

**SIXTH FIVE-YEAR REVIEW REPORT FOR  
CALIFORNIA GULCH SUPERFUND SITE  
LAKE COUNTY, COLORADO**



**Prepared by**

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## LIST OF ABBREVIATIONS AND ACRONYMS

AOC	Administrative Order on Consent
amsl	above mean sea level
ARAR	Applicable or Relevant and Appropriate Requirement
ARD	Acid Rock Drainage
AROD	ROD Amendment
ASARCO	American Smelting and Refining Company
AV	Arkansas Valley
AWQC	Ambient Water Quality Criteria
BRA	Baseline Risk Assessment
CDC	Centers for Disease Control and Prevention
CDPHE	Colorado Department of Public Health and Environment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Contaminant of Concern
CP	Contingency Plan
CPW	Colorado Parks and Wildlife
CSU	Colorado State University
CZL	Colorado Zinc-Lead Mill
D&RGW	Denver & Rio Grande Western Railroad Company
DWR	Division of Water Resources
EE/CA	Engineering Evaluation/Cost Analysis
EGWA	Elgin Smelter, Grant/Union Smelter, Western Zinc Smelter and Arkansas Valley South Hillside Slag Pile
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FFS	Focused Feasibility Study
FS	Feasibility Study
FTS	Fluvial Tailing Site
FYR	Five-Year Review
gpm	Gallons Per Minute
IC	Institutional Control
LCBLUD	Lake County Building and Land Use Department
LCCHP	Lake County Community Health Program
LMDT	Leadville Mine Drainage Tunnel
LMGFT	Lower Malta Gulch Fluvial Tailing
MCL	Maximum Contaminant Level
µg/dL	Micrograms per Deciliter
µg/L	Micrograms per Liter
µS/cm	microSiemens per centimeter
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Liter
MGTI	Malta Gulch Tailing Impoundment
MOU	Memorandum of Understanding
MTI	Malta Tailing Impoundment
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
OLEM	Office of Land and Emergency Management
OSWER	Office of Solid Waste and Emergency Response
O&M	Operation and Maintenance
OU	Operable Unit
POC	Point of Compliance

PRP	Potentially Responsible Party
PWT	Pacific Western Technologies, Ltd.
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
ROD	Record of Decision
RMP	Routine Monitoring Plan
RPM	Remedial Project Manager
SDWA	Safe Drinking Water Act
SEMS	Superfund Enterprise Management System
SFS	Screening Feasibility Study
TBC	To Be Considered
TI	Technical Impracticability
UAO	Unilateral Administrative Order
UP	Union Pacific
USBR	United States Bureau of Reclamation
USGS	United States Geological Survey
UU/UE	Unlimited Use and Unrestricted Exposure
WTP	Water Treatment Plant

# I. INTRODUCTION

The purpose of a five-year review (FYR) is to evaluate the implementation and performance of a remedy to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings and conclusions of reviews are documented in FYR reports such as this one. In addition, FYR reports identify issues, if any, found during the review and document recommendations to address them.

The U.S. Environmental Protection Agency (EPA) is preparing this FYR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 Code of Federal Regulations (CFR) Section 300.430(f)(4)(ii)) and considering EPA policy.

This is the SIXTH FYR for the California Gulch Superfund site (Site). The triggering action for this statutory review is the completion date of the previous FYR, September 29, 2017. The FYR has been prepared because hazardous substances, pollutants or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

The FYR was led by Linda Kiefer, the EPA's remedial project manager (RPM) for the Site. Representing the state of Colorado (State), Kyle Sandor is the project manager for the support agency, the Colorado Department of Public Health and Environment (CDPHE). EPA contractor support was provided by Treat Suomi and Claire Marcussen from Skeo. The review began on October 29, 2021.

The 18-square-mile Site is about 100 miles southwest of Denver, in Lake County, Colorado, in the Upper Arkansas River watershed. (Figure D-1). The Site includes the City of Leadville, various parts of the Leadville Historic Mining District, and a section of the Arkansas River from the confluence of California Gulch downstream to the confluence of Two-Bit Gulch. Populated areas include neighborhoods, commercial businesses such as restaurants and shops, and facilities for recreation, historical tourism, athletics, industrial and mining activities. Zoned uses for the Site include industrial mining, business, recreational and residential. The Parkville Water District supplies water to the majority of homes and businesses.

The Site consists of the following 12 operable units (OUs). This FYR Report addresses all 12 OUs (Figure D-1):

1. OU1 – Yak Tunnel and Water Treatment Plant (WTP)
2. OU2 – Malta Gulch Fluvial Tailing/Leadville Corp. Mill/Malta Gulch Tailing Impoundments
3. OU3 – Denver & Rio Grande Western Railroad Company (D&RGW) Slag Piles/Railroad Easement/Railroad Yard
4. OU4 – Upper California Gulch
5. OU5 – American Smelting and Refining Company (ASARCO) Smelters/Slag/Mill Sites
6. OU6 – Stray Horse Gulch and Evans Gulch Watersheds
7. OU7 – Apache Tailing Impoundments
8. OU8 – Lower California Gulch
9. OU9 – Residential Populated Areas
10. OU10 – Oregon Gulch
11. OU11 – Arkansas River Valley Floodplain
12. OU12 – Sitewide Water Quality

Former mining operations contributed to metals contamination in surface water, groundwater, soil and sediments. The Yak Tunnel Water Treatment Plant (WTP) in OU1 primarily treats waters draining from the Yak Tunnel and OU4 Upper California Gulch. Extensive piles of mine tailing, slag and waste rock are present on the Site; remedial efforts at OUs 2 through 11 are designed to control these source areas.<sup>1</sup> Water quality data are collected

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<sup>1</sup> The EPA designated OUs 2 through 11 to facilitate source remediation of specific geographic areas.

on an ongoing basis as part of the OU12 remedy selected in 2009. The OU12 and OU6 remedies are in the remedial action phase with expected completion dates in 2022 and 2026, respectively.

Remedies for OUs 1, 2, 3, 4, 5, 7, 8, 9, 10 and 11 have been completed. The remedies are monitored and maintained, as required, and are performing as intended. Except for OU11, all of these OUs have been partially deleted from the National Priorities List (NPL). The OU1 Yak Tunnel WTP continues to operate.

Remedial actions in OU6 and OU12, once fully implemented, are expected to perform as intended. Additionally, Institutional Controls are being finalized for OU6, OU11 and OU12. OU11 entered the operation and maintenance (O&M) phase in May 2017; this OU needs implementation of institutional controls before it can be partially deleted from the NPL.

The EPA has determined in this FYR Report that the completed cleanup activities at the following operable units (**OUs 1, 2, 3, 4, 5, 7, 8, 9, 10**) **are protective**. This means these remedies are protective of human health and the environment. There are no unacceptable risks to human health. Exposure to contamination is being controlled through the use of institutional controls.

- Yak Tunnel and WTP (OU1)
  - The contaminated waters that flow along and inside the Yak Tunnel are directed to a water treatment plant that treats the water and discharges it to California Gulch.
- Malta Gulch Fluvial Tailing/Leadville Corporation Mill/Malta Gulch Tailing Impoundments (OU2)
  - The contaminated soils have been excavated and the areas are covered with clean soil and revegetated.
- Denver & Rio Grande Western Railroad Company Slag Piles/Railroad Easement/Railroad Yard (OU3)
  - Fine slag was removed and capped. Use restrictions are in place to protect the cap.
- Upper California Gulch (OU4)
  - Mine drainage is diverted away from the mine waste piles. Contaminated soils and mine waste have been excavated and the areas covered with rock or clean soil and have been revegetated.
- ASARCO Smelters/Slag/Mill Sites (OU5)
  - Contaminated soils and mine waste have been excavated, consolidated and capped; the areas were covered with clean soil and revegetated.
- Apache Tailing Impoundments (OU7)
  - Mine tailings have been consolidated and capped with surface water controls, and the area was covered with clean soil or rock and was revegetated.
- Lower California Gulch (OU8)
  - Mine waste and sediment were removed, drainage channels were reconstructed, excavated areas were regraded and revegetated, and erosion controls were placed in tailings areas.
- Residential Populated Areas (OU9)
  - A county health program combines blood lead monitoring, education and community awareness, remediation when appropriate, and advises residents on how to reduce the potential exposure to lead in Leadville.
- Oregon Gulch (OU10)
  - Contaminated sediment and soil from the channel and floodplain have been removed to the tailing impoundment and covered, erosion has been controlled, and the leachate is managed by the Yak Tunnel Water Treatment Plant.

For the completed cleanup activities at **OU11 and OU12**, the remedies are **short-term protective**.

- Arkansas River Valley Floodplain (OU11)
  - Soil in ranches in the floodplain was amended to change the pH and was revegetated. Contaminated waste transported along the river has been treated or stabilized. Institutional controls are under consideration in the event of the land-use change.
- Sitewide Water Quality (OU12)
  - Surface water shows that water quality standards in the Arkansas River at the point of compliance are being met. There is a technical impracticability waiver for groundwater that cannot meet standards. In addition, restrictions are in place to limit people coming into contact with groundwater contamination. The EPA and CDPHE are evaluating if additional restrictions are necessary to limit people coming into contact with groundwater contamination.

Completed and future cleanup activities at **OU6** Stray Horse Gulch and Evans Gulch Watersheds **will be protective** once complete. The protection of human health and the environment is achieved by capping several waste rock piles and diverting water away in channels from acidic waste rock piles, and/or containing contaminated surface waters in a series of retention ponds; some waters are diverted for treatment at the U.S. Bureau of Reclamation (USBR) Leadville Mine Drainage Tunnel Treatment Plant. The area is zoned Industrial/Mining. Institutional controls are under consideration in the event of land-use changes and to protect engineered remedies.

**FIVE-YEAR REVIEW SUMMARY FORM**

SITE IDENTIFICATION		
<b>Site Name:</b> California Gulch		
<b>EPA ID:</b> COD980717938		
<b>Region:</b> 8	<b>State:</b> Colorado	<b>City/County:</b> Leadville/Lake
SITE STATUS		
<b>NPL Status:</b> Final		
<b>Multiple OUs?</b> Yes	<b>Has the Site achieved construction completion?</b> No	
REVIEW STATUS		
<b>Lead agency:</b> EPA		
<b>Author name:</b> Linda Kiefer, with additional support provided by Skeo		
<b>Author affiliation:</b> EPA Region 8		
<b>Review period:</b> 10/29/2021 – 8/31/2022		
<b>Date of site inspection:</b> 6/16/2022		
<b>Type of review:</b> Statutory		
<b>Review number:</b> 6		
<b>Triggering action date:</b> 9/29/2017		
<b>Due date (five years after triggering action date):</b> 9/29/2022		

## II. SITEWIDE RESPONSE ACTION SUMMARY

### Sitewide Basis for Taking Action

The Site has been the location of mining, mineral processing and smelting activities that have produced gold, silver, lead and zinc for more than 140 years. Numerous mining methods generated several types of waste: waste rock piles, mill tailings, slag and other smelter waste, and acid rock drainage (ARD).

Prior to listing the Site on the NPL, the EPA, the United States Geological Survey (USGS) and private parties conducted groundwater and surface water studies. The EPA added the Site to the NPL in 1983 due to the impact of heavy metals in soils and waste rock on humans, and mine drainage on surface waters in California Gulch and the Arkansas River. The initial Phase I sitewide remedial investigation (Phase I RI) was completed in May 1987. The report indicated that surface water in California Gulch exceeded primary drinking water standards for lead and cadmium and that the site surface water contained cadmium, copper, lead and zinc at levels that exceeded water quality criteria. In addition, soils and groundwater contained elevated levels of arsenic, zinc, lead, copper and cadmium. Subsequent remedial investigations and feasibility studies (RI/FSs) occurred throughout the early 1990s. The overall site chronology is presented in Table B-1.

Baseline risk assessments (BRAs) characterized risks to human and ecological receptors at the Site; risk-based numerical cleanup goals were also established based on land use. A summary of site risks and numerical cleanup goals is below. Appendix C discusses the BRAs in more detail.

Under the Site's 1994 Consent Decree with Asarco Inc, Leadville Corp., Apache Energy, Resurrection Mining, Newmont Corp., and the Res-Asarco Joint Venture, assessment of sitewide surface water and groundwater quality was deferred to OU12. The EPA issued a Record of Decision (ROD) for OU12 in September 2009. Remedial action activities are near completion to address contaminated surface water and groundwater with the completion of the remedial action anticipated by September 2022. Site risks and associated numerical cleanup goals applicable to OUs 2 through 11 are limited to soils, sediments and mine wastes (solid media).

