of sediment samples containing lead at concentrations exceeding its cleanup level."*: Table 2 indicates that lead exceeded the freshwater ecological cleanup value in about 45 sediment samples. Cadmium exceeded the cleanup level in about 54 samples, nickel exceeded in about 50 samples, chromium exceeded in about 26 samples, vanadium exceeded in about 21 samples, zinc exceeded in about 18 samples and copper exceeded in 7 samples. According to the number and distribution of sediment samples, cadmium and nickel should be included in the above sentence along with lead as primary PCOCs. Zinc, vanadium, chromium and copper also occur in sufficient samples to be called widespread and should be included in the above statement on PCOCs as well. If the intent of this statement is that lead is the primary PCOC due to toxicity or the negative impact to the lake ecology than the sentence should be reworded.

[*Commenter*: Mark Youngkin – written comment].

> **Response:** The referenced sentence has been reworded as follows: *"Lead is the primary PCOC in lake sediment due to the high number and widespread distribution of sediment samples containing lead at concentrations exceeding its cleanup level, <u>in addition to the magnitude of the detections above the cleanup level</u>*." Lead is the only contaminant with widespread detections that exceeded its respective cleanup level by more than an order of magnitude.

**Comment C9:** "*The 95 percent UCL concentration for cadmium based on the 2005 data set is below the cleanup level, so cadmium is not a COC in Lake sediment*.": It is evident from a cursory inspection of the 2005 sampling data presented on Table 2 that a significant number of deeper samples (>2.5 feet) are included in the sampling data. All samples below about 2.5 feet are historic age (1776-1938) and all samples below 6 feet are prehistoric age (pre-1776). By including the older historic and prehistoric samples in the data set for the 95% UCL calculation, the result is biased towards lower background values. Please clarify if the 95% UCL calculation for cadmium includes a significant percentage of background data and if this is a significant bias.

[*Commenter*: Mark Youngkin – written comment].

> **Response:** The methodology used to calculate the 95 percent UCL concentrations is presented in Appendix D of the FS/RAP. The baseline 95 percent UCL concentrations for all chemicals were calculated using data from the upper 3 feet of sediment. This is the depth interval to which ecological receptors are exposed, irrespective of whether background data are included. Even so, for cadmium, of the 43 samples used to develop the 95 percent UCL concentration, 41 samples were collected at depths of 2 feet or less. The remaining two samples were collected at a depth of 2.5 feet. No samples collected deeper than 2.5 feet were used in the baseline 95 percent UCL calculation for cadmium. Therefore, the baseline 95 percent UCL calculation for cadmium is not biased towards lower background values of historic samples at deeper depths.

**Comment C10:** Cadmium exceedances in the sample data occur as/or more frequently than lead exceedances. Cadmium contamination (POCC) may be as widespread and common as lead in Mountain Lake. The presumed source of post-1900 cadmium contamination is also runoff. Cadmium is released from car exhaust, auto tires, metal processing, battery and paint manufacturing, waste hauling / disposal, the burning of household or industrial waste, coal or oil, and from agricultural runoff from phosphate fertilizers. The 2001 data set for cadmium is suspect and the department has requested testing of cadmium during confirmation sampling. The FS-RAP should retain cadmium as a legitimate COC and not use the ad hoc 95% UCL calculation (that includes background data) to remove cadmium as a COC.

[*Commenter*: Mark Youngkin – written comment].

> **Response**: COCs are defined in the FS/RAP as PCOCs in lake sediment with 95 percent UCL concentrations that exceed the freshwater sediment cleanup levels under baseline (current) conditions and are not associated with background (Section 3.6.2 of the FS/RAP). Per USEPA guidance (1992), the 95 percent UCL should be used to evaluate potential exposures to chemicals in environmental media. Cadmium was not selected as a COC because the baseline 95 percent UCL concentration in the upper 3 feet of sediment (representing the ecological exposure area) was below the cleanup level. Also, as discussed in the Response to Comment C9, the 95 percent UCL calculation for cadmium is based on sediment data collected at depths of 3 feet or less which does not bias the data towards lower background values. Therefore, cadmium is appropriately not retained as a COC.
>
> Cadmium was regularly detected above cleanup levels in samples collected in 2001. However, as explained in Appendix D (Section D.2.1) of the FS/RAP, the 2001 cadmium data are suspect due to potential analytical interference. Therefore, cadmium will be sampled in post-remediation confirmation sediment samples.
>
> Although there are many sources of cadmium, the 95 percent UCL concentration demonstrates that cadmium is not present at concentrations that pose a risk to the ecological environment. Cadmium is also natural element in the earth's crust, and all soils and rocks contain some cadmium (EKI, 2002).

**Comment C11:** *Page 12 – Section 3.6.3, Remedial Action Area, "Post-remediation confirmation sampling following sediment removal in the remedial action area would confirm that COC concentrations have been reduced to acceptable risk levels.*" The confirmation sampling is limited only to lead and motor oil. Is the correlation between lead and other common storm water contaminants such as antimony, cadmium, zinc, copper, mercury, and pesticides so strong that this limited confirmation sampling will ensure that the all contamination is reduced to acceptable risk levels? The document should present analysis indicating that lead and motor oil are reliable indicators of the

broader suite of modern runoff contaminants or re-instate a broader range of COCs to the confirmation sampling.

Instead of adding former PCOCs back to the confirmation sampling suite in a piecemeal fashion, please consider revising the evaluation of COCs to include a larger suite of COCs that would also be collected for confirmation sampling including antimony, cadmium, zinc, copper, mercury, pesticides, etc. The collection of confirmation samples that are not COCs is problematic from a public perspective because the document does not specify procedures for non-COC contaminants.

[*Commenter*: Mark Youngkin – written comment].

> **Response**: See Response to Comments C1 through C4. Lead and motor oil are not intended to be indicators of the broader suite of modern runoff contaminants. The other contaminants were not selected as COCs based on the risk analysis showing that the 95 percent UCL concentrations are below cleanup levels; thus, the other contaminants do not pose a risk to aquatic receptors.
>
> Procedures for COCs in confirmation samples will also apply to the non-COCs. The referenced sentence has been revised as follows: *"Post-remediation confirmation sampling following sediment removal in the remedial action area would confirm that analyte concentrations have been reduced to acceptable risk levels."* The confirmation sample analytical suite includes the COCs, lead and motor oil, and non-COC metals for which data quality have been questioned or additional confirmation has been requested: antimony, cadmium, copper, and zinc. Details of the confirmation sampling and analyses will be provided in the RDIP.

**Comment C12:** *Section 8.1, Remedial Alternative Implementation, "If COCs are detected at concentrations exceeding cleanup levels in samples collected at the limits of dredging, the Trust will consult with DTSC to:*

- *Evaluate the risk associated with the remaining COC concentrations.*
- *Assess potential impacts of continued dredging on slope stability.*
- *Determine if additional dredging is warranted and feasible."*

As the confirmation sampling will include metal analytes that are not considered COCs, this section does not apply to the confirmation sampling of antimony and cadmium (or any others added to the confirmation sampling). It seems unusual to have confirmation sampling for constituents that are not considered COCs and also without procedures specified in the FS-RAP to address exceedances discovered during confirmation sampling. It would be more appropriate to include all problematic and/or suspect metals identified in the RI as PCOCs in the FS document as COCs and determine a reliable-representative suite of these COCs to use for confirmation sampling.

[*Commenter*: Mark Youngkin – written comment].

> **Response**: Section 8.1 (referenced above) has been revised to indicate that additional dredging decisions, based on the confirmation sampling data concentrations, will be conducted based on all analytes tested in confirmation

samples, not just those identified as COCs. As stated previously and in the FS/RAP, the confirmation sample analytical constituents will include the COCs, lead and motor oil, and non-COC metals for which data quality have been questioned or additional confirmation has been requested: antimony, cadmium, copper, and zinc. Details of the confirmation sampling and analyses will be provided in the RDIP.

**Comment C13:** To my knowledge, cadmium is not known as background at the Presidio. The discussion in the FS-RAP is not convincing that cadmium is from some unknown bedrock source (this statement may have been removed in the last public version of the document). Because these metals have dubious data sets, I appreciate that antimony and cadmium were added to the confirmation sampling. However, both metals would be more appropriately add to the list of COC for this project. This would ensure that the procedures in the document applicable to COCs would apply to these metals as well.

[*Commenter*: Mark Youngkin – written comment].

**Response**: Background concentrations of cadmium in various soil types at the Presidio are reported in the Presidio-wide Cleanup Level Document (EKI, 2002). However, the FS/RAP does not conclude that cadmium in Mountain Lake sediment is from an unknown bedrock source. See Response to Comments C7 and C10 explaining why antimony and cadmium were not selected as COCs. Also, as noted in Response to Comment C12, the document has been revised to clarify that procedures used to evaluate confirmation sampling data and assess the need for additional dredging will be applied to the non-COCs.

**Comment C14:** *Section 8.1, Remedial Alternative Implementation, Page 37, 2nd Paragraph*: From this description, it is difficult to determine whether a credible risk evaluation of confirmation samples can be performed during the dredging operation. The use of the term "site-specific release" is vague as used in this section in reference to confirmation samples. The term "site specific release" should apply to all contaminants related to modern runoff including lead, zinc, copper, antimony, cadmium, and pesticides. Since the majority of the contaminants associated with a site specific release have already been eliminated as COCs in the risk evaluation, the usefulness of this concept during the confirmation sampling is dubious. This section should be significantly expanded to provide more understandable and specific guidelines/procedures for determining a site specific release.

[*Commenter*: Mark Youngkin – written comment].

**Response**: Confirmation sample data will be evaluated based on comparison of 95 percent UCL concentrations with cleanup levels and background concentrations. The term "site-specific release" has been removed from the document. The referenced paragraph in Section 8.1 has been revised to read as follows: "*Results of confirmation sediment analyses will be compared to cleanup*

*levels in Table 3-1 to assess whether additional dredging should be conducted. If the concentrations of all constituents analyzed are below cleanup levels, then dredging activities will be terminated. For confirmation samples containing one or more analytes at concentrations exceeding cleanup levels, the confirmation sample results for the constituent exceeding the cleanup level will be evaluated using an analyte-specific 95 percent UCL of the mean and the UCL compared to the cleanup level to assess whether that analyte poses residual risk. Concentrations of metals that appear to represent background in naturally occurring sediment or fill material will be evaluated using existing Site data and background data to assess whether the metal concentrations are representative of background. If the analyte concentration poses residual risk, the analyte concentration is not associated with background, and additional dredging is feasible, sediment will be further dredged and the newly dredged area will be re-sampled and analyzed for the analyte that triggered the additional dredging. The Trust will consult with DTSC regarding confirmation sample results, potential additional dredging, and partial cap areas. Additional details related to confirmation sediment sampling, analytical test methods, sample frequency, and decision logic for additional dredging will be included in the RDIP."*

## D. Extent of Sediment Removal (East Arm)

**Comment D1:** The handouts distributed in the meeting show two different dredging footprints, particularly in the east arm. The dredging does not appear to extend up the East Arm. There is a conduit under the trail to the east arm but it is not functioning well. The water in the East Arm is stagnant, contains golf course runoff, and is a mosquito breeding ground. The East Arm should be given a higher priority in the project – the dredging should go further east that appears on the map.

[*Commenter*: Paul Epstein – oral comment].

**Response:** The dredging footprint is shown on Figures 6-4 and 8-3 of the FS/RAP. Confirmation sediment samples will be collected following dredging to the limits shown on the figures. Based on the results of confirmation sediment samples, sediment will be over-dredged, as necessary, until contaminant concentrations no longer pose a risk to ecological species. This includes dredging further east from sample location MLSE 26.

The area known as the "East Arm" is the drainage between the Presidio Golf Course and West Pacific Avenue, east of and across the trail from Mountain Lake. The East Arm is outside the scope of the remediation project as it does not contain contaminants from Highway 1 storm water discharges. The East Arm drainage may have collected pesticides over time from legal application of pesticides on the golf course. Pesticide contamination that has been legally applied is exempt from the scope of cleanup projects under the CERCLA.[2] Pesticides in Mountain

[2] CERCLA, 42 U.S.C. § 9607(i), excludes "application" of pesticides registered under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) from the scope of a CERCLA release.

Lake were investigated and included in the remediation project only because pesticides were co-located with contamination from Highway 1.

The Trust plans to expand wetland habitat in the East Arm under a separate project. Pesticide contamination in the East Arm, if confirmed, will be addressed under the scope of that project. This comment will be forwarded to the Trust's Planning, Projects, and Programs department for consideration. The two projects, although separate, are being coordinated by Trust staff.

**Comment D2:** We advocate for the most through remediation of the lake as possible, including its east arm. The complexity of the toxins in the lake clearly is beyond the comprehension of the general public. We urge that in designing the remediation, DTSC and the Trust ensure that any residual toxins do not become problematic in the future, whether from percolation or some other mechanism.

[*Commenter*: LSRA – written comment].

**Response:** See Response to Comment D1. As described in Section 3.3 of the FS/RAP, the Presidio golf course operates under an Integrated Pest Management Program which controls pesticide and fertilizer use. If pesticides are present in sediment of the East Arm, the pesticides are unlikely to percolate or discharge into Mountain Lake. Except for groundwater and seasonally high surface water flow, there is no hydraulic connection between the East Arm and Mountain Lake. The East Arm only discharges to Mountain Lake under seasonally high flows. Furthermore, although pesticides historically discharged from the golf course into Mountain Lake for over 100 years, pesticide levels in lake sediment are still low and below levels of concern for aquatic receptors (see Response to Comment C1). Therefore, it is unlikely that residual pesticides remaining in the East Arm would become problematic in the future for Mountain Lake.

**Comment D3:** If no work is conducted in the East Arm, won't the sediment and golf course contaminants in the East Arm overflow into Mountain Lake? Is there pesticide runoff and how is it being removed?

[*Commenters*: Vanh Dong – oral comment; John Maccabee – oral comment].

**Response:** See Responses to Comments D1 and D2.

**Comment D4:** We have been told that the East Arm is not part of the dredging project but will be part of future restoration work. One million dollars is being funded by the San Francisco International Airport to help restore the East Arm wetlands. But, there are several issues that need to be worked out, including the overall level of the lake, the hydrology, how restoration work will change the final lake bed, and whether water will flow into the East Arm to lessen the mosquito problem. There should be early planning so that a problem does not come up in the dredging process that cannot be counteracted later.

[*Commenter*: Eleanor Johns – oral comment].

> **Response:** See Response to Comments D1 and D2. The East Arm wetland mitigation project funded by the San Francisco International Airport is a separate project outside the scope of the Mountain Lake remediation project. This comment will be forwarded to the Trust's Planning, Projects, and Programs department for consideration. The two projects, although separate, are being coordinated by Trust staff.

**Comment D5:** We request that the "dog-leg," the eastern branch of the lake, be properly reconnected to the main body, with a new bridge where West Pacific Ave. turns north along the edge of the golf course.

[*Commenters*: Neighborhood Associations for Presidio Planning (NAPP) – written comment; LSRA – written comment].

> **Response:** See Responses to Comments D1 and D2. Connecting the East Arm with the main body of Mountain Lake and construction of a new bridge are outside the scope of the Mountain Lake remediation project. This comment will be forwarded to the Trust's Planning, Projects, and Programs department for consideration. The two projects, although separate, are being coordinated by Trust staff.

**Comment D6:** We are concerned about the counter-intuitive findings reportedly made by the project-sponsors that conclude that the lake should not be dredged to a depth deeper than that presently being proposed; that is, the vitality of the lake would be worsened by deeper dredging that what is being proposed. Please provide the public with a clear, accessible explanation of the findings on this subject.

[*Commenters*: NAPP – written comment; LSRA – written comment].

> **Response:** The FS/RAP does not make any findings regarding dredging to a depth deeper than that necessary to remove contaminants that pose an unacceptable ecological risk. The dredging plan in the FS/RAP was developed based on the removal of COCs in sediment that pose a significant risk to ecological receptors. As discussed in Section 8.1 of the FS/RAP, areas will be over-dredged, as necessary, where sediment confirmation sampling indicates that residual contaminants are still present in lake sediment. The depth of removal is not constrained by a finding that the vitality of the lake would be worsened by deeper dredging.

## E. Water Supply Quality

**Comment E1:** I am extremely concerned about the impact to our water supply (I believe 80% of our water comes from Lobos Creek with Mountain Lake as "headwater") if your project ends up stirring up all that toxic sludge you've identified. Should residents be

concerned – or why should residents not be concerned? I have sent our water out for independent lab tests a few times because I am already horrified this is where our water comes from (not Hetch Hetchy like the rest of San Francisco). Should we buy bottled water, or move? The levels of some of the agents in our water are extremely high already.

[*Commenter*: Jim Toth – written comment].

> **Response:** Lobos Creek provides 70 to 80% of the Presidio's drinking water supply; the remainder is purchased from the San Francisco Water Department. The Trust operates under a permit with the California Department of Public Health (CDPH) in the collection, testing, treatment, and distribution of the Lobos Creek water supply. To ensure healthy water from the Lobos Creek supply, the Trust conducts extensive testing to ensure that the Presidio's drinking water supply is safe and healthy. The water system complies with all regulations that limit the amount of certain contaminants in public water supplies set forth by the USEPA and CDPH. An Annual Water Quality Report is distributed each year to Presidio tenants to report the levels of chemicals in the water supply. This regular reporting and testing program will continue during and after the dredging of Mountain Lake.
>
> Mountain Lake is not at the headwaters of Lobos Creek. Lobos Creek is groundwater-fed and begins approximately downslope of the northern terminus of 17th Avenue; this is roughly 0.25 mile west of Mountain Lake. There is a groundwater connection between Mountain Lake and Lobos Creek. Surface water of Mountain Lake has been sampled and tested for contaminants. The levels of contaminants in surface water samples from the lake are below drinking water standards (see Section 3.4.2 of the FS/RAP).
>
> The dredging operations will be conducted in a manner that will minimize disturbance of sediment in the water column. The Trust is working with DTSC and the Regional Water Quality Control Board (RWQCB) to develop a Best Management Practices (BMP) plan. The BMP will identify operational measures that will promote settling of solids in the water column and a sampling and analysis plan for the decant water generated from the dewatering operations. The BMP measures and sampling plan will ensure that water quality of Mountain Lake will not be adversely affected by the dredging operations.

## F. Highway 1 Activities – Roadway Stabilization and Storm Water Treatment

**Comment F1:** Regarding the stone column network for stabilization, I am concerned about the possibility of permanent acoustic conductions and possible sound amplifications that could occur as a result of the stone columns interacting with other sources of constant noise, such as roadbed and tunnel vibration, as well as collective sounds from motor vehicles moving within the tunnel. Since noise is a matter of concern for CEQA compliance, I ask that you examine this potential acoustic issue to assure that

there will not be a noise penalty permanently affecting those living in the vicinity of Mountain Lake.

[*Commenter*: Sam Berman – oral and written comments].

> **Response:** Caltrans' engineers have examined this issue. The aggregate material in the stone columns will not emit or increase noise due to roadbed and tunnel vibrations or from motor vehicles. Approximately 75 to 80% of the lengths of the stone columns of compacted rocks will be submerged under groundwater and will not amplify sound.

**Comment F2:** The proposed storm water treatment system is unclear. The proposed treatment only would filter runoff water. The plan does not address final runoff control or connection into the City's sewer and storm water drainage system. Roadway runoff begins in the tunnel area and runs on both sides of the road approaching Lake Street. How extensive is the plan to catch all of the runoff? There may not be sufficient money for a follow-up to the filtration system.

[*Commenters*: Richard Shrieve- oral comment; Paul Epstein – oral comment; Eleanor Johns – oral comment].

> **Response:** The storm water treatment system will consist of inserts that are placed in all storm water drop inlets that collect runoff from the highway and feed the runoff into the lake. There are 19 drop inlets on the highway that will be retrofitted with the inserts. The inserts will filter out trash, sediments, and chemical contaminants from the storm water before it discharges into the lake. The inserts are easily maintained and serviced from the roadway.
>
> The 19 drop inlets collect all runoff from both sides of the highway between the Macarthur tunnel and Lake Street. There is an asphalt concrete dike along the eastern shoulder of the highway that directs all runoff into the drop inlets and does not allow water to sheet flow over the embankment into Mountain Lake. This dike will be replaced after the stone column stabilization work.
>
> Diversion of the runoff away from the lake and potentially into the City's storm water/sewer system is outside the scope of the remediation project. The diversion is planned as a future project, subject to National Environmental Policy Act (NEPA)/CEQA compliance. The future project is funded through a Consent Decree between the Trust and Caltrans (U.S. District Court, 2012). However, the storm water treatment inserts included in the remediation project do not rely on future diversion of storm water. With regular maintenance and servicing, the inserts could permanently prevent untreated highway runoff from discharging into Mountain Lake.

**Comment F3:** The details on the filtration monitoring system are not included in the proposed plan. Provide information on exactly how the filters will be changed, at what frequency, and especially during storm events, how it will be monitored.

[*Commenter*: Jan Blum – oral comment].

**Response:** Details on the filtration monitoring system will be developed in the remedial design. A robust monitoring and maintenance schedule for the inserts will be developed to ensure that the system is functioning as intended, such that untreated highway runoff does not discharge into Mountain Lake. The monitoring will include checking, cleaning out, and servicing, as necessary, the inserts at regular intervals and after severe storm events.

**Comment F4:** The design of the drainage system from Park Presidio Blvd. (Highway 1) needs to be adequate to handle extreme weather conditions so that intense rain storms do not overflow the barriers and the drain system, and the lake is fully protected from roadway runoff. If the current plan does not include connecting the Park Presidio Blvd. storm drainage to the City's sewer system, we urge you to re-design the project to include this component. Solid barriers should be included in the design, so that flood stage run-offs are adequately diverted into a sewer system, and do not end up in the lake. No amount of runoff should be permitted to flow into the lake.

[*Commenter*: LSRA – written comment].

**Response:** All roadway runoff is channeled into 19 drop inlets that direct the storm water into Mountain Lake. An asphalt concrete dike along the eastern edge of Park Presidio Blvd. (Highway 1) prevents runoff from sheet-flowing into the lake, including during severe storm events. As discussed in Response to Comment F2, the diversion project to redirect storm water away from the lake is a future project not within the scope of the remediation project and is subject to a separate environmental review process. The treatment filters that will be installed under the remediation project will effectively prevent contaminants from entering the lake from the highway.

**Comment F5:** In its current condition, the roadway is noisy. If one is in the park, there is a constant hum of tires on pavement. Vegetation and trees recently removed has increased noise levels. As part of the remediation, the northbound lanes of the roadway will be shored up. Caltrans should use the opportunity to repave the entire roadway with material that is more sound absorbent. The retaining wall on the west side of the highway is also noisy as it reflects road noise back into the park area. The wall could be coated with a material that breaks up the sound instead of having it reverberate back into the park.

[*Commenters*: Paul Epstein – oral comment; Bill Shepard – oral comment].

**Response:** Vegetation and trees removed for the project will be replanted to address noise and visual concerns. However, repaving of the highway and treatment of the retaining wall are outside the scope of the remediation project. For highway stabilization, the stone column network will be installed in the shoulder of the roadway which is mostly unpaved. To complete the stone column

installation, only a minor amount of pavement along the eastern edge of the highway shoulder will need to be removed and replaced. No pavement in the roadway will be removed or replaced. The retaining wall on the west side of the highway is not within the work area for the remediation project. This comment has been forwarded to Caltrans for consideration.

