Almaden Quicksilver Restoration Plan and Environmental Assessment

Final

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U.S. Fish and Wildlife Service
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California Department of Fish and Game
Office of Spill Prevention and Response

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Distribution

List of Acronyms

CalTrans	California Department of Transportation
CDFG	California Department of Fish and Game
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CD	Consent Decree
CFR	Code of Federal Regulations
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DOC	U.S. Department of Commerce
DOI	U.S. Department of the Interior
DTSC	Department of Toxic Substances Control
EA	Environmental Assessment
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
FWCA	Fish and Wildlife Coordination Act
FONSI	Finding of No Significant Impact
MOU	Memorandum of Understanding
MROSD	Midpeninsula Regional Open Space District
NCP	National Contingency Plan
NEPA	National Environmental Policy Act
NOAA Fisheries	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRD	Natural Resource Damages
NRDA	Natural Resource Damage Assessment
NWR	National Wildlife Refuge
OSPR	Office of Spill Prevention and Response
POST	Peninsula Open Space Trust
PRP	Potentially Responsible Party
REA	Resource Equivalency Analysis
RP/EA	Restoration Plan/Environmental Assessment
RWQCB	Regional Water Quality Control Board
SCDPR	Santa Clara County Department of Parks and Recreation
SCVWD	Santa Clara Valley Water District
SFBNWR	San Francisco Bay National Wildlife Refuge
SWRCB	State Water Resources Control Board
TSMP	Toxic Substances Monitoring Program
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USDA-WS	U.S. Department of Agriculture – Wildlife Services
USEPA	U.S. Environmental Protection Agency

USFDA	U.S. Food and Drug Administration
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

1.0 INTRODUCTION

1.1 Purpose

The U.S. Fish and Wildlife Service, on behalf of the Secretary of the Interior, and the California Department of Fish and Game, on behalf of the State of California, are issuing this Restoration Plan and Environmental Assessment (RP/EA) for public review. The RP/EA presents information to the public regarding the affected environment, the determination of natural resource injuries, and proposed restoration actions to compensate for natural resources injuries caused by the release of mercury within the Guadalupe River Watershed, including releases from the historic New Almaden Mining District (a portion of which is now Almaden Quicksilver County Park, Santa Clara County, California), to the Guadalupe River Watershed and south San Francisco Bay

This RP/EA is intended to comply with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, 42 USC 9611(i) for a plan, and follows the guidance in 43 CFR part 11.93. This document also is intended to meet the requirements of the National Environmental Policy Act (NEPA), 42 U.S.C. 4320-4370d; the California Environmental Quality Act (CEQA), Public Resources Code section 2100-21178.1; and their implementing regulations, to the extent that they apply. Specifically, this document is intended to meet the requirements of an Environmental Assessment under NEPA. The U.S. Fish and Wildlife Service Decision Document, which provides a Finding of No Significant Impact (FONSI) for three of five projects, is provided in Appendix A. This document is also intended to be used by appropriate lead agencies in place of the "Initial Study" requirement of CEQA.

The purpose of a restoration plan is to describe how restoration, replacement or acquisition of equivalent resources will be accomplished, based on an assessment of the natural resource injuries that occurred as the result of a release of a hazardous substance. Restoration planning is therefore the link between injury assessment and restoration. The goal of this RP/EA is to make the environment and the public whole for injuries to natural resources that resulted from releases of mercury within and to the Guadalupe River Watershed from sources of mercury, including from the New Almaden Mining District. The specific objectives of the RP/EA are to directly restore stream sediments and lotic/riparian habitat at two discrete sites of significant releases (primary restoration) and to compensate for interim lost services (compensatory restoration) by three other actions/projects. Additional environmental compliance might be required prior to actual implementation of the projects described herein.

This RP/EA proposes that restoration and/or enhancement of injured natural resources will be accomplished by implementing five restoration projects at specific locations in the Guadalupe River watershed, Coyote Creek watershed, and tidal marshes of South San Francisco Bay. This RP/EA provides a description of each of the preferred and non-preferred restoration projects, including the objectives, success criteria, monitoring, and environmental consequences of each project.

1.2 Overview/Summary of Releases

Almaden Quicksilver County Park is a 1,520-hectare (ha), undeveloped parcel situated on the northeast ridge of the Santa Cruz Mountains, approximately 19 kilometers (km) south of downtown San Jose. The Park is located in the 447 square kilometer watershed of the Guadalupe River, which drains the south central portion of the Santa Clara Valley into South San Francisco Bay via Alviso Slough (Woodward-Clyde Consultants 1992). Operations relating to the mining and/or processing of mercury ore containing the mineral cinnabar (mercury sulfide) were conducted from about 1845 to about 1971 along the Los Capitancillos Ridge, a line of hills which trend northwest-southeast across the Park. A series of mines, collectively referred to as the "New Almaden Mines", were located along the Los Capitancillos Ridge. The land was originally part of several Spanish land grants, and the mercury was first discovered in 1845 by a Mexican army officer, who also established the first mining company on the site.

The largest production occurred between 1846 and 1905 from the underground workings of the New Almaden Mine (Mine Hill Area). Because of the abundance of ore in the Mine Hill Area, other mine areas were not developed until production declined in the early 1900's. By 1917, the extensive underground ore bodies in the Mine Hill Area were largely exhausted, and only small scale operations continued until World War II. Interest in the mines was renewed by the war, and limited mining or mining related operations might have continued into the early 1970's. Mining activity during this time period primarily consisted of the reworking of formerly processed material and mining shallow ore bodies by open pit methods. The process of extracting mercury from the ore involved heating the ore to a temperature of 700 to 1,200 degrees Fahrenheit in furnaces and retorts to volatilize the mercury, and then condensing the vapor. After ore was processed, the residual materials, or calcines, were typically dumped near the process area. Calcines were also spread on unpaved roads in the Mine Hill Area as a road base material.

Santa Clara County purchased property from the New Idria Mining & Chemical Company in two transactions taking place in 1973 and 1975. The County designated this property as Almaden Quicksilver County Park, and opened the park to the public in 1975 (Santa Clara County 1995). The County subsequently acquired the Hacienda Furnace Yard area from a third party and added this area to the Park. Remedial actions were completed at five former mercury ore extraction or processing areas in Almaden Quicksilver County Park from 1998-2000 in accordance with a Remedial Action Plan developed by the County of Santa Clara Parks and Recreation Department (County) and approved by the California Department of Toxic Substances Control (DTSC), which was the lead agency responsible for overseeing efforts by the County to investigate and remediate mercury-containing waste materials which remained at the Park. The large Guadalupe Mine, however, was located outside the current park boundary and was not included in the Remedial Action Plan.

1.3 Natural Resource Trustees and Authorities

Federal statutes establish liability for natural resources damages to compensate the public for injury, destruction, and loss of federal, state, and tribal resources and their services resulting from hazardous substance releases. Natural resource trustees are authorized to act under those statutes, on behalf of the public, to assess and recover natural resource damages and to plan and implement actions to restore natural resources and resource services injured or lost as a result of

the releases. In this matter, the Trustees have pursued a claim for NRD under CERCLA (42 U.S.C. 9601 *et seq.*) and are following the guidance concerning restoration planning and implementation contained in the Department of the Interior Natural Resource Damage Assessment Regulations (*43 CFR Part 11*).

This RP/EA was developed based on a cooperative NRDA undertaken by the Trustees and a consortium of potentially responsible parties (PRPs), including the Santa Clara County Parks and Recreation Department, the Santa Clara Valley Water District, the City of San Jose, Myers Industries, Inc., Buckhorn, Inc., the Guadalupe Rubbish Disposal Company, Waste Management, Inc., and the Midpeninsula Regional Open Space District. These entities formed a working group that cooperatively evaluated natural resource injuries and identified the restoration alternatives presented in this document. A Consent Decree (CD) between the Trustees and PRPs has been executed and lodged with the Federal District Court, and, along with this draft RP/EA, is subject to public review and comment. If the RP/EA is approved and the CD entered, the PRPs will implement the five projects.

1.4 Coordination with Potentially Responsible Parties

In April, 2000, the Trustees invited the PRPs to participate in a cooperative natural resource damage assessment (NRDA). This invitation led to the development and approval of a Cooperative Agreement in September 2001, which included provisions to share and rely on previously gathered data and to acquire additional data only as agreed on by the signatories to the agreement. Under the provisions of this agreement, potential restoration projects were developed and those agreed upon have been included in this document.

1.5 Settlement of Natural Resources Claims

The United States and the State of California have entered into a proposed CD with PRPs, as discussed, that will, if entered as a judgment, resolve the claims against these PRPs asserted by both governments. The terms of the settlement are set forth in that CD, lodged with the United States District Court for the Northern District of California. (A copy is located in the Administrative Record.)

This RP/EA is an attachment to the CD, and if the CD and RP/EA are finalized, after an opportunity for public comment, will become enforceable as a court judgment. The CD and RP/EA provide for implementation of the proposed restoration projects by the PRPs, with oversight by the Trustee Agencies. The projects are listed in Table 1.

1.6 Public Participation

Public review is an integral part of the restoration planning process. The DOI NRDA regulations provide for the Natural Resource Trustees to solicit public comment on a draft RP and consider the comments during the preparation of a final RP (43 CFR 11.81[e]). In addition, public review of the RP, which also serves as an EA, is consistent with NEPA (42 U.S.C. 4321 *et seq.*) and its implementing regulations (40 CFR Parts 1500-1508). It is also consistent with the requirement of CEQA (Pub. Res. Code Sections 21000-21177.1).

Table 1. Restoration Projects and Resources Expected to Benefit

Project Name	Restoration Type	Benefited Resources
Hacienda Furnace Yard	Primary	Anadromous fish, migratory birds, amphibians
Jacques Gulch	Primary	Resident fish, migratory birds, amphibians
Coyote Creek *Arundo* Removal	Compensatory	Anadromous fish, migratory birds, amphibians
Hillsdale Bridge Fish Barrier Removal*	Compensatory	Anadromous fish
Ravenswood Marsh Predator Control	Compensatory	California Clapper Rails

* This project has already been implemented to take advantage of the mobilization to remove the Hillsdale Street Bridge. The Trustees agreed that the removal of the fish barrier would be recognized as a part of the PRP's restoration obligation.

Therefore, the Trustees seek public comment on this draft RP/EA during the public review period for the lodged consent decree. The Trustees will consider all comments submitted on the draft document, analyze the need to modify the proposed restoration alternatives; supplement, modify, or improve the analysis of alternatives; identify new alternatives; and make any factual corrections.

1.7 Administrative Record

The Natural Resource Trustees established an Administrative Record for the damage assessment and restoration planning process. The record contains documents relied on by the Trustees in assessing and quantifying injuries to natural resources and identifying, evaluating, selecting, and implementing restoration projects. This record will include comments received during the public review period for the draft RP/EA. Appendix B is a list of the documents contained in the Administrative Record. The Administrative Record can be viewed at:

- U.S. Fish and Wildlife Service
  Sacramento Fish and Wildlife Office
  2800 Cottage Way, Room W-2605
  Sacramento, CA 95825
  (916) 414-6600

- Santa Clara County
  Department of Parks and Recreation
  298 Garden Hill Drive
  Los Gatos, CA 95032

2.0 THE AFFECTED ENVIRONMENT

This section describes the physical environment, biological resources, federal and state endangered and/or threatened species, and protected areas affected, or within the area affected by, mercury releases, including releases from the New Almaden Mining District. The description of these resources focuses primarily on the natural resources and services that are relevant to the discussion of alleged injuries and restoration projects presented in this document.

The physical environment addressed in this section includes the major tributaries to, and the mainstem of, the Guadalupe River, and tidal wetlands of the Guadalupe River estuary, with their associated wildlife habitat. The biological resources section describes a variety of aquatic wildlife, such as fish and amphibians, and terrestrial wildlife dependent on the aquatic food web, such as piscivorous birds.

The area affected by mercury releases potentially includes portions of the Don Edwards San Francisco Bay National Wildlife Refuge.

2.1 Physical Environment

The New Almaden Mining District is located in the Leeward Hills Ecological Subsection of the Central California Coast Ecological Section (USFS 1998), on the eastern slopes of the Santa Cruz Mountains. The topography of the District reflects the dominant northwesterly trend of the bedrock structures, so that the main ridges and valleys tend northwestward. However, in the northern part of the district the alluvium filling the southern part of the Santa Clara Valley, which slopes northward to San Francisco Bay, has overlapped the bases of the mountain ridges. The alluvium nearly everywhere separates the northern-most of the three principal ridges in the district from the other two, and alluvial tongues extend up some of the valleys in the next ridge to the south. The other two main ridges are less distinctly separated, because the longitudinal valleys between them lie above the general slope of the Santa Clara Valley and are therefore sharply incised and devoid of filling.

The northern-most ridge, the Santa Teresa Hills, emerges from the alluvium at an altitude of about 60 meters in its western end and attains a maximum height of 350 meters at Coyote Peak near the eastern edge of the District. The next ridge to the south, across the valley of Alamitos Creek, is of special interest because it contains all of the former highly productive mercury mines. It is know as Los Capitancillos Ridge. At its northwest end, it rises abruptly to an altitude about 244 meters, and to the southeast it rises gradually to 530 meters on Mine Hill. Farther to the southeast it is more dissected, but its higher peaks reach about the same altitude. The Los Capitancillos Ridge is sharply cut in three places by the transverse Guadalupe, Alamitos, and Llagas Creeks, which flow into Santa Clara Valley. Longitudinal tributaries of these creeks separate it from the third parallel ridge.

The third ridge, the Sierra Azul, is part of the backbone of the California Coast Range, and is considerably higher than the either of the others. It extends for several miles with altitudes only about 60 meters above or below 1,036 meters; but near the western boundary of the district, it is

breached by Los Gatos Creek, which flows at grade with the Santa Clara Valley.

The slopes of the hills vary considerably in steepness. In general, the Santa Teresa Hills are fairly subdued, the Los Capitancillos Ridge moderately rugged, and the Sierra Azul decidedly rugged. In spite of the general ruggedness, however, local flats characterize the crests of all the main ridges. Landslides, ranging in length from a few tens of meters to over a kilometer, are common topographic features on Los Capitancillos Ridge and the lower slopes of the Sierra Azul. On these same ridges in areas where no distinct slides can be recognized, there are extensive slopes of excessively rocky soil which has moved downward by creep. The canyons in these areas are V-shaped, but so charged with loose rock that they offer very limited exposures of bedrock (Bailey and Everhart 1964).

The Santa Clara Valley floor, described as the Santa Clara Valley Ecological Subsection (USFS 1998), through which the Guadalupe River flows, is highly urbanized and landscaped, and the river itself confined to a narrow corridor with levees on either side, with varying degrees of vegetative cover. The river enters South San Francisco Bay via Alviso Slough, which is bordered by approximately 7.7 square kilometers of tidal wetlands managed by the Don Edwards San Francisco Bay National Wildlife Refuge.

The climate of the district is mild, but varies somewhat by altitude. In the Santa Clara Valley, the temperature drops a little below freezing a few times each winter, and summer temperatures rarely exceed 100 degrees F. The usual daily variation in temperature, however, is rather great. Precipitation generally occurs only during the winter and spring. The precipitation in the valley, which averages about 20 inches per annum, falls almost entirely as rain (Bailey and Everhart 1964).

