Inventory and Assessment of Abandoned Mines on California Agency-Owned Lands

CALIFORNIA CONSERVATION

OFFICE OF MINE RECLAMATION

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CALIFORNIA natural resources AGENCY

ARNOLD SCHWARZENEGGER, Governor
MIKE CHRISMAN, Secretary for Natural Resources

MEMORANDUM

TO: State Agencies Affected by Abandoned Mine Lands

FROM: Mike Chrisman, Secretary
California Natural Resources Agency

Mike Chrisman

DATE: August 12, 2009

SUBJECT: ABANDONED MINE INVENTORY

I am pleased to report that in an effort to assess and remediate some of the hazards associated with the legacy of mining in California, the Department of Conservation has recently completed an inventory of abandoned mines on State-owned land. The purpose of this memorandum is to set out basic procedural concepts concerning the "next steps" in what undoubtedly will be a long and difficult process.

Through the Governor's Office, I am directing the Department of Conservation to share the inventory with the involved land-owning agencies as well as associated regulatory agencies and non-governmental organizations where appropriate. The Department of Conservation will take the lead role in prioritizing and coordinating abandoned mine remediation efforts on these inventoried sites among the various land-owning agencies. This includes the collaborative pursuit of any available funding sources. The various State agencies involved in this effort, including both land-owning and regulatory, are encouraged to cooperate with each other and the Department of Conservation. Both the Governor's Office and the Natural Resources Agency are committed to proactive efforts associated with remediating residual abandoned mine features on property owned by the State. The inventory compiled by the Department of Conservation will serve as an important step in further preserving the environment and protecting the people of the State of California.

If you have any questions or need additional information, please contact Cy Oggins, at the Department of Conservation's Office of Mine Reclamation at (916) 323-9226.

INVENTORY AND PRELIMINARY ASSESSMENT OF ABANDONED MINES ON CALIFORNIA AGENCY-OWNED LANDS (August 2009)

PROJECT SUMMARY AND BACKGROUND

The Abandoned Mine Lands Unit (AMLU), part of the Office of Mine Reclamation in the California Department of Conservation (DOC), has inventoried abandoned mines on federal, State, local, and private lands in California since 1997. The AMLU also maintains the State's abandoned mine inventory database. From 2007 to 2008, at the direction of the Governor's Office and Natural Resources Agency, the AMLU completed an inventory of abandoned mines on State-owned lands (Figure 1). The following activities were conducted.

- The AMLU developed a project methodology that included the following steps (see flowchart in Appendix A).
  - Review data from 110 State-owned abandoned mine sites and features visited before 2007 and identify potential new sites and features on State lands using mine location databases such as the AMLU's Topographically Occurring Mine Symbols (TOMS) dataset, digital land ownership data, and Geographic Information Systems (GIS) tools.[1]
  - Visit and collect data at not-yet-inventoried sites, including recording Global Positioning System (GPS) positions of each mine feature and taking notes on any physical or chemical hazards associated with historic mining on the sites.
  - Identify sites for potential future action based on onsite observations, sampling, and/or environmental assessment.
- From 2007 to 2008, AMLU staff visited 231 abandoned mine sites on State-owned lands. Of 341 sites inventoried (110 prior to 2007 plus 231 new sites), AMLU staff identified 15 sites to sample for potential contaminants. The 15 sites are on lands owned by the Department of Parks and Recreation (State Parks), State Lands Commission (SLC), and Department of Fish and Game (DFG).
- In Spring 2008, the AMLU and Department of Toxic Substances Control (DTSC) sampled and provided preliminary assessments (not full characterizations) of the 15 sites identified during field inventories. Staff from the AMLU, DTSC, and a DTSC subcontractor collected more than 300 samples, including field screening measurements and soil, water, and sediment samples, for subsequent analysis.

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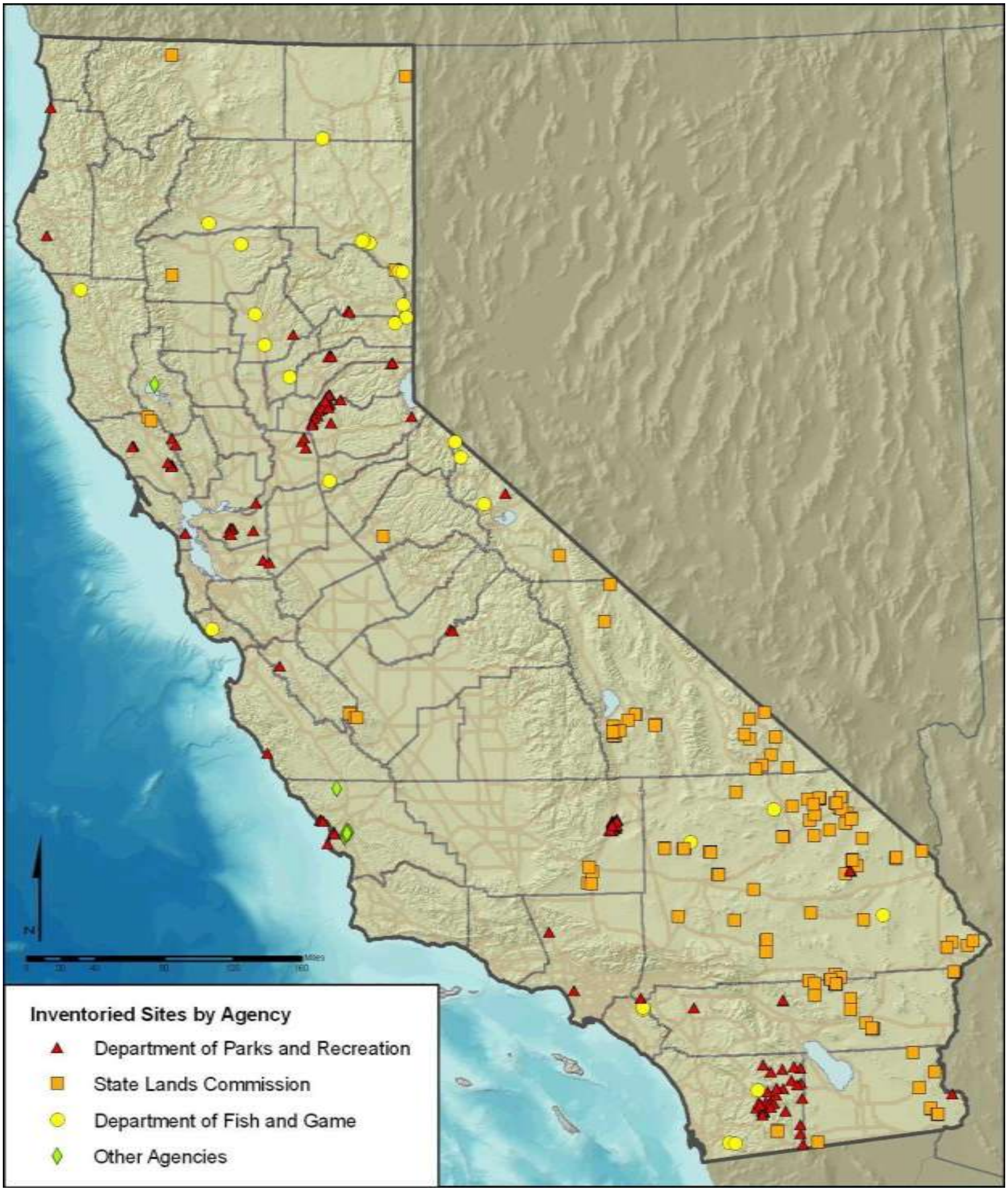
[1] The following terms are used throughout this document.

- A **feature** is a single human-made object or disturbance associated with mining, such as a shaft (vertical) or adit (horizontal) opening, tailings, machinery, facilities, etc.
- A **mine site** can consist of one or more features.
- **TOMS** are points in an AMLU dataset (DOC, 2001) created by digitally scanning mine symbols on U.S. Geological Survey (USGS) 7.5' map series topographic maps (see www.consrv.ca.gov/omr/abandoned_mine_lands/toms/Pages/index.aspx). Each TOMS point is considered a potential mine until a field inventory is completed and mine features are mapped. The AMLU typically finds an average of 3.5 features per TOMS symbol during field inventories. Inventoried features may be grouped into one mine site based on historical data and proximity to one another.

Figure 1. State-owned lands with abandoned mines (by State agency).



The AMLU's project methodology and results are summarized below. The project methodology is presented in more detail in Appendix A. Appendix B includes analytical data and results from the field sampling effort and summary information on the 15 State-owned sites sampled during this project. AMLU and other agency staffs who participated in or contributed to the project are listed at the end of this document.

METHODOLOGY

From 1997 through 2008, the AMLU inventoried 341 abandoned mine sites containing 5,135 features on State-owned lands.[2] Ownership information is provided in Table 1.

Table 1. Numbers of AML sites and features on State-owned lands.

Agency	No. of TOMS Points (Potential Mines)					Inventoried	
	Total	Inventoried (1997-2008)	Not inventoried (2007-08) [a]			Sites	Features
			Not Found [b]	Inaccessible or Denied Access [c]	Active or Being Reclaimed [d]		
State Parks	669	607	10	27	23	**149**	**3,552**
State Lands Commission	585	517	8	13	47	**143**	**1,213**
Fish and Game	105	96	0	6	3	**31**	**256**
CA National Guard (CNG)	13	13	0	0	0	**11**	**84**
Forestry and Fire Protection	5	5	0	0	0	**2**	**14**
University of California & California State University	2	2	0	0	0	**3**	**14**
Corrections	1	0	0	1	0	**0**	**0**
Water Resources	1	0	0	0	1	**0**	**0**
Transportation (Caltrans)	No comprehensive GIS data	1	2	0	0	**2**	**2**
Other State agencies		0	0	0	0	**0**	**0**
TOTAL	**1,381**	**1,240**	**20**	**47**	**74**	**341**	**5,135**

[a] Some abandoned mines may not have been identified or inventoried for reasons that include: (1) the available abandoned mine datasets may not include every mine site; (2) some State agencies do not maintain their land ownership data in a digital format that enables comparisons with abandoned mine data; and (3) recent acquisitions and other properties may not be recorded in any ownership dataset. Other field-related reasons are listed below.

[b] 20 TOMS points (1% of 1,381) were not found: the AMLU did not inventory two mine features in Caltrans rights-of-way as the features were reported paved over or otherwise "obliterated" (Robinson, 2004); 18 other features may have been erroneously mapped or also destroyed after being mapped.

[c] AMLU staff could not access 47 AML features (3%) for reasons such as dangerous cliffs or streams, thick vegetation, other natural factors, potential illegal activities onsite, or because the mine is located on the grounds of San Quentin Prison. After reviewing aerial photos and historical records about the mine sites, the AMLU believes they are unlikely to present a chemical or physical hazard.

[d] 74 TOMS points (5%) were determined to be part of active or reclaimed (not abandoned) mine sites.

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[2] Major abandoned mine sites that State regulatory agencies have investigated, are remediating, or have remediated were not included in this project. These sites include Empire Mine (State Parks) and Spenceville Mine (DFG) in Nevada County, Leviathan Mine (State Water Resources Control Board [SWRCB]) in Alpine County, Penn Mine (Regional Water Quality Control Board [RWQCB]) in Calaveras County, and the entire Utopia Mine site (Caltrans) in Lake County.

The AMLU followed its established inventory guidelines and procedures to investigate sites, collect field data, and establish a hazard ranking of abandoned mines on State lands. AMLU staff assessed and recorded all surface mining-related features on the entire mine site and recorded field notes and data on the AMLU's Field Inventory Form (see Appendix A). Data were later processed and entered into an Access database. Tasks at each site included the following.

- Identify and record each feature—such as hazardous openings (e.g., shaft or adit), tailings, and production facilities—using GPS, digital photographs, and notes, including general observations on the presence and extent of any contaminants, contaminant sources, affected media and pathways (soil and sediment, surface and ground water, and air), and biological resources.
- Evaluate factors to help prioritize relative hazards, such as ease of access, proximity to population centers, level of public visitation, and land and water use.
- Identify potential sites for follow-up contaminant sampling using best professional judgment based on *in situ* observations of potential chemical hazards.

The AMLU supplemented field observations after data entry by using a Chemical Risk Assessment (CRA)/Physical Risk Assessment (PRA) model (discussed in Appendix A) to help prioritize sites that may warrant further characterization.[3] Field sampling occurred during return trips to 15 sites that were identified during the initial inventories based on field observations (see Appendix B for details on the sampled sites).[4]

<u>State Parks</u>

- Anza-Borrego Desert State Park (SP) (*Roberts & Peeler Mine*)
- Cuyamaca Rancho SP (*Stonewall Mine*)
- Malakoff Diggins State Historic Park (SHP) (*Le Du & Malakoff Mines*)
- Picacho State Recreation Area (SRA) (*Picacho Mill*)
- Plumas-Eureka SP (*Plumas-Eureka Mine*)
- Providence Mountains SRA (*C & K Mine*)
- Robert Louis Stevenson SP (*Silverado Mine*)

<u>State Lands Commission</u>

- Parcels 103-009/010 (*Buckeye Mine*)
- Parcel 191-038 (*Los Padres Mine*)
- Parcel 199-023 (*Golden West Mine*)
- Parcel 204-016 (*Silver Giant Mine*)
- Parcel 204-019 (unnamed mine)

<u>Department Of Fish And Game</u>

- Butte Creek Ecological Reserve (ER) (*Pacific Gold #3 Mine*)
- Oroville Wildlife Area (WA) (*Gold Hill Dredging Co*.)
- Spenceville WA (*Wellman Creek Mine*)

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[3] The CRA/PRA, discussed in Appendix A, is an empirically-derived system for assigning a numerical score based on readily quantifiable measures present at an abandoned mine site: *chemical hazards* and *chemical exposure potential* (CRA) and *physical hazards* and *physical exposure potential* (PRA). The scores, which have values from 0 (no potential risk) to 5 (high potential risk), can be used to group sites into ranked categories for screening, comparison, and prioritization.

[4] This list does not include Bodie SHP, which was inventoried during this project, but was characterized and remediated separately by the U.S. Environmental Protection Agency (USEPA), State Parks, and AMLU. Sites with mixed ownership were also not sampled for this project. Examples of mixed-ownership sites include Vulcan Mine in San Bernardino County (the mine site includes lands owned by the SLC and Bureau of Land Management [BLM]) and sites in the Auburn and Folsom SRAs in El Dorado and Placer Counties (these lands are owned by the Bureau of Reclamation [BOR] and managed by State Parks).

Sampling and analysis were conducted under a contract between the AMLU and the DTSC, with analyses subcontracted to DTSC's consultant URS Corporation (URS). Prior to sampling at the 15 sites, the DTSC developed and implemented a Preliminary Site Investigation work plan (DTSC, 2008) to investigate potential soil, sediment, and surface water contamination. The plan had four parts: (1) a generalized methodology to establish the appropriate type, quantity, and location of samples for screening of hazardous substances; (2) a Sampling and Analysis Plan that described general soil, sediment, and water sampling techniques, analytical methods, and quantity of each sample to take; (3) a Quality Assurance Project Plan that described methods to use to ensure collection, analysis, and reporting of high-quality data; and (4) a Health and Safety Plan to help project staff to identify and mitigate risks.

The AMLU and DTSC determined that the primary constituents of concern (COCs) would be arsenic, lead, and mercury, with other metals (e.g., cadmium, copper, nickel, and zinc) possibly present onsite. Secondary concerns, present under certain conditions, included methylmercury (MeHg) (an organic form of mercury [Hg] created by sulfate-reducing bacteria), cyanide, and Acid Generation Potential (AGP). For each COC, DTSC developed Human Health Screening Criteria (HHSC) to determine potential impacts to human health by visitors to a mine site (Table 2).

Table 2. DTSC Human Health Screening Criteria for inorganics in soils at selected open-space recreational areas.

Constituent	Human Health Site Visitation Category and Criteria (mg/kg) [a]			
	Residential [b]	Employee [c]	Recreational [d]	Trespasser [e]
Arsenic [f]	0.07/background	0.50/1.6	--/780 [i]	--/10,000 [i]
Cadmium	1.7	450	12,000	59,000
Copper	300	41,000	350,000	>100,000
Lead [g]	150	500	1,200 [h]	1,200 [h]
Mercury	18	140	330	4,800
Methylmercury	6.1	62	--	--
Nickel	1,600	20,000	71,000	>100,000
Zinc	23,000	100,000	>100,000	>100,000

[a] Milligrams per kilogram (mg/kg) is equivalent to parts per million (ppm).
[b] Residential based on California Human-Exposure-Based Screening Levels (California Environmental Protection Agency, 2005). No sampled sites met this criterion.
[c] Employee based on 70 kg body weight, 250 day/year, 8 hours/day, 50 mg/day ingestion rate, 25 year exposure duration (USEPA, 1999).
[d] Recreational User based on a runner, 70 kg body weight, 200 days/year, 1 hour/day, 3 mg/day ingestion rate, 30 year exposure duration (Empire Mine Scenario).
[e] Trespasser based on a teenager with a 45 kg body weight, 12 days/year, 1 hour/day, 10 mg/day ingestion rate, 7 year exposure duration.
[f] Based on a cancer risk endpoint for soil or non-cancer, threshold effect.
[g] Based on a calculation using the Adult Lead Model for a female ranger of child-bearing age (recreational and trespasser scenarios are outside boundary conditions of the model).
[h] Value represents a maximum value not to be exceeded for children playing outside in various exposure scenarios, (Toxic Substances Control Act § 403).
[i] Based on non-cancer, threshold endpoint.

The HHSC are categorized by level of site visitation and focus on impacts from soil and sediment. Visitation levels used for each sampled site (Table 3) were based on information from the landowning agency and observed usage during two field visits. Ecological screening criteria were also developed to show protective levels for plants and animals. Potential impacts to ground and surface water from the leaching of waste constituents from soils were qualitatively assessed using Designated Level Methodology (DLM) (CVRWQCB, 1989).

Table 3. Anticipated maximum levels of visitation determined at the 15 sampled sites.

	Sampled Site	Mine Name	Maximum visitation level
STATE PARKS	Anza-Borrego Desert SP	Roberts & Peeler Mine	Recreational [a]
	Cuyamaca Rancho SP	Stonewall Mine	Recreational [a]
	Malakoff Diggins SHP	Le Du & Malakoff Mines	Recreational [a]
	Picacho State SRA	Picacho Mill	Recreational [a]
	Plumas-Eureka SP	Plumas-Eureka Mine	Employee [b]
	Providence Mountains SRA	*C & K Mine*	Trespasser [c]
	Robert Louis Stevenson SP	*Silverado Mine*	Recreational [a]
SLC	Parcels 103-009/010	*Buckeye Mine*	Trespasser [c]
	Parcel 191-038	*Los Padres Mine*	Recreational [a]
	Parcel 199-023	*Golden West Mine*	Recreational [a]
	Parcel 204-016	*Silver Giant Mine*	Recreational [a]
	Parcel 204-019	Unnamed mine	Trespasser [c]
DFG	Butte Creek ER (DFG Region 2)	*Pacific Gold #3 Mine*	Recreational [a]
	Oroville WA (DFG Region 2)	*Gold Hill Dredging Co.*	Recreational [a]
	Spenceville WA (DFG Region 2)	*Wellman Creek Mine*	Recreational [a]

[a] A "Recreational" level was used for the majority of the sites; these mine sites are open to the public, are visited regularly (but likely not daily by any individual), and are not located where any employee would spend extended time. No sites were categorized at the most-protective "Resident" level.
[b] An "Employee" level of visitation was used for Plumas-Eureka SP because some tested tailings are in a picnic area and close to a museum and adjacent historical exhibit, and because employees may contact the tailings on a daily basis.
[c] A "Trespasser" level was used for Providence Mountains SRA and SLC Parcel 204-019 (located in remote desert areas requiring long hikes to access with no onsite indicators of regular public visitation) and SLC Parcels 103-009/-010 (surrounded by private property with gated access road).

The sampling team typically consisted of two AMLU staff, two DTSC staff, and one URS consultant. Sampling was focused into a narrow timeframe to minimize travel expenses. Seven sites were sampled in northern California on April 17, 2008, and from April 21-25, 2008; eight sites were sampled in southern California from April 28 to May 2, 2008. Some of the locations were remote and receive very few human visitors per year, while other sites receive numerous human visitors every year.

Site screening sampling provided a point-in-time indication of potential contamination at the selected sites; it was not intended to represent a full site characterization. Field measurements and laboratory data analyses consisted of the following activities.

- Collection and analysis of approximately:
  - 125 surface soil samples (0 to 6 inches below ground surface) for metals including mercury, and cyanide where applicable;
  - 40 sediment samples for metals, including mercury and MeHg;
  - 25 surface water samples for metals, including mercury.
  - Appropriate quality assurance/quality control (QA/QC) samples (e.g., field duplicates, travel blanks) and background samples.
- Taking of approximately 275 field X-Ray Fluorescence (XRF) measurements for metals and additional pH measurements in water where water was present.
- Recording of site GPS locations, sample collection date/time, and site conditions.

Laboratory data included: soil data for California Administrative Manual (CAM) metals and mercury (all sites) and cyanide and Waste Extraction Test (WET) concentrations (selected sites); sediment data for CAM 17 metals and mercury (all sites) and MeHg (selected sites); and water data for metals and mercury (if water was present) and AGP tests (one site).[5]

SAMPLING RESULTS

XRF and laboratory data verified that some State-owned lands contain mining-related contaminants (see Table 4 and Appendix B).[6] Several State-owned abandoned mine sites contained constituents that exceeded HHSC, based on the maximum anticipated level of site visitation, or had potential water quality impacts based on the DLM analyses of soils (qualitative assessments of the leaching of metals from soils). Additional general findings are as follows.

- Elevated levels of arsenic, lead, mercury, cadmium, copper, zinc, and antimony in soils and sediment were found at some sites.
- Several samples were above relevant water quality criteria.
- Cyanide was detected in one soil sample (at Picacho SRA), water samples for pH showed no highly acidic waters (the lowest pH observed was ~ 5.5, and

[5] CAM 17 metals are the 17 heavy metals listed in CAM Title 22 (used to identify hazardous waste), a common suite of metals that can be analyzed in a single laboratory analysis using USEPA Method 6010-B. The WET test is an analytical procedure used to determine concentrations of metals that may leach from soils. The procedure involves the use of a buffer solution or deionized water to produce a leachate from the soil; the resulting concentration is known as the Soluble Threshold Limit Concentration, as opposed to the Total Threshold Limit Concentration analyzed directly from the soil sample (CVRWQCB, 1989).

[6] The XRF unit was an effective screening tool in the sampling effort; where the XRF measured elevated concentrations of a constituent, corresponding laboratory-analyzed samples also showed elevated levels. To determine the accuracy of the XRF, DTSC used regressions to compare XRF results to laboratory results for the same sample; R^2 values for metals ranged from 0.05 to 0.99.

samples ranged from ~5.5 to 7), and MeHg was detected at the Malakoff Diggins SHP, Picacho SRA, Robert Louis Stevenson SP, Butte Creek ER, and Oroville WA sample sites.

Table 4. Abandoned mine sites sampled.

Agency & Site		Exceeds HHSC [a,b]		Potential Water Quality Impact [c]
		Chemical Present	Visitation Level Exceeded	
STATE PARKS	**Anza-Borrego Desert SP** (*Roberts & Peeler Mine*)	No	none	Unknown (not tested)
	Cuyamaca Rancho SP (*Stonewall Mine*) [d]	No	none	**Arsenic**
	Malakoff Diggins SHP (*Le Du & Malakoff Mines*) [e]	No	none	No
	Picacho SRA (*Picacho Mill*) [e, f]	**Lead**	**Recreational, Trespasser**	**Arsenic, Lead**
	Plumas-Eureka SP (*Plumas-Eureka Mine*)	**Arsenic, Lead, Mercury**	**Employee, Recreational, Trespasser**	**Arsenic, Lead, Mercury**
	Providence Mountains SRA (*C & K Mine*)	**Lead**	**Trespasser**	**Arsenic, Lead**
	Robert Louis Stevenson SP (*Silverado Mine*)	No	none	No
SLC	**Parcels 103-009/010** (*Buckeye Mine*)	**Mercury**	**Trespasser**	**Mercury**
	Parcel 191-038 (*Los Padres Mine*) [d]	No	none	**Copper, Lead**
	Parcel 199-023 (*Golden West Mine*)	**Lead**	**Recreational, Trespasser**	**Lead**
	Parcel 204-016 (*Silver Giant Mine*)	**Lead**	**Recreational, Trespasser**	Unknown (not tested)
	Parcel 204-019 (unnamed mine)	**Lead**	**Trespasser**	**Lead**
DFG (all Region 2)	**Butte Creek ER** (*Pacific Gold #3 Mine*) [e]	No	none	No
	Oroville WA (*Gold Hill Dredging Co.*) [d]	No	none	No
	Spenceville WA (*Wellman Creek Mine*) [d, e]	No	none	**Copper**

[a] For HHSC criteria and visitation levels, see Tables 2 and 3.
[b] Athough no HHSC criteria were exceeded, or water quality impacts detected, at Anza-Borrego Desert SP, Malakoff Diggins SHP, Robert Louis Stevenson SP, Butte Creek ER, or Oroville WA, evaluation of habitat at these sites would help to assess the presence of ecological receptors and any potential exceedances of ecological screening criteria.
[c] From metals leaching from soil. Impacts could not be calculated for samples with constituents below the reporting limit using the WET test.
[d] DTSC initially determined that these sites exceeded the HHSC. The AMLU and DTSC re-evaluated the data and determined that the HHSC were not exceeded.
[e] Further characterization of MeHg detected at Malakoff Diggins SHP, Picacho SRA, Robert Louis Stevenson SP, Butte Creek ER, and Oroville WA is recommended.
[f] Further onsite assessment of cyanide detected in one soil sample at Picacho SRA is suggested to determine if additional areas are affected.

CONCLUSIONS AND RECOMMENDATIONS

1. Of the 341 abandoned mine sites, including 15 sampled sites, on State-owned lands inventoried for this project, the AMLU should further evaluate 10 sites in coordination with applicable land-owning and regulatory agencies, because of measured HHSC exceedances and/or potential water quality impacts. **From October 2007 to June 2009, characterization and remediation work was completed at an eleventh site: Bodie SHP.**[7] Initial steps would involve estimating potential costs to characterize and remediate contamination at these 10 sites and identifying funding sources. Further site characterization(s) could then occur based on prioritization and available funding (e.g., USEPA Brownfields grants, potential future 1872 Mining Law Reform fees, and other sources). The sites are:
    - Cuyamaca Rancho SP *(Stonewall Mine).*
    - Picacho SRA *(Picacho Mill).*
    - Plumas-Eureka SP *(Plumas-Eureka Mine).*
    - Providence Mountains SRA *(C & K Mine).*
    - SLC Parcel 103-009/010 *(Buckeye Mine).*
    - SLC Parcel 191-038 *(Los Padres Mine).*
    - SLC Parcel 199-023 *(Golden West Mine).*
    - SLC Parcel 204-016 *(Silver Giant Mine).*
    - SLC Parcel 204-019 *(unnamed mine).*
    - Spenceville WA *(Wellman Creek Mine)*.

2. The AMLU, in coordination with applicable land-owning and regulatory agencies, should evaluate ecological receptors at the sites above, as well as the following five remaining sampled sites, to determine if exceedances of ecological screening criteria occur (see Appendix A, Table A-7, for criteria).
    - Anza-Borrego Desert SP *(Roberts & Peeler Mine).*
    - Malakoff Diggins SHP *(Le Du & Malakoff Mines).*
    - Robert Louis Stevenson SP *(Silverado Mine).*
    - Butte Creek ER *(Pacific Gold #3 Mine).*
    - Oroville WA *(Gold Hill Dredging Company).*

    Potential impacts associated with MeHg detected at the following sites should also be evaluated.
    - Malakoff Diggins SHP *(Le Du & Malakoff Mines).*
    - Picacho SRA *(Picacho Mill).*
    - Robert Louis Stevenson SP *(Silverado Mine).*
    - Butte Creek ER *(Pacific Gold #3 Mine).*
    - Oroville WA *(Gold Hill Dredging Company).*

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[7] Addressing hazards associated with abandoned mine sites on State-owned land is already occurring. For example, the Budget Act of 2006 (Assembly Bill 1801, Item No. 3480-001-0035) appropriated funds from the DOC's Surface Mining and Reclamation Account for the DOC to "develop remediation strategies for statewide specified chemical hazards." In June 2009, the AMLU, State Parks, and USEPA completed a project to characterize and remediate chemical hazards (lead, mercury, and arsenic) at Bodie SHP (see Appendix B, Part 2A).

3. The AMLU should further assess sites that were not sampled for this project, but that were determined to have a high relative pollution potential based on the AMLU's predictive model (e.g., see Table B-4 for CRA Rank 5 sites representing the highest potential risk). Factors to consider include if the site has already been characterized or remediated and, if the contiguous site is of mixed ownership, where any contaminants may be located and what other landowners may need to be contacted.

4. The AMLU and State land-owning agencies should continue to remediate any high-priority physical hazards present on State lands. Physical hazards include unstable adits and shafts, hidden winzes, oxygen-depleted or poisonous gases, old explosives, and dangerous wildlife. The AMLU has an existing program to assist State agencies with abating hazardous mine features via signs, fences, backfilling, polyurethane foam plugs, bat-compatible gates, and other methods. Since 2002, the AMLU has partnered with public agencies to remediate more than 600 hazardous mine features. Since 2006, the AMLU has provided funding to remediate abandoned mines from a dedicated fee collected on gold and silver production.

5. State agencies should evaluate new land purchases and transfers for the presence of abandoned mines before completing the transactions and should maintain current and detailed land ownership information in a GIS format either individually or within a comprehensive State lands database. As "new" abandoned mine sites are "discovered" in the field, found through research (e.g., finding of historic mine maps), or reported by the public, the AMLU should inventory these sites.

6. Abandoned mine sites do not necessarily or naturally contain themselves within a single landowner's boundaries. For example, mine features at Malakoff Diggins SHP span the State property boundary with BLM land, and both water and sediment are transported across this border. Enhanced coordination to address hazards on public lands is occurring (e.g., through meetings of the DOC's Abandoned Mine Lands Forum, the California Abandoned Mine Lands Agency Group, and the Desert Managers Group) and will likely require continued or new partnerships between State and federal landowning and regulatory agencies.

APPENDIX A
DETAILED PROJECT METHODOLOGY

Appendix A describes the methodology used by the AMLU in 2007-08 to complete an inventory of abandoned mines on lands owned by the State.

Project Background

An estimated 47,000 abandoned mines lie on public and private lands in California, including more than 1,000 such mines on property owned by State Parks, SLC, DFG, and other State agencies.[1] Between 1997 and 2007, the AMLU had inventoried 2,318 abandoned mine sites with 13,499 mine-related features statewide on public and private lands, including 110 sites with 933 features on State-owned lands. For this project, AMLU staff visited an additional 231 abandoned mine sites on State lands. The mines are located all over the State (see Figure 1, page 2).

In some cases, land on which abandoned mines are located passed to the State around California's statehood in 1850.[2] The State acquired other abandoned mines by purchasing or accepting property for parks, wildlife areas or other reasons. Mine sites in the latter category include the following.

- **Bodie** in Mono County, which became a State Historic Park in 1962. From October 2007 through June 2009, the AMLU, State Parks, and USEPA characterized and remediated contaminants at Bodie SHP due to concern over chemical hazards at the Park. The AMLU and State Parks also fenced several physical hazards to protect public health and safety.
- **Empire Mine** in Nevada County, which State Parks purchased the surface rights to in 1974, and opened Empire Mine SHP in 1975. Between 1986 and 1989, State Parks removed 46,000 tons of contaminated sediment that was left onsite during the Gold Rush. State Parks, DTSC, and the RWQCB are currently remediating additional wastes from historic mining and milling operations.
- **La Trinidad, New London, Pick & Shovel, and Primera Mines** in San Luis Obispo County on CNG's Camp San Luis Obispo. The Federal government exercised its preemptive rights to the land in 1940, leased it from the State, enlarged it by 4,685 acres, and returned the Camp to the State in 1946. CNG has performed reclamation at the Primera Mine.
- **Leviathan Mine** in Alpine County, an abandoned sulfur mine that the SWRCB acquired in 1984 to cleanup and abate water quality problems.

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[1] The estimate in *California's Abandoned Mines: A Report on the Magnitude and Scope of the Issue in the State* (DOC, 2000) (www.consrv.ca.gov/omr/abandoned_mine_lands/AML_Report/Pages/Index.aspx) of 39,000 abandoned mines statewide was updated after the AMLU created its TOMS dataset (DOC, 2001).

[2] An example is the SLC's "school" lands. In March 1853, California received a grant of sections 16 and 36 out of each township (a 36-square-mile area divided into 36 sections of approximately 640 acres each) held by the federal government. The grant was to benefit public education; hence the term school lands.

- **Penn Mine** in Calaveras County, an abandoned zinc and copper mine that the Central Valley RWQCB and East Bay Municipal Utilities District became joint owners of following work to capture acid mine drainage from the site in 1978.
- **Spenceville Copper Mine** in Nevada County, which the DFG acquired from the federal government in 1962 as part of the Spenceville WA. In 2001, DFG and OMR mitigated an acid mine drainage problem in an open pit on this site.

Overview of the Project Methodology

The AMLU uses a standard methodology to inventory abandoned mines in California. For this project, the AMLU selected sites based on State ownership or management, which is usually only one criterion the AMLU uses to prioritize sites to inventory. Other considerations typically include expected hazard levels, proximity to population centers or recreational areas (e.g., campgrounds or off-highway vehicle [OHV] areas), and amount of public visitation. The AMLU's methodology for this project included the following steps (see flowchart in Figure A-1).

- Pre-field research to gather data on site location and ownership using GIS and other sources.
- Inventories of 341 mine sites on State-owned lands and subsequent data entry and site risk assessment.
- Follow-up sampling at 15 sites and analysis of the sampling data (sampling and analysis was performed pursuant to a contract between the AMLU and DTSC).

Pre-Field Research Methodology

Pre-field work included GIS analysis, research, and personal communications.

<u>GIS Analysis</u>

The goal of the GIS analysis was to identify which abandoned mines are located on State-owned parcels. The analysis was done using GIS to compare digital mine location data from the TOMS dataset (DOC, 2001) and other sources with available digital State land ownership data. This process was an ongoing effort during the project due to the challenges of obtaining both property data and up-to-date datasets.

Digital Mine Location Datasets

The primary dataset used for mine locations was the TOMS dataset (DOC, 2001); secondary mine datasets were also used during scoping and field inventory planning (Table A-1). These latter datasets were of less utility than the TOMS dataset, due to wide variation in geolocational accuracy; however, they do often contain useful attribute information about individual mines (e.g., commodity, type of mining operation). The TOMS dataset is the best available for mine locations; however, neither TOMS nor the other mine location datasets include every abandoned mine feature in California.

Figure A-1. Project Methodology Summary Flowchart.