**Comment F6:** We request, as part of the project, that Highway 1 be repaved with surface that will dampen or reduce road noise as part of the mitigation for taking down the trees that formerly buffered the sound. Similarly, we request that the retaining wall on the west side of Highway 1 opposite Mountain Lake be covered with a sound baffle to reduce road noise that is now reflected back into Mountain Lake Park, again as mitigation for the tree removal that formerly buffered the sound.

[*Commenters*: NAPP – written comment; LSRA – written comment].

**Response:** As provided in Response to Comment F5, repaving of Highway 1 and treatment of the retaining wall are outside the scope of the remediation project. Vegetation and tree removals will be mitigated by replanting the vegetation in areas disturbed by the project. The vegetation along the western bank of the lake, buffering sounds from the roadway, will be replanted to mitigate visual and noise impacts.

**Comment F7:** *Appendix I - California Environmental Quality Act (CEQA) Documentation, Appendix B Figures, Figure 6: Highway 1 Storm water Management Elements*: Figure 6 depicts separate systems for groundwater and storm water. Groundwater from the Highway 1 tunnel is conveyed by conduit to the north end of the lake (blue line). However, the groundwater flow (blue line) is incorrectly shown on the figure. My field inspection indicates that the groundwater conduit joins a network of four drop inlet storm drains beneath Park Presidio Blvd. These storm drains are not apparent on this figure. Other drop inlet storm drains along the Mtn. Lake perimeter road also connect to this storm drain network. I understand this perimeter road was heavily patrolled by the Army for many decades. It appears that this drainage system at the north end of the lake is designed for sizeable water flows and may include overflow storm water from the Highway 1 above. There is also a storm water conduit to what may be a Highway 1 sedimentation pond. This storm water system is not shown on project maps.

Only one sediment sample is shown at the north end of the lake and this sediment sample (MLSE25) may be located a considerable distance from the actual outfall location. The drop inlets & connecting conduits should be flushed and the sediment removed. The exact outfall location should be determined. Any obvious sediment at the outfall or along any connecting water course to the lake (through the marsh) should be removed prior to dredging activity. These actions should occur prior to construction of the dredging corridor (that appears to follow the course of the outfall alignment) to avoid disturbance of outfall sediments by construction activities. The disposition/proposed mitigation of this storm water system during/following construction activities should be added to the

FS/RAP. Please determine if the storm water network described at the north end of the lake is appropriate to add to this project. See attached sketch map of storm water system at north end of Mtn. Lake.

[*Commenter*: Mark Youngkin – written comment].

**Response:** As-built construction drawings circa 1938 provided by Caltrans (Attachment E of this Responsiveness Summary) show that commingled groundwater and roadway runoff are routed through the North Arm upland area to the northern tip of the lake by a pipe which runs along the long axis of the North Arm. This pipe is depicted on Figure 6 of the CEQA Initial Study (Appendix I of the FS/RAP). This pipe collects groundwater from the MacArthur Tunnel and roadway runoff. Drop inlets along the highway that feed into the pipe are shown on the as-built construction drawings in Attachment E of this Responsiveness Summary and Figure 6 of the CEQA Initial Study.

In addition, there are drop inlets underneath Park Presidio Blvd. (on West Pacific Ave.) that also feed into the pipe but are not shown on Figure 6, as Figure 6 is specific to Highway 1 drains. West Pacific Ave. (the lake's perimeter road) is not expected to be a significant source of contamination to Mountain Lake via these drop inlets as it was a minor access road used by the U.S. Marine Hospital, the Public Health Service Hospital, and then by the Army primarily for golf course maintenance. The access road is not a public thoroughfare and there is no evidence that the Army patrolled the roadway more heavily than other roads throughout the Presidio.

The existing storm water piping system does not directly discharge to the North Arm upland areas. The as-built construction drawings (Attachment E of this Responsiveness Summary) show that the pipe runs along the entire length of the North Arm and discharges in open water at the northern tip of the lake (as depicted on Figure 6 of the CEQA Initial Study).

It is unclear what the commenter is referring to as a "Highway 1 sedimentation pond." The North Arm of the lake is marshy and is mapped as wetland. However, storm water from Highway 1, and storm water and groundwater from the north pipe, do not discharge into this area. Also, as described in Response to Comment F4, an asphalt dike along the eastern shoulder of the roadway prevents storm water from Highway 1 from overflowing into the North Arm. The as-built drawings circa 1938 (Attachment E of this Responsiveness Summary) clearly label the North Arm area as "marshy and covered with undergrowth" soon after the pipe was constructed, indicating that it naturally contains water from filling of the North Arm in 1938.

Since the as-builts shows that the groundwater from the MacArthur Tunnel dewatering system commingled with roadway runoff discharges directly to the lake, rather than to the contiguous upland areas of the North Arm, it is unlikely that the North Arm contains sediment contaminated from roadway runoff.

Additional dredging and/or excavation to remove sediment and/or soil in the North Arm is, therefore, not included in the remediation plan. Also, additional sediment contamination to the north of the dredging limits shown in the FS/RAP is not anticipated, as indicated by the analytical results for sediment sampling location MLSE25. However, confirmation sampling and analysis will be conducted as proposed in the FS/RAP to confirm the northern dredging limit.

As part of the FS/RAP implementation, the location of the northern pipe outfall will be confirmed in the field. Also, the drop inlets and storm drains that direct highway runoff into Mountain Lake will be flushed and any sediment will be removed.

## G. Haul Routes and Traffic Management Plan

**Comment G1:** I am very opposed to the building of temporary on- and off-ramps for the removal of contaminated soil. It is a complete waste of money. The cost of the building and removal of the ramps has not been provided. It is rather late to be considering the ramps. I hope that an internal route though the park will be chosen.

[*Commenter*: Eleanor Johns – oral comment].

**Response:** The on- and off-ramps have been removed from the FS/RAP. Sections 6.3.2, 6.3.3, and 8.1 of the Final FS/RAP have been revised to remove discussion of the on- and off-ramps as a potential haul route. The ramps have also been removed from Figure 8-2, and the figure has been retitled from *"Haul Route Options"* to *"Project Haul Routes."*

The CEQA IS (Appendix I of the FS/RAP) evaluated the environmental impacts of the proposed project, assuming the ramps would be constructed. The ramps were expected to have a greater impact on the environment, from the construction and import of fill, than using existing roadways. Therefore, the analysis in the Initial Study was considered a worst-case scenario. Because the impacts of using the existing roadways would have less impact on the environment, the analysis of impacts in the IS would cover the reduced impacts expected from using existing roadways. Thus, the IS has not been updated.

**Comment G2:** The proposed plan does not definitively state which route will be used to transport dredged material from the site. At this point, it should be decided.

[*Commenters*: Richard Shrieve- oral comment].

**Response:** As discussed above in Response to Comment G1, the on- and off-ramps have been removed as a potential haul route. West Pacific Ave., Park Ave., or a combination thereof has been selected as the haul route for the project (see updated Figure 8-2 of the FS/RAP).

**Comment G3:** The number of truck routes and trips, and noise levels need to be taken into consideration. Also, there are concerns whether or not we should be building temporary on-ramps.

[*Commenter*: Catherine Stefani (legislative aide for Supervisor Mark Farrell) – oral comment].

> **Response:** See Responses to Comments G1 and G2 on the haul routes and ramps. Noise impacts were considered in the CEQA Initial Study (Appendix I of the FS/RAP, Noise, pages 49-52). Temporary increases in noise are expected during the project. Reasonable and feasible noise abatement measures will be implemented during construction to reduce the levels. Vegetation removed for the project along the western shore of the lake, adjacent to Highway 1, will be replanted following remediation to mitigate visual and noise impacts.

**Comment G4:** The project needs to be executed in a safe manner than minimizes the impact on the immediate neighborhood in terms of noise, traffic congestion and potential damage to the roadways and vegetation. Regardless of the haul route, whether eastward on West Pacific Ave. and/or northward to Park Presidio Blvd. or Park Blvd., care needs to be taken to avoid damaging the existing vegetation and the roadways, especially West Pacific. If West Pacific Avenue is selected as the haul route, which we support, part of the mitigation of adverse impacts should be the correction of any destabilization of the roadbed and post-project repaving of the surface of this roadway.

[*Commenter*: LSRA – written comment].

> **Response:** The project will be executed in a safe manner that minimizes the impact of traffic congestion and noise on the immediate neighborhood, and damage to roadways and vegetation. Appendix H, Table H-1 of the FS/RAP summarizes the project controls that will be implemented to minimize potential impacts on human and environmental resources, including, but not limited to, air quality, noise, recreation, traffic and transportation, and biological resources. All vegetation damaged from the project will be replanted and restored. Roadways damaged or destabilized by the project will be repaired or repaved, as necessary.

**Comment G5:** We request that all trucks be operated in a convoy fashion or in close groups, led by a pilot or lead vehicle, and maintain a speed under 5 miles per hour in both directions along West Pacific Avenue which is close to homes and is not well constructed. We ask that this convoy of trucks continue through the park, at a safe speed, until it exits out of the park. In light of the repeated problems the neighborhoods experienced in the past involving excessive speed and use of unauthorized access points by private contractors during Presidio soil remediation projects in the past, the use of convoys and a pilot vehicle are viewed as a necessary mitigation measures.

[*Commenters*: Bill Shepard – oral comment; NAPP – written comment; LSRA – written comment].

**Response:** A traffic management plan will be prepared during the remedial design phase of the project and followed during construction implementation. The sequencing of truck traffic will depend on a number of factors, including the pace of dewatering operations, space constraints, congestion along the existing haul route and in/out of the project staging area, and offsite landfill hours of operation. The adopted traffic plan will ensure the safety of park users and, to the extent practicable, minimize disturbance to nearby neighbors. The Trust's remediation department has routinely used contract terms to enforce contractor compliance with traffic protocols.

**Comment G6:** Because of the past experience with private contractor trucking operations in the Presidio, we request that all contracts include progressive monetary penalties for speeding and for using unauthorized routes to and from the Presidio, such as, beginning with a $1,000 penalty, and doubling the amount for each subsequent violation, so the trucking operators are adequately incentivized to make sure their drivers know and adhere to the designated routes and speed controls.

[*Commenter*: LSRA – written comment].

**Response:** The Trust's remediation department has routinely used contract terms to enforce contractor compliance with traffic protocols. The Trust's contracting department will consider monetary penalties in the procurement phase of the project.

**Comment G7:** Have you considered the environmental aspects of the transportation using trucks to dispose of contaminated waste? Do you allow too many truckers in the neighborhood, like 70 truckers a day? There is an environmental effect from local trucking because of fuel consumption. Using a rail system to haul waste from the Hunters Point district consumes less fuel.

[*Commenter*: Larry Frias – oral comment].

**Response:** The environmental impact of the transportation of waste from the site to offsite landfills was considered in the CEQA Initial Study (Appendix I of the FS/RAP, Transportation and Traffic, pages 57-61). The analysis evaluated the impact of 550 to 990 truck round-trips from the Mountain Lake project site to a disposal site in Buttonwillow, California, 265 miles away from the site. Approximately 25 truck round-trips are expected per day over a 4 to 8 week period. The CEQA analysis found a "less than significant impact" on the environment. The final waste disposal site(s) will be selected based on the results of waste characterization sampling, the landfill(s) that accept the waste, and cost. The waste disposal site(s) may include rail systems to out-of-state locations.

## H. Contractor Selection and Waste Disposal

**Comment H1:** Who is the prime contractor and how do we contact the contractor?

[*Commenters*: Audrey Knight - oral comment; Larry Frias – written comment].

> **Response:** The prime contractor has not yet been selected. Through a federal procurement process, the Trust will select a contractor based on qualifications, experience, and price. The Trust expects to select the contractor in Summer 2012.

**Comment H2:** I have not seen any information about the characteristics of the soils that will be dredged and transported to the appropriate landfill. Are the materials to be disposed classified as non-RCRA hazardous waste, RCRA hazardous, or non-hazardous?

[*Commenter*: Larry Frias – written comment].

> **Response:** The Remedial Investigation Summary (URS, 2011), available in the Administrative Record, presents the results of waste extraction test (WET) and toxicity characteristic leaching procedure (TCLP) tests performed on *in situ* sediment to determine the waste classification. The results indicate that some of the dried sediment will likely be classified as non-Resource Conservation and Recovery Act (RCRA) hazardous or non-hazardous waste, but this depends on the drying process used to dewater the sediment. Waste characterization tests will be performed on the sediment following dewatering operations to determine the classification of the material for disposal.

**Comment H3:** Where will the toxic dredged material go after it is removed from the lake?

[*Commenter*: John Maccabee – oral comment].

> **Response:** See Response to Comment H2 explaining characterization of the dredged material for disposal. Based on the preliminary *in situ* sampling already conducted, the material will likely be disposed of at non-RCRA hazardous or non-hazardous landfills. However, once the material is dredged and dewatered, it will be sampled for final disposal characterization. At that time, disposal location(s) will be selected. The material will be transported and disposed of at offsite facilities that are permitted to accept the waste.

## I. Miscellaneous

**Comment I1:** I recommend that prior to the proposed dredging of lake sediments as part of the clean-up plan, that the Remediation Advisory Board allow and support the recovery and curation of several long and short sediment cores from the lake. Sediments represent an archive of environmental change from the time of the lake's formation up to the present. The lake bottom sediments contain fossils (e.g., pollen , plant macrofossils, diatoms, fungal spores, microscopic charcoal, zoo plankton, etc.) that can be used to

reconstruct the last 2,000 years of human and naturally induced environmental change. If this lake is dredged, then the history of environmental change in the area of the San Francisco Bay will be lost forever. Storage for the recovered sediment cores is available at the National Lacustrine Core Repository, Minneapolis, Minnesota. The cost of collecting, initial analysis, and archival of cores that would be placed in the national repository would probably be less than $20,000. Additionally, one core could be prepared to provide an educational display that could inform the public about the history of the lake and the surrounding area.

[*Commenter*: Liam Reidy - oral and written comments].

> **Response:** To comply with provisions of the National Historic Preservation Act (NHPA), Trust archeologists prepared an Archeological Monitoring Assessment (AMA) for the project (Trust, 2012). As discussed in the FS/RAP, the dredging plan calls for removal of up to 6 feet of sediment from the lake bottom. Previous coring of the lake showed that the upper 6 feet of lake-bottom sediments post-date 1776 (Reidy, 2001). Thus, the AMA concludes that the likelihood of dredging activities to intentionally disturb prehistoric deposits is considered low. There is a potential, however, for remediation activities to disturb deeper sediments or for field observations and confirmation sample results that warrant deeper dredging while the project is underway, increasing the potential for impacts to prehistoric resources. Therefore, the AMA specifies that prior to implementing dredging, the Trust will take measures to ensure that the record of lake sediments is preserved for future scientific research by extracting cores through a direct push technique and submitting the preserved samples to the national facility. The AMA is available in the Administrative Record. This work is also documented in the CEQA Initial Study (Appendix I of the FS/RAP, Cultural Resources, page 30).

**Comment I2:** Are we going to make sure that the beach area is cleaned up and restored before the dredging begins?

[*Commenter*: Catherine Stefani (legislative aide for Supervisor Mark Farrell) – oral comment].

> **Response:** Cleanup and restoration of the beach area for aesthetic and recreational purposes is a land use planning feature that is outside the scope of the remediation project. Also, the beach area is within the City and County of San Francisco, under the jurisdiction of the San Francisco Recreation and Parks Department (SFRPD). The remediation project is not expected to impact the beach area. As shown on Figure 6-4 of the FS/RAP, the dredging footprint is within the Presidio, except for a small portion that extends into the City's property. This small portion in the City's jurisdiction is well outside of the beach area. This comment will be forwarded to the SFRPD for consideration.

**Comment I3:** The level of the lake should be restored so that there is no longer a beach on which small children can wander. That is the way it was a year ago but now has been greatly reduced in its level.

[*Commenter*: Jay Levy – written comment].

> **Response:** The remediation project will not impact the level of the lake water. Increasing the lake's water level is a land use planning feature that is outside the scope of the remediation project. This comment will be forwarded to the Trust's Planning, Projects, and Programs department and SFRPD for consideration.

**Comment I4:** For lake restoration, what is the baseline habitat that the lake is meant to support? For example, what kind of aquatic and bird life will the lake support?

[*Commenter*: John Maccabee – oral comment].

> **Response:** Future restoration of the lake to support aquatic and bird life is outside the scope of the remediation project. Restoration of Mountain Lake habitat is planned in accordance with the Mountain Lake Enhancement Plan and Environmental Assessment (Trust, NPS, GGNPA, October 2000) to repopulate the lake with native aquatic species. This comment will be forwarded to the Trust's Planning, Projects, and Programs department for consideration. The two projects, although separate, are being coordinated by Trust staff.

**Comment I5:** Coordination with all interested agencies, including the San Francisco Recreation and Parks Department, is important so that the dredging project is planned and considers other Mountain Lake park projects, including the restroom renovation and the playground restoration.

[*Commenter*: Catherine Stefani (legislative aide for Supervisor Mark Farrell) – oral comment].

> **Response:** See Response to Comment I2 indicating that the remediation dredging project is not expected to impact the City's property. The Trust is coordinating closely with the SFRPD to ensure that there are no on-site field or schedule conflicts between the Trust's and SFRPD's projects at Mountain Lake.

# J. California Department of Fish and Game Comments on the Initial Study/Negative Declaration

This sections responds to comments made by the California Department of Fish and Game (CDFG) through state clearinghouse review of the IS/ND.

**Comment J1:** The IS/ND states that limited vegetation removal related to the project occurred in early 2012 to accommodate data collection and mapping required for the project. This activity is related to the project and was conducted prior to DTSC releasing the IS/ND to the public and Responsible and Trustee agencies for review. The IS/ND

does not mention where the vegetation was removed, species, quantity and size of vegetation removed, methodology of removal, or if bird and bat pre-construction surveys were conducted. The activities conducted and the impacts of those activities should be fully disclosed after-the-fact in this IS/ND in order to describe the baseline environmental setting at the project site.

> **Response:** Limited vegetation around Mountain Lake was removed between November 2011 and January 2012, pursuant to the Presidio's Vegetation Management Plan and Environmental Assessment (VMP/EA; Trust and NPS, 2001) and in compliance with provisions of NEPA. The vegetation removal was not a component of the project proposed in the FS/RAP and associated IS/ND. The removal was conducted only to support early data collection and mapping efforts needed to complete investigation activities, prior to evaluation of alternatives in the FS/RAP.
>
> The VMP guides the Trust and NPS in management of vegetative resources throughout the Presidio. The VMP includes a vegetation management zoning map that controls future actions within three vegetation categories: Native Plant Communities Zone, Historic Forest Management Zone, and Landscape Vegetation Management Zone. These three zones are present at Mountain Lake and vegetation was removed from each zone in late 2011/early 2012. The VMP includes protocols for enhancement and restoration of these areas.
>
> The VMP also conforms to requirements of NEPA. The vegetation removal in late 2011/early 2012 was specifically evaluated and approved as a proposed project through the Trust's NEPA/National Historic Preservation Act (NHPA) review process. The NEPA review included analysis of the location, species, quantity, and size of vegetation to be removed; methodology of removal; and the need for bird or bat surveys. Measures to restore the areas consistent with the VMP were incorporated into the project through NEPA review.
>
> Because the vegetation removal conducted between November 2011 and January 2012 is not a component of the project proposed in the IS/ND and was subject to separate environmental compliance review, the baseline environmental setting as described in the IS/ND is appropriate. Potential impacts from the vegetation removal are outside the scope of the proposed project's CEQA review.

**Comment J2:** The IS/ND states there will not be any impacts to special-status bat species from the removal of up to 100 trees because the bats will just relocate on their own to new roost trees. CDFG believes there will be substantial impacts to bats including disruption to feeding, hibernating and taking care of young if trees that have roosting colonies or trees in close proximity to roosting colonies will be removed. The IS/ND should disclose any potential impacts (direct and indirect) of the project to species that could occur within the project area and surrounding habitat types. CDFG recommended avoidance and mitigation measures for tree removal activities include: 1) A qualified biologist should conduct a preconstruction survey for bats within 30 days prior to project activities. If bats are found, CDFG should be notified immediately; 2)

Trees should not be removed if there is a roosting, hibernating or maternal colony in that tree; 3) Trees should not be removed during the bat maternity season from April 1 through August 31 as there is likely to be young who cannot fly to other roosts during that time; and 4) If tree removal is unavoidable, a mitigation and monitoring plan describing replacement roosts and success criteria should be submitted to CDFG for approval prior to commencement of the project.

**Response:** Special-status species protected under the federal or California Endangered Species Act (ESA) are those that are listed as threatened or endangered. There are no bat species at the Presidio that are listed under the federal or California ESA, nor are any bat species at the Presidio proposed for listing or a candidate for listing under the federal or California ESA. Three species of bats have been documented in the vicinity of the project site--the Yuma myotis, California myotis, and western red bat. While two of these bat species (Yuma myotis and western red bat) are on the California Special Animals List (CDFG, 2011), their placement on the list ("Other Status") is an administrative designation carrying no legal requirements.

To support conservation efforts, the Trust will adopt the survey and tree removal measures used for birds under the Migratory Bird Treaty Act (MBTA) to also protect bats at the project site. Tree removals are scheduled to occur outside of bird nesting season. However, vegetation removal may occur during bird nesting season provided a nesting survey indicates no disruption to nesting birds and approval is obtained from Trust natural resource staff. Similar measures will be conducted for bats at the project site so that the project does not adversely impact the bats' nesting season.

The Presidio is an area of exclusive federal jurisdiction. The Trust is a federal agency established by Congress in 1996 through the enactment of the Presidio Trust Act, 16 U.S.C. §460bb appendix. The Trust has administrative jurisdiction over the interior 1,168 acres (Area B) of the Presidio, which includes Mountain Lake. The federal ESA, 16 U.S.C. §§ 1531 to 1544, contains a comprehensive program designed to protect threatened and endangered species and their ecosystems. Section 7 applies specifically to federal agencies, directing them to conserve listed species and limiting federal agency actions that may affect species. While the Trust must abide by the mandates of the federal ESA, there is no waiver of sovereign immunity in the Act that requires federal agencies to comply with state endangered species acts nor is there a provision for state authorized programs. The United States government, including its departments, agencies and instrumentalities, is not subject to state laws or regulations without a valid waiver of sovereign immunity.[3]

[3] In support of the proposition, the U.S. Supreme Court has repeatedly taken the position that any such waivers must be "clear and unequivocal" in their statutory text with any ambiguity being resolved in favor of the government (*i.e.* that there is no waiver). Hancock v. Train, 426 U.S. 167 (1976); Ruckelshaus v. Sierra Club, 463 U.S. 680 (1983); United States v. Nordic Village, Inc., 503 U.S. 30 (1992); and United States Department of Energy (DOE) v. Ohio, 503 U.S. 607 (1992). *See also* Consejo De Desarrollo Economico De Mexicali, A.C. v. United States, 482 F.3d 1157, 1173 (9th Cir. 2007) (citing United States

Because the Presidio is an area of exclusive federal jurisdiction, the Trust will continue to consult with the U.S. Fish & Wildlife Service (USFWS) as required under the federal ESA.