2.2 Biological Resources

The vegetation reflects the climatic differences due to altitude, although it is also influenced by other features such as northerly or southerly exposure, type of soil, and drainage (Bailey and Everhart 1964). Foothill woodland species are the dominant vegetation in Almaden Quicksilver County Park and surrounding areas. The predominant species include blue oak (*Quercus douglasii*), coast live oak (*Q. agrifolia*), California white oak (*Q. lobata*), canyon maple (*Acer macrophyllum*), common buckbrush (*Ceanothus cunneatus*), California laurel (*Umbellularia californica*), and poison-oak (*Rhus diversiloba*). The south-facing slopes are more xeric and have plants commonly found in the chaparral community, such as chamise (*Adenostoma fasciculatum*), toyon (*Heteromeles arbutifolia*), redberry (*Rhamnus crocea*) and buckbrush (*Ceanothus* spp.). Certain plant species such as fragrant fritillaria (*Fritillaria liliacea*) and the jewel flower (*Streptanthus albidus*), which are listed on the California Native Plant Society Watchlist, are associated with serpentine soils in the area (DTSC 1994). Riparian corridors along stream and river banks are characterized as Valley Foothill Riparian habitat, with plant species that include willows (*Salix* spp.), California sycamore (*Platanus racemosa*), Fremont cottonwood (*Populus fremontii*), and white alder (*Alnus rhombifolia*) (Mayer and Laudenslayer 1988).

The diversity of habitats within the area allows for a variety of wildlife. The most common bird

species are the red-winged blackbird (*Agelaius phoeniceus*), scrub jay (*Aphelocoma coerulescens*), robin (*Turdus migratorius*), western meadowlark (*Sturnella neglecta*), and yellow-billed magpie (*Pica nuttalli*) (DTSC 1994). Piscivorous bird species include the black-crowned night heron (*Nycticorax nycticorax*), snowy egret (*Egretta thula*), great egret (*Casmerodius albus*), great blue heron (*Ardea herodias*), green-backed heron (*Butorides striatus*), common merganser (*Mergus merganser*), and belted kingfisher (*Ceryle alcyon*) (Zeiner *et al.* 1990). Tidal areas of the drainage are used by numerous shorebirds and the California clapper rail (*Rallus longirostris obsoletus*), a federally listed "endangered" species. Mammalian species present in the area include the raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), coyote (*Canis latrans*), California ground squirrel (*Spermophilus beecheyi*), cottontail rabbit (*Sylvilagus audoboni*), deer mouse (*Peromyscus maniculatus*) and black-tailed deer (*Odocoileus hemionus columbianus*) (DTSC 1994). Bat species that forage in riparian areas include the little brown myotis (*Myotis lucifugus*), Yuma myotis (*M. yumanensis*), western pipistrelle (*Pipistrellus hesperus*) and the silver-haired bat (*Lasionycteris noctivagans*) (Ingles 1965).

Common amphibians and reptiles found within the area are the Pacific treefrog (*Hyla regilla*), western toad (*Bufo boreas*), non-native bullfrog (*Rana catesbeiana*), western rattlesnake (*Crotalus viridis*), gopher snake (*Pituophis catenifer*), southern alligator lizard (*Gerrhonotus multicarinatus*), and western pond turtle (*Clemmys marmorata*) (Zeiner *et al.* 1988).

Several native and non-native fish species occur in the perennial streams, reservoirs, and mainstem of the Guadalupe River drainage. Native species still known to be present include rainbow trout (*Oncorhynchus mykiss*), Sacramento sucker (*Catostomus occidentalis*), California roach (*Lavinia symmetricus*), prickly sculpin (*Cottus asper*), riffle sculpin (*C. gulosus*) and lamprey (*Lampetra* spp.). Small populations of the anadromous fall run Chinook salmon (*O. tshawytscha*) and steelhead trout (*O. mykiss*) also spawn in the river. The large number of non-native fish species introduced into the drainage included redear sunfish (*Lepomis microlophus*), bluegill sunfish (*Lepomis macrochirus*), largemouth bass (*Micropterus salmoides*), common carp (*Cyprinus carpio*), black crappie (*Pomoxis nigromaculatus*), brown bullhead (*Icalurus nebulosus*), and others. Native fish species now represent only about 30% of the total number of species in the drainage (Leidy 1984).

2.3 Endangered and Threatened Species

The Guadalupe River drainage is home to the red-legged frog (*Rana aurora*), a species formally listed as "threatened" under the Federal Endangered Species Act, and the foothill yellow-legged frog (*Rana boylei*), a California Species of Special Concern (DTSC 1994; Zeiner *et al.* 1988). It is also home to the Federally threatened steelhead trout (*Onchorynchus mykiss*) and California tiger salamander (*Ambystoma californiense*). California clapper rail and salt marsh harvest mouse (*Reithrodontomys raviventris*) are found in the tidal marshes surrounding the Guadalupe River estuary. In addition, wintering bald eagles (*Haliaeetus leucocephalus*) frequent the reservoirs built on the tributary creeks.

2.4 Protected Areas

2.4.1 Federally Protected Areas

National Wildlife Refuges

The U.S. Fish and Wildlife Service was established to preserve, protect and enhance the fish and wildlife resources of the country for the benefit of the American people. The estuary of the Guadalupe River, Alviso Slough, is bordered by tidal wetlands managed by the Don Edwards San Francisco Bay National Wildlife Refuge, which includes 25,000 acres in the South Bay. The refuge provides habitat for the endangered California clapper rail and the salt marsh harvest mouse, both species that are endemic to San Francisco Bay, as well as the California least tern and the California brown pelican. Visitors to the refuge can learn about the Bay environment, attend naturalist programs, observe wildlife, hike, fish, and hunt.

2.4.2 State Protected Areas

No state protected areas occur with in the boundaries of the Guadalupe River drainage and South San Francisco Bay.

2.5 Historic and Cultural Resources

The prehistory and history of the district resulted in a variety of cultural resources reflecting use by Native American tribes who used the South Bay and foothill habitats of the Guadalupe River drainage, as well as the historic mining activities that played such a prominent role in the settlement and development of California. The potential injuries to these sites were evaluated by the Department of Toxic Substances Control in its remedial action plan for the district, and no impacts to these resources were determined to exist (DTSC 1994).

3.0 POTENTIALLY INJURED RESOURCES

3.1 Lotic, Lentic, and Intertidal Habitat

3.1.2 Water

Concentrations and durations of contaminants in excess of applicable water quality criteria are defined as an injury to surface water resources in 43 CFR section 11.62 (b). Dames and Moore (under contract to Camp Dresser McKee) collected water samples from seven locations in the New Almaden Mining District in 1989. The locations included intermittent streams draining portions of the Mine Hill area, the Senator Mine area, an unaffected area, and upstream and downstream from the Hacienda Furnace Yard on Alamitos Creek. Sampling was conducted during the first rain event, and in the spring after the end of the rainy season. The detection limit was 0.1 ug/l. All samples were below the method reporting limit except the following: Mine Hill Road, 6.00 ug/l; Mine Hill, 1.00 ug/l, and the unaffected area, 1.00 ug/l. USEPA Water Quality Criteria for freshwater specify a 4-day average (chronic) concentration of .012 ug/l and a 1-hour average (acute) concentration of 2.4 ug/l. Given those criteria, one of seven sites exceeded acute concentrations, and two of seven (including a background site) exceeded chronic concentrations; whether they exceeded these concentrations over a 1-hour or 4-day duration, respectively, is unknown. Monitoring of the district since completion of remediation at the Mine Hill and Hacienda Furnace Yard areas shows continued exceedances of acute and chronic water quality criteria.

3.1.2. Sediment

Concentrations of substances in sediment that exceed hazardous waste criteria are defined in 43 CFR 11.62(b) as an injury to surface water resources. Sediment mercury concentrations exceeded State of California hazardous waste criteria (20 mg/kg wet weight) in Alamitos Creek below Almaden Reservoir, Guadalupe Creek below Guadalupe Reservoir, and Almaden Lake Park at the confluence of the two creeks in several investigations spanning two decades, most recently in 1998 (Haas and Ichikawa 2004). Concentrations of substances that would cause injury to biological resources are also defined as a surface water injury. Injuries to biological resources are defined in 43 CFR 11.62(f), and include, among other injury endpoints, death and physical deformity. In a laboratory study with inorganic mercury, a sediment total mercury concentration of 0.18 ug/g dry weight was associated with increased mortality (15 percent at hatching, 70 percent at 10 days post-hatch) and teratogenesis (5 percent) in embryos and larvae of rainbow trout, with all of those adverse effects increasing with increased mercury concentrations (Birge *et al.* 1979). Mean mercury concentrations that equal or exceed 0.18 ug/g occur throughout the Guadalupe River drainage. It should be kept in mind, however, that the actual toxicity and bioavailability of mercury are affected by site-specific factors such as the form of mercury, pH, dissolved oxygen, water temperature, and total organic carbon (Meili 1997).

3.1.3 Aquatic and Riparian Habitat

Injuries to surface water and sediment discussed above imply an injury to the aquatic and

riparian habitats of which they are components. Aquatic habitats in the drainage include freshwater creeks (lotic habitat), reservoirs (lentic habitat), and tidal sloughs. Approximately 197 hectares of reservoir, and 58.7 linear kilometers of creek, tidal slough, and valley foothill riparian habitat have potentially been injured by releases of mercury from the New Almaden Mining District.

3.2 Fish and Shellfish

The U.S. Food and Drug Administration (USFDA) has established 1 ug/g wet weight in the edible portions of fish and shellfish as the action level for protection of human health. Exceeding USFDA action levels is defined as an injury to biological resources in 43 CFR Section 11.62(f).

Little information exists in the literature from which to estimate mercury-induced injury to aquatic invertebrates. Most studies have focused on the effects of water concentrations of mercury on survival of aquatic invertebrates (Eisler 1987). No feeding studies of species with long-lived aquatic larval stages, such as dragonflies, have been reported. Caged and field-collected invertebrates were analyzed in 1996 (Haas and Ichikawa 2000) for total mercury and methylmercury to estimate potential injury to higher trophic level vertebrate species. Except for the caged *Corbicula*, invertebrate samples were composited by broad taxonomic group, rather than by species. For the caged *Corbicula*, test clams were collected from Lake Isabella, Kern County, with a mean pre-transplant mercury concentration of 0.0156 ug/g wet weight. The caged clams accumulated mercury over a twenty-eight day period in concentrations from 3.5 (Guadalupe Creek) to 10.1 (Alamitos Creek) times greater than pre-transplant concentrations. Similar results with caged *Corbicula* were obtained in 1998 (Haas and Ichikawa 2004). In addition, field collected crayfish tissue from the most contaminated stream sites exceeded the USFDA action level of 1 ug/g ppm wet weight. Mercury concentrations in invertebrates present a potential risk to vertebrates that feed in the aquatic food web.

Data on mercury concentrations in fish muscle tissue have been collected from various creeks and reservoirs in the Guadalupe River drainage over a number of years as part of the Toxic Substances Monitoring Program (TSMP) implemented by the State Water Resources Control Board. The State Toxic Substances Monitoring Program has reported mercury concentrations that exceed the Food and Drug Administration (FDA) action level of 1.00 ug/g (ww) in various sport fish species from reservoirs downstream of historic mining operations (CDM 1992; SWRCB 1990, 1991). At Hacienda Furnace Yard on Alamitos Creek, juvenile rainbow trout collected in 1986 had a mean fillet mercury concentration of 1.90 ug/g (ww). Juvenile trout collected in Guadalupe Creek downstream of Guadalupe Reservoir had a mean fillet mercury concentration of 1.00 ug/g ww (SWRCB 1990). Single adult trout and juvenile sucker fillet samples were also collected from Alamitos Creek in 1988. These samples were 1.55 ug/g and 1.33 ug/g (ww), respectively (SWRCB 1991). These results are similar to those reported for fish tissue samples collected in 1996 (Haas and Ichikawa 2000). In general, larger, more piscivorous fish such as largemouth bass tend to have higher concentrations of mercury than smaller insectivorous or herbivorous species such as California roach (Boudou and Ribeyre 1997). Additional fish samples collected in 1998 were therefore composited by species and size. A clear pattern of decreasing fish tissue concentrations can be seen with increasing distances

downstream from the New Almaden Mining District, approaching background concentrations in the vicinity of the Montague Expressway, approximately 30 kilometers downstream from the mines (Haas and Ichikawa 2004). Exceedences of the 1 ug/g level in Calero Reservoir, Almaden Reservoir, Alamitos Creek, Guadalupe Reservoir, and portions of the Guadalupe River were the basis of fish consumption advisories, still in effect, issued by Santa Clara County in 1971. In addition, USEPA recently recommended 0.3 ug/g wet weight as a level protective of human health in establishing water criteria for methylmercury (USEPA 2001). This recommended level is frequently exceeded throughout the affected portions of the drainage.

3.3 Amphibians and Reptiles

Limited information is available on the effects of mercury exposure on amphibian and reptile species. Birge *et al.* (1979) reported LC50s for mercuric chloride ranging from 1.3 to107.5 ug/l for the embryo-larval stages of 14 species of amphibians that were exposed from fertilization through 4 days post-hatch. In general, *Hyla* species seemed to be among the most sensitive (2.4 to 2.8 ug/l), while LC50s ranged from 7.3 to 67.2 for three *Rana* species. These LC50 concentrations are well over the mercury concentrations found in all but the most contaminated surface water at the remediation sites. Two composite samples of bullfrog tadpoles collected from the drainage in 1996 showed whole body concentrations similar to fish species from the same locations. Cherry Creek bullfrog tadpoles measured 0.08 ug/g wet weight, and tadpoles from the Guadalupe River at the Capitol Expressway measured 0.650 ug/g wet weight (CDFG unpubl. data). However, published studies on interpretation of tissue concentrations in amphibians are lacking, as are studies of oral exposures. Studies of chronic exposure effects in amphibians are rare, although the leopard frog (*Rana pipiens*) did not metamorphose during exposure to 1.0 ug/l methylmercury (Eisler 1987).

3.4 Migratory Birds

The effects of mercury exposure on birds seem to be highly variable and species-specific; however, in a review of mercury-related studies, Thompson (1996) concluded that egg mercury concentrations of up to 0.50 ug/g wet weight have little detrimental effect. Affects are likely when concentrations exceed that level. Heinz (1979), for example, reported reduced hatching success in captive mallards (*Anas platyrhynchos*) at egg mercury concentrations of 0.79 to 0.86 mg/kg fresh weight. Black-crowned night heron (*Nycticorax nycticorax*) eggs collected from a small colony located on an island in Almaden Lake Park in 1996 had mercury concentrations ranging from 0.32 to 1.42, with a mean of 0.897 ug/g wet weight (n=6) (Haas and Ichikawa 2000), indicating possible reproductive impairment in the colony. A productivity study of the colony conducted by the San Francisco Bay Bird Observatory in 1997 indicated no productivity for that year; however, predation could not be discounted as one of the contributing causes of the failure (Ryan 1997). Three mallard eggs collected from the same site averaged 0.113 ug/g wet weight, comparable to two mallard eggs collected from Calero Reservoir (Haas and Ichikawa 2000), indicating that mercury is probably not causing reproductive impairment in mallards at Almaden Lake Park.

The difference in egg concentrations between mallards and black-crowned night herons is likely due to the piscivorous feeding habits of the black-crowned night heron. The propensity for

mercury to biomagnify in the aquatic food web is well documented, and fish-eating birds-seem to be at the greatest risk of exposure because fish sequester methylmercury in muscle tissue (Powell 1983; Eisler 1987; Thompson 1996; Wiener and Spry 1996; Boudou and Ribeyre 1997). Other piscivorous species that breed in the drainage include the common merganser (*Mergus merganser*) and the belted kingfisher (*Ceryle alcyon*). Schwarzbach (pers. comm.) estimated a toxic concentration of methylmercury in fish consumed by the common merganser, based on a Lowest Observed Adverse Effect Concentration (LOAEC) in mallards (Heinz 1979), of 0.27 ug/g. Similar calculations for the belted kingfisher and black-crowned night heron resulted in values of 0.33 and 0.27 ug/g, respectively. These concentrations are exceeded in fish from most locations throughout the drainage, including some individual fish from background sites, indicating possible on-going reproductive injury to breeding piscivorous birds from methylmercury exposure. Of particular concern is the possible impact of mercury contamination on the federally listed endangered California clapper rail in South San Francisco Bay tidal wetlands. Mercury concentrations in sediment, prey, and rail eggs are indicative of a level of reproductive impairment in the species. The U.S. Fish and Wildlife Service estimated that 24 to 38% of South San Francisco Bay clapper rail eggs measured for mercury and other contaminants in 1992 were non-viable, depending on site. Mercury concentrations in 46.1% of the total set of eggs were below the threshold for possible effects of 0.5 ug/g fresh weight; 33.3% were between 0.5 and 1.0 ug/g, the level at which certain adverse effects occur; and 20.5% were greater than 1.0 ppm fresh weight (Schwarzbach *et al.* 1996).