Flowchart (page 1 of 2)

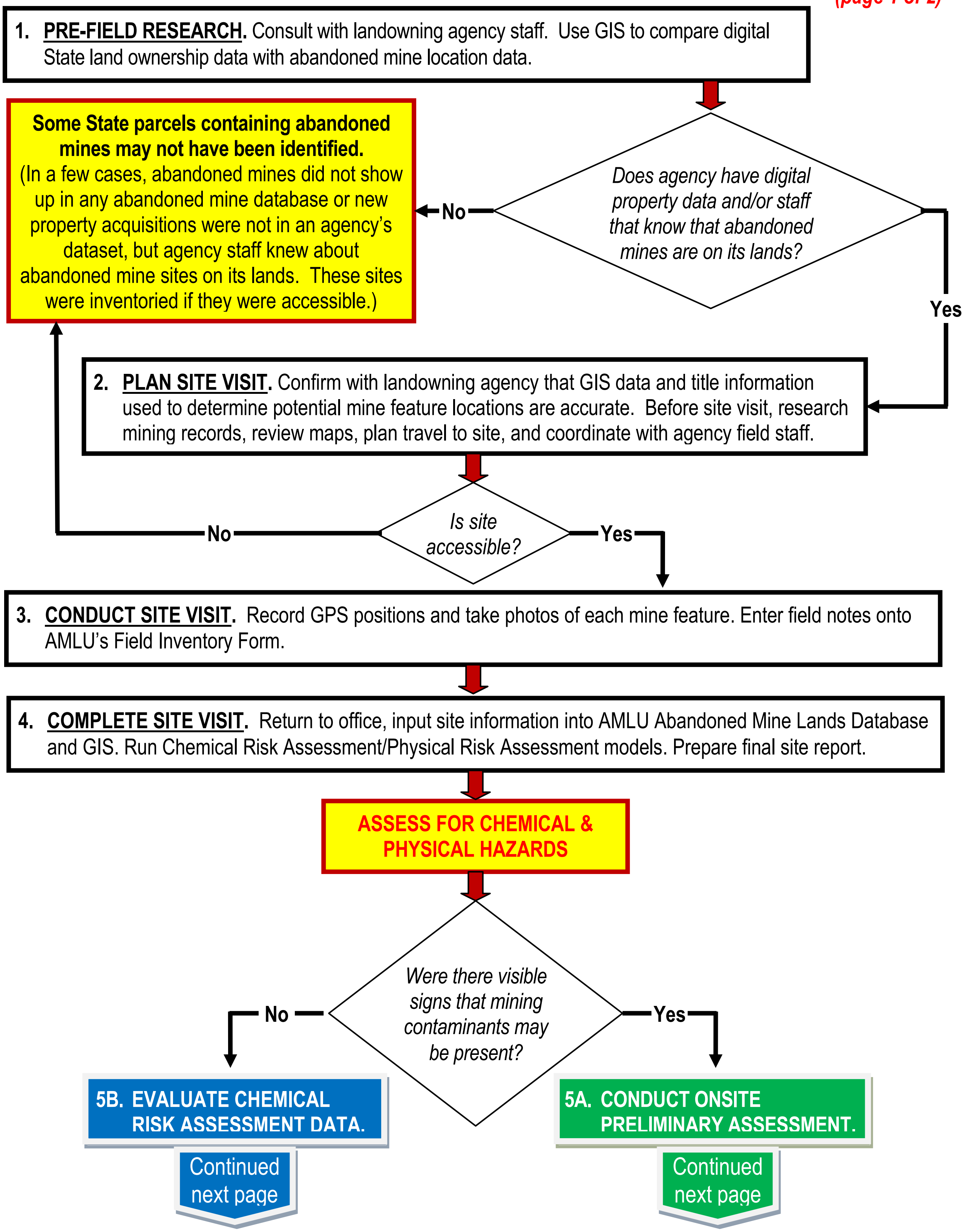
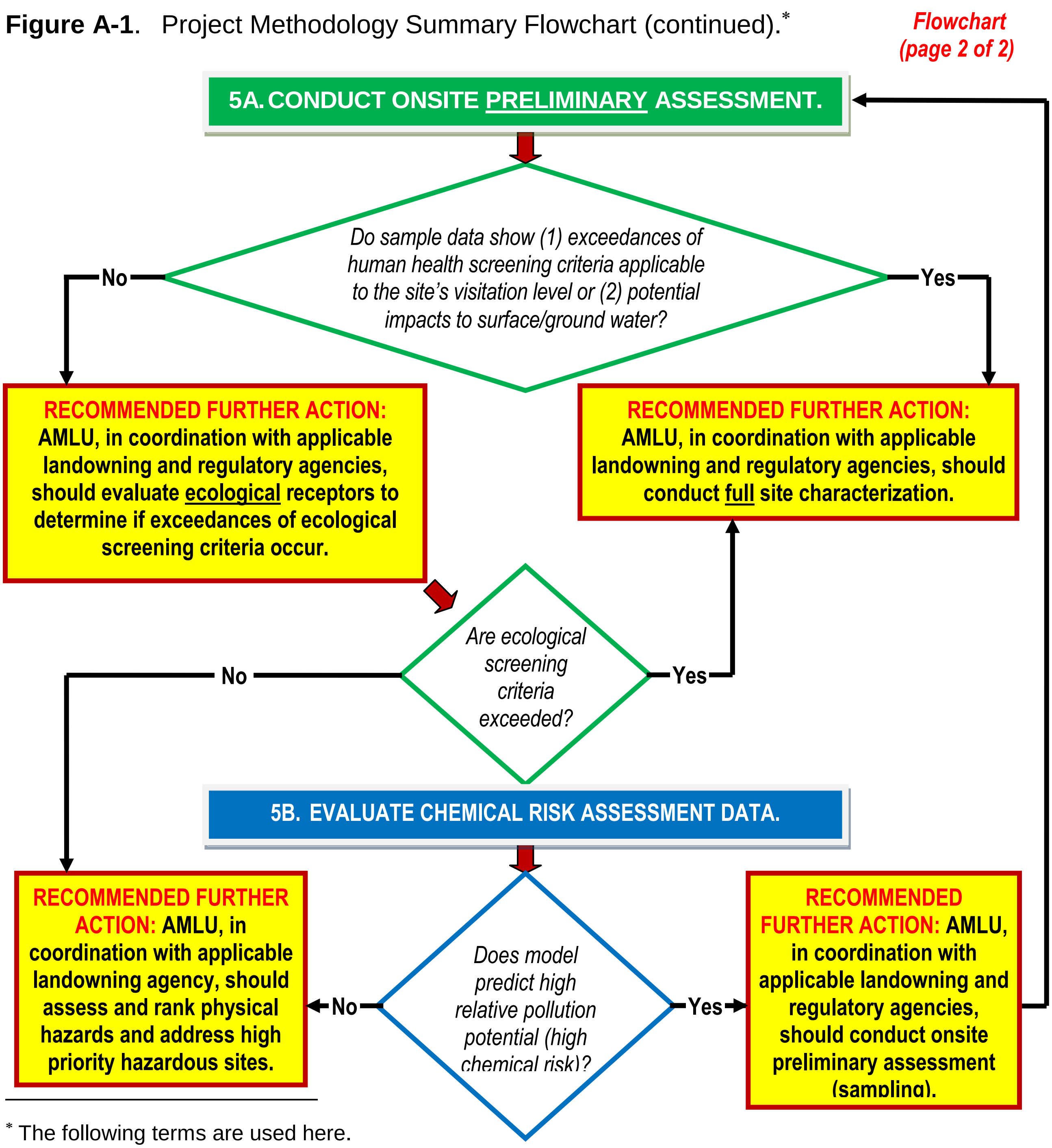


Figure A-1. Project Methodology Summary Flowchart (continued).*



* The following terms are used here.

- A **preliminary assessment** is an assessment of information about a site and its surrounding area and is designed to determine whether a site has the potential to pose a threat to human health and the environment. A preliminary assessment investigation collects readily available information about a site, including limited samples to determine presence of potential contamination. A preliminary assessment can be performed in a relatively short amount of time (usually less than a day).
- A **full site characterization** is a more detailed investigation that involves extensive sampling to determine the geographic extent, level and severity of contamination identified in the preliminary assessment process. The site characterization process is very time intensive, requiring several days and possibly seasonal sampling events, and more expensive than the preliminary assessment.
- **Site visitation levels** include resident, employee, recreational visitor, or trespasser (see Table 3, p. 6).

Table A-1. Digital mine location datasets used in project.

TOMS is a digital version of the mine symbols present on the USGS 7.5 minute topographical map series. It was created after the AMLU determined there was no spatially-accurate digital dataset of mine locations in California. From 1998 through 2001, each of the 7.5 minute quadrangles was examined and all mining features were digitized and annotated with information derived from the map. Positional accuracy was reliant on the accuracy of the original source maps; human digitization of mine symbols likely added slight deviations from the original source map, though this error has not been formally quantified to date.
Minerals Availability System/Mineral Industry Location System (MAS/MILS) (Causey, 1998) is a compilation of mine and mineral-related information on 29,239 sites in California created by the U.S. Department of Interior's former Bureau of Mines and currently housed by the USGS. MAS/MILS data, which were entered into the dataset between 1978-1995 (mostly in the 1980s) were derived from literature searches, onsite visits, maps, private reports, owner/operator information, government publications, mining industry periodicals, Mine Safety and Health Administration reports on operating properties, and other sources. • **MAS** focuses on 34 mineral commodities and has extensive data on significant mineral deposits, mining operations, and processing plants worldwide. The dataset classifies identified domestic and foreign mineral resources according to their respective extraction technologies, economics, and availability. • **MILS** is the location subsystem of MAS. It covers more commodities and had records for over 221,000 mineral occurrences, deposits, mines and processing plants. This information is used to support government agencies that have land-use planning responsibilities. These agencies looked to the Bureau of Mines for mineral resource assessments and to help identify and remediate inactive and abandoned mine hazards. As with CGS MINEFILE (below), MAS/MILS often provides data that can be associated through geographic proximity with the more accurate mine locations in the TOMS dataset. The dataset provides a variety of attributes for each mine listed, including mine name(s), location, operation type, processing type, ownership, and commodities produced. However, MAS/MILS does not catalog individual mine features or environmental information. Geolocational precision can be variable; some mines are accurately mapped, others are generally mapped (e.g., in the middle of a township or section). Prior experience indicates that the locations of these points are not reliable on their own.
California Geological Survey (CGS) MINEFILE (DOC, undated) is a computerized inventory of California mining data, with 27,389 data points. It consists of MAS/MILS data updated by DOC staff with geologic and commodity information obtained from additional research and field visits. From 1975-78, CGS computerized its mining Property Report files, a collection of 14,000 hard-copy reports. In 1980, CGS merged these data with three databases used by the U.S. Bureau of Mines: MILS; Mineral Resource Data System; and Computerized Resource Information Base. MINEFILE records for many, but not all, counties were revised after field visits. Most data were compiled and entered either between 1978-83 or 1989-93. Since that time, however, MINEFILE has been edited only sporadically as time and funding allowed, and the database is currently dormant. The quality of data and data entry in MINEFILE varies significantly. Accuracy of location is a problem, in part because the original descriptions in reports were vague; data entry accuracy may also be a contributing factor (entry and updating were done county by county; some counties received detailed attention, while others were not updated or were edited from an original entry completed years previously).

Table A-1. Digital mine location datasets used in project (continued).

Principal Areas of Mine Pollution (PAMP) (DOC, 2000) is a compilation of about 2,422 mining operations and associated water-quality problems provided to the State Water Resources Control Board by the CGS in 1972 and later converted to a digital format. Dataset criteria included mining operations that exceeded $100,000 in production, plus additional mines with lower production but with potential for high pollution concerns. Due to some limitations, the dataset is best used to identify possible environmental hazards, not to certify that the listed sites are significant pollution concerns.

- There is no information on what the additional selection criteria were, or about whether an attempt was made to normalize the dollar value (>$100,000) used to select sites.
- It is not possible to determine the completeness of the data, and many mines with pollution problems may not be listed because they did not meet the selection criteria.
- The reported coordinates for mines in the PAMP dataset often have poor spatial accuracy, and thus additional information sources may need to be consulted to accurately locate the mine sites. Coordinates in the original dataset were given in degrees and decimal minutes with up to two decimal places, and anecdotal spatial accuracy assessments indicate the data points are often off by as much as 1000 meters. It is likely that the original dataset was compiled using reported U.S. Public Land Survey System (PLSS) coordinates, and therefore may represent a center of a section or quarter section. Also, because the PLSS has been adjusted over the years, transcription of very old information to coordinates using more recent maps likely introduced another source of error. Typing errors have also been discovered and corrected for a few coordinates where the error was obvious (e.g., transposition of numbers within latitude/longitude coordinates).

In the AMLU's initial scoping, the PAMP shapefile was compared to parcel ownership data, but due to its low spatial accuracy and based on AMLU staff experience, individual PAMP points were usually assumed to be better represented by nearby TOMS points.

Digital Ownership Datasets

A comprehensive digital inventory of all of the State's land holdings does not currently exist. Most State agencies, boards, commissions, conservancies, departments, or other entities that hold land through fee title, easement, or other method of acquisition also do not maintain their own digital ownership data. Consequently, some State parcels containing abandoned mines were likely not evaluated for this project. However, the AMLU believes that the vast majority of abandoned mine sites on State-owned lands were identified or inventoried, and any missed are likely to be smaller, less significant sites in general.

Given the lack of available ownership data in a GIS format, the AMLU assembled the best available datasets from the agencies that could provide them, and used the most up-to-date statewide land ownership datasets for agencies that could not. The datasets used in GIS analysis are listed in Tables A-2 and A-3. The AMLU subsequently created a subset of the TOMS shapefile representing potential abandoned mines on lands owned by 15 State entities.

Table A-2. Digital ownership data layers used in project.

	Shapefile Type/Name	Description
Individual Agency Datasets	**CNG** *military_major_command_points & basebndry (2007)*	These shapefiles consist of polygons denoting boundaries of CNG owned and managed lands, including armories and Camps Los Alamitos, Roberts, and San Luis Obispo.
	DFG *DFG_Owned_Lands (Department of Fish and Game, 2006).*	This shapefile consists of polygons denoting DFG land boundaries, but does not distinguish between lands owned by DFG and lands managed by DFG but owned by another entity. DFG staff confirmed ownership of sites the AMLU identified as possibly containing abandoned mines.
	SLC *SLC_School_Lands shapefile (SLC, 2006)*	This shapefile consists of polygons of PLSS sections in which the SLC owns property. The polygons encompass the entire section, even if the SLC owns only a portion of the section. Fields in the tabular data for each polygon define portions and total acreage owned by the SLC. Section boundaries with portions defined in fractions (e.g., SE 1/4) were easily-defined. Hand-checking of plat maps using a BLM website (BLM, 2008) helped to define SLC parcel boundaries in sections that included lots, mineral surveys, or other non-standard divisions. Boundaries within some non-included tracts owned by the SLC were determined using PCTL05 and communication with SLC staff.
	State Parks *Parks _Feb07 shapefile (State Parks, 2007).*	This shapefile consists of polygons denoting boundaries of lands owned and managed by State Parks. Ownership was not always clear. For example, the boundaries layer for Folsom Lake SRA includes lands owned by the U.S. Bureau of Reclamation that are managed by State Parks, and does not identify some private inholdings. AMLU and State Parks' staffs resolved ownership questions by consulting on a park-by-park basis.
Statewide Datasets	**OWN5** Teale Data Center *(last updated, 1997)*	The OWN5 shapefile contains 24,338 polygons and shows statewide classifications of land ownership (e.g., federal, State, local, and private), but does not include parcel level data. Data were derived from 1:100,000 BLM Surface Management Status Maps (some dating back to the 1970s), digitized by the Department of Forestry, then registered to the PLSS coverage at Teale Data Center.
	PCTL05 California Resources Agency Legacy Project *(last updated, February 2005)*	The PCTL05 shapefile represents public, conservation, and trust land ownership in California. Developed for the Resources Agency's Legacy Project, this dataset depicts ownership features in California, classified into federal, State, local, and private holdings. The data are intended to provide general ownership information for conservation and other planning purposes. This dataset contains 39,428 polygons, which are more current and more detailed than the OWN5 polygons.
	California Protected Areas Database (CPAD) GreenInfo Network *(last updated, 2007)*	CPAD contains GIS files of lands protected primarily as open space for a governmental agency or non-profit organization (via easement or fee). It was developed jointly by GreenInfo Network and the Southern California Open Space Council, with assistance from numerous sources. This dataset is more up-to-date than OWN5 and PCTL05, but at the time this project was conducted, it did not cover the entire State.

Table A-3. State landowning agencies and datasets used to define ownership.[3]

Agency Name		Primary Database Used	Date	Agency Provided?	AML Present?
California Coastal Conservancy		CPAD	2007	No	No
California Highway Patrol		PCTL05	2005	No	No
California Institute of Technology		CPAD	2007	No	No
California State University		PCTL05 *(originally used OWN5)*	2005	No	Yes
California National Guard	Camp Los Alamitos, Camp Roberts, Camp San Luis Obispo	basebndry *(originally used OWN5)*	2007	Yes	Yes
	Armories	military_major_command_points			
Coachella Valley Mountains Conservancy		CPAD	2007	No	No
Corrections		PCTL05 *(originally used OWN5)*	2005	No	Yes
Department of Fish and Game		DFG_Owned_Lands *(originally used OWN5)*	2006	Yes	Yes
Forestry & Fire Protection		PCTL05 *(originally used OWN5)*	2005	No	Yes
General Services		CPAD	2007	No	No
Napa State Hospital		PCTL05	2005	No	No
Santa Monica Mountains Conservancy		PCTL05	2005	No	No
		CPAD	2007	No	No
State Lands Commission		CSLC_School_Lands_05	2005	Yes	Yes
State Parks		Parks_Feb07 *(originally used Parks_Nov05)*	2007	Yes	Yes
Transportation (Caltrans)		CPAD	2007	No	Yes
University of California		PCTL05 *(originally used OWN5)*	2006	No	Yes
Veterans Affairs		CPAD	2007	No	No
Water Resources		PCTL05	2005	No	No
		CPAD	2007	No	No
Wildlife Conservation Board		CPAD	2007	No	No

[3] Individual shapefiles provided by land-owning agencies contained a variety of data structure idiosyncrasies, some of which needed to be accounted for on a parcel-by-parcel basis. In addition, discrepancies between individual agency shapefiles and the shapefiles representing multiple agencies were common and included errors such as parcel boundaries not aligning and small inholdings not being shown. To resolve any differences, the AMLU first assumed that ownership data provided by a State agency were more reliable than the statewide shapefiles, and these data, where available, were used to define that agency's ownership. For State entities that were not able to provide a digital dataset, the AMLU initially used the OWN5 dataset to define land ownership. Queries using two additional statewide datasets, PCTL05 and CPAD, obtained after the project started, allowed AMLU staff to refine its analysis. In a limited number of cases, personal communication with contacts at State agencies provided information on parcel status; this information was assumed to be of high reliability.

Additional Research and Personal Communication

To supplement the GIS data and help identify potential hazards, the AMLU obtained additional site information prior to field inventory. Information sought included details on the physical extent of the mining operation onsite, surface and underground workings, and types of processing used. This information was obtained from printed literature and online information, historical maps and photographs, and agency staff communications.

- Printed literature and online resources. The main source for printed literature was the CGS library in Sacramento. The library contains a variety of mine-related information, including publications on mineral commodities or geographic areas, unpublished files, property reports, and other literature on mining and milling operations, extraction methods, and geology. Particularly useful were the *Report of the State Mineralogist*, *California Journal of Mines and Geology*, and California Division of Mines and Geology County Reports. In addition to print material, information from the Internet such as MINDAT (mindat.org, 2008) and general mine name queries in standard search engines provided additional information and references to review. Digital versions of plat maps were occasionally referenced to determine ownership.
- Historical maps and photographs. Historical maps and photos were obtained from CGS and other State agencies to provide further information about historical mining sites which were inventoried. Workings maps for Bodie SHP, Plumas-Eureka SP, and other mine sites helped to locate surface openings to underground workings, and to understand the scope of mining operations, and thus potential chemical hazards onsite. Historical photographs were sometimes useful in understanding mining and milling onsite, as buildings and structures are often no longer present onsite, and vegetation can obscure formerly open areas.
- Personal communication. Local historical information about a particular mine site was very important. During this study, this information was typically provided by field level staff knowledgeable with the local area, and it helped to locate and document many mines that were previously unknown to the AMLU; extensive communication also occurred with GIS staff from multiple agencies.

Field Inventory Methodology

The AMLU generally followed its established inventory guidelines, protocols, and procedures to conduct site investigations, collect field data, establish a hazard ranking of abandoned mine sites on State-owned lands, and post-process and enter data and other information obtained onsite. The entire mine site, as well as all surface features related to mining, were assessed and documented.

To facilitate individual site visits, AMLU staff briefed local managers within landowning departments, primarily State Parks and DFG. Work on SLC parcels was carried out under a pre-existing relationship with knowledgeable staff in the SLC Mineral Resources Division. A typical process, using State Parks as an example, occurred as follows. A park or district superintendent was informed prior to any field visit to explain the AMLU's role in this project. A meeting was then arranged with a ranger or other employee with knowledge of the abandoned mines on their lands. AMLU and the cooperating agency's staff agreed on a visit date and planned measures to expedite access (e.g., unlocking gates and confirming passable routes).

Locating Mine Sites

Finding and accessing abandoned mine sites can be difficult. Even with detailed location information and directions, conditions arise that cannot be anticipated, such as: using old, possibly inaccurate maps; roads, trails, and features may be mismarked; new roads and trails may obscure old ones; weather conditions change, causing wash outs, rock slides, and log falls; additional gates and locks may be encountered; and the right to pass may be denied. Many sites are adjacent to each other, and may have been connected by ditches, roads, trams, rail, and underground workings at some time during their history. The full extent of a "site" may be unknown, as more recent workings may have been developed since the last historical information was gathered. Even features indicated as minor "prospects" on a map have turned out to have been full-scale mining operations with many diverse and scattered features when finally located on the ground. This sometimes makes it difficult to know which site the investigator has actually located, and where one mine "site" begins and ends. Once onsite, AMLU staff typically find more features than depicted on topographic maps (see Figure A-2).

AMLU staff planned site visits in geographical groups designed to minimize staff hours, miles driven, and total project length. Extremely remote and difficult to access mines on State lands were visited, while previous inventory work might have considered these lower priority. The deadline for completion of this project required that timely access to specific State parcels be given priority, requiring AMLU staff to bypass mines on neighboring lands (e.g., BLM or National Park Service) that otherwise would have been inventoried for efficiency's sake on a given trip.

Overall Site Characterization

The AMLU staff assessed and documented the entire mine site and all surface features related to mining as follows: (1) identify each feature (e.g., shaft, tunnel, tailings, production facilities); (2) record positions with a GPS unit and take digital photographs of each feature; and (3) take notes and record general observations. Field notes and data were recorded on the AMLU's Field Inventory Form (see Figure A-3) and later post-processed and entered into an Access database.

Staff conducting the inventory characterized the overall setting and condition of each abandoned mine site by conducting an initial exploration of the extent of the historic mining operation, noting all surface features associated with it. Staff looked for visible features that evidenced past mining activity on the site (see site inventory below).

Figure A-2. Comparison of Mapped Versus Inventoried Mine Features at the St. Louis Mine, San Bernardino County.

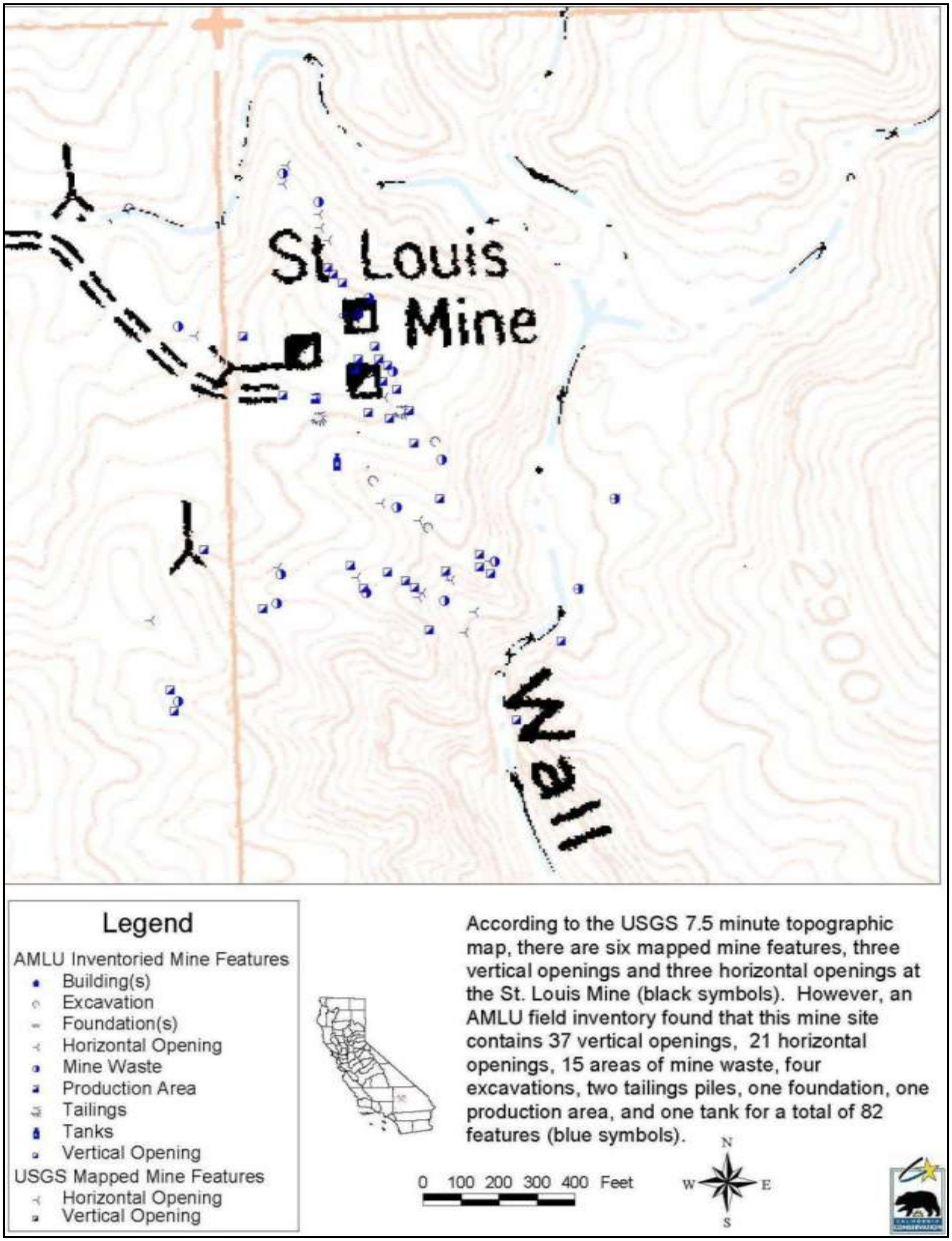


Figure A-3. AMLU Field Inventory Form.

DEPARTMENT OF CONSERVATION - OFFICE OF MINE RECLAMATION
HISTORIC, INACTIVE, AND ABANDONED MINE LANDS FIELD INVENTORY FORM

(Shaded boxes may not be required – see instruction sheet)

Source Information

Data Source (Agency)	Contact Phone # (Agency)	Field Crew	GPS User	Notetaker	Date

Databases this site is listed in (please include ID for each)

Mine Site Information

Mine Name

Status: ☐ Abandoned ☐ Inactive ☐ Active ☐ Mitigated ☐ Reclaimed ☐ Unknown

County	Quad Name	Quad Code

Site Photo ID | Site GPS Filename | GPS Brand/Model | Locational Accuracy: ☐ Unknown ☐ 15' ☐ 66' ☐ 328'

Latitude/Longitude | Township/Range/Section/Subsection Base Meridian | Elevation (feet)

Site Characterization/Access

Area Activity Type (with distances in miles)
☐ Rec Area = ☐ Campground = ☐ Trail = ☐ Workplace = ☐ Road = ☐ Dwelling = ☐ School = ☐ Town =

Operation Type
☐ Dredge ☐ Min Loc/Prospect ☐ Pit/Quarry ☐ Placer ☐ Proc Plant/Mill ☐ Underground ☐ Unknown

Begin date =
End date =

☐ IDLH ☐ EXPLOSIVES ☐ HAZMAT ☐ CULTURAL SIG ☐ WILDLIFE ☐ OFFSITE DISTURB ☐ AQUATIC INVERTS

Field Access: ☐ Trail ☐ 4WD Only ☐ Road ☐ X-Country

Entry: ☐ Unrestricted ☐ Gate ☐ Barrier ☐ Denied

Access: ☐ Easy ☐ Moderate ☐ Difficult

Population Proximity: ☐ < 10k ☐ 10k – 100k ☐ > 100K

Current Land Use (.5 mi): ☐ Residential ☐ Recreation/Open/Agriculture ☐ Commercial

Future Land Use (.5 mi): ☐ Residential ☐ Recreation/Open/Agriculture ☐ Commercial

Sensitive Environments: ☐ Threat/Endangered ☐ Unique/Sole Source ☐ Wetlands ☐ Cultural

Est. Total Acreage | Est. Acreage Disturbed

Characterization of Local Undisturbed Vegetation (% cover): ☐ 0% ☐ 1-5% ☐ 6-25% ☐ 26-50% ☐ 51-75% ☐ 76-100%

Characterization of On-Site Vegetation (% cover): ☐ 0% ☐ 1-5% ☐ 6-25% ☐ 26-50% ☐ 51-75% ☐ 76-100%

Commodity Group: ☐ Aggregate ☐ Non-Metal ☐ Metallic

Processing Location: ☐ On-Site ☐ Off-Site ☐ Unable to Determine

Fracture Spacing: ☐ <= 2' ☐ 2 – 5' ☐ >= 5'

Surface Water Distance (in feet)

Surface Water Sediment: ☐ High ☐ Medium ☐ Low

Surface Water Name

Groundwater Depth: ☐ 0-50' ☐ 51-150' ☐ > 150'

Commodities (if known)

Access Route Description

ACCESS ROUTE DESCRIPTION:

Ownership

Ownership: ☐ Private ☐ Public Agency =

Company	Name		
Address	City	State	Zip
Phone	Fax	E-mail	

Hazard Ranking

Rank: 0=None 1=Low 2=Medium 3=High 4=Extreme

Description	Rank	Frequency	Description	Rank	Frequency
Adits or Shafts?			Pools, Standing Water in Excess of 3 feet?		
Highwall Steeper than 1.5:1 in Excess of 10 feet?			Potentially Hazardous Structures, Machinery, Scrap, Trash?		
Evidence of Ground Cracks, Slumps, or Subsidence?			Metal Leaching, Evidence of ARD?		
Steep, Unstable Slopes, Rock Falls, or Debris Flows?			Evidence of Erosion, Rills, Gullies?		

Tailings Volume
☐ 0-50 CY ☐ 50-250 CY ☐ 250-500 CY ☐ 500-1000 CY ☐ 1000-10,000 CY ☐ 10,000-100,000 CY ☐ > 100,000 CY

Waste Rock Volume
☐ 0-50 CY ☐ 50-250 CY ☐ 250-500 CY ☐ 500-1000 CY ☐ 1000-10,000 CY ☐ 10,000-100,000 CY ☐ > 100,000 CY

On-site Water Body Classification
☐ None ☐ Intermittent ☐ Small Perennial ☐ Large Perennial/Lake

Mine Waste/Tailings in Contact with Surface Water?
☐ 0-50 CY ☐ 50-250 CY ☐ 250-500 CY ☐ 500-1000 CY ☐ 1000-10,000 CY ☐ 10,000-100,000 CY ☐ > 100,000 CY

Figure A-3. AMLU Field Inventory Form (continued).

MINE FEATURES				PHOTO ID	DIMENSIONS			ASSOCIATED DESCRIPTORS			
GPS/LOC ID	FEATURE TYPE (Ex: adit, shaft, building, waste pile, etc.)	CONDITION (Ex: open, collapsed, flooded, etc.)	DESCRIPTION (Include Flow (GPM), Color, Acid Reaction as appropriate)		X	Y	Z	EC	pH	ROCK	TEMP

SITE DESCRIPTION:

MINE FEATURES				PHOTO ID	DIMENSIONS			ASSOCIATED DESCRIPTORS			
GPS/LOC ID	FEATURE TYPE (Ex: adit, shaft, building, waste pile, etc.)	CONDITION (Ex: open, collapsed, flooded, etc.)	DESCRIPTION (Include Flow (GPM), Color, Acid Reaction as appropriate)		X	Y	Z	EC	pH	ROCK	TEMP(F)

AMLU Field Inventory Form

The AMLU Field Inventory Form, a Trimble GPS unit, and a digital camera were the primary tools used for onsite documentation. The Field Inventory Form provides data fields to record the following information that was later entered into a database and GIS.

- GPS point identifications (GIS IDs).
- Feature descriptions, including number, type, and condition of features found.
- Photograph identifiers (Photo IDs).
- Dimensional measurements for features and associated descriptors.
- Non-GPS locational information.
- Mine name(s).
- Date.
- Ownership and contact information.
- Operation type and dates.
- Onsite activity.
- Commodity mined.
- Mining district, county, and watershed.
- Rock type.
- Tailings and waste rock volumes.
- Mine status.
- Data sources.

Other Information included: a description of how the site was reached (turn-by-turn directions and any special instructions); site history; environmental setting (including biological and cultural resources); observations on the amount of public visitation; and any information provided by local contacts. Also included on the Form were factors used to calculate the CRA/PRA Rank (see below for details). This section of the form was used to characterize and document the following information: types of hazards onsite; accessibility and exposure potential (human population and proximity); current and future land use; water use; vegetation disturbance; commodity group; processing location; and various surface water descriptors used for screening-level assessments. The Field Inventory Form needed to be completed to the maximum extent possible while onsite to allow for efficient data entry and to prevent errors in, or omission of, data.

Site Inventory

A “mine site” is a collection of one or more human-made features related to the mining process in an area. AMLU staff classified each feature as follows.

- Each feature located at a mine site was described by using the following AML inventory identifications: building(s); containers/drums; conveyance; embankment; explosives; excavation; flume; foundation(s); headframe; horizontal opening; highwall; lake; mass wasting; production machinery; mercury; mine waste; ore stockpile; production area; sluice; spring/seep; stream/creek; subsidence; tailings; tanks; trash; vertical opening; well; and wetlands.

- These features were then characterized from the following list of conditions (descriptors): acid reaction; breached; closed; coal; collapsed; dispersed; draining; empty; ephemeral; eroded; filled; flooded; flowing; free; fresh; intact; lignite; mitigated; massive; old; open; partially collapsed; perennial; radioactive; stable; and unstable. Odor and color descriptors were also used to characterize mine features. Additional information was gathered for each feature.

The field inventory required recording the location of the individual features found at an abandoned mine site as accurately as possible. This was necessary because some features were located only a few feet apart, and some means of clearly identifying them from each other was required. All mine feature locations documented during the field inventory were collected and recorded using state-of-the-art GPS receivers, and in particular, by using differential and real-time GPS receivers. Positional accuracy using the differential GPS was usually three feet or better. In addition to accurately recording the GPS positions of all features found at each site, a “site” point was also collected at the center of the site. This site point identifies the site where all of the features were grouped, and can be used to navigate back to the site on future visits. Data collected from the differential GPS receivers were recorded and stored electronically, and the site point and feature location information was written on the Field Inventory Form.

Each feature discovered onsite was also documented with digital photography; usually several pictures were taken from different distances, angles, or settings. Photographs and related features were associated and recorded by use of a Photo Identification (Photo ID) on the Field Inventory Form.

Some mine sites spanned land ownership boundaries. For example, a site may cross from State lands into federal or private land entities. AMLU staff did not enter private land during field surveys, but if the mine site crossed a boundary between public lands, the entire site was inventoried to keep the mine site contiguous.

Every effort was made to locate and inventory all features associated with a given mine site, whether or not they were included in the TOMS dataset. Completing an inventory of all mine sites required AMLU staff to drive many miles on rough jeep trails, hike several miles cross-country, climb steep mountainsides, cross flowing creeks, and push through dense vegetation. On a few occasions, a potential mine feature represented in the TOMS dataset could not be accessed due to physical barriers (e.g., cliff, extremely dense vegetation) or land status issues (e.g., the TOMS point was part of an active mine site, private property blocked access, State Prison land).

While onsite, AMLU staff recorded information on both potential physical and chemical hazards. The goal was to collect sufficient information for the applicable State landowning agency to prioritize sites for future characterization, hazard remediation, or other action.

Determination of Future Sample Locations

As discussed in greater detail below, potential chemical hazards were followed up by identifying potential sample locations using AMLU staff's best professional judgment. Field sampling, conducted by the DTSC with AMLU assistance, was scheduled during return visits at the end of the project.

The rationale for selecting sampling sites was based on the type of mining, the mine features observed, and knowledge of mining practices at each mine from on-site observation or historic documents. During field work, any possible chemical contamination issues were noted, and location points were taken for later sampling. *In situ* observations of potential chemical hazards were made at a "screening level" of detail and were not intended to provide a complete site characterization. The following types of features and conditions were flagged for future sampling.

- Tailings.
- Draining adits or shafts.
- Mine waste or tailings in direct contact with water.
- Mine waste with indications of possible Acid Rock Drainage (ARD) potential, such as stained soil or lack of vegetation.
- Erosion potential.

Post-Field Processing of Data

Following field work, AMLU staff returned equipment to the office to download data from the GPS receiver and digital camera, enter the data, and prepare site files. The following represents a typical post-field process.

- Data from the Field Inventory Form and pre-inventory literature review or other research were entered into discrete records for each mine site visited.

- Specialized software was employed that would take GPS differential correction files downloaded separately from a GPS base station internet site, perform the differential correction, and export the final corrected GPS files to a GIS file format (ArcView shapefile). These files would then be appended using ArcView GIS, with latitude and longitude; and Teale Data Center's Albers Equal Area Conic projection coordinate grid northings and eastings. This file would be referenced when performing data entry on the site visited, in order to copy this information into the specific database record for the site and its associated features.

- Images from the digital camera were downloaded, and any retouching and post-processing was completed prior to the images being prepared for inclusion with the database record and electronically archived. Photographs were linked to database feature records, along with differentially-corrected GPS coordinates.

Database Implementation

To accommodate the diversity of possible data and allow for data queries, a relational database was used. The relational database structure allows each mine site to have one or more associated feature. The database consists of "site level" and "feature level" data.

- Site level information includes the following information: mine name(s); county name; mining district name (if known); access description; site location (latitude/longitude, Teale x,y); site description; site status; date of visit; crew initials; chemicals of concern; commodity; interaction with humans; operation type; literature citation and links; and overall site photos.
- The feature level includes information specific to an individual feature found onsite such as the following: feature type (adit, shaft, tailings, etc.); feature dimensions (x, y, z on field form); feature location (latitude /longitude, Teale x,y); feature conditions (open, collapsed, draining, eroded, etc.); feature description (a more detailed description of feature conditions); and feature photos.

