# New Idria Mercury Mine
# Expanded Site Inspection

## Idria, San Benito County, California

## Sampling and Analysis Plan

**USACE Contract Number: W91238-06-F-0083**
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**U.S. Environmental Protection Agency**
**Region 9**

**Prepared by:**
**Weston Solutions, Inc.**

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**QA Document Control Number:**

Approved by: ____________________________________
Christina Marquis, Program Manager
WESTON Solutions, Inc.

Approved by: ____________________________________
Thomas Fortner, Project Manager
WESTON Solutions, Inc.

Approved by: ____________________________________
Matt Mitguard, EPA Site Assessment Manager
U.S. Environmental Protection Agency, Region 9

Approved by: ____________________________________
Eugenia McNaughton, Quality Assurance Manager
U.S. Environmental Protection Agency, Region 9

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# List of Acronyms

| | |
|---|---|
| AOC | Analyte of Concern |
| AMD | Acid Mine Drainage |
| APN | Assessor Parcel Number |
| BLM | United States Bureau of Land Management |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CERCLIS | Comprehensive Environmental Response, Compensation, and Liability Information System |
| CLP | Contract Laboratory Program |
| CLPAS | Contract Laboratory Program Analytical Services |
| CRDL | Contract Required Detection Limits |
| CRMP | Coordinated Resource Management Planning |
| CRQL | CLP Contract Required Quantitation Limits |
| DTSC | California Department of Toxic Substances Control |
| DQO | Data Quality Objective |
| DQI | Data Quality Indicator |
| EPA | United States Environmental Protection Agency |
| ESI | Expanded Site Assessment |
| gpm | gallons per minute |
| km | kilometers |
| HRS | Hazard Ranking System |
| IDW | Investigation-Derived Wastes |
| IWMB | California Integrated Waste Management Board |
| LEA | Local Enforcement Agency |
| MCL | Maximum Contaminant Level |
| µg/L | micrograms per liter |
| mg/kg | milligrams per kilogram |
| mg/L | milligrams per liter |
| ng/L | nanograms per liter |
| MS/MSD | Matrix Spike/Matrix Spike Duplicate |
| NPL | National Priority List |
| PA/SI | Preliminary Assessment/Site Inspection |
| PM | Project Manager |
| PPE | Personal Protective Equipment |
| ppe | Probable Point of Entry |
| QA | Quality Assurance |
| QAO | Quality Assurance Office |
| QC | Quality Control |
| RCRIS | Resource Conservation and Recovery Information System |
| RPD | Relative Percent Difference |
| RSCC | Regional Sample Control Coordinator |
| RSL | Regional Screening Level |
| RWQCB | Regional Water Quality Control Board |
| SAM | Site Assessment Manager |
| SAP | Sampling and Analysis Plan |
| SARA | Superfund Amendments and Reauthorization Act of 1986 |
| SOP | Standard Operating Procedure |
| USACE | United States Army Corps of Engineers |
| SQuiRT | Screening Quick-Reference Tables |
| USGS | United States Geological Survey |
| WESTON | Weston Solutions, Inc. |
| XRF | X-ray florescence |

## 1.0 INTRODUCTION

Under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA), Weston Solutions, Inc. (WESTON®) has been tasked to conduct a Hazard Ranking System (HRS) Expanded Site Inspection (ESI) of the New Idria Mercury Mine Site (Site) located in the town of Idria, California (Figure 1). The HRS assesses the relative threat associated with actual or potential releases of hazardous substances to the environment, and has been adopted by the U. S. Environmental Protection Agency (EPA) to assist in setting priorities for further site evaluation and potential remedial action. The HRS is the primary method for determining a site's eligibility for placement on the National Priorities List (NPL). The NPL identifies sites where the EPA may conduct remedial actions.

This Sampling and Analysis Plan (SAP) describes the project and data use objectives, data collection rationale, quality assurance goals, and requirements for sampling and analysis activities. The SAP also defines the sampling and data collection methods that will be used for this project. The SAP is intended to accurately reflect the planned data-gathering activities for this site investigation; however, site conditions and additional EPA direction may warrant modifications. All significant changes will be documented in the final report.

WESTON has been tasked to gather and review existing available information regarding site conditions, identify and fill data gaps, and prepare HRS scoresheets and rationale for the site.

The specific field sampling and chemical analysis information pertaining to the site is addressed in this SAP, in accordance with the EPA documents *EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations* (QA/R-5), March 2001, *Guidance on Systematic Planning Using the Data Quality Objectives Process* (EPA QA/G-4), February 2006, and *Data Quality Objective Process for Superfund* (EPA 540/G-93/71), August 1993.

### 1.1 Project Organization

The following is a list of project personnel and their responsibilities:

**EPA Site Assessment Manager (SAM)** - The EPA SAM is Matt Mitguard. Mr. Mitguard is the primary decision maker for this investigation and is the primary contact for the WESTON Project Manager.

**WESTON Program Manager and Quality Assurance (QA) Coordinator** - The WESTON PM and Field Sampling QA Coordinator is Christina Marquis. Ms. Marquis is responsible for the overall performance of all tasks assigned to WESTON by the EPA. Ms. Marquis is authorized to approve Sampling Analysis Plans for sites conducted by WESTON to ensure project quality assurance goals are met.

**WESTON Project Manager (PM)** - The WESTON Project Manager is Thomas Fortner. Mr. Fortner is responsible for preparing the SAP, working with the laboratories, implementing the sampling design, collecting, handling, documenting, and transporting samples, generating field documentation of sampling activities, and working with the WESTON QA Coordinator to ensure project quality assurance goals are met.

**Analytical Laboratory** - The EPA Regional Sample Control Coordinator (RSCC) will arrange for laboratory services and data validation activities for metals by ILM05.3 or equivalent. Methyl mercury analysis will be conducted by a WESTON contracted laboratory.

**Data Validation –** The EPA RSCC will arrange data validation for this investigation.

## 1.2 Distribution List

Copies of the final SAP will be distributed to the following persons and organizations:

- Matt Mitguard, EPA Region 9
- Gail Morison, EPA QA Reviewer
- WESTON files

## 1.3 Statement of the Specific Problem

The Site is located in the New Idria Mining District in the Panoche/Silver Creek Watershed in San Benito County. Surface water from the site drains to San Carlos Creek which flows to Silver Creek and then to Panoche Creek. Panoche Creek flows to the Mendota Pool and San Joaquin River during periods of heavy precipitation and flood events. The Mendota Pool and San Joaquin River are recreational fisheries and are located over approximately 45 river miles downstream from the Site. The San Joaquin River flows to the San Francisco Bay which is a commercial fishery. Sensitive habitats and wetlands are found along the surface water pathway between the Site and San Joaquin River.

The Site intermittently operated as a mercury mine from approximately 1854 to 1972 and was the second largest mercury producer in the United States. Waste rock and calcines (processed mercury ore) are deposited throughout the site and along San Carlos Creek. Acid mine drainage (AMD) has been discharging from the Level 10 adit (the opening of the $10^{th}$ level horizontal mining passage; levels are similar to the floors of a building) into San Carlos Creek since at least 1969. San Carlos Creek receives overland flow from the calcine piles. The roasting process of the cinnabar ore makes residual mercury in the calcines more accessible to the environment. The mine drainage contains high concentrations of sulfate and iron resulting in a favorable environment for the methylation of the mercury by sulfate reducing bacteria. The high iron content of the mine drainage precipitates iron oxyhydroxide when mixed with the high oxygen content in San Carlos Creek which accumulates on the stream bed creating the orange appearance of the AMD. Mercury and methyl mercury are strongly adsorbed to the iron precipitate in acidic water and are seasonally flushed from the creek bed to impact downstream receptors.

San Carlos Creek downstream of the Site is listed on the Federal Clean Water Act 303(d) list of impaired water bodies for mercury impacts from the mine. Previous investigations have indicated the presence of mercury in surface water, stream sediments, and wetlands downstream of the mine. Surface water and sediment samples from the downgradient and background areas of the surface water drainage pathway are necessary to characterize the threat to human health and the environment.

## 2.0 BACKGROUND

### 2.1 Location and Description

The Site is located at the abandoned town of Idria in San Benito County, California. The Site is located within the New Idria District along with the Aurora, Molino, and San Carlos mines located south of the Site and the Spanish and Wonder mines located west of the Site. The geographic coordinates for the Site are 36° 24' 53" North latitude and 120° 40' 28" West longitude (NationalMap, 2010). The location of the Site is shown in Figure 1.