### Human Health Risks

The BRAs led to the conclusion that non-lead metals in surface soils and groundwater do not pose a significant health risk to residents. Thus, the only contaminant of concern (COC) for human health in soil is lead. To evaluate risk, calculations were performed to identify concentrations (action levels) of lead in soil that were of potential concern.

The EPA's 1996 risk assessment for lead was supported by a large body of site-specific data that included not only extensive measurements of lead in soil and dust in residential locations, but also an extensive demographics survey, data on lead levels in water and paint (both interior and exterior), data on the physical and chemical forms of lead at various locations around the community, and an informative, community-wide, blood lead study involving 314 children (about 65% of the total population of children living at the site). These data supported two parallel lines of investigation and assessment using the EPA's Integrated Exposure Uptake and Biokinetic (IEUBK) model to calculate the expected impact of lead levels in soil and dust on blood lead levels in area children. The second approach compared the measured blood lead values in area children with relevant national blood lead statistics in order to help evaluate the current effects of actual site exposure to lead.

The main findings, as exactly written in the 1999 OU9 ROD, of the 1996 lead risk assessment for the residential children are listed below.

1. In 1991, geometric mean blood lead levels in children living within the site boundaries were typically around 5-6 µg/dL, which was about 1-1.5 µg/dL higher than reported geometric mean values for children of similar age and sex living in other areas across the nation.
2. In 1991, the site-wide frequency of children exceeding the CDC's health-based blood lead target of 10 µg/dL was about 8%, which is slightly higher than the target of no more than . 5% above 10 µg/dL. This was indicative of a situation which exceeded EPA's goal of no individual child or group of similarly exposed children having a greater than 5% chance of exceeding a blood lead level of 10 µg/dL. In some

sub-areas of the site, the risk of exceeding 10 µg/dL appeared to be substantially higher (10%-25%) than the site-wide average. Additional blood lead data collected by county health agency from more than 100 children per year for each year between 1991 and the present suggests that the incidence of children in the community with blood lead levels above 10 µg/dL is continuing to fluctuate between 6% and 9%.

3. There is a statistically significant correlation between lead levels ranging from 3,000 mg/kg to 3,500 mg/kg in soil and dust and elevated blood lead levels in children.
4. Both interior and exterior leaded paint contribute to risk of elevated blood lead levels in children, mainly by adding to the concentration of lead in soil and/or dust in those homes where lead-based paint is a potential source of lead exposure.
5. The results of the IEUBK model run using default soil and dust ingestion rates predicted blood lead levels that were higher than observed. It was concluded that soil and dust ingestion rates in this community were probably somewhat lower than the national average values, possibly because the ground is frozen or snow-covered approximately eight months out of the year. Local efforts to minimize lead exposure through an extensive education and intervention program might also explain some of the variation in predicted versus currently observed blood lead levels.
6. Based on the analyses conducted, the risk assessment reached the conclusion that soil lead is a relatively minor source of exposure allocations where lead levels were less than about 1,000 mg/kg. Exposure via soil probably did not become a dominant source of exposure until lead levels were above the range from 3,000 mg/kg to 3,500 mg/kg. Other sources of lead contributing to current exposure included interior and exterior paint and indoor dust. Lead levels in the water supplied by the municipal water system are not of concern, but lead levels in some portions of the shallow aquifer are high enough that it would not be safe to use that groundwater as a routine source of drinking water.

Based on these results, the EPA developed the land-use-based, lead-remedial goals for soil (Table 1).

**Table 1: Land-Use-Based, Lead-Remedial Goals for Soil**

Exposure-Scenario-Based Remediation Goals	Land-Use-Based Lead Remedial Goals (mg/kg) <sup>z</sup>	Reference
Recreational	16,000	BRA Part C, 1995
Worker	6,100 – 7,700 (plausible action levels)	BRA Part C, 1995
Residential	3,500	BRA Part A, 1996 and OU9 ROD
<i>Notes:</i>		
1. Remedial goal is associated with child exposures resulting in that no more than five percent of all children (age 0 to 72 months) who live at this site, either now or in the future, will have blood lead values higher than 10 µg/dL blood lead level.		

### Ecological Receptor Risks

The 1995 Aquatic Ecological Risk Assessment evaluated risks both to terrestrial and aquatic receptors. Terrestrial receptors included plants irrigated with contaminated surface water and herbivores that ingested contaminated plants and soil. Historical irrigation activities resulted in risk associated with both ecological receptor pathways.

Contamination flowing downstream from California Gulch had adversely affected the Upper Arkansas River for aquatic receptors, with impacts most severe at the confluence and dissipating with distance downstream. Yak Tunnel WTP operations, beginning in 1992, improved water quality conditions within the first two years of operation. However, metals were still present at levels of concern. Zinc presented the greatest hazard for aquatic receptors, while levels of cadmium, copper and lead presented lower risks than zinc. Appendix C provides more details on ecological receptor risks.

### Sitewide Response Actions

Response actions and status of implementation for each OU are discussed in sections V through XVI below.

### III. PROGRESS SINCE THE PREVIOUS REVIEW

Progress since the 2017 FYR, protectiveness determinations from the 2017 FYR Report, and the status of recommendations from the 2017 FYR Report will be discussed below, within each individual OU.

### IV. FYR PROCESS

#### **Community Notification, Community Involvement and Site Interviews**

On May 12, 2022, the EPA published a public notice in the *Herald Democrat* (Appendix E), announcing commencement of the FYR process for the Site, providing contact information for EPA RPM Linda Kiefer, and inviting community participation in the FYR process. No one contacted the EPA or CDPHE as a result of this advertisement. The EPA contacted several public officials and known interested parties in Leadville/Lake County.

Staff from Newmont Mining Company, parent company of the Resurrection Mining Company (Newmont/Resurrection), that manage OUs 1, 4, 8 and 10, completed an emailed interview questionnaire on July 7, 2022. The staff indicated that operations and maintenance activities have been performing well; the Arkansas River, the primary receiving body for any environmental impacts from the Site, is as healthy as it has been in modern history. The staff also reported that contaminant levels in the water drainage have largely remained the same or are trending generally down and vary with seasonal precipitation. Regardless of those variations, the treatment systems in place continue to produce high-quality effluent that meets the discharge standards. The staff stated that equipment at the water treatment plant and associated conveyance systems are regularly evaluated, upgraded and/or replaced.

Newmont/Resurrection staff reported that, in comparison with the 1980s, the Arkansas River runs much cleaner, and the community increasingly looks at the river as a recreational and economic resource. In addition, the staff reported that reuse activities continue, largely in the form of new trail easements and recreational access.

Newmont/Resurrection has not received any complaints or inquiries from the community about environmental issues or the remedial action-. They stated that the EPA RPM keeps them well informed regarding site activities and remedial progress.

Several local officials and residents were invited to participate in an interview and did not voice any concerns about the Site.

The Site's information repository is available in an online format, which allows the EPA to make information available to the public more efficiently and conveniently.<sup>2</sup>

#### **Site Inspection**

The Site inspection took place on June 16, 2022, to evaluate the remedies at all OUs. In attendance were EPA Region 8 RPM Linda Kiefer, Kyle Sandor with CDPHE, and Treat Suomi from EPA contractor Skeo. In addition, Timothy Runnells with Engineering Analytics, a contractor representing Newmont/Resurrection, and William Santos with Newmont/Resurrection attended the inspection for OUs 1, 4, 8 and 10. The purpose of the inspection was to assess the protectiveness of the remedy.

EPA RPM Linda Kiefer led the site inspection, with contractor support provided by Skeo. The inspection focused on reviewing the conditions of capped waste piles, impoundments, diversion structures and engineering controls. It also included observation of OU9 removal actions completed during the last five years. The inspection also included viewing of several segments of the Arkansas River (OU11) downgradient. In addition, throughout the

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<sup>2</sup> On March 18, 2013, the EPA promulgated a final rule to amend 40 C.F.R. § 300.805(c) of the NCP "Location of the Administrative Record File" to acknowledge advancements in technologies used to manage and convey information to the public. This enabled the EPA to make Administrative Records available to the public via the internet. Also, EPA Region 8 provides space for the public to view records related to Superfund work at the Superfund Records Center by appointment located at 1595 Wynkoop Street in Denver, Colorado 80202-1129.

inspection, monitoring well locations and several surface water monitoring locations were observed as part of site-wide OU12. Newmont/Resurrection representatives provided site inspection tours of the Yak Tunnel WTP (OU1), followed by inspections of OUs 4, 8 and 10.

Sections V through XVI below provide details on the site inspection for each OU. The site inspection checklist and photographs are provided in appendices F and G, respectively. Data review is included below.

## **V. OU1: YAK TUNNEL AND WTP**

OU1 consists of the Yak Tunnel and WTP. The Yak Tunnel was constructed to dewater mines and to facilitate mineral exploration and development. The EPA estimated that 60,000 feet of tunnels and major laterals and 55 million cubic feet to 74 million cubic feet of void space are associated with the tunnel-mining activities.

At the time of the ROD in March 1988, studies indicated that a combined total of 210 tons per year of cadmium, lead, copper, manganese, iron and zinc were discharged from the Yak Tunnel into California Gulch, which drains into the Arkansas River. Surface water contamination is the major impact of the Yak Tunnel discharge. Shallow alluvial groundwater and stream sediment may have been impacted by historical releases from the Yak Tunnel.

The Yak Tunnel and Yak Tunnel WTP are located southeast of Leadville (Figure D-2).

### **V.1 OU1: RESPONSE ACTION SUMMARY**

#### **Basis for Taking Action**

Based on the results of the 1987 OU1 RI/FS, the EPA determined that surface water, groundwater and sediment remediation would be required for the protection of human health and the environment. Metals, including copper, zinc, cadmium and lead, from former mining activities had contaminated surface water, shallow alluvial groundwater and stream sediments at OU1. The surface water exposure pathway was identified as the principal pathway of concern to both human health and the environment to be addressed under OU1. Appendix B (Table B-2) provides a chronology of OU1 events.

#### **Response Actions**

The EPA completed an FS Report in June 1987 and a Proposed Remedial Action Plan for the Yak Tunnel in August 1987. The EPA issued a Unilateral Administrative Order (UAO) to ASARCO Incorporated, Newmont Mining Corporation, Res-ASARCO Joint Venture and Resurrection Mining Company on March 29, 1989, for the remedial design and remedial action of the Yak Tunnel. Two amendments were made to the UAO, on April 30, 1993, and June 16, 1993.

The remedies for the Yak Tunnel were selected initially in the 1988 OU1 ROD, changed in the 1989 ROD Amendment (AROD), and further altered in the 1991 and 2013 Explanation of Significant Differences (ESDs).

The remedial action objective (RAO) stated in the 1988 OU1 ROD is to decrease the release and threatened release of hazardous substances, pollutants and contaminants from the Yak Tunnel into California Gulch. The AROD and ESDs did not change the site RAO.

The selected remedy included: (1) Construction of a single surge pond as a permanent part of the remedy; (2) Construction of a flow-control bulkhead within the tunnel to prevent surges; (3) Identification of ground water flow direction and potential gradient reversal as an additional element of the monitoring plan; (4) Placement of six or more weirs, or other flow-measuring devices, at key locations in the Yak Tunnel; (5) Periodic inspection of the Yak Tunnel and (5) Development and implementation, as necessary, of a contingency plan to address any adverse effects on surface water or groundwater resulting from tunnel blockage. The 2013 ESD called for institutional controls to reduce or control human exposure to contaminants of concern and to maintain the integrity of and prevent disturbances to engineered features or structures established as part of the current remedy or future remedies.

The cleanup goals identified for OU1 are the effluent discharge limits for Outfall 001A presented in Table 2, as required by the 2008 Consent Decree. In addition, semi-annual whole effluent acute toxicity tests are required, alternating between aquatic invertebrates and fathead minnow at each semiannual test.

**Table 2: Effluent Discharge Limits Established in the 2008 Consent Decree**

COC	Effluent Discharge Limit (µg/L)	
	30-day Average	Daily Maximum
Cadmium (total recoverable)	50	100
Copper (total recoverable)	150	300
Mercury (total recoverable)	1	2
Lead (total recoverable)	300	500
Zinc (total recoverable)	750	1,500
<i>Notes:</i> µg/L = micrograms per liter <i>Source:</i> 2008 Consent Decree, Appendix A, Table 1.		