Sampling Methodology

As noted above, field sampling was scheduled after site inventories were completed. Sampling and analysis were contracted to the DTSC, which provided a Preliminary Site Investigation Plan for the project, performed part of the fieldwork, and subcontracted sample analyses to its consultant, URS. Project sampling procedures are described in the *Preliminary Site Investigation Sampling and Analysis Workplan for Abandoned Mine Land Sites on State Owned Lands* (DTSC, 2008). Data are summarized in Appendix B.

Sampling Plan Implementation

The sampling team typically consisted of two AMLU staff, two DTSC staff, and one URS consultant. Sampling work involved return trips to a small subset of sites that were identified during initial inventory trips. This work was focused into a narrow timeframe to minimize expenses. Sampling was conducted in April and May, 2008. Table A-4 lists the number of XRF measurements taken and laboratory sample analyses performed.

The primary COCs were determined to be arsenic, lead, and mercury. Samples were also collected for analysis of other CAM 17 metals (the 17 heavy metals listed in CAM Title 22, a common suite of metals), including cadmium, copper, and zinc. Cyanide was analyzed where evidence existed of its historical use during ore processing. MeHg was analyzed where conditions were favorable for possible generation. Field measurements included GPS location data and notes on sample collection date and time, and site conditions, XRF for metals analysis, pH measurements in water. In addition, the following were collected for laboratory analysis:

- Surface soil samples (0-6" below ground surface [bgs]) for mercury and other metals and cyanide where applicable.
- Sediment samples for metals, including mercury and MeHg.

- Water samples for metals, including mercury.
- Background samples and field duplicates and travel blanks for QA/QC

Table A-4. Number of field XRF measurements and sample analyses.

	Sample location *(commodity type)*	XRF [a]	Number of Sample Analyses										
			soil				sediment				water		AGP
			Metals 6010-B	Hg 7470-A	Cyanide	WET	Metals 6010-B	Hg 7470-A	WET	MeHg	Metals 6010-B	Hg 7470-A	
STATE PARKS	Anza-Borrego Desert SP *(strontium)*	5	2	2	--	--	--	--	--	--	--	--	--
	Cuyamaca Rancho SP *(gold)*	12	5	5	1	2	--	--	--	--	--	--	--
	Malakoff Diggins SHP *(gold)*	16	3	3	--	--	11	11	2	4	11	10	--
	Picacho SRA *(gold)*	25	8	8	1	3	2	2	--	2	1	1	--
	Plumas-Eureka SP *(gold)*	15	15	15	--	3	--	--	--	--	--	--	--
	Providence Mountains SRA *(lead/silver/copper)*	7	5	5	--	2	--	--	--	--	--	--	--
	Robert Louis Stevenson SP *(silver/gold)*	3	2	2	--	1	3	3	--	1	2	2	--
SLC	Parcel 103-009 & 103-010 *(mercury)*	15	6	6	--	2	--	--	--	--	--	--	--
	Parcel 191-038 *(gold)*	6	5	4	--	3	--	--	--	--	--	--	--
	Parcel 199-023 *(gold)*	8	5	5	2	3	--	--	--	--	--	--	--
	Parcel 204-016 *(lead/silver)*	7	4	4	1	--	--	--	--	--	--	--	--
	Parcel 204-019 *(copper/silver/lead/ zinc)*	9	5	5	--	3	--	--	--	--	--	--	--
DFG	Butte Creek ER *(gold)*	5	5	5	--	3	5	5	1	3	5	5	--
	Oroville WA *(gold)*	7	8	8	--	2	4	4	--	4	6	6	--
	Spenceville WA *(copper)*	11	5	5	--	2	3	3	1	--	4	4	2

[a] Does not include QA/QC readings.

Field Modifications to the Sampling Plan

Field conditions and schedule requirements/time constraints created the need for minor modifications to the sampling plans. DTSC and URS staff had not previously visited the mine sites, so some site-specific sampling recommendations were developed in the field. Some sites were very large and most were suspected to have heterogeneous contamination and thus did not lend themselves to sampling on a grid; instead mineralogy, color, grain size, erosion, and site-specific knowledge were used to select sample locations. On all sites, XRF readings were used to bias the waste rock and tailings sample collection towards areas of highest metals contamination (when found). The following are specific examples of modifications to the proposed plan that occurred.

- At Robert Louis Stevenson SP, altered site conditions from the time of inventory (a downed tree was removed) allowed access to a mine waste dump.
- At Plumas-Eureka SP, snow drifts precluded sampling near some buildings.
- At Butte Creek ER and Oroville WA, a lack of fine-grained sediment limited sampling. Also at Butte Creek ER, private property and higher-than-reported water flows prevented access to some dredger ponds.
- In Picacho SRA, extremely dense vegetation limited sediment sample collection along the edge of the Colorado River.
- At Cuyamaca Rancho SP, the boundary of the State's property prevented sampling of material that appeared to have flowed off the property.

Sampling Media, Procedures, Analysis and Reporting

Sampling medium included soil, sediment, and water. Soil included materials deposited directly by mining activity, formed *in situ*, or a colluvial deposit. Sediment included any material deposited by water, and was not necessarily submerged. The XRF was used mainly to analyze soil samples, but was also used on sediment samples. Table A-5 summarizes the sampling and analysis methods for the media sampled.

Field Assignments

In the field, some tasks were assigned to specific group. DTSC staff collected soil and sediment samples and operated the XRF. URS staff collected water samples, labeled samples, and took notes. AMLU staff operated the GPS unit and took photographs and notes. All field staff assisted with soil preparation (digging, sieving) and other tasks.

GPS

A GPS unit (Trimble Geo XT or XH) was used to mark the location where all samples were taken, including XRF measurements. The GPS data were downloaded into Pathfinder Office software, differentially corrected to improve accuracy, and converted into a shapefile for use with ArcGIS software.

Table A-5. Summary of sampling and analysis methods for media sampled.

Sample Medium	Methods/Procedures	Analysis/Reporting
Soil	Soil samples for metals and mercury analyses were collected from ground surface to approximately six inches below ground surface. A metal trowel was used to scoop the samples into a sieve. The samples were then sieved into a plastic bag. The bag was rotated several times to homogenize the sample. The XRF unit was then used on some of the samples. Finally, the contents of the bag were poured into an eight-ounce glass jar. Samples were placed on wet ice before shipping to the laboratory.	• Metals in soil were analyzed using USEPA method 6010-B for all CAM 17 metals. • Mercury in soil was analyzed using USEPA method 7470-A. • Cyanide was analyzed using USEPA method 9014. • WET samples were prepared using CA WET Citrate SW846, 3005A and 7470A.
Sediment	Sediment samples were collected for mercury and other metal analyses. MeHg samples were collected separately where conditions appeared favorable for MeHg generation (typically in fine, anoxic sediment in gold mining associated ponds). Samples were collected using a shovel to remove the first six inches of material below ground surface. The organic mat above the collected sediment was excluded from the samples. A dedicated plastic scoop was used to collect the sediment from the shovel. Most samples were collected in eight-ounce glass jars and preserved on wet ice before shipping. MeHg samples were collected in eight-ounce plastic jars, briefly preserved with wet ice, and then placed in a cooler with dry ice for shipping.	• Metals in sediment were analyzed using USEPA 6010-B. • Mercury in sediment was analyzed using USEPA method 7470-A. • MeHg was analyzed using USEPA method 1630.
Water	Water samples were collected for metals and mercury analyses. Water was either collected by hand or with a bailer. Water was contained in plastic bottles with nitric acid as a preservative. Additionally, pH was measured in the field using litmus strips. The pH test was mainly qualitative, to determine potential impairment from ARD.	• Metals in water were analyzed using USEPA method 6010-B. • Mercury in water was analyzed using USEPA method 7470-A.
ARD	AGP tests were used at the Spenceville WA to determine the ability of rock/soils to produce ARD. AGP samples were collected from ground surface to approximately six inches below ground surface. A steel trowel was used to scoop the samples into an eight-ounce glass jar.	• AGP of waste rock and tailings was analyzed using USEPA method M600/2-78-054 1.3.

XRF

A Niton XRF XLt 793 unit was used to analyze metals in soils and sediment. This portable, hand-held, single-operator unit performed XRF analysis of samples and displayed results in approximately 1 to 2 minutes. The unit provided a screening instrument in the field that was used to support decisions to collect samples for laboratory analysis. Generally, where the XRF unit determined elevated concentrations of COCs, a sample was collected for laboratory analysis.

XRF analysis was performed using one of several different methods, depending onsite conditions. The first method was to use the XRF on bare soils that were scraped with a trowel or other hand tool. The second method was to use a trowel to collect soil, then sieve the soil through a wire mesh to make a pile of fine material. The material was then stamped flat with a flat trowel. The second method excluded larger rocks which tend to make a sample more heterogeneous and results less consistent. In both of the first two methods, Mylar film was placed between the lamp of the XRF and the sample in order to prevent damage to the XRF. The third method, used when a laboratory sample was to be collected, involved sieving of the sample, collection in a plastic bag, and mixing of the contents by turning the bag over several times. The resulting sample was more homogenous. The XRF unit read the sample through the bag. Similarly, the XRF was used on subsamples (using small plastic bags) of sediment samples.

XRF locations were determined in the field, were generally biased, and were determined at the discretion of DTSC staff. In most cases, XRF locations were immediately recorded using GPS and soil samples were collected when any COCs appeared to be at high levels. At a few of the larger sites, XRF locations were chosen and flagged upon arrival to the mine site and soil sample locations were later selected based on XRF results. In cases where both XRF and laboratory sample were taken at the same location, an identification number was noted by the XRF operator to use for correlating the results of the two sample types.

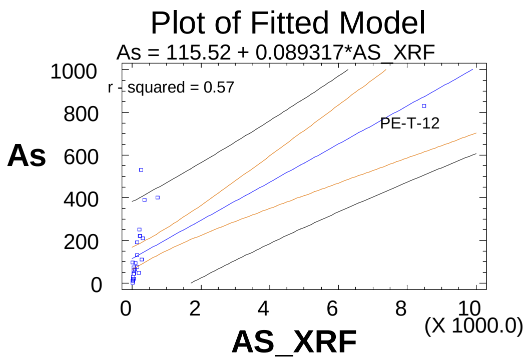
After sampling and analysis, the XRF results were compared with laboratory results. The graphs in Table A-6 / Figure A-4 compare XRF results (x-axis) with laboratory results (y-axis); each x-y coordinate represents a paired sample result, where a given sample was measured with both the XRF and analyzed in the laboratory. (There are multiple graphs for some constituents. In some cases the regressions were analyzed first with all data and then reanalyzed after removing one or more outliers.)

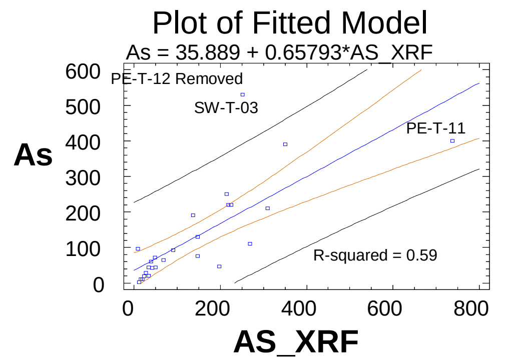
On the graphs, the blue line indicates the line that best fits the data, the orange curves represent the 95% confidence interval and the black curves represent the 95% prediction interval (a 95% chance that future observations would fit within the curve).

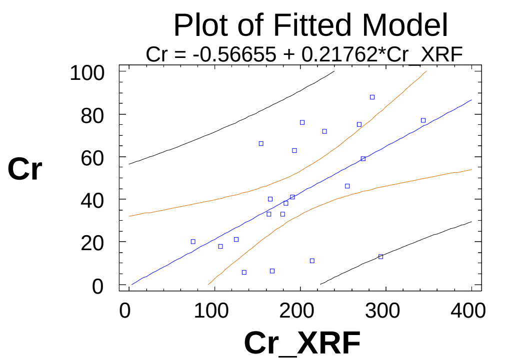
The r-squared value shown in some of the graphs represents the strength of correlation between x- and y-axis values. Higher r-squared values (> ~0.7) demonstrate where the XRF is an accurate tool for measuring metals in soil in the field.

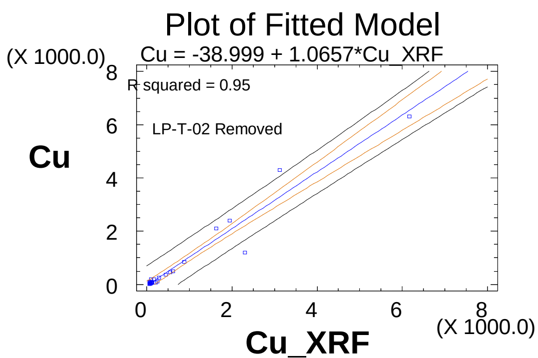
Table A-6 / Figure A-4. XRF/Laboratory Result Regressions.

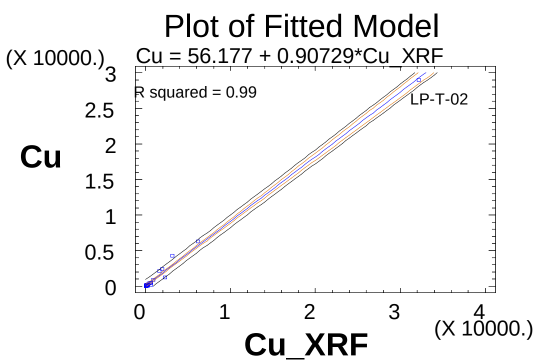
Constituent (element)	**Analysis** (all data)		**Reanalysis** (remove outliers)		Comments
	# samples	R^2	# samples	R^2	
Arsenic (As)	27	0.59			
Chromium (Cr)	22	0.31			
Copper (Cu)	28	0.99	*27*	*0.95*	*Reanalysis: excluding LP-T-02*
Mercury (Hg)	9	0.90			Insufficient pairs of samples
Nickel (Ni)	25	0.93	*24*	*.081*	*Reanalysis: excluding MD-S-23*
Lead (Pb)	58	0.49	53	0.91	*Reanalysis: <10,000 ppm, PI-T-0-06 removed*
Antimony (Sb)	10	0.86			Insufficient pairs of samples
Zinc (Zn)	64	0.83	*61*	*0.79*	*Reanalysis: outliers removed*
Cadmium (Cd)	5	0.55			Insufficient pairs of samples; (no graph)
Cobalt (Co)	13	0.06			(no graph)











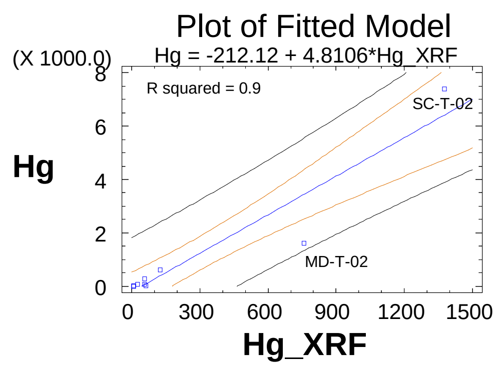
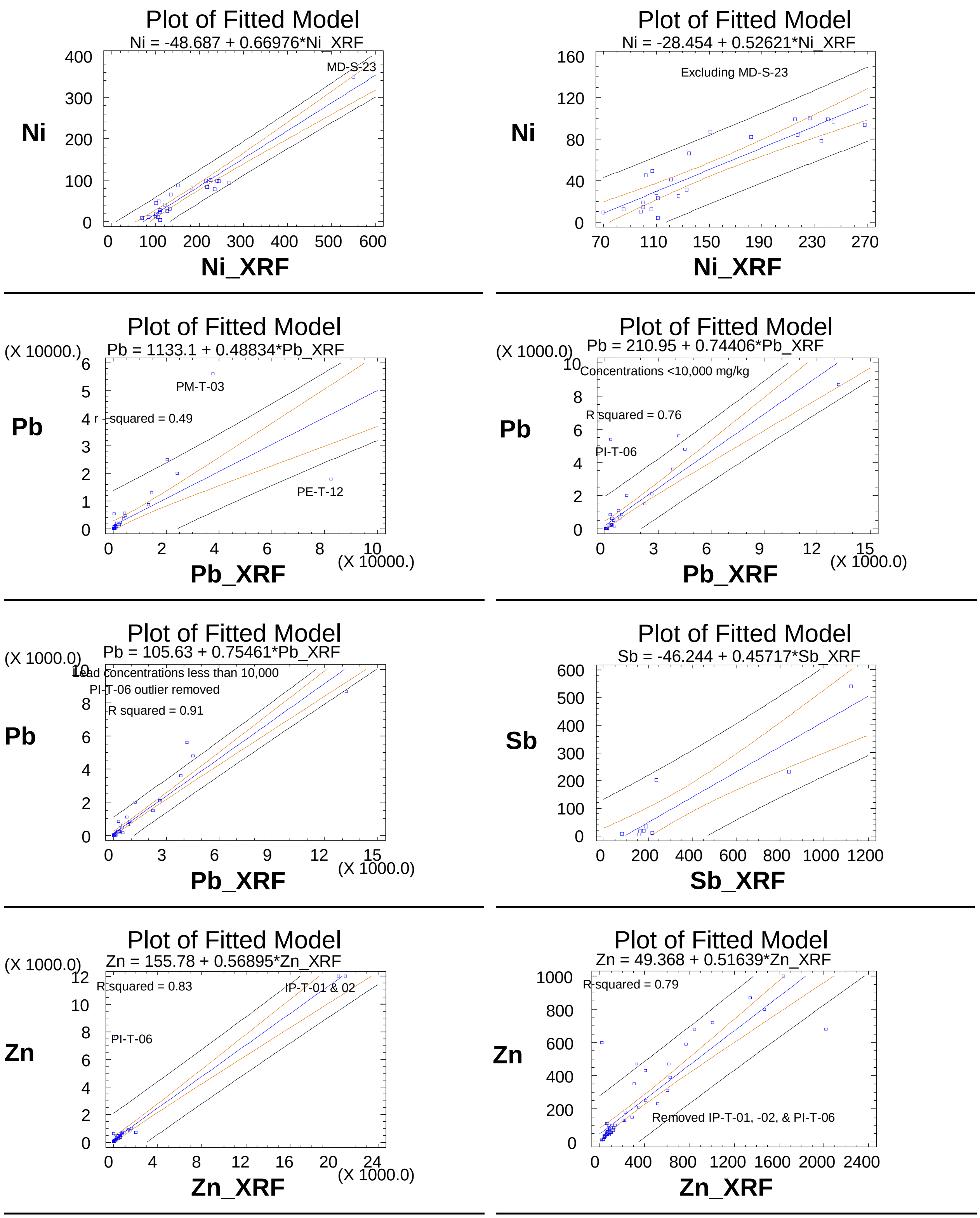


Table A-6 / Figure A-4. XRF/Laboratory Result Regressions.



Decontamination

Four types of field equipment required decontamination for soil and sediment samples: shovels, steel trowels, sieves, and flat trowels. Decontamination was performed in the field using a one-gallon hand sprayer filled with tap water. No decontamination procedures were required for water collection.

Chain of Custody

Samples were shipped overnight or delivered in person to the laboratories. Sample coolers contained a chain of custody form and were sealed to ensure integrity. Samples were shipped on wet ice, except for MeHg, which was shipped on dry ice. Test America Laboratory in Pleasanton, California performed all analyses, except for MeHg, which was performed by Brooks Rand in Seattle, Washington.

Ecological Screening Criteria for Inorganics in Soils

In addition to human health screening criteria, DTSC developed ecological screening criteria for inorganics in soils at selected open-space, recreational areas designed to show protective levels for plants and animals (Table A-7). Assessment of these criteria involves detailed analyses of onsite ecological receptors (e.g., mammal or bird).

Table A-7. Ecological screening criteria for inorganics in soils.

Constituent	**Ecological Criteria** (selected open-space, recreational areas)					Water quality criteria, fresh water [c] (µg/L)
	Plants [a] (mg/kg)	Invertebrates [a] (mg/kg)	Mammals [a] (mg/kg)	Avian [a] (mg/kg)	Sediment [b] (mg/kg)	
Arsenic	18	23[e]	46	43	9.3	150
Cadmium	32	140	0.36	0.77	0.99	2.2
Copper	70	70	49	28	31.6	9
Lead	120	1,700	56	11	35.8	2.5
Mercury	0.1[e]	0.3[e]	2[d]	1[d]	174	0.025
MeHg	--	--	--	--	0.00001[f]	0.003
Nickel	38	280	130	210	22.7	52
Zinc	160	120	79	46	121	120

[a] Ecological Soil Screening Levels (CVRWQCB, 2008).
[b] Threshold Effect concentrations (McDonald et al., 2000).
[c] California Toxics Rule, 40 CFR 131 (USEPA, 2000).
[d] Risk Management Criteria for Metals at BLM Mining Sites (BLM, 2004).
[e] Oak Ridge National Laboratory Screening Values (Oak Ridge National Laboratory, 2003).
[f] USEPA Region 5, Ecological Screening Levels [0.01 µg/kg].

Designated Level Methodology (DLM) Summary

A qualitative assessment of potential impacts to ground water and surface water from the leaching of waste constituents from soils was also performed using the DLM (CVRWQCB, 1989). The DLM begins with a water quality goal (WQG) that is the concentration a specific waste constituent must meet before interacting with ground water or surface water. The WQG is multiplied by an environmental attenuation factor (EAF), a number that describes the degree to which an individual environment may attenuate a waste constituent before it reaches ground water or surface water (e.g., due to factors like distance and permeability) (CVRWQCB, 1989). For WET test samples, the result is then divided by ten to compensate for dilution in the WET test. The calculated number becomes the Soluble Designated Level (SDL).

$$SDL = \frac{WQG * EAF}{10}$$
$$If\ Constituent\ Concentration < SDL, then\ \text{Pass}$$
$$If\ Constituent\ Concentration > SDL, then\ \text{Fail}$$

A WET test concentration of the waste constituent greater than the SDL results in a “failure” condition (where the waste constituent may degrade ground or surface water). For analyses directly from the soil sample, a “leachability factor” is multiplied in the equation to represent the resistance a soil has to leaching a constituent. Commonly, a leachability factor of 100 is used for metals (CVRWQCB, 1989). The resulting number is the Total Designated Level. Because the leachability factor is only an estimate, the SDL level is preferred. Since many WET test results were available for the report, only SDL concentrations were calculated and used to assess potential impacts.

DTSC provided water quality goals (Table A-8). EAFs were also developed for each site; each site was assigned a ground water EAF and a surface water EAF represented by a single number or a range (Table A-9).

The SDL was initially calculated using the greatest estimated EAF for each site (if the constituent concentration exceeded the SDL using the greatest EAF, then the failure condition would also occur using lower EAFs). The initial calculations showed that for all but one sample, a failure condition existed using the greatest EAF (the exception occurred at a site with other exceedances of the reporting limit at the greatest EAF). Therefore, the SDL was not calculated for other EAFs, and impacts were not calculated separately for ground water versus surface water impacts.

Table A-8. Regulatory concentration limits for metals in water.

Constituent	**Regulatory Concentration** (CVRWQCB, 2007) [a]					
	CDPH Primary MCL [b]	USEPA Primary MCL [b]	Public Health Goal	EPA IRIS	California Toxics Rule: Drinking water	California Toxics Rule: Freshwater aquatic life protection, continuous concentration
Antimony	6	6	--	2.8	14	--
Arsenic	50	10	0.004	2.1	--	150
Barium	1000	2000	2000	1400	--	--
Beryllium	4	4	1	14	--	--
Cadmium	5	5	0.04	3.5	--	Hardness dependent (0.8 - 6.2) [c]
Chromium (total)	50	100	134	--	--	--
Cobalt	--	--	--	--	--	--
Copper	1300	1300	170/300 (68) [d]	--	1300	Hardness dependent (2.9 - 30) [c]
Lead	15	15	2	--	--	Hardness dependent (.54 - 11) [c]
Mercury	2	2	1.2	--	0.05	--
MeHg	--	--	--	0.07	--	--
Molybdenum	--	--	--	35	--	--
Nickel	100	--	12	140	610	Hardness dependent (16 - 170) [c]
Selenium	50	50	--	35	--	5
Silver	--	--	--	35	--	Hardness dependent (.37 - 44) [c]
Thallium	2	2	0.1	0.6	1.7	--
Vanadium	--	--	--	63	--	--
Zinc	--	--	--	2100	--	Hardness dependent (37 - 390) [c]

[a] In most cases, the most restrictive concentration would be the applicable criteria for determining elevated levels of metals in water.

[b] Used by DTSC as suggested screening criteria.

[c] Based on formulas in Compilation of Water Quality Goals. Listed ranges use total recoverable concentrations over hardness range of 25-400 (mg/L as $CaCO_3$).

[d] The first number is the notification level. The second number is the response level.

Table A-9. Environmental Attenuation Factors developed by DTSC.

Site Name	EAF (Ground or Surface Water)		Remarks
	Ground [a]	Surface	
Anza-Borrego Desert SP	**100 -1000** [c]	**100 to1000**	Desert in steep terrain. Distant dry creeks. Shallow soil on bedrock.
Cuyamaca Rancho SP	**1 to 100** (100 if Ground Water Depth [GWD] is > 70 ft bgs [b] (1-10 near reservoir location)	**1 to10**	Multiple locations near drainage. Shallow soil on bedrock. Area near reservoir has shallow GW.
Malakoff Diggins SP	**1 to 100** (100 if GWD is > 70 ft bgs) [b] (1-10 if location has pond)	**1**	Multiple locations near drainage. Shallow soil on bedrock. Areas having ponds have shallow GW.
Oroville WA	**1 to 10**	**1**	Multiple locations near drainage. GW is shallow.
Picacho SRA	**1 to 100** (100 if GWD is > 70 ft bgs) [b]	**1 to100** (1 to10 near River)	Desert in rolling terrain. Multiple locations near drainage/Colorado River. Shallow soil on bedrock. Near river has shallow GW.
Plumas-Eureka SP	**10 to 100** (100 if GWD is > 70 ft bgs) [b]	**1 to 10**	Multiple locations near drainage. Shallow soil on bedrock.
Providence Mountains SRA	**100 to 1000** [c] (1000 if GWD is > 150 ft bgs)	**10 to100**	Desert in steep terrain. Multiple locations near drainage (dry creek in desert). Shallow soil on bedrock.
Robert Louis Stevenson SP	**10 to 100** (100 if GWD is > 70 ft bgs) [b]	**1**	1 location. Shallow soil on bedrock. Near drainage/creeks.
SLC Parcel 103-009/-010	**10 to 100** (100 if GWD is > 70 ft bgs) [b]	**1 to 10**	3 separate locations. Shallow soil on bedrock. Near drainage/creeks.
SLC Parcel 191-038	**100 to1000** [c] (1000 if GWD is > 150 ft bgs)	**100 to1000**	Desert in steep terrain. Distant dry creeks. Shallow soil on bedrock.
SLC Parcel 199-023	**100 to1000** [c] (1000 if GWD is > 150 ft bgs)	**100 to 1000**	Desert in rolling terrain. No dry creeks. Shallow soil on bedrock.
SLC Parcel 204-016	**100 to1000** [c] (1000 if GWD is > 150 ft bgs)	**100 to 1000**	Desert in steep terrain. Distant dry creeks. Shallow soil on bedrock.
SLC Parcel 204-019	**100 to 1000** [c] (100 for spring); (1000 if GWD is > 150 ft bgs)	**10 to100** (10 for spring. 100 for dry creek)	Desert in steep terrain. Multiple locations near drainage (dry creek in desert). Shallow soil on bedrock. Site is unique due to spring which suggests perched water table.
Spenceville WA	**1 to 10**	**1**	Multiple locations near drainage/ creeks. Shallow soil on bedrock.

[a] Depth to groundwater (GW) is highly variable in bedrock terrain and is dependent on topography, rainfall, lithology, weathering, and fracturing/jointing.

[b] Costal and Sierra Nevada mountain environment with moderate rainfall. 70 foot depth is assumed and based on other sites having similar characteristics.

[c] Desert/mountain environment with little rainfall and high evaporation/ transpiration. 150 foot depth and greater is assumed based on other sites having similar characteristics.

Chemical and Physical Risk Assessment (CRA/PRA)

Overview

The CRA/PRA model is an empirically-derived system for assigning a numerical score to AML based on readily quantifiable measures of chemical and physical properties and associated exposure potentials. This approach provides for a rapid, uniform, and objective evaluation of AML sites. These sites can then be compared and prioritized. The CRA/PRA model is empirically derived and is meant to rank a diversity of sites with a minimum of environmental data; consequently, the system provides a reasonable ordering of sites consistent with professional experience and observation.

The CRA/PRA model has four components: *chemical hazards, chemical exposure potential, physical hazards,* and *physical exposure potential*. Each component contains criteria that describe hazards at a site and their potential for environmental exposures. Each criterion has a numerical value associated with it. Numerical values form a relative ranking for each component, which are then grouped into categories. As discussed below, the CRA and PRA generate combined scores with values from 0 (no hazard) to 5 (potentially most hazardous).

The AMLU's Field Inventory Form is a primary source of data for the CRA/PRA model. The form includes information on location, ownership, mine type, and feature condition; addresses onsite chemical and physical hazards; and evaluates site access and sensitive environments. Data acquired during the site visit consist of measurement and observations of conditions indicative of potential chemical and physical hazard conditions at a site. Examples of chemical data include pH, volume and character of tailings and mine waste, and vegetative cover. Physical hazard data include openings to underground workings, pits and highwalls, unstable structures and machinery, and subsidences. These data are easily quantified in the field and suitable for GIS analysis.

The CRA/PRA model is implemented in Microsoft Excel, and consists of a series of attributes for each mine that are used to rank the site. Some attributes are numeric and come verbatim from the AMLU Field Form. Most, however, are intervals for a specific attribute type. For instance, a pH reading taken in the field for an impoundment might be "4.8." The CRA does not evaluate the specific value, but instead which interval the pH reading falls in (e.g., < 5, from 5 to 9, or > 9). All interval values are coded to represent environmentally significant values. Also, much of the input data consist of imprecise estimates; the categorical ranges clearly indicate this lack of precision. This coding scheme allows flexibility in how the CRA/PRA is calculated. If it is decided later on that a particular attribute or set of attributes are either being given too much or not enough weight in the calculation, the model can be modified to reflect those changes.

Exposure Scenarios

The principal use of exposure scenarios is to identify sensitive receptors which, in turn, provide insight on the COCs. Initially, the human exposure scenario for AML was thought to be principally one of recreational users. However, after evaluating data on AML distribution with respect to high-growth areas and land development, the AMLU concluded that exposure potentials to California citizens are better represented by multiple exposure scenarios, such as the following.

- Employee or residential setting (e.g., dwelling). Examples of AML impacts in residential areas include the Mesa de Oro development built on arsenic-laden tailings, and a series of mine collapses in Paradise, Oroville, and Grass Valley.
- Recreational use (hiker, camper, hunter, OHV user, etc.).
- Trespasser.
- Commercial use (e.g., manufacturing sites). No State AML sites fit this category.

Children are designated as the sensitive human receptor when evaluating potential impacts to humans due to their generally increased sensitivity to contaminants. Non-human exposure would likely be evaluated based on identified sensitive environments and associated sensitive species. The final component of the exposure scenario is addressing institutional controls. For example, Spenceville is posted and surrounded by fencing; yet, such controls can be subverted. Thus institutional controls should be considered ephemeral when evaluating long-term exposure.

Chemical Risk Assessment

The *chemical risk assessment* has two components: *chemical hazard ranking* (done in the field) and c*hemical exposure ranking* (based on field work and GIS analyses).

Chemical Hazard Score and Rank

The *chemical hazard score* is derived from a summation of categorized and weighted values for conditions onsite that may be hazardous to humans or affect the environment. Once all contributing factors are summed, the score is ranked from 0 (no effect) to 5 (the most hazardous chemical sites). The *chemical hazard score* is heavily weighted toward documented cases of ARD or heavy metals leaching, followed in weighting importance by the volume of mill tailings onsite. Mill tailings are likely to contribute to heavy metals or other toxins due to fine particle size and likelihood of remnant mill processing toxins (e.g., mercury, cyanide); they can also contribute to sedimentation. Finally, the scores take into account the volume of waste rock (large volumes of waste rock may pose problems similar to those of mill tailings, especially if the rock is acid-generating or contains high levels of metals or asbestos). This is then modified by the commodity mined, and the processing location relative to the mine site. Thus a site with a metallic commodity and onsite processing is more likely to present chemical hazards than an aggregate operation where processing occurred offsite.

The criteria used in the CRA model to calculate the *chemical hazard score* are volume of tailings (TL), volume of waste rock (WR), the degree and frequency (FML) of ARD or metals leaching (ML), and the commodity and processing group (CP). The *chemical hazard score* is calculated as follows.

$$\left\{\left((TL * 50) + (WR * 10) + \left((ML * FML) * 200\right)\right) * CP\right\} = Chemical\ Hazard\ Score$$

The volume of mine tailings is given as a range, which is assigned a value (Table A-9a). This value is then multiplied by 50 and added to the *chemical hazard* score. The volume of waste rock is given as a range, which is assigned a value (Table A-9b). This value is then multiplied by 10 and added to the *chemical hazard* score.

Table A-10a Amount of tailings onsite (yd^3) and correlating value.

Tailings Onsite (yd^3)	Value
0	0
1-49	1
50-249	2
250-499	3
500-999	4
1,000-9,999	8
10000-99,999	12
> 100,000	17

Table A-10b.Amount of mine waste onsite (yd^3) and correlating value.

Mine Waste Onsite (yd^3)	Value
< 49	0
50 to 249	1
250 to 499	2
500 to 999	3
1,000 to 9,999	6
10,000 to 99,999	10
> 100,000	15

The degree of metal leaching is assigned a value from 0 to 4 (4 represents the highest level of leaching). This value is multiplied by the frequency of occurrences of leaching for the site, and then multiplied by 200 as a weighting factor. This subtotal is then added to the *chemical hazard score*. The *chemical hazard score* is then multiplied by a modifier depending on the general type of commodity and where processing occurred. This multiplier is determined with the matrix below (Table A-10c). The processing location is listed in the first row, and the commodity group is listed in the first column. The resulting *chemical hazard score* is then grouped into *chemical hazard rankings* using the following ranges (Table A-10d).

Table A-10c.Commodity and processing group matrix.

	Onsite	Unknown	Offsite
Metallic	11	9	7
Non-Metallic	8	6	4
Aggregate	6	4	2

Table A-10d.Chemical hazard ranking from chemical hazard score.

Score	Rank
0	0
1 – 539	1
540 – 1,099	2
1,100 – 1,649	3
1,650 – 3,999	4
> 4,000	5
> 100,000	15

Chemical Exposure Score and Rank

The *chemical exposure score* is derived by summing categorized and weighted values for conditions onsite that may affect the exposure scenarios and pathways for humans and the environment. Once all contributing factors are summed, the *chemical exposure* *score* is ranked from 1 to 5 (1 represents very low potential for exposure; 5 represents sites with a high potential for exposure to humans and the environment).

The criteria used to calculate the *chemical exposure* score are site accessibility (ACC), current land use (CLU), anticipated future land use (FLU), and population density in proximity to the mine site (POP) with additional parameters to capture offsite effects. Additional parameters are mine waste (WSF) and tailings (TSF) in contact with surface flows, the stream class (SC) for the site, wind or water erosion (ERO) evidence, distance range to surface water (DIS), and percentage of vegetative cover (VEG) onsite compared to offsite. The *chemical exposure score*s are calculated as follows

$$\left(\left((TSF + WSF) * SC\right) + ERO + DIS + VEG + ACC + CLU + FLU + POP\right) = Chemical\ Exposure\ Score$$

The amount of cubic yards of tailings (Table A-10e) and mine waste (Table A-10f) in contact with surface flow are each assigned to a range and given a value, which is then multiplied by the stream class for the site. Stream classes are 0 for no stream, 1 for intermittent/ ephemeral, 2 for small perennial, and 3 for large perennial. This product is then added to the value for water/wind erosion. The water/wind erosion ranking may be a value from 0 to 4 (4 indicates the greatest amount of water/wind erosion onsite).

Table A-10e. Amount of tailings onsite contacting surface flows, and value

Tailings in Contact (yd^3)	**Value**
0	0
1-49	5
50-249	10
250-499	15
500-999	30
1,000-9,999	50
10,000-99,999	75
> 100,000	100

Table A-10f. Amount of mine waste onsite contacting surface flows, and value

Mine Waste in Contact (yd^3)	**Value**
< 49	0
50 to 249	1
250 to 499	2
500 to 999	3
1,000 to 9,999	6
10,000 to 99,999	10
> 100,000	15

This sum is then added to the weighted values for distance to surface water (Table A-10g) and the vegetative cover.