The Site is located on private land on assessor parcel numbers (APNs) 0293100030, 0293100170 and one smaller parcel APN 0293100160 in a rural area on the eastern slopes of San Benito Mountain in the Diablo Range. The abandoned town of Idria is comprised of dozens of dilapidated buildings. A small reservoir located above and south of the town, was constructed by damming San Carlos Creek and was the local drinking water source. Extensive waste rock and calcine tailing piles are exposed and cover a large portion of the Site. A large furnace and process area and other mine working features remain at the Site. AMD from the Level 10 adit runs between a waste rock pile and calcine tailings pile to an AMD pond prior to entering San Carlos Creek (SBC 2009, WESTON 2009). Important Site features are shown in Figure 2 and Figure 3.

### 2.2 Operational History

The New Idria mining claim was located in 1854 by prospectors and investors. In 1857 the first brick furnace to roast cinnabar ore was built at the Site. The mine operations expanded to include San Carlos, Aurora, and Molina mines and miles of tunnels, shafts and drifts were used to access the cinnabar. In the 1920s, the overburden was stripped down to form pits in order to access cinnabar. The mining continued nearly continuously with a few idle and low productivity periods due to economic lows in mercury values and land owner disputes. The Mine operated until the early 1970s. Several furnaces were built over the years with four large furnaces still located at the site adjacent to the Level 10 adit. Mercury was extracted from the cinnabar ore by crushing the ore and roasting it to release elemental mercury vapor which is cooled and condensed for bottling. The process is called calcination and the roasted ore is known as calcines which still contain some soluble mercury. Some of the older tailing piles themselves were mined and reprocessed as mercury extraction methods improved. The furnaces at the Site were also used to process mercury ore from the San Carlos and Aurora Mines which were transported by a 2-mile aerial tram or through the Level 10 adit. The New Idria Mine was reported to be the second largest mercury mine in the country and produced over 500,000 flasks (38,250,000 pounds) of mercury. One flask contains 76.5 pounds of mercury (TechLaw 2006, USGS 2000, BLM 2009).

Over the years, the extensive mine tunnels have flooded with groundwater which reacts with the high iron and sulfur content of the bedrock to form an acidic solution. The groundwater drains from the Level 10 adit as AMD. The AMD is presently not treated and flows through calcine tailing piles to San Carlos Creek. San Carlos Creek flows along the base of massive calcine tailing piles for length of approximately 2,500 feet.

### 2.3 Previous Investigations and Regulatory Involvement

#### 2.3.1 Federal Regulatory Involvement

United States Environmental Protection Agency

The 1996 EPA Site discovery was from a petition from the Coast Advocates to the EPA to conduct a preliminary site evaluation. The EPA's Water Division had involvement with the Coordinated Resource Management Planning (CRMP) effort for water quality in the Panoche/Silver Creek Watershed with respect to selenium, boron, salts and mercury. The EPA conducted a Preliminary Assessment/Site Inspection (PA/SI) at the site in 1997. The assessment identified elevated levels of mercury in source materials onsite and in sediment and surface water samples downgradient of the Site. The EPA recommended further assessment under CERCLA as a lower priority for removal assessment action. At the time of the decision, approximately 25 people were living at the Site. Figure 2 through Figure 7 show the 1997 PA/SI sampling locations.

The 1997 PA/SI included the collection of background surface water samples SW-1, SW-2 and SW-3, from the upper portion of San Carlos Creek upgradient of the New Idria Mine process area. These samples contained detectable concentrations of mercury of 0.1 micrograms per liter (µg/L). Background stream sediment samples were collected from locations SW-1, SW-2, and SW-3 and contained mercury concentrations of 1.5, 1.6, and 2.6 milligrams per kilogram (mg/kg), respectively. Surface water sample SW-4 was erroneously collected as a background sample from San Carlos Creek and contained 0.54 µg/L mercury. The corresponding sediment sample contained 19.7 mg/kg; however, this sample was in the drainage of several adits and the Creek Pit surface mine workings and is not representative of background conditions for the Site. Background soil samples NIM-18 and NIM-19 were collected from above and south of the San Carlos Creek reservoir and contained mercury concentrations of 1.4 and 3.9 mg/kg, respectively (Figure 2) (E&E 1998).

The 1997 PA/SI included the collection of source surface water and sediment samples from the Level 10 adit AMD. Six water samples were collected from the Level 10 adit and San Carlos Creek and contained mercury concentrations ranging from 0.2 to 16.5 µg/L. Six sediment samples were collected between the Level 10 adit and San Carlos Creek and contained mercury concentrations ranging from 0.22 to 25.7 mg/kg. Five source tailing samples were collected from the waste rock pile and calcine pile adjacent to the furnace and AMD and contained mercury concentrations ranging from 27.1 to 74.6 mg/kg (E&E 1998).

The 1997 PA/SI included the collection of surface water samples and sediment samples downgradient of the Site from San Carlos Creek and Silver Creek to the confluence of Panoche Creek 17.4 miles downstream of the AMD probable point of entry (ppe) to San Carlos Creek. Seven surface water sample locations contained mercury concentrations ranging from 0.2 to 9.6 µg/L and documented a significant release (three times background levels) attributable to the site to at least 5.7 miles downstream. The next sampling point downstream was located at 17.2 miles from the ppe. A total of 14 sediment sample locations contained mercury concentrations ranging from 0.13 to 22.5 mg/kg and also documented a significant release attributable to the site to at least 5.7 miles (E&E 1998).

In 2002, a Site Reassessment was conducted and determined that the site was still a candidate for further assessment under CERCLA. A significant factor to the decision was the mercury exposure to persons inhabiting the Site from contaminated soil (WESTON 2002).

In 2004, the EPA issued a Brownfield Grant to the County of San Benito to develop a remediation plan and risk assessment for the Site and the development of site use alternatives and community involvement. The project was expected to enhance the waterways to benefit small businesses downstream from the Site and draw visitors to the 380 acre area as a designated historic landmark generating revenue and jobs in the community. The County used the grant to conduct a responsible party search (EPA 2004, SBC 2003, TechLaw 2006).

In 2006, an EPA Triage Recommendation referred the Site to the Regional Water Board (EPA 2006).

The Site is not listed in the Resource Conservation and Recovery Information System (RCRIS) database as of January 30, 2010. The site is listed in CERCLIS as CA0001900463 (EPA 2010a, EPA 2010b).

United Sates Department of the Interior Bureau of Land Management

The Bureau of Land Management (BLM) has expressed interest with the Site and has had involvement with neighboring mercury mines in the New Idria District on BLM lands. The BLM has reviewed the Site and land downstream for potential acquisition adjacent to public lands currently owned by the BLM and has conducted regional studies of surface water and mine impacts. Some work has been conducted at the neighboring Aurora Mine by the BLM (E&E 1998, BLM 2009).

United Sates Department of the Interior United States Geological Survey

The United States Geological Survey (USGS) has researched the New Idria District mines and their impacts to nearby creeks including the San Carlos Creek and is a member of the CRMP. The USGS collected surface water samples and sediment samples from San Carlos Creek at locations upstream and downstream of the Site and from the Level 10 adit AMD in 1997 and 1999. Mercury concentrations in unfiltered San Carlos Creek surface water samples ranged from 8.26 nanograms per liter (ng/L) upstream from the Site and Aurora Mine to 19,610 ng/L downstream of the Site (USGS 2000). Figure 2 through Figure 4 show the USGS sampling locations.

### 2.3.2 State Regulatory Involvement

Regional Water Quality Control Board-Central Coast

The Central Coast Regional Water Quality Control Board (RWQCB) has had intermittent involvement with the Site. The RWQCB has developed water quality standards and beneficial uses under the Tulare Lake Basin Plan for West Side Streams which includes the San Carlos, Silver, and Panoche Creeks (RWQCB 2003). The RWQCB had collected samples from the Site and San Carlos Creek in 1975, 1988, and 2003. Figure 2 through Figure 4 show the RWQCB sampling locations.

In 1969, New Idria Mining and Chemical Company filed a Report of Waste Discharge with the RWQCB. The discharge was described as mill wastewater discharges of approximately 65 gallons per minute (gpm) to a settling pond, mine water discharges of approximately 40 gpm to San Carlos Creek, and one gpm of sewage to various closed cesspools (TechLaw 2006).

In 1970, waste discharge requirements under Resolution No. 70-205, prescribed requirements for the New Idria Mine for the discharge of mill waste, mine water, and sewage effluent to San Carlos Creek (RWQCB 1970).