**Status of Implementation**

The EPA released a Proposed Remedial Action Plan for the Yak Tunnel in August 1987. The EPA issued a UAO to ASARCO Incorporated, Newmont Mining Corporation, Res-ASARCO Joint Venture and Newmont/Resurrection in March 1989 for the Yak Tunnel’s remedial design and remedial action. The EPA made two amendments to the UAO on April 30, 1993, and June 16, 1993.

Construction of a surge pond and permanent WTP began in September 1988 and finished in June 1991. The construction efforts included four main elements: a surface water conveyance system, the surge pond itself, a barge transfer system and gravity filters. The Yak Tunnel WTP has been in operation since construction finished in February 1992.

The Yak Tunnel Bulkhead, constructed in 1994, controls surges of water coming from the Yak Tunnel, particularly during spring melt. The bulkhead is located about 1,680 feet into the tunnel from the portal. Additionally, removal actions in OU4 and OU6 in 1990s reduced metals loading into the Arkansas River from ephemeral tributaries.

Beginning in May 2002, increasing water levels were observed at piezometer BBW-5 and monitoring well BBW-10. The rise in groundwater elevations occurred concomitantly with the recovery of groundwater levels in the Black Cloud Mine workings above the 1330 Lateral level and indicated that a blockage existed in the upper region of the Yak Tunnel downgradient of the 1330 Lateral. A water level control program was implemented in 2005 and 2006 to control the rise of Yak Tunnel blockage water levels. The water level control program consists of groundwater pumping from behind the blockage and conveyance of this water to the Yak Tunnel WTP for treatment and discharge. Pumping of the Yak Tunnel blockage water from the Black Cloud began on March 21, 2006. Periodic shutdowns occur for maintenance, replacement or WTP treatment management of other water sources. Yak Tunnel blockage water levels have dropped during pumping and risen during shutdowns.

Environmental covenants on Newmont/Resurrection’s properties with OU1 remedy features were recorded with the Lake County Clerk and Recorder's Office on July 31, 2012, and October 1, 2012. These covenants are working as designed; they restrict land-use activities and protect remedy components (Appendix K). These controls restrict the use of untreated groundwater and protect remedial components. In addition to the environmental covenants, OU1’s industrial mining zoning designation limits land-use changes without Lake County approval and EPA and CDPHE notification of such proposed changes. All remedial components described in the OU1 ROD, as amended, are in place and all institutional controls are in place.

**Systems Operations/Operation & Maintenance (O&M)**

The 2008 Routine Monitoring Plan (RMP), Contingency Plan (CP) and the OU1 Work Plan govern the long-term implementation of the OU1 remedy, consistent with the terms of the 2008 Consent Decree by and among the United States, the State and Newmont/Resurrection, to which the RMP, CP and OU1 Work Plan are appended.

Routine O&M activities include repairing grouted areas of structures due to corrosion, settlement or other factors; occasional repair or replacement of monitoring well pumps and surface water monitoring equipment; repair of access roads; routine repair or replacement of pumps, motors, mixers, piping and tankage; and inspections. Resurrection submits monthly progress reports to the EPA and CDPHE that also summarize discharge monitoring results. Resurrection also submits annual reports to the EPA and CDPHE that summarize the routine and enhanced monitoring activities; Yak Tunnel bulkhead data including water levels, flows, and water quality data; bedrock groundwater levels and quality and Yak Tunnel blockage pumping data.

A series of upgrades and preventative maintenance took place at the Yak Tunnel WTP during this FYR period. Work at the Yak Tunnel has focused on creating a plan that allows for routine and regular upgrades and improvements.

In a letter dated October 2, 2014, the EPA allowed a temporary modification to the Work Plan for the effluent to be discharged from the Yak Tunnel WTP at a more alkaline pH, which is above the previously permitted maximum level. This temporary modification expanded the upper value of the 30-day average pH range to 11.0. Newmont/Resurrection can eliminate the addition of sulfuric acid post treatment, a step required to bring plant effluent within its previous permitted upper value of the pH range to 9.0. This temporary modification of the 2008 Consent Decree Work Plan’s effluent limitation was initially a 30-month trial program. Furthermore, in March 2018, this modification became permanent (SEMS#100011451). Effluent data collected during this FYR period show that OU1 discharge has not exceeded the effluent limits.

Well BBW-5 was not sampled in June 2020 due to pump failure. A new pump was installed, and the well was sampled in October 2020. Also, water quality samples could not be taken at BBW-10 beginning in 2012 due to the pump failing and being lodged in the well casing. Multiple attempts were made to dislodge the pump, but they were not successful. A contractor mobilized to the Site in 2016 and, after inspection of the well, declined to attempt removal of the pump. Instead, a replacement well was begun in late 2019. However, well installation stopped due to several large snowstorms and then there were delays due to the COVID-19 public health emergency. In June 2022, both BBW-5 and BBW-10 were replaced with new wells.

**V.2 OU1: PROGRESS SINCE PREVIOUS FYR**

This section includes the protectiveness determinations and statements from the 2017 FYR Report (Table 3). There were no recommendations identified from the 2017 FYR Report.

**Table 3: Protectiveness Determinations/Statements from the 2017 FYR Report**

OU #	Protectiveness Determination	Protectiveness Statement
1	Protective	The OU1 remedy is protective of human health and the environment. The RAOs are being met; contaminated waters draining from the Yak Tunnel are directed to and treated at the Yak Tunnel WTP before discharging the effluent to surface water. Institutional controls have been implemented.

**V.3 OU1: FYR PROCESS**

**Data Review**

Resurrection collects the following data to determine the status of the Yak Tunnel hydrologic system and determine if any changes are warranted to optimize the system:

- 1) Water level elevations behind the Yak Tunnel bulkhead, in monitoring wells and piezometers and mine shafts
- 2) Yak Tunnel flow and pump rates
- 3) Piezometer (BBW-7 and BBW-8) and monitoring well field parameter measurements and water quality (BBW-1 through BBW-4 every five years)
- 4) Yak Tunnel blockage field parameter measurements and water quality analyses
- 5) Field and water quality parameters in monitoring well BBW-5 and BBW-10<sup>3</sup> and the Yak Tunnel (semi-annual sampling event).

OU-1 monitoring locations are presented in Figure I-1. A water level control program was implemented to control the rise of Yak Tunnel blockage water levels. The water level control program consists of groundwater pumping from behind the blockage and conveyance of this water to the Yak Tunnel WTP for treatment and discharge. Pumping has continued since March 2006 (with periodic shutdowns for maintenance, replacement or WTP treatment management of other water sources), and Yak Tunnel blockage water levels have dropped as a result. At the historically high groundwater elevation, the groundwater elevation data continued to indicate a hydraulic gradient toward the Yak Tunnel. Therefore, no reversal of the hydraulic gradient away from the Yak Tunnel or adverse groundwater quality conditions are expected away from the Yak Tunnel, as long as the groundwater elevation remains below the historically high groundwater elevation. The groundwater elevation data continued to indicate a hydraulic gradient toward the Yak Tunnel during this FYR period.

Water quality sampling occurs semi-annually in bedrock monitoring well BBW-5 (monitoring groundwater in the upper portion of the Yak Tunnel behind the Yak Tunnel blockage) to assess bedrock groundwater quality conditions and identify any adverse water conditions. The monitoring wells have been placed along faults that are known or thought to connect hydraulically with the Yak Tunnel. The 2020 Annual Monitoring Report for OU1, published in March 2021, concluded that, overall, the 2020 water quality data from BBW-5 and the Yak Tunnel did not show significant adverse changes from historical data collected from 2007 through 2019 (Table I-1 and Table I-2, respectively). The October 2020 sample collected from the Yak tunnel blockage showed several analytes at the higher end of historical concentrations (aluminum, arsenic, cadmium, copper, iron, lead, manganese, magnesium, silica, specific conductance and zinc) (Table I-2). The PRP reports that this could potentially be due to the significant decrease in water levels at the blockage in 2020 due to consistent pumping. The PRP continues to collect water quality samples and will determine if the trend continues or whether the concentrations remain within historical ranges. Overall, the 2020 water quality data from the Yak Tunnel blockage show no significant changes from historical data.

The Yak Tunnel flow rate at the bulkhead does not represent free-flowing conditions because water is impounded behind the bulkhead and a blockage. The reason for the changes in the Yak Tunnel flow rate are not known though they may indicate changes to the blockage or may be related to plugging of the bulkhead intakes or pipes. Monthly average flow rates from the Yak Tunnel ranged from 128 gallons per minute (gpm) in October 2020 to a maximum of 380 gpm in July 2020. The flow from the Yak Tunnel bulkhead was consistent with seasonal trends of flows observed since the determination of the Yak Tunnel blockage. Flows from 2014 to 2020 have been higher than historical flows, but precipitation from 2013 to 2017 and in 2019 has also been higher than the 19-year average.

The Yak Tunnel blockage pumping system consists of the blockage pump, currently located in the Black Cloud shaft to dewater the mine pool backed up by the blockage. Pumping of the Yak Tunnel blockage water from the Black Cloud Shaft began in 2006. The historical high (i.e., pre-2006) groundwater elevation within the Yak Tunnel blockage of 10,685 feet above mean sea level (amsl) was reached at the Black Cloud Shaft prior to the initiation of pumping in March 2006. Pumping has continued since March 2006, with periodic shutdowns for maintenance, replacement or WTP treatment management of other water sources, and Yak Tunnel blockage water levels have dropped during pumping and risen during shutdowns. Table I-3 provides a summary of pumping for each month from January 1, 2020, to December 31, 2020, and includes cumulative volume pumped, groundwater

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<sup>3</sup> BBW-10 has not been sampled since 2012 due to blockage, and a replacement well was not installed and developed in time to provide data for this FYR.

elevation in the Black Cloud Shaft, the estimated water-level elevation above the Yak Tunnel blockage, and the estimated change in water level behind the Yak Tunnel blockage. The groundwater elevation in the Yak Tunnel blockage was 10,666 feet amsl in December 2019 and 10,639 feet amsl in December 2020. The water level elevation behind the blockage did not exceed the 10,684-foot amsl performance standard identified in the 2008 O&M Plan.

Water discharged from the Yak Tunnel WTP goes directly to Upper California Gulch surface water and is required to meet the EPA's surface water quality standards established in the 2008 Consent Decree. Effluent waters are sampled before being discharged from the plant. The EPA monitors the effluent results monthly. No exceedance of surface water quality standards was detected in discharged effluent from the Yak Tunnel WTP during this FYR period, based on the information accessed for the Yak Tunnel WTP discharge under permit COU000099.<sup>4</sup>

### **Site Inspection**

The OU1 site inspection took place on June 16, 2022. Participants are listed in Section III of this FYR Report. The Newmont/Resurrection's contractor, Tim Runnells and Will Santos, the Plant Manager, led the inspection of the treatment system, the Yak Tunnel portal and the surge pond. Since 2014, the EPA approved a request to temporarily allow for the effluent to be discharged at a pH above the previously permitted level. In 2018, the pH change was made permanent.

Site inspection participants noted that the plant was in good working operation at the time of the inspection. Significant upgrades to the plant have occurred since the previous FYR, including new hardware and software, ongoing rewiring of all electrical conduits and treatment system improvements, and a new surge pond and barge. In addition, two wells used for routine water quality and water level measurements in the Yak Tunnel are in the process of being replaced. All required documents, including safety and O&M guides, were available in the plant's command station. Photographs were taken of site features, including the Yak Tunnel WTP (Appendix G). An inspection checklist has been completed. It is available in Appendix F.

## **V.4 OU1: TECHNICAL ASSESSMENT**

**QUESTION A:** Is the remedy functioning as intended by the decision documents?

The site inspection and the review of documents, applicable or relevant and appropriate requirements (ARARs), and risk assumptions indicate that the Site's OU1 remedy has been fully implemented and is functioning as intended by site decision documents. Construction of the Yak Tunnel WTP and support structures was completed in 1992. The plant has operated continuously since that time, with the exception of being taken offline for routine maintenance and repairs. Technological and equipment improvements as well as preventative maintenance have been made at the plant during the current FYR period.