Table A-10g. Distance to surface water (feet)

Distance to Surface Water (feet)	**Value**
<500	2
500-1,000	1
>1,000	0

Both onsite and offsite average vegetative cover are stored as ranges of values. To be able to make a comparison between them, the midpoint for each range is taken and then a percent difference is calculated as:

$$\left(\frac{offsite - onsite}{offsite}\right) * 100 = \%\ Difference\ in\ Vegetative\ Cover$$

This percent difference is then given a weighted value (Table A-10h) and added to the *chemical exposure* score. Finally, values for site accessibility (Table A-10i), current and future land use (Table A-10j), and the human population size (total number of people) in proximity to the site are added to the *chemical exposure score* (Table A-10k).

Table A-10h.% difference in vegetative cover

Difference in Cover (%)	Value
0-10%	0
11-20%	1
21-50%	3
>50%	6

Table A-10i. Ease of access to site

Ease of access to site	Value
Easy	20
Moderate	10
Difficult	5

Table A-10j. Current and future land use

Land use type	Current	Future
Residential	20	5
Recreational / Open Space	10	3
Commercial	5	1

Table A-10k. Human population size within 10 to 15 miles of site

Population size	Value
≥ 100,000	5
10,000-100,000	3
< 10,000	1

The *chemical exposure score* is then grouped into *chemical exposure rankings* using the following ranges (Table A-10l):

Table A-10l. *Chemical exposure ranking* from *chemical exposure score*

Score	Rank
0-19	1
20-30	2
31-50	3
51-70	4
>70	5

Chemical Risk Category

This *chemical risk category* is determined by the combination of the *chemical hazard ranking* and the *chemical exposure ranking*. The following matrix was used to assign the overall *chemical risk category* (Table A-10m) ranging from 0 (sites with no chemical impacts) to 5 (sites with most significant potential for chemical impacts).

Table A-10m. *Chemical risk category* from hazard and exposure rankings.

		Hazard					
		0	**1**	**2**	**3**	**4**	**5**
Exposure	**1**	0	1	1	1	2	3
	2	0	1	1	2	3	3
	3	0	1	2	3	3	4
	4	0	1	2	3	4	5
	5	0	2	3	4	5	5

Physical Risk Assessment

The *physical risk assessment* is comprised of two principal components, the *physical hazard score*, which is done in the field, and the *physical exposure potential,* which is a combination of field work and GIS analyses.

Physical Hazard Score and Rank

The *physical hazard score* is derived from a summation of categorized and weighted values for conditions onsite that may have be physically hazardous to humans. Once all the contributing factors have been summed, the *physical hazard score* is ranked from 0 to 5 (0 represents no hazard; 5 represents the most physically hazardous sites). The criteria used to calculate the *physical hazard* score are the "condition" (CO) (the hazard level) and the number or "frequency"(FO) of underground openings; condition (CH) and frequency (FH) of highwalls; subsurface stability (SSS); slope stability (SLS); condition (CWB) and frequency (FWB) of water bodies; and condition (CMT) and frequency (FMT) of structures and machinery. Each item is multiplied by a weighting factor (listed below) and summed. The *physical hazard score* is calculated as follows.

$$(((CO * FO) * 100) + ((CH * FH) * 50) + (SSS * 10) + (SLS * 10) + ((CWB * FWB) * 20) + ((CMT * FMT) * 20)) = Physical\ Hazard\ Score$$

The *physical hazard score* is calculated by adding all of the subtotals below (0 = lowest condition [e.g., least hazardous] and 4 = highest condition [e.g., most hazardous]).

- Underground openings (e.g., shafts, adits) are cumulatively given a condition from 0 to 4. This number is multiplied by the number of shafts and adits onsite regardless of condition and by a weighting factor of 100.
- Highwalls may be given a condition from 0 to 4. This number is multiplied by the number of 100-foot sections of highwalls onsite, and by a weighting factor of 50.
- Subsurface stability and slope stability are each given a ranking from 0 to 4. These rankings are multiplied by a weighting factor of 10.
- Water bodies are cumulatively given a ranking from 0 to 4. This number is multiplied by the number of water bodies and by a weighting factor of 20.
- Structures, equipment, machinery, scrap, and trash are given a hazard ranking from 0 to 4. This number is multiplied by the total number of structures, equipment, machinery, scrap, and trash, and by a weighting factor of 20.

After the *physical hazard score* is calculated, mine sites are placed into ranking categories from 0 to 5 (5 is most hazardous) (Table A-10n).

Table A-10n. Physical hazard ranking from physical hazard score.

Score	Rank
0	0
1 – 399	1
400 – 1,199	2

Score	Rank
1,200 – 2,399	3
2,400-4,799	4
> 4,800	5

Physical Exposure Score and Rank

Physical exposure potential, like chemical exposure potential, is calculated using inputs of site accessibility (Table A-10o), land use (Table A-10p), and population proximity (Table A-10q). The *physical exposure score* is calculated as follows:

$$(ACC + CLU + FLU + POP) = Physical\ Exposure\ Score$$

For physical hazard exposures, ease of access to the site and the land use of the site are the most important criteria. A site that is essentially in a residential area and that is easily accessed presents the greatest potential for exposure.

Table A-10o. Ease of access to site

Ease of access to site	Value
Easy	20
Moderate	10
Difficult	5

Table A-10p. Current and future land use

Land use type	Current	Future
Residential	20	5
Recreational / Open Space	10	3
Commercial	5	1

Table A-10q. Human population size within 10-15 miles of site.

Population Size	Value
≥ 100,000	5
< 100,000 and ≥ 10,000	3
< 10,000	1

The *physical exposure score* is calculated by adding the assigned values for each of the four fields above, and categorizing scores into rankings 1 to 4, as follows (Table A-10r).

Table A-10r. Physical exposure ranking from physical exposure score.

Score	Rank
0 – 22	1
23 – 32	2

Score	Rank
33 – 39	3
40 – 50	4

Physical Risk Category

This *physical risk category* is determined by combining the *physical hazard ranking* and the *physical exposure ranking*. The following matrix (Table A-10s) was used to assign overall *physical risk category*. These categories range from 0 (no physical hazards) to 5 (sites with significant physical hazards).

Table A-10s. *Physical risk category* from hazard and exposure rankings.

		Hazard					
		0	**1**	**2**	**3**	**4**	**5**
Exposure	**1**	0	1	1	2	3	5
	2	0	1	2	3	4	5
	3	0	1	3	4	5	5
	4	0	2	4	4	5	5

APPENDIX B
ANALYTICAL DATA

Appendix B includes the analytical data and summary of laboratory results from the field sampling effort at the 15 State-owned sites sampled during this project (see Figure B-1), data from the review of CRA/PRA scores for all sites calculated by AMLU staff (see Figure B-2), and summary information for individual agencies. The appendix is divided into two parts.

PART 1: DATA SUMMARY

A summary of the laboratory and XRF data measured at 15 State-owned abandoned mine sites is presented in Part 1, along with a summary of site-specific characteristics.

- **Human Health Screening Criteria**

  Table B-1 shows laboratory results compared to the exceedance levels of HHSC for inorganics in soils at selected open-space recreational areas. Exceedances for arsenic, lead, and/or mercury by the determined highest anticipated visitation level (employee, recreational, or trespasser) are highlighted. No exceedances of HHSC for residents were detected during this project.

- **Designated Level Methodology Results**

  Table B-2 shows DLM calculations for each site where WET tests were performed (and there was at least one laboratory detection) on soil or sediment.

- **Sampling Location Site Information and Maps**

  Table B-3 provides summaries of site-specific information on each of the 15 abandoned mine sites sampled for this project for all agencies. More detailed information and maps, organized by agency, are provided in Part 2.

- **CRA/PRA Model Calculations**

  Table B-4 provides a summary of inventoried sites with the highest potential risk calculated using the CRA model (i.e., sites with CRA scores = 5). More detailed CRA and PRA results for all inventoried sites, organized by agency, are provided in Part 2. The CRA/PRA scores were not derived from sampling data and are meant to rank a diversity of sites for comparison and prioritization. The scores are also based on conditions present when a site is inventoried. Thus a score presented in the tables below for each agency (e.g., a CRA or PRA score of 5) may not reflect changed conditions (e.g., if site contaminants have been remediated or if all hazardous openings on the site are permanently closed).

PART 2: AGENCY-SPECIFIC INFORMATION

Maps and summaries of individual sampling sites for three state agencies—State Parks, SLC, and DFG—are provided in Part 2 of this Appendix.

Figure B-1. Sampling locations.

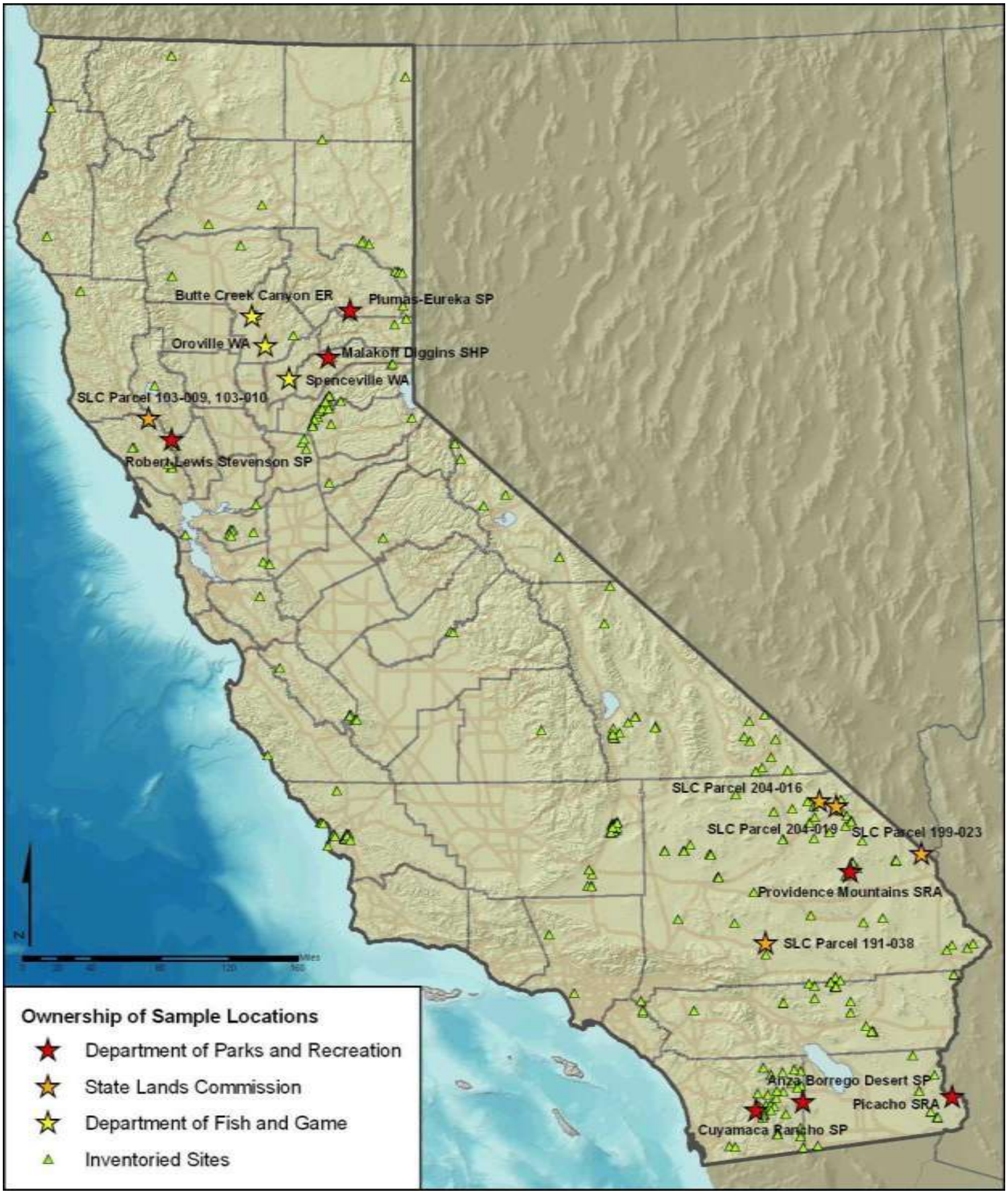
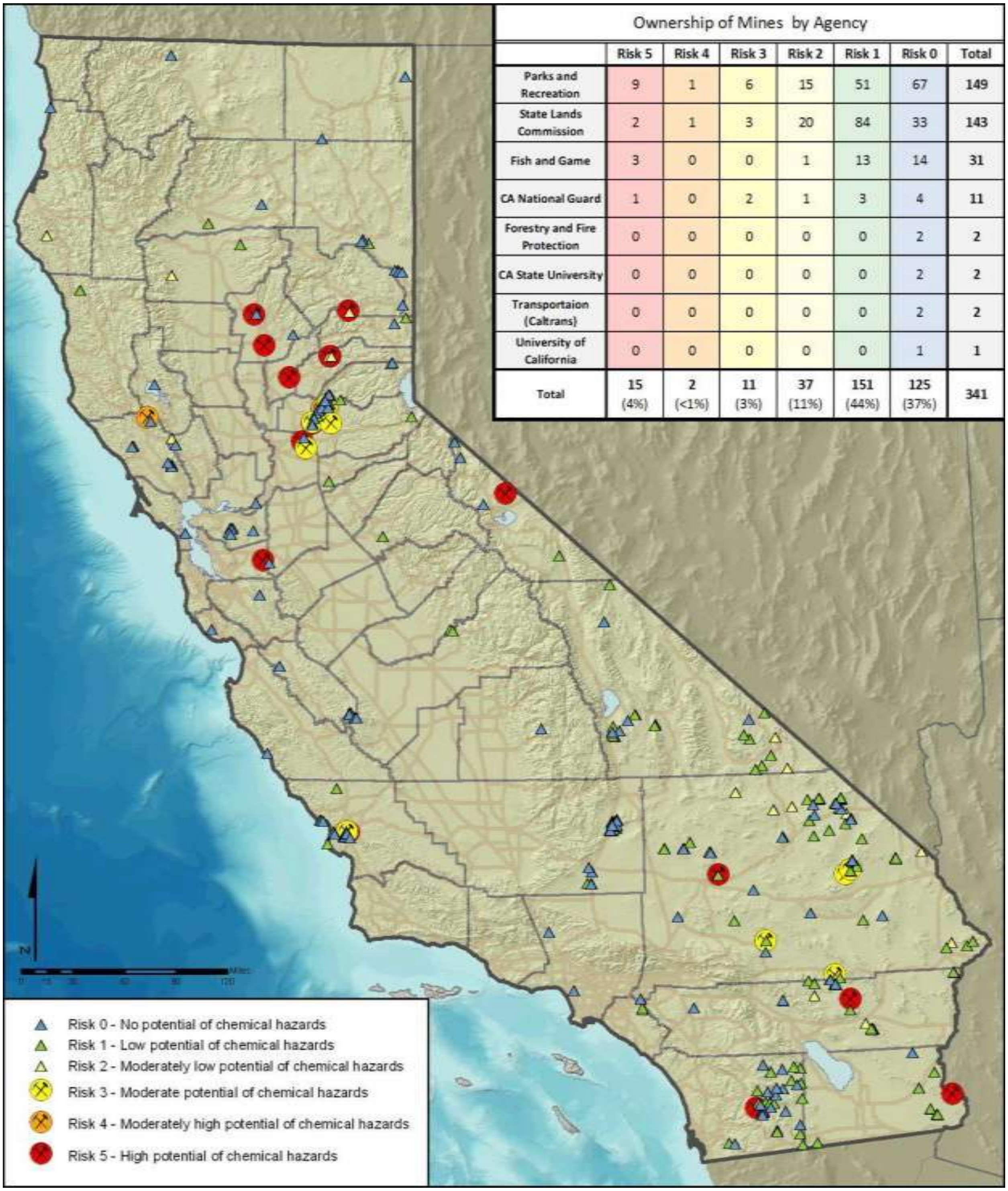


Figure B-2. Inventoried locations with Chemical Risk Assessment (CRA) values.



Ownership of Mines by Agency

	Risk 5	Risk 4	Risk 3	Risk 2	Risk 1	Risk 0	Total
Parks and Recreation	9	1	6	15	51	67	149
State Lands Commission	2	1	3	20	84	33	143
Fish and Game	3	0	0	1	13	14	31
CA National Guard	1	0	2	1	3	4	11
Forestry and Fire Protection	0	0	0	0	0	2	2
CA State University	0	0	0	0	0	2	2
Transportaion (Caltrans)	0	0	0	0	0	2	2
University of California	0	0	0	0	0	1	1
Total	15 (4%)	2 (<1%)	11 (3%)	37 (11%)	151 (44%)	125 (37%)	341

Human Health Screening Criteria (highlighted rows = exceedances)

Table B-1. Data compared to human health screening criteria for inorganics in soil.

State Agency	Site/ Visitation Level (if exceedances present)	Sample ID (QC = Quality Control)	Sample Type	Constituents (ppm, except MeHg in ppb)							
				Arsenic	Cadmium	Copper	Lead	Mercury	MeHg	Nickel	Zinc
STATE PARKS	Anza-Borrego Desert SP	AB-T-01	Environmental	1.5	0.51	4.6	6.9	0.049	--	3.6	30
		AB-T-02	Background	0.98	0.49	0.98	1.2	0.048	--	0.98	35
	Cuyamaca Rancho SP	SM-T-01	Environmental	19	0.9	45	12	0.071	--	7.3	75
		SM-T-01-QC	Environmental	17	0.91	42	11	0.078	--	7.8	81
		SM-T-02	Environmental	130	0.49	18	9.5	9.9	--	4.6	36
		SM-T-03	Background	2.7	0.5	22	6.9	0.05	--	6.1	69
		SM-T-04	Environmental	93	0.5	12	13	2.1	--	1.6	27
	Malakoff Diggins SHP	MD-S-14	Environmental	4.6	0.77	38	10	0.077	0.054	18	35
		MD-S-15	Environmental	1.4	0.72	8.5	5.7	0.35	0.041	5.7	6.9
		MD-S-16	Environmental	1.1	0.53	16	3.2	0.056	--	18	21
		MD-S-17	Environmental	2.7	0.56	30	13	0.15	--	44	80
		MD-S-18	Environmental	2.6	0.57	25	8.4	0.14	--	41	73
		MD-S-19	Environmental	2.5	0.82	19	12	0.098	--	14	15
		MD-S-20	Environmental	8.3	0.75	27	5.6	0.2	--	12	10
		MD-S-21	Environmental	4.7	0.002	29	7.6	0.0002	1.02	23	30
		MD-S-22	Environmental	4.8	0.89	49	38	39	--	53	72
		MD-S-23	Environmental	4.2	0.52	3	1.2	0.32	--	350	25
		MD-S-24	Environmental	26	0.48	37	5.8	0.52	8.36	37	40
		MD-T-01	Background	5.3	0.52	6.5	1.3	0.051	--	1.6	4.8
		MD-T-01-QC	Background	4.8	0.51	6.7	1.4	0.049	--	1.5	5.3
		MC-T-02	Environmental	20	0.5	26	1.6	1,600	--	28	20
	Picacho SRA (Recreational)	PI-S-11	Environmental	89	0.63	12	22	3.4	4.03	6.4	110
		PI-S-11-QC	Environmental	68	0.69	6.3	19	4.7	4.85	4.8	78
		PI-T-01	Environmental	390	0.72	20	17	0.38	--	12	55
		PI-T-01-QC	Environmental	430	0.76	22	19	0.37	--	12	60
		PI-T-02	Environmental	190	0.54	18	8.2	0.099	--	5.3	130
		PI-T-03	Environmental	110	2.7	13	13	0.13	--	4.1	470
		PI-T-04	Environmental	75	1.1	15	**2,100**	3.6	--	8.3	250
		PI-T-05	Environmental	210	1.3	16	47	0.18	--	6.7	150
		PI-T-06	Environmental	47	21	160	**5,400**	13	--	9.2	7,600
		PI-T-07	Background	5.8	0.5	16	15	0.049	--	9	42
	Plumas-Eureka SP (Employee)	PE-T-01	Environmental	**120**	3.4	200	**3,600**	11	--	3.1	430
		PE-T-01-QC	Environmental	**120**	3.1	150	**3,500**	4.6	--	2.9	370
		PE-T-02	Environmental	**45**	2.3	190	**2,000**	0.4	--	3.4	470
		PE-T-03	Environmental	**51**	2.3	100	**1,100**	2.6	--	2.8	350
		PE-T-04	Environmental	**72**	1.7	31	**510**	0.99	--	1.8	110
		PE-T-05	Environmental	**250**	1.1	26	**840**	24	--	3.1	100
		PE-T-06	Environmental	**370**	0.84	74	**5,600**	58	--	5.2	110
		PE-T-07	Environmental	**67**	6.3	180	**1,100**	19	--	23	400
		PE-T-08	Environmental	**110**	1.3	120	**2,100**	**880**	--	15	190
		PE-T-09	Environmental	**60**	3.6	59	**640**	14	--	6.4	180

Human Health Screening Criteria (highlighted rows = exceedances)

Table B-1. Data compared to human health screening criteria for inorganics in soil.

State Agency	Site/ Visitation Level (if exceedances present)	Sample ID (QC = Quality Control)	Sample Type	Constituents (ppm, except MeHg in ppb)							
				Arsenic	Cadmium	Copper	Lead	Mercury	MeHg	Nickel	Zinc
STATE PARKS (continued)	Plumas-Eureka SP (Employee) (continued)	PE-T-10	Environmental	**140**	2.7	81	350	48	--	7.8	240
		PE-T-11	Environmental	**400**	1.7	250	**8,700**	24	--	4.6	210
		PE-T-11-QC	Environmental	**420**	2.2	320	**11,000**	20	--	5.9	300
		PE-T-12	Environmental	**830**	12	200	**18,000**	170	--	12	800
		PE-T-13	Background	**13**	0.48	41	58	0.24	--	18	50
	Providence Mountains SRA (Trespasser)	PM-T-01	Environmental	60	10	450	**25,000**	0.15	--	9.6	310
		PM-T-01-QC	Environmental	64	16	450	**25,000**	0.12	--	8.1	410
		PM-T-02	Background	9.1	1.9	23	220	0.089	--	10	88
		PM-T-03	Environmental	120	130	1,200	**56,000**	12	--	8.7	680
		PM-T-04	Background	10	0.74	13	18	0.051	--	14	58
	Robert Louis Stevenson SP	RL-S-01	Environmental	97	4.5	31	9.6	0.45	0.851	160	600
		RL-S-02	Environmental	68	2.5	18	7.8	0.26	--	33	94
		RL-S-02-QC	Environmental	72	2.7	21	8.9	0.3	--	38	110
		RL-T-04	Environmental	42	0.5	12	15	2.5	--	4.5	21
		RL-T-05	Background	29	0.49	11	12	0.093	--	8.9	62
SLC	Parcel 103-009, 103-010 (Trespasser)	SC-T-01	Environmental	5.4	0.5	41	10	610	--	24	53
		SC-T-01-QC	Environmental	5.2	0.5	40	11	600	--	24	54
		SC-T-02	Environmental	6.9	0.58	92	30	**7,400**	--	23	54
		SC-T-03	Environmental	4	0.5	29	5.3	260	--	45	100
		SC-T-04	Background	2.3	0.53	31	1.7	8.2	--	27	57
		SC-T-05	Background	1	0.49	64	0.98	0.88	--	29	72
	Parcel 191-038	LP-T-01	Environmental	5.7	1.8	6,300	270	0.49	--	25	47
		LP-T-02	Environmental	8.6	3.2	29,000	810	4.9	--	23	48
		LP-T-02-QC	Environmental	9	3.4	27,000	850	4.9	--	24	50
		LP-T-03	Environmental	4.8	1.6	4,300	610	0.093	--	25	44
		LP-T-04	Background	3.9	0.67	74	8.3		--	31	49
	Parcel 199-023 (Recreational)	NN-T-01	Environmental	65	3.9	86	**1,500**	0.32	--	1.8	390
		NN-T-02	Environmental	3.7	0.48	4.9	17	0.052	--	3.1	61
		NN-T-03	Environmental	12	1	64	160	0.05	--	3.3	230
		NN-T-04	Background	2.5	0.49	8.3	4	0.051	--	4.8	42
		NN-T-05	Environmental	1.7	0.5	13	8	0.049	--	3.3	130
	Parcel 204-016 (Recreational)	SH-T-01	Environmental	85	9.1	370	**4,800**	0.73	--	7.1	870
		SH-T-02	Environmental	44	0.5	4.9	88	0.12	--	0.99	14
		SH-T-03	Environmental	8.6	0.8	35	150	0.085	--	7.9	100
		SH-T-04	Background	4.7	0.86	49	8.3	0.051	--	28	58
	Parcel 204-019 (Trespasser)	IP-T-01	Environmental	15	57	64	**13,000**	27	--	7.9	12,000
		IP-T-01-QC	Environmental	16	67	71	**14,000**	28	--	8	13,000
		IP-T-02	Environmental	18	63	110	**20,000**	32	--	12	12,000
		IP-T-03	Background	5	0.5	11	25	0.051	--	8.2	43
		IP-T-04	Environmental	6.1	4	95	230	65	--	12	54

Human Health Screening Criteria (highlighted rows = exceedances)

Table B-1. Data compared to human health screening criteria for inorganics in soil.

State Agency	Site/ Visitation Level (if exceedances present)	Sample ID (QC = Quality Control)	Sample Type	Constituents (ppm, except MeHg in ppb)							
				Arsenic	Cadmium	Copper	Lead	Mercury	MeHg	Nickel	Zinc
DFG	**Butte Creek ER** (DFG Region 2)	BC-S-13	Environmental	3.6	0.85	65	6.7	0.11	2.11	100	63
		BC-S-14	Environmental	2.4	0.83	73	12	0.086	0.756	98	61
		BC-S-14-QC	Environmental	3.8	0.83	62	7.6	0.098		96	55
		BC-S-15	Environmental	4	0.66	39	3.4	0.066	0.166	100	47
		BC-S-16	Environmental	3.8	1	51	4.6	0.1		85	44
		BC-T-01	Environmental	3.8	0.48	44	11	0.057		100	40
		BC-T-02	Environmental	3.8	0.48	31	2.2	0.051		78	37
		BC-T-03	Environmental	3.8	0.48	40	2.2	0.051		87	40
		BC-T-04	Environmental	4.3	0.5	44	5	0.062		82	44
		BC-T-05	Background	1.7	0.5	32	9.4	0.049		49	45
	Oroville WA (DFG Region 2)	OW-S-17	Environmental	2.9	0.75	43	6.3	0.08	0.644	81	44
		OW-S-17-QC	Environmental	2.5	0.78	33	4.7	0.09		70	37
		OW-S-18	Environmental	2.6	1.1	36	11	0.11	0.465	63	38
		OW-S-18-QC	Environmental						0.481		
		OW-S-19	Environmental	3.8	0.81	61	5.5	0.12	0.166	140	51
		OW-T-01	Environmental	2.8	0.49	22	2.5	0.051		84	26
		OW-T-01-QC	Environmental	2.7	0.51	22	1.7	0.051		91	26
		OW-T-02	Environmental	3.4	0.49	28	3.9	0.082		66	32
		OW-T-03	Environmental	2.7	0.49	27	2.4	0.52		99	31
		OW-T-04	Environmental	10	0.5	58	24	0.19		94	59
		OW-T-05	Environmental	4.1	0.51	42	8.4	0.048		99	33
		OW-T-06	Environmental	4.1	0.49	44	5.9	0.053		97	42
		OW-T-07	Background	2.3	0.49	10	6.7	0.049		19	15
	Spenceville WA (DFG Region 2)	SW-S-08	Environmental	44	1.3	850	46	0.16		14	590
		SW-S-08-QC	Environmental	45	1.2	880	40	0.15		14	580
		SW-S-09	Environmental	45	2.5	670	280	0.85		11	930
		SW-T-01	Environmental	220	2.2	2,400	240	1.5		5.3	680
		SW-T-02	Environmental	220	2.2	2,100	190	1.3		5.6	720
		SW-T-02-QC	Environmental	220	2.2	2,200	190	1.3		5.7	750
		SW-T-03	Environmental	530	2.7	490	840	7.2		3.4	1,000
		SW-T-04	Background	2.8	0.48	72	9.4	0.05		12	85

Designated Level Methodology Results

Table B-2. DLM calculation results for WET test sites.

State Agency and Report Location		Sample ID [b]	Lead (Pb) [a]				Arsenic (As) [a]				Mercury (Hg) [a]				Copper (Cu) [a]				EAF [a]
			Pb	SDL	WQG	Pass (P)/Fail (F)	As	SDL	WQG	Pass (P)/Fail (F)	Hg	SDL	WQG	Pass (P)/Fail (F)	Cu	SDL	WQG	Pass (P)/Fail (F)	
State Parks	Cuyamaca Rancho SP	SM-T-01	<0.50				<0.50				<0.020								
		SM-T-02	<0.50				**1.7**	0.1	0.01	F	<0.020								100
	Picacho SRA	PI-T-02	<0.50				**1.1**	0.1	0.01	F	<0.020								100
		PI-T-03	**1.7**	0.15	0.015	F	**0.64**	0.1	0.1	F	<0.020								100
		PI-T-06	**18**	0.15	0.015	F	<0.05				<0.020								100
	Plumas-Eureka SP	PE-T-09	**33**	0.15	0.015	F	**0.52**	0.1	0.01	F	<0.020								100
		PE-T-11	**33**	0.15	0.015	F	**0.94**	0.1	0.01	F	<0.020								100
		PE-T-12	**180**	0.15	0.015	F	<0.50				**0.66**	0.0005	0.00005	F					100
	Providence Mountains SRA	PM-T-01	**1400**	1.5	0.015	F	**2.3**	1	0.01	F	<0.020								1,000
		PM-T-03	**3000**	1.5	0.015	F	<0.50				<0.020								1,000
SLC	Parcel 103-009, 103-010	SC-T-02	<0.50				<0.50				**0.52**	0.0005	0.00005	F					100
		SC-T-03	<0.50				<0.50				**0.03**	0.0005	0.00005	F					100
	Parcel 191-038	LP-T-02	**48**	1.5	0.015	F	<0.50								**1800**	130	1.3	F	1,000
		LP-T-02-QC	**46**	1.5	0.15	F	<0.50								**1800**	130	1.3	F	1,000
		LP-T-03	**12**	1.5	0.015	F	<0.50								**89**	130	1.3	P	1,000
	Parcel 199-023	NN-T-01	**30**	1.5	0.015	F	<0.50				<0.020								1,000
		NN-T-03	<0.50				<0.50				<0.020								
		NN-T-05	<0.50				<0.50				<0.020								
	Parcel 204-019	IP-T-01	**470**	1.5	0.015	F	<0.50				<0.020								1,000
		IP-T-01-QC	**450**	1.5	0.015	F	<0.50				<0.020								1,000
		IP-T-02	**1000**	1.5	0.015	F	<0.50				<0.020								1,000
DFG	Spenceville WA	SW-S-08	<0.50				<0.50								**20**	1.3	1.3	F	10
		SW-T-01	<0.50				<0.50								**58**	1.3	1.3	F	10

[a] Exceedances are highlighted. All concentrations are in ppm.

[b] QC = Quality control sample.

Sampling Location Site Information Summary

Table B-3 provides summaries on each of the 15 sites sampled for this project (see Figure B-1 for sample locations). For site details, see Part 2 of Appendix B.

Table B-3. Sample location summaries (all 15 sites).

AML Site Name and Location		Physical Description	Individual Site Analyses
STATE PARKS	**Anza-Borrego Desert SP** Roberts and Peeler Mine (former strontium mine), San Diego & Imperial Co.	Entire mine site is part State-owned and part private. State Parks' portion gets some OHV and hiking traffic. Site has shallow workings and open cuts with dispersed fine gray-white surface material present on surface (possible strontium ore?). Sampled to evaluate metals content of surface material.	No HHSC exceedances detected.
STATE PARKS	**Cuyamaca Rancho SP** Stonewall Mine (former gold mine), San Diego Co.	Site has mill sites, equipment, and 3 collapsed shafts (1 fenced). Sampled at waste rock dump, tailings pile, and sediment down gradient to property line.	Potential ground/surface water impacts (based on DLM) exist from arsenic detected in tailings dispersed onsite and possibly downslope.
STATE PARKS	**Malakoff Diggins SHP** Bloomfield Hydraulic, Lake City Diggings, & Le Du Mine (former gold mine), Nevada Co.	Site contains parts of multiple hydraulic mines with drain tunnel inlets/outlets, sluice tunnels, shafts, and ponds. Diggings drain to Humbug Creek and South Yuba River. Sampled at drain tunnel outlets, flooded shafts, and ponds.	MCL for antimony in water was exceeded in 4 of 11 samples (North Bloomfield/Lake City tunnel outlets and 2 ponds). MCL for nickel in water was exceeded in 1 sample ("Red Shaft" next to Humbug Creek Trail). MeHg in sediment was detected in 4 samples (range 0.041-8.36 ng/g).
STATE PARKS	**Picacho SRA** Picacho Millsite (former gold millsite), Imperial Co.	Site has 2 mill foundations with related equipment. More than 4,500 yd^3 of tailings are spread over a large area. Tailings are eroded by both wind and water into a wetland on the edge of the Colorado River, with regular visitation on a hiking trail built across the top of a tailings pile. Sampled at eroded tailings, trail atop tailings, assay office, cyanide tank location, and mill foundations.	Lead above HHSC was measured at 2,100 mg/kg on floor of lower mill and 5,400 mg/kg at front of assay office foundation. Potential ground/surface water impacts (based on DLM) exist from arsenic at 2 locations: tailings pile below site and where trail crosses tailings. Surface or ground water may be impacted from lead in front of assay office foundation and on trail. Cyanide was detected at 6.0 mg/kg in a soil sample taken next to a decayed tank. A sample measuring 4.85 ng/g of MeHg was collected at the edge of a marsh.

[a] Abbreviations used in table: DLM=Designated Level Methodology; HHSC=Human Health Safety Criteria; MCL=Maximum Contaminant Level; OHV=Off Highway Vehicle.

Table B-3. Sample location summaries (all 15 sites).

AML Site Name and Location		Physical Description	Individual Site Analyses
STATE PARKS	**Plumas-Eureka SP** Plumas-Eureka Mine (former gold mine), Plumas Co.	Site has extensive underground workings, old town sites, and several mill sites (one mill still standing) scattered across a mountainside. Most of the site is difficult to access, but a visitor area and exhibits are located downslope of the main mill site (which is off limits to public). Sampled at main mill site area, adjacent plating area, assay office, one large and two smaller tailing ponds, and sulphuret works site.	Arsenic exceeded HHSC at all sample areas, ranging from 13 to 830 mg/kg. Lead exceeded HHSC at multiple locations, including up to 18,000 mg/kg near a picnic area within 10 meters of Jamison Creek (this area appears to be built on top of tailings from the sulphuret mill, and the creek may erode some of this material at high flows) and in tailings piles. Mercury exceeded HHSC outside the Mohawk Stamp Mill. Potential ground/surface water impacts (based on DLM) exist from lead in tailings behind the assay office and arsenic, lead, and mercury from the sulphuret mill tailings in the Jamison Creek picnic area.
	Providence Mountains SRA C & K Mine (former lead, silver, and copper mine), San Bernardino Co.	Site has several adits and shafts, waste rock dumps, old buildings and equipment, and a small furnace site. Sampled at slag pile and waste rock.	Lead was measured at levels above HHSC at a slag pile near the smelter and a mineralized waste rock dump near a shaft. Potential ground/surface water impacts (based on DLM) exist from arsenic and lead at the slag pile and from lead at the dump.
	Robert Louis Stevenson SP Silverado Mine (former silver and gold mine), Napa Co.	Site has several adits, open cuts, and waste rock piles spread over the hillside. A hiking trail provides access. Sampled at sulfide-rich waste rock pile, discharge water from adit, and sediment in water.	A sample measuring 0.851 ng/g of MeHg was collected below a draining adit.
SLC	**Parcel 103-009 & 103-010** Buckeye Mine (former mercury mine), Sonoma Co.	Entire site has several adits, small retorts, waste and tailing piles, and a main mill site with rotary furnace and condenser stacks. Most of the site is on private property. Site has very low visitation. Sampled at small retorts on SLC land.	Potential ground/surface water impacts (based on DLM) exist from mercury measured above HHSC near a retort.
	Parcel 191-038 Los Padres Mine (former gold mine), San Bernardino Co.	Site has several adits, a shaft, and a mill site. OHV traffic is common. Sampled at largest waste rock dump and small tailings piles (5 yd^3).	Potential ground/surface water impacts (based on DLM) exist from copper and lead at tailings and waste rock piles.

Table B-3. Sample location summaries (all 15 sites).