**Comment J3:** The IS/ND states vegetation removal may occur during the nesting season if nesting surveys indicates no disruption and approval is obtained from Trust staff. This should state approval will be obtained from CDFG and, if appropriate, USFWS staff. It also states the nesting season is until July 31. CDFG believes the nesting season for birds can be from January 31 to August 15 and recommends conducting surveys until August 15 or later depending on certain environmental and site-specific factors. The focused surveys for active nests of such birds should be conducted by a qualified biologist (as determined by a combination of academic training and professional experience in biological sciences and related resources management activities) within 14 days prior to the beginning of project-related activities. CDFG recommends defining an active nest as a nest having eggs or chicks present, or a nest that adult birds have staked a territory and are displaying, constructing a nest, or are repairing an old nest. These surveys should include the areas within 200 feet of the edge of the proposed impact area(s). If special concern nesting birds are found, a 50-foot radius buffer should be stabilized around the nest, and a 300-foot radius buffer in the case of hawks and owls. The area should be fenced and avoided until the young have fledged, as determined b a qualified biologist. If a lapse in project-related work of 14 days or longer occurs, another focused survey and, if required, consultation with CDFG, should be required before project work is reinitiated.

**Response:** As described in Response to Comment J2, the Presidio is an area of exclusive federal jurisdiction managed by a federal agency, the Trust. As such, the Trust does not consult with CDFG. The Trust consults, as required, with the USFWS under the federal ESA.

In compliance with the MBTA, the Trust follows internal protocols to ensure that disruptions to nesting birds do not occur. The Trust's protocols of scheduling tree removals, surveying by qualified biologists, and setting up buffers around nesting birds, already meet or exceed the CDFG's recommendations in this comment. Qualified biologists determine each year's nesting season at the Presidio, which usually ends on July 31st, but is subject to change based on actual observed nesting behavior.

## K. Corrections to the Draft FS/RAP

Corrections were made to the document, as necessary, to fix typographical errors and minor errors in data reporting. The analysis and conclusions of the FS/RAP have not

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v. Nordic Village, Inc., 503 U.S. 30, 33 (1992). "As a general matter, purported statutory waivers of sovereign immunity are not to be liberally construed." 482 F.3d 1157, 1173 (citation omitted) (emphasis added). As stated in DOE v. Ohio, "waivers of immunity must be 'construed strictly in favor of the sovereign' [citation omitted] and not enlarge[d] . . . beyond what the language requires." 503 U.S. at 615.

changed based on these corrections. Also, Appendix D and Appendix E were specifically updated as described below.

**Corrections to Appendix D, Post-Remediation 95 Percent Upper Confidence Limit (UCL) Calculations:** The post-remediation 95 percent UCL calculations in Appendix D have been updated to correct minor errors in the data set reported in the Draft FS/RAP. The data used in the Draft FS/RAP were based on a preliminary dredging footprint that was modified prior to publication of the Draft FS/RAP. The post-remediation data set presented in Table D-3 and the associated 95 percent UCLs in Table D-4 have been updated to represent the correct dredging footprint in the FS/RAP. The text has also been revised accordingly. The analysis and conclusions of Appendix D based on the minor corrections to the data have not changed.

**Corrections to Appendix E, Evaluation of Background Metals in Mountain Lake Sediment:** The evaluation of background metals analysis in Appendix E has been updated to correct minor errors in the data set used to prepare scatter plots in the Draft FS/RAP. The data used in the Draft FS/RAP were based on a preliminary dredging footprint that was modified prior to publication of the Draft FS/RAP. The data set presented in Table E-1 and the associated scatter plots have been updated to represent the correct dredging footprint in the FS/RAP. The text has also been revised accordingly. The analysis and conclusions of Appendix E based on the minor corrections to the data have not changed.

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# Attachment A
# List of Public Comments and Comment Number Key

**List of Public Comments and Comment Number Key**
**Responsiveness Summary for the Feasibility Study/Remedial Action Plan and Initial Study/Negative Declaration**
**Mountain Lake**
**Presidio of San Francisco, California**

| Comment Date | Commenter | Type of Comment | Comment Number in Responsiveness Summary [a] |
|---|---|---|---|
| 4/19/2012 Public Meeting Comments | Audrey Knight | oral comment | H1 |
| | Richard Shrieve | oral comment | F2, G2 |
| | Doug Kern | oral comment | A1, C1 |
| | Sam Berman | oral comment | A1, C1, F1 |
| | Paul Epstein | oral comment | A1, D1, F2, F5 |
| | Eleanor Johns | oral comment | A1, D4, F2, G1 |
| | Catherine Stefani, legislative aide to Mark Ferrell | oral comment | A1, G3, I2, I5 |
| | John Maccabee | oral comment | D3, H3, I4 |
| | Vanh Dong | oral comment | A1, D3 |
| | Bill Shepard | oral comment | F5, G5 |
| | Jan Blum | oral comment | A1, C1, F3 |
| | Larry Frias | oral comment | G7 |
| | Liam Reidy | oral comment | I1 |
| 3/23/2012 | Jay Levy | written comment | A1, I3 |
| 3/29/2012 | Jim Toth | written comment | E1 |
| 4/20/2012 | Sam Berman | written comment | F1 |

**List of Public Comments and Comment Number Key**
**Responsiveness Summary for the Feasibility Study/Remedial Action Plan and Initial Study/Negative Declaration**
**Mountain Lake**
**Presidio of San Francisco, California**

| Comment Date | Commenter | Type of Comment | Comment Number in Responsiveness Summary [a] |
|---|---|---|---|
| 4/23/2012 | Larry Frias | written comment | H1, H2 |
| 4/25/2012 and 5/3/2012 | Mark Youngkin | written comments | A1, B1, B2, B3, B4, B5, B6, B7, B8, C6, C7, C8, C9, C10, C11, C12, C13, C14, F7 |
| 5/2/2012 | California Department of Fish and Game (CDFG) | written comment | J1, J2, J3 |
| 5/3/2012 | Lake Street Residents Association (LSRA) | written comment | A1, C5, D2, D5, D6, F4, F6, G4, G5, G6 |
| 5/3/2012 | Neighborhood Associations for Presidio Planning (NAPP) | written comment | D5, D6, F6, G5 |
| 5/3/2012 | Liam Reidy | written comment | I1 |
| 5/3/2012 | Doug Kern | written comment | A1, C1, C2, C3, C4 |

[a] Refer to Responsiveness Summary for response to specific comment. The comments are categorized into the following topic areas:
A – Support of Proposed Remedial Alternative
B – Evaluation of Background Metals
C – Chemicals of Concern and Sediment Confirmation Sampling
D – Extent of Sediment Removal (East Arm)
E – Water Supply Quality
F – Highway 1 Activities – Roadway Stabilization and Storm Water Treatment
G – Haul Routes and Traffic Management
H – Contractor Selection and Waste Disposal
I – Miscellaneous
J – California Department of Fish and Game Comments on the Initial Study/Negative Declaration

# Attachment B
# Written and Oral Comments Received on the Draft FS/RAP and IS/ND

## Coyle, Genevieve

**Subject:** FW: Public Comment Period for Mountain Lake FS/RAP - March 19 to May 3, 2012

**From:** Jay Levy [mailto:jay.levy@ucsf.edu]
**Sent:** Friday, March 23, 2012 2:23 PM
**To:** Coyle, Genevieve
**Subject:** Re: Public Comment Period for Mountain Lake FS/RAP - March 19 to May 3, 2012

Dear Ms. Coyle,

How does one respond to the proposal?

A1 For example, I am very much in favor of the remediation proposed, including the dredging and rehabilitation of the area in its natural landscape.

I3 I also favor that the level of the lake be restored so that there is no longer a beach on which small children can wander lake was up to the cement steps. That was the way it was a year ago but now has been greatly reduced in its level.

Thank you,

Jay Levy

1111 Lake St.

San Francisco, CA

Content-Type: application/pdf;
name="Mountain Lake Proposed Plan Fact Sheet.pdf"
Content-Description: Mountain Lake Proposed Plan Fact Sheet.pdf
Content-Disposition: attachment;
filename="Mountain Lake Proposed Plan Fact Sheet.pdf"; size=1866985;
creation-date="Fri, 16 Mar 2012 15:08:19 GMT";
modification-date="Wed, 14 Mar 2012 09:00:55 GMT"

Attachment converted: Macintosh HD:Mountain Lake Propos#21D93E.pdf (PDF /«IC») (0021D93E)

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Jay A. Levy, MD
Professor of Medicine

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Content-Type: application/pdf;
name="Mountain Lake Proposed Plan Fact Sheet.pdf"
Content-Description: Mountain Lake Proposed Plan Fact Sheet.pdf
Content-Disposition: attachment;
filename="Mountain Lake Proposed Plan Fact Sheet.pdf"; size=1866985;
creation-date="Fri, 23 Mar 2012 14:25:43 GMT";
modification-date="Wed, 14 Mar 2012 09:00:55 GMT"

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## Coyle, Genevieve

**Subject:** FW: Mountain Lake Remediation - Impact to Presidio Residential water supply?

>>> On 3/29/2012 at 1:18 PM, in message
<1333052313.72432.YahooMailNeo@web124901.mail.ne1.yahoo.com>, Scott <scott_tother@yahoo.com>
wrote:

> To whom it may concern,
>
> E1 I am extremely concerned about the impact to our water supply (I believe 80% of our water comes from Lobos Creek with Mountain Lake as 'headwater') if your project ends up stirring up all that toxic sludge you've identified. Should residents be concerned - or rather I should phrase the question, why should we NOT be concerned? I have sent our water out for independent lab tests a few times because I am already horrified this is where our water comes from (not Hetch Hetchy like rest of SF).
>
> I'm sure I won't be the only extremely concerned Presidio resident... should we sign up w/ Bottled Water vendor? should we move? I really hope we get honest truth and not some wash-over in 'it's all alright'... the levels of some of the agents in our water are extremely high already...I'm just real nervous about this, and we have two small children.
>
> I won't be able to attend the meeting, and so I'm submitting my question via e-mail.
>
> Thank you very much for your time,
>
> Scott Toth
> Presidio Resident

Subject: The possibility of long term acoustic amplifications: A prepared comment for the public meeting on the remediation of Mountain Lake, Presidio of San Francisco

From: Sam Berman
101 Lombard St. Suite 804W
San Francisco, CA 94111

To: Remedios Sunga DTSC
700 Heinz Avenue, Suite 200
Berkeley, CA 94710-2721
rsunga@dtsc.ca.gov

Date: April 19, 2012

To provide adequate stabilization and protection for the highway 1 tunnel adjacent to Mountain Lake, it is my understanding that CalTrans will emplace a series of over 400 stone filled columns of depth 50 to 60 feet to accomplish the required stabilization. It is also my understanding that the stones will be compacted but not permanently held together with adhesive or concrete.

F1 My concern is about the possibility of permanent acoustic connections and possible sound amplifications that could occur as a result of these columns interacting with other sources of constant noise such as roadbed and tunnel vibration as well as collective sounds from motor vehicles moving within the tunnel.

Since noise is a matter of concern for CEQA compliance, I ask that you examine this potential acoustic issue to assure that there will not be a noise penalty permanently affecting those living in the vicinity of the remediated Mountain Lake.

Thank you for your attention to this comment.

Sincerely,

Sam Berman
RAB Community Member.

## Coyle, Genevieve

**Subject:** FW: Mountain Lake Environmental Cleanup - April 19, 2012 public meeting presentation

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**From:** Larry F Frias [mailto:larryf@wastesolutionsgroup.com]
**Sent:** Monday, April 23, 2012 5:32 PM
**To:** Coyle, Genevieve
**Subject:** Re: Mountain Lake Environmental Cleanup - April 19, 2012 public meeting presentation

Genevieve - Thanks for taking the time to send us the hard copies of your presentation. I was glad that I participated in that public discussion and I gained a lot of insights about the upcoming project. However, I have not seen any information about the characterstics of the soils that you would like to dredge and transport to the appropriate landfill. Are the materials to be disposed in classified as Non-RCRA hazardous waste (CAL HAZ), RCRA (Federal waste) or just non-hazardous waste. Do you have this information available already? When do you think we would know the possible General Contractors on this project. I really appreciate your help. Thanks....Larry (415) 823-8772

H2

H1

## Coyle, Genevieve

**Subject:** FW: Mtn Lake chromium

>>> On 4/25/2012 at 10:10 PM, in message <CAHe7LXoZp6ABM=qF_zigX+zkmOGL953LXwv1d_S57=T-oLN+9g@mail.gmail.com>, Mark Youngkin <my@markyoungkin.com> wrote:

Hello.

C6 I am looking for info on chromium - what is eco effect of leaving chromium exposed in sediment at bottom excavated surface of lake at 200-400 ppm. This info is not in RI or FS?

Mark Y.

On Apr 25, 2012 10:15 AM, "Radhika Majhail" <rmajhail@dtsc.ca.gov> wrote:

Julie,
Thank you so much for responding.
Regards,
Radhika

>>> On 4/25/2012 at 1:51 AM, in message <13986286.1335343888292.JavaMail.root@wamui-bucket.atl.sa.earthlink.net>, Julie Cheever <jcheever@igc.org> wrote:

Radhika,
Thank you very much for arranging the meeting. It is much appreciated.
I am sorry I am not able to come because I am out of town.
Regards,
Julie Cheever

-----Original Message-----
From: Radhika Majhail
Sent: Apr 20, 2012 8:39 PM
To: "Jr. Edward J Callanan" , Jan Monaghan , John Chester , Jerry Dodson , Kevin Whilden , Julie Cheever , Julian Hultgren , Mark Youngkin , brian_ullensvang@nps.gov, John Budroe , CMooney@ParksConservancy.org, KBickert@ParksConservancy.org, SFarrell@ParksConservancy.org, Eileen Fanelli , Genevieve Coyle , SOverman@presidiotrust.gov, Jan Blum <1janblum@sbcglobal.net>, Doug Kern , Jim Ketcham , Toni Kramer , Gloria Gee
Cc: Denise Tsuji , Kimi Klein , Lori Koch , Robert Boggs , Remedios Sunga
Subject: PAH's and Risk assessment Discussion

Hello! All,
California Department of Toxic Substances Control invites you all to discuss the PAH's and Risk Assessment for Presidio Sites. The meeting will be held at the Golden Gate Club. Please confirm your attendance.
Below are the meeting details:
**Date**: April 26,2012
**Time**: 6:30 p.m. - 7:45 p.m.
**Room**: Cypress Room (See the attached scaled drawing)
**Location**: Golden Gate Club
35 Fisher Loop, San Francisco, CA 94129
Thank you very much.
Regards,
Radhika Majhail
Public Participation Specialist

State of California – The Natural Resources Agency
DEPARTMENT OF FISH AND GAME
Bay Delta Region
7329 Silverado Trail
Napa, CA 94558
(707) 944-5500
www.dfg.ca.gov

*EDMUND G. BROWN JR., Governor*
*CHARLTON H. BONHAM, Director*

May 2, 2012

Ms. Remedios Sunga
Department of Toxic Substance Control
700 Heinz Avenue
Berkeley, California 94710

Dear Ms. Sunga:

Subject: Remedial Action Plan for Mountain Lake, SCH #2012032037, Initial Study/Mitigated Negative Declaration, City and County of San Francisco

The Department of Fish and Game (DFG) has reviewed the Initial Study/Mitigated Negative Declaration (IS/MND) provided for the subject project. The Department of Toxic Substance Control (DTSC) is considering approval of the Remedial Action Plan for Mountain Lake (RAP). The RAP includes dredging approximately 15,600 cubic yards (cy) of sediments contaminated with lead and total petroleum hydrocarbons from Mountain Lake which would be transported to a permitted, off-site landfill. As part of the project activities, the California Department of Transportation (Caltrans) will stabilize the State Highway 1 roadbed and upgrade the drainage system of the roadway adjacent to the lake prior to the dredging activities. Dredging would be done using a barge, and dredged material would be pumped through a temporary pipeline or other similar transport to the dewatering area approximately 600 feet north of the lake. Depending on staging at the dewatering area, dredged material could temporarily be stored within a diked lagoon or tanks prior to dewatering. Dewatering of the excavated sediment would occur at the staging area. When sufficiently dewatered, the solids would be trucked off-site to a landfill licensed to receive the material. As a Trustee Agency pursuant to the California Environmental Quality Act (CEQA) Section 15386, DFG offers the following comments and recommendations regarding sensitive resources.

*Trust Remediation, Page 8*

J1 The IS/MND states that limited vegetation removal related to the project occurred in early 2012 to accommodate data collection and mapping required for the project. This activity is related to the project and was conducted prior to DTSC releasing the IS/MND to the public and Responsible and Trustee agencies for review. The IS/MND does not mention where the vegetation was removed, species, quantity and size of vegetation removed, methodology of removal, or if bird and bat pre-construction surveys were conducted. The activities conducted and the impacts of those activities should be fully disclosed after-the-fact in this IS/MND in order to describe the baseline environmental setting at the project site.

*Biological Resources*

J2 The IS/MND states there will not be any impacts to special-status bat species from the removal of up to 100 trees because the bats will just relocate on their own to new roost trees. DFG believes there will be substantial impacts to bats including disruption to feeding, hibernating and taking care of young if trees that have roosting colonies or trees in close proximity to roosting

colonies will be removed. The IS/MND should disclose any potential impacts (direct and indirect) of the project to species that could occur within the project area and surrounding habitat types. DFG recommended avoidance and mitigation measures for tree removal activities include:

1) A qualified biologist should conduct a preconstruction survey for bats within 30 days prior to project activities. If bats are found, DFG should be notified immediately;
2) Trees should not be removed if there is a roosting, hibernating or maternal colony in that tree;
3) Trees should not be removed during the bat maternity season from April 1 through August 31 as there is likely to be young who cannot fly to other roosts during that time;
4) If tree removal is unavoidable, a mitigation and monitoring plan describing replacement roosts and success criteria should be submitted to DFG for approval prior to commencement of the project.

J3 The IS/MND states vegetation removal may occur during the nesting season if nesting surveys indicates no disruption and approval is obtained from *Trust* staff. This should state approval will be obtained from DFG and, if appropriate, U.S. Fish and Wildlife Service staff. It also states the nesting season is until July 31. DFG believes the nesting season for birds can be from January 31 to August 15 and recommends conducting surveys until August 15 or later depending on certain environmental and site-specific factors. The focused surveys for active nests of such birds should be conducted by a qualified biologist (as determined by a combination of academic training and professional experience in biological sciences and related resource management activities) within 14 days prior to the beginning of project-related activities. DFG recommends defining an active nest as a nest having eggs or chicks present, or a nest that adult birds have staked a territory and are displaying, constructing a nest, or are repairing an old nest. These surveys should include the areas within 200 feet of the edge of the proposed impact area(s). If special concern nesting birds are found, a 50-foot radius buffer should be established around the nest, and a 300-foot radius buffer in the case of hawks and owls. The area should be fenced and avoided until the young have fledged, as determined by a qualified biologist. If a lapse in project-related work of 14 days or longer occurs, another focused survey and, if required, consultation with DFG, should be required before project work is reinitiated.

If you have any questions, please contact Ms. Suzanne DeLeon, Environmental Scientist, at (831) 440-9433; or Mr. Craig Weightman, Acting Environmental Program Manager at (707) 944-5577.

Sincerely,

Scott Wilson

Scott Wilson
Acting Regional Manager
Bay Delta Region

cc: State Clearinghouse

# LAKE STREET RESIDENTS ASSOCIATION

A NEIGHBORHOOD ASSOCIATION SERVING THE LAKE STREET CORRIDOR

William R. Shepard
President

Herbert Elliott
Vice-President

Ann Weinstock
Secretary

51 TWENTY FIRST AVENUE
SAN FRANCISCO, CALIFORNIA 94121

Telephone (415) 981-3880
Facsimile (415) 981-3881


May 3, 2012

Radhika Majhail, DTSC
8800 Cal Center Drive
Sacramento, CA 5826-3200

**Re: Draft Feasibility Study and Remedial Action Plan for Mountain Lake**

Dear Ms. Majhail:

The Lake Street Residents Association ("LSRA") submits the following comments regarding the Draft Feasibility Study and Remedial Action Plan for Mountain Lake ("Draft FS/RAP-Mountain Lake"):

A1 1. The LSRA supports Remediation Alternative #3 – dredging with offsite disposal and limited capping.

D5, F6, G5, D6 2. The LSRA adopts the comments submitted by the Neighborhood Associations For Presidio Planning ("NAPP").

3. While LRSA applauds this project, its basic concerns are two-fold:

G4 First, the project needs to be executed in a safe manner than minimizes the impact on the immediate neighborhood in terms of noise, traffic congestion and potential damage to the roadways and vegetation. NAPP's comments address this concern. Regardless of the haul route, whether eastward on West Pacific Avenue and/or northward to Park Presidio Blvd or Park Blvd, care needs to be taken to avoid damaging the existing vegetation and the roadways, especially West Pacific.

G4 If West Pacific Avenue is selected as the haul route, which we support, part of the mitigation of adverse impacts should be the correction of any destabilization of the roadbed and post-project repaving of the surface of this roadway.

G6 Additionally, because of the past experience with private contractor trucking operations in the Presidio, we request that all contracts include progressive monetary penalties for speeding and for using unauthorized routes to and from the Presidio, such as, beginning with a $1,000 penalty, and doubling the amount for each subsequent violation, so the trucking operators are adequately incentivized to make sure their drivers know and adhere to the designated routes and speed controls.

D2 Second, realizing that this remediation and restoration process is likely to be one-time event, we advocate for the most thorough remediation of the lake as possible, including its east arm. The complexity of the toxins in the lake clearly is beyond the comprehension of the general public, including the LSRA. We urge that in designing the remediation, DTCS and the Trust ensure that any residual toxins do not become problematic in the future, whether from percolation or some other mechanism.

C5 We also urge DTCS and the Trust to carefully consider any input from the Restoration Advisory Board of the Presidio of San Francisco and its members. The LSRA shares their concerns and supports their comments about the adequacy of the treatment of cadmium and antimony. Whether naturally present or by-products of materials that have been flushed or dumped into the lake, we urge that these elements be thoroughly removed with wide margins. Likewise, we urge that pesticides, whether from the golf course or other sources, be identified and removed thorough the dredging process with sufficiently wide margins to ensure that they do not persist after completion of this remediation project.

F4 Finally, the LSRA requests that the design of the drainage system from Park Presidio Blvd be adequate to handle extreme weather conditions so that intense rain storms do not overflow the barriers and the drain system, and the lake is fully protected from future run-off. If the current plan does not include connecting the Park Presidio Blvd storm drainage to the San Francisco sewer system, we urge you to re-design the project to include this component. Merely, installing filters is not sufficient to prevent adverse run-off. Solid barriers should be included in the design, so that flood-stage run-offs are adequately diverted into a sewer system, and not end up in the lake. No amount of run-off from the highway should be permitted to flow into the lake.

Thank you for your consideration of these comments.