3.5 Lost Human Use

The U.S. Food and Drug Administration has established 1 ug/g wet weight in the edible portions of fish and shellfish as the action level for protection of human health. Exceedences of the 1 ug/g level in Calero Reservoir, Almaden Reservoir, Alamitos Creek, Guadalupe Reservoir, and portions of the Guadalupe River were the basis of a fish consumption advisory issued by Santa Clara County in 1971. The current advisory issued by the State of California recommends against consumption of fish from the Guadalupe River.

4.0 RESTORATION PLANNING

4.1 Restoration Strategy

The goal of the natural resource damages authority under CERCLA is to compensate the public for injuries to natural resources and the services they provide resulting from the discharge of hazardous substances. This goal can be achieved by returning injured natural resources to their baseline condition and by compensating for any interim losses of natural resources and services that occur during the period of recovery to baseline.

Restoration actions may be characterized as either primary or compensatory. Primary restoration actions are taken to return injured natural resources and services to baseline on an accelerated time frame. NEPA requires the Trustees to consider a "no action" alternative, and NRDA regulations recommend the Trustees consider natural recovery, the functional equivalent of "no action", under primary restoration. Under this alternative, the Trustees would take no direct action to restore injured natural resources or compensate for lost services pending natural recovery. The principal advantages of this approach are the ease of implementation and the absence of monetary costs. The Trustees may select natural recovery if it satisfies ten criteria outlined in the NRDA regulations (43 CFR Part 11, section 82). These criteria include: (1) technical feasibility; (2) benefit:cost ratio; (3) cost effectiveness; (4) results of any planned response actions; (5) potential for additional injuries; (6) natural recovery period; (7) ability of the resources to recover without alternative actions; (8) potential effects on human health and safety; (9) consistency with other relevant policies; and (10) compliance with applicable laws. Alternative primary restoration activities can range from natural recovery to actions which prevent interference with natural recovery to more intensive actions that are expected to return injured natural resources and services to baseline faster than natural recovery.

Compensatory restoration is action taken to compensate for the interim losses of natural resources or services pending recovery to baseline conditions. The type and scale of compensatory restoration depends on the nature of the primary restoration and the level and rate of recovery of the injured natural resources or services in response to the primary restoration action. The amount of compensation to which the trustees are entitled is calculated as the difference between the value of ecological services obtained through restoration or replacement and the value of the services that would have been provided had the releases not occurred. Different methodologies are available to estimate this value. The method employed by the Trustee agencies in this case was resource equivalency analysis (REA), which was used to scale the proposed restoration projects presented in this RP/EA .

The Trustees have determined that primary restoration of the most contaminated creek sites will significantly accelerate the return of potentially injured natural resources and services to baseline. In addition, losses were, and continue to be, suffered during the period of recovery from the releases, and technically feasible, cost-effective alternatives exist to compensate for these losses. The Trustees have determined that services of the same type and quality, and of comparable value as the lost ecological and human use services could be provided through appropriate habitat enhancement projects. The Trustees therefore rejected the no action alternative.

The Trustees, working cooperatively with the PRPs, considered the area affected by mercury releases, estimates of the initial lost ecological services, and estimated recovery periods for the impacted habitat types. In applying a scaling approach, the Trustees relied on available data, applicable literature, experience, and best professional judgment. Precise scaling calculations are often not possible because knowledge of relevant physical and biological processes is not sufficient. Accordingly, some general assumptions were adopted to allow an estimation of the scale of restoration necessary to compensate for injuries resulting from this release. Subsequently, a suite of restoration alternatives (hereafter collectively referred to as "restoration alternatives" or "projects") was identified. Projects were also evaluated against criteria provided in the regulations (see above.) Implementation of the suite of restoration projects is considered the preferred alternative under NEPA/CEQA

4.2 Evaluation Criteria

The NRDA regulations (43 CFR Part 11) recommend that Trustees develop a reasonablenumber of possible alternatives for restoration, rehabilitation, replacement, and/or acquisition of equivalent resources, and the related services lost to the public, and then identify the preferred alternatives based on specified selection criteria. In addition to the criteria discussed above, the Trustees used the following criteria to consider and prioritize restoration projects. The criteria are separated into two categories, the first being described as "threshold" and the latter described as "additional" criteria. Restoration alternatives had to achieve a minimum level of acceptance under the threshold criteria to receive further consideration under the additional criteria. The criteria are not ranked in order of priority.

4.2.1 Threshold Criteria

Technical Feasibility:
The project must be technically sound. The Trustees considered the level of risk or uncertainty involved in implementing the project. A proven track record demonstrating the success of projects utilizing a similar or identical restoration technique can be used to satisfy this evaluation criterion.

Consistency with the Trustees Restoration Goals:
The proposed alternative must meet the Trustee's intent to restore, replace, enhance, or acquire the equivalent of the injured resources or the services those resources provided.

Compliance with Laws:
The proposed restoration alternatives must comply with all applicable laws.

Public Health and Safety:
The proposed alternatives cannot pose a threat to the health and safety of the public.

4.2.2 Additional Criteria

Relationship to Injured Resources and Services:

Projects that restore, replace, enhance, or acquire the equivalent of the resources and services injured by the release are preferred to projects that benefit other comparable resources or services. The Trustees considered the types of resources or services potentially injured, the location, and the connection or nexus of project benefits to those injured resources.

Avoidance of Further Injury:
Proposed projects should avoid or minimize adverse impacts to the environment and the associated natural resources. The Trustees considered the future short- and long-term injuries, as well as mitigation of past injuries, when evaluating projects.

Likelihood of Success:
The Trustees considered the potential for success and the level of expected return of resources and resource services. The Trustees also considered the ability to monitor and evaluate the success of the project; the ability to correct any problems that arise during the course of the project; and the capability of individuals or organizations expected to implement the project. Performance criteria were expected to be clear and measurable.

Multiple Resource Benefits:
The Trustees considered the extent to which the proposed alternative benefits more than one natural resource or resource service in terms of quantity and quality of the types of natural resources or services expected to result form the project.

Time to Provide Benefits:
The Trustees considered the time expected for the project to begin providing benefits to the target ecosystem and/or public. A more rapid time to delivery of benefits was favorable.

Duration of Benefits:
The Trustees considered the expected duration of benefits from the proposed restoration alternatives. Projects expected to provide longer-term benefits were regarded more favorably.

Use of Publicly-owned Lands:
The Trustees considered that long-term protection of projects and more favorable benefits relative to cost could best be achieved by implementing projects on publicly-owned land.

Opportunities for Collaboration:
The Trustees considered the possibility of enhancing benefits to natural resources or services by coordinating restoration projects with ongoing or proposed projects or programs.

Benefits Relative to Costs:
The Trustees considered the relationship of resource and service benefits to expected costs for each alternative. PRP implementation of projects was considered the least costly method of achieving restoration, all other factors being equal.

Total Cost and Accuracy of Estimate:
The Trustees evaluated the estimated total cost of each project alternative and the validity of the estimate. The total cost estimate included costs to design, implement, monitor, and manage the

project. The validity of cost estimates was evaluated based on the completeness, accuracy, and reliability of methods used to estimate costs, as well as the credentials of the person or entity submitting the cost estimate.

4.3 Evaluation of Environmental Restoration Alternatives

The NRDA regulations encourage Trustees to reduce transaction costs and avoid delays in restoration by conducting the NEPA process concurrently with the development of the restoration plan. To comply with the requirements of NEPA, the trustees analyzed the effects of each proposed restoration alternative on the quality of the human environment. NEPA's implementing regulations direct Federal agencies to evaluate the potential significance of proposed actions by considering both the context and the intensity of the action. For the restoration actions considered, the appropriate context and area of potential significance of the action is regional, rather than national or world-wide. In addition, several projects are based on conceptual designs rather than detailed engineering design work. Therefore, details of specific projects might require additional refinements to reflect site conditions or other factors, and individual projects might require preparation of additional NEPA/CEQA documents.

Working collaboratively with the PRP's in applying the criteria outlined above, the Trustees identified five projects that will restore and compensate for injured natural resources and lost services, other than lost recreational fishing. Section 4.3.1 describes the two restoration alternatives that are considered primary restoration. Section 4.3.2 describes the three projects that are considered compensatory restoration. The project costs are summarized in Table 2.

Table 2. Summary of Restoration Projects and Estimated Costs

Project Name	Type Project	Estimated Cost
Hacienda Furnace Yard	Primary	$1,675,000
Jacques Gulch (Favored Approach)	Primary	$3,206,977
Coyote Creek *Arundo* Removal	Compensatory	$1,399,435
Hillsdale Bridge Fish Barrier Removal	Compensatory	$ 197,635
Ravenswood Marsh Predator Control	Compensatory	$ 271,775

4.3.1 Primary Restoration

Creeks in Almaden Quicksilver County Park (Park) downstream of inactive mining sites were shown during the Remedial Investigation/Feasibility Study (RI/FS) to have sediment mercury concentrations exceeding the state hazardous waste criteria of 20 ppm wet weight. Exceedance of hazardous waste criteria in sediments is a defined injury to surface water resources in the Department of the Interior Natural Resource Damage Assessment and Restoration Regulations (43 CFR Part 11). The most contaminated locations were in the vicinity of the Hacienda Furnace Yard on Alamitos Creek; Deep Gulch, a tributary to Alamitos Creek on the southeast slope of Mine Hill; and an unnamed tributary on the southwest slope of Mine Hill that flows into Jacques Gulch. Jacques Gulch flows into Almaden Reservoir, which is on Alamitos Creek upstream from the Hacienda Furnace Yard. The State-approved remedial action plan implemented in 1997 removed or consolidated and capped the majority of contaminated waste ore, referred to as calcines, from Deep Gulch and Hacienda Furnace Yard stream banks. However, remaining calcine piles continue to release mercury to surface water runoff. In addition, calcines in and above Jacques Gulch were left in place. Primary restoration projects in Hacienda Furnace Yard and Jacques Gulch will remove/consolidate and/or stabilize the remaining visible calcine materials, thereby restoring those areas to baseline conditions.

4.3.1.1 #1 Primary Restoration Alternative: Hacienda Furnace Yard Restoration and Enhancement Project

Project Description

This restoration project will be implemented in Deep Gulch and Hacienda Furnace Yard on Alamitos Creek. Three locations in the project area will be addressed:

1. **Upper Hacienda**: The upper Hacienda area is situated on a steep slope and has exposed soils with minimal non-native grass cover relative to adjacent, non-calcine, areas. Remove/consolidate and/or stabilize onsite calcine material from Alamitos Creek bottom for a distance of about 150 ft., and from the creek bank slope at that location below Almaden Road.
2. **Lower Hacienda**: Remove/consolidate and/or stabilize onsite calcine located along a distance of about 150 ft. at Lower Hacienda on the slope between Alamitos Creek and Almaden Road.
3. **Deep Gulch**: Remove/consolidate and/ or stabilize onsite calcine on the eastern bank of Deep Gulch Creek above Mine Hill trail gate to the old retort remains, for a distance of about 300 ft.

The proposed activities are to: (1) Remove and consolidate calcine material from the creek channel, creek banks and nearby areas, or where appropriate, stabilize the calcine material on-site. Removed calcine will be consolidated in the Mine Hill area of the Park where calcines were consolidated in the remedial action, i.e., deposited in an existing depression and capped. (2) Smooth grade and hydro-seed with native grasses all disturbed areas. (3) Maintain cap on consolidation area of the site.

Restoration Objectives

a. **Goal:** Reduce mercury loading to the Guadalupe River watershed from anthropogenic sources by removal/consolidation and/or stabilization of remaining exposed calcine material in the Hacienda Furnace Yard and Deep Gulch Creek areas.

b. **Objectives:**

i. Identify remaining calcine deposits and prepare restoration plan
ii. Remove/consolidate and/or control calcines and re-grade the areas to stable condition
iii. Import clean substrate for plant growth, where necessary
iv. Revegetate by Hydro-seeding disturbed areas and replacing trees

Probability of Success

Regulatory and technical feasibility are considered high for this project, indicating a high probability of overall success. In addition to NEPA/CEQA review, permits or other appropriate approvals will be requested from the following regulatory agencies, as needed:

1. US Corps of Engineers for Sec. 404 permit.
2. RWQCB Clean Water Act certification.
3. Endangered Species Section 7 consultation with USFWS for California red-legged frog and with NMFS for steelhead trout.
4. RWQCB storm water and waste discharge permits.
5. Streambed alteration agreement with CDFG.
6. SCVWD encroachment permit.
7. County Roads and Airports Department permit.
8. Approvals from California DTSC may be required for transportation of the calcine materials and their consolidation at the Mine Hill site.

Technical feasibility of the project is dependent upon receipt of agency approvals for various aspects of the proposed project. Watershed and stream corridor restoration are well-established fields of expertise. While no restoration can be perfect in the creation of baseline conditions or a pristine ecological system, riparian corridor restoration has been shown to have significant benefits to habitat and water quality and can provide the habitat suitability for a broad range of species, including those that may be injured by the release of mercury or that are endangered and threatened. Stream restoration has become commonplace in recent years, and numerous guidance documents and design references are available. Technical aspects of the restoration that might be affected by regulatory issues include: (1) At Location #1, the work requires diversion of Los Alamitos Creek flow from Hacienda site via the existing Calero canal for a period of 4 to 6 weeks in order to remove and/or stabilize calcines from the creek bottom and from the creek bank below Almaden Road. Consequently the calcine removal or stabilization at location #1 will be contingent upon appropriate State and Federal agency approval of the stream diversion. (2) Removal and/or onsite stabilization of calcine from Location #2 will require accessing the site from Almaden Road (with construction of a culvert for transport of equipment over the Creek and its removal on

completion of the project), which will require approval from DTSC and possibly from County Roads and Airports for transportation of calcine material outside the Park and on County roads. (3) Consolidation of material at the Mine Hill area will be accomplished in a manner similar to the prior remediation activity at the Park.

Success Criteria and Monitoring

a. Calcine Removal/Consolidation/Stabilization

Calcine material has different formation and character from that of natural soil formation and it is easily recognizable by visual inspection. All visible calcine material will be identified, removed and consolidated, and capped at a location in the Mine Hill area of the Park and/or stabilized in place.

Performance Criterion: Removal/consolidation/stabilization of all visible calcine material at project locations, and capping in accordance with DTSC and/or RWQCB specifications.

b. Re-vegetation/Assessment

Re-establishment and survival of native species will be inspected annually for up to three years after project completion. Each year, a qualified biologist will inspect the project locations and provide a report, with recommendations, as to:

- whether or not habitat is developing that is reasonably comparable with surrounding areas
- whether or not additional planting or re-planting will be cost effective and required to reestablish native vegetation
- possible adjustments to success criteria

Monitoring may cease if the Trustees determine that the performance criterion has been met prior to the end of three years or continued until the performance criterion has been met.