In 1975, the RWQCB responded to a complaint from a rancher that runoff from the Site was degrading the San Carlos Creek 1.5 miles downstream where cattle were drinking the surface water. Surface water was collected from six locations from the Level 10 adit to 1.75 miles downstream in San Carlos Creek. Samples collected from AMD to San Carlos Creek ranged in mercury concentration from 0.0023 to 0.004 milligrams per liter (mg/L). A water sample, collected from San Carlos Creek upgradient of the AMD and downgradient of some mine workings and adits, contained mercury concentrations of 0.0027 mg/L. A water sample collected from San Carlos Creek at a location approximately 1.75 miles downgradient of the AMD ppe contained mercury concentrations of 0.0078 mg/L. A water sample collected from San Carlos Creek just upstream the confluence of East Fork San Carlos Creek was reported to contain detectable concentrations of mercury. The RWQCB determined that water quality at the sampling locations were not in the levels recommended for livestock use and that the New Idria Mining and Chemical company had violated Resolutions No. 70-205 where waste discharge shall not cause a pollution of ground or surface waters (RWQCB 1975).

In 1982, Idria Land and Development Company was issued a waste discharge permit (Facility ID 50353001001) for metals recovery at the site (TechLaw 2006).

In 1988, the RWQCB responded to a complaint from Mrs. Jane Woods, property owner adjacent to the Site, concerning the AMD discharge from the Site to San Carlos Creek. Surface water samples were collected from six locations along the AMD and San Carlos Creek and one sample from the San Carlos Creek reservoir. Mercury was detected in samples NIM3 (upstream of ppe in San Carlos Creek), NIM4 (downstream of ppe in San Carlos Creek, and NIM8 (sludge sample 2-miles downstream of ppe in San Carlos Creek) at concentrations of 0.008 mg/L, 0.0050 mg/L, and 1.25 mg/L, respectively. The RWQCB stated that the discharge of mine drainage to San Carlos Creek is not regulated by a National Pollution Discharge Elimination System permit, which is required for such discharges to surface water. It was determined that the discharge to the creek was in violation of Resolution 70-205 where waste discharge shall not cause a pollution of ground or surface waters and neither the treatment facility nor the discharge shall cause any nuisance. The RWQCB requested the Site owners submit a report containing a work plan and time schedule for eliminating the existing pollution and nuisance conditions caused by the mine drainage to San Carlos Creek. The RWQCB also requested the Site owners to submit a report of waste discharge and filing fee to update the waste discharge requirements to reflect the current operations at the site and any discharges to San Carlos Creek (RWQCB 1988).

In 1989, Dames & Moore, on behalf of New Idria Associates, submitted a report of waste discharge and a work plan to the RWQCB. The work plan objective was to develop an understanding of the hydrology and geochemistry of the mine drainage and identify appropriate remedial strategies for mitigating the AMD and adverse effects on San Carlos Creek (D&M 1989).

In 1991, the RWQCB conducted an inspection of the Site and collected four surface water samples labeled NIM #1 through NIM #4; however, the inspection report did not identify the actual sampling locations. Samples NIM #2 and NIM #3 contained mercury at a concentration of 0.53 µg/L and 5.5 µg/L, respectively. The other two samples did not contain mercury above the 0.5 µg/L quantitation limit. The inspection determined that Resolution No. 70-205 was violated (RWQCB 1991).

In 1992, the RWQCB imposed an Administrative Civil Liabilities to Futures Foundations for violations under the California Water Code Section 13323 and non-payment of annual fees (RWQCB 2003).

In 2003, the RWQCB conducted an inspection of the Site and collected and analyzed eight water samples. The inspection report also compiled and evaluated historical data and available information. Surface water samples were collected from upstream and downstream locations of San Carlos Creek, the San Carlos Creek reservoir, Panoche Creek, and from the mine effluent and AMD pond. Two samples collected from the San Carlos Creek downstream of the ppe contained mercury concentrations of 0.28 and 0.41 µg/L. The remaining samples did not contain detectable mercury concentrations above the 0.2 µg/L quantitation limit. The RWQCB determined that "further action at the New Idria Mine at this time is severely hampered by its relatively low priority as compared to other known pollutant sources, the difficulties encountered in identifying responsible and financially solvent parties, and the costs involved in a satisfactory remedial action. We will, however, evaluate the contributions of mercury from the watershed in the context of the mercury TMDL for the Delta. If the New Idria Mine appears to be a significant source of mercury to the San Joaquin River and Delta, more work may be needed at the mine site" (RWQCB 2003).

A 2006 Clean Water Act Section 303(d) list of water quality limited segments identifies a 5.1 mile segment of San Carlos Creek downstream of New Idria Mine as polluted by mercury with a potential source identified as AMD and resource extraction (RWQCB 2003, RWQCB 2006).

In 2007, Resolution 70-205 was rescinded by the RWQCB (RWQCB 2009).

The Site is listed in the State water Resources Control Board GeoTracker database under Futures Foundation (L10006522358) as a land disposal site, Case # 5D352001H01 (RWQCB 2010).

Integrated Waste Management Board

In the mid 1980s, Futures Foundation, a San Jose based drug rehabilitation program, purchased the property and began dumping waste on the surface of the northern calcine tailing piles. Discarded materials include trash/garbage, appliances, abandoned vehicles, tires, scrap metals, wood waste, and inert debris. The California Integrated Waste Management Board (IWMB) and

Department of Toxic Substances Control (DTSC) working in conjunction the San Benito County Health and Human Services Agency, which acts as the Local Enforcement Agency (LEA), was able to have hazardous materials removed from the site in February 2003 (IWMB 2004).

Department of Toxic Substances Control

The Site is listed in the DTSC's Envirostor database as New Idria Mine (35100001) as an evaluation site and was referred to RWQCB as of 2007. The DTSC assisted the IWMB in the cleanup of the illegal landfill. (DTSC 2010).

### 2.3.3 Local Regulatory Involvement

San Benito County Health and Human Services Agency

San Benito County Health and Human Services Agency LEA, in conjunction with the IWMB and DTSC was able to have hazardous waste removed from the site in February 2003. The LEA conducts annual inspections of the former illegal landfill site for the IWMB (IWMB 2010, SBC 2006).

### 2.3.4 Educational Institutions Research

University of Santa Cruz

In 2000, the University of California, Santa Cruz, investigated the Site and determined that the mercury in San Carlos Creek downstream from the Site is being leached from the mine waste piles. Surface water samples were collected from San Carlos Creek at locations upstream and downstream of the Site and from the Level 10 adit AMD in 1997, 1998 and 1999. Mercury concentrations in unfiltered surface water samples ranged from 4.2 to 13 ng/L upstream from the Site and 2,900 to 12,400 ng/L downstream of the Site (UCSC 2000).

Chapman University/ Stanford University

Studies were conducted at various mercury mine sites where mine wastes were sampled for mercury speciation. The study determined that the calcification process of mercury ore typically transforms cinnabar to metacinnabar. The higher metacinnabar content in calcines increases the mercury solubility. The speciation study also determined the mineral content of mine waste from the Site as 56% cinnabar, 22% montroydite, 22% eglestonite which is unique as compared to the speciation of mine waste from other mine sites (CU/SU 2005).

## 2.4 Geology

The Site is located in the southern central Diablo Range which makes up part of the California Coast Ranges of the Pacific Border Physiographic Province. The Topography is rugged with an approximate elevation range of 2,200 at San Carlos Creek at the northern portion of the Site to 4,200 feet south of the Camp 2 Pit. The Site lies on the northern slopes of San Carlos Peak with an elevation of 4,845 feet.

The area is known geologically as the New Idria antiform or the New Idria formation where the largest serpentine body is exposed in the south coast ranges of California and is a block of highly sheared serpentinite approximately 15 kilometers (km) long and 5 km wide, parallel to the San Andreas fault. This serpentinite body is in fault contact with rocks of the Franciscan complex, Great Valley sediments, and Tertiary marine and nonmarine sediments. These serpentine rocks form a dome that has been continuing to rise since around 11 million years ago. Numerous tectonic inclusions of Franciscan complex rocks are found within the dome and some have been recrystallized under high pressure to glaucophane schist, indicating that these rocks were forced up from depths greater than 15 to 20 km in the Franciscan subduction zone (CNPS 2006).

The New Idria Mining District was mined for mercury, chromite, magnesite, asbestos and benitoite. Cinnabar (mercury) deposits were mined from approximately 1854 to 1974 (BLM 2009).

The Vallecitos Creek Valley Groundwater Basin, of the Tulare Lake Hydrologic Region, is located two miles north of the site. The majority of the basin is located in a northwest-southeast trending synclinal valley in the Coast Range Mountains of eastern San Benito County. The eastern portion of the basin extends along the San Carlos Creek and Silver Creek valley to the Griswold Hills. The middle of the valley is occupied be Quaternary Alluvium surrounded by Plio-Pleistocene nonmarine sediments and Lower Miocene to Paleocene marine sediments. The basin is drained to the northwest and to the east from the syncline divide near the center of the basin. Vallecitos Creek drains to the northwest to Panoche Valley by way of Griswold Canyon and finally to the San Joaquin Valley via Panoche Creek. Los Pinos Creek drains the basin to the east and exits the mountains via Silver Creek. Average precipitation values range from 11 to 15 inches (DWR 2004).