AML Site Name and Location		Physical Description	Individual Site Analyses
SLC	**Parcel 199-023** Golden West Mine (former gold mine), San Bernardino Co. *(DTSC calls it the "North of Needles" parcel.)*	Site has several shafts with waste rock piles and a small production area. Site ownership is divided between SLC and BLM. The site is remote, but evidence of some visitation exists. Sampled at large waste rock pile on SLC property, small tailings piles (10 yd^3), and residue in tank.	Lead was measured above HHSC at a waste dump next to an open shaft. Potential ground/surface water impacts (based on DLM) exist from lead from the same area.
SLC	**Parcel 204-016** Silver Giant Mine (former lead and silver mine), San Bernardino Co. *("Shadow Mountains" parcel.)*	The site is mostly on BLM land and consists of several small adits and shafts and a mill site. Site is remote but has unrestricted access. Sampled at tailings pile (12 yd^3) and mill foundation, both on SLC property.	Lead was measured above HHSC at a very small tailings pile adjacent to a mill foundation.
SLC	**Parcel 204-019** Unnamed (former copper, silver, lead, zinc mine), San Bernardino Co. *("Pachalka Springs" parcel.)*	Site has a mill area with small tailings pile (44 yd^3), with a declined adit up a hillside. Site access requires a short hike across a desert wash. Sampled at tailings pile and the wash sediment below.	Lead was measured above HHSC (as high as 20,000 mg/kg) at a tailings pile downslope from the mine.
DFG	**Butte Creek ER** Pacific Gold # 3 (former gold mine), Butte Co. (DFG Region 2)	Site has ~200 acres of dredger tailings with internal ponds. Butte Creek intersects the tailings piles. Recreation occurs in and along the creek. Sampled at beach and ponds.	MeHg in sediment ranged from 0.106 to 2.11ng/g. The highest level was collected in a tailings pond.
DFG	**Oroville WA** Gold Hill Dredging (former gold mine), Butte Co. (DFG Region 2)	Site has ~7 square miles of dredger tailings with ponds. The Feather River intersects and can submerge part of the tailing piles during high flow events. Area has high fishing, hunting, and OHV use. Sampled at ponds and inflow/outflow areas.	The MCL for thallium in water was exceeded at a large pond next to the Feather River Channel. MeHg was detected in three samples at levels up to 0.64 ng/g (in mud flats at the edge of the pond as well as in two seasonally flooded areas).
DFG	**Spenceville WA** Wellman Creek Mine (former copper mine), Yuba Co. (DFG Region 2)	Site has 2 shafts and 2 waste rock piles (totaling ~580 yd^3). The site has low recreational use (some hunting). Waste rock piles are near Wellman Creek and may have acid generation potential (AGP). Sampled at waste rock piles, eroded material, and creek water.	One of 4 water samples exceeded the thallium MCL. Potential impacts to ground/surface water (based on DLM) exist from copper at a waste pile and on eroded material below the waste pile near the creek. AGP testing showed potential to generate acid in two samples (results averaged 81 tons CaCO3 per kiloton (kt) of rock).

Table B-4. Sites with high chemical risk potential **(CRA=5)** calculated when site was inventoried.*

Agency	Agency/Site *(Mine Name)*	County	Commodity	Operation**	Sampled During Inventory Project?
STATE PARKS	**Bodie SHP** *(Bodie)*	Mono	Gold, Silver	UNDG, MILL	No (characterization and remediation completed by USEPA, State Parks, and AMLU in separate project in 2007-09).
STATE PARKS	**Carnegie State Vehicular Recreation Area** *(Tesla)*	Alameda	Coal, Sand, Clay	UNDG, MILL	No (RWQCB and State Parks have characterized site and are planning remediation remedies).
STATE PARKS	**Cuyamaca Rancho SP** *(Stonewall)*	San Diego	Gold	UNDG, MILL	Yes (historic waste rock dump, tailings pile, and onsite sediment).
STATE PARKS	**Folsom Lake SRA** *(Zantgraf)* &	El Dorado	Gold	UNDG, MILL	No (mixed ownership: U.S. Bureau of Reclamation is the land owner; State Parks manages the land).
	(Mississippi Bar)	Sacramento	Aggregate	DRDG	
STATE PARKS	**Malakoff Diggins SHP** *(Le Du)* & *(Malakoff)*	Nevada	Gold, Sand & Gravel	PLCR	Yes (two sites on State land; overall site has mixed ownership: BLM/State Parks).
			Gold	HYDR	
STATE PARKS	**Picacho SRA** *(Picacho Mill)*	Imperial	Gold	MILL	Yes (sampling included tailings piles near Colorado River).
STATE PARKS	**Plumas-Eureka SP** *(Plumas-Eureka)*	Plumas	Gold, Silver, Lead	UNDG, MILL	Yes (historic main mill site and other areas; mill is closed to the public).
SLC	**Parcels 103-009/010** (*Buckeye*)	Sonoma	Mercury	PIT, MILL, UNDG	Yes (at retorts discovered onsite; overall site is mixed ownership, with historic mercury processing on SLC lands).
SLC	**Parcel 197-001** *(Saint Louis)*	San Bernardino	Silver	UNDG, MILL	No (SLC has independently assessed this mixed ownership [SLC/BLM] site with mill and tailings on BLM land).
SLC	**Parcel 233-011** *(Iron Chief)*	Riverside	Gold	UNDG, MILL	No (mixed public-private ownership with mill site/tailings on private land).
DFG (all Region 2)	**Butte Creek ER** *(Pacific Gold #3)*	Butte	Gold, Platinum, Sand & Gravel	DRDG	Yes (ponds and small beach on DFG lands near creek; overall site is mixed public-private ownership).
DFG (all Region 2)	**Oroville WA** *(Gold Hill Dredging Co.)*	Butte	Sand & Gravel, Silver, Gold	DRDG	Yes (ponds and inflow/outflow areas; site is managed by DFG for Dept. of Water Resources).
DFG (all Region 2)	**Spenceville WA** *(Wellman Creek)*	Yuba	Copper	UNDG	Yes (two waste piles with ARD potential; site is mixed public-private ownership).
CNG	**Camp San Luis Obispo** *(Pick and Shovel)*	San Luis Obispo	Asbestos, Chromium	PIT, MILL, UNDG	No (CNG independently characterized this site and other abandoned mine sites within Camp San Luis Obispo).

* CRA/PRA scores, which are not derived from sampling data, incorporate many factors (see Appendix A). A score is calculated based on conditions present when a site is inventoried; thus a score may not reflect changed conditions (e.g., the site is cleaned up or hazardous openings are permanently closed). The CRA/PRA score is also based on an entire mine site; if a mine site crosses ownership boundaries, with one feature on State-owned lands and multiple features off State lands, the CRA/PRA score for the entire site may be higher than that calculated had only the State's portion of the site been evaluated. (See notes above and Appendix B for site details.)

**Operation Type abbreviations used above: DRDG=Dredge; HYDR= Hydraulic; MILL=Processing Area/Mill; PIT=Pit/Quarry; PLCR=Placer; UNDG=Underground.

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APPENDIX B, PART 2A
AGENCY-SPECIFIC INFORMATION: STATE PARKS

Site Remediation Summary: Bodie SHP Chemical Remediation, Mono County

In the late 1800s to early 1900s, Bodie was part of a major gold mining district. In 1962, the town and adjacent area became Bodie SHP, which is owned and managed by State Parks. The park is preserved in a state of "arrested decay," and a critical priority for State Parks is to maintain the appearance and historical setting of mining, including structures, artifacts, and other cultural resources, and protect public health and safety.

Above: Bodie SHP's Standard Mil.
Below: An XRF is used to analyze dust in the Wheaton-Hollis Hotel.

From 2007 to 2009, with funds from OMR's Surface Mining and Reclamation Account, the AMLU, State Parks, and USEPA coordinated to investigate and remediate chemical hazards at Bodie SHP left over from historic mining and gold processing, including lead (used in the assay process to measure the amount of gold in an ore sample); mercury (used as amalgamate with gold to enhance recovery); and arsenic (commonly associated with gold deposits and occurring naturally in the area). The USEPA conducted sampling and remediation work (locations and procedures were designed to fully characterize and remediate contaminants and protect cultural resources and artifacts), which was monitored by Park archaeologists and OMR staff. The project included the following tasks.

- Installation of a modified radon extraction system to reduce mercury vapor concentrations inside the Standard Mill and remediated lead-contaminated soil on slope below the Mill (placed filter fabric and clean fill, revegetated slope, and installed fences to reduce disturbance).
- Remediation of lead-contaminated soil from Bell and Rose Klyps Assay buildings (removed top foot of soil in and around buildings; replaced soil with clean fill).
- Removal of lead contaminated dust in Wheaton-Hollis Hotel using a HEPA vacuum.
- Controlling of erosion of mine tailings adjacent to Bodie Creek by building a diversion channel lined with rocks collected onsite to carry runoff away from the tailings, by constructing weirs in the creek to slow stream flows, and by composting and revegetating the tailings to promote growth of native plants

A lined diversion ditch (right) prevents runoff from eroding mine tailings (light colored soil on left).

Sampling Site Summary: Anza-Borrego Desert SP (*Roberts and Peeler Mine)*

SITE INFORMATION

Location	Outline Area of Sampled Portion	Commodity	Physical Description
San Diego & Imperial Co., ~25 miles southeast of Borrego Springs.	0.1 acre	Strontium (also gypsum and aggregate)	Entire mine site is part State-owned and part private. State Parks' portion gets some OHV and hiking traffic. Site has shallow workings and open cuts with dispersed fine gray-white surface material present on surface (possible strontium ore?). Sampled to evaluate metals content of surface material.

NUMBERS OF FIELD XRF MEASUREMENTS AND SAMPLES ANALYZED

XRF	soil				sediment				water		AGP
	Metals 6010-B	Hg 7470-A	Cyanide	WET	Metals 6010-B	Hg 7470-A	WET	MeHg	Metals 6010-B	Hg 7470-A	
5	2	2	--	--	--	--	--	--	--	--	--

SAMPLING RESULTS*

Maximum level of visitation anticipated	Constituents exceeding HHSC	Constituents with potential for metals leaching from soils**	Notes
Recreational	**None**	**Unknown (No WET test)**	No HHSC were exceeded.

HHSC Sample ID	Sample Type	Constituents (milligrams/kilogram = parts per million)							
		Arsenic	Cadmium	Copper	Lead	Mercury	Methylmercury	Nickel	Zinc
AB-T-01	Environmental	1.5	0.51	4.6	6.9	0.049	--	3.6	30
AB-T-02	Background	0.98	0.49	0.98	1.2	0.048	--	0.98	35

* Sampling data compared to human health screening criteria (HHSC) or that show potential for impact to ground or surface water quality (any exceedances are highlighted).
** DLM Waste Extraction Test (WET) concentration > Soluble Designated Level (SDL).

State Parks: Anza-Borrego Desert SP

SampleID	As	Hg	Pb
Laboratory Samples			
Soil			
AB-T-01	1.5	0.049	6.9
AB-T-02	<0.98	<0.048	1.2
XRF Samples			
AB-A	<17	<14	<26
AB-B	<21	<14	<34
AB-C	<15	<12	<23
AB-D	<12	<10	<18
AB-T-01	<13	<10	<20

<u>Sampling Site Summary</u>: Cuyamaca Rancho SP (*Stonewall Mine)*

SITE INFORMATION

Location	Outline Area of Sampled Portion	Commodity	Physical Description
San Diego Co., 14 miles south of Julian on Hwy 79.	5 acres	Gold	Site has mill sites, equipment, and 3 collapsed shafts (1 fenced). Sampled at waste rock dump, tailings pile, and sediment down gradient to State Parks property line.

NUMBERS OF FIELD XRF MEASUREMENTS AND SAMPLES ANALYZED

XRF	soil				sediment				water		AGP
	Metals 6010-B	Hg 7470-A	Cyanide	WET	Metals 6010-B	Hg 7470-A	WET	MeHg	Metals 6010-B	Hg 7470-A	
12	5	5	1	2	--	--	--	--	--	--	--

SAMPLING RESULTS*

Maximum level of visitation anticipated	Constituents exceeding HHSC	Constituents with potential for metals leaching from soils**	Notes
Recreational	**None**	***Arsenic***	Potential impacts to ground and surface water (based on DLM) exist from arsenic detected in tailings dispersed onsite and possibly downslope.

HHSC Sample ID	Sample Type	Constituents (milligrams/kilogram = parts per million)							
		Arsenic	Cadmium	Copper	Lead	Mercury	Methylmercury	Nickel	Zinc
SM-T-01	Environmental	19	0.9	45	12	0.071	--	7.3	75
SM-T-01-QC	Environmental	17	0.91	42	11	0.078	--	7.8	81
SM-T-02	Environmental	130	0.49	18	9.5	9.9	--	4.6	36
SM-T-03	Background	2.7	0.5	22	6.9	0.05	--	6.1	69
SM-T-04	Environmental	93	0.5	12	13	2.1	--	1.6	27

WET	Lead (Pb)				Arsenic (As)				Mercury (Hg)				Copper (Cu)				EAF
Sample ID	Pb	SDL	WQG	Pass/Fail	As	SDL	WQG	Pass/Fail	Hg	SDL	WQG	Pass/Fail	Cu	SDL	WQG	Pass/Fail	
SM-T-01	<0.50				<0.50				<0.020								
SM-T-02	<0.50				1.7	0.1	0.01	Fail	<0.020								100

* Sampling data compared to human health screening criteria (HHSC) or that show potential for impact to ground or surface water quality (any exceedances are highlighted).
** DLM Waste Extraction Test (WET) concentration > Soluble Designated Level (SDL).

State Parks: Cuyamaca Rancho SP

SampleID	As	Hg	Pb
Laboratory Samples			
Soil			
SM-T-01	19	0.071	12
SM-T-01-QC	17	0.078	11
SM-T-02	130	9.9	9.5
SM-T-03	2.7	<0.050	6.9
SM-T-04	93	2.1	13
XRF Samples			
SM-A	<17	<8	109
SM-B	40	<7	20
SM-D	99	<8	14
SM-D	22	<7	57
SM-H	37	<8	<16
SM-I	67	<7	31
SM-K	75	<6	23
SM-T-01	23	<7	25
SM-T-02	147	<7	38
SM-T-03	<10	<7	29
SM-T-04	91	<7	35
SM-X	129	<9	32

SEDIMENT
SOIL
WATER
XRF

Sampling Site Summary: Malakoff Diggins SHP (*Bloomfield Hydraulic, Lake City Diggings, Le Du*)

SITE INFORMATION

Location	Outline Area of Sampled Portion	Commodity	Physical Description
Nevada Co., ~11 miles from Nevada City	70 acres	Gold	Site contains parts of multiple hydraulic mines with associated drain tunnel inlets/outlets, sluice tunnels, shafts, and ponds. Mine features throughout Park can be attractions for hikers, school field trips, and other visitors. Diggings drain to Humbug Creek and South Yuba River. Sampling at tunnel outlets, flooded shafts, and ponds.

NUMBERS OF FIELD XRF MEASUREMENTS AND SAMPLES ANALYZED

XRF	soil				sediment				water		AGP
	Metals 6010-B	Hg 7470-A	Cyanide	WET	Metals 6010-B	Hg 7470-A	WET	MeHg	Metals 6010-B	Hg 7470-A	
16	3	3	--	--	11	11	2	4	11	10	--

SAMPLING RESULTS*

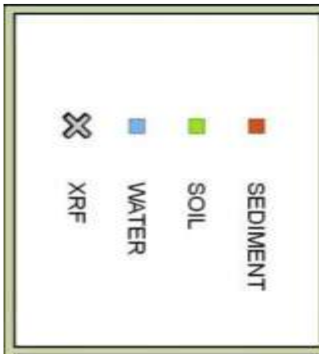
Maximum level of visitation anticipated	Constituents		Notes
	exceeding HHSC	with potential for metals leaching from soils**	
Recreational	**None**	**None Detected**	MCL for antimony in water was exceeded in 4 of 11 samples (North Bloomfield/Lake City tunnel outlets and 2 ponds). MCL for nickel in water was exceeded in 1 sample ("Red Shaft" next to Humbug Creek Trail). MeHg was detected in 4 samples ranging from 0.041 to 8.36 ng/g (Lake City Tunnel outfall).

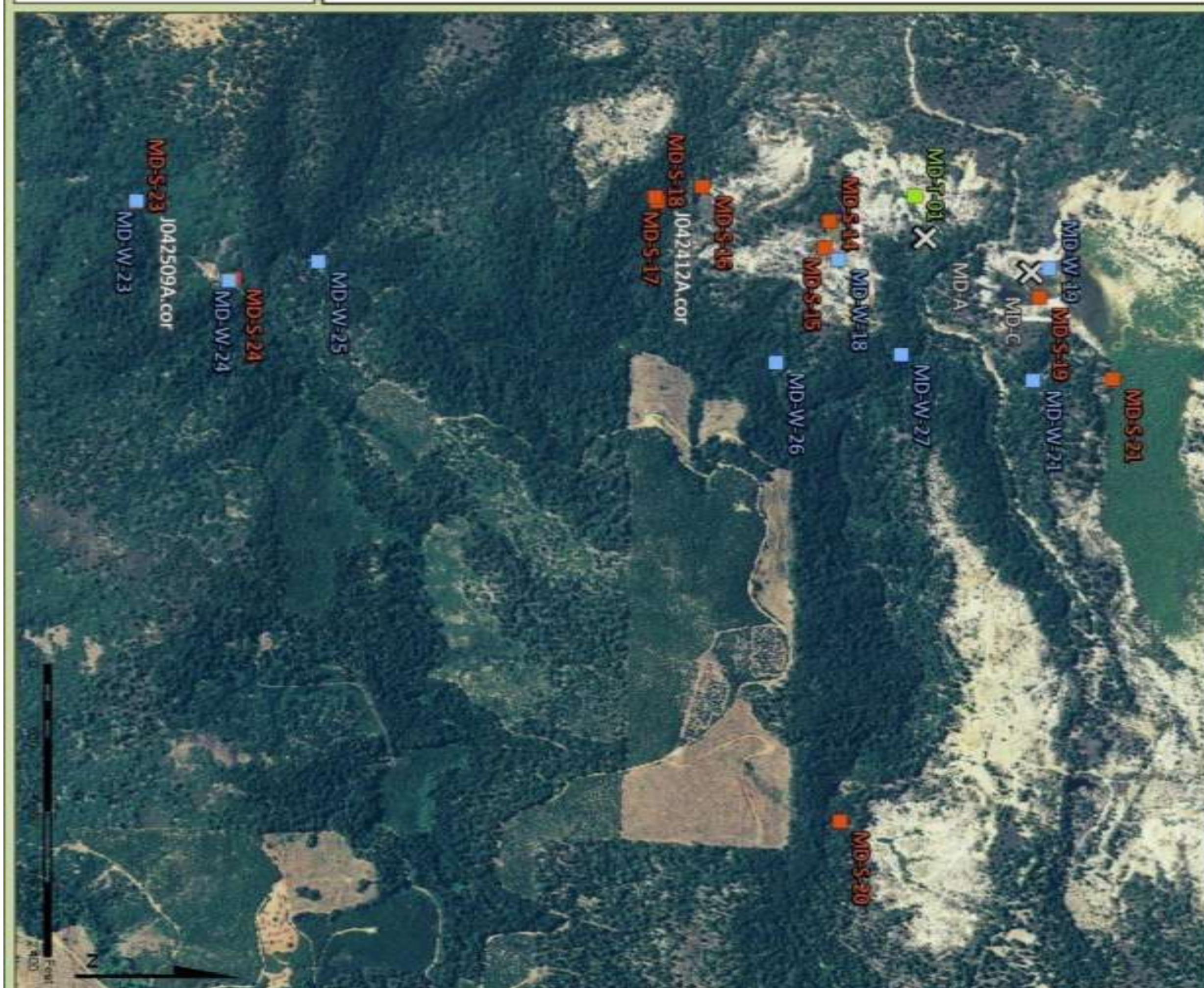
HHSC Sample ID	Sample Type	**Constituents** (milligrams/kilogram = parts per million)							
		Arsenic	Cadmium	Copper	Lead	Mercury	Methylmercury	Nickel	Zinc
MD-S-14	Environmental	4.6	0.77	38	10	0.077	0.000054	18	35
MD-S-15	Environmental	1.4	0.72	8.5	5.7	0.35	0.000041	5.7	6.9
MD-S-16	Environmental	1.1	0.53	16	3.2	0.056	--	18	21
MD-S-17	Environmental	2.7	0.56	30	13	0.15	--	44	80
MD-S-18	Environmental	2.6	0.57	25	8.4	0.14	--	41	73
MD-S-19	Environmental	2.5	0.82	19	12	0.098	--	14	15
MD-S-20	Environmental	8.3	0.75	27	5.6	0.2	--	12	10
MD-S-21	Environmental	4.7	0.002	29	7.6	0.0002	0.00102	23	30
MD-S-22	Environmental	4.8	0.89	49	38	39	--	53	72
MD-S-23	Environmental	4.2	0.52	3	1.2	0.32	--	350	25
MD-S-24	Environmental	26	0.48	37	5.8	0.52	0.00836	37	40
MD-T-01	Background	5.3	0.52	6.5	1.3	0.051	--	1.6	4.8
MD-T-01-QC	Background	4.8	0.51	6.7	1.4	0.049	--	1.5	5.3
MD-T-02	Environmental	20	0.5	26	1.6	1,600	--	28	20

* Sampling data compared to human health screening criteria (HHSC) or that show potential for impact to ground or surface water quality (any exceedances are highlighted).
** DLM Waste Extraction Test (WET) concentration > Soluble Designated Level (SDL).

State Parks: Malakoff Diggins SHP

SampleID	As	Hg	MethylMercury	Pb
Laboratory Samples				
Sediment				
MD-S-14	4.6	<0.077	0.054	10
MD-S-15	<1.4	0.35	0.041	5.7
MD-S-16	<1.1	<0.056		3.2
MD-S-17	2.7	0.15		13
MD-S-18	2.6	0.14		8.4
MD-S-19	2.5	0.098		12
MD-S-20	8.3	0.2		5.6
MD-S-21	4.7	<0.00020	1.02	7.6
MD-S-22	4.8	39		38
MD-S-23	4.2	0.32		1.2
MD-S-24	26	0.52	8.36	5.8
Soil				
MD-T-01	5.3	<0.051		1.3
MD-T-01-QC	4.8	<0.049		1.4
Water				
MD-W-17	<0.0050	<0.00020		<0.0050
MD-W-18	<0.0050	<0.00020		<0.0050
MD-W-19	<0.0050	<0.00020		<0.0050
MD-W-20	<0.0050	<0.00020		<0.0050
MD-W-21	<0.0050			<0.0050
MD-W-23	<0.0050	<0.00020		<0.0050
MD-W-23-QC	<0.0050	<0.00020		<0.0050
MD-W-24	<0.0050	<0.00020		<0.0050
MD-W-25	<0.0050	<0.00020		<0.0050
MD-W-26	<0.0050	<0.00020		<0.0050
MD-W-27	<0.0050	<0.00020		<0.0050
XRF Samples				
MD-A	<6	<4		12
MD-E	<6	<4		<8
MD-F	<6	<4		<8
MD-G	<4	<3		<6
MD-S-15	<4	<3		11
MD-S-17A	<10	<7		34
MD-S-17A	<8	<6		20
MD-S-18	<9	<6		28
MD-S-19	<6	<4		12
MD-S-19A	<6	<5		<8
MD-S-23	<6	<5		<8
MD-S-24	<5	<4		<7
MD-T-01	<8	<6		<11





<u>Sampling Site Summary</u>: Picacho SRA (*Picacho Millsite)*

SITE INFORMATION

Location	Outline Area of Sampled Portion	Commodity	Physical Description
Imperial Co., ~25 miles north of Yuma, AZ on dirt roads and a ¾-mile hike on a trail from a popular campground.	7 acres	Gold	Site has 2 adjacent mill foundations with related equipment. More than 4,500 yd^3 of tailings are spread over a large area. Tailings are eroded by both wind and water into a wetland on the edge of the Colorado River, with regular visitation on a hiking trail built across the top of a tailings pile. Sampling at eroded tailings, trail atop tailings, assay office, cyanide tank location, mill foundations.

NUMBERS OF FIELD XRF MEASUREMENTS AND SAMPLES ANALYZED

XRF	soil				sediment				water		AGP
	Metals 6010-B	Hg 7470-A	Cyanide	WET	Metals 6010-B	Hg 7470-A	WET	MeHg	Metals 6010-B	Hg 7470-A	
25	8	8	1	3	2	2	--	2	1	1	--

SAMPLING RESULTS*

Maximum level of visitation anticipated	Constituents exceeding HHSC	Constituents with potential for metals leaching from soils**	Notes
Recreational	***Lead***	***Arsenic, Lead***	Lead above HHSC was measured at 2,100 mg/kg (on floor of lower mill) and 5,400 mg/kg (at front of assay office foundation). XRF readings of cupels onsite (which can be handled by visitors) also showed extremely high lead levels. Potential impacts to ground/surface water exist from arsenic at 2 locations (tailings pile below site and on hiking trail where it crosses tailings) and from lead at 2 locations (the trail and in front of assay office foundation). Cyanide was detected at 6.0 mg/kg in 1 soil sample (adjacent to a decayed cyanide tank). A sample measuring 4.85 ng/g of MeHg was collected (at the edge of a marsh connected to the Colorado River).

HHSC Sample ID	Sample Type	Constituents (milligrams/kilogram = parts per million)							
		Arsenic	Cadmium	Copper	Lead	Mercury	Methylmercury	Nickel	Zinc
PI-S-11	Environmental	89	0.63	12	22	3.4	0.00403	6.4	110
PI-S-11-QC	Environmental	68	0.69	6.3	19	4.7	0.00485	4.8	78
PI-T-01	Environmental	390	0.72	20	17	0.38	--	12	55
PI-T-01-QC	Environmental	430	0.76	22	19	0.37	--	12	60
PI-T-02	Environmental	190	0.54	18	8.2	0.099	--	5.3	130
PI-T-03	Environmental	110	2.7	13	13	0.13	--	4.1	470
PI-T-04	Environmental	75	1.1	15	**2,100**	3.6	--	8.3	250
PI-T-05	Environmental	210	1.3	16	47	0.18	--	6.7	150

* Sampling data compared to human health screening criteria (HHSC) or that show potential for impact to ground or surface water quality (any exceedances are highlighted).
** DLM Waste Extraction Test (WET) concentration > Soluble Designated Level (SDL).

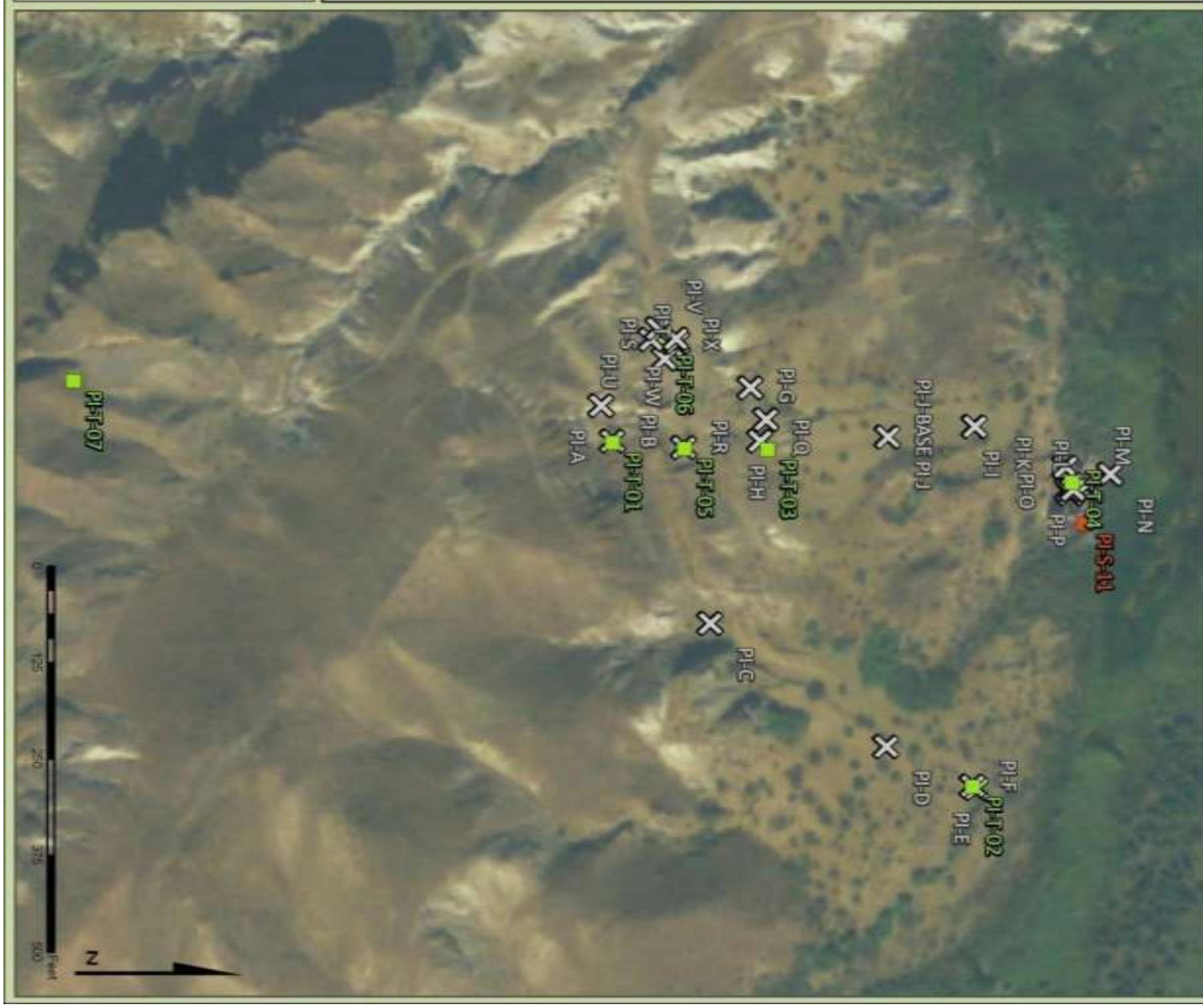
HHSC Sample ID	Sample Type	Constituents (milligrams/kilogram = parts per million)							
		Arsenic	Cadmium	Copper	Lead	Mercury	Methylmercury	Nickel	Zinc
PI-T-06	Environmental	47	21	160	**5,400**	13	--	9.2	7,600
PI-T-07	Background	5.8	0.5	16	15	0.049	--	9	42

WET	Lead (Pb)				Arsenic (As)				Mercury (Hg)				Copper (Cu)				
Sample ID	Pb	SDL	WQG	Pass/Fail	As	SDL	WQG	Pass/Fail	Hg	SDL	WQG	Pass/Fail	Cu	SDL	WQG	Pass/Fail	EAF
PI-T-02	<0.50				**1.1**	**0.1**	**0.01**	**Fail**	<0.020								**100**
PI-T-03	**1.7**	**0.15**	**0.015**	**Fail**	**0.64**	**0.1**	**0.1**	**Fail**	<0.020								**100**
PI-T-06	**18**	**0.15**	**.0015**	**Fail**	<0.05				<0.020								**100**

State Parks: Picacho SRA

SampleID	As	Hg	MethylMercury	Pb	Zn
Laboratory Samples					
Sediment					
PI-S-11	89	3.4	4.03	22	110
PI-S-11-QC	68	4.7	4.85	19	78
Soil					
PI-T-01	390	0.38		17	55
PI-T-01-QC	430	0.37		19	60
PI-T-02	190	0.099		8	130
PI-T-03	110	0.13		13	470
PI-T-04	75	3.6		2,100	250
PI-T-05*	210	0.18		47	150
PI-T-06	47	13		5,400	7,600
PI-T-07	5.8	<0.049		15	42
Water					
PI-W-16	0.0068	<0.00020		<0.005	0.013
*Cyanide was detected at 6 ppm for sample PI-T-05					
XRF Samples					
PI-A	<9	<6		19	73
PI-C	390	<8		24	291
PI-D	324	<8		18	304
PI-E	145	<7		<13	143
PI-G	108	<8		23	291
PI-I	120	<7		64	318
PI-J	194	<8		29	216
PI-J	141	<9		65	276
PI-K	39	<8		237	76
PI-L	<10	<7		24	38
PI-M	417	<7		44	157
PI-N	220	<6		50	105
PI-O	16	<7		72	56
PI-Q	9	<5		25	52
PI-S	16	<7		87	194
PI-T-01	351	<8		37	63
PI-T-02	137	<7		<14	219
PI-T-03	269	<9		149	616
PI-T-04	147	<8		2,637	411
PI-T-05	310	<8		63	289
PI-T-06	198	8		309	207
PI-U	<12	<7		40	124
PI-V	29	<7		62	220
PI-W	<55	<11		1,951	10,141
PI-X	<33	10		978	879

SEDIMENT
SOIL
WATER
XRF



Sampling Site Summary: Plumas-Eureka SP (*Plumas-Eureka Mine)*

SITE INFORMATION

Location	Outline Area of Sampled Portion	Commodity	Physical Description
Plumas Co., ~50 miles north of Truckee by Hwy 89.	8 acres	Gold	Site has extensive underground workings, old town sites, and several millsites scattered across a mountainside. Most of the site is difficult to access, but a visitor area and exhibits are located downslope of the main millsite (which is off limits to public). Sampling at main millsite area, adjacent plating area, assay office, one large and two smaller tailing ponds, and sulphuret works site.

NUMBERS OF FIELD XRF MEASUREMENTS AND SAMPLES ANALYZED

XRF	soil				sediment				water		AGP
	Metals 6010-B	Hg 7470-A	Cyanide	WET	Metals 6010-B	Hg 7470-A	WET	MeHg	Metals 6010-B	Hg 7470-A	
15	15	15	--	3	--	--	--	--	--	--	--

SAMPLING RESULTS*

Maximum level of visitation anticipated	Constituents exceeding HHSC	Constituents with potential for metals leaching from soils**	Notes
Employee	***Arsenic, Lead, Mercury***	***Arsenic, Lead, Mercury***	Arsenic exceeded HHSC at all sampled locations with a range from 13 to 830 mg/kg. Lead exceeded HHSC in all but 2 locations, with lead levels up to 18,000 mg/kg at 1 site (near picnic area within 10 meters of Jamison Creek that appears to be built atop sulphuret mill tailings). Lead levels were also elevated in tailings piles. Mercury exceeded HHSC in 1 area (along outer southeast side of Mohawk Stamp Mill). Potential impacts to ground/surface water exist from lead (in tailings behind assay office) and arsenic, lead, and mercury (from sulphuret mill tailings in Jamison Creek picnic area).

HHSC Sample ID	Sample Type	Constituents (milligrams/kilogram = parts per million)							
		Arsenic	Cadmium	Copper	Lead	Mercury	Methylmercury	Nickel	Zinc
PE-T-01	Environmental	**120**	3.4	200	**3,600**	11	--	3.1	430
PE-T-01-QC	Environmental	**120**	3.1	150	**3,500**	4.6	--	2.9	370
PE-T-02	Environmental	**45**	2.3	190	**2,000**	0.4	--	3.4	470
PE-T-03	Environmental	**51**	2.3	100	**1,100**	2.6	--	2.8	350
PE-T-04	Environmental	**72**	1.7	31	**510**	0.99	--	1.8	110
PE-T-05	Environmental	**250**	1.1	26	**840**	24	--	3.1	100
PE-T-06	Environmental	**370**	0.84	74	**5,600**	58	--	5.2	110
PE-T-07	Environmental	**67**	6.3	180	**1,100**	19	--	23	400
PE-T-08	Environmental	**110**	1.3	120	**2,100**	**880**	--	15	190

* Sampling data compared to human health screening criteria (HHSC) or that show potential for impact to ground or surface water quality (any exceedances are highlighted).
** DLM Waste Extraction Test (WET) concentration > Soluble Designated Level (SDL).