Reporting

Annual reporting of activities conducted will be prepared and submitted to the Trustee Agencies. Specific information will include some or all of the following:

- Construction completion report
- Planting/vegetation plan
- Progress reports on habitat restoration
- Biological determinations of planting success and success criteria
- Activities planned for next reporting cycle

Additional reports will be required to comply with any permits issued.

4. *Contingencies*

- All references to dates/timeframes for monitoring and reporting requirements will calculated from the date of final construction completion.
- If plants become naturally established to the extent that maintenance can be reduced or ended in less than three years, appropriate reductions in maintenance can be made as approved by the Trustee Agencies.
- Once performance criteria have been achieved for the area, as determined by the trustee agencies, no further monitoring and reporting will be required.

Environmental Consequences

Project implementation will be facilitated by diverting Alamitos Creek through the canal from Almaden Reservoir to Calero Reservoir for a period of 4-6 weeks. This will dewater approximately 0.5 miles of Alamitos Creek from Almaden Dam to the Almaden Road Bridge, near the Park entrance, where the water will be returned via siphon to the creek. This activity will adversely affect red-legged frogs, steelhead, and/or their associated habitat for a short period of time during the construction period. The following procedures will be implemented to minimize impact:

1. Red-legged Frog. Red-legged frogs have been documented to occur irregularly in the project area. Prior to construction the area to be dewatered will be surveyed by a qualified red-legged frog biologist to determine whether red-legged frogs are present; the results of the survey will be used to determine the appropriate level of biological monitoring during the construction period. Dewatering will be accomplished slowly to encourage mobile aquatic organisms to move downstream. As dewatering progresses, a crew led by a qualified red-legged frog biologist will capture any adult frogs and collect any egg masses found in the area for re-location below the point where water is returned to the stream. Biological monitors assigned during the construction period ensure to the extent possible that construction activities do not injure any red-legged frogs that enter the area. All frog mortalities will be fully documented.

2. Steelhead. Rainbow trout, some of which might be anadromous steelhead, have been documented to occur in the project area. Therefore, the species will be assumed to be present and a pre-construction survey will not be conducted. Dewatering will be accomplished slowly to encourage mobile aquatic organisms to move downstream. As dewatering progresses, a crew led by a qualified steelhead biologist will capture all fish remaining in the reach by electrofishing and relocate them below the point where water is returned to the stream. If any pools remain after dewatering is completed, those pools will be re-surveyed to ensure that as many fish as possible are captured and relocated; all mortalities will be fully documented.

3. Work may involve removal of a number of mature trees (possibly 20-40 at Deep Gulch, a smaller number at Upper and Lower Hacienda); the exact number will be determined after the site survey and delineation of the calcine area and site access. Replacement trees will be incorporated into the re-vegetation plan.

Remediation at the Hacienda Furnace Yard was conducted by Santa Clara County under a Remedial Action Plan (RAP) and Negative Declaration prepared by DTSC. The RAP and Negative Declaration are the CEQA equivalents of an EA and Finding of No Significant Impact (FONSI) under NEPA. In addition, Sec. 7 consultation under the ESA was completed by the U.S. Fish and Wildlife Service. Federal nexus for the Sec. 7 consultation was established when the County applied to the U.S. Army Corps of Engineers for a wetland fill permit under Section 404 of the Clean Water Act. Based on the prior environmental documentation, it is expected that this RP/EA will support a FONSI; however, endangered species Sec. 7 consultation will still be needed to complete this project. It is expected that the benefits of this project and a compensatory project on Coyote Creek will provide adequate mitigation for the environmental consequences described.

Evaluation

Project benefits include:

1. Reduction of total calcine mass at, and downstream of, Hacienda furnace yard, totaling an estimated 7,000 to 10,000 cubic yards of material. These materials represent a major concentration of calcines in the Hacienda area of Los Alamitos Creek, where historically the highest levels of Hg in creek sediment have been detected.
2. Reduction of mercury bioavailability to benthic organisms, fish, piscivorous birds, and other wildlife.
3. Restoration of riparian habitat to benefit red-legged frog, native fish species, and terrestrial wildlife dependent on riparian habitat.
4. Minimization of potential vegetation stress due to the structural/physical nature of the calcines.

This project has been evaluated against the selection criteria described in 43 CFR Part 11 and in section 4.2 of this document, and has been determined to be consistent with these selection factors. The Trustees have determined that this restoration project will restore resources injured by mercury releases.

Implementation Schedule

It is expected that the time required for survey, design and permit applications would be up to 12 months, and that the bidding and field implementation process would be approximately 11 months. The actual Implementation schedule is dependent on seasonal factors (e.g., water levels). Field implementation should be scheduled to commence and be completed within a construction window from May-October. The actual field implementation period will be approximately 8 to 12 weeks.

4.3.1.2 #2 Primary Restoration Alternative: Jacques Gulch Restoration and Enhancement Project

Project Description

This restoration project will be implemented within the Jacques Gulch drainage, upstream of Almaden Reservoir. Jacques Gulch drains an area of approximately 2 square miles bounded by Mine Hill to the northeast, Jacques Ridge to the Northwest, and Bald Mountain to the Southwest. This project is intended to prevent the Jacques Gulch drainage from being an ongoing significant source of mercury in the Guadalupe River Watershed. Project planning will include the evaluation of two locations within the Jacques Gulch drainage, identified for planning purposes as Locations A and B, where calcines and mining debris have been observed. Location A is generally that area on Jacques Gulch upstream of the confluence with the reservoir. Location B is generally that area on an unnamed upstream tributary that drains a portion of Mine Hill to Jacques Gulch. Location A is triangular in shape, extending approximately 1000 feet upstream from the culvert (beneath Alamitos Road) that connects Jacques Gulch to the reservoir, and varying in width from approximately 100 feet at the culvert to approximately 40 feet at the upstream project limit. Location B is a steep narrow drainage of a minimum of 1000 feet or more in length and varying in width from 20 to 40 feet over most of this distance.

Historical accumulation of calcines and mining debris occurred at various locations within the project locations generally described above. Under low flow conditions, calcines within the wetted perimeter of the streambed may contribute dissolved mercury in the water column. At both Locations A and B, calcines and other mining debris occur as cemented masses and loose deposits in the stream bed and along the stream banks, where they can be eroded during high flow events and deposited in the reservoir.

The first phase of this project will be development of an Engineer's Report that evaluates the technical feasibility and costs of different project approaches and options. The favored option/approach to be evaluated in the Engineer's Report is the consolidation, encapsulation, and stabilization of visible calcines and mining debris within the Jacques Gulch drainage with those that were consolidated and capped during the remedial action implemented under the oversight of DTSC in the Mine Hill Area on Almaden Quicksilver County Park ("Favored Approach").

The Engineer's Report may also evaluate other potential approaches that will satisfy the intent of this project, including the trapping and periodic removal of mercury-bearing materials, the stabilization and capping of calcines and mining debris in place, and other potential management controls that can withstand high-energy flow conditions. Soil stabilization methods will be evaluated on a site-specific basis, and may include excavation and replacement with imported material, stabilization with structural or biological materials, contouring, and capping with clean fill. Stream rehabilitation will avoid the use of riprap and other hard-scape materials to the maximum extent practicable.

As to any approach other than the Favored Approach (i.e., consolidation with the existing encapsulated materials on the County park, which is already subject to ongoing maintenance and monitoring requirements), the Engineer's Report will consider and propose the locations(s), frequency, and methods for periodic water quality monitoring necessary to ensure that mercury concentrations in water entering Almaden Reservoir meet applicable regulatory requirements, including compliance with any obligations imposed pursuant to a TMDL.

The materials that have aggregated at Locations A and B do not support significant riparian vegetation either because the materials have formed a cemented texture that is impenetrable to roots or because they are too coarse to serve as adequate substrate for deep-rooted vegetation. Much of the area along Alamitos Creek above and below the reservoir potentially provides suitable habitat for the endangered red-legged frog and the tiger salamander. This project provides an excellent potential to enhance the habitat conditions and possibly the amount of habitat available for these endangered species.

All approaches will propose designs to maximize habitat value and minimize erosion, including importation of sufficient substrate to help support vegetation. All approaches will also provide for plantings certified by a biologist to attempt to maximize habitat value and vegetation that is likely to become self-sustaining. Where possible, plantings will be from seeds collected from plants on-site and started at a nursery in the year before the project construction. Maintenance, including weed control, browse protection, site inspection, and insect and disease control, will be performed if needed during the re-establishment period of native vegetation. Monitoring and re-planting will be conducted as needed for up to three years following construction completion.

Following submittal of the Engineer's Report, if SCVWD recommends an approach other than the Favored Approach, SCVWD will also submit a proposal with an associated monitoring program to the Trustees, who will approve, modify and approve, or disapprove the proposal.

Should an approach other than the Favored Approach be selected by SCVWD and approved by the Trustees, environmental documentation, permit applications, and construction design required for that project will be initiated.

Restoration Objectives

a. Goal: Reduce mercury loading to the Guadalupe River watershed by removal/consolidation, trapping and consolidation or removal, and/or onsite stabilization of visible mercury-containing calcines and sediments and restoration of riparian habitat within the Jacques Gulch drainage at and upstream of its confluence with Almaden Reservoir

b. Objectives:

i. Prepare Engineer's Report and, if an alternative other than the Favored Approach is recommended, propose specific alternative approach (including a water quality monitoring program) for restoration of Jacques Gulch.

ii. Remove/consolidate and/or control calcines and re-grade the project area

to stable condition, and, if an alternative other than the Favored Approach is pursued, implement water quality monitoring.

iii. Import clean substrate for plant growth.

iv. Vegetate the area with riparian and/or seasonal wetland species.

Probability of Success

Regulatory and technical feasibility are considered high for this project, indicating a high probability of overall success. In addition to potential NEPA/CEQA review, this project may require permits from the following regulatory agencies:

1. U.S. Army Corps of Engineers Clean Water Act Section 404 permit.
2. RWQCB Clean Water Act Section 401 Certification.
3. U.S. Fish and Wildlife Service Endangered Species Act Section 7 consultation.
4. RWQCB grading and NPDES permit.
5. California Department of Fish and Game streambed alteration permit.
6. County Roads and Airports Department.
7. County Department of Parks and Recreation.
8. Approvals from California DTSC may also be required for transportation of the calcine materials and/or their consolidation at the Mine Hill site.
9. Transportation and disposal requirements as imposed by DTSC if an alternative to the Favored Approach is implemented that involves removal of materials containing mercury.

Watershed and stream corridor restoration are well-established fields of expertise. While no restoration can be perfect in the creation of baseline conditions or a pristine ecological system, riparian corridor restoration has been shown to have significant benefits to habitat and water quality and can provide the habitat suitability for a broad range of species, including those that may be injured by the release of mercury or that are endangered and threatened. Stream restoration has become commonplace in recent years, and numerous guidance documents and design references are available. Location A is easily accessed from the road for equipment ingress and egress, and is sufficiently small (approximately one acre) that the actual construction period will be short, with excavation and grading activities completed within approximately 3-5 weeks, and substrate and plantings installation completed within another 3-5 weeks (approximately). Location B is not as easily accessible. Excavation is likely to be achieved using small equipment in the channel working upstream, and grading and channel configuration will then be conducted working downstream. This process is likely to require at least 8 to 10 weeks for completion, followed by 2 to 3 weeks (approximately) for installation of substrate and plantings.

The portion of the Jacques Gulch drainage to be addressed by this project is located in an area of the Park and adjacent to a reservoir; much of this area is undeveloped for public access, improving the potential for successful re-vegetation and habitat retention. The existence of native habitat upstream of the project locations and in other areas in the vicinity of the reservoir indicates that success criteria for established plantings should be successful. If access and transportation issues can be resolved, removal of aggregated material is likely to be easily accomplished, as underlying native soils are easy to distinguish visually from the calcines;

otherwise, on-site stabilization and/or management alternatives may be needed to address project goals.

Success Criteria and Monitoring

1. *Calcine Removal/Consolidation//Trapping/Stabilization/Revegetation Management*

Calcine material has different formation and character from that of natural soil formation and it is easily recognizable by visual inspection. All visible calcine material will be removed, consolidated, and capped at the Mine Hill Area of the Park, and/or trapped and/or stabilized in place.

Performance Criterion:

a. Removal/consolidation/encapsulation in accordance with any DTSC-imposed requirements or trapping/stabilization/ management of all visible calcine material at Locations A and B, with water quality monitoring (if an approach other than the Favored Approach is implemented) to confirm that mercury is not being released to the Guadalupe River Watershed in excess of applicable regulatory requirements.

b. Reestablishment and survival of native species will be inspected annually for up to three years after construction completion. Each year, a qualified biologist will inspect the project locations and provide a report, with recommendations, as to:

- whether or not habitat is developing that is reasonably comparable with surrounding areas
- whether or not additional planting or re-planting will be cost effective and required to reestablish native vegetation
- possible adjustments to success criteria

Monitoring may cease if the trustees determine that the success criterion has been met prior to the end of three years or be extended beyond three years if it has not.

2. *Reporting*

Annual reporting of activities conducted will be prepared and submitted by the project implementers to the Trustees. Specific information will include some or all of the following:

- Engineer's Report
- Environmental documents (e.g., FONSI/Neg. Dec. or Environmental Impact Statement/Report)
- Applicable permits
- Construction completion report
- Progress reports

- Water quality monitoring reports (i.e., if an approach other than the Favored Approach is implemented)
- Biological report, as provided for in 1.b., above

3. *Contingencies*

Construction seasons are dependent upon the presence/absence of sensitive species and upon site conditions. These factors may significantly alter the period and completion of construction. If other than the Favored Approach is implemented and water quality monitoring reveals that mercury in concentrations exceeding applicable regulatory requirements is being released into the Guadalupe River Watershed from Jacques Gulch, the SCVWD will submit to the Trustees a proposed revised approach to address such exceedances/releases. The Trustees may approve, revise and approve, or disapprove such revised approach. Thereafter, the SCVWD will implement the approved revised approach.

Environmental Consequences

The project is located within the historic range of the California red-legged frog and the California tiger salamander, which was listed by the U.S Fish and Wildlife Service as threatened throughout its range in August 2004. However, amphibian surveys conducted by the U.S. Fish and Wildlife Service in 1997-1998 did not find either species in the Jacques Gulch project area. Because the stream is ephemeral, little water will be present during the construction period, and impacts to the frog are unlikely. The tiger salamander tends to breed in ephemeral pools, stockponds, and sometimes reservoirs, but rarely in streams; impacts to the salamander are therefore also unlikely.

1. Red-legged Frog. Prior to construction the area will be surveyed by a qualified red-legged frog biologist to determine whether red-legged frogs are present; the results of the survey will be used to determine the appropriate level of biological monitoring during the construction period. A crew led by a qualified red-legged frog biologist will re-locate any frogs or egg masses identified during the survey outside the project area. Biological monitors assigned during the construction period, if required, will ensure to the extent possible that construction activities do not injure any red-legged frogs that enter the area. All frog mortalities that occur will be fully documented.

2. Tiger Salamander. Prior to construction the area will be surveyed by a qualified tiger salamander biologist to determine whether tiger salamanders are present; the results of the survey will be used to determine the appropriate level of biological monitoring during the construction period. A qualified tiger salamander biologist will relocate any salamanders identified during the survey outside the project area. Biological monitors assigned during the construction period, if required, will ensure to the extent possible that construction activities do not injure any salamanders that enter the area. All tiger salamander mortalities that occur will be fully documented.

3. Work might involve removal of a "to be determined" number of mature trees; the exact number will be determined after the site survey and delineation of the calcine area and site access. Replacement trees will be incorporated into the re-vegetation portion of the restoration design.

It is expected that the benefits of this project and a compensatory restoration project on Coyote Creek will provide adequate mitigation for the environmental consequences described.