Waters flowing from the Yak Tunnel continue to be a potential source of contamination. If left untreated, the waters would adversely affect water quality in the Arkansas River. Thus, it is important to continue the treatment and monitoring of these waters and ensure that the hydraulic gradient is maintained towards the Yak Tunnel through pumping. Under the 2008 Consent Decree, Newmont/Resurrection agreed to operate and maintain the OU1 remedy features. On July 29, 2013, the EPA signed an ESD clarifying that institutional controls are required. All institutional controls required by site decision documents are in place, as are procedures to notify the EPA and CDPHE should local governments approve a change in land use. Environmental covenants on Newmont/Resurrection's properties with OU1 remedy features were recorded with the Lake County Clerk and Recorder's Office on July 31, 2012, and October 1, 2012. These covenants are working as designed; they restrict land use activities and protect remedy components. The Yak Tunnel WTP, including the surge pond, is enclosed

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<sup>4</sup> Accessed results for 2017 to 2021 for permit COU00009 at <https://echo.epa.gov/tools/data-downloads/icis-npdes-dmr-and-limit-data-set>. Accessed 6/2/2022.

within secured and signed perimeter fencing. The Yak Tunnel portal discharges via piping that carries the discharge directly to the WTP. The EPA partially deleted OU1 from the NPL in April 2016.

**QUESTION B:** Are the exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy selection still valid?

There have been no changes to the ARARs identified in the ROD or since the previous FYR. No newly promulgated standards have been identified that could call into question the protectiveness of the remedy as implemented. Appendix H provides more detailed information.

**QUESTION C:** Has any other information come to light that could call into question the protectiveness of the remedy?

No additional information has come to light that would call into question the protectiveness of the remedy.

## V.5 OU1: ISSUES/RECOMMENDATIONS

Issues/Recommendations
<b>OU(s) without Issues/Recommendations Identified in the FYR:</b>
OU1

## V.6 OU1: PROTECTIVENESS STATEMENT

Protectiveness Statement(s)	
<i>Operable Unit:</i>	<i>Protectiveness Determination:</i>
1	Protective
The OU1 remedy is protective of human health and the environment. The RAOs are being met; contaminated waters draining from the Yak Tunnel are directed to and treated at the Yak Tunnel WTP, before discharge of the effluent to surface water. Institutional controls have been implemented.	

## VI. OU2: MALTA GULCH FLUVIAL TAILING/LEADVILLE CORP. MILL/MALTA GULCH TAILING IMPOUNDMENTS

OU2 is located southwest of Leadville (Figure D-3). It consists of three waste features: the Malta Tailing Impoundment (MTI), the Malta Gulch Tailing Impoundments (MGTI) and the Lower Malta Gulch Fluvial Tailings (LMGFT).

The MTI consists of three small impoundments occupying 4.6 acres and estimated to contain about 10,000 cubic yards of waste. Leadville Silver & Gold constructed the MTI for wastes from a pyrite recovery process mill that operated from 1983 to 1988. Since 1995, the LMGFT no longer exists since it was moved under a removal action and deposited into the MGTI. The MGTI and the MTI both contain consolidated mining waste and are currently capped and revegetated.

The Stringtown Mill Area of the Leadville Mining Area District, which includes the MGTI, was developed between 1879 and 1882 as a large group of placer claims. The MGTI is about 23 acres in size, is located at the upper end of Malta Gulch and contains an estimated 1.5 million tons of waste. Ore and Chemical Company created the first tailings impoundment as part of a sink-float mill that operated from 1943 to 1946. Hecla Mining Company (Hecla), in conjunction with Day Mines (Day), leased the property for disposal of tailings generated from its milling of ores from the Sherman Mine, a silver mine in a dolomite formation. Leadville Corporation

purchased the OU2 property in 1968 and leased it to Hecla until 1987; Hecla later purchased Day Mines (Hecla/Day). The MGTI, in its present configuration, was constructed in 1974 by Hecla/Day. During its leasehold, Hecla/Day operated an on-site flotation mill, while the Leadville Corporation refitted the mill to use a cyanide leaching process, adding additional tailings to the impoundments in 1988. On November 17, 2005, the Colorado Division of Reclamation, Mining and Safety initiated bond forfeiture with the permittee, Leadville Corporation, for the reclamation of OU2 facilities operated under the permit.

Lower Malta Gulch is located directly downstream of the MGTI. Fluvial tailings are the tailings that have been washed downstream of the impoundments. When Ore & Chemical Company operated the mill, the LMGFT impoundments were not entirely effective for containment; about 600,000 tons of the tailings washed or flowed down Lower Malta Gulch. The LMGFT is about 26 acres in size. It consisted of fluvial tailings deposits with an estimated volume of 30,000 cubic yards.

## **VI.1 OU2: RESPONSE ACTION SUMMARY**

### **Basis for Taking Action**

In September 1991, the EPA and Hecla/Day signed an Administrative Order on Consent (AOC) for the performance of an engineering evaluation/cost analysis (EE/CA) at the MGTI. Its purpose was to determine the nature and extent of releases and to determine an appropriate response action. Based on the results of the Site's 1993 EE/CA, the EPA determined that principal threats at OU2 were: 1) the potential for casual use through direct contact with the tailings materials, which are contaminated with heavy metals; and 2) the potential release of heavy metals, cyanide and sulfates to groundwater as a result of precipitation events. Table 4 lists the types of contamination found in the different media at OU2. Appendix B (Table B-3) provides a chronology of OU2 events.

**Table 4: Types of Contamination in Each Media for OU2**

<b>Media</b>	<b>Contamination</b>
Tailings impoundments	Elevated lead and zinc
Fluvial tailings	Elevated lead

### **Response Actions**

The EPA entered into agreements in January 1993 with Hecla/Day and Leadville Silver & Gold to define the extent of the companies' liability in paying for cleanup at the MGTI and the MTI. Under a subsequent partial Consent Decree between the EPA and Hecla/Day, money was set aside for the OU2 cleanup. An August 1994 Consent Decree allowed the United States, as a successor to the Ore and Chemical Company, to settle the company's liabilities at the LMGFT.

Four removal actions took place at OU2 (Table B-4). Beginning in 1995, the fluvial tailings were excavated from LMGFT and deposited in the MGTI. The excavated area was revegetated. Four check dams and a runoff control berm were constructed between the upper and lower portions of Malta Gulch. Confirmation sampling showed that the excavation and removal had lowered lead levels to below the Site's residential cleanup level. Monitoring in 1997 and 1998 verified that the revegetation was successful; therefore, no further monitoring was required for this area. The material in the MGTI was consolidated, graded, capped and revegetated. Forty-two drums, some very corroded, were removed from the Leadville Corporation Mill and disposed of appropriately. The 1996 removal action at the MTI consolidated the tailings, neutralized acidic leachate, and capped and revegetated the area.

The removal actions have prevented or controlled the release or threatened release of hazardous substances from the sources of contamination identified in OU2 such that there are no unacceptable risks to human health and the environment from those sources. Lead is the principal COC. The response actions were designed to control all COCs in the capped material.

The EPA issued the ROD for OU2 on September 30, 1999. It indicated that the OU2 removal actions reduced or eliminated any potential risk posed to human health or the environment from releases of hazardous substances found at the MGTI, the LMGFT and the MTI portions of OU2. Therefore, the OU2 1999 ROD selected a "No

Further Action” remedy assuming the OU remains zoned for Industrial Mining or similar uses that do not allow residential use. The EPA issued an ESD on July 29, 2013, to clarify that institutional controls are required to maintain the integrity of and prevent disturbances to engineered features or structures established as part of the remedy.

### **Status of Implementation**

The EPA partially deleted OU2 from the NPL on July 23, 2001. The Industrial Mining zoning designation for the MGTI and the MTI remains in place. Future use of the mill and impoundment site will require a permit from the Colorado Department of Reclamation, Mining and Safety (DRMS), previously the Colorado Division of Mining and Geology. In addition, Lake County passed an ordinance on April 15, 2013, that acts as an institutional control. Together, these institutional controls protect remedy components, require best management practices for soil excavation, and require CDPHE approval for any excavation or earth removal activity that exceeds 10 cubic yards or that would impact an engineered remedy.

Surface water and groundwater monitoring in the vicinity of OU2 is being addressed as part of OU12.

### **Systems Operations/Operation & Maintenance (O&M)**

In addition to the four removal actions, the 1999 ROD specified the following monitoring requirements to maintain the effectiveness of the removal actions:

- Monitor the vegetative covers
- Inspect impoundments
- Review the zoning definition to ensure consistency with the remedy
- Review the status of the Colorado Division of Mining and Geology (now DRMS) permit and use of the mill and impoundments
- Upon termination of the Colorado Division of Mining and Geology (now DRMS) permit, ensure that final facility reclamation is protective of human health and the environment
- Monitor groundwater for metals and other inorganic parameters in June of each year at nine locations (conducted as part of the OU12 monitoring program)

CDPHE conducts annual O&M inspections and maintenance activities per the Site’s October 2016 O&M Plan. O&M activities are performed under the EPA grant funded with Special Account monies.<sup>5</sup> O&M activities include inspection and maintenance of the covers and surface water controls. As a result of the September 2021 inspection, TetraTech, the state O&M inspection contractor, made several recommendations to improve the functionality and longevity of various remedy components. The O&M issues identified do not currently present concerns for the remedy’s protectiveness. CDPHE in consultation with the EPA will determine which of these recommendations will be implemented as part of O&M activities.

#### *Malta Gulch Tailings Impoundment CDPHE O&M Contractor Recommendations*

- Monitor the erosion features during future inspections
- Have a comprehensive vegetation inspection performed by a certified specialist
- Reseed areas lacking vegetation
- Excavate a larger, more-defined spillway channel to convey potential flows from the pond north of Tailings Impoundment #3
- Remove vegetation and transplant trees from channels on eastern and southern edges of Tailings Impoundment #1 to facilitate drainage off-site
- Repair the damaged section on the outlet end of the northeastern culvert and remove the sediment and vegetation to allow flows to pass through unimpeded and improve drainage from the MGTI
- Grade the bench on the western edge of Tailings Impoundment #3 to drain down the impoundment face or reinforce the low spot drainage to minimize erosion

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<sup>5</sup> Special Accounts are PRP-funded, site-specific, interest-bearing accounts housed within Superfund’s "Hazardous Substances Superfund (Trust Fund)."

- Repair the fence along the boundary with County Road 36
- Contact the Colorado Department of Reclamation, Mining and Safety and Division of Water Resources to determine the regulatory status of the MGTI impoundments. If regulated by the Division of Water Resources, a review of the construction of the embankments with respect to current dam safety rules may be required.

*Malta Tailings Impoundment CDPHE O&M Contractor Recommendations*

- Have a comprehensive vegetation inspection performed by a certified specialist
- Have a vegetation specialist develop options to re-establish vegetation in the area where sheet erosion has removed the topsoil
- Transplant the trees growing in the northern and southern channels
- Continue to inspect the channel for signs of inadequate capacity, such as flow overtopping the channel banks
- Construct and line a more defined channel on the northern and southeastern boundaries of the site

## **VI.2 OU2: PROGRESS SINCE PREVIOUS FYR**

This section includes the protectiveness determinations and statements from the 2017 FYR Report (Table 5). There were no recommendations identified from the 2017 FYR Report.

**Table 5:** Protectiveness Determinations/Statements from the 2017 FYR Report

<b>OU #</b>	<b>Protectiveness Determination</b>	<b>Protectiveness Statement</b>
2	Protective	The remedy at OU2 is protective of human health and the environment. The removal actions conducted at OU2 greatly reduced or eliminated any potential risk posed to human health or the environment from releases of hazardous substances and an institutional control ensures that engineered remedy components are protected and any soil excavation is performed in a manner protective of human health and the environment.

## **VI.3 OU2: FYR PROCESS**

### **Data Review**

There are no applicable data to review for OU2.

### **Site Inspection**

The OU2 site inspection took place on June 16, 2022. Participants are listed in Section III of this FYR Report. The capped impoundments remain intact and vegetative covers are in good condition. Fencing and warning signs are in good condition. It appears that some trespassing occurs, as a few old tires were disposed of at the MGTI. An inspection checklist has been completed (Appendix F). Representative photographs from the site inspection are included in Appendix G.

## **VI.4 OU2: TECHNICAL ASSESSMENT**

**QUESTION A:** Is the remedy functioning as intended by the decision documents?

The site inspection and the review of documents, ARARs and risk assumptions indicate that the remedy is functioning as intended by the OU’s removal actions and the ROD. All institutional controls required by the decision documents are in place. Should local governments approve a change in land use, procedures are in place to notify the EPA and CDPHE.