Sincerely,

William R. Shepard

cc: Genevieve Coyle, Presidio Trust
Remedios Sunga, DTSC

NA PP

# NEIGHBORHOOD ASSOCIATIONS FOR PRESIDIO PLANNING

Box 29086, Presidio Station, San Francisco, California 94129 415-990-9059

Cow Hollow Association

Golden Gate Valley Neighborhood Association

Lake Street Residents Association

Laurel Heights Improvement Association

Marina Community Association

Pacific Heights Residents Association

Planning Associatio for the Richmond

Presidio Heights Association of Neighbors

Presidio Terrace Association

Sea Cliff Properties Association

May 3, 2012

**Via Email Only**

Remedios Sunga, DTSC
799 Heinz Avenue, Suite 200
Berkeley, CA 94710-2721
rsunga@dtsc.ca.gov

**Re: NAPP Comments on the Proposed Draft Feasibility Study and Remedial Action Plan for Mountain Lake**

Dear Mr. Sunga:

The Neighborhood Associations For Presidio Planning ("NAPP"), a coalition of 10 neighborhood groups bordering the Presidio, submits the following comments on the above-referenced draft FS/RAP for Mountain Lake:

D5 1. NAPP requests that the "dog-leg", the eastern branch of the Lake, be properly reconnected to the main body, with a new bridge where West Pacific Avenue turns north along the edge of the golf course.

F6 2. NAPP requests, as part of the project, that Highway 1 be repaved with a surface that will dampen or reduce road noise as part of the mitigation for taking down the trees that formerly buffered the sound.

F6 3. Similarly, NAPP requests that the retaining wall on the west side of Highway 1 opposite Mountain Lake be covered with a sound baffle to reduce road noise that is now reflected back into Mountain Lake Park, again as mitigation for the tree removal that formerly buffered the sound.

G5 4. NAPP further requests that the truck hauling be limited to a speed of 5 mph on West Pacific Avenue; that the trucks operate in convoys both coming and going; and that the convoys be lead by a pilot vehicle for their entire travel within the Presidio so they neither speed nor deviate from the defined route. In light of the repeated problems the neighborhoods experienced in the past involving excessive speed and use of unauthorized access points by private

contractors during Presidio soil remediation projects in the past, the use of convoys and a pilot vehicle are viewed as a necessary mitigation measure.

D6 5. NAPP is concerned about the counter-intuitive findings reportedly made by the project-sponsors that conclude that the lake should not be dredged to a depth deeper than that presently being proposed; that is, the vitality of the lake would be worsened by deeper dredging than what is being proposed. Please provide the public with a clear, accessible explanation of the findings on this subject.

Thank you.

Sincerely,

William R. Shepard,
Chair

cc: Radhika Majhail, DTSC - email only: rmajhail@dtsc.ca.gov
Genevieve Coyle, Presidio Trust - email only: gcoyle@presidiotrust.gov

# COMMENTS ON THE ENVIRONMENTAL CLEANUP FOR MOUNTAIN LAKE, PRESIDIO NATIONAL PARK, SAN FRANCISCO

By

Liam Reidy

Department of Geography

University of California, Berkeley,

Berkeley, CA 94720

May 3rd, 2012

**To Whom It May Concern:**

I1 I would like to recommend to the Remediation Advisory Board that prior to the proposed dredging of the Mountain Lake sediments as part of the clean-up plan, that they would allow and support the recovery and curation of several long and short sediment cores from the lake.

The sediments represent an archive of environmental change from the time of the lake's formation up to the present. The lake bottom sediments contain fossils (e.g. pollen, plant macrofossils, diatoms, fungal spores, microscopic charcoal, zoo plankton, etc.) that can be used to reconstruct the last 2,000 years of human and naturally induced environmental change.

Mountain Lake is one of the few natural lakes found in coastal California. If this lake is dredged then the history of environmental change in the area of the San Francisco Bay will be lost forever. Analytical techniques not yet developed but may be developed in the future could further help the reconstruction of what happened in this area over the last two thousand years. Storage for the recovered sediment cores is available at the National Lacustrine Core Repository, Minnealopolis, Minnesota. Additionally, one core could be prepared to provide an educational display that could inform the public about the history of the lake and the surrounding area.

Yours respectfully,
Liam Reidy

C.C. rsunga@dtsc.ca.gov

rmajhail@dtsc.ca.gov

gcoyle@presidiotrust.gov

Douglas Kern
3229A Clement Street
San Francisco, CA 94121

Ms. Remedios Sunga
Department of Toxic Substances Control
700 Heinz Avenue, Suite 200
Berkeley, CA 94710
rsunga@dtsc.ca.gov

May 3, 2012

RE: Draft Feasibility Study and Remedial Action Plan for Mountain Lake, Presidio of San Francisco

Dear Ms. Sunga,

Thank you for the opportunity to comment on the document and for your time to review my comments here. I appreciate the opportunities that have been made available for public input into the Mountain Lake remediation process, as the lake is an incredibly important site to the community. I support Dredging with Offsite Disposal and Limited Capping, Remedial Alternative 3, as the preferred remedial action.

A1

I believe that there is no remaining dispute regarding roadway and stormwater inputs as the source of contaminants to Mountain Lake. However, the Draft FS/RAP screening process eliminates many of the metals and pesticides that should be retained as Chemicals of Concern (COCs). Title 22 Metals and pesticides should be returned to the COC list and tested for during confirmation sampling.

Cadmium, Zinc

C2

I am grateful to see that the Department has required that sampling be done for cadmium. Cadmium was found in the storm-drain samples and in the lake sediment. However, cadmium should be returned to the COC list. According to the document in App. D, pg. D-2, cadmium may be elevated due to analytical interference. However, eliminating cadmium data on the possibility that it *may* be in error, without proof that it *is* in error, is not in the public interest. In fact, cadmium is a constituent used in the vulcanization of rubber and is a very likely contaminant from roadway runoff and windblown dust to Mountain Lake. The 1938 patent for the vulcanization of rubber is included for your reference and likewise shows that zinc is similarly associated with the making of automobile tires. Cadmium and zinc should be returned to the COC list and tested for during confirmation sampling.

Copper

C3 There are many significant detections of copper in lake sediment. Copper is highly toxic to aquatic organisms. Copper is also widely distributed in uses where it might have contaminated Mountain Lake. The most notable and most likely way for copper to enter Mountain Lake is through roadway runoff and windblown dust generated from the copper in break pads. The problem of copper contamination from break pads caused California to pass SB346 in 2010, requiring manufacturers to reduce the level of copper in break pads to less than 5% by 2021 and to less than 0.5% by 2025. Copper should be returned to the COC list and tested for during confirmation sampling.

Pesticides

C4 Pesticides have been detected above cleanup limits in lake sediments. Pesticides are widely harmful to amphibians, likely future inhabitants of the lake, and have been linked to delayed metamorphosis, immunosuppression, hermaphroditism, sex reversal, and mortality. In humans, pesticides may be carcinogenic and lead to hormone and endocrine disorders. Since pesticides have been detected around the lake in sediment they should remain a COC and be tested for during confirmation sampling. The averaging process used during screening is inappropriate considering the known pesticide contamination and the future safety of the lake to aquatic organisms.

Conclusions

C1 The averaging techniques used to screen out various Potential COCs are inappropriate when used over wide areas or include points outside the known contaminant detection areas. These techniques are not in the public interest and do not provide adequate reassurance that all toxic contaminants will be removed properly from Mountain Lake. I request that all Title 22 metals and pesticides be returned to the COC list and be tested for during confirmation sampling so that the cleanup process for Mountain Lake, that began for many of us nearly 20 years ago, be concluded with assurance that we have removed hazardous levels of contamination.

Thank you, Ms. Sunga, for your attention to my comments.

Sincerely,

Doug Kern
Community Member
Presidio Restoration Advisory Board

Patented Feb. 8, 1938

2,108,018

# UNITED STATES PATENT OFFICE

2,108,018

## VULCANIZATION OF RUBBER

Thomas C. Morris, Akron, Ohio, assignor to Wingfoot Corporation, Wilmington, Del., a corporation of Delaware

No Drawing. Application October 31, 1935, Serial No. 47,639

17 Claims. (Cl. 18—53)

This invention relates to a method of treating rubber. More particularly it relates to a method of compounding and vulcanizing rubber.

One object of the invention is to provide an accelerator mixture which is capable of a very superior degree of dispersion in the rubber mix. Another object is to increase the uniformity of cure of the finished rubber. Still another object is to make possible the use of an accelerator which does not require the usual careful control of particle size. Other objects and advantages will appear as the description proceeds.

It is well known that mercapto aryl thiazoles are excellent accelerators of the vulcanization of rubber. Representative accelerators of this type include 1-mercaptobenzothiazole, 4- or 5-nitro 1-mercaptobenzothiazole, 4- or 5-chlor 1-mercaptobenzothiazole, 3- or 5-methyl 1-mercaptobenzothiazole, 4-chlor 5-nitro 1-mercaptobenzothiazole, 3- or 5-ethoxy 1-mercaptobenzothiazole, 3- or 5-methoxy 1-mercaptobenzothiazole, 1-mercapto alpha or beta naphthathiazole, etc.

It is also well known that in order that these accelerators function properly they must be added to the rubber mix in company with a metal oxide, which is usually zinc oxide (but may be cadmium or lead oxides, etc.) and a monobasic saturated or unsaturated fatty acid preferably a higher fatty acid such as stearic, oleic, palmitic, linoleic, lauric, although the lower members above acetic acid such as propionic, butyric, etc. may also be used.

The present invention is based upon the discovery that at the temperature of vulcanization the mercapto aryl thiazole, the metal oxide, and the fatty acid react at least as far as to form the metal salts of the thiazole and the acid to give a material which is completely soluble in the rubber in the quantities ordinarily employed.

This reaction does not take place at milling temperatures. Therefore, in the regular procedures as previously practiced, dispersion of this type of accelerator has depended upon mechanical distribution of the solid particles. The degree of dispersion obtainable has thus been a function of the particle size of the accelerator as well as of the amount of mechanical working applied. This has necessitated a painstaking pulverizing and sifting control with attendant trouble and expense. In the vulcanization, perfect uniformity of cure has been dependent upon close juxtaposition of alternate accelerator and metal oxide particles (the fatty acid being already in solution) and diffusion through the thin separating films of rubber during the reaction. Large individual particles or agglomerates cause non-uniform cure and hard spots.

If, however, the accelerator, zinc oxide, and fatty acid are first reacted, the mix is sufficiently soluble at milling temperatures so that many times the conventional amount of accelerator will completely dissolve in the rubber. By this means, better dispersion and much more intimate contact between rubber and accelerator are obtained.

In one example of the practice of the invention, 5 parts of 1-mercaptobenzothiazole, 5 parts of zinc oxide, and 27 parts of stearic acid were fused together, cooled, and the product ground. This material had a solubility at 80 degrees C. of 3.3 parts of mercaptobenzothiazole per 100 parts of rubber and at 90 degrees C. 3.8 parts of mercaptobenzothiazole per 100 parts of rubber. At these same temperatures, pure 1-mercaptobenzothiazole has solubilities of 0.65 and 0.80 parts per 100 of rubber.

Other mixes using ratios of zinc stearate to zinc mercaptobenzothiazole of 10:1 and 2.84:1 (the preceding example is 5:1) showed similar results.

It will be understood that it is not intended that the invention shall be limited to the above method of preparation. The mixtures may be made by co-precipitation from solution, or by intimately grinding the preformed metal salts together. Furthermore, while 1-mercaptobenzothiazole, zinc oxide and stearic acid are preferred in the practice of the invention, other 1-mercapto aryl thiazoles, of which those previously listed are illustrative, other metal oxides and other fatty acids above acetic acid may be employed.

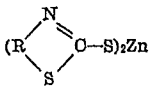
The materials of the invention are used in any of the standard rubber formulae, employing the usual excess of zinc oxide over the stoichiometric quantity required to form the zinc salts of the mercapto aryl thiazole and the acid. The quantities employed are the same as when the unreacted components are separately added as in existing practice.

Although only the preferred form of the invention has been described in detail, it will be apparent to those skilled in the art that the invention is not limited thereto but that various modifications may be made therein without departing from the spirit of the invention or the scope of the appended claims, in which it is intended to cover by suitable expression all features of patentable novelty inherent in the invention.

What I claim is:

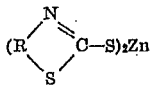
1. The method of compounding rubber which

comprises adding to it a mixture of zinc stearate and a compound having the formula



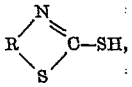
in which R is arylene.

2. The method of treating rubber which comprises adding to it a mixture of zinc stearate and a compound having the formula



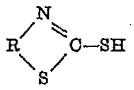
in which R is arylene and subjecting the mix to vulcanization.

3. The method of treating rubber which comprises adding to it the reaction product of a compound having the formula



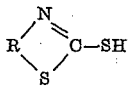
in which R is arylene, a fatty acid above acetic, and the oxide of a metal selected from the group consisting of zinc, cadmium, copper and lead and subjecting the mix to vulcanization.

4. The method of compounding rubber which comprises adding to it the reaction product of a compound having the formula



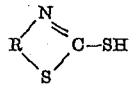
in which R is arylene, a fatty acid above acetic, and the oxide of a metal selected from the group consisting of zinc, cadmium, copper and lead.

5. The method of compounding rubber which comprises adding to it a mixture of the salts of a compound having the formula



in which R is arylene and a fatty acid selected from the group consisting of stearic, oleic, palmitic, linoleic and lauric acids with a metal selected from the group consisting of zinc, cadmium, copper and lead.

6. The method of treating rubber which comprises adding to it a mixture of the salts of a compound having the formula



in which R is arylene; and a fatty acid selected from the group consisting of stearic, oleic, palmitic, linoleic and lauric acids with a metal selected from the group consisting of zinc, cadmium, copper and lead, and subjecting the mix to vulcanization.

7. The method of compounding rubber which comprises adding to it a mixture of the metal salts of 1-mercaptobenzothiazole and a fatty acid above acetic, the metal being selected from the group consisting of zinc, cadmium, copper and lead.

8. The method of treating rubber which comprises adding to it a mixture of the metal salts of 1-mercaptobenzothiazole and a fatty acid above acetic, the metal being selected from the group consisting of zinc, cadmium, copper and lead, and subjecting the mix to vulcanization.

9. The method of compounding rubber which comprises adding to it a mixture of zinc mercaptobenzothiazole and zinc stearate.

10. The method of treating rubber which comprises adding to it a mixture of zinc mercaptobenzothiazole and zinc stearate, and subjecting the mix to vulcanization.

11. In the process of dispersing zinc oxide, stearic acid and mercaptobenzothiazole in rubber, the improvement which comprises mixing them with the rubber in the form of zinc stearate and zinc mercaptobenzothiazole.

12. The method of compounding rubber which comprises adding to it a mixture of the zinc salt of 1-mercaptobenzothiazole and zinc laurate.

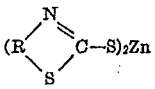
13. A rubber vulcanization accelerator composition comprising a mixture of the zinc salt of a mercapto aryl thiazole and a zinc salt of a fatty acid above acetic.

14. A rubber vulcanization accelerator composition comprising a mixture of the zinc salt of 1-mercaptobenzothiazole and a zinc salt of a fatty acid selected from the group consisting of stearic, oleic, palmitic, linoleic and lauric acids.

15. A rubber vulcanization accelerator composition comprising a mixture of the zinc salt of 1-mercaptobenzothiazole and zinc stearate.

16. A rubber vulcanization accelerator composition comprising a mixture of the zinc salt of 1-mercaptobenzothiazole and zinc laurate.

17. The method of treating rubber which comprises adding to it a mixture of a compound having the formula



in which R is arylene, and the zinc salt of a fatty acid above acetic.

THOMAS C. MORRIS.

Written Comments

From: Mark Youngkin
3301 Clay St Apt 105
San Francisco, CA 94118

To: Remedios Sunga DTSC
700 Heinz Avenue, Suite 200
Berkeley, CA 94710-2721
rsunga@dtsc.ca.gov

Date: May 3, 2012

Subject: Proposed Draft Feasibility Study and Remedial Action Plan for Mountain Lake
Presidio of San Francisco, California

A1 The draft Feasibility Study and Remedial Action Plan (FS-RAP) evaluates the environmental contamination at Mountain Lake and proposes a cleanup action or "remedy" to address the contamination. I support the proposed Remedial Alternative 3, Dredging with Offsite Disposal and Limited Capping, as the preferred remedial action. The following comments address the draft FS-RAP:

Page 7 – Section 3.3 Conceptual Site Model

B4 Comment: The section labeled Conceptual Site Model presents only background information. The conceptual site model as presented on Figure 3-1 is simply an illustration of potential exposure pathways. The document *Evidence of Environmental change over the last 2000 years at Mountain Lake, in the northern San Francisco Peninsula, California by Liam Reidy, 2001 Master Thesis at Mountain Lake, University of California at Berkeley* provides ample information to develop a conceptual site model. The thesis describes a modern period beginning in 1938 with rapid sedimentation rates and elevated metals (lead, copper, zinc) attributed to runoff from the Presidio golf course and roadway. The highest concentrations of lead, copper, zinc are found in the upper 55 cm (<2 feet) during the modern period. Between 1776 (about 200 cm) and 1937 (about 90 cm), historical concentrations of chromium, nickel, lead, zinc and copper are elevated above prehistoric background in lake sediments. The Reidy thesis attributes the lead-zinc contamination to increased agricultural runoff (vegetation removal and grazing) along with other activities at the Public Health Service Hospital. Lead exceeds the freshwater ecological cleanup concentration beginning circa 1900 (about 5 feet deep). Metal concentrations first increase above prehistoric background with the arrival of European settlers beginning after 1776. Prehistoric background metal concentrations are first encountered at a depth of approximately 200 cm (about 1776) and extend down to 580 cm (about AD 100). It is clear from this data that prehistoric background should be represented in prehistoric sediment samples below a depth of 6 feet. There is no evidence in the core data for significant disturbance of the sediment except for the 1938 construction event that is clearly indicated in cores as a light grey laminated layer up to 10 cm thick at a depth of around 2½ feet.

Page 8 – PCOCs in Sediment

*"The following are PCOCs in Lake sediment (URS 2011):*

- *Metals: arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, vanadium and zinc."*

C7 Comment: Antimony does not appear as a PCOC even though it is present in several samples of lake sediment above cleanup levels. The drop inlet storm-drain samples 1 and 2 contain antimony at an elevated concentration. DTSC has

requested that post-remediation sediment confirmation samples be collected for antimony. The removal of antimony appears arbitrary and antimony should be listed as a PCOC in this section.

Page 9 -

*"Lead is the primary PCOC in lake sediment due to the high number and widespread distribution of sediment samples containing lead at concentrations exceeding its cleanup level."*

C8 Comment: Table 2 indicates that lead exceeded the freshwater ecological cleanup value in about 45 sediment samples. Cadmium exceeded the cleanup level in about 54 samples, nickel exceeded in about 50 samples, chromium exceeded in about 26 samples, vanadium exceeded in about 21 samples, zinc exceeded in about 18 samples and copper exceeded in 7 samples. According to the number and distribution of sediment samples, cadmium and nickel should be included in the above sentence along with lead as primary PCOCs. Zinc, vanadium, chromium and copper also occur in sufficient samples to be called widespread and should be included in the above statement on PCOCs as well. If the intent of this statement is that lead is the primary PCOC due to toxicity or the negative impact to the lake ecology than the sentence should be reworded.

Page 10 – Section 3.6.1 Evaluation of Background Metals

B1 Comment: My correlation analysis of the XRF data for metals in sediment cores presented in the 2001 Reidy thesis suggest a strong correlation between two groups of metals: chromium-vanadium-nickel correlate together in one group and lead-zinc-copper correlate together in another. Chromium, nickel and vanadium have mean concentrations from modern sediments (post 1938) similar to the mean of concentrations in historical sediments (1776-1938). Chromium, nickel, vanadium, lead, copper and zinc all show mean concentrations in historical sediments (1776-1938) above prehistoric sediment concentrations. Background concentrations of chromium, nickel and vanadium are only present in prehistoric sediments below a depth of six feet. The Reidy data suggest that chromium, nickel and vanadium occur above freshwater ecological cleanup levels in prehistoric sediments prior to 1776. However, this does not appear to have been verified in the FS/RAP.

B2 Comment: Correlation analysis for the Mountain Lake data shown on Table 2 (provided by Doug Kern) indicates strong correlations between two groups of metals similar to the Reidy thesis data: chromium-vanadium-nickel correlate together and lead-mercury-cadmium-zinc-copper correlate together. Cadmium and mercury are clearly shown in this analysis as related to modern contaminants and not correlated with background metals.

*"Appendix E provides an evaluation of background metals in Mountain Lake sediment." ..."The evaluation in Appendix E demonstrates that Mountain Lake sediment is likely a mix of Colma formation and greenstone and that chromium, nickel, and vanadium concentrations in Mountain Lake sediment are consistent with background concentrations for that mix of material."*

B3 Comment: The discussion in Appendix E using sediment color, historical reports, and scatter plots is not convincing and appears unnecessary as the 2001 Reidy thesis data clearly shows elevated chromium, nickel and vanadium concentrations in prehistoric sediments. The RI and FS documents indicate that the Colma background data set is utilized on this project. The FS document expends considerable effort to establish that the Mtn. Lake sediments contain a mixture of Colma and greenstone compromising the use of Colma background. The document does not identify a substitute set of background samples at Mtn. Lake to replace the Colma data or calculate appropriate concentrations for background metals. The Reidy thesis clearly indicates that prehistoric age sediments occur beneath a depth of six feet in lake sediments. All samples recovered from prehistoric sediments below a depth of six feet should be indicated in the document / Table 2 as background samples. The speculation in this appendix should not replace a calculation of background concentrations from site specific prehistoric samples.

Page 10 - Section 3.6.2 Chemicals of Concern (COCs) in Sediment

*"The COCs in Mountain Lake sediment are a subset of the PCOCs. The COCs are defined as PCOCs in Lake sediment with 95 percent UCL concentrations that exceed the freshwater sediment criteria from the Development of Presidio-Wide Cleanup Levels for Soil, Sediment, Groundwater, and Surface Water (EKI 2002) under baseline (current) conditions and are not associated with background. The 95 percent UCL calculations for baseline conditions are included in Appendix F. Per DTSC's request, these 95 percent UCL calculations were generated using all existing sediment data collected at the site, not limited to the upper 2.5 to 3.5 feet of sediment."*

B5 Comment: The conceptual site model utilized in the FS/RAP does not include sediment age data (as developed in the 2001 Reidy thesis). By combining contaminant data from modern shallow sediments with deeper prehistoric sediment, the UCL calculation apparently incorporates a large number of background samples. By including prehistoric samples in the analysis, the 95% UCL calculation is biased towards the lower background concentrations. Please clarify if it was the intention of the UCL calculation to include prehistoric background sample data. In my opinion, the 95% UCL calculation should only be applied to modern sediments impacted by runoff contamination. The background samples should be separated from the data set and analyzed for the range of concentrations typical of the background metals chromium, nickel and vanadium (as these potentially exceed freshwater ecological cleanup levels in prehistoric samples).

*"However, as discussed in Section 3.6.1 and Appendix E, nickel in Lake sediment is representative of background concentrations in native and fill material. Therefore, nickel is not a COC in Lake Sediment."*

B6 Comment: The distinction between native and fill material (as used here) is confusing in regard to background. The concept of a background concentration in both native and fill material appears contradictory and not adequate justification for removing nickel as a COC. The document fails to define what samples represent background and therefore neglects to separate background samples from the data set shown on Table 2. I believe that a commonly accepted definition of background would include the native prehistoric sediments below six feet with no historic or modern metal contamination and naturally occurring metal concentrations. If the document is using another definition(s), please clarify.