Evaluation

Project benefits include:

1. Removal and/or stabilization/management of visible calcine mass downstream of Mine Hill, totaling an estimated 12,000 to 15,000 cubic yards of material. These materials are the last significant concentration of calcines in the subwatershed draining to Alamitos Creek upstream of Almaden Dam.
2. Minimization of potential vegetation stress due to the structural/physical nature of the calcines.
3. Restoration of aquatic and riparian habitat to benefit red-legged frog and other native amphibian species, and terrestrial wildlife dependent on riparian cover.
4. Reduction in dissolved and suspended mercury in water released from Almaden Reservoir to Alamitos Creek and Calero Reservoir, with associated reduction of mercury bioavailability to benthic organisms, fish, piscivorous birds, and other wildlife. Downstream benefits will also enhance the benefits of project 4.3.1.1.

This project has been evaluated against the selection criteria described in 43 CFR Part 11 and in section 4.2 of this document, and has been determined to be consistent with these selection factors. The Trustees have determined that this restoration project will restore resources injured by the mercury releases.

Implementation Schedule

The model schedule for the project is as follows.

Dec 2005	Annual Progress Report to Trustees
Aug 2006	Site Survey/Project Description
Dec 2006	Annual Progress Report to Trustees
December 2007	Annual Progress Report to Trustees
November 2008	Engineer's Report/Environmental Documents Prepared
Dec 2008	Annual Progress Report to Trustees
November 2009	Environmental Permits

Dec 2009	Annual Progress Report to Trustees
Aug-Oct. 2010	Construction
Aug.-Oct. 2010	Site Inspection
Dec 2010	Annual Progress Report to Trustees
June 2011	Construction Completion Report
Dec 2011	Final Report to Trustees

4.3.2 Compensatory Restoration

Three projects have been developed to provide compensatory restoration for resources potentially diminished by mercury contamination from historic mining operations, including those in the New Almaden Mining District. These projects focus on riparian habitat and associated resources, anadromous fish, and California clapper rails.

4.3.2.1 #1 Restoration Alternative: Coyote Creek *Arundo donax* Eradication and Habitat Enhancement

Project Description

Arundo donax (Arundo) is a highly invasive non-native species that infests creeks and adjacent habitat, displacing native vegetation and thereby reducing the quality of riparian habitat. The displacement of native habitat reduces the quality of available habitat for wildlife, including endangered species. Studies in the watershed have documented a reduction in native fish species productivity associated with the presence of *Arundo*. This project will restore approximately 12-14 acres of native riparian habitat infested by *Arundo*.

Year One work will begin with a survey of shoreline surrounding Anderson Reservoir (approximately 8 miles) to identify and remove *Arundo* infestations and continue at the first known infestation site approximately 0.75 mile downstream of Anderson dam at least to Fisher Avenue (approximately 6 miles). Year two work will include follow-up treatment on Year One removal areas, and additional removals on a second reach of Coyote Creek, beginning approximately 1.2 miles downstream of Fisher Avenue to Metcalf Road (approximately 4.5 miles), including removal of *Arundo* at Metcalf Road, and a survey to identify and remove other *Arundo* sites within this reach. Year Three work will include follow-up treatment on Year One and Year Two areas, and remove *Arundo* on a third reach of Coyote Creek beginning approximately 2 miles downstream of Metcalf Road and ending at Hellyer Avenue (approximately 4 miles). It will include the planting of the Year One control areas if sufficient *Arundo* control has been achieved. Year Four work and beyond will include follow-up treatment of all control areas. It will include monitoring of Year One re-vegetation sites and replanting of Year Two treatment sites. Year Five will follow the same program strategy with follow-up control of sites as needed, and replanting of the Year Three control site. At this juncture in the program, all sites should have adequate control efforts to be close to 100 percent completed, and will have been initially replanted. The final program stages are follow-up monitoring of all control and re-vegetation efforts, with reporting to appropriate stakeholders. The plan to work downstream from the uppermost area of *Arundo* infestation will ensure that treated areas are not re-infested with *Arundo* from upstream sources. This will also complement an on-going *Arundo* eradication program being carried out by others, in two areas within the identified reaches, each of which is approximately 1.25 miles in length.

The *Arundo* infestations will be mapped using Global Positioning System technology and geographically linked to an information database using Geographic Information System software. Combined with future field surveys, this provides the capability for tracking the condition of the sites over time. *Arundo* acreage will be estimated based on the square footage

below/within the dripline of the canopy of the stand at each site.

Initial control of the *Arundo* will consist of removal of biomass, appropriate disposal of biomass, and treatment of residual and clumps with an approved herbicide. Removal methods will include mechanical and hand methods, as determined on a site specific basis. Removal of underground rhizomes will only be done in cases where the practice does not accelerate erosion or worsen stream instability. Hand methods will typically remove only above-ground biomass. Typical herbicide control consists of applying the chemical to freshly cut stumps. The plant takes the herbicide into its underground portions, where the herbicide kills the roots. Follow-up control using additional herbicide applications on re-growth is typically required, particularly for large stands, and will be carried out as part of this project until complete eradication of the stand is accomplished. Foliar application might be used in areas that can be treated in this manner without compromising water quality or riparian resources. Generally, at least two or three annual re-treatments are required for complete eradication of the original stand. Since herbicide application is most effective in the fall of the year, this is the time of year that most field work for biomass removal and herbicide application will be conducted. The type of herbicide used will vary depending on the location of the stand in proximity to the water. Stands within or near the water will be treated with herbicides approved for aquatic use. Stands away from the water may be treated with the same herbicide or others as determined on a site specific basis. The types of herbicides used will those that have been previously reviewed and approved for use in consultation with trustee and regulatory agencies.

Following eradication, some sites will have sufficient surrounding native riparian vegetation to allow for natural re-colonization, so that active re-vegetation with appropriate site-specific native species should not be required. However, if, following consultation with the landowner, the Trustees and the SCVWD identify cost effective opportunities to further enhance habitat through supplemental re-vegetation, they may be exploited. Maintenance, including weed control, non-native species control, browse protection, site inspection, and insect and disease control, will be performed if needed during the re-establishment period of native vegetation. The overall project goal is to ensure that areas where *Arundo* has been removed are re-colonized, to the greatest extent possible, with native vegetation. This may be facilitated through natural re-colonization or active re-vegetation efforts.

Restoration Objectives

a. Goal: Improve habitat and prey base for wildlife resources similar to those potentially injured by the release of mercury in the Guadalupe River watershed by eradicating *Arundo* in the Coyote Creek Riparian Corridor commencing at Anderson Reservoir and moving downstream to Hellyer Avenue.

b. Objectives:

i. Map *Arundo* infestation sites
ii. Implement *Arundo* eradication program
iii. Revegetate *Arundo* removal/infestation sites with native vegetation

iv. Verify achievement of success criteria

Scaling Approach

Numerous wildlife and fish species are native to the Guadalupe River watershed; most of these species also occur in the Coyote Creek watershed, which has not had the same degree of impact from historic mining activities. The potential to restore resources comparable to those injured historically in the Guadalupe River Watershed is therefore quite high. This project will compensate in part for past injuries to those resource services that are not addressed by the primary restoration projects described in Section 4.3.1.

Rather than attempt direct restoration of fish and wildlife resources, the project focuses on creating habitat conditions beneficial to native fish and wildlife, with the expectation that restoration and enhancement of habitat will result in direct benefits to those resources.

Probability of Success

Regulatory and technical feasibility are considered high for this project, indicating a high probability of overall success. This project is governed by applicable laws and regulations concerning the proper storage and use of herbicides, and proper disposal of biomass. The project also complies with regulatory protection of resources under the protection of USFWS, CDFG, and NOAA Fisheries.

The technical basis of *Arundo* control is well-established, and requires a combination of mechanical or hand biomass removal and follow-up chemical control techniques. Optimization of the treatment program may be achieved by evaluation and manipulation of variables, such as timing, rates of chemical application, mulching, and alternative biomass disposal options. Density of infestation, access to treatment sites, weather, stream conditions, availability of native plants, and other factors will influence the amount of work that can be accomplished in a given year.

The roots and rhizomes of the plant can take years to completely degrade and will effectively inhibit growth of other plants until they have completely decomposed. Re-vegetation by naturally occurring species may not be complete until sufficient decomposition has occurred. While this may slow the re-vegetation process, it allows sites to be easily inspected to ensure there is no regrowth of *Arundo* or other invasive vegetation, and to implement follow-up treatment, if necessary.

There are a number of unknown variables that could affect the feasibility of elements of the project. There are no good historical data to build upon as the SCVWD is currently in the early implementation stages of the *Arundo* Control Program approved under the Stream Maintenance Program. With that fact in mind, the SCVWD does not have a comprehensive idea of all of the factors affecting success of the program as well as the obstacles to implementation. There are currently unresolved biological issues regarding protection of potential nesting habitat found in *Arundo*. The mapping elements are not complete. Any, or all, of these factors could initiate "change-management" strategies as more data become available.

Success Criteria and Monitoring

1. Verification of Eradication of Arundo donax

Sites where initial activities to eradicate *Arundo* have been conducted will be re-inspected annually for three years and follow-up chemical or other treatments will be performed when needed. The Trustees will perform a final inspection in the fifth year to determine whether the treated areas have been successfully cleared. If, as a result of the inspection the Trustees determine that the *Arundo* has not been fully eradicated, then the Trustees may, in conjunction with the SCVWD and after consultation with the Landowner, suggest further actions by the SCVWD sufficient to reasonably assure the effective eradication of remaining stands.

Performance Criterion: Eradication of all *Arundo* stands identified and treated in the project areas.

2. Re-vegetation/Assessment

Regrowth or recruitment of native species will be inspected annually, for up to five years after eradication, at all sites where follow-up inspections and treatments for *Arundo* have been conducted. Each year, a qualified biologist will make an assessment and, where appropriate, recommendations for each site regarding:

- whether or not the site would support naturally occurring riparian vegetation
- whether or not adequate habitat is developing
- whether or not active re-vegetation efforts are feasible and are likely to be cost effective
- adjustments to success criteria
- whether or not success criteria have been met

Performance Criterion: Appropriate native vegetation cover in the project areas will be recommended by qualified biologists in consultation with the trustees and project proponents by comparison to native cover at sites with similar habitat types and soil/water conditions. Annual monitoring must demonstrate within five years after initial treatment that vegetation is attaining the pre-determined cover criterion. The goal of re-vegetation is to have 40% native cover in the treated area within 5 years after the end of final treatment. This cover criterion applies to those areas where there are no other limiting factors that would preclude the presence, or that degree of coverage, of naturally-occurring riparian vegetation.

3. Reporting

Annual reporting of activities conducted will be prepared and submitted to the Landowner and Trustee Agencies. Specific information will include relevant information such as the following (if applicable):

- Location maps and areas of eradication treatment sites
- Volume of biomass removed and disposed, disposal site
- Initial and follow-up treatment activities conducted
- Biological determinations of re-vegetation
- Re-vegetation sites success evaluation
- Activities planned for next reporting cycle
- Number and location of sites meeting success criteria

4. Contingencies

- All date/timeframe references to maintenance, monitoring, and reporting are calculated from the date of final treatment on a given site
- If plants become naturally established to the extent that maintenance can be reduced or ended in less than three years, appropriate reductions in maintenance may be made, in consultation with the Trustee Agencies. Once success criteria have been achieved and reported for a given site, with concurrence of the Trustee Agencies, no further monitoring and reporting of that area will be required
- Treatments of outbreaks of new stands of *Arundo* outside those identified and eradicated in this project are not included in the scope of work for this project

Environmental Consequences

Project implementation will result in some disturbance of wildlife and possible impacts from the short-term loss of cover while native species become established; however, it is expected that the benefits of this project will provide adequate mitigation for the environmental consequences described.

Evaluation

Project benefits include:

- Replacement of non-native *Arundo* with native habitat suitable for a broad range of species potentially injured by mercury releases by providing greater structural, biological and age diversity.
- Improvement of fish habitat in the following ways:
  - Structural diversity
  - Temperature control
  - Nutrient supplement
  - Bank stability/erosion control
  - Reduced surface runoff
  - Improved stream function
  - Reduced flood risk
- Reduction of habitat fragmentation, which may:
  - facilitate wildlife movement
  - provide contiguous nesting/foraging habitat

This project will complement *Arundo* removal projects being implemented by other entities in Coyote Creek and increase their probability of success by eliminating upstream sources of *Arundo*.

This project has been evaluated against the selection criteria described in 43 CFR Part 11 and in section 4.2 of this document, and has been determined to be consistent with these selection factors. The Trustees have determined that this restoration project will restore resources comparable to those injured by mercury releases in the Guadalupe River watershed.

Implementation Schedule

The model schedule for the project is as follows:

Aug. 2006	Survey and Mapping of Sites
Aug.-Oct. 2006	Initial treatment, biomass removal and disposal
Dec. 2006	Annual Monitoring Report
July 2007	Treatment Site Inspections
Aug.-Oct. 2007	Follow-up treatment
Dec. 2007	Annual Monitoring Report
July 2008	Treatment Site Inspections
Aug.-Oct. 2008	Follow-up treatment
Dec. 2008	Annual Monitoring Report
July 2009	Treatment Site Inspections
Aug.-Oct. 2009	Follow-up treatment
Dec. 2009	Annual Monitoring Report
July 2010	Treatment Site/Re-vegetation Inspections
Aug.-Oct. 2010	Follow-up treatment
Dec 2010	Annual Monitoring Report
July 2011	Re-vegetation Inspections
Dec 2011	Annual Monitoring Report
July 2012	Re-vegetation Inspections
Dec 2012	Annual Monitoring Report
July 2013	Re-vegetation Inspections
Dec 2013	Annual Monitoring Report
July 2014	Re-vegetation Inspections
Dec 2014	Annual Monitoring Report
July 2015	Re-vegetation Inspections

4.3.2.2 #2 - Hillsdale Bridge Fish Passage Improvement Project

Project Description

Hillsdale Bridge is located on the Guadalupe River approximately 2 miles downstream from the confluence of Guadalupe Creek and Alamitos Creek. The Hillsdale Bridge is a two-lane vehicle bridge that has been de-commissioned. Within the channel beneath the bridge are constructed features that impede fish passage during certain flow regimes. Of greatest concern is the barrier to young salmonid passage that occurs during low flow periods in mid- to late summer, preventing these fish from migrating downstream.

The project will remove the constructed features in the channel.

Restoration Objectives

a. Goal: Replace fish potentially lost to mercury contamination by improving fish passage conditions in the Guadalupe River and facilitating juvenile outmigration.

b. Objectives:
i. Remove artificial barriers impeding fish passage
ii. Verify achievement of performance criteria

Scaling Approach

Several anadromous fish species are native to the Guadalupe River watershed, including steelhead trout, fall-run Chinook salmon, and Pacific lamprey. Mercury releases from historic mining operations, including those in Almaden Quicksilver County Park, potentially reduced productivity of these species, and resulted in issuance of fish consumption advisories. By improving the potential for out-migration by juvenile anadromous fish, this project will compensate in part for past injuries to those resources that are not addressed by the primary restoration projects described in Section 4.3.1.

Rather than attempt direct restoration of anadromous fish resources, the project focuses on creating habitat conditions beneficial to native fish, with the expectation that improved fish passage will result in increased productivity of those resources.

Probability of Success

Regulatory and technical feasibility are considered high for this project, indicating a high probability of overall success. All required permits have previously been obtained.

Stream restoration has become commonplace in recent years, and numerous guidance documents and design references are available. The size of this site is sufficiently small that the actual construction period will likely be short, with removal of bridge, excavation, removal of all grouted rock, rubble, and sacked concrete rip-rap contained within the channel, and restoration of the channel grade completed within 6-8 weeks. The site is easily accessed from the road for

equipment ingress and egress. Removal of structural material is likely to be easily accomplished with available equipment.