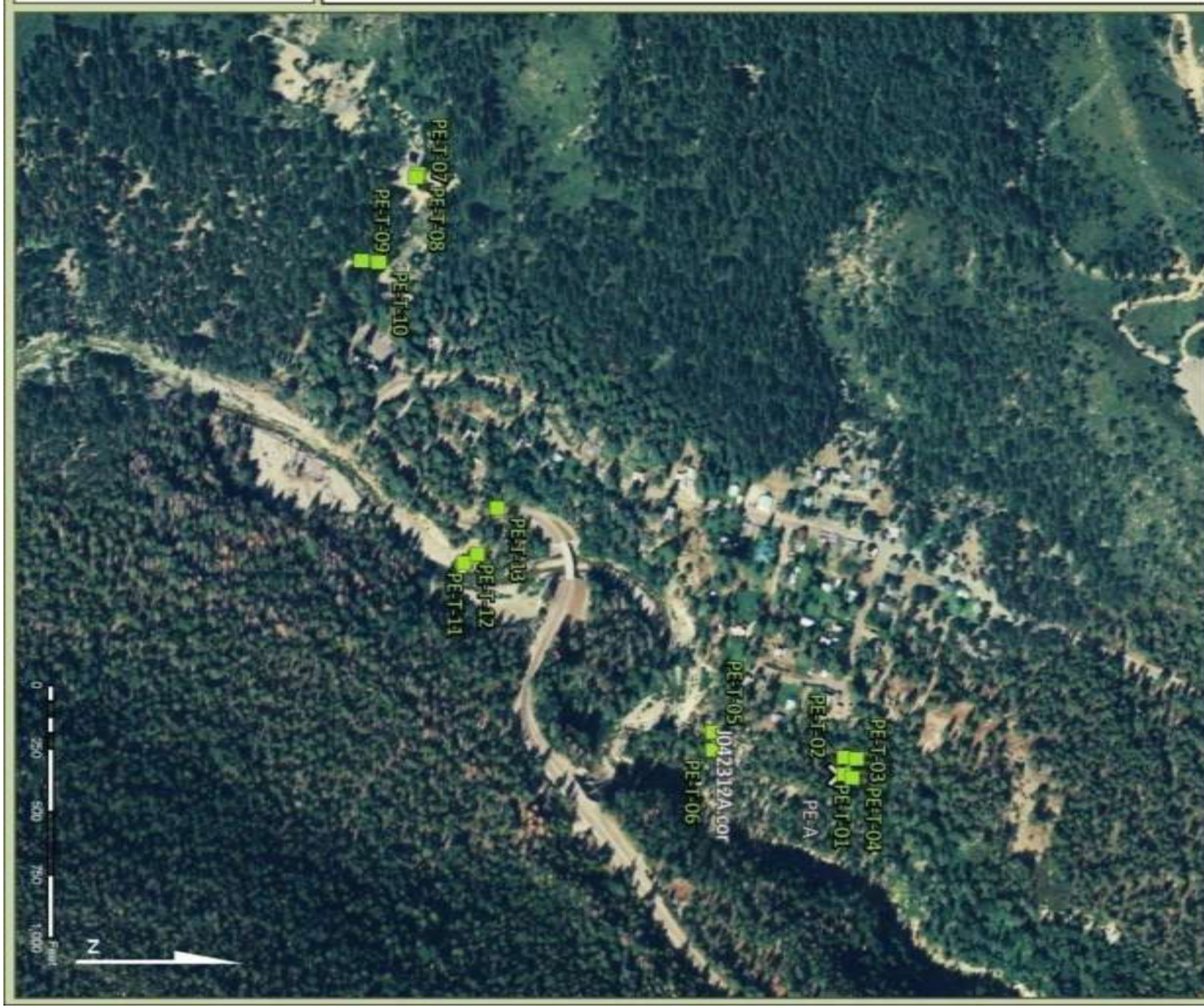
HHSC	Sample	Constituents (milligrams/kilogram = parts per million)							
Sample ID	Type	Arsenic	Cadmium	Copper	Lead	Mercury	Methylmercury	Nickel	Zinc
PE-T-09	Environmental	60	3.6	59	640	14	--	6.4	180
PE-T-10	Environmental	140	2.7	81	350	48	--	7.8	240
PE-T-11	Environmental	400	1.7	250	8,700	24	--	4.6	210
PE-T-11-QC	Environmental	420	2.2	320	11,000	20	--	5.9	300
PE-T-12	Environmental	830	12	200	18,000	170	--	12	800
PE-T-13	Background	13	0.48	41	58	0.24	--	18	50

WET	Lead (Pb)				Arsenic (As)				Mercury (Hg)				Copper (Cu)				
Sample ID	Pb	SDL	WQG	Pass/Fail	As	SDL	WQG	Pass/Fail	Hg	SDL	WQG	Pass/Fail	Cu	SDL	WQG	Pass/Fail	EAF
PE-T-09	33	0.15	0.015	Fail	0.52	0.1	0.01	Fail	<0.020								100
PE-T-11	33	0.15	0.015	Fail	0.94	0.1	0.01	Fail	<0.020								100
PE-T-12	180	0.15	0.015	Fail	<0.50				0.66	0.0005	0.00005	Fail					100

State Parks: Plumas-Eureka SP

SampleID	As	Hg	Pb
Laboratory Samples			
Soil			
PE-T-01	120	11	3,600
PE-T-01-QC	120	4.6	3,500
PE-T-02	45	0.4	2,000
PE-T-03	51	2.6	1,100
PE-T-04	72	0.99	510
PE-T-05	250	24	840
PE-T-06	370	58	5,600
PE-T-07	67	19	1,100
PE-T-08	110	880	2,100
PE-T-09	60	14	640
PE-T-10	140	48	350
PE-T-11	400	24	8,700
PE-T-11-QC	420	20	11,000
PE-T-12	830	170	18,000
PE-T-13	13	0.24	58
XRF Samples			
PE-T-01	<64	<8	3,832
PE-T-02	<33	<6	1,220
PE-T-03	<26	<5	747
PE-T-04	48	<5	491
PE-T-05	214	<6	921
PE-T-06	<76	56	4,167
PE-T-07A	128	<10	2,299
PE-T-07B	83	11	1,051
PE-T-07C	72	<10	1,275
PE-T-07D	127	<9	1,049
PE-T-09	39	<6	838
PE-T-09B	<44	<9	892
PE-T-11A	739	<14	13,235
PE-T-12A	8,488	63	82,381
PE-T-E	74	<6	3,081

SEDIMENT
SOIL
WATER
XRF



<u>Sampling Site Summary</u>: Providence Mountains SRA (*C & K Mine)*

SITE INFORMATION

Location	Outline Area of Sampled Portion	Commodity	Physical Description
San Bernardino Co., ~60 miles from Needles by I-40 and Essex Road, 2 miles by jeep trail past gate, and 1 mile by hiking trail.	3 acres	Lead, Silver, Copper	Site has several adits and shafts, waste rock dumps, old buildings and equipment, and a small furnace site. Sampling at slag pile and waste rock.

NUMBERS OF FIELD XRF MEASUREMENTS AND SAMPLES ANALYZED

XRF	soil				sediment				water		AGP
	Metals 6010-B	Hg 7470-A	Cyanide	WET	Metals 6010-B	Hg 7470-A	WET	MeHg	Metals 6010-B	Hg 7470-A	
7	5	5	--	2	--	--	--	--	--	--	--

SAMPLING RESULTS*

Maximum level of visitation anticipated	Constituents exceeding HHSC	Constituents with potential for metals leaching from soils**	Notes
Trespasser	***Lead***	***Arsenic, Lead***	Lead was measured at levels above HHSC at 2 locations (at a slag pile near the smelter and a mineralized waste rock dump near a shaft). Potential impacts to ground/surface water exist from arsenic and lead (at the slag pile) and from lead (at the mineralized dump).

HHSC Sample ID	Sample Type	Constituents (milligrams/kilogram = parts per million) Arsenic	Cadmium	Copper	Lead	Mercury	Methylmercury	Nickel	Zinc
PM-T-01	Environmental	60	10	450	**25,000**	0.15	--	9.6	310
PM-T-01-QC	Environmental	64	16	450	**25,000**	0.12	--	8.1	410
PM-T-02	Background	9.1	1.9	23	220	0.089	--	10	88
PM-T-03	Environmental	120	130	1,200	**56,000**	12	--	8.7	680
PM-T-04	Background	10	0.74	13	18	0.051	--	14	58

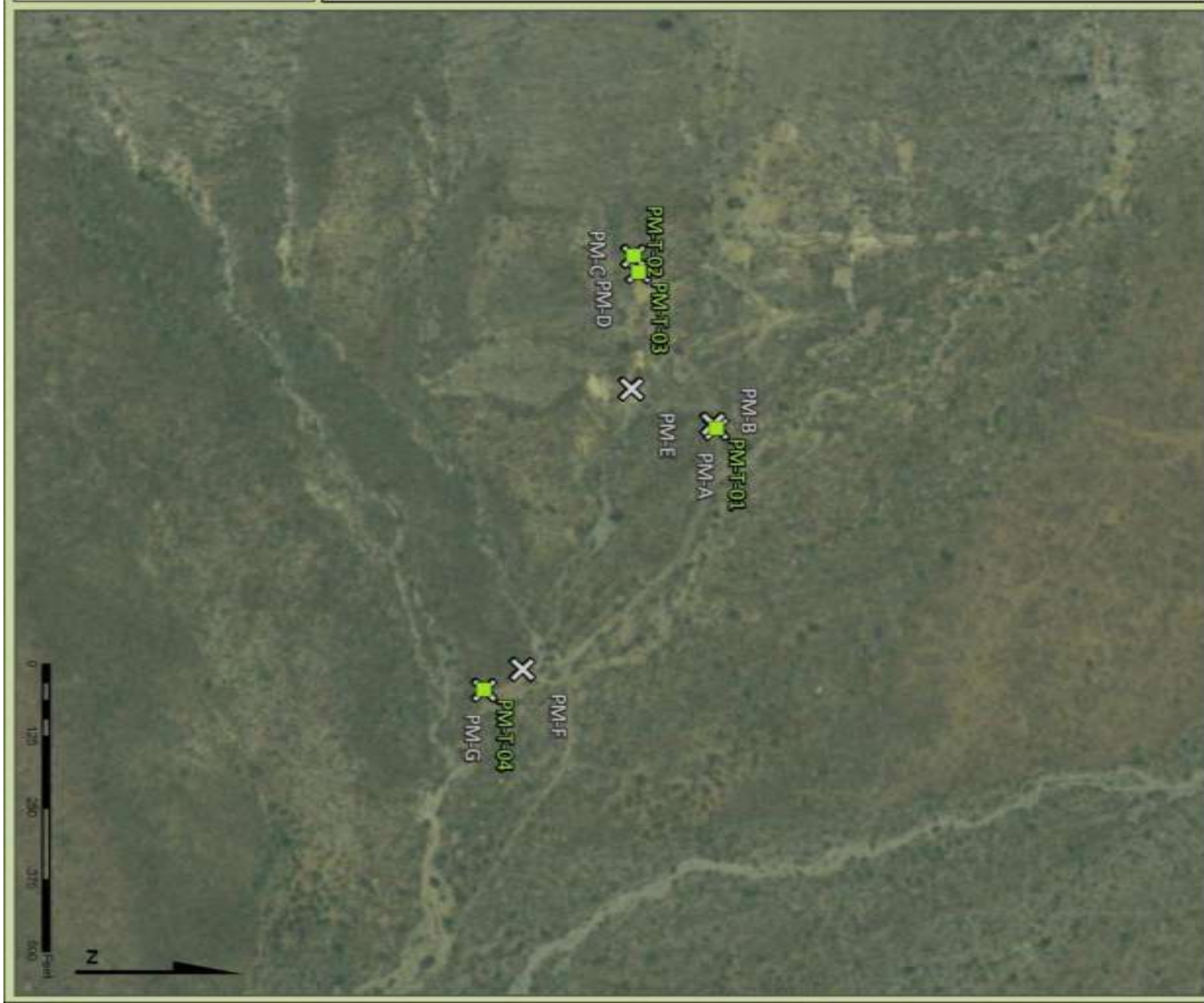
WET	Lead (Pb)				Arsenic (As)				Mercury (Hg)				Copper (Cu)				EAF
Sample ID	Pb	SDL	WQG	Pass/Fail	As	SDL	WQG	Pass/Fail	Hg	SDL	WQG	Pass/Fail	Cu	SDL	WQG	Pass/Fail	
PM-T-01	**1400**	**1.5**	**0.015**	**Fail**	**2.3**	**1**	**0.01**	**Fail**	<0.020								**1,000**
PM-T-03	**3000**	**1.5**	**0.015**	**Fail**	<0.50				<0.020								**1,000**

* Sampling data compared to human health screening criteria (HHSC) or that show potential for impact to ground or surface water quality (any exceedances are highlighted).
** DLM Waste Extraction Test (WET) concentration > Soluble Designated Level (SDL).

State Parks: Providence Mountains SRA

SampleID	As	Cd	Hg	Pb	Sb
Laboratory Samples					
Soil					
PM-T-01	60	10	0.15	25,000	230
PM-T-01-QC	64	16	0.12	25,000	220
PM-T-02	9.1	1.9	0.089	220	2.5
PM-T-03	120	130	12	56,000	540
PM-T-04	10	0.74	0.051	18	2.3
XRF Samples					
PM-B	<163	<38	<13	15,218	749
PM-E	39	<36	<9	664	157
PM-F	<11	<30	<7	29	138
PM-T-01	<203	<43	<16	20,433	844
PM-T-02	<20	<32	<8	233	95
PM-T-03	<304	159	<23	37,762	1,126
PM-T-04	19	<31	<8	40	<78

SEDIMENT
SOIL
WATER
XRF



<u>Sampling Site Summary</u>: Robert Louis Stevenson SP (*Silverado Mine)*

SITE INFORMATION

Location	Outline Area of Sampled Portion	Commodity	Physical Description
Napa Co., ~7 miles from Calistoga off Hwy 29.	0.3 acres	Silver, Gold	Site has several adits, open cuts, and waste rock piles spread over the hillside. A hiking trail provides access. Sampling at sulfide-rich waste rock pile, discharge water from adit, and sediment in water.

NUMBERS OF FIELD XRF MEASUREMENTS AND SAMPLES ANALYZED

XRF	soil				sediment				water		AGP
	Metals 6010-B	Hg 7470-A	Cyanide	WET	Metals 6010-B	Hg 7470-A	WET	MeHg	Metals 6010-B	Hg 7470-A	
3	2	2	--	1	3	3	--	1	2	2	--

SAMPLING RESULTS*

Maximum level of visitation anticipated	Constituents exceeding HHSC	Constituents with potential for metals leaching from soils**	Notes
Recreational	**None**	**None Detected**	A sample measuring 0.851 ng/g of methylmercury was collected (below a draining adit).

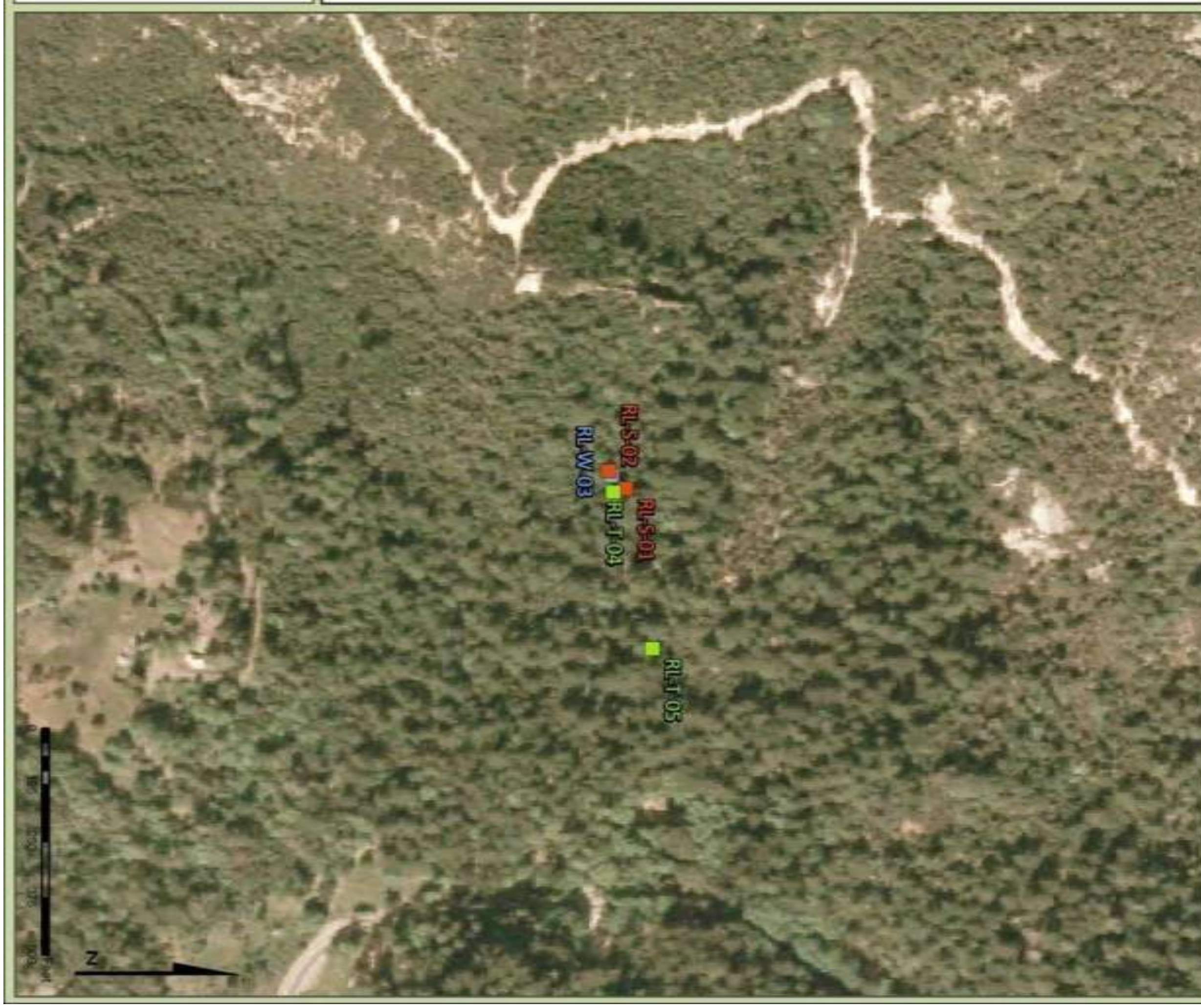
HHSC Sample ID	Sample Type	Constituents (milligrams/kilogram = parts per million) Arsenic	Cadmium	Copper	Lead	Mercury	Methylmercury	Nickel	Zinc
RL-S-01	Environmental	97	4.5	31	9.6	0.45	0.000851	160	600
RL-S-02	Environmental	68	2.5	18	7.8	0.26	--	33	94
RL-S-02-QC	Environmental	72	2.7	21	8.9	0.3	--	38	110
RL-T-04	Environmental	42	0.5	12	15	2.5	--	4.5	21
RL-T-05	Background	29	0.49	11	12	0.093	--	8.9	62

* Sampling data compared to human health screening criteria (HHSC) or that show potential for impact to ground or surface water quality (any exceedances are highlighted).
** DLM Waste Extraction Test (WET) concentration > Soluble Designated Level (SDL).

State Parks: Robert Louis Stevenson SP

SampleID	As	Hg	MethylMercury	Pb
Laboratory Samples				
Sediment				
RL-S-01	97	<0.45	0.851	9.6
RL-S-02	68	<0.26		7.8
RL-S-02-QC	72	0.3		8.9
Soil				
RL-T-04	42	2.5		15
RL-T-05	29	0.093		12
Water				
RL-W-03	<0.01	<0.00020		<0.005
RL-W-03-QC	<0.01	<0.00020		<0.005
XRF Samples				
RL-S-01	10	<3		<5
RL-T-04	42	<9		31
RL-T-05	27	<7		17

SEDIMENT
SOIL
WATER
XRF



CRA/PRA Results for all inventoried sites (State Parks).*

Park Unit	County	Mine Name	Commodity	Oper-ation**	CRA	PRA	Observations/Notes (if any)
Angel Island SP	Marin	Unknown	aggregate	PIT	0	1	
Annadel SP	Sonoma	Gordonkerr Quarry	unknown	PIT	0	1	
		Unknown	unknown	PIT	1	1	
		Unknown	unknown	PROS	1	0	
		Wymore Quarry	unknown	PIT	0	1	
Anza-Borrego Desert SP	Imperial	Roberts & Peeler	strontium, gypsum, aggregate	PIT	1	0	Mixed ownership (State/private) with shallow workings and open cuts that gets some hikers and OHV traffic. Fine gray-white surface material sampled to evaluate metals content.
	San Diego	Best Yet Deposit	tungsten	PROS	0	0	
		Dolomite	dolomite	PIT MILL	0	1	
		Dos Cabezas	limestone, gemstones	PIT MILL	1	3	
		Expansion Group	gold	UNDG	0	3	Mixed ownership.
		Felden Deposit	tungsten	PROS	1	0	
		Golden Queen	gold	UNDG	1	3	Fenced shafts.
		Granite Mountain	gold	UNDG MILL	1	4	Steep hike up remote hill required to access several adits and 1 shaft.
		Gravel Pit	aggregate	PIT	0	3	
		Hilton Deposit	calcium	PIT	1	3	
		Katherine Prospect	tin	UNDG	0	1	
		Live Oak Group	unknown	PROS	1	1	
		Moly	molybdenum	UNDG	1	1	
		New Hope No. 2 , Henderson Deposit	tungsten	UNDG	2	1	
		Smitty Prospect	tungsten	PROS	0	1	

* As noted earlier, the CRA/PRA is meant to rank a diversity of sites for comparison and prioritization. Scores (0=no hazard; 5=potentially most hazardous) are calculated based on conditions present when the entire mine site was inventoried. Subsequent actions (e.g., site clean-up or permanent closure of hazardous openings) may not be captured in the score, and a mixed-ownership site with one feature on State lands and multiple features off State lands may have a higher CRA/PRA score than the State-owned portion only.
** Operation type abbreviations used above: DRDG=Dredge; HYDR= Hydraulic; MILL=Processing Area/Mill; PIT=Pit/Quarry; PLCR=Placer; UNDG=Underground.

CRA/PRA Results for all inventoried sites (State Parks).*

Park Unit	County	Mine Name	Commodity	Oper-ation**	CRA	PRA	Observations/Notes (if any)
Anza-Borrego Desert SP	San Diego	Unknown	gold	UNDG	1	3	
		Unknown	gold	UNDG	1	3	
		Unknown	unknown	UNDG	1	3	
		Unknown	gemstones	UNDG	0	3	
		Unknown	dolomite	PIT	1	1	
		Unknown	unknown	PIT	0	1	
		Unknown	sand & gravel	PIT	0	1	
		Unknown	sand & gravel	PIT	0	1	
		Unknown	unknown	PROS	0	1	
		Unknown	aggregate	PIT	0	0	
		Unknown	gold	PROS	0	0	
		Unknown	gold	PROS	0	0	
		Unknown	gold	PROS	0	0	
Auburn SRA	El Dorado	Browns/ Kennebeck Bar	gold	DRDG	4	0	BOR owned, Parks managed.
		Cherokee Flat	gold	UNDG	1	3	BOR owned, Parks managed.
		French Hill Mine	gold	UNDG MILL	0	1	BOR owned, Parks managed.
		Heinz Gilbert	gold	HYDR UNDG	0	3	BOR owned, Parks managed
		Lukens	gold	UNDG MILL	1	1	BOR owned, Parks managed.
		Mountain Quarries	limestone	PIT UNDG MILL	2	5	3 openings gated in 2006. Ongoing vandalism offset by Park mainten-ance. BOR owned, Parks managed.
		Sliger	gold	UNDG MILL	3	3	BOR owned, Parks managed.
		Unknown	gold	UNDG	2	1	BOR owned, Parks managed.
		Unknown	gold	HYDR UNDG MILL	1	4	Openings 2-50 feet off trail. BOR owned, Parks managed.
	Placer	Annie Laurie	gold	UNDG MILL	1	3	BOR owned, Parks managed.
		Auburn Quarry	aggregate	PIT	2	2	BOR owned, Parks managed.
		Bauer	gold	UNDG	0	4	Several shafts located adjacent to heavily traveled dirt road. Mixed ownership (BOR/BLM).
		Bowman	gold	UNDG	0	3	BOR owned, Parks managed.
		Hinchy	gold	UNDG	1	2	BOR owned, Parks managed.
		Homestake	gold	HYDR UNDG	1	2	BOR owned, Parks managed.
		Mack	gold	UNDG MILL	2	1	BOR owned, Parks managed.

CRA/PRA Results for all inventoried sites (State Parks).*

Park Unit	County	Mine Name	Commodity	Oper-ation**	CRA	PRA	Observations/Notes (if any)
Auburn SRA	Placer	Old Vore	gold	HYDR UNDG MILL	1	2	BOR owned, Parks managed.
		Unknown	unknown	HYDR UNDG	2	5	2 shafts closed in 2008 after dog fell in one (Dewie the Dog and Dirty Jobs projects). BOR owned, Parks managed
		Unknown	gold	HYDR UNDG	3	3	BOR owned, Parks managed.
		Unknown	gold	PLCR UNDG	2	3	BOR owned, Parks managed.
		Unknown	gold	UNDG	1	3	BOR owned, Parks managed.
		Unknown	gold	UNDG	1	3	BOR owned, Parks managed.
		Unknown	gold	UNDG	0	4	Shaft near house closed in 2001. BLM owned, Parks managed.
		Unknown	gold	UNDG	0	4	Found by fire crews along old road/trail near residence. BOR owned, Parks managed.
		Unknown	unknown	UNDG	0	3	BOR owned, Parks managed.
		Unknown	gold	DRDG	2	0	BOR owned, Parks managed.
		Unknown	gold	UNDG	1	1	BOR owned, Parks managed.
		Unknown	gold	UNDG	1	1	BOR owned, Parks managed.
		Unknown	gold	UNDG	0	2	BOR owned, Parks managed.
		Unknown	gold	PLCR	1	0	BOR owned, Parks managed.
		Unknown	unknown	UNDG	0	1	BOR owned, Parks managed.
		Unknown	gold	UNDG	0	1	BOR owned, Parks managed.
Austin Creek SRA	Sonoma	Meaker Ranch	magnesium	PROS	0	0	
		Western Carbonic Acid Gas Co.	magnesium	UNDG	1	1	
Bodie SHP	Mono	Bodie	gold, silver	UNDG MILL	5	5	Chemical remediation project and fencing of multiple physical hazards completed in 2009.
Brannan Island SRA	Sacramento	Unknown	sand & gravel	PIT	0	0	
Carnegie SVRA	Alameda	Tesla	coal, sand, clay	UNDG MILL	5	5	RWQCB and State Parks have characterized site and are planning remediation remedies. Multiple physical hazard closures completed since 2007.
	San Joaquin	Carnegie Lime Kilns	limestone	UNDG MILL	0	3	
Castaic Lake SRA	Los Angeles	Castaic Pit	clay	PIT	0	0	

CRA/PRA Results for all inventoried sites (State Parks).*

Park Unit	County	Mine Name	Commodity	Oper-ation**	CRA	PRA	Observations/Notes (if any)
Chino Hills SP	San Bernardino	Unknown	aggregate	PIT	0	0	
Cowell Ranch/ John Marsh Property SHP	Contra Costa	Stone House Ranch	sandstone, sand & gravel	PIT UNDG	0	3	
Cuyamaca Rancho SP	San Diego	Stonewall	gold	UNDG MILL	4	4	Site has mill sites, equipment, and 3 collapsed shafts (1 fenced) that appear to be stable. Sampled at waste rock dump, tailings pile, and sediment down gradient to State Parks property line.
Donner Memorial SP	Nevada	Michel's Pond	aggregate	PIT	0	1	
	Placer	Coldstream Valley Pit	aggregate	PIT	1	1	
Estero Bluffs SP	San Luis Obispo	Unknown	sand & gravel	PIT	1	0	
	San Luis Obispo	Unknown	aggregate	PIT	0	1	
	San Luis Obispo	Unknown	sand & gravel	PIT	0	1	
Folsom Lake SRA	El Dorado	Unknown	gold	PROS	0	3	Sites in Folsom SRA are BOR owned, Parks managed.
		Unknown	gold	PIT UNDG	0	3	
		Wild Goose	gold	HYDR UNDG	1	3	
		Unknown	gold	HYDR UNDG	3	4	
		Zantgraf	gold	UNDG MILL	5	3	
	Sacramento	Mississippi Bar	aggregate	DRDG	5	0	
		Unknown	gold	UNDG	0	4	Adits along popular bike trail closed in 2009.
Hollister Hills SVRA	San Benito	Martin Ranch Deposits	calcium, limestone	UNDG	0	3	
Humboldt Redwoods SP	Humboldt	Unknown	stone	PIT	2	1	
Kenneth Hahn SRA	Los Angeles	Unknown	aggregate	PIT	0	0	
Lake Oroville SRA	Butte	Southern Cross	gold	UNDG MILL	0	3	
Lake Perris SRA	Riverside	Bernasconi Quarry	stone	PIT	0	3	Large, fenced quarry (rock quarried to build Lake Perris dam)/highwall.

CRA/PRA Results for all inventoried sites (State Parks).*

Park Unit	County	Mine Name	Commodity	Oper-ation**	CRA	PRA	Observations/Notes (if any)
Limekiln SP	Monterey	Limekiln Creek-Lucia	limestone, calcium	MILL	0	1	
Malakoff Diggins SHP	Nevada	Bloomfield	gold	HYDR	2	5	Openings difficult to access; little evidence of visitation.
		Derbec	gold	UNDG	2	1	
		Le Du	gold, sand & gravel	PLCR	5	5	Sites contains parts of multiple hydraulic mines with drain tunnel inlets/outlets, sluice tunnels, shafts, and ponds. Mine features in Park can be attractions for hikers, school field trips, and other visitors. Diggings drain to Humbug Creek and South Yuba River. Sampling at tunnel outlets, flooded shafts, and ponds. Le Du Mine is mixed ownership (BLM/Parks). Bat gates and high tensile steel mesh installed in 2007. At Malakoff Mine, several shafts along trail are fenced. Easily accessed parts of highwall have split rail fence and signs to warn visitors.
		Malakoff	gold	HYDR	5	5	
Marshall Gold Discovery SHP	El Dorado	Sutter Mill & Bar	gold	DRDG	3	0	BOR owned, Parks managed.
Millerton Lake SRA	Fresno	Sullivan (John L.)	gold	UNDG	1	4	Open adits are far behind locked gate in area closed to public.
	Madera	Unnamed	gold	UNDG	1	4	Site accessed best by water. Features hard to locate; some behind locked gate.
Montana de Oro SP	San Luis Obispo	Unknown	sand & gravel	PIT	1	0	
Morro Bay SP	San Luis Obispo	Cerro Cabrillo	aggregate	PIT	0	1	
		Rodrigues Pit	stone	PIT	0	0	
		Unknown	aggregate	PIT	0	1	
		Unknown	sand & gravel	PIT	0	1	
Mount Diablo SP	Contra Costa	Black Point adit	copper	UNDG	0	1	
		Unknown	gold	UNDG	0	2	
		Unknown	unknown	PROS	0	1	
		Unknown	gold	PROS	0	1	
		White Diamond Claim	gold, silver	PROS	0	1	
Ocotillo Wells SVRA	San Diego	Unknown	unknown	UNDG	1	3	

CRA/PRA Results for all inventoried sites (State Parks).*

Park Unit	County	Mine Name	Commodity	Oper-ation**	CRA	PRA	Observations/Notes (if any)
Picacho SRA	Imperial	Picacho Mill	gold	MILL	5	3	Site has 2 adjacent mill foundations with related equipment. Onsite tailings are eroded by both wind and water. Regular visitation on a hiking trail built across top of tailings. Sampling at eroded tailings, trail atop tailings, assay office, cyanide tank location, mill foundations.
Plumas-Eureka SP	Plumas	Jamison	gold, silver, lead	UNDG	2	4	Openings basically collapsed, buildings stable, machinery in creek.
		Plumas-Eureka	gold, silver, lead	UNDG MILL	5	5	Site has extensive workings, old town sites, and several millsites. Most of the site is difficult to access, but a visitor area and exhibits are located downslope of the main millsite (which is off limits to public). Sampling at main millsite area, adjacent plating area, assay office, one large and two smaller tailing ponds, and sulphuret works site.
Prairie City SVRA	Sacramento	Capital Dredging Co.	gold, silver, platinum	DRDG	3	1	
Prairie Crk. Redwoods SP	Humboldt	Upper Gold Bluffs	gold, platinum	PLCR	0	0	
Providence Mtns SRA	San Bernardino	C And K	lead, silver, copper	UNDG	3	4	Site has several adits and shafts, waste rock dumps, old buildings and equipment. Sampled at slag pile and waste rock. Adits/shafts are remote and miles behind locked gate(s). Site is fenced and signed.
		Mitchell	lead, silver, zinc, copper	UNDG	1	3	
		Unknown	lead, silver, copper, gold	UNDG	1	3	
Red Rock Canyon SP	Kern	Adams Camp	gold, silver	PLCR UNDG	1	5	AMLU/Parks planning closures in FY 2009-10.
		Barrett's Opal Claim	gemstones	PROS	1	0	
		Calsilco	pumice	PIT UNDG	0	4	Highly visited site; several high-walls. Signs present but often vandalized. Mixed ownership (BLM).
		Klondike Group	unknown	UNDG	1	5	Some hazardous features fenced.
		Larmark	gold	PLCR	0	3	
		Mickey Mouse Lead	lead	PROS	0	0	

CRA/PRA Results for all inventoried sites (State Parks).*

Park Unit	County	Mine Name	Commodity	Oper-ation**	CRA	PRA	Observations/Notes (if any)
Red Rock Canyon SP	Kern	Pasadena	gold	PLCR UNDG	1	5	Numerous unstable placer adits and drifts that would be hard to mitigate.
		Red Rock Cyn Placer	gold	PLCR	1	4	Main concern is low mound near road with room and portals.
		Ricardo Placer	gold	PLCR UNDG	1	1	
		Roaring Ridge	gemstones	UNDG	0	3	2 openings backfilled in 2009.
		Snow White	clay	UNDG PIT	1	4	Unstable, partially collapsed openings: 1 closed with wood; 1 has bent-open corrugated metal cover; another is open and unstable.
		Unknown	unknown	PLCR	2	5	Numerous unstable placer adits and drifts. Mitigation would be difficult.
		Unknown	unknown	UNDG	1	3	
		Unknown	unknown	UNDG	1	3	
		Unknown	gold	PLCR UNDG	1	2	
		Unknown	unknown	UNDG	1	2	
		Unknown	unknown	UNDG	0	3	
		Unknown	pumicite	UNDG	0	3	
		Unknown	unknown	PROS	1	0	
		Unknown	aggregate	PIT	0	0	
		Unknown	unknown	PROS	0	0	
		Unknown	unknown	PIT	0	0	
		Unknown	unknown	UNDG	1	5	4 shafts backfilled at Last Chance Canyon mouth in 2009.
		Unknown	gold	PLCR UNDG	2	3	Low placer adits, mostly collapsed.
		Unknown	unknown	Placer	0	4	Low placer adits, mostly collapsed.
Robert Louis Stevenson SP	Napa	Silverado	gold, silver	UNDG	2	5	Site has adits, open cuts, and waste rock piles. Sampled waste rock, adit discharge water, and sediment in water. Unstable, flooded workings and a shallow vertical opening are near a hiking trail.
		Unknown	unknown	UNDG	0	1	
Salton Sea SRA	Riverside	Fan Hill Prospects	unknown	PROS	0	0	
		Little Black Top	gold	UNDG	1	3	Shaft found in road capped in 2006. Cap later vandalized; shaft closed with polyurethane foam in 2009.
Washoe Meadows SP	El Dorado	Unknown	aggregate	PIT	1	0	

APPENDIX B, PART 2B
AGENCY-SPECIFIC INFORMATION: STATE LANDS COMMISSION (SLC)

Sampling Site Summary: SLC Parcels 103-009 &103-010 (*Buckeye Mine)*

SITE INFORMATION

Location	Outline Area of Sampled Portion	Commodity	Physical Description
Sonoma Co., ~12 miles from Cloverdale off Geysers Rd., and 1 mile hike on private property past locked gate.	2 acres	Mercury	Mixed ownership site has several adits, small retorts, waste and tailing piles, and a main mill site with rotary furnace and condenser stacks. Hg processing is on SLC land, but main mill and most of site is on private property. Site has very low visitation. Sampled at small retorts on SLC property.

NUMBERS OF FIELD XRF MEASUREMENTS AND SAMPLES ANALYZED

XRF	soil				sediment				water		AGP
	Metals 6010-B	Hg 7470-A	Cyanide	WET	Metals 6010-B	Hg 7470-A	WET	MeHg	Metals 6010-B	Hg 7470-A	
15	6	6	--	2	--	--	--	--	--	--	--

SAMPLING RESULTS*

Maximum level of visitation anticipated	Constituents exceeding HHSC	Constituents with potential for metals leaching from soils**	Notes
Trespasser	***Mercury***	***Mercury***	Potential impacts to ground/surface water exist from mercury measured above HHSC (near a retort).

HHSC Sample ID	Sample Type	Constituents (milligrams/kilogram = parts per million) Arsenic	Cadmium	Copper	Lead	Mercury	Methylmercury	Nickel	Zinc
SC-T-01	Environmental	5.4	0.5	41	10	610	--	24	53
SC-T-01-QC	Environmental	5.2	0.5	40	11	600	--	24	54
SC-T-02	Environmental	6.9	0.58	92	30	7,400	--	23	54
SC-T-03	Environmental	4	0.5	29	5.3	260	--	45	100
SC-T-04	Background	2.3	0.53	31	1.7	8.2	--	27	57
SC-T-05	Background	1	0.49	64	0.98	0.88	--	29	72

WET	Lead (Pb)				Arsenic (As)				Mercury (Hg)				Copper (Cu)				
Sample ID	Pb	SDL	WQG	Pass/Fail	As	SDL	WQG	Pass/Fail	Hg	SDL	WQG	Pass/Fail	Cu	SDL	WQG	Pass/Fail	EAF
SC-T-02	<0.50				<0.50				0.52	0.0005	0.00005	Fail					100
SC-T-03	<0.50				<0.50				0.03	0.0005	0.00005	Fail					100

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* Sampling data compared to human health screening criteria (HHSC) or that show potential for impact to ground or surface water quality (any exceedances are highlighted).
** DLM Waste Extraction Test (WET) concentration > Soluble Designated Level (SDL).