B7 Comment: Although chromium, nickel and vanadium may be naturally occurring above the freshwater ecological cleanup value in prehistoric sediments (subject to verification), these metals are common runoff pollutants and may have impacted the lake above prehistoric background. At Mtn. Lake, the only sediments containing naturally occurring metal concentrations are prehistoric sediments (pre-1776) greater than six feet deep. A significant number of deeper sediment samples are shown on Table 2 and the estimation of prehistoric background (pre-1776) concentrations does not appear to be difficult. No matter how small the background data set from Table 2 is – this data would be preferable to the analysis presented in Appendix E. Until the concentrations of the background metals chromium, nickel and vanadium are determined from the existing Mtn. Lake data set, the document will continue to arbitrarily ignore these metals and not determine appropriate cleanup values for them.

*"The 95 percent UCL concentration for cadmium based on the 2005 data set is below the cleanup level, so cadmium is not a COC in Lake sediment."*

C9 Comment: It is evident from a cursory inspection of the 2005 sampling data presented on Table 2 that a significant number of deeper samples (>2.5 feet) are included in the sampling data. All samples below about 2.5 feet are historic age (1776-1938) and all samples below 6 feet are prehistoric age (pre-1776). By including the older historic and prehistoric samples in the data set for the 95% UCL calculation, the result is biased towards lower background values. Please clarify if the 95% UCL calculation for cadmium includes a significant percentage of background data and if this is a significant bias.

C10 Comment: Cadmium exceedances in the sample data occur as /or more frequently than lead exceedances. Cadmium contamination (POCC) may be as widespread and common as lead in Mountain Lake. The presumed source of post-1900 cadmium contamination is also runoff. Cadmium is released from car exhaust, auto tires, metal processing, battery and paint manufacturing, waste hauling / disposal, the burning of household or industrial waste, coal or oil, and from agricultural runoff from phosphate fertilizers. The 2001 data set for cadmium is suspect and the department has requested testing of cadmium during confirmation sampling. The FS-RAP should retain cadmium as a legitimate COC and not use the ad hoc 95% UCL calculation (that includes background data) to remove cadmium as a COC.

Page 12 – Section 3.6.3 Remedial Action Area

*"Post-remediation confirmation sampling following sediment removal in the remedial action area would confirm that COC concentrations have been reduced to acceptable risk levels."*

C11 Comment: The confirmation sampling is limited only to lead and motor oil. Is the correlation between lead and other common stormwater contaminants such as antimony, cadmium, zinc, copper, mercury, and pesticides so strong that this limited confirmation sampling will ensure that the all contamination is reduced to acceptable risk levels? The document should present analysis indicating that lead and motor oil are reliable indicators of the broader suite of modern runoff contaminants or re-instate a broader range of COCs to the confirmation sampling.

C11 Comment: Instead of adding former PCOCs back to the confirmation sampling suite in a piecemeal fashion, please consider revising the evaluation of COCs to include a larger suite of COCs that would also be collected for confirmation sampling including antimony, cadmium, zinc, copper, mercury, pesticides, etc. The collection of confirmation samples that are not COCs is problematic from a public perspective because the document does not specify procedures for non-COC contaminants.

Page 36 - – Section 8.1 Remedial Alternative Implementation

*If COCs are detected at concentrations exceeding cleanup levels in samples collected at the limits of dredging, the Trust will consult with DTSC to:*

- *Evaluate the risk associated with the remaining COC concentrations.*
- *Assess potential impacts of continued dredging on slope stability.*
- *Determine if additional dredging is warranted and feasible.*

C12 Comment: As the confirmation sampling will include metal analytes that are not considered COCs, this section does not apply to the confirmation sampling of antimony and cadmium (or any others added to the confirmation sampling). It seems unusual to have confirmation sampling for constituents that are not considered COCs and also without procedures specified in the FS-RAP to address exceedances discovered during confirmation sampling. It would be more appropriate to include all problematic and/or suspect metals identified in the RI as PCOCs in the FS document as COCs and determine a reliable-representative suite of these COCs to use for confirmation sampling.

Page 37 -

*"As part of the dredging operations, confirmation sampling and analysis for COCs in sediment will be performed to verify that material left in place meets cleanup levels or to document the quality of sediment to remain where slope stability prevents sediment removal. Confirmation samples will be analyzed for the two COCs: lead and TPHmo. Although not identified as a COC, due to potential analytical interferences (see Appendix D), confirmation samples will be collected and analyzed for cadmium at locations where existing samples have cadmium concentrations exceeding its cleanup levels. Similarly, as requested by DTSC, confirmation samples will also be collected and analyzed for antimony at locations*

*where existing samples have reporting limits exceeding 3.0 mg/kg (the background threshold value for Colma Formation).*

C13 Comment: To my knowledge, cadmium is not known as background at the Presidio. The discussion in the FS-RAP is not convincing that cadmium is from some unknown bedrock source (this statement may have been removed in the last public version of the document). Because these metals have dubious data sets, I appreciate that antimony and cadmium were added to the confirmation sampling. However, both metals would be more appropriately add to the list of COC for this project. This would ensure that the procedures in the document applicable to COCs would apply to these metals as well.

*"Results of confirmation sediment analyses will be compared to cleanup levels in Table 3-1 to assess whether additional dredging should be considered. If the concentrations of all COCs analyzed are below cleanup levels, then dredging activities will be terminated. For confirmation samples containing one or more COCs at concentrations exceeding cleanup levels, the occurrence and concentration of the COC will be evaluated to assess the relationship to a site specific release. If the COC concentration appears to be related to a site-specific release, sediment will be further dredged and the newly dredged area will be re-sampled and analyzed for the COC that triggered the additional dredging. If the COC concentration does not appear to be related to a site-specific release, the confirmation sample results for the COC constituent exceeding the cleanup level will be evaluated using a compound-specific 95 percent UCL of the mean and the UCL compared to the cleanup level to assess whether that COC poses residual risk. Concentrations of metals that appear to represent background in naturally occurring sediment or fill material will be evaluated using existing site data and background data to assess whether the metal concentrations are related to a site-specific release. The Trust will consult with DTSC regarding confirmation sample results, potential additional dredging, and partial cap areas. Additional details related to confirmation soil sampling, analytical test methods, sample frequency, and decision logic for additional dredging will be included in the RDIP."*

C14 Comment: From this description, it is difficult to determine whether a credible risk evaluation of confirmation samples can be performed during the dredging operation. The use of the term "site-specific release" is vague as used in this section in reference to confirmation samples. The term "site specific release" should apply to all contaminants related to modern runoff including lead, zinc, copper, antimony, cadmium, and pesticides. Since the majority of the contaminants associated with a site specific release have already been eliminated as COCs in the risk evaluation, the usefulness of this concept during the confirmation sampling is dubious. This section should be significantly expanded to provide more understandable and specific guidelines / procedures for determining a site specific release.

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## Appendix E: Evaluation of Background Metals in Mountain Lake Sediment

B8 Comment: The use of color to assign an origin of greenstone to these sediments is speculative. Since the sediments are derived from a combination of windblown and runoff material, it cannot be determined from these scatter plots if the origin of the metal contamination is from greenstone, serpentine or both. Because the sample data mixes sediment from modern, historic and prehistoric ages, then sediments known to be contaminated (post-1776) have been included on the scatter plots and any conclusions drawn from this data are suspect. It is interesting to compare Mountain Lake values to regional studies with a large range of values. But this data is not site specific and potentially misleading. The Reidy thesis data clearly shows that chromium, nickel and vanadium concentrations are elevated in prehistoric sediments. An analysis including only prehistoric samples greater than six feet deep could determine the range of concentrations typical of prehistoric background. A cursory examination of deeper samples shown on Table E-1 suggests that the prehistoric (below 6 feet) background concentration (if calculated) may be below the freshwater ecological cleanup level for chromium, nickel and vanadium. Please clarify why the document avoided calculating background concentrations for these metals from the data set on Table 2.

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Appendix I - California Environmental Quality Act (CEQA) Documentation
Appendix B Figures
Figure 6: Highway 1 Stormwater Management Elements

F7 Comment: Figure 6 depicts separate systems for groundwater and stormwater. Groundwater from the Highway 1 tunnel is conveyed by conduit to the north end of the lake (blue line). However, the groundwater flow (blue line) is incorrectly shown on the figure. My field inspection indicates that the groundwater conduit joins a network of four drop inlet storm drains beneath Park Presidio Blvd. These storm drains are not apparent on this figure. Other drop inlet storm drains along the Mtn. Lake perimeter road also connect to this storm drain network. I understand this perimeter road was heavily patrolled by the Army for many decades. It appears that this drainage system at the north end of the lake is designed for sizeable water flows and may include overflow storm water from the Highway 1 above. There is also a stormwater conduit to what may be a Highway 1 sedimentation pond. This storm water system is not shown on project maps.

Only one sediment sample is shown at the north end of the lake and this sediment sample (MLSE25) may be located a considerable distance from the actual outfall location. The drop inlets & connecting conduits should be flushed and the sediment removed. The exact outfall location should be determined. Any obvious sediment at the outfall or along any connecting water course to the lake (through the marsh) should be removed prior to dredging activity. These actions should occur prior to construction of the dredging corridor (that appears to follow the course of the outfall alignment) to avoid disturbance of outfall sediments by construction activities. The disposition / proposed mitigation of this stormwater system during/following construction activities should be added to the FS/RAP. Please determine if the stormwater network described at the north end of the lake is appropriate to add to this project. See attached sketch map of stormwater system at north end of Mtn. Lake.

Thank you for your attention to my remarks.

Sincerely,

Mark Youngkin
Community Co-Chair
Restoration Advisory Board
Presidio of San Francisco

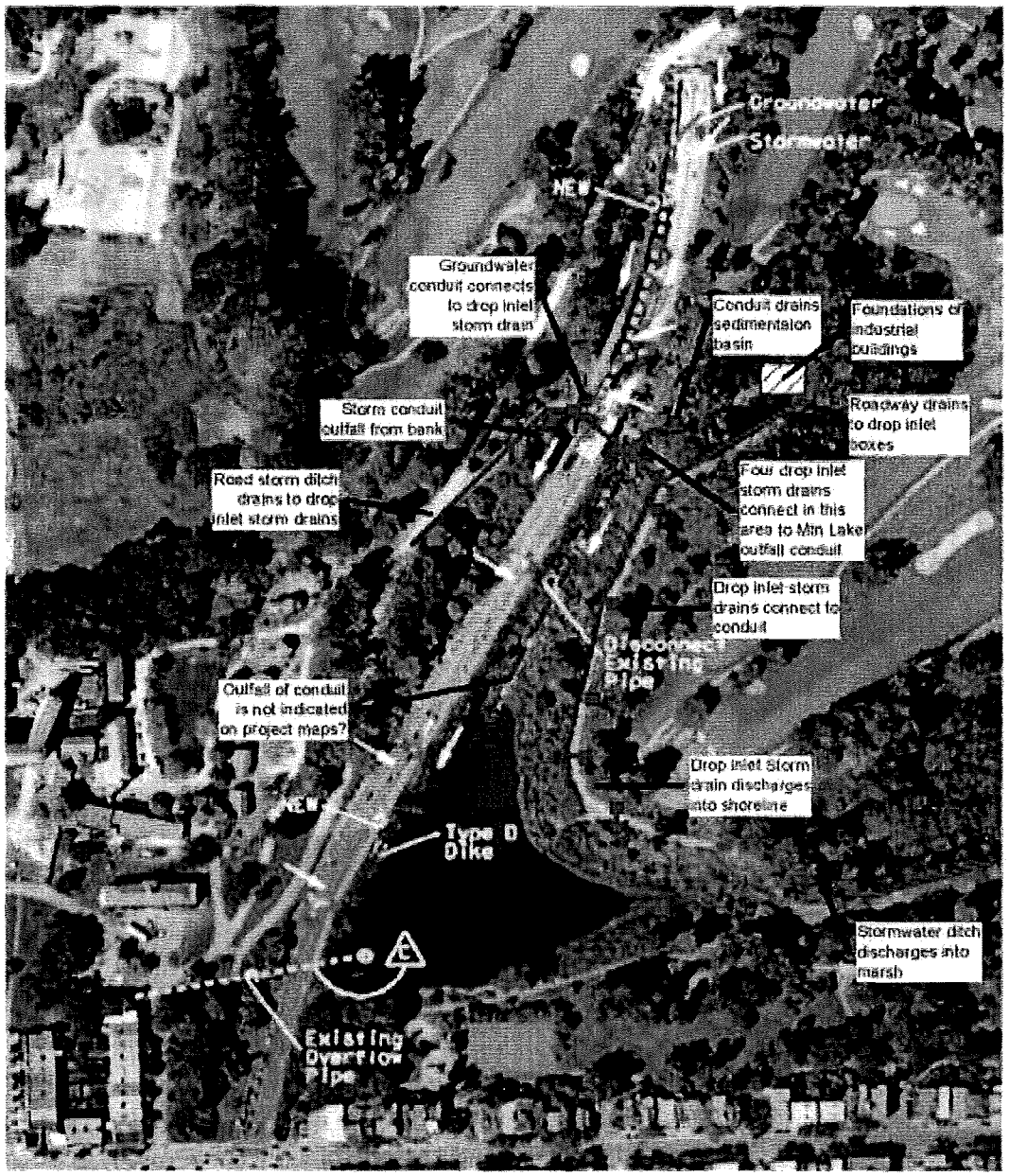


**Figure 6: Highway 1 Stormwater Management Elements**

Original of this figure shows groundwater from Hwy 1 tunnel draining by conduit directly to Mtn. Lake with no stormwater inputs. This is incorrect. A significant network of drop inlet boxes, roadway ditches, and a sedimentation basin (adjacent to the Hwy 1 roadway) discharge into Mtn. Lake through this groundwater conduit. The Mtn. Lake outfall is shown as uncertain with no location indicated on project maps.

MS. MAJHAIL: You can submit the written comments till May 3rd. Yes. You can submit your comments. You can e-mail them to us or write them and mail it. Either way.

Do you have a comment?

MS. KNIGHT: Well, I would like to know the contractor.

MS. MAJHAIL: Can you come up and state your name so we can have that recorded?

MS. KNIGHT: My name is Audrey Knight, and H1 I would like to know who the prime contractors are and how we can get in contact with them.

MS. MAJHAIL: Okay.

MR. SHRIEVE: I have --

MS. MAJHAIL: Your name?

MR. SHRIEVE: My name is Richard Shreve. I live in the neighborhood. I have a couple of concerns. G2 First of all, your proposed plan does not say definitively which route you plan to use to take the dredged material away, and we've been concerned that that ought to be by this time decided.

Secondly, Jun, this is for you. This is just a technical question. Have you used this technique before of shoring up?

MR. KANG: Yes, we have.

MR. SHRIEVE: How long does it take to complete one of those 400?

MR. KANG: Is it okay to answer that question?

MS. MAJHAIL: Yes.

MR. KANG: The timeline is we are going to start construction in mid-June. It takes ninety working days, not to just install the storm column, but other works on sop top of that, as well.

We bring it all the way up to mid-October, close to November. It will be done by then.

F2 MR. SHRIEVE: And then the second concern I have is that the plan that Caltrans has submitted thus far only deals with filtering runoff water.

It doesn't deal with the final runoff of the runoff water into the City sewer and storm drainage system, which seems to me to be the logical ultimate step for this, and I would like to see that resolved in the timeline, too.

MR. KANG: The second project is coming, as well, but that's not open for discussion here.

MR. SHRIEVE: That's in the works.

MR. KANG: I will talk to you outside.

MS. MAJHAIL: Okay. Next comment, please. Thank you.

1 MR. KERN: Hello. My name is Doug Kern.
2 I've been working on this project with many of the
3 participants here since 1994, so eighteen years working
4 on Mountain Lake, and I want to thank DTSC and the Trust
5 and Caltrans for their many years of work on this.
6 A1 I very much am in support of the
7 alternative, the excavation alternative. In fact, I do
8 feel that Mountain Lake is a little bit like a landfill,
9 kind of a landfill underwater, and there have been years
10 of these different sediments filling the lake, and as I
11 think was mentioned early in the slide, there were
12 pesticides and metals found in the lake, and I note in
13 the data part of the report that many of these metals
14 were found in the drop inlets where the roadway runoff
15 would come into the lake.
16 I also note that for -- since the beginning
17 of -- of all this investigation, we've noted that
18 pesticides were a part of the contaminants that were
19 clearly coming from the -- the golfcourse.
20 So in a risk assessment, it appears that
21 through a process of statistical analysis, the remaining
22 contaminants are now lead and motor oil, and I also note
23 in the document that DTSC has requested that cadmium and
24 antimony be tested for.
25 So the relevance of these after all the

statistics are done is only lead, motor oil, cadmium and antimony will be tested for in the information sampling.

Well, as many of you may know, aquatic species are really susceptible to things like pesticides. In fact, we're hearing all over the world that pesticide use may be contributing to the deformities in frogs due to the estrogen receptor-like characteristics of pesticide.

So what I -- and I also notice that copper is very toxic to aquatic organisms.

C1 So my recommendation for the department is in the confirmation sampling, to sample for all the metals and a sample for pesticides, as well.

And that way, we'll know if the lake is really clean after all this work.

Caltrans is doing all this stone work. I mean, it's got to be millions of dollars, and then all of this excavation, we should really test for a lot of these chemicals at the end of the day to make sure we've gotten them and not just rely on that we think we will have gotten them.

I mean, we can't know unless we actually test for them.

So I'd like to encourage others. You may not realize that from the presentation. You may not have

read the document, but I'd like you to also encourage the department to test for full suite of metals and for pesticides in the confirmation sampling to make sure we have a clean lake at the end of the day.

Thanks very much.

MS. MAJHAIL: Thank you.

MR. BERMAN: My name is Sam Berman. I am a member of the Restoration Advisory Board and have been a member since 1997, and I want to thank DTSC.

A1 I agree with what Doug said. The choice of the cleanup option I think is an excellent choice, and I C1 hope that DTSC will follow the comments that Doug made about the other contaminants not included in the COCs.

I have a particular request. I'm just going to read the e-mail and letter that I am sending to -- to Remedios, and it says the following: The subject is the possibility of long-term acoustic amplifications. I'll just read a couple sentences and that's all. It won't take too much time.

"To provide adequate stabilization and protection for the Highway 1 and the tunnel adjacent to Mountain Lake, it is my understanding that Caltrans would then place a series of over 400 stone-built columns of depth fifty to sixty feet to accomplish the required stabilization.

1 "It is also my understanding that the stone
2 will be compacted, but not permanently held together with
3 adhesive or concrete.
4 F1 "My concern is about the possibility of
5 permanent acoustic conductions and possible sound
6 amplifications that could occur as a result of these
7 columns interacting with other sources of constant noise,
8 such as roadbed and tunnel vibration, as well as
9 collective sounds from motor vehicles moving within the
10 tunnel.
11 Since noise is a matter of concern for CEQA
12 compliance, and I ask that you examine this potential
13 acoustic issue to assure that there will not be a noise
14 penalty permanently affecting those living in the
15 vicinity of the remediated Mountain Lake.
16 "Thank you for your attention to this
17 comment."
18 MS. MAJHAIL: Thank you very much.
19 MR. EPSTEIN: My name is Paul Epstein. I
20 am a neighbor and have been part of the Friends of
21 Mountain Lake Park for in excess of twenty years at this
22 point.
23 I just have a couple of comments, and some
24 of them are really directed to Caltrans.
25 The -- I'm just curious about the

1 construction of the system which is going to attempt to
2 catch the runoff.
3 Obviously there's runoff on both sides of
4 the road, and there's also runoff that begins in the
5 tunnel area, and that's uphill from the lake.
6 F2 So that there's going to be a flow from the
7 roadway, and I'm just wondering how extensive the
8 planning has been to catch all of this.
9 It's not just a question of the immediate
10 area next to the lake itself, but the whole stretch of
11 the lake from the top of the tunnel down to approaching
12 Lake Street.
13 With regard to the roadway, I have two
14 suggestions, comments, please, and those have to do with
15 two aspects of the road itself.
16 F5 Even in its current condition, it's noisy,
17 and if one is in the park, there's the constant hum of
18 tires on the pavement, and I would suggest that as part
19 of the remediation over the roadway that Caltrans repave
20 the roadway with a material which is more sound absorbent
21 than the material that's there now, which is mostly
22 concrete, as I recall.
23 Another source of noise into the park is
24 the retaining wall on west side of the highway, which
25 just acts as a -- a reflector of all road noise back into

1 the park area, and I'm sure Caltrans has faced that
2 problem in many areas other places, and some sort of
3 coating -- I don't know technically what the term is
4 even, but that wall could be coated with something to
5 break up the sound instead of having it just reverberate
6 back into the park.
7 D1 I am somewhat concerned about the artistic
8 treatment that what the documents are calling the east
9 arm of the lake is, and I note that the two handouts that
10 we got, the program and then the multi-colored piece have
11 different lakes.
12 The plan's different as to -- if you
13 actually compare the size of what is going to be dredged
14 and what is going to be not dredged -- and I don't see
15 much of an effort towards the east arm, and the problem,
16 of course, is that there is reportedly some sort of
17 conduit under the road there, but I think it's not
18 functioning very well, and the east arm forms its own
19 little lake containing golf course runoff and also
20 becomes a mosquito breeding ground because the water
21 doesn't go anywhere.
22 So I would urge, to the extent it's
23 possible, that the east arm be given a higher priority in
24 the project and that the dredging go further east than
25 appears to be on -- on the map.

1 A1 That all said, I'm very pleased to see this
2 plan happening, and we all look forward to a clean lake.
3 Thank you.
4 MS. MAJHAIL: Thank you.
5 MS. JOHNS: My name is Eleanor Johns. I'm
6 also a neighbor and long-time user of Mountain Lake Park,
7 A1 and I'm very pleased that this project is finally coming
8 to fruition.
9 My concern -- some of them have already
10 been mentioned, but I'd like to reiterate what my
11 personal concerns are.
12 G1 There were three different routes mentioned
13 for removing the contaminated soil once it was dewatered.
14 I am very, very much opposed to having this removed by
15 building temporary on- and off-ramps.
16 I think it is a complete waste of money,
17 and in coming to two or three of the previous meetings, I
18 did ask the question about how much that would cost and I
19 never did get an answer, and I think at this stage of the
20 game, it seems rather late to start thinking about
21 building temporary on- and off-ramps. So I'm hoping that
22 that will not be one of the choices.
23 It seems to me that it alone will be four
24 or five, six months, and it may be painful for those
25 folks that live near the park, but I'm hoping that some

internal route in the park will be chosen.

In tonight's presentation from Caltrans, I heard that there were nineteen storm drains, and this is the very first time I heard that.

In previous meetings, I've only heard -- and I personally only observed three storm drains that are visible.

F2 So I don't know what these nineteen storm drains are, and I am concerned, as other folks have mentioned, about the filtration system that will be a temporary process for filtering out future runoff, and I do hope that there will be some realistic approach and follow-up to that filtration system that will have money available to make it actually happen.

And my third concern has to do with the overall level of the lake that we end up with and how that interacts with what another neighbor mentioned, which is the east arm project.

D4 My understanding is that the east arm is not part of the dredging, but, in fact, will be part of the restoration of the lake, and although -- well, we have had some workshops on this and have had a bit of information to instruct us about what will happen.