**QUESTION B:** Are the exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy selection still valid?

There have been no changes to the ARARs identified in the ROD or since the previous FYR. No newly promulgated standards have been identified that could call into question the protectiveness of the remedy as implemented (see Appendix H for more detail). There have been no other changes in exposure assumptions or toxicity data that would call into question the protectiveness of the remedy. Currently, there are no proposed reuse plans at the OU2 mill that would affect the protectiveness of the remedy.

**QUESTION C:** Has any other information come to light that could call into question the protectiveness of the remedy?

No additional information has come to light that would call into question the protectiveness of the remedy.

## VI.5 OU2: ISSUES/RECOMMENDATIONS

Issues/Recommendations
<b>OU(s) without Issues/Recommendations Identified in the FYR:</b>
OU2

### OTHER FINDINGS

Review, assess and implement as appropriate the recommendations in the 2021 O&M OU2, 5 and 7 Inspection Report.

## VI.6 OU2: PROTECTIVENESS STATEMENT

Protectiveness Statement(s)	
<i>Operable Unit:</i> 2	<i>Protectiveness Determination:</i> Protective
<i>Protectiveness Statement:</i> The remedy at OU2 is protective of human health and the environment. The removal actions conducted at OU2 reduced or eliminated any potential risk posed to human health or the environment from releases of hazardous substances and an institutional control ensures that engineered remedy components are protected, and any soil excavation is performed in a manner protective of human health and the environment.	

## VII. OU3: DENVER & RIO GRANDE WESTERN RAILROAD COMPANY (D&RGW) SLAG PILES/RAILROAD EASEMENT/RAILROAD YARD

OU3 includes three slag piles – Arkansas Valley (AV) Smelter, La Plata and Harrison Street – owned by the Denver & Rio Grande Western Railroad Company (D&RGW), an easement that runs diagonally through Leadville, and part of the rail yard known as Poverty Flats (Figure D-4). Union Pacific (UP) acquired D&RGW’s properties nationwide in 1996, taking over the responsibilities outlined in the 1993 Consent Decree with D&RGW.

### *AV Smelter Slag Pile*

The AV Smelter Slag Pile covers about 40 acres just west of the Stringtown Mill Area. The pile consists of slag produced by the AV, which operated from 1882 to 1960. Based on aerial photography, the pile volume in the late 1950s was about 1.2 million cubic yards. In 1998, about 422,000 cubic yards of slag remained, of which 190,000 cubic yards was stockpiled fine slag.

### *La Plata Slag Pile*

The La Plata Slag Pile, located west of Leadville city limits on Elm Street, has a volume estimated at 105,000 cubic yards. Bimetallic Smelting Company leased the La Plata area in OU3 from 1892 to 1900 for pyritic smelting of low-grade ores.

*Harrison Street Slag Pile*

The Harrison Street Slag Pile was located in a residential area, near the northeast corner of Harrison Avenue and Elm Street, in Leadville. The original slag pile ranged from 20 feet to 50 feet in height, and covered about 3 acres. The Harrison Street Slag Pile was removed to original grade and relocated to the AV Smelter Slag Pile in March 1998.

*Rail Yard*

The rail yard, located between 12th Street, Highway 24, 17th Street and County Road 8, has seen over 130 years of transportation activities mostly associated with mining in the area. The part of the rail yard formerly owned by D&RGW is near the north end of Leadville, encompasses an area of 43 acres, and is crossed by abandoned rail lines and access roads. Slag was used in the rail yard as ballast and as a road base to provide support for heavy vehicle traffic. Slag was also deposited around the loading dock due to spillage during transportation activities.

*Rail Easement*

The rail easement includes the part of the railroad track that runs diagonally through Leadville. It consists of about 25 feet on either side of the track centerline. Slag was used as a road base to provide support for heavy vehicle traffic. Slag was also deposited as spillage from passing rail cars.

**VII.1 OU3: RESPONSE ACTION SUMMARY**

**Basis for Taking Action**

Based on the results of the Site’s 1989 RI, the 1992 RI and the 1993 screening feasibility study (SFS), the EPA identified the fine fraction of the stockpiled AV Smelter slag and the potential for particulate release during ballast operations as a potential human health exposure pathway. Appendix B (Table B-5) provides a chronology of OU3 events.

Table 6 lists the contaminants found in OU3 media.

**Table 6: Contaminated Media, OU3**

Media	Contamination/Issue
Slag	Elevated levels of zinc, lead, arsenic and cadmium; low acid-generating potential and a neutral-to-basic pH.
Fine slag (less than 3/8 of an inch)	Elevated lead.

In May 1996, D&RGW submitted an FS for the stockpiled fine slag at the AV Smelter Slag Pile, in accordance with the terms of the 1993 Consent Decree.

**Response Actions**

*AV Smelter Slag Pile*

After the fine slag (slag with a particle size of 3/8 inch or less) was consolidated at the AV Smelter Slag Pile, the EPA issued the Stockpiled Fine Slag – AV Smelter Slag Pile ROD (1998 OU3 ROD) on May 6, 1998. Based on consideration of CERCLA requirements, detailed analyses of alternatives and public comments, the EPA determined that a "no action" alternative was the appropriate remedy, because no complete human or ecological exposure pathways were identified for the stockpiled fine slag and the potential for release of metals in leachate from the stockpiled fine slag is minimal. The 1998 OU3 ROD also included a provision for the potential use of the slag in the future based on regional market demand for the material as a component in construction materials.

The no action alternative left the stockpiled fine slag in its existing condition with no control or cleanup planned. The no action alternative included a provision for future use of the slag if it is encapsulated prior to its use or reuse.

### *La Plata Slag Pile*

Based on the lack of fine slag or leachate generation, the 1998 OU3 ROD did not require remedial action at this location.

### *Harrison Street Slag Pile*

The 1998 OU3 ROD provides a contingency for resource utilization, which may be undertaken in the future if regional market demand exists for the material. As part of its ballast operations, UP relocated about 104,000 cubic yards of slag to the AV Smelter Slag Pile in March 1998 to bring the Harrison Street Slag Pile to grade. As a result, soils containing elevated concentrations of lead were exposed. These soils create the potential for unacceptable human health risks if the property was developed for residential use in the future. To date, the land remains vacant.

### *Rail Easement*

As part of work done under the Site's 1993 Consent Decree, UP submitted a work plan that proposed converting the easement into a segment of the paved Mineral Belt Bike Trail. The trail was completed in the late 1990s. UP subsequently donated ownership of the easement to Lake County via a quitclaim deed.

### *Rail Yard*

During summer 1997 and fall 1997, UP removed 1,264 cubic yards of fine slag from the rail yard and placed it onto the AV Smelter Slag Pile. As a result, soils containing elevated concentrations of lead were exposed. These soils created the potential for unacceptable human health risks if the property is developed for residential use in the future.

On August 6, 2014, the EPA issued an ESD that required institutional controls on OU3 properties in the form of a local ordinance, environmental covenant, and/or restrictive notice.

### **Status of Implementation**

On February 23, 2009, Lake County implemented institutional controls in an ordinance that included OU3. This ordinance requires best management practices for soil excavation and requires CDPHE approval for any excavation or earth-removal activity because all of OU3 is considered an engineered remedy. The city of Leadville adopted a similar ordinance for properties within city limits on May 7, 2013. The EPA completed a deletion of OU3 from the NPL on April 11, 2016.

### **Systems Operations/Operation & Maintenance (O&M)**

The 1998 no action ROD for OU3 did not require maintenance of the fine slag piles. The 1998 Memorandum of Understanding (MOU) entered into between UP, Lake County and the EPA indicated that the fine slag on the rail easement would be incorporated into the Mineral Belt Trail and that Lake County is responsible for long-term maintenance of the Mineral Belt Trail.

Any future use of the fine slag would require it to be encapsulated for reuse. Encapsulation can include the use of fine slag in concrete or asphalt aggregate, as a road base or as backfill (so long as the slag is chemically bound or physically separated from an exposure by a barrier consisting of a different material).

Since the last FYR, several of the properties have changed ownership and future use. CJK Milling acquired the AV Smelter Slag pile and has received approval from the EPA and CDPHE to use the slag for road base. Lake County purchased the Harrison Street property from UP and intends to build a Judicial Center on the property; the EPA provided a "reasonable steps" letter to Lake County. The proposed Rail Yard mixed use development discussed in the 2017 FYR is under way with several homes constructed; the developer is working with CDPHE under the voluntary cleanup program and a CDPHE-approved materials management plan.

## **VII.2 OU3: PROGRESS SINCE PREVIOUS FYR**

This section includes the protectiveness determinations and statements from the 2017 FYR (Table 7). There were

no recommendations identified from the 2017 FYR.

**Table 7: Protectiveness Determinations/Statements from the 2017 FYR Report**

OU #	Protectiveness Determination	Protectiveness Statement
3	Protective	The remedy at OU3 is protective of human health and the environment. Institutional controls that protect the engineered remedy components ensure that soil excavations are performed in a manner protective of human health and the environment.

### VII.3 OU3: FYR PROCESS

**Data Review**

There are no applicable data to review for OU3.

**Site Inspection**

The OU3 site inspection took place on June 16, 2022. Participants are listed in Section III of this FYR Report. The inspection did not result in significant findings. The Rail Easement/Rail Yard area (also known as Poverty Flats) was annexed into the city of Leadville in January 2017. The new owner contacted CDPHE, as directed in the institutional controls. A Material Management Plan for the development was approved by CDPHE. During the inspection, it was noted that several homes have been built and sold and more homes are under construction. In addition, Lake County purchased the Harrison Street Property from UP in order to construct a new Justice Center. This property was observed and has not yet been developed. However, the EPA reviewed the development plans and issued a comfort letter to the county in February 2022, stating that the EPA has not identified any obvious incompatibility between Lake County’s proposed use of the property and the EPA’s selected cleanup option, as described by the county.

All other slag piles in this OU had been relocated to the AV South Hillside Slag Pile in 1998 or incorporated into the paved Mineral Belt Trail. Photographs were taken of site features, including slag piles (Appendix E). An inspection checklist has been completed. It is available in Appendix D. The slag piles were intact and appeared to be in good condition. The Mineral Belt Trail was intact, appeared to be in good condition and was in active use by people walking, biking and skating. The site inspection checklist and photographs are included in appendices F and G, respectively.

### VII.4 OU3: TECHNICAL ASSESSMENT

**QUESTION A:** Is the remedy functioning as intended by the decision documents?

The site inspection and the review of documents, ARARs and risk assumptions indicate that the remedy is functioning as intended by the no action ROD for OU3.

All institutional controls required by site decision documents are in place. The EPA and CDPHE will be notified if local governments approve a change in land use.

**QUESTION B:** Are the exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy selection still valid?

There have been no changes to the ARARs identified in the ROD or since the previous FYR. No newly promulgated standards have been identified that could call into question the protectiveness of the remedy as implemented (see Appendix H for detail). There have been no other changes in exposure assumptions or toxicity data that would call into question the protectiveness of the remedy. There are currently no proposed reuse plans for OU3 that would affect the protectiveness of the remedy.

**QUESTION C:** Has any other information come to light that could call into question the protectiveness of the remedy?

The OU3 ROD focused on fine slag at the AV Smelter Slag Pile. Redevelopment proposals for the Harrison Street and Rail Yard (Poverty Flats) properties highlighted that fine slag may not be the only contaminated media of concern at OU3. As a result, an ESD signed on August 6, 2014, required institutional controls. In addition, the EPA clarified the use of the term “contingency” for fine slag utilization in the 1998 ROD. Fine slag can be used for future commercial purposes by following the requirements set out in the 1998 ROD. The city of Leadville adopted an ordinance on May 7, 2013, and Lake County on February 23, 2009, that limits unacceptable exposures to slag and contaminated soils. The EPA partially deleted OU3 from the NPL in 2016.

The contingency has been exercised by the Leadville Scenic Railroad and the CJK Milling Company, which requested letters for approval to use this contingency provision in early January 2022. In mid-January 2022, the EPA and CDPHE approved the use or reuse of the slag material as a commercial product as long as the slag is encapsulated for reuse.