No information was found by the Department of Water Resources in published literature regarding the occurrence of groundwater within the basin. Review of San Joaquin District well completion report files revealed records for three wells. The three wells were all located in the northwest portion of the basin. Well depths ranged from 80 to 122 feet, with initial water levels at 15 to 40 feet. No yield data was provided. There were no well records for the main body of the basin. Review of the USGS topographic maps of the area and a field reconnaissance revealed several stock wells. It is likely that the water bearing units are restricted to the shallow alluvium in the center of the valley (DWR 2004).

The drilling of a water well was attempted at the Woods property adjacent to the Site, however tough drilling conditions were encountered in the Sandstone bedrock and groundwater was not encountered (Pinnacle 2002).

## 2.5 Waste Characteristics

Investigations conducted by the RWQCB and EPA have documented elevated concentrations of mercury, chromium, iron, nickel, selenium, zinc, and sulfates. Additionally, low pH from AMD has impacted surface water at the Site. Methyl mercury has also been documented at the site.

Estimates of over 500,000 cubic yards of calcines are reported to be at the Site. A continuous discharge of AMD from the Level 10 adit is estimated to range from 10 to 50 gpm.

### 2.6 Hazard Ranking System (HRS) Pathways

The HRS surface water pathway (Zone-1) evaluated in this ESI is along the San Carlos Creek from the Site to Silver Creek and Silver Creek to Panoche Creek. Attribution of mercury to San Carlos and Silver Creeks appears to be solely from mines in the New Idria Mining District based on mining records and geological maps of the area. The headwaters of San Carlos Creek are located on the northern slope of San Benito Mountain, located approximately three miles south of the site, and flows into the San Carlos Reservoir which served as a drinking water reservoir for the town of Idria. In addition to the New Idria Mine, the San Carlos Creek and its tributaries are in the drainage of San Carlos, Aurora, Molina, Creek Pit, Sulfur Spring, Ranchito, H.G. Quicksilver, and Spanish Mines. These mines are located upstream of the Level 10 adit. The Level 10 adit AMD flows through calcine and waste rock piles into an AMD pond and enters San Carlos Creek at the crossing of New Idria Road. The AMD impacted San Carlos Creek flows northward along the base of massive calcine tailing piles for a distance of approximately 2,500 feet. San Carlos Creek becomes Silver Creek approximately 5.4 miles downstream of the ppe at the confluence of Larious, Lopez, and Los Pinos Creeks draining the Vallecitos Valley. Silver Creek flows northward between the Griswold Hills and Tumey Hills and enters Panoche Creek approximately 17 miles downstream from the ppe (CDC 2001).

The second surface water pathway (Zone-2) evaluated in this ESI is along the Panoche Creek from the confluence of Silver Creek to the Mendota Pool. The Zone-2 surface water pathway will not be evaluated for HRS because mercury in the Panoche Creek is not solely attributable to the Site. The Panoche Creek, upstream and west of the confluence with Silver Creek, receives drainage from over two dozen mercury mines located on the southern and western hills of the Panoche Valley. The Panoche Creek flows eastward to the Panoche alluvial fan in agricultural land of the Central Valley. The present day Panoche Creek bed terminates at Belmont Avenue west of the City of Mendota and 36 miles downstream of the ppe (CDC 2001).

During flood events, surface water from the Panoche Creek flows eastward along the south shoulder of Belmont Avenue. The flood water diverges from Belmont Avenue at the intersection of Douglass Avenue where the majority of the flow crosses over the road and drains north. The Douglass Avenue flood water flows north to Ashland Avenue alignment ponds and over the banks of the Firebaugh No. 3 lift canal where it flows both north and south. The northern flow can enter numerous drains, the southern flow enters the Mendota Pool (FCWD 2010).

A portion of the flood water continues eastward along the south shoulder of Belmont Avenue, crosses beneath the road at the intersection of Lyon Avenue, and continues along the north shoulder of Belmont Avenue. A small portion of this flood water flows north on Washoe Avenue into farmlands. The Belmont flood water continues east to a storm drain at the intersection of Derrick Avenue where it passes beneath the City of Mendota and emerges on the east side of Route 180 where it flows through ditches to the Fresno Slough wetlands or Mendota Pool. The Mendota Pool is a fishery and a recreation area.

The San Carlos Creek reservoir, located upstream of the ppe, historically has been used as a drinking water source and could be utilized in the future as a water supply. Surface water is utilized by residences, located approximately one mile downstream of the ppe, as non-potable water source after it passes through a treatment system. Surface water recharges groundwater in a portion of the Vallecitos Creek Valley Groundwater Basin located approximately four miles downstream of the ppe. Several water wells are located in this groundwater basin and are likely used for cattle. It is unknown if the wells are used as a drinking water source. Surface water in San Carlos and Silver Creeks are also used for livestock watering (DWR 2004, E&E 1998).

Several published wetland environments are located along the surface water pathway. The Level 10 adit drains AMD directly into a wetland. Palustrine wetlands are reported to be located where San Carlos Creek becomes Silver Creek approximately 5.4 miles downstream of the ppe and at locations in Silver Creek 16 miles and 20 miles downstream of the ppe. Palustrine wetlands are also reported to occur along the surface water pathway in Panoche Creek (USFWS 2009).

The EPA may conduct a wetland survey along the Zone-1 HRS surface water pathway to verify the published wetland areas and evaluate the presence of un-published wetlands. The investigation of the extent of jurisdictional wetlands and other waters of the United States will be conducted in accordance with the 1987 US Corps of Engineers (USACE) Wetlands Delineation Manual (USACE 1987), the arid west regional supplement to the Wetlands Delineation Manual (USACE 2008), and the USACE Field Guide to the Identification of the Ordinary High Water Mark in the Arid West Region (USACE 2008). The USACE 1987 Wetlands Delineation Manual identifies key diagnostic criteria for determining the presence of wetlands. These include (1) wetland hydrology, (2) hydric soils, and (3) a predominance of wetland vegetation. Wetland boundaries will be field mapped using GPS. Wetland data sheets will be filled out for representative wetland types.

Habitats for threatened or endangered species are present in the vicinity of the Site and downstream of the Site:

- The California Condor
- Giant Garter Snake
- San Joaquin Kit Fox
- Giant Kangaroo Rat
- Blunt-nosed Leopard Lizard
- San Benito evening primrose

The San Joaquin Antelope Squirrel, Golden Eagle, Prairie Falcon, Burrowing Owl, Cooper's Hawk, Northern Harrier, and Long Eared Owl are among the species of concern that may be present (BLM 2009).

## 3.0 PROJECT OBJECTIVES

### 3.1 Project Task and Problem Definition

WESTON has been tasked to conduct sampling in order to investigate soil and surface water contamination in the vicinity of the Site. To confirm if a release to the surface water pathway has occurred, surface water samples will be collected from various locations along the surface water pathway (Zone-1) extending downstream from the Level 10 adit, San Carlos Creek, and Silver Creek to Panoche Creek to further the HRS process. To demonstrate the presence of hazardous substances in the sources to surface water, samples will be collected from the Level 10 adit AMD and from the onsite calcine piles adjacent to the surface water pathway.

Additional surface water samples will be collected along the Zone-2 surface water pathway from Panoche Creek downstream from the Silver Creek confluence to the end of the creek at Belmont Avenue. The flood water course will also be sampled along Belmont Avenue towards the Mendota Pool and San Joaquin River. Data from these samples will not be used for HRS purposes as attribution can not readily be identified from the Site or from other mercury mines in the Panoche Creek watershed.

### 3.2 Data Use Objectives

Data collected during this site investigation will be used to:

- Determine the concentrations of metals in surface water and sediments to identify if a release of hazardous substances to surface water has occurred.
- Determine the concentrations of metals in site soil materials (solids from calcine and tailing piles and/or sediment) to establish the presence of a hazardous substance source.
- Determine whether the pH of site surface water is significantly different from the natural background values.
- Evaluate whether further HRS characterization of the site is necessary. If additional characterization of the site is indicated, an addendum will be made to this SAP that documents these findings and provides a design and procedures for additional site characterization. The SAP Addendum will be submitted to the QAO for approval.
- Data from the additional sampling along the Panoche Creek toward the Mendota Pool will be provided to stakeholders and to better inform the public of environmental conditions.

If source materials or site soils are found to be contaminated by metals, then the presence of hazardous substances in the source will be documented. If surface water samples or sediments are found to be contaminated with metals above the corresponding action levels, an observed release will be documented and integrated into the site's HRS score.