Success Criteria and Monitoring

1. *Removal of fish migration impediments*

   The impediments to fish migration will be removed.

   Performance Criterion: Removal of structures.

2. *Restoration of channel grade*

   Performance Criterion: Completion of construction and persistence of the grade through three winter high flow seasons.

3. *Reporting*

   Reporting of activities conducted will be prepared and submitted to the Trustee Agencies. Specific information in a one-time report will include confirmation of Project construction completion information.

4. *Contingencies*

   Once performance criteria have been achieved and reported no further monitoring and reporting will be required.

Environmental Consequences

Project implementation will result in some disturbance to fish and wildlife; however, it is expected that the benefits of this project will provide adequate mitigation for the environmental consequences described.

Evaluation

Project benefits include:

- Improved fish habitat as a result of:
  - Greater range of mobility for feeding
  - Unimpeded passage during migration periods
- Reduces habitat fragmentation, which will facilitate movement of anadromous and resident fish species and wildlife.

This project has been evaluated against the selection criteria described in 43 CFR Part 11 and in section 4.2 of this document, and has been determined to be consistent with these selection

factors. The Trustees have determined that this restoration project, together with other projects described herein, will restore resources comparable to those injured by mercury releases in the Guadalupe River watershed.

Implementation Schedule

As discussed in Section 1.5, this project has already been implemented to take advantage of the mobilization to remove the Hillsdale Street Bridge. The Trustees agreed that the removal of the fish barrier would be recognized as a part of the PRP's restoration obligation. The schedule for the project was as follows:

Prior to Oct 2003	Project Construction
Dec 2003	Construction Completion Report

4.3.2.3 #3 Compensatory Restoration Alternative: Ravenswood Marsh Predator Control

Project Description

Marshes in the San Francisco Bay were and currently are home to numerous species of birds, mammals, fish, and vegetation, including the California clapper rail, which is listed as Endangered under the Federal Endangered Species Act (ESA). Habitat for the California clapper rail typically consists of pickleweed and cordgrass salt water marshes within a system of sloughs having constant tidal circulation.

The Ravenswood Marsh contains elements of habitat suitable for the California clapper rail and is part of the Ravenswood Open Space Preserve owned by Mid-Peninsula Regional Open Space District (MROSD) (see Figure 1). The 115-acre marsh is located along the western shore of the San Francisco Bay, approximately 0.5 miles east of University Avenue and 0.75 miles south of State Route 84. The Ravenswood Marsh is accessed by traveling east on Bay Road, towards the San Francisco Bay. As part of this project, MROSD will continue to maintain the current level of public access to the Preserve, including parking, an informational kiosk, walkways, and bike trails.

The Cooley Landing peninsula lies immediately southeast of the marsh. Relative to the Ravenswood Marsh, the peninsula is smaller, covering approximately 15 acres. This upland area contains a grassy meadow, small trees, and various man-made features including a driveway, an old house, a landlocked dredge, and a boat landing in substantial disrepair. MROSD owns the northern and southern margins of the peninsula and Peninsula Open Space Trust (POST) owns the 6.62 acre central portion containing the structures. This project includes MROSD negotiations with POST to allow similar predator controls on the POST parcel, if recommended by USDA-WS.

Historically, the Ravenswood Marsh was a natural tidal salt marsh and probably contained habitat characteristics suitable for California clapper rail. In the mid-1900s, a levee was constructed around the marsh to isolate it from tidal action and to construct a pond for the production of salt. In 2000, restoration of the hydrology and vegetation began at the Ravenswood Marsh to "provide a safe and natural habitat for many native plants and animals [including] the California clapper rail and the salt marsh harvest mouse." Routine monitoring of the restoration activities at the site will be performed, for the initial 10 years, by others under the direction of the San Francisco Bay Regional Water Quality Control Board (RWQCB) and the California Department of Fish and Game (CDFG). Results from the first annual monitoring report indicate that the restoration effort has successfully created appropriate hydrologic and geomorphic conditions to support marsh function and further natural development. In 2001, California Clapper Rails were observed foraging at the marsh.

The U.S. Fish and Wildlife Service (USFWS) listed the California clapper rail as an endangered species on October 13, 1970. Threats to the California Clapper Rail include loss and degradation of habitat, invasion of non-native cordgrass, pollution, and predation. Adult and juvenile California clapper rails are preyed upon by non-native red foxes and feral cats, while their eggs

can be predated by raccoons, striped skunks, and Norway rats. The red fox is a significant predator of the California clapper rail and probably contributes to its population decline.

Therefore, this project consists of funding five years of predator damage management (i.e., predator control) to be implemented by the USDA-WS at the Ravenswood Marsh. USDA-WS will be contracted with to implement a program of predator controls at the Ravenswood Marsh in a manner and at a level of effort similar to that provided to SFBNWR in areas of similar size and features. In 2001, the USDA-WS performed a preliminary inspection of the Ravenswood Marsh and concluded that predation pressures from red fox, raccoon, skunk, rat, and feral cat are likely. Successful predator control programs currently are operating in marshes north and south of the Ravenswood Marsh. Discussions with USDA-WS, SFBNWR, CDFG, and USFWS indicated that the implementation of a predator control program at the Ravenswood Marsh is likely to be successful and would contribute to the regional efforts to reduce predation pressures on the California clapper rail.

Restoration Objectives

a. Goal: Reduce predation pressures on the California clapper rail (*Rallus longirostris obsoletus*) at the Ravenswood Marsh.

b. Objectives:

i. Fund a five-year predator control program to be implemented by the U.S. Department of Agriculture Animal and Plant Health Inspection Service Wildlife Services (USDA-WS).
ii. Request the San Francisco Bay National Wildlife Refuge (SFBNWR) to include the Ravenswood Marsh in its annual counts of the California clapper rail.
iii. Enable access to the Ravenswood Marsh by the public for the safe viewing of the California clapper rail.
iv. Work with POST to allow USDA-WS access to Cooley Landing to perform predator control activities complementary to those on Midpeninsula Regional Open Space District (MROSD) land.

Scaling Approach

California clapper rails nesting in tidal wetlands in the estuary of the Guadalupe River have shown decreased productivity potentially as a result of exposure to mercury contamination. In areas such as Ravenswood marsh where contaminants concentrations are lower, predator control programs have been shown to dramatically improve clapper rail numbers. The potential to restore clapper rail resources comparable to those injured historically in the Guadalupe River Watershed is therefore high. This project will compensate in part for past injuries to those resources that are not addressed by the primary restoration projects described in Section 4.3.1.

Rather than attempt direct restoration of clapper rails, this project will complement an ongoing marsh restoration project by focusing on controlling known rail predators, with the expectation

that relief from predation pressure will result in direct benefits to rails as they expand into developing habitat.

Probability of Success

Regulatory and technical feasibility are considered high for this project, indicating a high probability of overall success. Permits required for the implementation of predator control activities are the responsibility of the USDA-WS. Under the Animal Damage Control Act of 1931 and the Rural Development, Agricultural, and Related Agencies Act of 1988, the USDA has the authority to implement predator damage management activities. Based on a Final Environmental Assessment, the USFWS issued its "Finding of No Significant Impact" for the "Predator Management Plan," which became final on May 2, 1991. This project will not require MROSD to obtain permits.

USDA-WS routinely implements predator control activities throughout SFBNWR. Based on reconnaissance of the Ravenswood Marsh by USDA-WS and CDFG personnel, the marsh is an excellent candidate for successful predator control actions. Similar projects in other marshes managed by the U.S. Fish and Wildlife service have shown dramatic increases in clapper rail numbers after predator management was initiated.

Success Criteria and Monitoring

1. Assess efforts to remove predators from the Ravenswood Marsh

USDA-WS reports annually on the success of its predator damage management program, which is implemented in several areas throughout San Francisco Bay under the direction of the SFBNWR. The reports include the number, location, and types of traps set, and the number, location, and species of predators captured at the marsh. This information will be used to estimate:

- whether predators are being captured at the marsh,
- whether predation pressures are likely to decrease, and
- whether changes to the predator control program should be made.

Success Criterion: USDA has completed a five-year predator control program at the Ravenswood Marsh with a level of effort comparable to that completed for SFBNWR in areas of similar size and features.

2. Reporting

There are three routine annual monitoring and reporting programs currently in place that describe various habitat conditions at the Ravenswood Marsh:

- Those parties implementing marsh restoration activities submit annual reports describing the success of the restoration effort to the CDFG, USFWS, and

RWQCB. This information will be useful in assessing the suitability of the Ravenswood Marsh for supporting nesting and breeding California clapper rails.

- SFBNWR performs an annual count of the California clapper rail. Once SFBNWR includes the Ravenswood Marsh in its annual counting program, the information will be useful in determining whether the California clapper rail are using the Ravenswood Marsh for foraging, nesting, and/or breeding.
- USDA-WS annually reports the results of its predator control program.

MROSD will assure that the trustees receive copies of the identified reports through the end of the five year predator control project. Taken together, the three annual monitoring reports will provide information to the trustees to assist in:

- determining the optimal time for initiating the five year predator control program, and
- evaluating the predator control measures at the Ravenswood Marsh.

3. Contingencies

There are no contingencies applicable to MROSD's obligation to fund this project. At the trustee's discretion and prior to initiating predator control at the Ravenswood Marsh, the funding may be used to perform comparable predator control at another location if suitable conditions for effective predator control do not develop sufficiently at the Ravenswood Marsh. In such an event, MROSD would not be responsible for any monitoring or reporting obligations.

Environmental Consequences

The project will result in the capture of an unknown number of non-native predators and feral domestic animals; however, the environmental consequences of the program have been documented in an Environmental Assessment and Finding of No Significant Impact prepared by the staff of the Don Edwards San Francisco Bay National Wildlife Refuge. Other than an expansion in geographic scope, no consequences in addition to those previously documented are expected to occur, and the benefits of the project are expected to significantly exceed the environmental costs.

Evaluation

There are three primary benefits expected from the implementation of this project:

- Removal from the Ravenswood Marsh of predators such as red fox, skunk, raccoon, and feral cat that potentially affect a broad range of resident animals.
- Reduced specific predation pressures on the California clapper rail at the Ravenswood Marsh.
- Improved regional efforts to control predators within the SFBNWR.

Additional benefits are also anticipated, including:

- Reduced predation of other animals at the Ravenswood Marsh, such as birds and the endangered salt marsh harvest mouse.
- Enhanced growth of the California clapper rail population at the Ravenswood Marsh.
- Enhanced regional growth of the California clapper rail population.
- Reduced predation pressure on California clapper rail on adjacent properties and within the foraging range of the removed predators.
- Possible increased opportunities for viewing of the California clapper rail by visitors to the Ravenswood Marsh.

This project has been evaluated against the selection criteria described in 43 CFR Part 11 and in section 4.2 of this document, and has been determined to be consistent with these selection factors. The Trustees have determined that this restoration project will restore resources comparable to those injured by mercury releases in the Guadalupe River watershed.

Implementation Schedule

Predator control activities will be performed by USDA-WS for a period of five years. The start date for implementing the predator control program at the Ravenswood Marsh will be determined by the resource trustees. Parameters to be considered in deciding when to begin predator control will include the quality and stability of the habitat at the Ravenswood Marsh, success of predator control programs in adjacent areas, and foraging, nesting, and breeding occurrences of California clapper rail in the Ravenswood Marsh. Information directly related to these critical parameters is contained in the three current routine annual monitoring reports for the area.

5.0 APPLICABLE LAWS AND REGULATIONS

5.1 Overview.

The three major environmental statutes that guide the restoration of injured resources and lost services for the Guadalupe River Watershed are CERCLA, NEPA, and CEQA. These statutes set forth a specific process of environmental impact analysis and public review. In addition, the Trustees and PRPs must comply with several additional federal, State, and local statutes, regulations, and policies. Relevant, and potentially relevant, statutes, regulations, and policies are discussed below.

In addition to compliance with these statutes and regulations, the Trustees should consider relevant environmental or economic programs or plans that are ongoing or planned in or near the affected environment. The Trustees should ensure that restoration projects neither impede nor duplicate such programs or plans. By coordinating the restoration projects identified in this document with other relevant restoration programs and plans, the Trustees can enhance the overall effort to restore and improve the environment and resources potentially affected by the release of mercury within the Guadalupe River Watershed.

Several of the restoration actions identified in this RP/EA involve projects constructed in waters of the United States. Therefore, these projects are subject to review and approval by the appropriate regulatory agencies.

5.1.1 Federal Statutes

Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)

Removal of additional calcine materials will require compliance with the provisions of CERCLA to ensure public health and safety. The original Remedial Action Plan developed by the County and approved by DTSC, the lead agency responsible for overseeing efforts by the County to investigate and remediate mercury-containing waste materials, will be amended as necessary, with the cooperation of DTSC, to ensure compliance with CERCLA and provided appropriate documentation for activities undertaken to implement the primary restoration projects selected.

National Environmental Policy Act (NEPA), as amended, 42 U.S.C. 4321, et seq., 40 C.F.R. Parts 1500-1508

NEPA requires an assessment of any Federal action that might impact the environment. NEPA applies to restoration activities undertaken by Federal trustees. Congress enacted NEPA in 1969 to establish a national policy for the protection of the environment. NEPA established the Council on Environmental Quality (CEQ) to advise the President and carry out certain other responsibilities related to the implementation of NEPA by Federal agencies. Pursuant to Presidential Executive Order, Federal agencies are obligated to comply with the NEPA regulations adopted by the CEQ. These regulations outline the responsibilities of Federal agencies under NEPA and provide specific procedures for preparing environmental

documentation to comply with NEPA. Except where a categorical exclusion or other exception applies, NEPA requires that an Environmental Assessment (EA) be prepared in order to determine whether a proposed restoration action will have a significant effect on the quality of the human environment.

Generally, when it is uncertain whether an action would have a significant effect, Federal agencies begin the planning process by preparing an EA. The EA may undergo a public review and comment period. Federal agencies may then review the comments and make a determination. Depending on whether the impact is considered significant, an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI) will be issued.

The Trustees have integrated this CERCLA restoration planning process with the NEPA and CEQA (discussed under the section on State statutes) processes to comply with these requirements. This integrated process allows the Trustees to meet the public involvement requirements of CERCLA, NEPA, and CEQA concurrently. This RP/EA is intended to accomplish NEPA and CEQA compliance by: (1) summarizing the current environmental setting; (2) describing the purpose and need for restoration action; (3) identifying alternative actions; (4) and assessing public participation in the decision process. Supplemental project-specific NEPA and/or CEQA documents might be needed for some of the restoration projects, as identified in the Decision Document. Others might fall within an existing EIS or EIR.

Federal Water Pollution Control Act (Clean Water Act [CWA]), 33 U.S.C. Section 1251 et seq.

The objective of the Clean Water Act is to restore and maintain the chemical, physical, and biological integrity of the nation's water. The CWA is the principal statute governing pollution control and water quality of the nation's waterways. To this end, Section 404 of the CWA requires a permit from the U.S. Army Corps of Engineers for the discharge of dredge or fill material into waters of the United States. Section 401 of the CWA requires the state to certify that any Federally permitted or licensed activity that might result in discharge to waters of the U.S., including issuance of a Section 404 permit, will not violate applicable water quality standards established by the state. In California, the Section 401 water quality certification program is administered by the Regional Water Quality Control Boards.

Endangered Species Act (ESA), 16 U.S.C. Section 1531, et seq.