Lake County purchased the Harrison Street Property from UP in order to construct a new Justice Center. The county reached out to the EPA to obtain a “Reasonable Steps” letter regarding the development plans. The EPA reviewed the development plans and issued a comfort letter to the county in February 2022, stating that the EPA has not identified any obvious incompatibility between Lake County’s proposed use of the property, as described by the county, and the EPA’s selected cleanup option.

Development in the former Harrison Street slag pile does not call into question the protectiveness of the OU3 remedy due to the reasons listed below.

- In 1998, UP removed the Harrison Street Slag Pile, returning the area to its original grade, and relocated the pile to the AV Slag Pile.
- After the removal, confirmation data show lead in the soils on the Harrison Avenue property may create the potential for unacceptable human health risks if the property is developed for residential use (> 3,500 mg/kg).
- Lake County (in 2009) and the city of Leadville (in 2013) implemented ordinances requiring CDPHE approval for any excavation or earth removal activity.

## VII.5 OU3: ISSUES/RECOMMENDATIONS

Issues/Recommendations	
OU(s) without Issues/Recommendations Identified in the FYR:	
OU3	

## VII.6 OU3: PROTECTIVENESS STATEMENT

Protectiveness Statement(s)	
<i>Operable Unit:</i> 3	<i>Protectiveness Determination:</i> Protective
<i>Protectiveness Statement:</i> The remedy at OU3 is protective of human health and the environment. Institutional controls that protect the engineered remedy components ensure that soil excavations are performed in a manner protective of human health and the environment.	

## VIII. OU4: UPPER CALIFORNIA GULCH

Upper California Gulch (OU4) is part of the Leadville Historic Mining District. It is located southeast of Leadville (Figure D-5). Placer gold mining started with the discovery of gold in California Gulch in 1860. When the placer deposits were exhausted, underground mining was used to extract gold, silver, lead and zinc ore. Breece Hill, above Upper California Gulch, was networked with underground mines in an area that covers about eight square miles. As mines were developed, waste rock was excavated and left near the mine entrances. Although a total of 131 waste piles were initially identified in OU4, the number of waste rock piles of concern in the OU has been reduced to 20 through investigations and analytical screening.

The OU4 waste piles are divided into six sub-basins: Garibaldi, Whites Gulch, Nugget Gulch, AY Minnie, Iron Hill and South Area, which also includes the Fluvial Tailing Site 4 (FTS 4), also known as Oro City. The 20 waste rock piles in these sub-basins contain a total estimated volume of 431,000 cubic yards, impacting 28.3 acres. Fluvial tailings deposition is discontinuous and appears to have been subdivided into several distinct pockets. In OU4, the FTS 4 extends for a distance of approximately 1.5 miles along Upper California Gulch, from slightly upstream of the Yak Tunnel portal to the upstream end of the Printer Boy Mine area. The waste rock piles are primarily weathered porphyry with limited to no vegetation, and with highly oxidized surfaces. Fluvial tailings and fluvial tailings mixed with alluvial sediments are located in the South Area and FTS 4/Oro City and have an estimated volume of 102,000 cubic yards. The tailings piles are largely unvegetated, with grasses and lodgepole pine growing on a quarter of the tailings surface. A wetland area exists along the Upper California Gulch channel, within OU4 boundaries. Oro City is considered a cultural and historic resource in the Leadville Historic Mining District.

The land in OU4 is zoned for industrial and mining land uses.

### VIII.1 OU4: RESPONSE ACTION SUMMARY

#### **Basis for Taking Action**

Based on the results of the OU4 1994 RI/FS, the EPA determined that actual or threatened releases of hazardous substances at and from waste rock and fluvial tailings piles on OU4 may present an imminent and substantial endangerment to public health, welfare or the environment if not addressed through remedial action. Metals from former mining activities are present in waste rock and fluvial tailings piles and may leach to surface water or groundwater via ARD. Appendix B (Table B-6) provides a chronology of OU4 events.

#### **Response Actions**

Resurrection Mining Company completed removal activities from 1995 to 1996, prior to the issuance of the 1998 ROD. The activities included work on the Garibaldi Mine in the Garibaldi sub-basin, work on the Agwalt Mine in Whites Gulch, and work on the Upper California Gulch surface water diversion. The ROD identified the need for more response activities in the Garibaldi sub-basin, Whites Gulch (Printer Girl Waste Pile), Nugget Gulch Waste Rock, AY Minnie Waste Rock, Iron Hill Waste Rock and FTS 4/Oro City.

The EPA issued the ROD for OU4 on March 31, 1998. The RAOs established in the 1998 OU4 ROD include:

- Control erosion of contaminated materials into local water courses
- Control leaching and migration of metals from contaminated materials into the surface water
- Control leaching and migration of metals from contaminated materials into the groundwater

The selected remedy for OU4 consisted of the following remedial components:

- Garibaldi sub-basin:
  - Diversion of surface water and selected removal of waste
- Whites Gulch sub-basin:
  - Excavation, consolidation and removal of waste rock at the Printer Girl Waste Rock Pile.

- Regrading of excavated areas of the Printer Girl Waste Rock Pile and construction of diversion ditches to control surface water run-on to the regraded areas
- Nugget Gulch sub-basin:
  - Excavation and consolidation of the Rubie, Adirondack, Colorado No. 2 East, and North Mike Waste Rock Piles onto the Colorado No. 2 Waste Rock Pile
  - Regrading and placement of a simple rock or vegetated cover over the Colorado No. 2 Waste Rock Pile
  - Terracing, soil amendment and revegetation of excavated areas
  - Construction of diversion ditches to control surface water run-on to the terraced and regraded areas
- AY Minnie sub-basin:
  - Construction of diversion ditches to reduce surface water run-on onto the AY Minnie Waste Rock Pile
  - Relocation of Lake County Road 2 to allow space for construction of a sedimentation pond and provide added protection from stability failures of timber cribbing without destroying the mining heritage and cultural resources of this mining area
- Iron Hill sub-basin:
  - Regrading and placement of a simple cover (revegetated soil or rock) over the Mab Waste Rock Pile as well as revegetation of surrounding disturbed areas
- Oro City:
  - Reconstruction and stabilization of the Upper California Gulch stream channel to prepare for a 500-year flood event
  - Regrading and removal, if necessary, of channel spoil material and selected fluvial tailings
  - Construction of eight sediment dams in the channel and about 1.5 acres of wetlands along the channel

The OU4 ROD did not contain numeric cleanup standards, but was meant to address potential source material contributing to surface water and groundwater contamination at the Site. On March 17, 2004, the EPA issued an ESD deferring remedial activities at FTS 4/Oro City in response to concerns regarding the historical significance of the Oro City area as an early mining camp. This decision was supported by interim surface water and groundwater monitoring data. The OU12 remedy addresses sitewide surface water and groundwater contamination to monitor the effectiveness of the source control remedies. Further source remediation may be conducted under OU12 if deemed necessary. On July 29, 2013, the EPA issued an ESD to add institutional controls as a component of the OU4 remedy.

### **Status of Implementation**

The removal action at the Garibaldi sub-basin finished in January 1996. Response actions at Nugget Gulch, Whites Gulch, AY Minnie and Iron Hill began in 1998. Resurrection completed the remedial actions in accordance with the 1998 ROD in 2001.

In December 2010, Lake County implemented institutional controls for OU4 in the form of a resolution amending the Lake County Land Development Code and adopting regulations that protect both engineered and non-engineered remedies at OU4 (see K.1 in Appendix K). A best management practice handout is provided to all applicants applying for a building permit within OU4. In addition, any disruption of engineered or non-engineered remedies within OU4 requires written approval from CDPHE. In addition to the institutional controls provided by the 2008 Consent Decree and the Lake County regulations, all OU4 is in Lake County's Industrial Mining zoning district, which serves to limit future changes of land use without county approval and notification to the EPA and CDPHE of such proposed changes. In addition, Newmont/Resurrection recorded environmental covenants on its OU4 properties on July 31, 2012, and October 1, 2012. These covenants prohibit residential use and restrict groundwater use. The EPA deleted OU4 from the NPL on October 24, 2014.

### **Systems Operations/Operation & Maintenance (O&M)**

Newmont/Resurrection conducts inspections in accordance with the OU4, 8, 10, Operations and Maintenance

Plan, California Gulch Superfund Site, which is Appendix D to the 2008 Consent Decree approved on August 29, 2008. Its findings are documented in the Annual California Gulch Superfund Site OU4, OU8 and OU10 inspection reports. During this FYR period, Newmont/Resurrection completed routine maintenance and repairs to ditches such as removing debris, vegetation, and reseeding localized barren areas.

## VIII.2 OU4: PROGRESS SINCE PREVIOUS FYR

This section includes the protectiveness determinations and statements from the 2017 FYR Report (Table 8). There were no recommendations identified from the 2017 FYR Report.

**Table 8: Protectiveness Determinations/Statements from the 2017 FYR Report**

OU #	Protectiveness Determination	Protectiveness Statement
4	Protective	The remedy at OU4 is protective of human health and the environment. Exposure pathways that could result in unacceptable risks are being controlled by diverting contaminated surface water and removing, consolidating and/or covering mine waste. Institutional controls have been implemented to ensure that engineered remedy components are protective and that any soil excavation is performed in a manner protective of human health and the environment. Residential use is prohibited in certain portions of OU4.

## VIII.3 OU4: FYR PROCESS

### Data Review

There are no applicable data to review for OU4.

### Site Inspection

The OU4 site inspection took place on June 16, 2022. Participants are listed in Section III of this FYR Report. Photographs were taken of representative waste piles (Appendix G). An inspection checklist has been completed. It is available in Appendix F.

An unpaved roadway crosses OU4. Based on the results of the O&M activities conducted during this FYR, Newmont/Resurrection completed routine maintenance and repairs to ditches such as removing debris and vegetation and reseeding localized barren areas. Most of the OU4 waste piles have been removed and consolidated; some piles have been revegetated or covered with rock and posted with no trespassing signs. There are roadways throughout OU4 that local residents and tourists use to access various parts of the Site, primarily for recreation activities.

## VIII.4 OU4: TECHNICAL ASSESSMENT

**QUESTION A:** Is the remedy functioning as intended by the decision documents?

Newmont/Resurrection constructed surface water diversion structures, moved mining waste; excavated and consolidated mining wastes and covered and regraded the covered waste rock. Under the 2008 Consent Decree, Newmont/Resurrection agreed to operate and maintain OU4 remedy features. All institutional controls required by site decision documents are in place as are procedures to notify the EPA and CDPHE should local governments approve a change in land use. In addition, Newmont/Resurrection placed environmental covenants on its OU4 properties to further protect remedy features. These environmental covenants were recorded with the Lake County Clerk and Recorder’s Office on July 31, 2012, and October 1, 2012.

**QUESTION B:** Are the exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy selection still valid?

There have been no changes to the ARARs identified in the ROD or since the previous FYR. No newly promulgated standards have been identified that could call into question the protectiveness of the remedy as implemented (see Appendix H for details). The 1998 OU4 ROD did not establish numeric cleanup standards for surface water or groundwater. The RAOs identified in the 1998 OU4 ROD included controlling erosion of contaminated materials into local waterways and controlling the leaching and migration of contaminated materials into surface water and groundwater. These RAOs have largely been achieved based on the review of the sitewide data collected as part of OU12.

**QUESTION C:** Has any other information come to light that could call into question the protectiveness of the remedy?

No additional information has come to light that would call into question the protectiveness of the remedy.

### VIII.5 OU4: ISSUES/RECOMMENDATIONS

Issues/Recommendations
<b>OU(s) without Issues/Recommendations Identified in the FYR:</b>
OU4

### VIII.6 OU4: PROTECTIVENESS STATEMENT

Protectiveness Statement(s)		
<i>Operable Unit:</i> 4	<i>Protectiveness Determination:</i> Protective	<i>Planned Addendum Completion Date:</i> <a href="#">Click here to enter a date</a>
<p><i>Protectiveness Statement:</i> The remedy at OU4 is protective of human health and the environment. Exposure pathways that could result in unacceptable risks are being controlled by diverting contaminated surface water and removing, consolidating and/or covering mine waste. Institutional controls have been implemented to ensure that engineered remedy components are protective, and that any soil excavation is performed in a manner protective of human health and the environment. Residential use is prohibited in certain portions of OU4.</p>		

## IX. OU5: ASARCO SMELTERS/SLAG/MILL SITES

OU5 includes five smelter sites – the Elgin Smelter, the Grant/Union Smelter, the Western Zinc Smelter, the AV South Hillside Slag Pile (collectively known as the EGWA sites), and the AV Smelter. OU5 also includes one mill site, the Colorado Zinc-Lead Mill (CZL) which is co-located with the AV Smelter (Figure D-6).