## 3.3 Action Levels

In accordance with the HRS, the action levels to establish an observed release to surface water and to establish an on-site source are concentrations that are significantly above background concentrations. “Significantly above background” is defined as three times the background concentration for all media. If the background concentration is below the analytical quantitation limit, then the default background level is the background sample quantitation limit; “significantly above background” for this scenario is defined as a detect in the media where the analyte was not detected in the background media. Surface water and sediment samples will be collected from San Carlos Creek at locations upstream of any mining activities and from East San Carlos Creek. East San Carlos Creek drains the same geological area; however appears not to be a significant drainage for any mercury mines. Additional background surface water samples and sediment will be collected from tributaries downstream from the Site at locations determined during the field event to determine these background levels. Soil and sediment background samples will be collected in a geologically similar area that does not appear to have been affected by mining operations.

Based on previous investigations discussed in Section 2.3, metals are the constituents deemed most likely to be elevated above background levels. Sample pH may also provide necessary data for site evaluation. In addition to the primary HRS action level, secondary action levels based on relevant guidance values for human health (EPA Regional Screening Levels (RSLs); Bureau of Land Management Human Risk Management Criteria for Abandoned Mine Sites) and ecological risks (National Oceans and Atmospheric Administration Screening Quick-Reference Tables or [SQuiRTs]) threshold effects level for freshwater sediments and chronic values for freshwater are also presented. Additionally, drinking water Maximum Contaminant Levels (MCLs) are presented for comparison purposes as water from San Carlos Creek reservoir has historically been used as a drinking water source. These secondary values are presented mainly for comparison with risk-based goals and provide a baseline for evaluating the method detection limits for the analysis. The action levels for metals are presented in Table 3-1.

## 3.4 Decision Rules

Decisions will be based primarily on data generated from this SAP. The decision rules are:

If source materials (site soils) are found to be contaminated by metals, then the presence of hazardous substances in the source will be documented and integrated into the site’s HRS score.
If surface water or sediment samples are found to contain concentrations of individual metals significantly above background, then an observed release will be documented and integrated into the site’s HRS score.
If surface water or sediment samples from Panoche Creek and flood water course to Mendota Pool/San Joaquin River are found to contain concentrations of individual metals significantly above background concentrations collected from sampling locations upstream of the Silver Creek confluence, then a portion of the contamination can be attributed to the Site.

## 3.5 Data Quality Objectives

### 3.5.1 Data Quality Objective (DQO) Process

The DQO process, as set forth in the EPA document, *Guidance for the Data Quality Objectives Process*, EPA QA/G-4, was followed to establish the data quality objectives for this project. An outline of the process and the outputs for this project are included in Appendix A.

### 3.5.2 DQO Data Categories

This investigation will involve the generation of definitive data for soil and surface water (see Section 3.1). The specific requirements for this data category are detailed in Section 9. The data generated under this project will comply with the requirements for that data category as defined in *Data Quality Objective Process for Superfund*, EPA 540/G-93/71, September 1993. All definitive analytical methods employed for this project will be methods approved by the EPA.

### 3.5.3 Data Quality Indicators

Data quality indicator goals (DQIs) for this project were developed following guidelines in *EPA Guidance for Quality Assurance Project Plans*, EPA QA/G-5 Final. All sampling will be guided by procedures detailed in Section 6.2 and standard operating procedures (SOP) to ensure representativeness of sample results. Table 3-1 documents the DQIs for this project. As presented in these tables, the published reporting limits for the Method Reporting Limit (including the EPA Contract Laboratory Program (CLP) modified California Contract Required Quantitation Limits, or CRQLs) were determined to be appropriate for this project. The acceptable ranges for Accuracy (percent recovery for MS/MSD analysis) will fall between 75 and 125 percent for water samples and 65 and 135 percent for soil samples. The threshold of precision (Relative Percent Difference for MS/MSD and duplicate sample analysis) will be less than, or equal to, 35 percent for water samples, and 50 percent for soil samples. The analytical method detection limits for each analyte of concern are lower than the RSLs for industrial soil, MCLs for water, and SQuiRTs for surface water and sediment as shown in Table 3-1. These action levels are only used as risk-based benchmarks for the purposes of validating the appropriateness of the method detection levels. The Industrial RSL is the most applicable action level for the site soils; the Residential RSL is presented for reference purposes only. SQuiRTs are the most appropriate action level for the surface water pathway.

## 3.6 Sample and Data Management

Samples will be collected and logged on a chain-of-custody form as discussed in Section 8.5. Samples will be kept secure in the custody of the sampler at all times, who will assure that all preservation parameters are being followed. Samples will be transferred to the laboratory via a certified carrier in a properly custody-sealed container with chain-of-custody documentation. The Forms II Lite data management system will be used to create chain-of-custody documents. The laboratory should note any evidence of tampering upon receipt.

The completed laboratory data report will be submitted to the EPA QAO, who will contract the data validation. The EPA QAO, will provide the data validation reports to the EPA SAM. The EPA SAM will then provide the data reports to the WESTON PM. The data validation reports and laboratory data summary sheets will be included in the final report to be submitted to the EPA SAM. Before submittal, the final report will undergo a technical review to ensure that all data have been reported and discussed correctly.

## 3.7 Schedule of sampling Activities

The work is expected to take five to seven days to perform. The work is tentatively scheduled for shortly after the rainy season in May or June 2010.

## 3.8 Special Training Requirements/Certifications

There are no special training or certification requirements specific to this project. Training requirements relevant to WESTON's health and safety program comply with 29 CFR 1910.120. The Site-Specific Health and Safety Plan is presented in Appendix B.

## 4.0 SAMPLING RATIONALE

### 4.1 Sampling Locations and Rationale

Up to 10 solid-matrix (soil, tailings) and up to 57 sediment samples will be collected from the site and areas downgradient to determine whether a release to the environment can be observed. The final location and actual number of samples collected will be determined by the field team based on accessibility and professional judgment based on the physical criteria described in this section and in Section 6.2. Sediment samples and surface water samples will target areas that are documented as palustrine/riverine wetlands and at areas where wetland vegetation are observed. The remaining sediment and surface water samples will be collected at a sampling interval of 4,000 river feet in areas where there are no wetlands to provide data to assess the extent and continuity of contamination. A sampling interval of 8,000 feet will be used for the Zone-2 surface water pathway along the Panoche Creek and the floodwater along Belmont Avenue to the Mendota Pool. The sampling interval along the Zone-1 HRS surface water pathway was developed to provide a sufficient number of sample locations to demonstrate continuity and contaminant attribution within practical and budgetary constraints. The sampling interval for the Zone-2 non HRS surface water pathway was doubled to provide contaminant data, not solely attributable to the Site, along the Panoche Creek and flood water pathway to the Mendota Pool. Generalized sample locations are presented in Figures 2 through 13.

Up to 14 water samples will be collected from the San Carlos Creek Reservoir, Level 10 adit AMD, San Carlos Creek at the AMD ppe, San Carlos Creek downstream of the calcine piles, and from the wetland where San Carlos Creek becomes Silver Creek. Surface water is not anticipated to be found downstream of the first Silver Creek Wetland. A portion of these water samples may be collected for methyl mercury analysis in addition to the metals analyses.

#### 4.1.1 Sediment Sampling

An estimate 34 sediment samples will be collected from the Zone-1 HRS surface water pathway. Sediment samples will be collected from fine-grained (silt to sand) material where it collects in pools and on the inside of natural bends in the stream bed. To establish background concentrations of analytes of concern (AOCs), two sediment samples will be collected from the headwaters of San Carlos Creek (SD-1) and from East Fork San Carlos Creek (SD-11) above the confluence with San Carlos Creek. Additional background sediment samples may be collected from selected tributaries to San Carlos Creek and Silver Creek. Sediment samples (SD-4 to SD-7) will be collected from AMD between the Level 10 adit and ppe to San Carlos Creek. One sediment sample (SD-2) will be collected from the San Carlos Creek reservoir to assess AOCs in the former drinking water supply originating from the Aurora and San Carlos Mines. One sample (SD-3) will be collected from San Carlos Creek upstream of the AMD ppe to assess AOCs originating from the Ranchito, Sulphur Spring, Creek Pit, Molina, and San Carlos mercury mines. One sample (SD-14) will be collected from Larious Creek above the confluence with San Carlos Creek to assess AOCs originating from the Wonder and Sampson mercury mines. The majority of the sediment samples will be collected from San Carlos Creek and Silver Creek

downstream of the onsite calcine tailings piles. Three sediment samples (SD-32 to SD-34) will be collected from the wetland area at the confluence of Silver Creek and Panoche Creek.
An estimated 23 sediment samples will be collected from the Zone-2 non-HRS surface water pathway. Ten sediment samples will be collected along the Panoche Creek and 13 sediment samples from the floodwater pathway along Belmont, Douglass, Washoe, and Ashland Avenues to the Mendota Pool.