I do happen to know that there is one million dollars coming from the San Francisco

1 International Airport to help restore the wetlands in
2 that east arm area, but I don't understand the hydrology
3 yet and what's being worked out and how that restoration
4 will work into the final lake bed that we end up with and
5 whether we will have a water flow from the west arm into
6 the lake that will lessen the mosquito problem.
7 And we keep being told that this will be
8 part of the restoration, but it seems to me that there
9 has to be some planning ahead so that we don't get into
10 the dredging and then end up with a problem that we can't
11 counteract. So basically all of that hydrology in the
12 lake level.
13 So those are my concerns, and I hope
14 they'll be addressed.
15 Thank you.
16 MS. COYLE: I did just want to respond to
17 your question on the nineteen storm drains. I just want
18 to clarify. That was misspoken when we said nineteen.
19 There are, in fact, three storm drains that
20 feed the runoff into the lake. There are, I believe,
21 sixteen drop inlets along the highway. They are funneled
22 into three storm drains.
23 So when he said nineteen, I think he said
24 sixteen, and they're actually the breaks where the water
25 runs in. They're collected into three storm drains.

MR. KANG: Storm drains and inlets are a little different. I misspoke, but there are nineteen open.

MS. JOHNS: But they all go to the lake?

MR. KANG: All go to the lake. We are putting filters in every one of them to ensure nothing is going to fall into the lake.

MS. JOHNS: But two other folks said we're concerned about what happens beyond those filters which we're told are just a temporary fix. So that's another comment.

Thank you.

MS. MAJHAIL: Thank you.

MS. STEFANI: My name Catherine Stefani. I'm a legislative aid for Supervisor Mark Ferrell. He couldn't be here; he had another meeting.

A1 I just want to thank the Presidio, Caltrans for moving this forward. I think this is a time that we never thought that we'd see this happen. Thank you, thank you for all your hard work.

G3 We do want to reiterate that there are concerns about the number of routes and trips and noise to be taken into consideration, including what Eleanor Johns just mentioned, whether or not we should be building temporary on-ramps or not.

1 I2 Also -- and then whether or not we are
2 going to make sure that the beach area is cleaned up and
3 restored to before the dredging began.
4 I5 Also, I didn't hear anything about
5 coordinating with the Recreation and Park Department. I
6 know in the 2008 bond -- I might have missed that. The
7 2008 bond, there -- there is going to be a restroom
8 renovation, and that should be beginning I think in the
9 fall.
10 Also, there's going to be 2012 bond on the
11 November ballot and Mountain Lake, I'm happy to announce,
12 is set to receive two million dollars for playground
13 restoration and restoration for the park.
14 So I really think that it's very good news
15 and I'm happy to announce that tonight. I just want to
16 make sure that we're coordinating with all the agencies
17 possible as we dredge and as we perform all of the other
18 tasks in the park.
19 Thank you very much.
20 MS. MAJHAIL: Thank you.
21 MR. MACCABEE: Hi. My name is John
22 Maccabee. I'm a neighbor, as well.
23 I have two comments. One has to do with
24 I4 when the lake is finally restored. Is there a baseline
25 of what it is meant to support, what kind of aquatic

1 life, bird life, which I think addresses your question,
2 D3 also, about was -- is there pesticide runoff and how is
3 it being removed?
4 H3 Then the other thing that I wonder about is
5 we're supposing that whatever sediments's are taken out
6 are toxic in some way.
7 Does part of your plan include where is
8 that stuff all going to be going? And that's a concern.
9 MS. MAJHAIL: Thank you.
10 MS. DONG: My name's Vanh Dong, a neighbor
11 and also park user for the last thirty years.
12 A1 I am really glad we're going to see there this in our
13 lifetime, we hope.
14 D3 I want to follow up on two items, the east
15 lake coming down from the golfcourse and the current
16 concern about other pesticides and other contaminants.
17 I think doing the study now is if nothing
18 else baseline that we would be compared, so it is the
19 baseline for future -- future work if necessary, but I
20 don't understand if you don't dredge or do something to
21 that east arm why all the sediment and all the drain from
22 the golfcourse, which is draining to that area, won't
23 then somehow overflow and go into the Mountain Lake in
24 the established area where it is now.
25 So I'd like to know how that is going

1 mediated and also the analysis of that.

2 MS. MAJHAIL: Thank you.

3 MR. SHEPARD: My name is Bill Shepard,

4 Chairman of the Neighborhood Association Planning and we

5 hope to submit a formal detailed comment before the

6 deadline, but I want to reiterate concerns of the prior

7 F5 speaker tonight, and that is that the noise emanating

8 from the road surface and the concrete wall on the west

9 side of Park Presidio Boulevard.

10 Part of this project, in order to stabilize

11 the west embankment of the lake, resulted in removal of a

12 lot of vegetation and trees, and as a result of that, the

13 side-effect of that is this increased noise level along

14 with -- if these trees were there or not, it would be a

15 loud area, and we certainly expect to have --

16 particularly we're shoring up the northbound lanes of the

17 roadway.

18 That should be replaced with a quiet

19 surface and while we're at it, the entire highway.

20 G5 Another concern that NAP has is the truck

21 hauling protocol. I recall hearing somewhere that the

22 trucks may be -- may operate in a convoy fashion, and we

23 are requesting that all the trucks proceed in convoys or

24 in close -- in a group led by a pilot vehicle or lead

25 vehicle, that they maintain a speed under 5 miles an hour

on West Pacific Avenue, because they're coming so close to the homes there and that roadway is not a terribly well constructed surface as it is.

And we would ask the -- this idea of a convoy and the pilot vehicle continue on through the park till it exits either on to Lombard Street or on some -- some rotating the material out of the park.

Certainly not at 5 miles on hour. We don't want to create traffic problems, but now we have noted in the past with park projects that when you're dealing with contractors providing services to the park, oftentimes the truck drivers don't follow with the protocol and they'll use different entrances and different exits. And varying speeds, not responsible speeds.

So for that reason, we would like the concept of a convoy with a lead vehicle escorting the trucks both in and out of the park to the extent that it's financially feasible.

That's it. Thank you.

MS. MAJHAIL: Thank you very much.

MS. BLUM: My name is Jan Blum. I'm a member of the Restoration Advisory Board. I want that thank you for holding this meeting.

A1 I support your alternative. I do have a couple of questions I'd like to ask or statements to

F3 make, and that is I would like to see a -- something on paper that defines your filtration monitoring system on the storm water, especially during storm events.

That's when we want to make sure that we don't have that same old problem going back into the lake.

So I would like to see something spelled out for us on exactly how the filters will be changed, at what frequency, and especially during storm events, how will it be monitored.

C1 And I would also certainly like to support the comments of Doug Kern and Sam Berman on testing for full suite of pollutants, not just the limited suite that you have discussed.

Thank you.

MS. MAJHAIL: Thank you very much.

MR. FRIAS: My name is Larry Frias. I work with Waste Solutions Group and San Francisco Bay Railroad on Market.

G7 My question to the DTSC is during implementation of the trucks for dispose to contaminated waste, are you -- do you have any consideration in the environmental aspects of the transportation?

And I'm asking it, do you allow too many truckers in the neighborhood, like seventy truckers a

1 day?

2 Because what it is, we maintain few hours

3 of progress for the community in San Francisco, and from

4 the Hunters Point district and they haul the waste from

5 the Presidio to the railyard and we do it by rail, which

6 is less consuming in terms of fuel consumption.

7 That's my question regarding environmental

8 effect of the local trucking, because we don't believe in

9 local trucking. We want least consumption of fuel.

10 That's why we maintain the rail system.

11 MS. MAJHAIL: Thank you very much.

12 Any more comments? Yes.

13 MR. REIDY: Hi. My name is Liam Reidy.

14 I'm an environmental geographer in the Department of

15 Geography at UC Berkeley.

16 I'm the one who was waving a red flag about

17 this issue about lead at the bottom of the lake. I'm the

18 guy with the lead with a bee in his bonnet about the lead

19 at the bottom of the lake.

20 The project has come a tremendously long

21 way in the time that I got involved back in 1999 taking

22 the initial sediment cores, and I think it would have

23 been helpful to show some of the stratigraphic analyses

24 that have been undertaken in the past to make it clear

25 that the meter for the most part where the contaminants

1 are.

2 I1 Again, I spoke very briefly at last month's

3 meeting, and I'm here from a completely scientific point

4 of view. I have been opposed to just taking sediment

5 cores, but to make sure that we get full samples to

6 really get out the environmental history of the area over

7 the last 2,000 years.

8 Now I did make the proposal to the Presidio

9 Trust archeology folks. Now the one thing is, the big

10 problem, of course, is money. The amount of money that

11 it would cost to recover all these cores that would be

12 placed in the core in Minnesota, the national core, the

13 core repository, plus with all the initial analysis on

14 the cores, we're talking lowball figure, probably less

15 than $20,000. We're talking about less than .00002

16 percent for the total budget of this project.

17 Now, I did speak with the archeology folks

18 again this past week end and they told me that it's an

19 issue of funding.

20 I think that a project of this magnitude,

21 if you can't find $20,000 to reserve the record and the

22 National Core Repository of the recovery of the cores and

23 put them in Minnesota where a UC-Berkeley team of

24 paleontologists can get at them, I think that would be

25 kind of a sad day for somebody like myself that would be

1 interested in the environmental history of the area.
2 Other than that, I'd like to see the right
3 thing is being done at the end of the day. I believe
4 it's all coming together.
5 I think what the local people need to have
6 is a little bit more patience for the next six, twelve
7 months and the Presidio Trust see this through with DTSC
8 and we'll have a very functional lake going forward, and
9 just somebody had a question what are we getting once we
10 dredge the lake.
11 I don't way to see that we're destroying
12 the environmental record at the bottom of the lake. But
13 the lake itself, the depth of the lake or the swan song
14 of the lake will be pushed forward into the future.
15 About 1,500 to 2,000 years from now, there
16 will be probably people here in the area hopefully
17 dealing with the same issue about the sedimentation, the
18 infilling of the lake and most of that will be the
19 dredging of the contaminants that's being removed will be
20 organic material, pollen, leaves, dead insects.
21 Again the lake will -- has gone to Gatorade
22 green. I have the pictures from the year 2000 to the
23 present. Very clear water, and again, these improvements
24 and these efforts by the Presidio Trust and others have
25 really and truly turned the ship around and it's now

1 pointing in the right direction.
2 Thank you.
3 MS. MAJHAIL: Thank you.
4 Any more comments? Yes.
5 MR. BERMAN: I'm Sam Berman. This is just
6 a comment. I want to thank Liam, our last speaker,
7 because if it wasn't for his work, probably the whole
8 remediation project would never have been started,
9 because the Army declared that nothing needed to be done
10 with the lake, and it was his work that discovered the
11 lake, and I think you should add that to your collection
12 of slides and give him the proper recognition.
13 MS. MAJHAIL: Thank you.
14 (Applause).
15 Any more comments? Yes.
16 AUDIENCE PARTICIPANT: I have a question.
17 MS. MAJHAIL: If there are no more
18 comments, we can have the question time. We will be
19 around here and you can ask the questions. All the team
20 is here. Feel free to ask the questions.
21 If there are no more comments, then I would
22 like to adjourn the meeting here, and just to let you
23 know that the previous meetings that we had, we looked to
24 the committee members with our concerns regarding
25 questions, regarding implementation.

# Attachment C
# Public Meeting, Draft Remedial Action Plan (RAP)
# Reporter's Transcript of Proceedings
# Thursday, April 19, 2012
# Golden Gate Club, Presidio, San Francisco, California

PUBLIC MEETING )

MOUNTAIN LAKE )

DRAFT REMEDIAL ACTION PLAN (RAP) )

_____)

REPORTER'S TRANSCRIPT OF PROCEEDINGS

THURSDAY, APRIL 19, 2012

GOLDEN GATE CLUB

PRESIDIO, SAN FRANCISCO, CALIFORNIA

Reported by: MARK I. BRICKMAN, CSR RPR
License No. 5527

1 ATTENDEES

2 PRESENTERS:

3 Radhika Majhail, Public Participation Specialist
Department of Toxic Substances Control
4
Genevieve Coyle, Environmental Remediation Project Mgr
5 Presidio Trust

6 Remedios Sunga, Hazardous Substances Engineer
Department of Toxic Substances Control
7
Jun Kang, Project Manager
8 Caltrans

9 PUBLIC SPEAKERS

10 Audrey Knight

11 Richard Shrieve

12 Doug Kern

13 Sam Berman

14 Paul Epstein

15 Eleanor Johns

16 Catherine Stefani

17 John Maccabee

18 Vanh Dong

19 Bill Shepard

20 Jan Blum

21 Larry Frias

22 Liam Reidy

23

24

25

1 BE IT REMEMBERED that, pursuant to Notice
2 of the Meeting, and on April 19, 2012, 6:36 PM at the
3 Golden Gate Club, Presidio of San Francisco, California,
4 before me, MARK I. BRICKMAN, CSR No. 5527, State of
5 California, there commenced a meeting under the
6 provisions of the Department of Toxic Substances Control.
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1 AGENDA

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16 Mr. Maccabee 39

17 Ms. Dong 40

18 Mr. Shepard 41

19 Ms. Blum 42

20 Mr. Frias 43

21 Mr. Reidy 44

22

23

24

25

1 MS. MAJHAIL: Good evening. Everybody.
2 Hello, everybody. I'm the Public Information Specialist
3 with the Department of Toxics Substances Control and I'll
4 be the facilitator for tonight's meeting.
5 Before we get started, a few housekeeping
6 items. The bathrooms are out the back door on the left
7 and the right and we have the fire exits are all the
8 exits marked on in the room here.
9 So I welcome you all to the meeting, the
10 public meeting for Mountain Lake. It is the meeting on
11 the Draft Remedial Action Plan, which is also called the
12 cleanup plan. We're going to talk about the cleanup for
13 Mountain Lake.
14 So before we get started, I'm going to
15 just -- there are -- on the back table, we have some
16 handouts that are like this. This is just the proposed
17 cleanup plan that we mailed, and this is what we're
18 discussing tonight.
19 There's a sign-in sheet in the back. Make
20 sure that you have signed in. Make sure to give us your
21 e-mail.
22 You do not -- we did not print the slides
23 from tonight's evening, but if you have your e-mail ID in
24 the back, we'll make sure that you get a copy of it, and
25 there is -- there is a bunch of -- there are a bunch of

1 comment cards in the back.
2 Today is the formal meeting and we are here
3 to accept your verbal comments, as well. For you that
4 want to use one of the comment cards, please grab one or
5 give it to the DTSC employees that we have here.
6 And there is another brochure in the back
7 like this. This is just for your information. This is
8 about the future of the Mountain Lake, but this is not
9 something that we're going to be covering tonight.
10 So you can take it home. It's just for
11 your information, but it's not for tonight's
12 presentation.
13 Today we're going to have presentations
14 from Genevieve Coyle from the Trust. She's the Project
15 Manager for the Trust, and Medi Sunga. She is DTSC
16 Project Manager, and also we have Jun Kang. He is from
17 Caltrans. We'll be having their presentations tonight.
18 Brief presentation review. After the
19 welcome, we're going to go over the DTSC site cleanup
20 process. I will go over the process that DTSC follows
21 for any site cleanup.
22 After that, we'll have discussion on Draft
23 Feasibility Study on the cleanup plan. That will be done
24 by Genevieve, and that follows by presentation on the
25 proposed Mountain Lake remediation action site, Medi, and

1 then the Caltrans highway work will be discussed.
2 So let's talk about the stakeholders.
3 Every site has stakeholders, and Mountain Lake also has
4 stakeholders.
5 We have three -- three big groups here. We
6 have the agencies. That will be DTSC and the Water
7 Board, and then we have the land managers. Those are --
8 the Presidio Trust, Caltrans, City & County of San
9 Francisco and we have general public, and also the RAB in
10 here and the Mountain Lake community neighbors are also
11 part of the public.
12 So the first step, the first stage is the
13 site discovery stage in the cleanup process. This is the
14 first stage when DTSC becomes aware of a site when we
15 know -- it becomes aware that it's contaminated.
16 From there, we move on to the second stage.
17 That's called the preliminary assessment stage. In this
18 stage, we actually just answer the big question here is
19 is the cleanup necessary? Do we need to clean up? So
20 we're just asking those questions here.
21 After -- and while we're doing there -- the
22 technical team is doing this, the public participation
23 unit profiles a community profile, and before we --
24 before we write the profile, we send out the rate.
25 We mail it out to the community to get

1 input from the community, and this community profile
2 talks about -- it basically tells us the issues, the
3 concerns, the nature of the community.
4 After that, we move on to the public
5 participation plan. This is again just the detailed
6 community profile and it talks about all the public
7 participation activities that we'll be dealing with
8 through the entire process.
9 Then the big stage is the Remedial
10 Investigation and the feasibility stage. Here we ask the
11 big question is how much do we have to clean up?
12 So we try to find out the extent of the
13 contamination, where -- how far is the contamination.
14 And after that, we do some public
15 information meetings. Now these meetings are not -- is
16 not what we're doing today. These meetings were -- are
17 basically meetings that are done for the public to
18 provide information to the public and are not formal
19 meetings, and if you remember that for Mountain Lake, we
20 did three workshops prior to today's meeting with the
21 community -- the residents of the -- the neighbors of
22 Mountain Lake and the people who were interested in
23 Mountain Lake cleanup.
24 And this is where we are today, the public
25 meeting on the Proposed Draft Remedial Action Plan.

1 So once we have a draft document that we
2 are ready to put out for public review and we set up a
3 public comment period, then somewhere in the middle of
4 the public comment period, we do the public meeting,
5 which is tonight's meeting, and this is a formal public
6 meeting. We have a court reporter here, so your comments
7 will be recorded here, as well.
8 After tonight's meeting, we move on to the
9 next phase. That would be finalizing the RAP, and before
10 we finalize the RAP, one thing that we need to consider
11 here is the comments that we will receive during the
12 comment period.
13 All the comments that we receive, they are
14 responded before we finalize the RAP, and usually the
15 Trust and DTSC work together and generate a response to
16 comments document.
17 That document is usually sent out to
18 whoever has commented, and the -- the whole thing is
19 compiled and put out in the information.
20 The next stage becomes the remedial design.
21 In this stage, we -- whatever -- you know, the Final RAP,
22 whatever we have on paper on this stage, regarding the
23 engineering detail comment plan.
24 We start putting those details together on
25 how it will be done. So all those engineering activities

1 come together in this phase.
2 After that phase, we move to the next step.
3 That's the implementation. Whatever design we have on
4 the paper, now we start putting to the ground. We start
5 working on it and we start doing the cleanup.
6 Once that process is done, we move on to
7 the operation and maintenance phase here. Now here we
8 decide do we need to keep monitoring something after we
9 have we're done with the cleanup?
10 If yes, this is the stage where we decide
11 what plans do we need to keep monitoring certain
12 contaminants, if any, and after that, then we certify --
13 then DTSC certifies the site and that's what the cleanup
14 is.
15 With that, I'm going to have Genevieve come
16 here and talk about Mountain Lake.
17 MS. COYLE: Hi, everybody. My name is
18 Genevieve Coyle. I'm the Project Manager at the Presidio
19 Trust in the Environmental Remediation Department. I'm
20 going to give you a brief overview of the history and
21 background of Mountain Lake, how we discovered the
22 contamination, what the contaminants are in Mountain Lake
23 and the alternatives that were looked at for cleanup.
24 So I imagine most of you are here tonight
25 because you already know where Mountain Lake is located,

1 but in case you don't, it is here in the southern portion
2 of the Presidio. Lake street, Richmond District of San
3 Francisco is immediately to the south. We have Highway
4 1, Park Presidio Boulevard that runs immediately west
5 adjacent of the lake, and to the northwest of the lake is
6 Presidio Golfcourse.
7 This is West Pacific Avenue, which turns
8 into a trail, and then if you spend a lot of time there,
9 as you know, there's the Mountain Lake Park which has
10 tennis courts and children's playground, a lot of dog
11 walkers and runners, a nice recreation area.
12 So the lake is about four acres in size.
13 At its deepest point, it's approximately nine feet deep.
14 The lake is a natural lake in San
15 Francisco. It is primarily groundwater fed. It also
16 receives runoff from neighboring areas, and that includes
17 the nearby Highway 1 storm drain as well as the
18 golfcourse and nearby riparian areas.
19 The level of water in Mountain Lake is
20 regulated by an overflow pipeline. That pipeline starts
21 in the southwest corner of the lake and it connects to
22 the City's storm water sewer system.
23 When the lake gets -- water gets to a
24 certain height, the water is released through that
25 pipeline.

1 The reason for that is because the lake
2 water would otherwise overtake the roadway when it got
3 too high.
4 And then in the southwest corner of the
5 lake is a beach, and that is actually within the City &
6 County of San Francisco.
7 On this next slide here you can see here
8 this is actually the Presidio property boundary, and this
9 corner of the lake right here with a beach is within the
10 City & County of San Francisco.
11 This is the overflow pipeline here that
12 extends from the southwest corner of the lake. This is
13 Mountain Lake Park. This is the West Pacific Avenue, and
14 then this is Mountain Lake Trail, which is the footpath
15 that winds up and around the lake over to the Public
16 Health Service Hospital.
17 The lake itself is primarily inhabited by
18 non-native exotic species. A lot of these occurred by
19 people throwing away their pets, unfortunately, and the
20 lake includes bull frog, carp and catfish.
21 The east and southeastern shores of the
22 lake on this end has been restored with native plants.
23 There's also wetland habitat around the lake perimeter
24 and in the east arm.
25 The east arm is over in this area, which is

1 a drainage area, and then, as I mentioned, the south
2 shore area is a park and beach.
3 And so Mountain Lake used to be about forty
4 percent larger than it is today. When Highway 1 was
5 constructed in the 1930s, the lake was filled in, and so
6 it's approximately forty percent smaller than it used to
7 be.
8 The lake has historically received runoff
9 from the highway for the last eighty years because the
10 storm drains feed the runoff directly into the lake.
11 So pollutants in the lake have accumulated
12 over time. Those include leaded fuels and the other
13 contaminants associated with highway use, and also
14 pesticides that were historically used at the golfcourse.
15 So why is cleanup necessary? So the last
16 fifteen years, we have collected almost 200 sediment
17 samples from the lake and many surface water samples so
18 that we understand the contaminants in the lake.
19 Once we have all of that data, we run
20 what's called a human health and environmental risk
21 assessment. And the human health risk assessment, we
22 look at the level of contaminants in the lake, but
23 whether they pose a potential risk to humans.
24 In the Environmental Risk Assessment, what
25 we do is we look at protecting wildlife, the aquatic

1 species in the lake. That includes everything from the
2 organisms that live in the sediment to the fish and to
3 the birds that eat the fish. So it encompasses the whole
4 food chain.
5 So for the human health, the public health
6 evaluation, that also includes use by dogs and park
7 users.
8 The contaminants are limited to submerged
9 sediment. The contaminants in the surface -- what we
10 found is in the surface water, the contaminant levels are
11 very low. They're below drinking water levels and water
12 quality criteria.
13 This is not surprising because lead and
14 motor oil, which is a primary contaminants of concern in
15 the lake, are the type of contaminants that are stuck to
16 the sediment and fall to the bottom.
17 So it's not surprising that we find only
18 the sediments contaminated and not the water itself.
19 So because the contaminants are in the
20 submerged sediment where humans can't contact it, there's
21 no human risk at the site. There's no fishing, boating
22 or swimming allowed.
23 We know that people do occasionally walk
24 out on to the beach. Young children might play on the
25 beach area.