The ESA directs all Federal agencies to conserve endangered and threatened species and their habitat and encourages such agencies to utilize their authorities to further these purposes. Under the act, the National Marine Fisheries Service and the U.S. Fish and Wildlife Service publish lists of threatened and endangered species. Section 7 of the ESA requires that Federal agencies consult with these two agencies to minimize the effects of Federal actions on endangered species. Prior to implementation of the selected restoration projects, the Trustees will conduct Section 7 consultations in conjunction with the Essential Fish Habitat (EFH) consultation.

As noted previously in this RP/EA, several Federal and state-listed species frequent the areas impacted by the mercury releases. Some are also found in areas where the Trustees plan to

implement restoration projects. Some listed species, such as the California clapper rail and the steelhead trout, will benefit from the restoration projects. Should the Trustees determine that any of the projects would adversely affect a threatened or endangered species, they will either redesign the project, or substitute another project.

Fish and Wildlife Coordination Act (FWCA), 16 U.S.C. 661, et seq.

The FWCA requires that Federal agencies consult with the USFWS, NMFS, and state wildlife agencies for activities that affect, control, or modify waters of any stream or bodies of water, in order to minimize the adverse impacts of such actions on fish and wildlife resources and habitat. This consultation is generally incorporated into the process of complying with Section 404 of the CWA, NEPA, or other Federal permit, license, or review requirements.

Rivers and Harbors Act, 33 U.S.C. 401, et seq.

The Rivers and Harbors Act regulates development and use of the nation's navigable waterways. Section 10 of the Act prohibits unauthorized obstruction or alteration of navigable waters and vests the USACOE with authority to regulate discharges of fill and other materials into such waters. Restoration actions that require Section 404 CWA permits are also likely to require permits under Section 10 of the Rivers and Harbors Act. However, a single permit usually serves for both. Therefore, the Trustees can ensure compliance with the Rivers and Harbors Act through the same mechanism.

Executive Order (EO) 12898 – Environmental Justice

On February 11, 1994, President Clinton issued EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations. This EO requires each federal agency to identify and address as appropriate disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations. The USEPA and CEQ have emphasized the importance of incorporating environmental justice review in the analyses conducted by Federal agencies under NEPA and developing mitigation measures that avoid disproportionate environmental effects on minority and low-income populations.

Executive Order (EO) 11988 – Construction in Flood Plains

This 1977 EO directs Federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with occupancy and modification of flood plains and to avoid direct or indirect support of development of flood plains wherever there is a practical alternative. Each agency is responsible for evaluating the potential effects of any action it might take in a flood plain. Before taking any action, the agency should determine whether proposed action will take place in a flood plain. For any major Federal action significantly affecting the quality of the human environment, the evaluation will be included in the agency's NEPA compliance document. The agency should consider alternatives to avoid adverse effects and incompatible development in flood plains. If the only practicable alternative requires siting in a flood plain, the agency should: (1) design or modify the action to minimize potential harm; and (2) prepare

and circulate a notice containing an explanation of why the action is proposed to be located in the flood plain.

Executive Order (EO) 13112 – Invasive Species

EO 13112 applies to all Federal agencies whose actions might affect the status of invasive species and requires agencies to identify such actions and to the extent practicable and permitted by law to: (1) take actions specified in the EO to address the problem consistent with their authorities and budgetary resources; and (2) not authorize, fund, or carry out actions that they believe are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere unless, "pursuant to guidelines that it has prescribed, the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize the risk of harm will be taken in conjunction with the actions."

5.1.2 State Statutes

California Environmental Quality Act (CEQA), Pub. Res. Code Sections 21000-21177.1

CEQA was adopted in 1970 and applies to most public agency decisions to carry out, authorize, or approve projects that might have adverse environmental impacts. CEQA requires that agencies inform themselves about the environmental effects of their proposed actions, consider all relevant information, provide the public with an opportunity to comment on the environmental issues, and avoid or reduce potential environmental harm whenever feasible.

The CEQA process begins with a preliminary review of whether CEQA applies to the project in question. Generally, a project is subject to CEQA if it involves a discretionary action by an agency that might cause a significant effect on the environment. Once the agency determines that the project is subject to CEQA, the lead agency should then determine whether the action is exempt under either a statutory or categorical exemption (14 Cal. Code Regs. Section 15061).

If the lead agency determines that the project is not exempt, then an Initial Study should be prepared to determine whether the project might have a potentially significant impact on the environment (14 Cal. Code Regs. Section 15063). To meet the requirements of this section, the lead agency may use an environmental assessment prepared pursuant to NEPA. Based on the Initial Study, the lead agency determines the type of CEQA document that will be prepared. The test for determining whether an Environmental Impact Report (EIR) or Negative Declaration should be prepared is whether a fair argument can be made based on substantial evidence that the project might have a significant adverse effect on the environment (Pub. Res. Code Section 21068, Cal. Code Regs. Section 15063).

A number of the proposed restoration projects might be categorically exempt due to: (1) 14 Cal. Code Regs. Section 15304, "Minor alterations to land, water, or vegetation"; (2) 14 Cal. Code Regs. Section 15307, "Actions taken by regulatory agencies for protection of natural resources"; and (3) 14 Cal. Code Regs. Section 15308, "Actions by regulatory agencies for protection of the environment". None the less, the Trustees decided to proceed with further CEQA documentation

as an aid to appropriate project lead agencies. The Trustees have integrated this RP/EA with the NEPA and CEQA processes to comply, in part, with those requirements.

This RP/EA is intended to address the Initial Study requirements under CEQA by: (1) summarizing the current environmental setting; (2) describing the purpose and need of the restoration action; (3) identifying alternative actions; (4) assessing the environmental consequences of the preferred action; and (5) summarizing opportunities for public participation in the decision process. Project-specific NEPA and CEQA documents might be needed for some of the restoration projects. Other projects might fall within an existing EIS or EIR. CEQA encourages the use of an EIS or FONSI or combined state/Federal documents in place of separate EIRs or Negative Declarations (Pub. Res. Code Section 21083.5, 21083.7; Cal Code Regs. Section 15221-15222). This RP/EA and Decision Document can therefore be used in place of a separate Negative Declaration.

California Endangered Species Act, Fish and Game Code Sections 2050 et seq.

It is the policy of the State of California that state agencies should not approve projects which would jeopardize the continued existence of any endangered or threatened species, or result in the destruction or adverse modification of habitat essential to the continued existence of those species if there are reasonable and prudent alternatives available. If reasonable and prudent alternatives are not available, individual projects may be approved if appropriate mitigation and enhancement measures are provided. Under this act, the Fish and Game Commission established a list of threatened and endangered species based on criteria recommended by CDFG.

Public Resources Code, Division 6, Sections 6001 et seq.

The Public Resources Code, Division 6, gives the State Lands Commission trustee ownership over state sovereign tide and submerged lands. Permits or leases might be required from the State Lands Commission if a restoration project is located on such lands.

5.3 Other Potentially Applicable Statutes and Regulations

Additional statutes might be applicable to NRDA restoration planning activities. The statutes listed below, or their implementing regulations, might require permits from federal or state permitting authorities:

Migratory Bird Treaty Act, 16 U.S.C., Section 703 et seq.

Archeological Resources Protection Act, 16 U.S.C., Section 460 et seq.

National Historic Preservation Act of 1966 as amended, 16 U.S.C. Sections 110, 470.

Federal Insecticide, Fungicide, and Rodenticide Act, 7 U.S.C., Section 6.

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6.2 Agencies, Organizations, and Individuals Contacted

U.S. Fish and Wildlife Service
Sacramento Fish and Wildlife Office
2800 Cottage Way, Rm. W-2605
Sacramento, CA 95825

U.S. Fish and Wildlife Service
Don Edwards San Francisco Bay National Wildlife Refuge
P.O. Box 524
Newark, CA 94560

California Department of Fish and Game
Region 3
7329 Silverado Trail
Yountville, CA 94559

Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118

Santa Clara County
Department of Parks and Recreation
298 Garden Hill Drive
Los Gatos, CA 95032

U.S. Department of Agriculture
Animal and Plant Health Inspection Service
511 Finely Drive
Taft, CA 93268

U.S. Department of Commerce
National Marine Fisheries Service
777 Sonoma Ave., #325
Santa Rosa, CA 95404

Midpeninsula Regional Open Space District
330 Distel Circle
Los Altos, CA 94022

California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street
Oakland, CA 94612

California Department of Toxic Substances Control
Region 2
700 Heinz Ave., Suite 200
Berkeley, CA 95670

U.S. Army Corps of Engineers
San Francisco District
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San Francisco, CA 94105

U.S. Geological Survey
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APPENDIX A

NEPA Decision Document

July 16, 2007

Decision Document Concerning the Almaden Quicksilver Restoration Plan and Environmental Assessment

Purpose

This Decision Document approves and makes final the Almaden Quicksilver Restoration Plan and Environmental Assessment (RP/EA), the draft of which was dated January 14, 2005 and upon which public comment was sought, in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), in particular 42 U.S.C. section 9611(i), and its implementing regulations found at 43 CFR part 11.93 and with the National Environmental Policy Act (NEPA) as amended, 42 U.S.C. section 4321 et seq., and its implementing regulations, 40 CFR Part1500, 516 of the Departmental Manual, and the U.S. Fish and Wildlife Service's (USFWS) NEPA Manual (550 FW 1 and 2).

Background

The RP/EA was prepared jointly by the United States Department of the Interior (DOI), represented by the USFWS, and the State of California, represented by the California Department of Fish and Game, Office of Spill Prevention and Response (CDFG) (collectively, the Trustees). These agencies, through a memorandum of understanding, worked with the Potentially Responsible Parties (PRPs) to cooperatively evaluate potential actions to address natural resource injuries from historical and ongoing releases of mercury into the Guadalupe River watershed.

Almaden Quicksilver County Park is a 1,520-hectare (ha), undeveloped parcel situated on the northeast ridge of the Santa Cruz Mountains, approximately 19 kilometers (km) south of downtown San Jose. The Park is located in the 447 square km watershed of the Guadalupe River, which drains the south central portion of the Santa Clara Valley into South San Francisco Bay via Alviso Slough. Operations relating to the mining and/or processing of mercury ore containing the mineral cinnabar (mercury sulfide) were conducted from about 1845 to about 1971 along the Los Capitancillos Ridge, a line of hills which trend northwest-southeast across the Park. The largest production occurred between 1846 and 1905 from the underground workings of the New Almaden Mine (Mine Hill Area). Because of the abundance of ore in the Mine Hill Area, other mine areas were not developed until production declined in the early 1900's. By 1917, the extensive underground ore bodies in the Mine Hill Area were largely exhausted, and only small scale operations continued until World War II. Interest in the mines was renewed by the war, and limited mining or mining related operations might have continued into the early 1970's. After ore was processed, the residual materials, or calcines, were typically dumped near the process area. Calcines also were spread on unpaved roads as a road base material in the Mine Hill Area.

Santa Clara County purchased the property from the New Idria Mining & Chemical Company in two transactions taking place in 1973 and 1975. The County designated this property as Almaden Quicksilver County Park, and opened the park to the public in 1975 (Santa Clara County 1995). The County subsequently acquired the Hacienda Furnace Yard area from a third party and added this area to the Park. Remedial actions were completed at five former mercury ore extraction or processing areas in Almaden Quicksilver County Park from 1998–2000 in accordance with a Remedial Action Plan developed by the County of Santa Clara Parks and Recreation Department (County). These remedial actions were approved by the California Department of Toxic Substances Control (DTSC), the lead agency responsible for overseeing efforts by the County to investigate and remediate mercury-containing waste materials which remained at the Park.

The areas potentially impacted by the release of mercury from historic mining operations include the Alamitos Creek subwatershed and associated reservoirs, the Arroyo Calero subwatershed and associated reservoir, the Guadalupe Creek subwatershed and associated reservoir, the mainstem of the Guadalupe River, Alviso Slough (the estuary of the Guadalupe River), and tidal wetlands associated with the Don Edwards San Francisco Bay National Wildlife Refuge

Both Federal and California statutes establish liability for natural resource damages to compensate the public for injury, destruction, and loss of resources and their services due to chemical releases. State and Federal statutes authorize natural resource trustees to act on behalf of the public to assess and recover natural resource damages and to plan and implement actions to restore natural resources and natural resource services injured or lost as a result of chemical releases. In the case of potential injuries to natural resources due to mercury releases from the historic mercury mines, the Trustees worked cooperatively with a majority of the PRPs to develop a suite of five restoration projects. The projects will be or have been funded and implemented by some of the PRPs, under the oversight of the Trustees, as required by a consent decree entered by the Federal District Court for the Northern District of California on November 16, 2005.

NEPA Decision

The public review draft RP/EA evaluated a suite of five projects as the "preferred alternative" and the "no action" alternative. It did not evaluate other alternatives because the Consent Decree requires the performance of the five specific projects only. The Trustees developed criteria to evaluate the projects included in the draft RP/EA in terms of compliance with federal and state laws and natural resource benefits. The preferred alternative restoration projects are considered either primary or compensatory as described in the RP/EA, and as indicated below.

(A) Preferred alternative:
Hacienda Furnace Yard Restoration on Alamitos Creek (Primary),
Jacques Gulch Restoration on Jacques Creek and an unnamed tributary (Primary),
Arundo Removal and Riparian Habitat Restoration on Coyote Creek (Compensatory),
Fish Barrier Removal on the Guadalupe River at Hillsdale Street (Compensatory),
Predator Control in Ravenswood Marsh in East Palo Alto (Compensatory).

(B) No Action Alternative:
No action would be taken to implement any of the proposed restoration activities.

This Decision Document concludes that a Finding of No Significant Impact (FONSI) under NEPA is appropriate for three of the five projects that constitute the preferred alternative, specifically *Arundo* Removal and Riparian Habitat Restoration on Coyote Creek, Fish Barrier Removal on the Guadalupe River at Hillsdale Street, and Predator Control in Ravenswood Marsh in East Palo Alto (see Table 1).

The two primary restoration projects, Hacienda Furnace Yard and Jacques Gulch, have not been developed in enough detail to make a final determination as to whether or not they will have a significant impact on the environment. Supplemental NEPA and/or CEQA analyses will be performed for those projects when the PRPs have developed detailed engineering designs or operational plans including such information as the means and duration of any dewatering of the stream. As discussed in the RP/EA, the PRPs' specific proposed approaches will likely require review by those government officials responsible for compliance with section 404 of the Clean Water Act and with the Federal Endangered Species Act (ESA), as amended (16 U.S.C. Section 1531 et seq.).

With the possible exception of these two primary restoration projects, USFWS concludes that the selected action does not constitute a major federal action significantly affecting the quality of the human environment.

Public Review

A public comment period for the draft RP/EA was held from September 14 through October 17, 2005. The document was available in hard copy form and electronically though the State and federal government web pages. In addition, the draft RP/EA was included as an appendix to the consent decree, which was also available for public comment. No written comments were received on either the draft RP/EA or the consent decree. A public meeting was held on September 21, 2005. The public was invited to submit oral or written comments on the draft RP/EA at the meeting. Two members of the public expressed support for the draft RP/EA; no other oral comments were received. The Trustees determined that no changes to the proposed restoration projects identified in the draft RP/EA were necessary.

Environmental Consequences

To comply with NEPA, CEQA, and other State of California and federal requirements, the Trustees analyzed the effects of each restoration project on the quality of the human environment including impacts to species listed under the Federal and/or State Endangered Species Act(s). Although the projects will be funded and implemented by the PRPs, the Trustees remain responsible for ensuring that each project is implemented in accordance with the RP/EA.

NEPA's implementing regulations direct federal agencies to evaluate the potential significance of proposed actions by considering context, duration, and intensity of the action. For the restoration projects considered, the appropriate context is local and regional, as opposed to national or worldwide. Any disturbance to fish and wildlife and possible impacts from

implementation of the restoration projects are expected to be local, short-term, and moderate with adequate mitigation provided by the benefits of the projects.