The AV/CZL site is located about 1.5 miles southwest of Leadville on the north bank of California Gulch. The combined area covers about 70 acres. The entire AV/CZL site lies above the 500-year floodplain of Lower California Gulch. This site is also next to parts of OU3 that includes the AV Smelter Slag Pile. The AV Smelter, which is part of the Leadville Historic Mining District, operated from 1879 to 1961. It was the longest-operating smelter in the Leadville area, processing a wide variety of ores and reprocessing slag to produce lead, silver and other metals. The CZL operated intermittently from 1926 to 1938, using a custom flotation process to produce zinc, lead, gold, silver and some copper. The byproduct of mill operations was tailings that were discharged below the mill, presumably into the CZL Tailing Impoundment (OU8). The mill closed in 1930. After remodeling, it reopened in 1935 to process ores from several local mines and waste dumps; these operations ceased in 1938.

The Elgin Smelter, which operated intermittently from 1879 to 1903, is located in north-central Leadville, on the

south bank of Big Evans Gulch, near the intersection of U.S. Highway 24 and State Highway 91. Several different companies leased and operated the Elgin Smelter works between 1893 and 1902. The Grant/Union Smelter was actually two smelters – the Grant Smelter, which operated from 1878 to 1882, and the Union Smelter, which operated from 1892 to 1900. Both smelters were near the confluence of Georgia Gulch and California Gulch, northeast of the Colorado Mountain College campus. The Western Zinc Smelter, which operated from 1914 to 1926, is located in the western part of Leadville, about 75 feet west of McWethy Drive and about 100 feet south of the Lake County fairgrounds. The Western Zinc Mining and Reducing Company used the facility to extract zinc from ores.

The AV South Hillside Slag Pile (also referred to as the Tramway Slag Pile) is located south of U.S. Highway 24 on the hillside across from the AV Smelter site. It was perhaps used by the AV Smelter or the Grant/Union Smelter. The site consists of an estimated 16,000 cubic yards of slag in two elongated piles that extend about 2,000 feet parallel to California Gulch and U.S. Highway 24. There are no smelter remains or any other waste materials except slag at this site.

Prior to the remedial action, smelter debris covered much of the OU5 area. The debris consisted primarily of brick, concrete, metal, tile, wood and glass, as well as residual mine waste and smelter materials, including coke/charcoal, limestone, ore, matte, tailings and flue dust.

Most of the smelter and mill structures at the AV/CZL site have been demolished, though some buildings and foundations remain preserved as cultural heritage properties. The EGWA sites are currently vacant.

## IX.1 OU5: RESPONSE ACTION SUMMARY

### Basis for Taking Action

The final sitewide BRAs conducted from 1991 to 1996 identified non-residential soils and future residential area soils as potential media of concern at OU5. Metals from former mining practices, including lead, arsenic, cadmium, copper and zinc in soil and air, presented a potential risk to human and ecological receptors. The human health risks at the Site have been attributed to lead and arsenic. Therefore, these two contaminants were selected as indicator chemicals for remedial response. Appendix B (Table B-7) provides a chronology of OU5 events.

Table 9 lists the contaminated medium at OU5.

**Table 9: Contaminated Medium, OU5**

Medium	Area of OU5	Contamination
Soil	AV	Results of the soils investigation indicate elevated arsenic, cadmium, lead and zinc levels; the highest levels of contamination were detected in samples from the baghouse area.
	CZL	Elevated lead levels
	Elgin Smelter	Elevated lead and arsenic levels
	Grant/Union Smelter	Elevated lead and arsenic levels
	Western Zinc Smelter	Elevated lead and arsenic levels
	AV South Hillside Slag Pile	Elevated lead and arsenic levels

### Response Actions

In September 1990, the EPA and ASARCO Incorporated signed an AOC for sampling at the Site. In 1991, the EPA issued a UAO that required ASARCO Incorporated to conduct studies and complete RIs. In August 1994, ASARCO Incorporated entered into a Consent Decree with the United States, the State and PRPs to perform certain remediation work in OUs 5, 7 and 9.

The EPA issued two RODs for OU5. The EPA issued the OU5 ROD for the AV/CZL site on September 29, 2000. The EPA issued the second OU5 ROD for the EGWA sites on October 31, 2000.

The OU5 ROD for the AV/CZL established the following RAOs:

*Tailings*

- Control airborne transport of tailings particles
- Control erosion of tailings into local water courses
- Control leaching and migration of metals from tailings into surface water
- Control leaching and migration of metals from tailings into groundwater

*Flue Dust*

- Control airborne transport of flue dust particles
- Control erosion of flue dust and deposition into local water courses
- Control release and migration of metals from flue dust in surface water
- Control leaching and migration of metals from flue dust into groundwater
- Control contamination exposure to humans, animals and aquatic life

*Non-residential Area Soils*

- Control airborne transport of contaminated materials
- Control erosion of contaminated materials and deposition into local water courses
- Control leaching and migration of metals from soils in surface water
- Control leaching and migration of metals from soils into groundwater
- Control contamination exposure to humans, animals and aquatic life

*Residential Area Soils*

- Prevent direct exposure of the population to elevated concentrations of contaminants in the surface soil.

The remedy selected for the AV/CZL site consisted of:

- Excavation of flue dust and relocation to a single-lined, fully encapsulated repository.
- Consolidation of tailings and non-residential soils and placement of an 18-inch vegetated soil cover over the consolidated pile. This remedy will make portions of the AV/CZL site a permanent waste management area.
- Implementation of institutional controls such as deed notices or deed restrictions to provide notification that a barrier is in place and to restrict land uses incompatible with the remedy.
- Development of an O&M program during the remedial design to include inspection and maintenance of the cover and surface water controls, as well as inspection for evidence of erosion, differential settlement of the cover and adequacy of vegetation.

The OU5 ROD for the EWGA established the following RAOs:

*Slag*

- Control of leaching of metals of concern in concentrations that would have an adverse impact on soils, surface water, or groundwater
- Control airborne transport of contaminated materials
- Control erosion of contaminated materials to prevent deposition into local surface water courses

*Non-residential Area Soils*

- Control airborne transport of contaminated materials
- Control erosion of contaminated materials and deposition into local water courses
- Control leaching and migration of metals from soils in surface water
- Control leaching and migration of metals from soils into groundwater
- Control contamination exposure to humans, animals and aquatic life

### *Residential Area Soils*

- Prevent direct exposure of the population to elevated concentrations of contaminants in the surface soil.

The remedy selected for the EGWA sites consisted of:

- Implementation of institutional controls to warn of potential hazards and to maintain the effectiveness of the remedy by limiting access to or use of the property for current or potential future land use scenarios

The 2000 EGWA ROD determined that the selected remedy would control airborne transport, erosion and metals leaching from contaminated materials because no significant pathway for transport of constituents from slag or soil to other environmental media have been identified for the EGWA sites.

The 2000 OU5 RODs for the EGWA sites and AV/CZL site did not contain numeric cleanup standards but were meant to address potential source material contributing to surface water, groundwater and releases to air. The OU12 remedy addresses sitewide surface water and groundwater contamination to measure effectiveness of source control remedies. The EPA issued a minor ROD Modification (ROD Mod) on May 16, 2013, that clarifies the institutional controls.

### **Status of Implementation**

Implementation of the 2000 OU5 AV/CZL ROD began in June 2002. Some smelter structures were demolished, flue dust was excavated, and contaminated materials were transported to an on-site repository. Tailings and contaminated soil were consolidated on site and placed under 18 inches of clean soil cover that was then vegetated. Diversion ditches to prevent run-on and ponding on the consolidated waste pile were also constructed. Remedial actions were initiated by ASARCO Incorporated but discontinued when the company filed for bankruptcy. The EPA assumed lead responsibility for implementation of the OU5 remedy through a settlement agreement between ASARCO Incorporated and the federal government signed in 2007. The EPA completed OU5 remedial activities in 2010 and an O&M plan in 2016.

The OU5 RODs for both the EGWA sites and the AV/CZL sites included institutional controls as a component of the remedy. After the original overlay district concept for implementation of institutional controls proved infeasible, an alternate course of action was designed during the previous FYR period. Lake County passed an ordinance that acts as an institutional control on April 15, 2013. It protects remedy components, requires best management practices for soil excavation, and requires CDPHE approval for any excavation or earth removal activity that exceeds 10 cubic yards. The city of Leadville adopted a similar ordinance for properties in OU5 and within city limits on May 7, 2013. The EPA partially deleted OU5 from the NPL on October 24, 2014.

### **Systems Operations/Operation & Maintenance (O&M)**

CDPHE conducts annual O&M inspections and maintenance activities, per the Site's October 2016 O&M Plan. O&M activities are performed under the EPA grant funded with Special Account monies. O&M activities include inspection and maintenance of the covers and surface water controls. As a result of the September 2021 inspection, TetraTech, the State O&M Inspection contractor, made several recommendations to improve the functionality and longevity of various remedy components. The O&M issues identified do not currently present concerns for the remedy's protectiveness. CDPHE in consultation with EPA will determine which of these recommendations will be implemented as part of O&M activities.

### *Arkansas Valley Smelter CDPHE O&M Contractor Recommendations*

- Have a comprehensive vegetation inspection performed by a certified specialist
- Reshape the riprap-lined channel adjacent to the ruins on the northern side of the AV repository
- Remove the excess riprap and repair the downstream end of the eastern culvert to restore the culvert's capacity
- Install a locking device on the Sump to minimize tampering
- With the potential for unauthorized access to the site, it is recommended that "No Trespassing" signs be placed around each of the historic concrete structures to discourage access.

- Repair the well casing AVRPMW-3

*Colorado Zinc-Lead Mill CDPHE O&M Contractor Recommendations*

- Have a comprehensive vegetation inspection performed by a certified specialist
- Institute erosion control measures on unvegetated slopes to minimize the potential for continued erosion and transport of soils off site
- Institute run-on controls to minimize the impact of future erosion
- Construct runoff control berms along the toe of the eroding slopes to minimize the potential for metal-laden soils to enter California Gulch

*Grant/Union Smelter CDPHE O&M Contractor Recommendations*

- After slag removal, utilize slope shaping to stabilize slopes and cover up erodible soils

*Western Zinc Smelter Recommendations*

- Reshape and reinforce channels in each of the locations noted. The purpose is to provide adequate capacity and material for an estimated flow rate to prevent further gully erosion or channel migration.

*Arkansas Valley South Hillside Slag Pile CDPHE O&M Contractor Recommendations*

- “No Trespassing” signs are recommended to discourage vehicle access onto the slag piles.

## **IX.2 OU5: PROGRESS SINCE PREVIOUS FYR**

This section includes the protectiveness determinations and statements from the 2017 FYR Report (Table 10). There were no recommendations identified from the 2017 FYR Report.

**Table 10: Protectiveness Determinations/Statements from the 2017 FYR Report**

<b>OU #</b>	<b>Protectiveness Determination</b>	<b>Protectiveness Statement</b>
5	Protective	The remedy at OU5 is protective of human health and the environment. Source contamination has been addressed through engineered remedy components. Institutional controls restrict land uses that would be incompatible with this remedy. The RAOs stated in the two 2000 OU5 RODs for the EGWA Sites and the AV/CZL Sites have been achieved. In addition, CDPHE ensures the remedy remains functioning as intended through routine O&M activities. All institutional controls required by site decision documents are in place, as are procedures to notify the EPA and CDPHE should local governments approve a change in land use.

## **IX.3 OU5: FYR PROCESS**

### **Data Review**

There are no applicable data to review for OU5.

### **Site Inspection**

The OU5 site inspection took place on June 16, 2022. Participants are listed in Section III of this FYR Report. The site inspection checklist and photographs are included in appendices F and G, respectively. All contaminated materials at OU5 former smelter areas have been consolidated and put under a protective cover. The covers are vegetated and in good condition.

## IX.4 OU5: TECHNICAL ASSESSMENT

**QUESTION A:** Is the remedy functioning as intended by the decision documents?

The site inspection and the review of documents, ARARs and risk assumptions indicate that the Site's OU5 remedy is functioning as intended by site decision documents. An 18-inch soil cover was placed over the consolidated waste. The grading of the cover's surface promotes positive drainage. Vegetation minimizes erosion and the potential for exposure to contaminants. In addition, surface water diversion channels minimize run-on and ponding on the surface of the waste management unit. The EPA assumed the lead for remedial and O&M activities at OU5 through a settlement with ASARCO Incorporated in 2007. CPDHE is currently responsible for O&M activities.