1 We did collect samples of sand and sediment
2 at that beach area. The levels are much lower than
3 protected levels of human health, which is good.
4 What we did find -- if you can go to the
5 next slide -- in the Ecological Risk Assessment. The
6 levels of contaminants are above what's considered
7 protective of the ecological environment.
8 The chemicals of concern, which are the
9 contaminants that are driving the unacceptable risk, are
10 lead and motor oil.
11 So now that we know that there are
12 contaminants of concern in the lake, we defined what's
13 called the remedial action area. That's the area that
14 we're targeting for cleanup.
15 What we found is that the lateral and
16 vertical extent of sediments are contained in the
17 sediments of concern. It covers most of the lake's
18 footprint.
19 It includes sediment down to approximately
20 two and a half feet below sediment surface, and then
21 there's a few pockets. There's three, and we have
22 another map to show you later.
23 There's three areas where the contamination
24 extends from about four and a half to six and a half
25 feet.

1 This represents approximately 15,600 cubic
2 yards of sediment in the lake.
3 So the plan that's out for public review
4 now is called a Draft Feasibility Study/Remedial Action
5 Plan.
6 The feasibility study part of the report is
7 where we look -- we compile various alternatives for how
8 we're going to clean up the lake and we evaluate them to
9 select the preferred alternative.
10 In this case, we compiled three
11 alternatives. The first one is a no action. It's just a
12 baseline alternative. What it means is if we took no
13 action to change the lake whatsoever.
14 In this case, we're not preferring no
15 action, because we do know that there is a risk to the
16 ecological environment. Leaving it alone would not be
17 protective of the environmental receptors.
18 We also looked at capping. What capping
19 would entail is bringing in about two to three feet of
20 imported sand and placing it in the bottom of the lake.
21 This basically blocks any receptors from
22 contacting the -- it's basically a protective layer and
23 it allows ecological receptors to not contact the
24 contaminated soil underneath the cap.
25 This is also not a preferred alternative.

1 It would -- we found that it would have minimal reduction
2 in construction impacts over a dredging removal
3 alternative.
4 There's also a long-term maintenance
5 required of the cap to ensure that it continues to
6 function in place, and we also know that there is an
7 issue with the level of the lake.
8 Right now the lake depth is about nine feet
9 at its deepest. About four to five feet on the average.
10 If we brought in two to three feet of sand, that would
11 make the lake about two to one foot deep, which we know
12 does not help the lake functioning.
13 So in our -- in our plan, what we're -- our
14 preferred alternative is excavation, which is removal by
15 dredging. So the contaminated sediment would be removed
16 by a dredge.
17 In this case, we also can see that has some
18 limited capping. There are certain areas of the lake,
19 primarily the Highway 1 -- the western edge of the lake
20 along Highway 1 where we're unsure if we can safely
21 dredge at certain depths because of the stability of the
22 embankment.
23 We are targeting a clean closure so that we
24 can remove all of the contaminated sediment, but if we're
25 out there and we find that we cannot dredge and dig

1 without the slope falling into the water, then we do have
2 a contingency in here where we would put a cap just in
3 those areas, but then only as a contingency.
4 This is our preferred alternative. It
5 would effectively remove contaminated sediment from the
6 site and it would protect ecological receptors.
7 Once we compile the alternatives, we walk
8 through a nine criteria. These are EPA criteria that are
9 used commonly for an environmental remediation site.
10 The first two are threshold criteria. So
11 any remedy that we select must be protective of human
12 health and the environment and it also must comply with
13 all laws and regulations.
14 Then we move to the primary balancing
15 criteria. There's five of these factors. We look at the
16 long-term effectiveness and permanence of the remedy. We
17 look at whether the remedy would reduce the toxicity,
18 mobility and volume of the contamination.
19 We look at a short-term effectiveness that
20 really gets to the construction impacts. We look at how
21 easily implementable our remedy is, and then we also
22 factor in the cost.
23 And then the last two is state and local
24 agency acceptance and the community acceptance. So
25 that's where we are tonight. We're bringing in public

1 comment on our plan and seeing if the community accepts
2 our proposal.
3 And now I'm going to pass it over to Medi
4 Sunga and she's going to talk about the proposed remedy.
5 MS. SUNGA: Good evening. Tonight I will
6 be talking about the proposed remedy for the Mountain
7 Lake site, and as Genevieve discussed, there are three
8 factors that were evaluated in the Remedial Action Plan,
9 and we selected the removal and offsite disposal with
10 sediment capping if needed.
11 And under this alternative, approximately
12 15,600 cubic yards of contaminated sediment will be
13 removed from the lake. These will take into account all
14 ecological resources, and the sediments, the sand and the
15 sediments will be removed across most portions of the
16 lake, and these sediments will be dredged depending on
17 locations of higher contaminated sediments.
18 After dredging, sediment samples will be
19 taken from the bottom of the lake and will be analyzed
20 for elements of concern to make sure that contaminated
21 sediments have been removed.
22 And as Genevieve said, we place sand cap in
23 areas where dredging may not be possible, primarily along
24 Highway 1, and at completion of the dredging and
25 confirmation samples are all okay, the bottom of the lake

1 will be contoured to make more functional stable slopes.
2 The sediments will be transferred to an
3 onsite staging area near -- near the lake and there it
4 will be dewatered, and the water that is extracted will
5 be discharged back to the lake after testing and the
6 dewatered sediment will be transferred offsite to
7 appropriate and accepted landfill.
8 After all cleanup's done, we have to go
9 back and restore the areas of the lake, the staging area
10 and the access road that is impacted before cleanup.
11 This is the dredging plan, as you can see,
12 the most impacted area of the lake will be dredged and
13 two, two and a half feet below sediment surface.
14 The green area will be dredged to about six
15 and a half feet, and that area will be dredged to four
16 and a half feet. In orange will go to five and a half
17 feet below sediment surface.
18 This is the final cleanup. You can see the
19 dredge will be placed on the lake where sediments will be
20 removal by pumps or other means, and it will be conveyed
21 from here to -- by a pipeline to the staging area where
22 it will be dewatered and the water will be restored back
23 to the lake and the dewatered sediments will be taken
24 offsite.
25 These are stone columns that will be

1 installed by Caltrans to stabilize the roadway because
2 the dredging near the roadway may impact or will affect
3 the stability of the road, and the details of this will
4 be discussed by Caltrans next.
5 These are the possible routes that will be
6 used by the trucks that will be going in and out of the
7 staging area.
8 This is Mountain Lake. This is the staging
9 area here. There are two possible routes that will be
10 used from the staging area. One is through West Pacific
11 to Arguello and then to Lombard to Highway 101 or it
12 could follow Washington, Park to Lincoln and to Highway
13 101 or it could follow Washington all the way to Lincoln
14 to Highway 101.
15 The other route is from staging area to a
16 road under the Park Presidio Boulevard, to make a sharp
17 turn to Park boulevard extension and it will take the
18 same route as the first one here.
19 There is also -- there's also an
20 alternative of the starting with on and off-ramp from
21 Highway 1, as this is showing you, where so the trucks
22 can directly go to Highway 1, but it may not be possible
23 to do that because a lot of tanks will be -- to use
24 Highway 1, there will be a lot of traffic obstruction.
25 The department has followed the impacts of

1 the proposed project to the environment, and we have
2 prepared an initial study in compliance with the
3 California Environmental Quality Act.
4 And the findings -- our findings indicate
5 that although the project will be minor and short-term
6 impacts, the project will have no significant
7 environmental impact to the environment.
8 In fact, it will improve -- it will make a
9 healthier lake than before.
10 So we prepared a declaration that is also
11 available for public comments.
12 This is the project schedule. We are
13 currently on the 45-day comment period by which started
14 March 19th and it will end on May 3, and we are
15 anticipating completing the Remedial Action Plan or
16 finalizing the Remedial Action Plan and the CEQA document
17 in down and the final will follow in July.
18 Caltrans will be initiated in June or July
19 after all the preparation is needed for the cleanup with
20 constructing the staging area and the access ramps.
21 The actual remediation will not happen till
22 next year, early next year, but the Trust is trying to
23 expedite the schedule to be able to do the work this
24 year, and there are additional work on the lake that will
25 be conducted to restore part of our cleanup project.

1 And the next talk is about Caltrans work,
2 and Jun.
3 MR. KANG: Good evening. My name is Jun.
4 I'm the project manager with Caltrans. We're going to be
5 performing stabilization of Highway 1.
6 Because the dredging was chosen as the
7 alternative to remediate the lake, when you dredge
8 near -- near the toe of the embankment underwater, it
9 might undermine the stability of the embankment, which
10 means might undermine the structure of the roadway.
11 So what we are proposing to do is to
12 install some of the stone columns. The next slide will
13 show you some layouts to stabilize the road prior to
14 dredging operations to begin or come close to the
15 highway.
16 And also we are -- part of the project,
17 we're installing filters in storm drains to make sure
18 that none of the contaminants from the roadway will flow
19 into the lake.
20 Next slide.
21 This is a layout of the stone columns.
22 This is not a solid stone column driven into the ground,
23 but it is an aggregate. Let's go back to the -- here.
24 So we are installing about four -- 400
25 stone columns, 400 plus stone columns two foot in

1 diameter and six feet apart in three rows. It's about a
2 thousand feet along the lake and probably a hundred feet
3 above and a hundred feet below.
4 Next slide, please.
5 So this is one of the kind of show you what
6 the stone column installation is about. This is one type
7 that is shown here. We will -- we will pre-drill about
8 seven feet at the top and drive the shaft into the ground
9 forty -- 35 foot to 45 feet and then we'll put rocks
10 through the shoot. As we pull up about three feet and we
11 will dynamically compact.
12 So what it does is it compacts the rocks
13 inside the hole, expanding the -- the volume to compact
14 the entire area.
15 So from the tip to the -- about seven feet
16 below the ground, we'll be dynamically compacting. From
17 seven feet to the top we'll be statically compacting.
18 And this will basically compact the soils
19 around it making this entire embankment very stable.
20 We have about nineteen storm drains along
21 the highway that ultimately leads to the lake. The whole
22 reason of doing a remediation work is so that we won't
23 have the contamination again.
24 So we will be installing filters on those
25 drains which can be serviced every six months to make

1 sure that no contaminants will be flowing into the lake.
2 Next slide.
3 Next.
4 MS. MAJHAIL: Now the question is how can
5 you participate. You can participate by submitting your
6 verbal comment tonight. This is a mic that we've pet up
7 there.
8 You can come up, say your name aloud and
9 clear so that the -- the reporter catches and records it
10 correctly and say your comment.
11 If you want us to read your comment, you
12 can write your comment on the comment card in the back
13 and you can send it out here.
14 You can also send your written comments to
15 us before May 3rd. May 3rd is the end of the public
16 comment period. So your comments should be -- be
17 postmarked no later than May 3rd.
18 AUDIENCE PARTICIPANT: Is there a time
19 that we can ask questions about some of the information
20 that was presented tonight?
21 MS. MAJHAIL: Yes.
22 AUDIENCE PARTICIPANT: Thank you.
23 MS. MAJHAIL: You can submit your
24 comments, the written comments. And the contact
25 information is also on the plan, the proposed plan that

1 was mailed. The information is also on that handout, as
2 well.
3 This is a 45-day comment public comment,
4 and as I said, it ends on May 3rd. After May 3rd, we
5 will be preparing our response to comments document and
6 we will be sending the copies to the people who commented
7 and also putting it in the information repositories.
8 We have the Presidio library, the Trust
9 library here as one of the -- as one of the information
10 repositories and we also have the repository in the DTSC
11 office in Berkeley area, as well.
12 You can also find this information online,
13 the Presidio Trust database, DTSC database or you can go
14 to the Trust database, as well.
15 So at this time we would like to receive
16 your public comments. These are recorded public records
17 and we will not be responding to them at this moment.
18 So if you have your questions, hold on to
19 the questions right now, but feel free to submit your
20 comment that we can get recorded.
21 Yes.
22 AUDIENCE PARTICIPANT: Will there be
23 allowance further public comment after we're allowed to
24 ask the questions? Because the questions might give
25 rise --

1 MS. MAJHAIL: You can submit the written
2 comments till May 3rd. Yes. You can submit your
3 comments. You can e-mail them to us or write them and
4 mail it. Either way.
5 Do you have a comment?
6 MS. KNIGHT: Well, I would like to know
7 the contractor.
8 MS. MAJHAIL: Can you come up and state
9 your name so we can have that recorded?
10 MS. KNIGHT: My name is Audrey Knight, and
11 I would like to know who the prime contractors are and
12 how we can get in contact with them.
13 MS. MAJHAIL: Okay.
14 MR. SHRIEVE: I have --
15 MS. MAJHAIL: Your name?
16 MR. SHRIEVE: My name is Richard Shreve.
17 I live in the neighborhood. I have a couple of concerns.
18 First of all, your proposed plan does not
19 say definitively which route you plan to use to take the
20 dredged material away, and we've been concerned that that
21 ought to be by this time decided.
22 Secondly, Jun, this is for you. This is
23 just a technical question. Have you used this technique
24 before of shoring up?
25 MR. KANG: Yes, we have.

1 MR. SHRIEVE: How long does it take to
2 complete one of those 400?
3 MR. KANG: Is it okay to answer that
4 question?
5 MS. MAJHAIL: Yes.
6 MR. KANG: The timeline is we are going to
7 start construction in mid-June. It takes ninety working
8 days, not to just install the storm column, but other
9 works on sop top of that, as well.
10 We bring it all the way up to mid-October,
11 close to November. It will be done by then.
12 MR. SHRIEVE: And then the second concern
13 I have is that the plan that Caltrans has submitted thus
14 far only deals with filtering runoff water.
15 It doesn't deal with the final runoff of
16 the runoff water into the City sewer and storm drainage
17 system, which seems to me to be the logical ultimate step
18 for this, and I would like to see that resolved in the
19 timeline, too.
20 MR. KANG: The second project is coming,
21 as well, but that's not open for discussion here.
22 MR. SHRIEVE: That's in the works.
23 MR. KANG: I will talk to you outside.
24 MS. MAJHAIL: Okay. Next comment, please.
25 Thank you.

1 MR. KERN: Hello. My name is Doug Kern.
2 I've been working on this project with many of the
3 participants here since 1994, so eighteen years working
4 on Mountain Lake, and I want to thank DTSC and the Trust
5 and Caltrans for their many years of work on this.
6 I very much am in support of the
7 alternative, the excavation alternative. In fact, I do
8 feel that Mountain Lake is a little bit like a landfill,
9 kind of a landfill underwater, and there have been years
10 of these different sediments filling the lake, and as I
11 think was mentioned early in the slide, there were
12 pesticides and metals found in the lake, and I note in
13 the data part of the report that many of these metals
14 were found in the drop inlets where the roadway runoff
15 would come into the lake.
16 I also note that for -- since the beginning
17 of -- of all this investigation, we've noted that
18 pesticides were a part of the contaminants that were
19 clearly coming from the -- the golfcourse.
20 So in a risk assessment, it appears that
21 through a process of statistical analysis, the remaining
22 contaminants are now lead and motor oil, and I also note
23 in the document that DTSC has requested that cadmium and
24 antimony be tested for.
25 So the relevance of these after all the

1 statistics are done is only lead, motor oil, cadmium and
2 antimony will be tested for in the information sampling.
3 Well, as many of you may know, aquatic
4 species are really susceptible to things like pesticides.
5 In fact, we're hearing all over the world that pesticide
6 use may be contributing to the deformities in frogs due
7 to the estrogen receptor-like characteristics of
8 pesticide.
9 So what I -- and I also notice that copper
10 is very toxic to aquatic organisms.
11 So my recommendation for the department is
12 in the confirmation sampling, to sample for all the
13 metals and a sample for pesticides, as well.
14 And that way, we'll know if the lake is
15 really clean after all this work.
16 Caltrans is doing all this stone work. I
17 mean, it's got to be millions of dollars, and then all of
18 this excavation, we should really test for a lot of these
19 chemicals at the end of the day to make sure we've gotten
20 them and not just rely on that we think we will have
21 gotten them.
22 I mean, we can't know unless we actually
23 test for them.
24 So I'd like to encourage others. You may
25 not realize that from the presentation. You may not have

1 read the document, but I'd like you to also encourage the
2 department to test for full suite of metals and for
3 pesticides in the confirmation sampling to make sure we
4 have a clean lake at the end of the day.
5 Thanks very much.
6 MS. MAJHAIL: Thank you.
7 MR. BERMAN: My name is Sam Berman. I am
8 a member of the Restoration Advisory Board and have been
9 a member since 1997, and I want to thank DTSC.
10 I agree with what Doug said. The choice of
11 the cleanup option I think is an excellent choice, and I
12 hope that DTSC will follow the comments that Doug made
13 about the other contaminants not included in the COCs.
14 I have a particular request. I'm just
15 going to read the e-mail and letter that I am sending
16 to -- to Remedios, and it says the following: The
17 subject is the possibility of long-term acoustic
18 amplifications. I'll just read a couple sentences and
19 that's all. It won't take too much time.
20 "To provide adequate stabilization and
21 protection for the Highway 1 and the tunnel adjacent to
22 Mountain Lake, it is my understanding that Caltrans would
23 then place a series of over 400 stone-built columns of
24 depth fifty to sixty feet to accomplish the required
25 stabilization.

1 "It is also my understanding that the stone
2 will be compacted, but not permanently held together with
3 adhesive or concrete.
4 "My concern is about the possibility of
5 permanent acoustic conductions and possible sound
6 amplifications that could occur as a result of these
7 columns interacting with other sources of constant noise,
8 such as roadbed and tunnel vibration, as well as
9 collective sounds from motor vehicles moving within the
10 tunnel.
11 Since noise is a matter of concern for CEQA
12 compliance, and I ask that you examine this potential
13 acoustic issue to assure that there will not be a noise
14 penalty permanently affecting those living in the
15 vicinity of the remediated Mountain Lake.
16 "Thank you for your attention to this
17 comment."
18 MS. MAJHAIL: Thank you very much.
19 MR. EPSTEIN: My name is Paul Epstein. I
20 am a neighbor and have been part of the Friends of
21 Mountain Lake Park for in excess of twenty years at this
22 point.
23 I just have a couple of comments, and some
24 of them are really directed to Caltrans.
25 The -- I'm just curious about the

1 construction of the system which is going to attempt to
2 catch the runoff.
3 Obviously there's runoff on both sides of
4 the road, and there's also runoff that begins in the
5 tunnel area, and that's uphill from the lake.
6 So that there's going to be a flow from the
7 roadway, and I'm just wondering how extensive the
8 planning has been to catch all of this.
9 It's not just a question of the immediate
10 area next to the lake itself, but the whole stretch of
11 the lake from the top of the tunnel down to approaching
12 Lake Street.
13 With regard to the roadway, I have two
14 suggestions, comments, please, and those have to do with
15 two aspects of the road itself.
16 Even in its current condition, it's noisy,
17 and if one is in the park, there's the constant hum of
18 tires on the pavement, and I would suggest that as part
19 of the remediation over the roadway that Caltrans repave
20 the roadway with a material which is more sound absorbent
21 than the material that's there now, which is mostly
22 concrete, as I recall.
23 Another source of noise into the park is
24 the retaining wall on west side of the highway, which
25 just acts as a -- a reflector of all road noise back into

1 the park area, and I'm sure Caltrans has faced that
2 problem in many areas other places, and some sort of
3 coating -- I don't know technically what the term is
4 even, but that wall could be coated with something to
5 break up the sound instead of having it just reverberate
6 back into the park.
7 I am somewhat concerned about the artistic
8 treatment that what the documents are calling the east
9 arm of the lake is, and I note that the two handouts that
10 we got, the program and then the multi-colored piece have
11 different lakes.
12 The plan's different as to -- if you
13 actually compare the size of what is going to be dredged
14 and what is going to be not dredged -- and I don't see
15 much of an effort towards the east arm, and the problem,
16 of course, is that there is reportedly some sort of
17 conduit under the road there, but I think it's not
18 functioning very well, and the east arm forms its own
19 little lake containing golf course runoff and also
20 becomes a mosquito breeding ground because the water
21 doesn't go anywhere.
22 So I would urge, to the extent it's
23 possible, that the east arm be given a higher priority in
24 the project and that the dredging go further east than
25 appears to be on -- on the map.

1 That all said, I'm very pleased to see this
2 plan happening, and we all look forward to a clean lake.
3 Thank you.
4 MS. MAJHAIL: Thank you.
5 MS. JOHNS: My name is Eleanor Johns. I'm
6 also a neighbor and long-time user of Mountain Lake Park,
7 and I'm very pleased that this project is finally coming
8 to fruition.
9 My concern -- some of them have already
10 been mentioned, but I'd like to reiterate what my
11 personal concerns are.
12 There were three different routes mentioned
13 for removing the contaminated soil once it was dewatered.
14 I am very, very much opposed to having this removed by
15 building temporary on- and off-ramps.
16 I think it is a complete waste of money,
17 and in coming to two or three of the previous meetings, I
18 did ask the question about how much that would cost and I
19 never did get an answer, and I think at this stage of the
20 game, it seems rather late to start thinking about
21 building temporary on- and off-ramps. So I'm hoping that
22 that will not be one of the choices.
23 It seems to me that it alone will be four
24 or five, six months, and it may be painful for those
25 folks that live near the park, but I'm hoping that some

1 internal route in the park will be chosen.
2 In tonight's presentation from Caltrans, I heard
3 that there were nineteen storm drains, and this is the
4 very first time I heard that.
5 In previous meetings, I've only heard --
6 and I personally only observed three storm drains that
7 are visible.
8 So I don't know what these nineteen storm
9 drains are, and I am concerned, as other folks have
10 mentioned, about the filtration system that will be a
11 temporary process for filtering out future runoff, and I
12 do hope that there will be some realistic approach and
13 follow-up to that filtration system that will have money
14 available to make it actually happen.
15 And my third concern has to do with the
16 overall level of the lake that we end up with and how
17 that interacts with what another neighbor mentioned,
18 which is the east arm project.
19 My understanding is that the east arm is
20 not part of the dredging, but, in fact, will be part of
21 the restoration of the lake, and although -- well, we
22 have had some workshops on this and have had a bit of
23 information to instruct us about what will happen.
24 I do happen to know that there is one
25 million dollars coming from the San Francisco

1 International Airport to help restore the wetlands in
2 that east arm area, but I don't understand the hydrology
3 yet and what's being worked out and how that restoration
4 will work into the final lake bed that we end up with and
5 whether we will have a water flow from the west arm into
6 the lake that will lessen the mosquito problem.
7 And we keep being told that this will be
8 part of the restoration, but it seems to me that there
9 has to be some planning ahead so that we don't get into
10 the dredging and then end up with a problem that we can't
11 counteract. So basically all of that hydrology in the
12 lake level.
13 So those are my concerns, and I hope
14 they'll be addressed.
15 Thank you.
16 MS. COYLE: I did just want to respond to
17 your question on the nineteen storm drains. I just want
18 to clarify. That was misspoken when we said nineteen.
19 There are, in fact, three storm drains that
20 feed the runoff into the lake. There are, I believe,
21 sixteen drop inlets along the highway. They are funneled
22 into three storm drains.
23 So when he said nineteen, I think he said
24 sixteen, and they're actually the breaks where the water
25 runs in. They're collected into three storm drains.