SLC: Parcels 103-009 &103-010

SampleID	As	Hg	Pb
Laboratory Samples			
Soil			
SC-T-01	5.4	610	10
SC-T-01-QC	5.2	600	11
SC-T-02	6.9	7,400	30
SC-T-03	4	260	5.3
SC-T-04	2.3	8.2	1.7
SC-T-05	1	0.88	<0.98
XRF Samples			
SC-T-01	<8	125	15
SC-T-02	<15	1,379	49
SC-T-03	<9	57	<13
SC-T-04	11	<9	<14
SC-TA	<9	50	<13
SC-TB	<12	<11	<17
SC-TC	<9	20	<12
SOIL	<14	19	<18

SEDIMENT
SOIL
WATER
XRF

Sampling Site Summary: SLC Parcel 191-038 (*Los Padres Mine)*

SITE INFORMATION

Location	Outline Area of Sampled Portion	Commodity	Physical Description
San Bernardino Co., ~7 miles from Landers off Hwy 24 on jeep trail.	2 acres	Gold	Site has one main adit, smaller adits, a shaft, and a mill site. OHV traffic is common. Sampled at largest waste rock dump and small tailings piles (5 yd^3).

NUMBERS OF FIELD XRF MEASUREMENTS AND SAMPLES ANALYZED

XRF	soil				sediment				water		AGP
	Metals 6010-B	Hg 7470-A	Cyanide	WET	Metals 6010-B	Hg 7470-A	WET	MeHg	Metals 6010-B	Hg 7470-A	
6	5	4	--	3	--	--	--	--	--	--	--

SAMPLING RESULTS*

Maximum level of visitation anticipated	Constituents exceeding HHSC	Constituents with potential for metals leaching from soils**	Notes
Recreational	None	*Copper, Lead*	Potential impacts to ground/surface water (based on DLM) exist from copper and lead at tailings and waste rock piles.

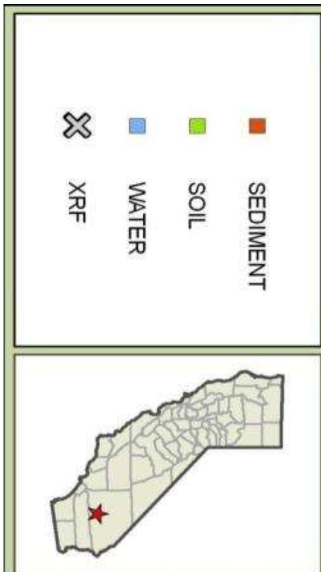
HHSC Sample ID	Sample Type	Constituents (milligrams/kilogram = parts per million) Arsenic	Cadmium	Copper	Lead	Mercury	Methylmercury	Nickel	Zinc
LP-T-01	Environmental	5.7	1.8	6,300	270	0.49	--	25	47
LP-T-02	Environmental	8.6	3.2	29,000	810	4.9	--	23	48
LP-T-02-QC	Environmental	9	3.4	27,000	850	4.9	--	24	50
LP-T-03	Environmental	4.8	1.6	4,300	610	0.093	--	25	44
LP-T-04	Background	3.9	0.67	74	8.3		--	31	49

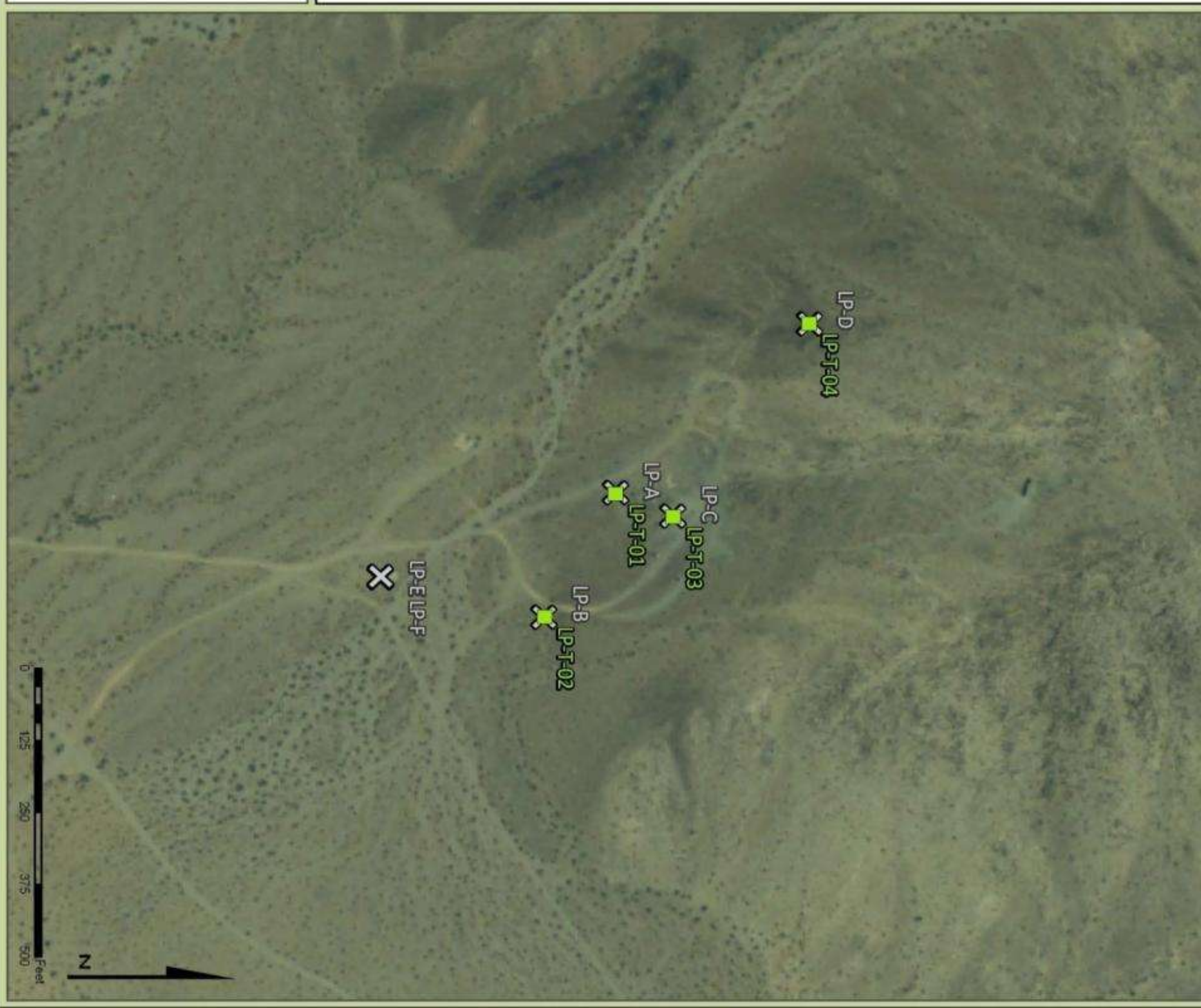
WET	Lead (Pb)				Arsenic (As)				Mercury (Hg)				Copper (Cu)				
Sample ID	Pb	SDL	WQG	Pass/Fail	As	SDL	WQG	Pass/Fail	Hg	SDL	WQG	Pass/Fail	Cu	SDL	WQG	Pass/Fail	EAF
LP-T-02	48	1.5	0.015	Fail	<0.50								1800	130	1.3	Fail	1,000
LP-T-02-QC	46	1.5	0.15	Fail	<0.50								1800	130	1.3	Fail	1,000
LP-T-03	12	1.5	0.015	Fail	<0.50								89	130	1.3	Pass	1,000

* Sampling data compared to human health screening criteria (HHSC) or that show potential for impact to ground or surface water quality (any exceedances are highlighted).
** DLM Waste Extraction Test (WET) concentration > Soluble Designated Level (SDL).

SLC: Parcel 191-038

SampleID	As	Cu	Hg	Pb
Laboratory Samples				
Soil				
LP-T-01	5.7	6,300	0.49	270
LP-T-02	8.6	29,000	4.9	810
LP-T-02-QC	9	27,000	4.9	850
LP-T-03	4.8	4,300	0.093	610
LP-T-04	3.9	74		8.3
XRF Samples				
LP-E	<13	<77	<9	30
LP-F	<12	84	<8	24
LP-T-01	<26	6,172	<9	332
LP-T-02	<53	32,163	<11	1,238
LP-T-03	<24	3,124	9	380
LP-T-04	<12	114	<8	30





Sampling Site Summary: SLC Parcel 199-023 (*Golden West Mine*)

SITE INFORMATION

Location	Outline Area of Sampled Portion	Commodity	Physical Description
San Bernardino Co., ~23 miles north of Needles and 4 miles off Hwy 95 on jeep trail (aka "North of Needles" parcel).	0.5 acres	Gold	Site has several shafts with waste rock piles and a small production area. The site, which is split between SLC and BLM ownership, is remote, but evidence of visitation exists. Sampled at large waste rock pile on SLC property, small tailings piles (10 yd^3), and residue in tank.

NUMBERS OF FIELD XRF MEASUREMENTS AND SAMPLES ANALYZED

XRF	soil				sediment				water		AGP
	Metals 6010-B	Hg 7470-A	Cyanide	WET	Metals 6010-B	Hg 7470-A	WET	MeHg	Metals 6010-B	Hg 7470-A	
8	5	5	2	3	--	--	--	--	--	--	--

SAMPLING RESULTS*

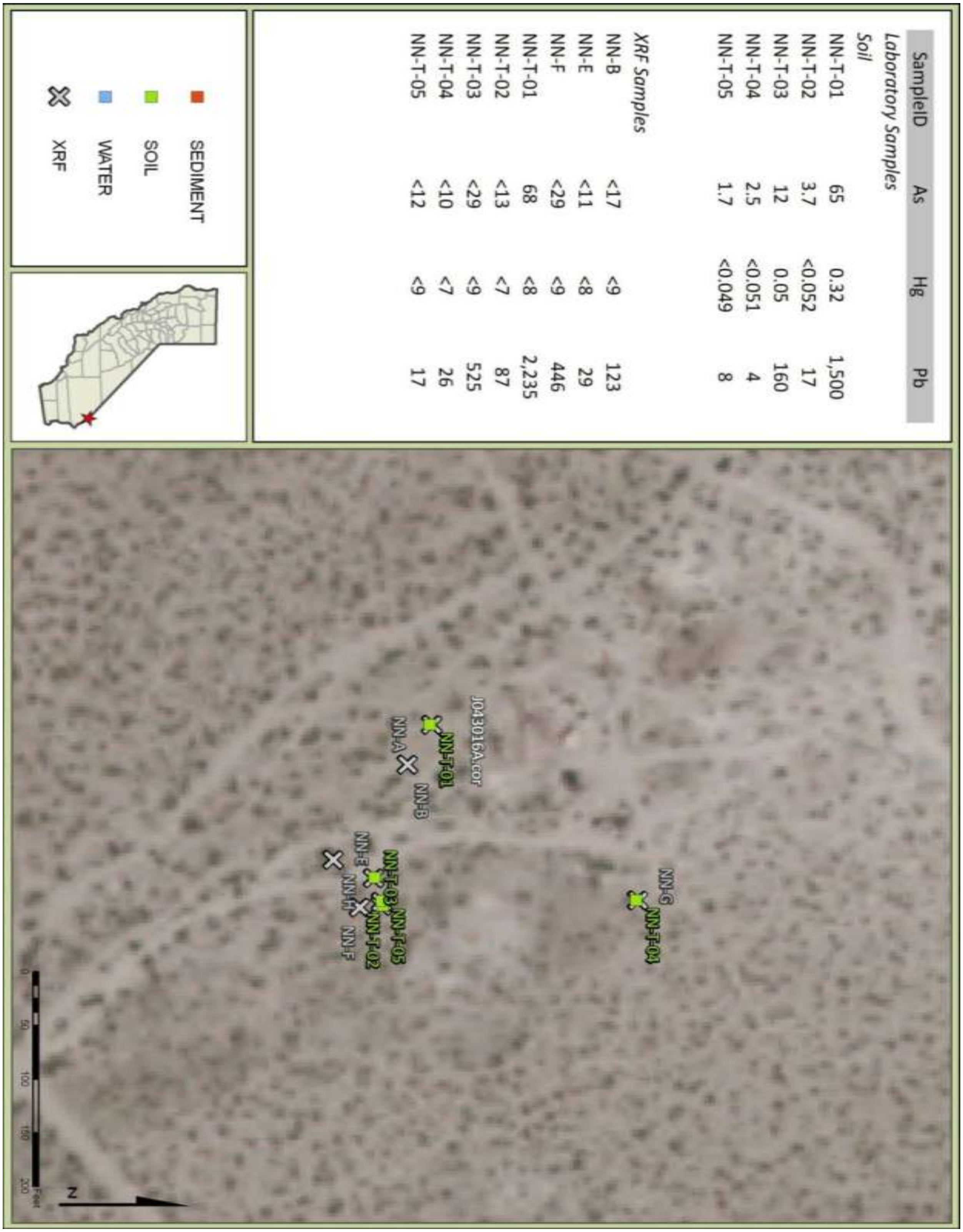
Maximum level of visitation anticipated	Constituents exceeding HHSC	Constituents with potential for metals leaching from soils**	Notes
Recreational	*Lead*	*Lead*	Lead was measured above HHSC at 1 location (a waste rock dump next to an open shaft). Potential impacts to ground/ surface water exist from lead from the same area.

HHSC Sample ID	Sample Type	Constituents (milligrams/kilogram = parts per million)							
		Arsenic	Cadmium	Copper	Lead	Mercury	Methylmercury	Nickel	Zinc
NN-T-01	Environmental	65	3.9	86	**1,500**	0.32	--	1.8	390
NN-T-02	Environmental	3.7	0.48	4.9	17	0.052	--	3.1	61
NN-T-03	Environmental	12	1	64	160	0.05	--	3.3	230
NN-T-04	Background	2.5	0.49	8.3	4	0.051	--	4.8	42
NN-T-05	Environmental	1.7	0.5	13	8	0.049	--	3.3	130

WET	Lead (Pb)				Arsenic (As)				Mercury (Hg)				Copper (Cu)				EAF
Sample ID	Pb	SDL	WQG	Pass/Fail	As	SDL	WQG	Pass/Fail	Hg	SDL	WQG	Pass/Fail	Cu	SDL	WQG	Pass/Fail	
NN-T-01	**30**	**1.5**	**0.015**	**Fail**	<0.50				<0.020								**1,000**
NN-T-03	<0.50				<0.50				<0.020								
NN-T-05	<0.50				<0.50				<0.020								

* Sampling data compared to human health screening criteria (HHSC) or that show potential for impact to ground or surface water quality (any exceedances are highlighted).
** DLM Waste Extraction Test (WET) concentration > Soluble Designated Level (SDL).

SLC: Parcel 199-023



SampleID	As	Hg	Pb
Laboratory Samples			
Soil			
NN-T-01	65	0.32	1,500
NN-T-02	3.7	<0.052	17
NN-T-03	12	0.05	160
NN-T-04	2.5	<0.051	4
NN-T-05	1.7	<0.049	8
XRF Samples			
NN-B	<17	<9	123
NN-E	<11	<8	29
NN-F	<29	<9	446
NN-T-01	68	<8	2,235
NN-T-02	<13	<7	87
NN-T-03	<29	<9	525
NN-T-04	<10	<7	26
NN-T-05	<12	<9	17

<u>Sampling Site Summary</u>: SLC Parcel 204-016 (*Silver Giant Mine)*

SITE INFORMATION

Location	Outline Area of Sampled Portion	Commodity	Physical Description
San Bernardino Co., ~30 miles east of Baker via I-15, and 14 miles north on paved and unpaved roads (aka Shadow Mountains parcel).	0.3 acres	Lead, silver	Site, which is mostly on BLM land, consists of several small adits and shafts and a millsite. Site is remote but has unrestricted access. Sampled at tailings pile (12 yd^3) and mill foundation, both on SLC property.

NUMBERS OF FIELD XRF MEASUREMENTS AND SAMPLES ANALYZED

XRF	soil				sediment				water		AGP
	Metals 6010-B	Hg 7470-A	Cyanide	WET	Metals 6010-B	Hg 7470-A	WET	MeHg	Metals 6010-B	Hg 7470-A	
7	4	4	1	--	--	--	--	--	--	--	--

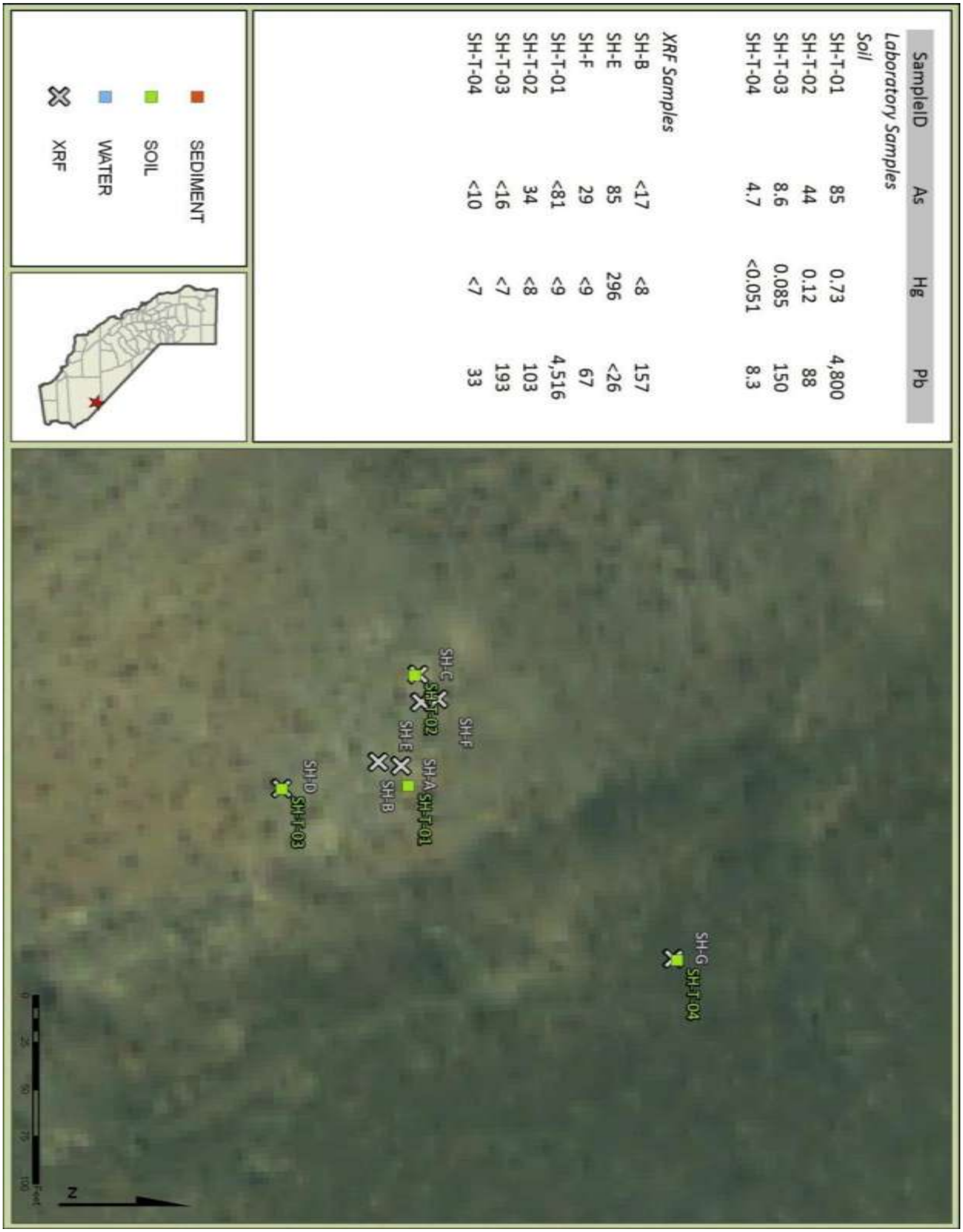
SAMPLING RESULTS*

Maximum level of visitation anticipated	Constituents		Notes
	exceeding HHSC	with potential for metals leaching from soils**	
Recreational	***Lead***	**Unknown (No WET test)**	Lead was measured above HHSC at 1 location (a very small tailings pile adjacent to a mill foundation).

HHSC Sample ID	Sample Type	**Constituents** (milligrams/kilogram = parts per million)							
		Arsenic	Cadmium	Copper	Lead	Mercury	Methylmercury	Nickel	Zinc
SH-T-01	Environmental	85	9.1	370	**4,800**	0.73	--	7.1	870
SH-T-02	Environmental	44	0.5	4.9	88	0.12	--	0.99	14
SH-T-03	Environmental	8.6	0.8	35	150	0.085	--	7.9	100
SH-T-01	Environmental	85	9.1	370	**4,800**	0.73	--	7.1	870
SH-T-02	Environmental	44	0.5	4.9	88	0.12	--	0.99	14

* Sampling data compared to human health screening criteria (HHSC) or that show potential for impact to ground or surface water quality (any exceedances are highlighted).
** DLM Waste Extraction Test (WET) concentration > Soluble Designated Level (SDL).

SLC: Parcel 204-016



SampleID	As	Hg	Pb
Laboratory Samples			
Soil			
SH-T-01	85	0.73	4,800
SH-T-02	44	0.12	88
SH-T-03	8.6	0.085	150
SH-T-04	4.7	<0.051	8.3
XRF Samples			
SH-B	<17	<8	157
SH-E	85	296	<26
SH-F	29	<9	67
SH-T-01	<81	<9	4,516
SH-T-02	34	<8	103
SH-T-03	<16	<7	193
SH-T-04	<10	<7	33

Sampling Site Summary: SLC Parcel 204-019 *(Unnamed)*

SITE INFORMATION

Location	Outline Area of Sampled Portion	Commodity	Physical Description
San Bernardino Co., ~30 miles east of Baker via I-15 and 9 miles north by paved and unpaved roads (aka Pachalka Springs parcel).	2 acres	Copper, Gold, Silver, Lead, Zinc	Site has a mill area with small tailings pile (44 yd^3) and a declined adit far up a hillside. Site access requires a short hike across a desert wash. Sampled at the tailings pile and the wash sediment below.

NUMBERS OF FIELD XRF MEASUREMENTS AND SAMPLES ANALYZED

XRF	soil				sediment				water		AGP
	Metals 6010-B	Hg 7470-A	Cyanide	WET	Metals 6010-B	Hg 7470-A	WET	MeHg	Metals 6010-B	Hg 7470-A	
9	5	5	--	3	--	--	--	--	--	--	--

SAMPLING RESULTS*

Maximum level of visitation anticipated	Constituents		Notes
	exceeding HHSC	with potential for metals leaching from soils**	
Trespasser	*Lead*	*Lead*	Lead as high as 20,000 mg/kg was measured above HHSC in 1 sample (at a tailings pile down slope from the mine).

HHSC	Sample	**Constituents** (milligrams/kilogram = parts per million)							
Sample ID	Type	Arsenic	Cadmium	Copper	Lead	Mercury	Methylmercury	Nickel	Zinc
IP-T-01	Environmental	15	57	64	**13,000**	27	--	7.9	12,000
IP-T-01-QC	Environmental	16	67	71	**14,000**	28	--	8	13,000
IP-T-02	Environmental	18	63	110	**20,000**	32	--	12	12,000
IP-T-03	Background	5	0.5	11	25	0.051	--	8.2	43
IP-T-04	Environmental	6.1	4	95	230	65	--	12	54

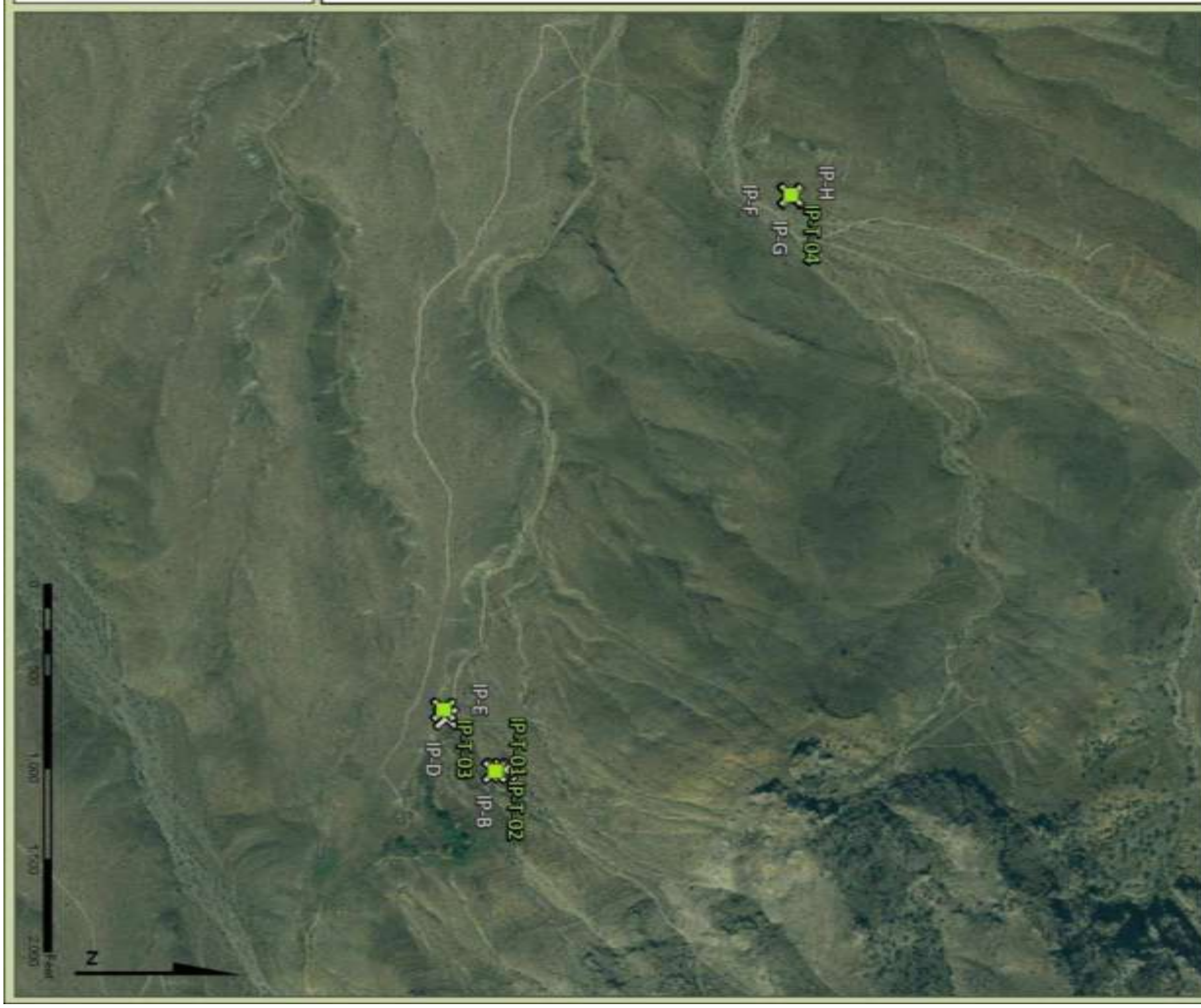
WET	Lead (Pb)				Arsenic (As)				Mercury (Hg)				Copper (Cu)				EAF
Sample ID	Pb	SDL	WQG	Pass/Fail	As	SDL	WQG	Pass/Fail	Hg	SDL	WQG	Pass/Fail	Cu	SDL	WQG	Pass/Fail	
IP-T-01	**470**	**1.5**	**0.015**	**Fail**	<0.50				<0.020								**1,000**
IP-T-01-QC	**450**	**1.5**	**0.015**	**Fail**	<0.50				<0.020								**1,000**
IP-T-02	**1000**	**1.5**	**0.015**	**Fail**	<0.50				<0.020								**1,000**

* Sampling data compared to human health screening criteria (HHSC) or that show potential for impact to ground or surface water quality (any exceedances are highlighted).
** DLM Waste Extraction Test (WET) concentration > Soluble Designated Level (SDL).

SLC: Parcel 204-019

SampleID	As	Hg	Pb	Zn
Laboratory Samples				
Soil				
IP-T-01	15	27	13,000	12,000
IP-T-01- QC	16	28	14,000	13,000
IP-T-02	18	32	20,000	12,000
IP-T-03	5	<0.051	25	43
IP-T-04	6.1	65	230	54
XRF Samples				
IP-C	<218	<22	18,616	30,521
IP-D	<17	<9	106	147
IP-F	<21	<8	282	89
IP-F	<13	<7	62	55
IP-G	<21	17	292	81
IP-T-01	<184	<19	14,433	21,089
IP-T-02	<242	<22	24,186	20,442
IP-T-03	<12	<8	53	80
IP-T-04	<19	26	335	89

SEDIMENT
SOIL
WATER
XRF



CRA/PRA Results for all inventoried sites (SLC).*

County	Mine Name	Commodity	Operation**	CRA	PRA	Observations/Notes (if any)
Fresno	Unknown	asbestos	PROS	1	0	
	Unknown	asbestos	PROS	0	0	
Imperial	Crown Uranium	clay, uranium	PIT UNDG	1	3	Mixed ownership abandoned mine site (BLM/SLC). Bat gates installed on 2 adits on SLC land in 2005.
	Golden Queen Prospect	gold	PROS	2	4	1 abandoned mine feature backfilled in 2006.
	Jet Black	manganese	PIT UNDG	1	3	1 feature fenced in 2006.
	Lucky Star Uranium Prospect	clay, uranium	PIT	1	1	
	Roark	tungsten	UNDG	1	1	
	Tee Wee	gold	UNDG	1	2	
	Unknown	gold	UNDG	1	4	25 features, including some stable adits. Can drive nearby, but must hike to site.
	Unknown	gold	UNDG	1	3	1 shaft backfilled in 2006.
	Unknown	geodes	PROS	0	1	Mixed ownership site (BLM/SLC).
	Whitecap Prospect	gold	UNDG	1	3	1 shaft plugged with polyurethane foam in 2003.
Inyo	Ash Meadows	boron, clay	PROS	1	0	
	Baxter	lead, silver	UNDG	2	5	Mixed ownership site with 2 features on SLC land, rest on BLM land. Site access is via little traveled 4WD road and hike.
	Dublin Hills Quartzite	quartzite	UNDG	1	2	Mixed ownership (BLM/SLC).
	Gladstone	lead, silver, copper, gold	UNDG	1	3	Mixed ownership (BLM/SLC) site with some underground workings (one deep adit/ stoped area) located in designated wilderness with little sign of visitation.
	Paul Imlay Prospect	manganese, copper	UNDG	1	3	Mixed ownership (BLM/SLC).
	Rusty Pick	unknown	UNDG	1	2	
	Sunset Claim	copper	UNDG	1	3	
	Trinity Talc	talc	PIT UNDG	2	3	
	Try Again Prospects	calcium, limestone	PROS	0	0	
	Unknown	unknown	UNDG MILL	2	4	Mixed ownership with most openings on private inholding and 1 adit on SLC land.

* As noted earlier, the CRA/PRA is meant to rank a diversity of sites for comparison and prioritization. Scores (0=no hazard; 5=potentially most hazardous) are calculated based on conditions present when the entire mine site was inventoried. Subsequent actions (e.g., site clean-up or permanent closure of hazardous openings) may not be captured in the score, and a mixed-ownership site with one feature on State lands and multiple features off State lands may have a higher CRA/PRA score than the State-owned portion only.
** Operation type abbreviations used above: DRDG=Dredge; HYDR= Hydraulic; MILL=Processing Area/Mill; PIT=Pit/Quarry; PLCR=Placer; UNDG=Underground.

CRA/PRA Results for all inventoried sites (SLC).*

County	Mine Name	Commodity	Operation**	CRA	PRA	Observations/Notes (if any)
Inyo (continued)	Unknown	copper	UNDG	1	5	Numerous adits with easy access. Closures planned for FY 2009/10.
	Unknown	unknown	UNDG	1	3	
	Unknown	unknown	UNDG	1	1	
	Unknown	unknown	PROS	1	1	Mixed ownership (BLM/SLC).
	Unknown	unknown	UNDG	1	1	Mixed ownership (BLM/SLC).
	Unknown	aggregate	PROS	1	0	Mixed ownership (BLM/SLC).
	Unknown	copper, gold	PROS	1	0	
	Unknown	unknown	PROS	1	0	
	Unknown	uranium	PROS	1	0	
	Unknown	boron	PROS	0	0	
	Unknown	gold	PROS	0	0	
	Unknown	unknown	PROS	0	0	
	Unknown	unknown	PROS	0	0	
Kern	Unknown	feldspar	PROS	1	3	"Rosamond shaft" site of near miss with vehicle in 2005. Backfilled in 2005.
	Unknown	unknown	UNDG	0	3	"Mojave shaft" backfilled in 2007.
	Unknown	aggregate	PIT	0	1	
	Unknown	unknown	PROS	0	1	
	Verdi Development property	uranium	PIT UNDG	1	3	
Lassen	Unknown	sand and gravel	PROS	0	0	
Modoc	Unknown	aggregate	PIT	0	0	
Mono	Unnamed	unknown	PIT	1	0	
Riverside	Gold Dollar	gold, silver, copper	UNDG	2	4	Site is difficult to access. Rough 4WD drive and hike up steep canyon.
	Gold King	gold, silver	UNDG	2	2	Mixed ownership (BLM/SLC). Adit on SLC land; most features on BLM land.
	Golden Bee	gold	UNDG	2	5	Mixed ownership (NPS/SLC). In 2009, 3 features were closed and a vandalized closure was repaired.
	Iris Lode	gold	UNDG	1	2	
	Iron Chief	gold	UNDG MILL	5	5	Mixed ownership with mill site & tailings on BLM land; tailings eroding onto SLC lands. At least two vandalized closures on SLC land to be repaired. Road to site has been blocked with boulders.
	Lookout Prospect	gold, copper, silver	UNDG	1	3	
	Orofino Prospects	gold	UNDG	1	1	
	Rusty Gold	copper, gold	UNDG MILL	1	3	Fenced main shaft and backfilled 7 prospects in 2006.
	Triangle	gold	UNDG	2	4	Mixed ownership: 1 foundation on BLM land, rest on SLC land. Access to site requires long hike into wilderness.

CRA/PRA Results for all inventoried sites (SLC).*

County	Mine Name	Commodity	Operation**	CRA	PRA	Observations/Notes (if any)
Riverside (continued)	Unknown	gold	UNDG	1	3	Mixed ownership (BLM/SLC). 1 shaft fenced on SLC land in 2006.
	Unknown	gold	UNDG	1	3	
	Unknown	gold, silver, copper, lead	UNDG	1	3	
	Unknown	stone	UNDG PIT	1	3	
	Unknown	gold	UNDG	1	1	
	Unknown	unknown	PROS	1	1	
	Unknown	gold	UNDG	0	3	
San Benito	McCray Property	chromium	PIT	2	0	Asbestos hazard area.
	Unknown	chromium	PROS	1	0	
	Unknown	chromium	PROS	1	0	
	Unknown	asbestos	PROS	0	0	
	Unknown	chromium	PROS	0	0	
	Valdez Bros. Chrome	chromium	PROS	0	0	
San Bernardino	American Opal Co.	gemstones, gold, silver	UNDG	1	2	1 shaft plugged with polyurethane foam in 2003.
	Arnold-Edward	copper, gold, silver	UNDG	1	3	1 shaft fenced in 1007.
	Arrastre	copper, gold	PIT MILL	1	1	
	Arrowhead	gold	UNDG	1	3	Mixed ownership (BLM/SLC).
	Clamento No. 3 Prospect	copper, gold, lead, silver	UNDG	1	2	
	Clark Mountain Gold Prospect	gold	UNDG MILL	1	4	Low amount of visitation.
	Clark Mountain Station	lead, copper, zinc, silver, gold	UNDG	2	**5**	Mixed ownership site with 3 shafts and 1 adit on BLM land. Bat gate installed on 1 hazardous adit on SLC land in 2008.
	Dish Hill	cinder, pumice	PIT	0	1	
	Frisco No. 3	gold, lead, silver	UNDG	1	3	
	Gold Hill Group	gold, lead, silver, zinc	UNDG	2	**5**	Mixed ownership (BLM/SLC). Remote site with several shafts, some along jeep trail. Closures planned in FY 2009/10.
	Gold Standard	copper, gold	UNDG	2	3	Mixed ownership (BLM/SLC). Cupola installed on an adit and 1 feature signed on SLC land in 2006-07.
	Golden Harvest	gold	UNDG	1	3	Mixed ownership (BLM/SLC).
	Golden West	gold	UNDG	2	4	Mixed ownership site (SLC/ BLM) has several shafts with waste rock piles and a small production area. Sampled at large waste rock pile, small tailings piles, and tank on SLC land. Shafts are fenced but fencing is old. Site is remote, but OHV tracks and trash show visitation.