### 4.1.2 Soil and Tailings Sampling

Up to 10 soil and tailing samples will be collected from the Site. Three calcine tailing samples will be collected from the southern tailings pile and five samples from the larger northern tailings pile. These samples will be collected from fine-grained (silt to sand size fractions) from at least six to twelve inches below ground surface to preserve volatile mercury concentrations. Two background samples will be collected from the same soil type as the natural soil at the mine, but from areas that do not appear to be affected by mining operations near the headwaters of San Carlos Creek.

### 4.1.3 Surface Water Sampling

Up to 14 surface water samples will be collected along the Zone-1 HRS surface water pathway. To establish background concentrations of AOCs, two surface water samples will be collected from the headwaters of San Carlos Creek (SW-1) and from East Fork San Carlos Creek (SW-9) above the confluence with San Carlos Creek. Surface water samples (SW-4 and SW-5) will be collected from AMD between the Level 10 adit and ppe to San Carlos Creek. One surface water sample (SW-2) will be collected from the San Carlos Creek reservoir to assess AOCs in the former drinking water supply originating from the Aurora and San Carlos Mines. One sample (SW-3) will be collected from San Carlos Creek upstream of the AMD ppe to assess AOCs originating from the Ranchito, Sulphur Spring, Creek Pit, Molina, and San Carlos mercury mines. One sample (SW-12) will be collected from Larious Creek above the confluence with San Carlos Creek to assess AOCs originating from the Wonder and Sampson mercury mines. The remaining surface water samples will be collected from San Carlos Creek downstream of the AMD ppe and calcine tailing piles. Two surface water samples (SW-13 and SW-14) will be collected from first wetland areas along Silver Creek. Flowing surface water is not anticipated to be found downstream of the first wetland areas along Silver Creek at the time of the sampling event. No surface water samples will be collected from the Zone-2 non-HRS surface water pathway.

Surface water samples will be collected for methyl mercury analysis to provide additional contaminant data not pertinent to the HRS. The methyl mercury analysis will be performed on the background sample (SW-1), San Carlos reservoir sample (SW-2), source samples (SW-3, SW-5, and SW-7), Larious Creek attribution sample (SW-12) and the first wetland area along Silver Creek (SW-14). The locations were chosen to assess where the methylation of mercury occurs and impact to wetlands.

## 4.2 Analytes of Concern

Based on the use of the site and the previous sampling events described in Section 2.3, specific AOCs at the site are metals. Data from previous RWQCB, USGS and EPA sampling at the site indicate the presence of these compounds in tailings, soil, and surface water at the site. Surface water samples will also be analyzed for Total Hardness by EPA Method 130.2 to assess the toxicity of metals. Additionally, selected surface water samples will be analyzed for methyl mercury for non-HRS purposes.

## 5.0 REQUEST FOR ANALYSIS

Laboratory services will be scheduled and arranged for by EPA Region 9 for metal analyses. Samples will be analyzed through EPA's CLP and/or US EPA Region 9 Laboratory. Samples submitted for methyl mercury analyses will be analyzed by a WESTON contracted laboratory. Sample containers, preservatives, holding times, and estimated number of field and QC samples are summarized in Tables 5-1 and 5-2.

As enumerated in Table 5-1, surface water samples will be collected at 14 locations. Each sampling location will consist of a set of field filtered and unfiltered samples. Four duplicate surface water samples and one equipment blank sample will be collected for a total of 33 surface water samples. A double-volume sample will be collected at one filtered location and one un-filtered location for use as laboratory QC samples. Each surface water sample will be analyzed for metals via EPA CLPAS ILM05.4 or equivalent. A total of 16 unfiltered surface water samples, including two duplicate samples, will be analyzed for total hardness by EPA Method 130.2. Water samples will be analyzed for pH in the field using a calibrated water quality meter. Seven surface water sampling locations will be analyzed for methyl mercury. One duplicate sample and field blank samples will also be collected for a total of nine water samples for methyl mercury analysis by EPA Method 1630 or equivalent.

As enumerated in Table 5-2, solid-matrix (soil, sediment, tailings) samples will be collected at up to 67 locations. Seven duplicate samples will be collected for a total of 74 solid-matrix samples. Additional soil will be collected at four sample locations for use as a laboratory QC sample. Each solid-matrix sample will be analyzed for metals via EPA CLPAS ILM05.4 or equivalent.

One equipment blank will be collected from a disposable sieve prior to its use to ensure that the sampling materials do not contain AOCs. The sieves are the only non-standard piece of sampling equipment that will come into contact with the sample. Each sieve is dedicated to a sample and no other non-dedicated sampling equipment will be used. The equipment blank will be analyzed for metals in the same manner as the surface water samples (see Table 5-1).

To provide analytical quality control for the analytical program, the following measures will be utilized:

- All total metal sample analysis will be conducted by a laboratory selected by EPA.
- All methyl mercury analysis will be by a qualified WESTON contracted laboratory.
- Additional volume of sample will be collected for at least one sample per media per each analytical method, to be utilized for matrix spike/matrix spike duplicate analysis.
- A CLP-type data package will be required from the laboratory for all resultant data.
- Holding times will be strictly observed for each analyte type and medium; holding times for each analysis are presented in Tables 5-1 and 5-2.

## 6.0 METHODS AND PROCEDURES

## 6.1 Field Equipment

### 6.1.1 Sampling Equipment

The following equipment will be used to obtain environmental samples:

| Equipment | Fabrication | Dedicated |
|---|---|---|
| Filters and tubing | Plastic | Yes |
| Scoops | Plastic | Yes |
| Gloves | Nitrile | Yes |
| Sieves | Plastic | Yes |
| Zip-lock containers | Plastic | Yes |
| Drying plates | Paper | Yes |

No non-dedicated sampling materials will be used.

### 6.1.2 Inspections/Acceptance Requirements for Supplies and Consumables

There are no project-specific inspection/acceptance criteria for supplies and consumables. It is standard operating procedure that: personnel will not use broken or defective materials, items will not be used past their expiration date, supplies and consumables will be checked against order and packing slips to verify the correct items were received, and the supplier will be notified of any missing or damaged items.

## 6.2 Sampling Procedures

### 6.2.1 Solid Matrix Sampling

Solid-matrix samples will be collected from up to ten locations based on the generalized criteria established in Section 4 of this plan. Specific locations and actual number of samples will be determined by the field team based on access, presence of suitable medium, and observations that might indicate a specific risk to human health and/or the environment.

Tailings samples will be collected from areas predominantly comprised of fine-grained (silt to sand) materials. The sample will be collected from six to twelve inches below surface to obtained representative samples that have not been exposed to the sun causing volatilization of mercury. The field team will ensure that the sample medium is generally consistent in grain size from sample to sample. A brief description of the grain size, color, and characteristic will be recorded in the log book.

Sediment samples will be collected from areas in the streambed where fine-grained sediment is deposited. This includes sediment bars on the inside bend of the creek, braided areas, and pools. Water will be removed from sediment samples by allowing the solids to settle in the sample container and decanting the water after the water clarifies sufficiently; a plastic bag may be used for this purpose.

Three preliminary samples will be screened at each sediment and tailing sampling location using an Innov-X Systems Soil Analyzers X-ray florescence (XRF) device. The preliminary samples will be sieved to remove the coarse fraction using a disposable 10 mesh (2.0 mm) sieve or finer. A portion of the sieved sample will be air dried, if visually determined to have a moisture content of over 20%, and screened with the XRF. The XRF data will be used to determine which preliminary sample at a sampling location, based on the highest mercury concentration, will be submitted to the laboratory for definitive analyses. No other decisions will be made based on the XRF data as its sole use is intended to provide screening level data. The coarse fraction of the sample and the sieved portion of the sample will be weighed to determine the percentage of fines in the matrix of each sample submitted to the laboratory. Two sample locations will have both sieved and non-sieved samples submitted for analyses for comparison purposes.

All soil and sediment samples will be collected in accordance with USEPA ERT SOP #2012 (Appendix B). The sieved samples will be homogenized and then transferred with a trowel from the bag to 4-ounce wide-mouth glass jars. Sample containers will be filled to the top, taking care to prevent soil from remaining in the lid threads prior to being closed to prevent potential contaminant migration to or from the sample. Sample containers will be closed as soon as they are filled, immediately chilled to $4^{o}$C, and processed for shipment to the laboratory.

### 6.2.2 Surface Water Sampling

Surface water will be collected from up to 14 locations at the site, based on the general criteria outlined in Section 4 of this plan. Surface water will be collected from locations where the polyethylene sample bottle can be submerged beneath the surface such that it may be filled and capped without entraining surface scum or bottom sediment. Two sets of surface water samples will be collected at each location. The first set will be unfiltered and preserved with nitric acid to a pH of less than 2; the second set will be filtered with a 0.45 micron disposable filter and preserved with nitric acid to a pH of less than 2.