1 MR. KANG: Storm drains and inlets are a
2 little different. I misspoke, but there are nineteen
3 open.
4 MS. JOHNS: But they all go to the lake?
5 MR. KANG: All go to the lake. We are
6 putting filters in every one of them to ensure nothing is
7 going to fall into the lake.
8 MS. JOHNS: But two other folks said we're
9 concerned about what happens beyond those filters which
10 we're told are just a temporary fix. So that's another
11 comment.
12 Thank you.
13 MS. MAJHAIL: Thank you.
14 MS. STEFANI: My name Catherine Stefani.
15 I'm a legislative aid for Supervisor Mark Ferrell. He
16 couldn't be here; he had another meeting.
17 I just want to thank the Presidio, Caltrans
18 for moving this forward. I think this is a time that we
19 never thought that we'd see this happen. Thank you,
20 thank you for all your hard work.
21 We do want to reiterate that there are
22 concerns about the number of routes and trips and noise
23 to be taken into consideration, including what Eleanor
24 Johns just mentioned, whether or not we should be
25 building temporary on-ramps or not.

1 Also -- and then whether or not we are
2 going to make sure that the beach area is cleaned up and
3 restored to before the dredging began.
4 Also, I didn't hear anything about
5 coordinating with the Recreation and Park Department. I
6 know in the 2008 bond -- I might have missed that. The
7 2008 bond, there -- there is going to be a restroom
8 renovation, and that should be beginning I think in the
9 fall.
10 Also, there's going to be 2012 bond on the
11 November ballot and Mountain Lake, I'm happy to announce,
12 is set to receive two million dollars for playground
13 restoration and restoration for the park.
14 So I really think that it's very good news
15 and I'm happy to announce that tonight. I just want to
16 make sure that we're coordinating with all the agencies
17 possible as we dredge and as we perform all of the other
18 tasks in the park.
19 Thank you very much.
20 MS. MAJHAIL: Thank you.
21 MR. MACCABEE: Hi. My name is John
22 Maccabee. I'm a neighbor, as well.
23 I have two comments. One has to do with
24 when the lake is finally restored. Is there a baseline
25 of what it is meant to support, what kind of aquatic

1 life, bird life, which I think addresses your question,
2 also, about was -- is there pesticide runoff and how is
3 it being removed?
4 Then the other thing that I wonder about is
5 we're supposing that whatever sediments's are taken out
6 are toxic in some way.
7 Does part of your plan include where is
8 that stuff all going to be going? And that's a concern.
9 MS. MAJHAIL: Thank you.
10 MS. DONG: My name's Vanh Dong, a neighbor
11 and also park user for the last thirty years.
12 I am really glad we're going to see there this in our
13 lifetime, we hope.
14 I want to follow up on two items, the east
15 lake coming down from the golfcourse and the current
16 concern about other pesticides and other contaminants.
17 I think doing the study now is if nothing
18 else baseline that we would be compared, so it is the
19 baseline for future -- future work if necessary, but I
20 don't understand if you don't dredge or do something to
21 that east arm why all the sediment and all the drain from
22 the golfcourse, which is draining to that area, won't
23 then somehow overflow and go into the Mountain Lake in
24 the established area where it is now.
25 So I'd like to know how that is going

1 mediated and also the analysis of that.

2 MS. MAJHAIL: Thank you.

3 MR. SHEPARD: My name is Bill Shepard,

4 Chairman of the Neighborhood Association Planning and we

5 hope to submit a formal detailed comment before the

6 deadline, but I want to reiterate concerns of the prior

7 speaker tonight, and that is that the noise emanating

8 from the road surface and the concrete wall on the west

9 side of Park Presidio Boulevard.

10 Part of this project, in order to stabilize

11 the west embankment of the lake, resulted in removal of a

12 lot of vegetation and trees, and as a result of that, the

13 side-effect of that is this increased noise level along

14 with -- if these trees were there or not, it would be a

15 loud area, and we certainly expect to have --

16 particularly we're shoring up the northbound lanes of the

17 roadway.

18 That should be replaced with a quiet

19 surface and while we're at it, the entire highway.

20 Another concern that NAP has is the truck

21 hauling protocol. I recall hearing somewhere that the

22 trucks may be -- may operate in a convoy fashion, and we

23 are requesting that all the trucks proceed in convoys or

24 in close -- in a group led by a pilot vehicle or lead

25 vehicle, that they maintain a speed under 5 miles an hour

1 on West Pacific Avenue, because they're coming so close
2 to the homes there and that roadway is not a terribly
3 well constructed surface as it is.
4 And we would ask the -- this idea of a
5 convoy and the pilot vehicle continue on through the park
6 till it exits either on to Lombard Street or on some --
7 some rotating the material out of the park.
8 Certainly not at 5 miles on hour. We don't
9 want to create traffic problems, but now we have noted in
10 the past with park projects that when you're dealing with
11 contractors providing services to the park, oftentimes
12 the truck drivers don't follow with the protocol and
13 they'll use different entrances and different exits. And
14 varying speeds, not responsible speeds.
15 So for that reason, we would like the
16 concept of a convoy with a lead vehicle escorting the
17 trucks both in and out of the park to the extent that
18 it's financially feasible.
19 That's it. Thank you.
20 MS. MAJHAIL: Thank you very much.
21 MS. BLUM: My name is Jan Blum. I'm a
22 member of the Restoration Advisory Board. I want that
23 thank you for holding this meeting.
24 I support your alternative. I do have a
25 couple of questions I'd like to ask or statements to

1 make, and that is I would like to see a -- something on
2 paper that defines your filtration monitoring system on
3 the storm water, especially during storm events.
4 That's when we want to make sure that we
5 don't have that same old problem going back into the
6 lake.
7 So I would like to see something spelled
8 out for us on exactly how the filters will be changed, at
9 what frequency, and especially during storm events, how
10 will it be monitored.
11 And I would also certainly like to support
12 the comments of Doug Kern and Sam Berman on testing for
13 full suite of pollutants, not just the limited suite that
14 you have discussed.
15 Thank you.
16 MS. MAJHAIL: Thank you very much.
17 MR. FRIAS: My name is Larry Frias. I
18 work with Waste Solutions Group and San Francisco Bay
19 Railroad on Market.
20 My question to the DTSC is during
21 implementation of the trucks for dispose to contaminated
22 waste, are you -- do you have any consideration in the
23 environmental aspects of the transportation?
24 And I'm asking it, do you allow too many
25 truckers in the neighborhood, like seventy truckers a

1 day?

2 Because what it is, we maintain few hours

3 of progress for the community in San Francisco, and from

4 the Hunters Point district and they haul the waste from

5 the Presidio to the railyard and we do it by rail, which

6 is less consuming in terms of fuel consumption.

7 That's my question regarding environmental

8 effect of the local trucking, because we don't believe in

9 local trucking. We want least consumption of fuel.

10 That's why we maintain the rail system.

11 MS. MAJHAIL: Thank you very much.

12 Any more comments? Yes.

13 MR. REIDY: Hi. My name is Liam Reidy.

14 I'm an environmental geographer in the Department of

15 Geography at UC Berkeley.

16 I'm the one who was waving a red flag about

17 this issue about lead at the bottom of the lake. I'm the

18 guy with the lead with a bee in his bonnet about the lead

19 at the bottom of the lake.

20 The project has come a tremendously long

21 way in the time that I got involved back in 1999 taking

22 the initial sediment cores, and I think it would have

23 been helpful to show some of the stratigraphic analyses

24 that have been undertaken in the past to make it clear

25 that the meter for the most part where the contaminants

1 are.

2 Again, I spoke very briefly at last month's

3 meeting, and I'm here from a completely scientific point

4 of view. I have been opposed to just taking sediment

5 cores, but to make sure that we get full samples to

6 really get out the environmental history of the area over

7 the last 2,000 years.

8 Now I did make the proposal to the Presidio

9 Trust archeology folks. Now the one thing is, the big

10 problem, of course, is money. The amount of money that

11 it would cost to recover all these cores that would be

12 placed in the core in Minnesota, the national core, the

13 core repository, plus with all the initial analysis on

14 the cores, we're talking lowball figure, probably less

15 than $20,000. We're talking about less than .00002

16 percent for the total budget of this project.

17 Now, I did speak with the archeology folks

18 again this past week end and they told me that it's an

19 issue of funding.

20 I think that a project of this magnitude,

21 if you can't find $20,000 to reserve the record and the

22 National Core Repository of the recovery of the cores and

23 put them in Minnesota where a UC-Berkeley team of

24 paleontologists can get at them, I think that would be

25 kind of a sad day for somebody like myself that would be

1 interested in the environmental history of the area.
2 Other than that, I'd like to see the right
3 thing is being done at the end of the day. I believe
4 it's all coming together.
5 I think what the local people need to have
6 is a little bit more patience for the next six, twelve
7 months and the Presidio Trust see this through with DTSC
8 and we'll have a very functional lake going forward, and
9 just somebody had a question what are we getting once we
10 dredge the lake.
11 I don't way to see that we're destroying
12 the environmental record at the bottom of the lake. But
13 the lake itself, the depth of the lake or the swan song
14 of the lake will be pushed forward into the future.
15 About 1,500 to 2,000 years from now, there
16 will be probably people here in the area hopefully
17 dealing with the same issue about the sedimentation, the
18 infilling of the lake and most of that will be the
19 dredging of the contaminants that's being removed will be
20 organic material, pollen, leaves, dead insects.
21 Again the lake will -- has gone to Gatorade
22 green. I have the pictures from the year 2000 to the
23 present. Very clear water, and again, these improvements
24 and these efforts by the Presidio Trust and others have
25 really and truly turned the ship around and it's now

1 pointing in the right direction.
2 Thank you.
3 MS. MAJHAIL: Thank you.
4 Any more comments? Yes.
5 MR. BERMAN: I'm Sam Berman. This is just
6 a comment. I want to thank Liam, our last speaker,
7 because if it wasn't for his work, probably the whole
8 remediation project would never have been started,
9 because the Army declared that nothing needed to be done
10 with the lake, and it was his work that discovered the
11 lake, and I think you should add that to your collection
12 of slides and give him the proper recognition.
13 MS. MAJHAIL: Thank you.
14 (Applause).
15 Any more comments? Yes.
16 AUDIENCE PARTICIPANT: I have a question.
17 MS. MAJHAIL: If there are no more
18 comments, we can have the question time. We will be
19 around here and you can ask the questions. All the team
20 is here. Feel free to ask the questions.
21 If there are no more comments, then I would
22 like to adjourn the meeting here, and just to let you
23 know that the previous meetings that we had, we looked to
24 the committee members with our concerns regarding
25 questions, regarding implementation.

1 So we are planning another workshop during
2 the design -- somewhere during the design and
3 implementation phase with the community so we can provide
4 some more information on that.
5 So with that, I adjourn the meeting for
6 tonight. Thank you very much for coming. Yes.
7 AUDIENCE PARTICIPANT: How will you
8 announce the dates for the future workshop?
9 MS. MAJHAIL: We have not -- we don't know
10 yet. We'll probably be sending out again -- make sure
11 you be on our mailing list so we can send out the
12 invitation via e-mail.
13 Thank you very much. Thank you for coming
14 out tonight for the meeting. Thank you very much.
15 (The meeting concluded at 7:41 PM).
16 ---o0o---
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25

1 STATE OF CALIFORNIA )
2 COUNTY OF SAN FRANCISCO )
3
4 I, the undersigned, hereby certify that the
discussion in the foregoing meeting was taken at the
5 time and place therein stated; that the foregoing is a
6 full, true and complete record of said matter.
7
8 I further certify that I am not of counsel or
attorney for either or any of the parties in the
9 foregoing meeting and caption named, or in any way
10 interested in the outcome of the cause named in said
11 action.
12
13
14 IN WITNESS WHEREOF, I have
15 hereunto set my hand this
16 _____day of _____,
17 2012.
18 _____
19 MARK I. BRICKMAN CSR 5527
20
21
22
23
24
25

# Attachment D
# Concentrations of Chromium, Nickel, and Vanadium in Deeper Sediments

# Concentrations of Chromium, Nickel, and Vanadium in Deeper Sediment

| Sample Number | Source | Chromium (mg/kg) | Nickel (mg/kg) | Vanadium (mg/kg) |
|---|---|---|---|---|
| MLSE 1(7) | URS, 2001 | 110 | 110 | 70 |
| MLSE 1(9) | URS, 2001 | 53 | 25 | 43 |
| MLSE 2(8) | URS, 2001 | 110 | 120 | 78 |
| MLSE 3(7) | URS, 2001 | 190 | 210 | 140 |
| MLSE 3(9) | URS, 2001 | 110 | 120 | 76 |
| MLSE 6(8) | URS, 2001 | 190 | 200 | 110 |
| MLSE 7(7) | URS, 2001 | 110 | 120 | 84 |
| MLSE 7(9) | URS, 2001 | 80 | 88 | 57 |
| MLSE 8(7) | URS, 2001 | 44 | 26 | 37 |
| MLSE 8(9) | URS, 2001 | 48 | 26 | 41 |
| MLSE 9(8) | URS, 2001 | 82 | 90 | 68 |
| MLSE 12(8) | URS, 2001 | 60 | 33 | 56 |
| MLSE 13(8) | URS, 2001 | 100 | 110 | 73 |
| MLSE 14(8) | URS, 2001 | 94 | 97 | 73 |
| MLSE 21(7) | URS, 2005 | 26 | 21 | 23 |
| **Samples Collected at Depths Greater than Six Feet** | | | | |
| | Minimum | 26 | 21 | 23 |
| | Maximum | 190 | 210 | 140 |
| | Average | 94 | 93 | 69 |
| **Baseline Samples Collected at Depths Less than Three Feet** | | | | |
| | Minimum | 25 | 12 | 13 |
| | Maximum | 280 | 290 | 190 |
| | Average | 92 | 89 | 56 |
| **Freshwater Sediment Cleanup Levels**[(a)] | | | | |
| | Serpentine | 1,700 | 4,500 | 74 |
| | Colma | 140 | 110 | 90 |

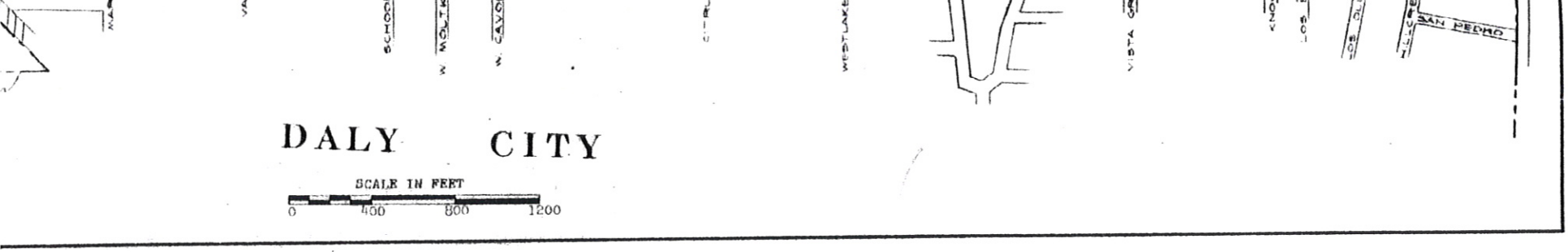
**Notes:**

(a) Cleanup levels are based upon ecological freshwater sediment criteria and background metals concentrations for the Colma and Serpentinite formations. Source is Table 7-3 and Table 7-5 from *Development of Presidio-Wide Cleanup Levels for Soil, Sediment, Groundwater and Surface Water* (EKI 2002). Colma formation and serpentinite formations are considered likely, based upon previous sediment sampling, to be encountered during sediment remediation of Mountain Lake. Other soil types, such as greenstone, are also expected to be encountered during remediation.

**Abbreviations:**

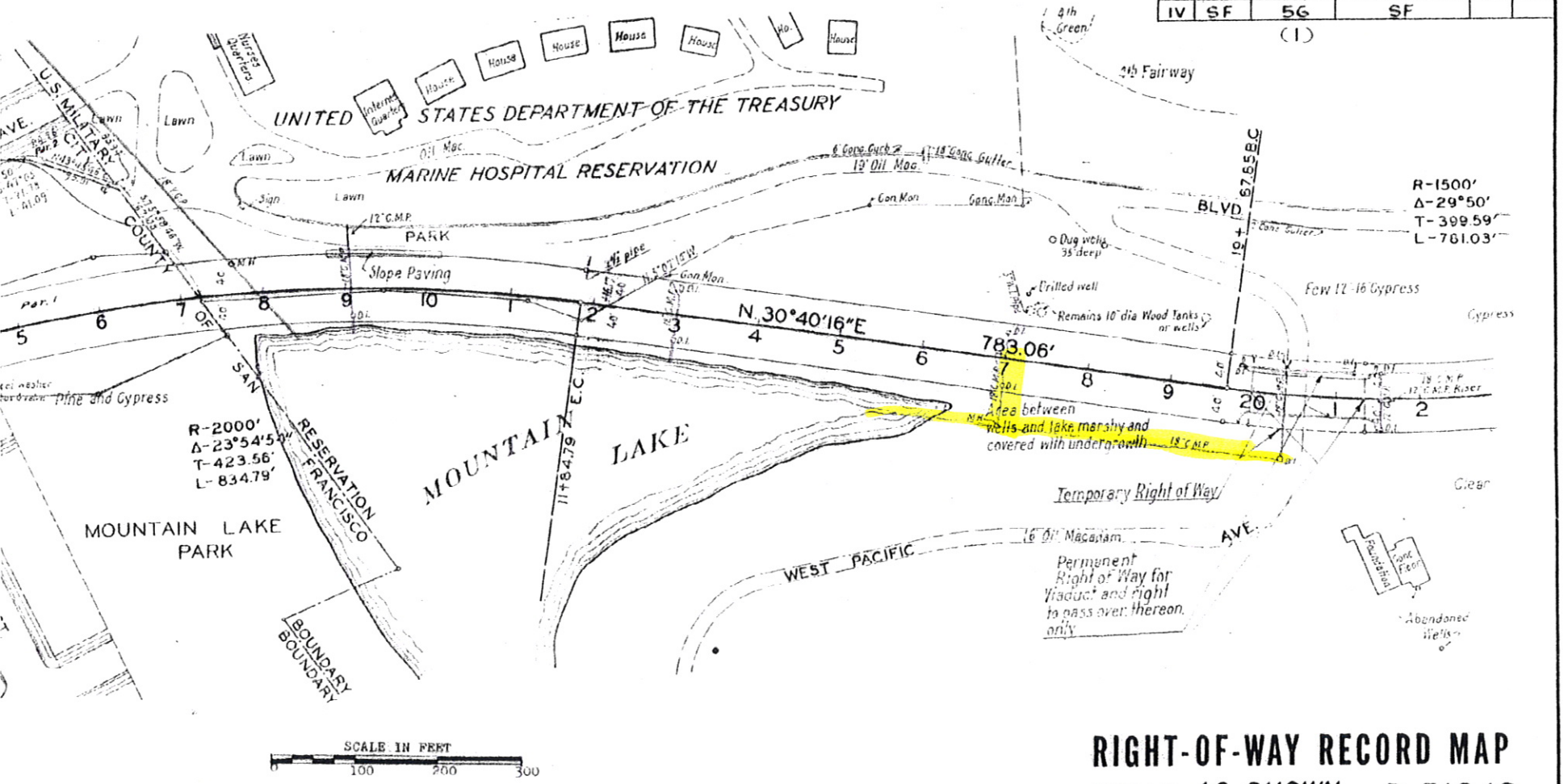
mg/kg - milligrams per kilogram

# Attachment E
# Highway 1 Storm Water System As-builts, circa 1938




| DIST. | COUNTY | ROUTE | SECTION | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|
| IV | SF | 56 | SF | | |

(1)

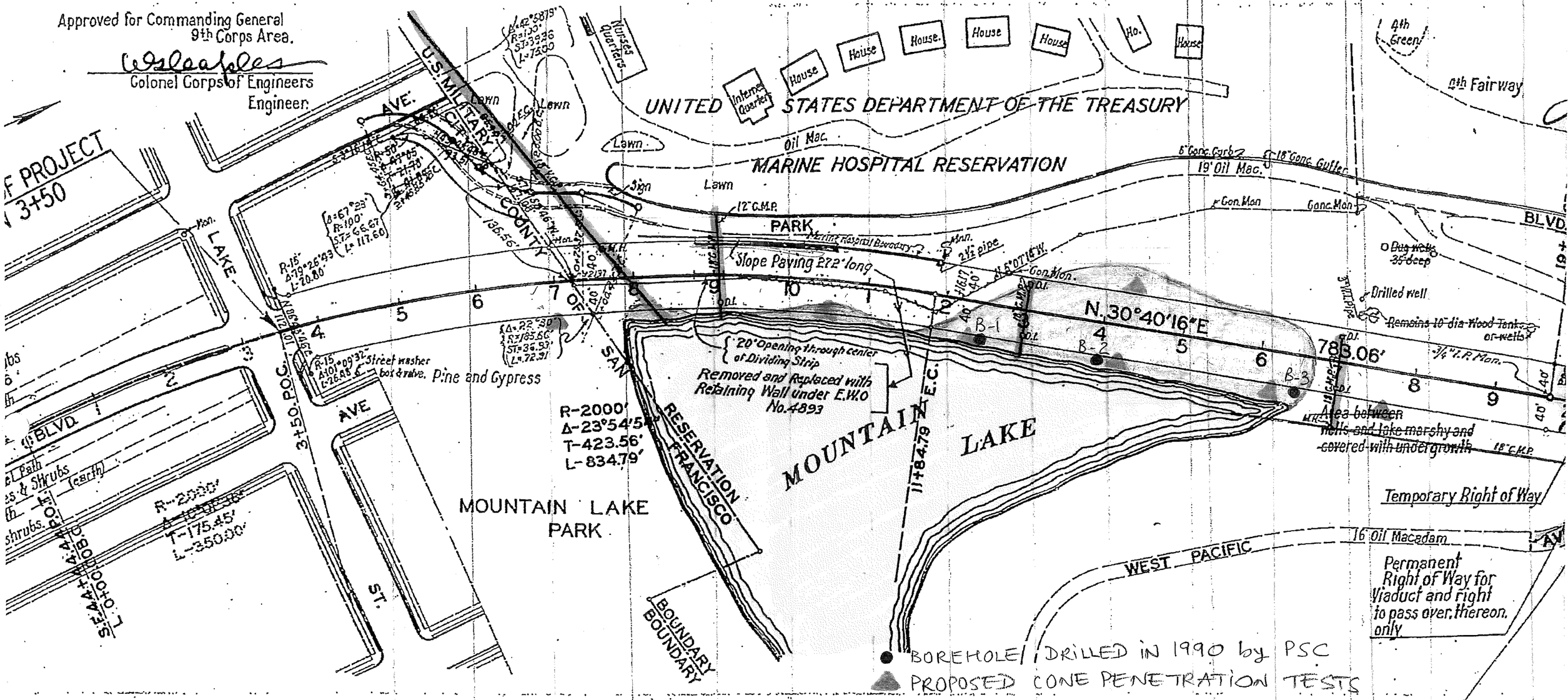



# RIGHT-OF-WAY RECORD MAP

SCALE: AS SHOWN R-510.10

R510012

(DIF 94)

PWA CAL 2013-F
Unit 5

Approved for Commanding General
9th Corps Area.
W. Sleaples
Colonel Corps of Engineers
Engineer.