As documented in the RP/EA, the primary restoration projects will significantly accelerate the return of potentially injured resources and services to baseline. The compensatory projects will provide the same type, quality, and comparable value of lost ecological and human use services. The trustees also determined, with the possible noted exception(s) of the Hacienda Furnace Yard and Jacques Gulch projects, that the proposed projects can be implemented with no significant adverse effects to soils, air quality, water resources, floodplains, wetlands, vegetation, fisheries, wildlife, threatened/endangered species, visual quality, aesthetics/recreation, cultural resources, and the local economy.

An issue potentially requiring further analysis concerns possible effects on species protected under the ESA. The RP/EA envisions that any mitigation required to address potential adverse impacts on such species arising from the details of the Hacienda Furnace Yard and Jacques Gulch restoration projects will be provided by the Coyote Creek project.

Project-specific environmental consequences for each preferred project are discussed in Section 4 of the RP/EA, and summarized in Table 1 of this document. Mitigation measures are included, as appropriate, in some of the proposed projects to minimize potential impacts.

Cumulative Impacts

This section addresses the potential overall cumulative impacts of implementing the preferred alternative projects as required by NEPA. The Trustees examined a variety of proposed projects to restore resources and/or services lost as a result of the mercury releases. The Trustees believe that the projects selected in the RP/EA will not cause significant cumulative adverse impacts to natural resources or the services they provide. The Trustees further believe that the proposed projects will not affect the quality of the human environment in ways deemed "significant."

Cumulative environmental impacts are those combined effects on quality of the human environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what Federal or non-Federal agency or person undertakes such other actions (40 CFR 1508.7, 1508.25(a), and 1508.25(c)). Since these projects are designed to achieve recovery of injured natural resources, the cumulative environmental consequences will be largely beneficial; the selected projects address restoration and as such, are designed to enhance natural resources and provide benefits to the biological and physical environment. Habitat restoration projects may have short-term negative effects associated with in-stream or riparian habitat, but these effects will be temporary and localized, with the expected outcomes providing benefits to listed species and other biological resources.

The selected restoration projects build upon or are included in prior projects that have already undergone environmental review. The Trustees reviewed available prior documentation in consideration of cumulative impacts.

DTSC has determined that additional removal and containment of the last significant calcine deposits, i.e., implementation of the preferred primary restoration projects at Hacienda Furnace Yard and Jacques Gulch, will not result in any significant environmental impacts. DTSC issued

an Explanation of Significant Differences for these changes to the Cleanup Plan, Initial Study, and Negative Declaration under CEQA. The projects will reduce the threat of mercury exposure from impacted soils as well as the potential for releases of mercury into surface waters, thus providing improvements in environmental quality. Environmental impacts to biological resources are expected to be less than significant. Project activities include procedures to minimize impacts to species listed under the ESA, specifically red-legged frogs (*Rana aurora*) and steelhead (*Oncorynchus mykiss*), from dewatering in the project area as well as provisions to minimize impacts to riparian habitat.

Arundo removal in Santa Clara County is already approved as potential mitigation for other projects. The Santa Clara Valley Water District applied for a 10 year maintenance permit for its stream maintenance program. An EIR was prepared and NMFS and USFWS were consulted pursuant to section 7 of the ESA. This permit includes control of Giant Reed (*Arundo donax*) throughout Santa Clara County as mitigation which compensates for impacts to riparian vegetation from stream maintenance activities.

The Santa Clara Valley Water District and USACE prepared an EIS/R for the Upper Guadalupe River Flood Control Project. The California Regional Water Quality Control Board issued Waste Discharge Requirements and Water Quality Certification for the project. The EIS/R includes improvements for fish passage at the Hillsdale Bridge. The document indicates that any impacts are fully mitigated because of improved fish passage.

The USFWS prepared an Environmental Assessment and a Predator Management Plan to benefit endangered species including clapper rails at the San Francisco Bay National Wildlife Refuge (SFBNWR). The Predator Control Program at the refuge is implemented to control introduced species which prey on federally listed clapper rails (*Rallus longirostris obsoletus*). The Ravenswood Marsh Predator Control Program is a small geographical expansion of the program currently being implemented at the SFBNWR.

The RP/EA evaluates the preferred projects for environmental consequences. Below is an evaluation of the impacts to specific resources from the preferred projects combined.

Red-legged frog, tiger salamander (Ambystoma californiense) (ESA listed species), and amphibious species: Both the Hacienda Furnace Yard and Jacques Gulch projects may have a negative, short term impact on amphibious species including red-legged frogs and/or tiger salamanders if they are present during project implementation. As discussed in RP/EA, mitigation measures are planned during project implementation and these projects will require further analysis under the ESA. Overall, these restoration projects are designed to improve and restore aquatic and riparian habitat to benefit red-legged frogs, tiger salamanders and other amphibians.

Steelhead and *other fish species:* The Hacienda Furnace Yard project may impact steelhead and resident rainbow trout if they are present during project implementation. As discussed in the RP/EA, mitigation measures are planned during project implementation and this project will also require further analysis under the ESA. Overall, this project is designed to restore aquatic habitat and benefit fish. The Fish Barrier Removal at Hillsdale Street project is designed to improve habitat for fish, specifically to improve passage downstream for young salmonids during low

flows in the summer months. The *Arundo* Removal on Coyote Creek project is also expected to improve habitat for native fish through restoration of native, riparian habitat.

Vegetation and Mature Trees: The Hacienda Furnace Yard and Jacques Gulch project may include the removal of mature trees to allow removal of calcine deposits. However, the project includes re-vegetation and planting of trees to mitigate for those that are removed. The *Arundo* Removal on Coyote Creek project is specifically for the removal of invasive, non-native *Arundo donax* and re-vegetation of native species.

Clapper Rail: The Ravenswood Marsh Predator Control Project is designed to benefit federally listed clapper rails through predator control. As discussed in the RP/EA the trustees expect the benefit to clapper rails to be significant.

Red foxes (Vulpes vulpes), feral cats (Felis silvestris), raccoons (Procyon lotor), striped skunks (Mephitis mephitis), and Norway rats (Rattus norvegicus): The Predator Control in Ravenswood Marsh Project is expected to include removal of non-native red foxes, feral cats, Norway rats, striped skunks, and raccoons. This project will be an expansion of an existing project. However, the trustees do not expect significant or negative cumulative impacts to these species as they are, with the exception of the raccoon and the striped skunk, not native to the San Francisco Bay Area, and are generally abundant in California.

Although this plan directs efforts at restoring injured resources and creating beneficial impacts to injured resources, many other local and regional activities may influence the ability of the selected projects to create a net population or species-level benefit for injured resources. Maintenance activities, future watershed development, and climate change might have a negative impact on the recovery of injured resources. Monitoring of projects selected in the final RP/EA will assess whether the cumulative impacts will be beneficial rather than adverse.

Environmentally Preferred Alternative

The environmentally preferred alternative is the alternative that will promote NEPA, as expressed in Section 101 of NEPA. The identification of the environmentally preferred alternative is the one which best meets the following requirements:

1. Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.

2. Ensure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings.

3. Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences.

4. Preserve important historical, cultural, and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice.

5. Achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life`s amenities.

6. Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

Based on the analysis of the proposed action when compared to the no action alternative, the proposed action meets the criteria above and is therefore the environmentally preferred alternative.

Basis for Decision

The restoration projects selected for implementation will provide restoration of potentially injured resources through compliance with applicable laws and regulations while preventing unnecessary or anticipated negative effects from occurring.

The proposed action complies or will comply with the ESA, the National Historic Preservation Act, and Executive Orders 11988 and 11990.

Conclusion

Based upon environmental review and evaluation of the Almaden Quicksilver RP/EA, I have determined that the selected action does not constitute a major federal action significantly affecting the quality of the human environment within the meaning of section 102 (2) (c) of the National Environmental Policy Act of 1969 and regulations of the Council on Environmental Quality (40 CFR 1508.9). Accordingly, an Environmental Impact Statement is not required for this action, or for the three compensatory restoration projects. The Hacienda Furnace Yard Restoration Project and the Jacques Gulch Restoration Project will undergo further NEPA review in the permit application process.

This Decision Document is duly approved by:

Steve Thompson
Manager, California/Nevada Operations Office
U.S. Fish and Wildlife Service

7-17-07
Date

Table 1. Summary of benefits and impacts of restoration alternatives.

Alternative		Project Benefits	Project Impacts/Mitigation	Prior NEPA/CEQA Review	NEPA Complete
Preferred	Hacienda Furnace Yard	1. Reduction of calcine mass. 2. Reduction of mercury bioavailability to biota. 3. Restoration of riparian habitat. 4. Minimization of vegetative stress.	1. Dewatering of 0.5 miles of creek for 4–6 weeks during construction — temporary loss of habitat for steelhead and red-legged frog mitigated by slow dewatering and compensatory habitat. 2. Loss of mature riparian trees — mitigated by avoidance/planting.	Remedial action at Hacienda Furnace Yard completed NEPA/ CEQA review in 1994–1996 prior to implementation. Explanation of Significant Differences for Changes to the Cleanup Plan, Initial Study, and Negative Declaration finalized by DTSC to allow calcine disposal at Mine Hill Remediation site.	Further analysis based on design documents will be required

	Jacques Gulch	1. Reduction of calcine mass. 2. Reduction of mercury bioavailability to biota. 3. Restoration of riparian habitat. 4. Minimization of vegetative stress.	1. Temporary loss of habitat for aquatic biota — mitigated by timing construction for the dry season and compensatory habitat. 2. Loss of mature riparian trees — mitigated by avoidance/planting.	None; but similar in scope to Hacienda Furnace Yard project. Explanation of Significant Differences for Changes to the Cleanup Plan, Initial Study, and Negative Declaration finalized by DTSC to allow calcine disposal at Mine Hill Remediation site.	Further analysis based on design documents will be required
	Coyote Creek *Arundo* Removal	1. Replacement of non-native *Arundo* with native vegetative habitat. 2. Improved fish habitat. 3. Reduced habitat fragmentation.	Disturbance of wildlife and possible impacts from the short-term loss of cover while native species become established; however, it is expected that the benefits of this project will provide adequate mitigation.	ESA consultation on *Arundo* removal as a routine maintenance action by the Santa Clara Valley Water District (CEQA reviewed) was completed by the USFWS.	Yes
	Hillsdale Bridge Fish Barrier Removal	1. Improved passage for out-migrating anadromous fish. 2. Reduced habitat fragmentation.	Disturbance to fish and wildlife; however, it is expected that the benefits of this project will provide adequate mitigation.	NEPA/CEQA documentation completed; project constructed in 2003.	Yes

	Ravenswood Marsh Predator Control	1. Removal of non-native predators on California clapper rails and other wetland species. 2. Improved regional efforts to control predators within the SFBNWR.	Capture of an unknown number of non-native predators and feral domestic animals; however, no consequences in addition to those previously documented by SFBNWR other than slight geographic expansion	NEPA review completed by USFWS on predator control plan for SFBNWR in 1991.	Yes
No Action		None	Temporary impacts of habitat loss avoided, but adverse effects of mercury contamination continue.	Not applicable.	Yes

APPENDIX B

Administrative Record

Appendix B

Almaden Quicksilver County Park Administrative Record File Index

Date	Title	Type of Document	Lead Author
1989	Environmental mercury assessment phase III sampling area descriptions, Almaden Quicksilver County Park Vol. 1. San Francisco, California, for Santa Clara County Parks and Recreation Department, Los Gatos, California	CERCLA Response	Dames and Moore, Inc.
1991	Toxic substances monitoring program 1988-1989. State Water Resources Control Board Report 91-1 WQ, California Environmental Protection Agency, Sacramento, California.	Monitoring Report	State Water Resources Control Board
1992	Risk assessment, Almaden Quicksilver County Park. Camp Dresser and McKee, Inc., Denver, Colorado, for Santa Clara County Parks and Recreation Department, Los Gatos, California.	CERCLA Response	Camp Dresser and McKee, Inc.
1992	Assessment of mercury in water and sediments of Santa Clara Valley streams and reservoirs. Woodward-Clyde Consultants, Oakland, California, for the Santa Clara Valley Nonpoint Source Pollution Control Program.	Monitoring Report	Woodward-Clyde Consultants, Inc.
1993	Environmental mercury assessment phase IV feasibility study, Almaden Quicksilver County Park. Camp Dresser and McKee, Inc., Walnut Creek, California, for Santa Clara County Parks and Recreation Department, Los Gatos, California.	CERCLA Response	Camp Dresser and McKee, Inc.
1994	Negative declaration for remedial action plan, Almaden Quicksilver County Park, San Jose, Santa Clara County, California. Department of Toxic Substances Control, Region 2, Berkeley, California.	Negative Declaration - CERCLA Response	Department of Toxic Substances Control

Date	Title	Type of Document	Lead Author
1996	Analytical results for sediment samples, for U.S. Fish and Wildlife Service, Sacramento fish and Wildlife Office.	Letter	Mark Stevenson, CDFG
1996	Results of sediment sample grain size analyses, for U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office	Letter	Gary Ichikawa, CDFG
1997	Report of analyses of sediment and tissue samples for methylmercury, from Frontier Geosciences Environmental Research Corporation, Seattle, WA., for Gary Ichikawa	Letter	John Turner, CDFG
1997	Black-crowned night herons at Almaden Lake Park, San Jose, California: reproductive success and habitat usage: a summary of 1997 breeding season surveys	Monitoring Report	Tom Ryan, San Francisco Bay Bird Observatory
1998	Biological and physical/habitat assessment of California water bodies: selected reaches associated with mercury mining within the Guadalupe River watershed; for U.S. Fish and Wildlife Service, Sacramento FWO	Monitoring Report	Jim Harrington, CDFG
1999	Black-crowned night herons at Almaden Lake Park, San Jose, California: reproductive success and habitat usage: a summary of 1998 breeding season surveys, for U.S. Fish and Wildlife Service, Sacramento FWO	Monitoring Report	Robin Dakin, San Francisco Bay Bird Observatory
1999	Effects of mercury contamination on the distribution of the California red-legged frog, for U.S. fish and Wildlife Service, Sacramento FWO	Monitoring Report	Morrison, Western Foundation of Vertebrate Zoology
2000	Preassessment Screen Determination Report, Almaden Quicksilver County Park, Santa Clara County, California	Report	Jim Haas, USFWS

Date	Title	Type of Document	Lead Author
2000	Data report and quality assurance/quality control document: United States Fish and Wildlife Service Almaden Quicksilver Mine mercury and methylmercury data	Analytical Report	Mark Stevenson, CDFG
2000	Summary of 1998 quantitative electrofishing data, Guadalupe River tributaries, Santa Clara County, California.	Monitoring Report	Jim Haas, USFWS
2001	Cooperative Agreement	Legal	Chuck McKinley, DOI
2003	Draft Consent Decree	Legal	Chuck McKinley, DOI
2004	Legacy of Mining in South San Francisco Bay: Mercury Concentrations in Sediment and Biota	Monitoring Report	Jim Haas, USFWS
2004	Sediment Mercury Concentrations and Benthic Macroinvertebrate Community Metrics in the Guadalupe River Watershed, Santa Clara County, California	Monitoring Report	Jim Haas, USFWS
2004	Effects of Mercury on Fish in the Guadalupe River Watershed, Santa Clara County, California	Monitoring Report	Jim Haas, USFWS
2004	Draft Almaden Quicksilver Restoration Plan and Environmental Assessment	Report	Jim Haas, USFWS
2005	Public Review Draft Almaden Quicksilver Restoration Plan and Environmental Assessment	Report	Jim Haas, USFWS
2007	Final Almaden Quicksilver Restoration Plan and Environmental Assessment w/Finding of No Significant Impact	Report	Jim Haas, USFWS