Surface water will be sampled for methyl mercury analysis at four locations following EPA Region 9 Laboratory Field Sampling Guidance Documents #1229 for Trace Metal Clean Sampling of Natural Waters (also referred to as “clean hands, dirty hands” techniques). This sampling method is utilized for low levels of mercury and minimizes the potential for cross contamination of the water samples. The surface water samples will be filtered with a 0.45 micron disposable filter in the field due to anticipated high iron content. Water samples will be contained in fluoropolymer or glass bottles provided by the laboratory. Water samples for methyl mercury analysis will be shipped overnight and preserved at the laboratory.

In addition to the collection of samples for laboratory analysis, visual observations of calcines deposited in the creeks from the Site will be made at the sampling locations. The calcines are identified due to their distinct color, size and shape.

Sampling locations will be documented using a handheld global positioning system (GPS) unit with sub-meter accuracy under ideal conditions.

### 6.3 Decontamination Procedures

All sampling materials are disposable equipment intended for one-time use will not be decontaminated, but will be packaged for appropriate disposal.

## 7.0 DISPOSAL OF INVESTIGATION DERIVED WASTE

In the process of collecting environmental samples at this site, several different types of potentially contaminated investigation-derived wastes (IDW) will be generated, including the following:

- Used personal protective equipment(PPE); and
- Disposable sampling equipment.

The EPA's National Contingency Plan requires that management of IDW generated during site investigations comply with all relevant or appropriate requirements to the extent practicable. This sampling plan will follow the *Office of Emergency and Remedial Response (OERR) Directive* 9345.3-02 (May 1991) which provides the guidance for management of IDW during site investigations. Listed below are the procedures that will be followed for handling IDW. The procedures are flexible enough to allow the site investigation team to use its professional judgment on the proper method for the disposal of each type of IDW generated at each sampling location.

- IDW will be double bagged in plastic trash bags and disposed of as municipal refuse. These wastes are not considered hazardous and can be sent to a municipal landfill. Any PPE that is to be disposed of that can still be reused will be rendered inoperable before disposal.

# 8.0 SAMPLE IDENTIFICATION, DOCUMENTATION AND SHIPMENT

## 8.1 Field Notes

### 8.1.1 Field Logbooks

Field logbooks will document where, when, how, and from whom any vital project information was obtained. Logbook entries will be completed and accurate enough to permit reconstruction of field activities. The logbook is bound with consecutively numbered pages. Each page will be dated and the time of entry noted in military time. All entries will be legible, written in ink, and signed by the individual making the entries. Language will be factual, objective, and free of personal opinions. At a minimum, the following information will be recorded, if applicable, during the collection of each sample.

- Sampler’s name(s)
- Date and time of sample collection
- Type of sample (e.g., surface water)
- Type of sampling equipment used
- Field instrument readings and calibration readings for any equipment used, and
- equipment model(s) and serial number(s)
- Field observations and details related to analysis or integrity of samples (e.g., weather
- conditions, noticeable odors, colors, etc.)
- Sample preservation
- Lot numbers of the sample containers, sample identification numbers and any
- explanatory codes, and chain-of-custody form numbers
- Shipping arrangements (overnight air bill number)
- Name(s) of recipient laboratory(ies)

In addition to sampling information, the following specifics may also be recorded in the field logbook for each day of sampling:

- Team members and their responsibilities
- Time of arrival on site and time of site departure
- Other personnel on site
- Summary of any meetings or discussions with any potentially responsible parties, or
- representatives of any federal, state, or other regulatory agency
- Deviations from sampling plans or site safety plan procedures
- Changes in personnel and responsibilities, as well as reasons for the change
- Levels of safety protection
- Record of photographs

### 8.1.2 Photographs

Photographs will be taken at representative sampling locations and at other areas of interest onsite including calcines identified in the creek beds that have originated from the onsite tailing piles. They will verify information entered in the field logbook. When a photograph is taken, the following information will be written on the logbook or will be recorded in the field photography log:

- Date, location
- Description of the subject photographed
- Name of person taking the photograph

## 8.2 Sample Nomenclature

A unique, identifiable name will be assigned to each sample. The prefix “NIMM” (New Idria Mercury Mine Site) will be applied to each sample location. The qualifiers SS (surface soil), TL (tailings and calcines), SD (stream sediment), and SW (surface water) will be used to identify the sample medium. Water samples that are filtered in the field will be identified with the suffix “F”. A unique number will be assigned to each sample location. For example, if a sediment and surface water sample are collected at the third location visited, then the sample number will be “NIMM-SD-3" for the sediment sample, and “NIMM-SW-3-F” for the filtered surface water sample. Duplicate and blank samples will be assigned fictitious names. The EPA Regional Sample Control Coordinator may assign additional sample numbers. See Section 4 and Tables 5-1 and 5-2 for specific nomenclature and location assignments.

## 8.3 Containers, Preservation, and Holding Time Requirements

All sample containers used will have been delivered to WESTON in a pre-cleaned condition. Container, preservation, and holding time requirements are summarized in Tables 5-1 and 5-2.

## 8.4 Sample Labeling, Packaging, and Shipping

All samples collected will be labeled in a clear and precise way for proper identification in the field and for tracking in the laboratory. Sample labels will be created using the Forms II Lite data management system. Sample labels will be affixed to the sample containers and secured with clear tape. Samples will have preassigned, identifiable and unique numbers in accordance with Section 8.2. The sample labels will contain the following information where appropriate:

- Sample number
- Sample location
- Date and time of collection
- Site name
- Analytical parameter and method of preservation
- CLP Case Number (if applicable)

Sample coolers will be retained in the custody of site personnel at all times or secured so as to deny access to anyone else. The procedures for shipping samples are as follows:

- The bottom of the cooler will be lined with bubble wrap to prevent breakage during shipment.
- Screw caps will be checked for tightness.
- Sample containers will have custody seals affixed so as to prevent opening of the container without breaking the seal.
- All glass sample containers will be wrapped in bubble wrap.
- All containers will be sealed in zip-lock plastic bags.

All samples will be placed in coolers with the appropriate chain-of-custody forms. The Forms II Lite data management system will be used to create all chain-of-custody forms. All forms will be enclosed in plastic bags and affixed to the underside of the cooler lid. Empty space in the cooler will be filled with bubble wrap or styrofoam peanuts to prevent movement and breakage during shipment. Each ice chest will be securely taped shut with strapping tape, and custody seals will be affixed to the front, right, and back of each cooler.

Samples will be shipped for immediate delivery to the contracted laboratory. The EPA Region 9 Regional Sample Control Coordinator (Garrett Peterson (510) 412-2389) will be notified daily of the sample shipment schedule and will be provided with the following information:

- Sampling contractor's name
- The name of the site
- Case number
- Shipment date and expected delivery date
- Total number of samples by matrix, and relative level of contamination (i.e., low, medium, or high)
- Carrier, air bill number(s), and method of shipment (e.g., priority)
- Irregularities or anticipated problems associated with the samples
- Whether additional samples will be sent, if this is the last shipment

### 8.5 Chain of Custody Requirements and QA/QC Summary Forms

A chain of custody form will be maintained for all samples to be submitted for analysis, from the time the sample is collected until its final deposition. Every transfer of custody must be noted and signed for; a copy of this record is kept by each individual who has signed. Corrections on sample paperwork will be made by drawing a single line through the mistake and initialing and dating the change. The correct information will be entered above, below, or after the mistake. When samples are not under the direct control of the individual responsible for them, they must be stored in a locked container sealed with a custody seal. The chain of custody must include the following:

- Sample identification numbers

- Site name
- Sample date
- Number and volume of sample containers
- Required analyses
- Signature and name of samplers
- Signature(s) of any individual(s) with control over samples
- Airbill number
- Note(s) indicating special holding times and/or detection limits

Traffic reports will be used to document sample collection and shipment to the laboratory for analysis. The Forms II Lite data management system will be used to generate all traffic reports and chains of custody. One copy will be completed and sent with the samples for each laboratory and each shipment. If multiple coolers are sent to a single laboratory on a single day, only one form will be completed. If all sample information cannot be entered in one form, then multiple forms will be used. One copy of the form will be sent to the EPA RSCC, another copy will be sent to Contract Laboratory Analytical Services Support, and one copy will accompany the samples to the laboratory. A photocopy of the original will be made for WESTON's master file. The document titled "*Contract Laboratory Program Guidance for Field Samplers*," EPA Superfund document 540-R-07-06, will be taken to the field as a reference. This document is included in Appendix D.