CRA/PRA Results for all inventoried sites (SLC).*

County	Mine Name	Commodity	Oper-ation**	CRA	PRA	Observations/Notes (if any)
San Bernardino (continued)	Hicks Perlite Prospect	perlite	PROS	1	0	
	Iron Horse	copper, lead, silver, zinc	UNDG	2	3	2 features fenced in 2004.
	Juniper Fluorite	fluorite, copper, silver	UNDG	1	4	Declined shaft and several adits in wilderness area, but old roads lead to some features. Warning sign placed on declined shaft in 2007.
	Little Dove	gold, silver	PROS	1	4	Workings located a short hike into wilderness.
	Little Mike	copper, gold, silver	UNDG	1	3	
	Lizard Group	copper	UNDG MILL	1	2	Mixed ownership (BLM/SLC).
	Lorman	copper, gold, silver	UNDG MILL	3	4	Mixed ownership (BLM/SLC) with 2 of 6 shafts on SLC land. Evidence of visitation is everywhere (graffiti, bottles, cans, trash, and burnt wood).
	Los Padres	gold	UNDG MILL	3	5	Site has a main adit, smaller adits, shaft, and mill site. Sampled at largest waste rock dump and small tailings piles. OHV traffic common. 2 adits blocked in 2006, with closures repaired in 2008. Ongoing vandalism is being monitored.
	New Deal	aluminum, iron, manganese, silica, stone	PIT UNDG	2	5	21 mine features including shafts and adits. One double compartment shaft in middle of parking area. Closures planned in FY 2009/10.
	New Trail	copper, gold, lead, silver, zinc	UNDG	1	5	Mixed ownership with most workings on BLM land. Some workings on SLC land were posted with warning signs in 2007.
	Pacific Fluorite	antimony, fluorite, zinc	UNDG MILL	1	2	Bat gate and cupola installed in 2003.
	Providence	copper, gold, lead, silver	UNDG	2	3	20 mine features.
	Red Canyon Deposits	gypsum	PROS	1	2	
	Riggs	silver, lead, zinc	MILL	2	5	Mixed ownership with main adit on private land. Openings on SLC land very difficult to access on steep slopes.
	Saint Louis	silver	UNDG MILL	5	5	SLC has independently assessed this mixed ownership (SLC/BLM) site. Mill and tailings on BLM land. 4 hazardous openings backfilled in 2007.
	Silver Giant	lead, silver	UNDG MILL	2	5	Mixed ownership site (mostly BLM) with several small adits and shafts and a millsite. Site is remote but access is unrestricted. Sampled at tailings pile and mill foundation on SLC land.

CRA/PRA Results for all inventoried sites (SLC).*

County	Mine Name	Commodity	Oper-ation**	CRA	PRA	Observations/Notes (if any)
San Bernardino (continued)	Silver Hill No. 10&11	copper, lead, antimony	UNDG	1	4	2 open adits, one with winze near portal. Site is difficult to access up steep, loose, rocky slopes.
	Silver Horde	lead, zinc, silver	UNDG	1	5	Horizontal and vertical openings, uphill several feet from a road.
	Trade Rat	copper, gold, silver	UNDG	1	3	Hazardous shaft fenced in 2004 and later backfilled in 2007.
	Unknown	copper, gold, lead, silver, zinc	UNDG MILL	2	3	Site has a mill area with small tailings pile and a declined adit far up a hillside. Site access requires a short hike across a wash. Sampled at the tailings pile and the wash sediment below.
	Unknown	unknown	UNDG	1	5	Horizontal and vertical openings, uphill several feet from a road. Some features have old fences.
	Unknown	silver	UNDG	1	5	Mixed ownership. 1 shaft on BLM land. 2 hazardous openings on SLC land backfilled in 2007.
	Unknown	gold, silver, lead, copper, tungsten	UNDG	1	5	Site is in remote part of Mojave National Preserve. 51 features are spread over low desert hills with no roads connecting them; most hazardous features are not visible from local jeep trail.
	Unknown	gold, silver, lead	UNDG	1	5	Most accessible feature signed in 2008. Most other features are spread over low hills with no roads connecting them, but features can be seen from jeep trail.
	Unknown	gold	UNDG	1	4	Site in Fry Mountains. 3 hazardous shafts backfilled and 1 fenced in 2007.
	Unknown	gold	UNDG	1	4	Mixed ownership (BLM/SLC).
	Unknown	gold, silver	UNDG	1	4	Several open adits with evidence of visitation.
	Unknown	gold, silver	UNDG	1	4	Up faint trail near popular OHV area and campground. Warning sign in place.
	Unknown	gold	UNDG	1	3	
	Unknown	gold, silver	UNDG MILL	1	3	Mixed ownership (BLM/SLC).
	Unknown	unknown	UNDG	1	3	Shaft near Los Padres Mine closed with polyurethane plug in 2006.
	Unknown	unknown	UNDG	1	3	
	Unknown	manganese	UNDG	1	3	
	Unknown	gold, silver, lead	UNDG	1	2	
	Unknown	tungsten	UNDG	1	2	
	Unknown	unknown	UNDG	1	2	
	Unknown	unknown	UNDG	1	2	

CRA/PRA Results for all inventoried sites (SLC).*

County	Mine Name	Commodity	Oper-ation**	CRA	PRA	Observations/Notes (if any)
San Bernardino (continued)	Unknown	gold, silver, lead, copper, tungsten	UNDG	1	1	Mixed ownership.
	Unknown	cinders	PIT	1	0	Mixed ownership (BLM/SLC).
	Unknown	unknown	PROS	1	0	Mixed ownership (BLM/SLC).
	Unknown	gold	PROS	0	3	
	Unknown	gold	PROS	0	1	
	Unknown	gold	PROS	0	1	
	Unknown	perlite	PROS	0	1	
	Unknown	unknown	PROS	0	1	
	Unknown	aggregate	PIT	0	0	
	Unknown	clay	PROS	0	0	Mixed ownership (BLM/SLC).
	Unknown	clay, aggregate	PROS	0	0	
	Unknown	gold, silver	PROS	0	0	
	Unknown	gold, silver, copper	PLCR	0	0	
	Unknown	unknown	PROS	0	0	
	Unknown	unknown	PROS	0	0	
	Unknown	unknown	PROS	0	0	
	Vulcan	iron	PIT UNDG	3	3	Mixed ownership near Mojave NP. All features but 2 buildings on federal land.
	Vulture Copper	copper, silver, lead, zinc, gold	UNDG	0	1	
	Wilshire	lead, silver, zinc, copper	UNDG	1	3	Mixed ownership (BLM/SLC).
	World East Adit (Cal 180/192/194)	barite, antimony	UNDG	1	3	
San Diego	Buckthorn Deposit	feldspar, silica	PIT UNDG	1	4	Underground workings along 4WD trail.
	Metal Mountain	tungsten	UNDG	1	4	Mixed ownership (BLM/SLC). Underground workings at end of 4WD trail. Remote area with recent visitation. Warning signs installed.
Siskiyou	Empire	gold	UNDG MILL	0	3	
Sonoma	Black Bear	mercury	PROS	0	0	
	Buckeye	mercury	PIT UNDG MILL	4	5	Mixed ownership site (private/SLC) has several adits, small retorts, waste and tailing piles, and a main mill site with rotary furnace and condenser stacks. Hg processing is on SLC land, but main mill and most of site is on private property. Site has very low visitation. Sampled at small retorts on SLC land.
Tehama	North Elder Creek Chromite Deposits	chromium	MILL	2	1	
Tuolumne	Unknown	gold	UNDG	1	2	Mixed ownership (private/SLC).

APPENDIX B, PART 2C
AGENCY-SPECIFIC INFORMATION: DEPARTMENT OF FISH AND GAME (DFG)

Sampling Site Summary: Butte Creek ER (*Pacific Gold #3 Mine*)

SITE INFORMATION

Location	Outline Area of Sampled Portion	Commodity	Physical Description
Butte Co., ~5 miles outside of Chico off Honey Run Rd. (DFG Region 2)	20 acres	Gold	Site has 200 acres of dredger tailings with internal ponds and relatively little fine-grained material. Butte Creek intersects the tailings piles. Recreational activities occur in and along the creek. Highly-targeted sampling at small recreational beach and internal ponds.

NUMBERS OF FIELD XRF MEASUREMENTS AND SAMPLES ANALYZED

XRF	soil				sediment				water		AGP
	Metals 6010-B	Hg 7470-A	Cyanide	WET	Metals 6010-B	Hg 7470-A	WET	MeHg	Metals 6010-B	Hg 7470-A	
5	5	5	--	3	5	5	1	3	5	5	--

SAMPLING RESULTS*

Maximum level of visitation anticipated	Constituents exceeding HHSC	Constituents with potential for metals leaching from soils**	Notes
Recreational	**None**	**None Detected**	A sediment sample measuring 2.11 ng/g of methylmercury was collected (in a tailings pond).

HHSC Sample ID	Sample Type	Constituents (milligrams/kilogram = parts per million)							
		Arsenic	Cadmium	Copper	Lead	Mercury	Methylmercury	Nickel	Zinc
BC-S-13	Environmental	3.6	0.85	65	6.7	0.11	0.00211	100	63
BC-S-14	Environmental	2.4	0.83	73	12	0.086	0.000756	98	61
BC-S-14-QC	Environmental	3.8	0.83	62	7.6	0.098	--	96	55
BC-S-15	Environmental	4	0.66	39	3.4	0.066	0.000166	100	47
BC-S-16	Environmental	3.8	1	51	4.6	0.1	--	85	44
BC-T-01	Environmental	3.8	0.48	44	11	0.057	--	100	40
BC-T-02	Environmental	3.8	0.48	31	2.2	0.051	--	78	37
BC-T-03	Environmental	3.8	0.48	40	2.2	0.051	--	87	40
BC-T-04	Environmental	4.3	0.5	44	5	0.062	--	82	44
BC-T-05	Background	1.7	0.5	32	9.4	0.049	--	49	45

* Sampling data compared to human health screening criteria (HHSC) or that show potential for impact to ground or surface water quality (any exceedances are highlighted).
** DLM Waste Extraction Test (WET) concentration > Soluble Designated Level (SDL).

DFG: Butte Creek ER

SampleID	As	Hg	MethylMercury	Pb
Laboratory Samples				
Sediment				
BC-S-13	3.6	0.11	2.11	6.7
BC-S-14	2.4	<0.086	0.756	12
BC-S-14-QC	3.8	0.098		7.6
BC-S-15	4	0.066	0.166	3.4
BC-S-16	3.8	<0.10		4.6
Soil				
BC-T-01	3.8	0.057		11
BC-T-02	3.8	<0.051		2.2
BC-T-03	3.8	<0.051		2.2
BC-T-04	4.3	0.062		5
BC-T-05	1.7	<0.049		9.4
Water				
BC-W-21	<0.01	<0.00020		<0.005
BC-W-21-QC	<0.01	<0.00020		<0.005
BC-W-22	<0.01	<0.00020		<0.005
BC-W-23	<0.01	<0.00020		<0.005
BC-W-24	<0.01	<0.00020		<0.005
XRF Samples				
BC-T-01	<11	<8		25
BC-T-02	<11	<8		16
BC-T-03	<9	<8		<13
BC-T-04	<10	<7		<14
BC-T-05	<9	<7		<12

SEDIMENT
SOIL
WATER
XRF

Sampling Site Summary: Oroville WA (*Gold Hill Dredging Company)*

SITE INFORMATION

Location	Outline Area of Sampled Portion	Commodity	Physical Description
Butte Co., ~2 miles from Oroville off Hwy 99. (DFG Region 2)	150 acres	Gold	Site has ~7 square miles of dredger tailings with ponds. The Feather River intersects and can submerge a large portion of the tailing piles during high flow events. The area has high fishing, hunting, and OHV usage. Highly-targeted sampling at internal ponds and inflow/outflow areas.

NUMBERS OF FIELD XRF MEASUREMENTS AND SAMPLES ANALYZED

XRF	soil				sediment				water		AGP
	Metals 6010-B	Hg 7470-A	Cyanide	WET	Metals 6010-B	Hg 7470-A	WET	MeHg	Metals 6010-B	Hg 7470-A	
7	8	8	--	2	4	4	--	4	6	6	--

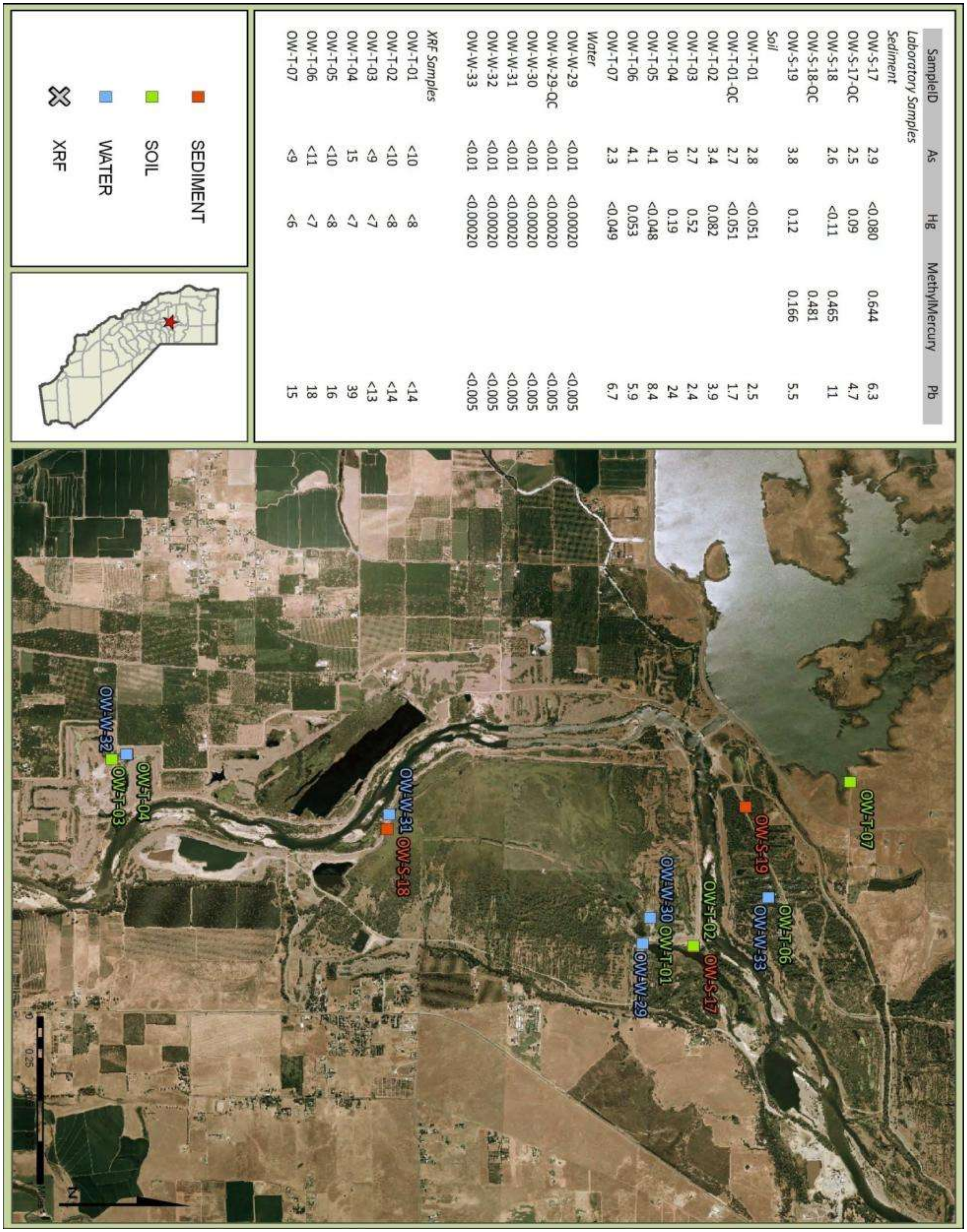
SAMPLING RESULTS*

Maximum level of visitation anticipated	Constituents exceeding HHSC	Constituents with potential for metals leaching from soils**	Notes
Recreational	**None**	**None Detected**	The MCL for thallium in water was exceeded in 1 of 6 samples (at a large pond next to Feather River Channel). Methylmercury was detected in 3 samples at levels up to 0.64 ng/g (in mud flats at the pond's edge and in two seasonally flooded areas).

HHSC Sample ID	Sample Type	Constituents (milligrams/kilogram = parts per million)							
		Arsenic	Cadmium	Copper	Lead	Mercury	Methylmercury	Nickel	Zinc
OW-S-17	Environmental	2.9	0.75	43	6.3	0.08	0.000644	81	44
OW-S-17-QC	Environmental	2.5	0.78	33	4.7	0.09	--	70	37
OW-S-18	Environmental	2.6	1.1	36	11	0.11	0.000465	63	38
OW-S-18-QC	Environmental						0.000481		
OW-S-19	Environmental	3.8	0.81	61	5.5	0.12	0.000166	140	51
OW-T-01	Environmental	2.8	0.49	22	2.5	0.051	--	84	26
OW-T-01-QC	Environmental	2.7	0.51	22	1.7	0.051	--	91	26
OW-T-02	Environmental	3.4	0.49	28	3.9	0.082	--	66	32
OW-T-03	Environmental	2.7	0.49	27	2.4	0.52	--	99	31
OW-T-04	Environmental	10	0.5	58	24	0.19	--	94	59
OW-T-05	Environmental	4.1	0.51	42	8.4	0.048	--	99	33
OW-T-06	Environmental	4.1	0.49	44	5.9	0.053	--	97	42
OW-T-07	Background	2.3	0.49	10	6.7	0.049	--	19	15

* Sampling data compared to human health screening criteria (HHSC) or that show potential for impact to ground or surface water quality (any exceedances are highlighted).
** DLM Waste Extraction Test (WET) concentration > Soluble Designated Level (SDL).

DFG: Oroville WA



SampleID	As	Hg	MethylMercury	Pb
Laboratory Samples				
Sediment				
OW-S-17	2.9	<0.080	0.644	6.3
OW-S-17-QC	2.5	0.09		4.7
OW-S-18	2.6	<0.11	0.465	11
OW-S-18-QC			0.481	
OW-S-19	3.8	0.12	0.166	5.5
Soil				
OW-T-01	2.8	<0.051		2.5
OW-T-01-QC	2.7	<0.051		1.7
OW-T-02	3.4	0.082		3.9
OW-T-03	2.7	0.52		2.4
OW-T-04	10	0.19		24
OW-T-05	4.1	<0.048		8.4
OW-T-06	4.1	0.053		5.9
OW-T-07	2.3	<0.049		6.7
Water				
OW-W-29	<0.01	<0.00020		<0.005
OW-W-29-QC	<0.01	<0.00020		<0.005
OW-W-30	<0.01	<0.00020		<0.005
OW-W-31	<0.01	<0.00020		<0.005
OW-W-32	<0.01	<0.00020		<0.005
OW-W-33	<0.01	<0.00020		<0.005
XRF Samples				
OW-T-01	<10	<8		<14
OW-T-02	<10	<8		<14
OW-T-03	<9	<7		<13
OW-T-04	15	<7		39
OW-T-05	<10	<8		16
OW-T-06	<11	<7		18
OW-T-07	<9	<6		15

Sampling Site Summary: Spenceville WA (*Wellman Creek Mine)*

SITE INFORMATION

Location	Outline Area of Sampled Portion	Commodity	Physical Description
Yuba Co., ~14 miles from Marysville. (DFG Region 2)	2.5 acres	Copper	Site has 2 waste rock piles (~580 yd^3 total) near creek and 2 shafts. Recreational use is low (some hunting). Sampled at waste rock piles, eroded material, and creek.

NUMBERS OF FIELD XRF MEASUREMENTS AND SAMPLES ANALYZED

XRF	soil				sediment				water		AGP
	Metals 6010-B	Hg 7470-A	Cyanide	WET	Metals 6010-B	Hg 7470-A	WET	MeHg	Metals 6010-B	Hg 7470-A	
11	5	5	--	2	3	3	1	--	4	4	2

SAMPLING RESULTS*

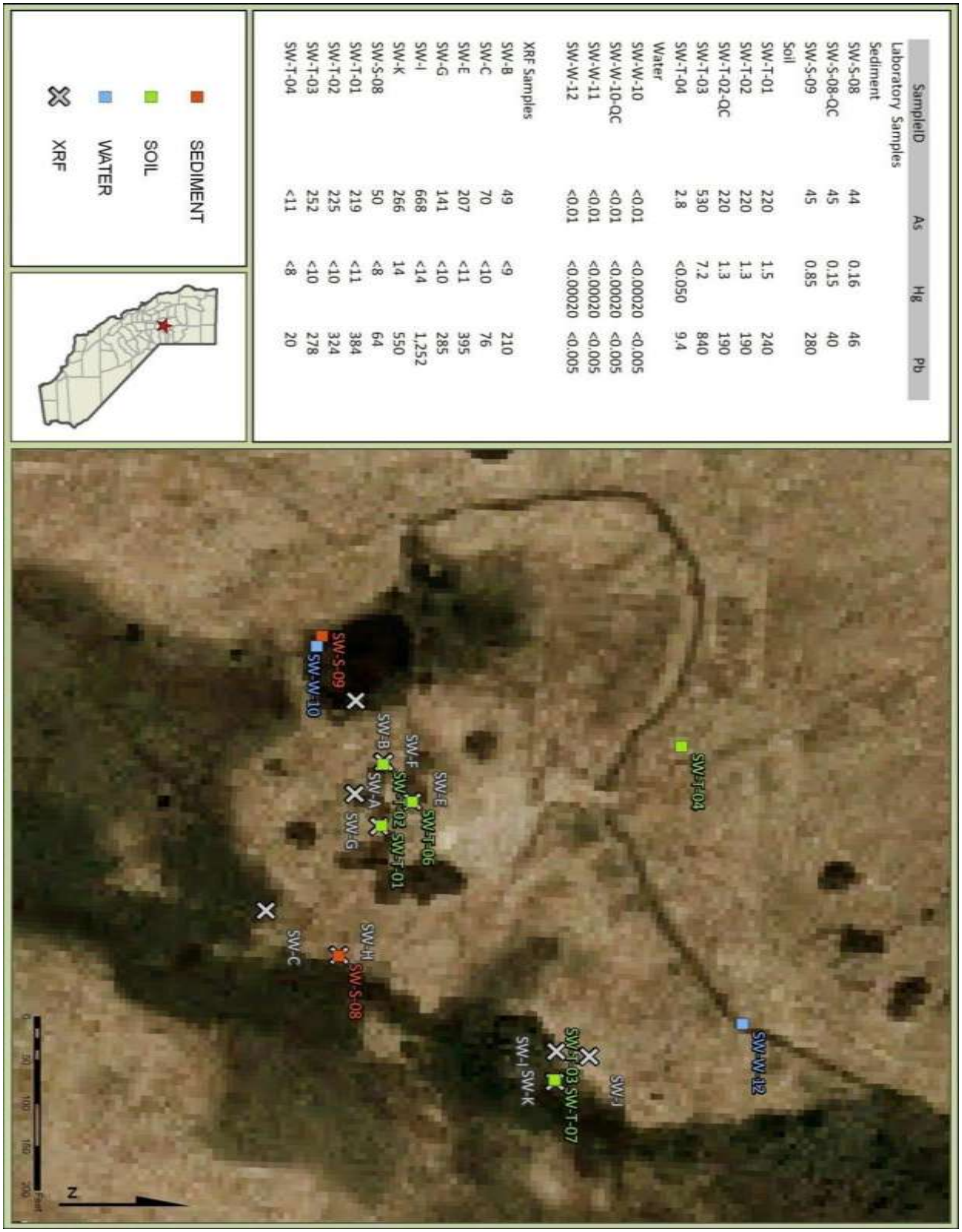
Maximum level of visitation anticipated	Constituents exceeding HHSC	Constituents with potential for metals leaching from soils**	Notes
Recreational	None	*Copper*	1 of 4 samples exceeded the thallium MCL. Potential impacts to ground/surface water exist from copper (at and downslope of a waste pile). AGP tests show potential to generate acid in waste piles; the test result averaged 81 tons CaCO3/ kiloton (kt) rock. Acid neutralization potential (ANP) was not detected: the AGP samples had an ANP:AGP ratio of 0 and ANP-AGP averaging -74 tons/kt. (Waste rock is potentially acid generating if the ANP:AGP ratio is <1 or if ANP-AGP <-20 tons/kt.)

HHSC Sample ID	Sample Type	Constituents (milligrams/kilogram = parts per million) Arsenic	Cadmium	Copper	Lead	Mercury	Methylmercury	Nickel	Zinc
SW-S-08	Environmental	44	1.3	850	46	0.16	--	14	590
SW-S-08-QC	Environmental	45	1.2	880	40	0.15	--	14	580
SW-S-09	Environmental	45	2.5	670	280	0.85	--	11	930
SW-T-01	Environmental	220	2.2	2,400	240	1.5	--	5.3	680
SW-T-02	Environmental	220	2.2	2,100	190	1.3	--	5.6	720
SW-T-02-QC	Environmental	220	2.2	2,200	190	1.3	--	5.7	750
SW-T-03	Environmental	530	2.7	490	840	7.2	--	3.4	1,000
SW-T-04	Background	2.8	0.48	72	9.4	0.05		12	85

WET	Lead (Pb)				Arsenic (As)				Mercury (Hg)				Copper (Cu)				EAF
Sample ID	Pb	SDL	WQG	Pass/Fail	As	SDL	WQG	Pass/Fail	Hg	SDL	WQG	Pass/Fail	Cu	SDL	WQG	Pass/Fail	
SW-S-08	<0.50				<0.50								20	1.3	1.3	Fail	10
SW-T-01	<0.50				<0.50								58	1.3	1.3	Fail	10

* Sampling data compared to human health screening criteria (HHSC) or that show potential for impact to ground or surface water quality (any exceedances are highlighted).
** DLM Waste Extraction Test (WET) concentration > Soluble Designated Level (SDL).

DFG: Spenceville WA



SampleID	As	Hg	Pb
Laboratory Samples			
Sediment			
SW-S-08	44	0.16	46
SW-S-08-QC	45	0.15	40
SW-S-09	45	0.85	280
Soil			
SW-T-01	220	1.5	240
SW-T-02	220	1.3	190
SW-T-02-QC	220	1.3	190
SW-T-03	530	7.2	840
SW-T-04	2.8	<0.050	9.4
Water			
SW-W-10	<0.01	<0.00020	<0.005
SW-W-10-QC	<0.01	<0.00020	<0.005
SW-W-11	<0.01	<0.00020	<0.005
SW-W-12	<0.01	<0.00020	<0.005
XRF Samples			
SW-B	49	<9	210
SW-C	70	<10	76
SW-E	207	<11	395
SW-G	141	<10	285
SW-I	668	<14	1,252
SW-K	266	14	550
SW-S-08	50	<8	64
SW-T-01	219	<11	384
SW-T-02	225	<10	324
SW-T-03	252	<10	278
SW-T-04	<11	<8	20

CRA/PRA Results for all inventoried sites (DFG).*

DFG Region	County	Mine Name	Commodity	Oper-ation**	CRA	PRA	Observations/Notes (if any)
1	Lassen	Basic Rock Products Inc.	aggregate	PIT	0	0	
		Cowboy Joe Pit	aggregate	PIT	0	0	
		Unknown	aggregate	PIT	0	1	
		Unknown	aggregate	PIT	1	0	
		Unknown	aggregate	PIT	1	0	
		Unknown	aggregate	PIT	0	0	
		Unknown	aggregate	PIT	0	0	
	Mendocino	Sugar Pine	chromium	PROS	1	0	
	Modoc	Unknown	aggregate	PIT	0	0	
	Shasta	Unknown	aggregate	PIT	1	1	Mixed ownership. Anderson River Park, but one area is privately owned.
	Tehama	Unknown	aggregate	PIT	1	0	
2	Amador	Unknown	clay	PIT	1	1	Site surrounded by private property.
	Butte	Gold Hill Dredging Company	sand and gravel, silver, gold	DRDG	5	5	Large mixed ownership (DWR owned/DFG managed as Oroville WA) dredge site with extensive dredger tailings with ponds. The Feather River intersects and can submerge a large portion of the tailings during high flows. Area has high fishing, hunting, and OHV usage. Sampled at internal ponds and inflow/outflow areas.
		Pacific Gold #3	gold, sand and gravel, platinum	DRDG	5	2	Mixed ownership site has extensive dredger tailings with internal ponds and relatively little fine-grained material. Butte Creek intersects the tailings piles. Recreational activities occur in and along the creek. Sampled at small recreational beach and ponds.

* As noted earlier, the CRA/PRA is meant to rank a diversity of sites for comparison and prioritization. Scores (0=no hazard; 5=potentially most hazardous) are calculated based on conditions present when the entire mine site was inventoried. Subsequent actions (e.g., site clean-up or permanent closure of hazardous openings) may not be captured in the score, and a mixed-ownership site with one feature on State lands and multiple features off State lands may have a higher CRA/PRA score than the State-owned portion only.
** Operation type abbreviations used above: DRDG=Dredge; HYDR= Hydraulic; MILL=Processing Area/Mill; PIT=Pit/Quarry; PLCR=Placer; UNDG=Underground.

CRA/PRA Results for all inventoried sites (DFG).*

DFG Region	County	Mine Name	Commodity	Oper-ation**	CRA	PRA	Observations/Notes (if any)
2	Plumas	Unknown	granite	PIT	0	1	
	Sierra	Unknown	aggregate	PIT	0	0	
		Unknown	copper, gold	PROS	1	2	Mixed ownership.
	Yuba	Wellman Creek Mine (Spenceville WA)	copper	UNDG	5	4	Mixed ownership site has 2 waste rock piles (~580 yd^3 total) near creek and 2 shafts. Recreational use is low (some hunting). Sampled at waste rock piles, eroded material, and creek.
3	Santa Cruz	Unknown	unknown	UNDG	4	0	
5	San Diego	Mica Gem	mica	PIT MILL	1	0	Mixed ownership.
		Unknown	gold	UNDG	1	2	
		Unknown	quartz	PROS	0	0	
		Unknown	sand and gravel	PIT	1	3	
	Orange	Claymont Clay	tourmaline	UNDG	1	2	
		Sierra	clay	PIT	1	1	
6	Mono	Unknown	aggregate	PIT	0	1	
		Unknown	aggregate	PIT	0	1	
		Unknown	unknown	PIT	0	1	
	San Bernardino	Earl, Ellen and Bonanza Prospect	gold, silver	UNDG	1	3	Mixed ownership. Only prospects/excavations on state lands with adit on BLM land.
		Old Woman Claim	unknown	PROS	0	0	
		Unknown (Mt. Sheep Watering Area)	unknown	UNDG	2	5	Mixed ownership. Most chemical and physical hazards on BLM land.

APPENDIX B, PART 2D
AGENCY-SPECIFIC INFORMATION: OTHER STATE AGENCIES

CRA/PRA Results for inventoried sites (Other State Agencies).*

Agency, County, and Mine Name			Commodity	Oper-ation**	CRA	PRA	Observations/Notes (if any)
Caltrans	Lake	Utopia	mercury	UNDG	0	0	The RWQCB is investigating this mine site.
CDF	Shasta	Unknown	aggregate	PIT	0	1	
	Tulare	Unknown	aggregate	PIT	0	0	
CNG	San Luis Obispo	El Devisadero Chrome Mine	chromium	PIT	1	0	All sites are Department of Defense owned, CNG managed. CNG independently characterized La Trinidad, New London, Pick and Shovel, and Primera Mines in Camp San Luis Obispo and has done reclamation at the Primera Mine.
		La Trinidad	chromium	PIT	3	1	
		Lee Quarry	clay	PIT	0	0	
		New London	gold, lead, silver	PIT UNDG MILL	2	4	
		Pick and Shovel	asbestos, chromium	PIT UNDG MILL	5	3	
		Primera	chromium	PIT	3	3	
		Unknown	aggregate	PIT	0	1	
		Unknown	stone	UNDG MILL	1	1	
		Unknown	chromium	PIT	0	0	
		Unknown	sand and gravel	PIT	0	0	
		Unknown	sand and gravel	PIT	1	0	
CSU	Butte	Lancha Plana Gold	sand and gravel, gold	DRDG	0	0	Butte Creek has flooded site; multiple disturbances.
	San Luis Obispo	Unknown	aggregate	PIT	0	3	
UC	Santa Clara	Copernicus Peak	manganese	PROS	0	0	

* As noted earlier, the CRA/PRA is meant to rank a diversity of sites for comparison and prioritization. Scores (0=no hazard; 5=potentially most hazardous) are calculated based on conditions present when the entire mine site was inventoried. Subsequent actions (e.g., site clean-up or permanent closure of hazardous openings) may not be captured in the score, and a mixed-ownership site with one feature on State lands and multiple features off State lands may have a higher CRA/PRA score than the State-owned portion only.
** Operation type abbreviations used above: DRDG=Dredge; HYDR= Hydraulic; MILL=Processing Area/Mill; PIT=Pit/Quarry; PLCR=Placer; UNDG=Underground.

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Jon Mistchenko, Engineering Geologist. Jon has a B.S. degree in Geology from Sacramento State University. He joined the AMLU as a student in 1999 and contributed to the AMLU's 2000 report to the Legislature. Jon was promoted to Engineering Geologist in 2001 where he specializes in abandoned mine inventory and physical hazard remediation.

Sarah Reeves, Engineering Geologist. Sarah began working for the AMLU as a student in 1998 and as an Engineering Geologist in 2001. She has been involved in all aspects of the AMLU, including site assessments and remediations, and co-authored the AMLU reports *California's Abandoned Mine Lands: A Report on the Scope and Magnitude of the Issue in the State* (2000) and *Abandoned Mine Lands Assessment of the North Yuba Watershed* (2003). Sarah graduated with a B.S. degree in Geology with an emphasis on ore deposit geology from Sacramento State University in 2000.

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Persons Consulted/Acknowledgements

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ABBREVIATIONS/ACRONYMS USED

µg/L = micrograms per liter.
AGP = Acid Generation Potential.
AMD = Acid Mine Drainage.
AMLU = Abandoned Mine Lands Unit.
ANP = Acid Neutralization Potential.
ARD = Acid Rock Drainage.
As = arsenic.
bgs = below ground surface.
BLM = Bureau of Land Management.
BOR = Bureau of Reclamation.
$CaCO_3$ = calcium carbonate.
Caltrans = California Department of Transportation.
CAM = California Administrative Manual.
CDPH = California Department of Public Health.
CGS = California Geological Survey.
CNG = California National Guard.
COC = Constituent of Concern.
CPAD = California Protected Areas Database
Cr = chromium.
CRA = Chemical Risk Assessment.
Cu = copper.
CVRWQCB = Central Valley RWQCB.
DFG = Department of Fish and Game.
DLM = Designated Level Methodology.
DOC = Department of Conservation.
DRDG = Dredge.
DTSC = Department of Toxic Substances Control.
EAF = Environmental Attentuation Factor.
ER = Ecological Reserve.
GIS = Geographic Information Systems.
GPS = Global Positioning System.
Hg = mercury.
HHSC = Human Health Screening Criteria.
HYDR = Hyrdraulic Mine.
kg = kilogram.
kt = kiloton.
MAS/MILS = Minerals Availability System/ Mineral Industry Location System.
MCL = Maximum Contaminant Level.
MeHg = methylmercury.
mg = milligram.
mg/kg = milligrams per kilogram.
MRDS = Mineral Resources Data System.
ng = nanogram.
ng/g = nanogram per gram.
Ni = nickel.
OHV = Off-Highway Vehicle.
OMR = Office of Mine Reclamation.
PAMP = Principal Areas of Mine Pollution.
Pb = lead.
PLCR = Placer Mine.
PLSS = Public Land Survey System.
ppm = parts per million.
PRA = Physical Risk Assessment.
PROS = Prospect.
QA/QC = Quality Assurance/Quality Control.
RWQCB = Regional Water Quality Control Board.
Sb = antimony.
SDL = Soluble Designated Level.
SHP = State Historic Park.
SLC = State Lands Commission.
SP = State Park.
SRA = State Recreation Area.
State Parks = Department of Parks and Recreation.
SWRCB = State Water Resources Control Board.
TOMS = Topographically Occurring Mine Symbols.
U.S.C. = United States Code.
UNDG = Underground Mine.
URS = URS Corporation.
USEPA = U.S. Environmental Protection Agency.
USGS = U.S. Geological Survey.
WA = Wildlife Area.
WET = Waste Extraction Test.
WQG = Water Quality Goal.
XRF = X-Ray Fluorescence.
yd^3 = cubic yards.
Zn = zinc.