A QA/QC summary form will be completed for each laboratory and each matrix of the sampling event. The sample number for all blanks, reference samples, laboratory QC samples (MS/MSDs) and duplicates will be documented on this form. This form is not sent to the laboratory. The original form will be sent to the EPA; a photocopy of the original will be made for WESTON's master file.

# 9.0 QUALITY ASSURANCE AND CONTROL (QA/QC)

## 9.1 Field Quality Control Samples

The QA/QC samples described in the following subsections, which are also listed in Tables 5-1 and 5-2, will be collected during this investigation.

### 9.1.1 Assessment of Field Contaminants (Blanks)

#### 9.1.1.1 Equipment Blanks

An equipment rinsate blank will be collected to evaluate the dedicated disposable sieves by pouring Ultra Pure Blank Water DI+™ water over the sieve. One equipment rinsate blank will be collected and will be analyzed for metals in the same manner as the surface water samples (see Table 5-1).

The equipment blanks will be preserved, packaged, and sealed in the manner described for the surface water samples in Section 6.2. A separate sample number will be assigned to each sample, and it will be submitted blind to the laboratory.

If any compound is detected in equipment blank, then sample data will be considered acceptable without qualification only if the results are above five times the amount detected in the blank(s) for each respective analyte. If the analyte detected in the blank is a common laboratory contaminate, then the sample results for those analytes would be qualified unless the results are above ten times the amount detected in the blank(s). Sample results that are below five times (ten times for common laboratory contaminants) the amount detected in the blanks, additional evaluation will be require during data validation.

#### 9.1.1.2 Field Blanks

Field blanks will only be collected for methyl mercury sampling locations to demonstrate that sample contamination has not occurred during field sampling and sample processing. One field blank must be generated for every 10 samples that are collected at a given site. Field blanks are collected before sample collection. Field blanks are generated by filling an appropriate container with reagent water in the laboratory, transporting the filled container to the sampling site, processing the water through each of the sample processing steps and equipment that will be used in the field, collecting the field blank in one of the sample bottles, and shipping the bottle to the laboratory for analysis.

#### 9.1.1.3 Temperature Blanks

For each cooler that is shipped or transported to an analytical laboratory, a 40-mL vial of deionized water will be included that is marked "temperature blank." This blank will be used by the sample custodian to check the temperature of samples upon receipt.

### 9.1.2 Assessment of Sample Variability (Field Duplicates or Co-located Samples)

Duplicate soil and surface water samples will be collected at the sample locations indicated in Tables 5-1 and 5-2. Locations for duplicate samples were chosen based on the potential of the sample containing AOCs. One in samples 10 samples, per matrix, will be designated as a duplicate sample.

When collecting duplicate water samples, bottles with the two different sample identification numbers will be alternated in the filling sequence. Soil samples to be analyzed for metals will be homogenized in a sample-dedicated zip-lock bag. Homogenized material will then be transferred to 4 oz. glass jars.

Duplicate samples will be preserved, packaged, and sealed in the same manner described for the surface water samples in Section 6.2. A separate sample number will be assigned to each duplicate, and it will be submitted blind to the laboratory.

## 9.2 Background Samples

Background surface water and soil samples will be collected upgradient of the site to differentiate between on-site and off-site contributions to contamination. Additional background samples will be collected from select tributaries to the surface water pathway and from Panoche Creek at a location upstream from the Silver Creek confluence. Background samples indicated in Tables 5-1 and 5-2 will be collected from the location shown in Figures 2 and 4. Background samples will be submitted blind to the laboratory and analyzed by the methods indicated in Tables 5-1 and 5-2.

## 9.3 Laboratory Quality Control Samples

A laboratory QC sample is not an extra sample; rather, it is a sample that requires additional QC analyses.

For water samples, double volumes of sample will be provided to the laboratory for its use for QC purposes. Two sets of water sample containers will be filled and all containers labeled with a single sample number.

Soil samples for laboratory QC purposes will be obtained by collecting one additional sample from a co-located location in the same way as the original samples. The additional sample will be assigned the same sample number as the original sample.

For this sampling event, the samples collected at the locations indicated in Tables 5-1 and 5-2 will be the designated laboratory QC samples. These locations were chosen because they are suspected to contain detectable levels of AOCs. The sample labels and chain-of-custody records for these samples will identify them as a laboratory QC samples. At a minimum, one sample per 20 samples, per matrix, will be designated as a laboratory QC sample.

### 9.4 Analytical and Data Package Requirements

It is required that all samples be analyzed in accordance with the methods listed in Tables 5-1 and 5-2. The laboratory is required to supply documentation to demonstrate that their data meet the requirements specified in the contract.

The data validation package shall include all original documentation generated in support of this project. In addition, the laboratory will provide original documentation to support that all requirements of the methods have been met. This includes, but is not limited to, sample tags, custody records, shipping information, sample preparation/extraction records, and instrument printouts such as mass spectra. Copies of information and documentation required in this document are acceptable. CLP methods will follow the contract required data package requirement.

### 9.5 Data Validation

Validation of analytical data generated by the CLP and contract laboratories for this investigation will be contracted by the EPA in accordance with the *EPA Contract Laboratory Program National Functional Guidelines for Low Concentration Organic Data Review* (*EPA540-R-00-006*, June 2001). Tier 3 validation for 100% of the data will be required.

To meet requirements for categorization as definitive data, the following criteria will be evaluated:

- Holding times
- Sampling design approach
- Blank contamination
- Initial and continuing calibration
- Detection limits
- Analyte identification and quantitation
- Matrix spike recoveries
- Performance evaluation samples when specified
- Analytical and total error determination
- Laboratory Control Samples.

Upon completion of validation, data will be classified as one of the following: acceptable for use without qualifications, acceptable for use with qualifications, or unacceptable for use.

### 9.6 Field Variances

As conditions in the field may vary, it may become necessary to implement minor modifications to this plan. When appropriate, the EPA will be notified of the modifications and a verbal approval obtained before implementing the modifications. Modifications to the original plan will be documented in the final report.

## 9.7 Assessment of Project Activities

### 9.7.1 WESTON Assessment Activities

The following assessment activities will be performed by WESTON:

- All project deliverables (SAP, Data Summaries, Data Validation Reports, Site Inspection Report) will be peer-reviewed prior to release to the EPA. In time-critical situations, the peer review may be concurrent with the release of a draft document. Errors discovered in the peer review process will be reported by the reviewer to the originator of the document, who will be responsible for corrective action.
- The WESTON QA Officer will review project documentation (logbooks, chain of custody forms, etc.) to ensure the SAP was followed and that sampling activities were adequately documented. The QA Officer will document deficiencies and the Field Project Manager will be responsible for corrective actions. The QA Officer is also responsible for Review and assessment of the data for data quality issues for the project.
- The WESTON Project Manager is responsible for the review of data, and ensuring that sampling design approach and total error determination meet the DQOs for this project.

### 9.7.2 EPA Assessment Activities

EPA assessment activities, which can include surveillance, management system reviews, readiness reviews, technical system audits, performance evaluation, and audits and assessments of data quality, have not been formally identified to WESTON by the EPA at the time of completion of the SAP.

### 9.7.3 Project Status Reports to Management

It is standard procedure for the WESTON PM to report to the EPA SAM any issues, as they occur, that arise during the course of the project that could affect data quality, data use objectives, the project objectives, or project schedules.

### 9.7.4 Reconciliation of Data with DQOs

Assessment of data quality is an ongoing activity throughout all phases of a project. The following outlines the methods to be used by WESTON for evaluating the results obtained from the project.

- Review of the DQO outputs and the sampling design will be conducted by the WESTON QA Officer and the EPA prior to sampling activities. The reviewer will submit comments to the WESTON PM for action, comment, or clarification. This process will be iterative.
- A preliminary data review will be conducted by WESTON. The purpose of this review is to look for problems or anomalies in the implementation of the sample collection and analysis procedures and to examine QC data for information to verify assumptions

underlying the DQOs and the SAP. Anomalies may include changes in the Method Detection Limits (MDLs) as a result of dilution, sampling, and/or matrix factors across the sample suite; such anomalies will be reported in writing to the SAM when they are confirmed.

- Data review will also include a comparison of analytical results, Method Detection Limits, and background concentrations in an effort to determine whether each result can be identified as “significantly above,” or “significantly below” background, as defined in Section 3.3.

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**FIGURES**

**TABLES**

# APPENDIX A:

# DATA QUALITY OBJECTIVE WORKSHEET

# APPENDIX B:

# SITE SPECIFIC HEALTH AND SAFETY PLAN

# APPENDIX C:

# STANDARD OPERATING PROCEDURES

## APPENDIX D:

## INSTRUCTIONS FOR
## SAMPLE SHIPPING
## AND
## DOCUMENTATION