The EPA completed construction of the engineered remedy in 2010. All institutional controls required by site decision documents are in place. The EPA and CDPHE will be notified should local governments approve a change in land use. In addition, the EPA signed a minor ROD modification on May 16, 2013, that clarified the institutional controls. The EPA partially deleted OU5 from the NPL on October 24, 2014.

**QUESTION B:** Are the exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy selection still valid?

The RAOs identified in the selected remedies for OU5 included controlling erosion of contaminated materials into local waterways; controlling the leaching and migration of contaminated materials into surface water and groundwater; controlling airborne transport of contaminated materials; controlling contamination exposure to humans, animals and aquatic life; and preventing direct exposure of humans to elevated contaminant levels in surficial soil. These RAOs have been achieved through implementation of the engineered remedy.

There have been no changes to the ARARs identified in the OU5 RODs or since the previous FYR. No newly promulgated standards have been identified that could call into question the protectiveness of the remedy as implemented.

**QUESTION C:** Has any other information come to light that could call into question the protectiveness of the remedy?

As per Lake County Resolution 2013-12, written approval from CDPHE is required to excavate and remove any earthen materials, including, but not limited to, native dirt, mine waste rock (e.g., tailings, slag, flue dust) in excess of 10 cubic yards from a non-engineered remedial component of the Site. In July 2019, the Leadville, Colorado & Southern Railroad Company contacted CDPHE to move slag material from the Grant/Union Smelter Site (OU5) to Southern Railroad's property (OU3) for use as railroad ballast. CDPHE reviewed and approved the proposal in September 2019. No other information has come to light that could call into question the protectiveness of the remedy.

## IX.5 OU5: ISSUES/RECOMMENDATIONS

Issues/Recommendations
OU(s) without Issues/Recommendations Identified in the FYR:
OU5

### OTHER FINDINGS

Review, assess and implement as appropriate the recommendations in the 2021 O&M OU2, 5 and 7 Inspection Report.

## IX.6 OU5: PROTECTIVENESS STATEMENT

Protectiveness Statement(s)	
<i>Operable Unit:</i> 5	<i>Protectiveness Determination:</i> Protective
<p><i>Protectiveness Statement:</i> The remedy at OU5 is protective of human health and the environment. Source contamination has been addressed through engineered remedy components. Institutional controls restrict land uses that would be incompatible with this remedy. The RAOs in the two 2000 OU5 RODs for the EGWA sites and the AV/CZL sites have been achieved. In addition, CDPHE ensures the remedy continues to function as intended through routine O&amp;M activities. All institutional controls required by site decision documents are in place, as are procedures to notify the EPA and CDPHE should local governments approve a change in land use.</p>	

## X. OU6: STRAY HORSE GULCH AND EVANS GULCH WATERSHEDS

Located east of Leadville, OU6 is 3.4 square miles in size (Figure D-7). OU6 consists of several consolidated mine waste piles (including Hamm’s Tailing Impoundment and the Penrose Mine Waste Pile), and about 2,200 acres of mining wastes in Stray Horse Gulch, the upper portion and headwater of Evans Gulch, and the lower portion of Evans Creek. On its western boundary, OU6 also includes some residential areas in Leadville and a drainage corridor along 5th Street and Starr Ditch downstream of the confluence with the Stray Horse drainage. Appendix D contains maps identifying the location of individual tailings piles by number and areas addressed by the pre-ROD removal action phases, as well as a detailed view of the Stray Horse Gulch area of OU6.

The headwaters of Stray Horse Gulch are east of Leadville, in the area of Breece Hill and the IbeX/Irene Milling/Mining Complex. This water flows through Leadville via the 5th Street drain and Starr Ditch and eventually discharges to Lower California Gulch. The Hamm’s Tailing Impoundment covers an area of about 6.5 acres, with a volume of about 245,000 cubic yards. The impoundment is located in Stray Horse Gulch. The Penrose Mine Waste Pile was located south of East 4th Street in Leadville and east of Hazel Street. The Penrose Mine Waste Pile covered an area of about 4 acres. It contained about 173,000 cubic yards of waste rock.

Historically, during heavy periods of precipitation or snow melt, tailings materials from both Hamm’s Tailing Impoundment and Penrose Mine Waste Pile have been eroded and suspended in surface waters moving downslope through residential areas of Leadville. This surface water is collected by Starr Ditch and conveyed by the ditch to California Gulch and the Arkansas River. In addition, metals leached from the multiple other mine wastes present in OU6 and were transported to California Gulch via the portion of Starr Ditch south of 5th Street.

Lake County’s current zoning designation for most of OU6 is industrial mining. Other current land uses for smaller areas of OU6 include recreation, commercial activities, mine tourism and residential uses. The Leadville area has been classified as a National Historic Landmark. Little Stray Horse Gulch contains several famous historic mines, including the Matchless Mine of Baby Doe and Horace Tabor.

### X.1 OU6: RESPONSE ACTION SUMMARY

#### Basis for Taking Action

The final sitewide BRA evaluated soil, slag, waste rock and tailings in upland areas, as well as fluvial tailings and sediments in riparian areas. Contaminants evaluated included arsenic, antimony, barium, beryllium, cadmium, chromium, copper, lead, nickel, manganese, mercury, silver, thallium and zinc. The EPA selected lead and arsenic as indicator chemicals for cleanup based on the human health risk posed by these two contaminants at the Site.

Table 11 lists contaminated media in OU6. Appendix B (Table B-8) provides a chronology of OU6 events.

**Table 11: Contaminated Media, OU6**

Media	Contamination
Sediment	Based on data from the 1997 EE/CA for Stray Horse Gulch, elevated metals contamination was found in the sampling stations along Stray Horse Gulch.
Mine tailings and waste rock piles	The Stray Horse Gulch tailings and waste rock piles were analyzed by x-ray fluorescence for lead and arsenic concentrations as part of the mine waste piles RI. Surface soils contained elevated arsenic, lead, cadmium and zinc levels. Subsurface and foundation soils contained significantly elevated levels of arsenic, cadmium, lead and zinc.

**Response Actions**

The EPA implemented several response actions at OU6 between 1990 and 2001 (see Table B-9 for a comprehensive list), prior to the signing of the ROD to systematically clean up most mine wastes causing contamination in OU6. These response actions included:

- Relocation, consolidation and/or capping of selected mine waste piles
- Collection and treatment of ARD from mine waste piles. Treatment occurs at the WTP operated by the U.S. Bureau of Reclamation (USBR) at the portal of the Leadville Mine Drainage Tunnel (LMDT).
- Construction of ARD retention ponds and subsequent maintenance
- Diversion of clean surface water around mine wastes
- Rehabilitation of Stray Horse Gulch and Starr Ditch

The EPA issued the ROD for OU6 on September 25, 2003. The 2003 OU6 ROD identified the following RAOs for OU6:

- Control erosion of mine waste rock and deposition into local water courses
- Control leaching and migration of metals from mine waste rock into surface water
- Control leaching of metals from mine waste rock into groundwater
- Prevent direct unacceptable exposures to elevated concentrations of contaminants in the soil and waste rock

The OU6 selected remedy consisted of the following elements:

- Maintenance of the existing response actions implemented prior to the ROD
- Installation of bulkheads in the LMDT
- Pumping ARD impounded behind the bulkhead to the surface with conveyance to the USBR treatment plant via a gravity pipeline
- Removal of the Ponsardine mine waste pile, with on-site disposal
- Repair of unstable cribbing associated with the Robert Emmet mine site
- Institutional controls to address future changes in land use

The EPA modified the 2003 OU6 ROD with an AROD on September 28, 2010, to expand 2003 ROD remedy to include diversion systems and address additional waste rock piles as follows:

- Phase 1: Improve the clean water diversion systems along the Mahala, Pyrenees, Greenback, RAM, Old and New Mikado and Adelaide-Ward waste rock piles
- Phase 2: Selectively cap additional mine waste rock piles to decrease the volume of ARD generated
- Phase 3: Enlarge and enhance the current ARD collection system and retention ponds
- Eliminate the use of the LMDT and USBR LMDT Treatment Plant from the OU6 remedy, except in the case of emergencies
- Shift the monitoring of groundwater and water levels in the LMDT to OU12 Sitewide Water Quality
- Site and construct a sitewide repository in OU6

- Remove implementation of bulkheads in the LMDT
- Implement institutional controls to protect engineered remedies and to reduce exposure to contaminants that will remain

The 2003 OU6 ROD and 2010 OU6 AROD did not contain numeric cleanup standards, but were meant to address potential source material contributing to surface water and groundwater contamination. The OU12 remedy addresses sitewide surface water and groundwater contamination to monitor the effectiveness of the source control remedies.

### **Status of Implementation**

Since 2012, the following remedy elements of the 2003 OU6 ROD and 2010 OU6 AROD have been implemented:

- Maintenance of the existing response actions implemented prior to the ROD
- Removal of the Ponsardine mine waste pile, with on-site disposal
- Repair of unstable cribbing associated with the Robert Emmet mine site
- Multiple tracer and other studies to investigate the existence and quality of a hydraulic connection between the Marion adit and the LMDT. These studies assessed the effectiveness of the 2000 removal action that diverted ARD discharged by surface water control structures to the subsurface for conveyance to the USBR WTP.
- Remedial design activities
- Installation of monitoring wells in the LMDT as part of data collection to support remedial design activities
- A non-time-critical removal action in 2005 to construct an engineered outlet for the Gaw Shaft. The Gaw Shaft is believed to be a relief point for the mine pool impounded behind suspected blockages in the LMDT
- Installation of a relief well during the 2008 State of Emergency due to high water levels and a blockage in the LMDT
- Pumping the water in the Mikado Pond to the Marion Pond in 2011 to prevent an uncontrolled release into Stray Horse Gulch
- Removal of sediment in the Marion, Greenback, Mikado and Adelaide ponds, and addition of signage and fencing in 2012
- Adoption of an ordinance enacting institutional controls in OU6 along Starr Ditch by the city of Leadville on May 7, 2013. These institutional controls protect remedy components, require best management practices for soil excavation, and require CDPHE approval for any excavation or earth removal activity that exceeds 10 cubic yards. Additional areas of OU6 are zoned for industrial mining and business use. The need for additional institutional controls on portions of OU6 outside city limits is being evaluated.
- In 2014, Mikado Pond was dewatered to prevent overtop; sediments were removed to increase capacity.
- A time-critical removal action that began in 2015 provided an additional system to drain Greenback Pond during spring runoff, extended and improved surface water controls, removal of sedimentation from retention ponds, pumping of ARD retention ponds to prevent overtopping, and pumping water at the Gaw Shaft through a relief well, and monitoring of the mine pool. Monitoring of mine pool water levels continues as part of the O&M activities for completed remedy components.
- Construction of the repository in June 2013; the repository also receives contaminated residential soils removed from OU9 (See Section XII).
- The diversion ditch upgradient of the Mikado, RAM and Pyrenees waste rock piles was re-engineered in 2016 that included construction of the Gaw pump house to better divert clean water into No Name Gulch and, ultimately, into California Gulch. The effectiveness of this diversion is being monitored.

After completion of Phase 1 activities in 2016, the EPA completed a Technical Assessment Report in March 2021 to support Phase 2 (waste rock pile capping) and Phase 3 (resizing of collection channels and ponds) remedial design and remedial action activities for OU6. The assessment revised the conceptual understanding of the OU6

geology and hydrology based on information obtained during Phase 1 activities to refine the design for the Phase 2 and Phase 3 remedial actions. Recommendations can be found in the report.

In 2020, to meet the requirements of the OU6 decision documents that require institutional controls designed to protect engineered remedies and to reduce exposure to contaminants left in place, the EPA and CDPHE proposed an amendment of the Lake County Land Development Code. The amendment is under review. In order for the remedy to comply with Colorado's Environmental Covenants Act (C.R.S. 25-15-317 to 327), Lake County will need to enter into an intergovernmental agreement (IGA) granting the State authority to enforce against violations of the land-use control ordinance. If an IGA is not reached, areas affected by the amended remedy containing waste left in place or engineered features will need an environmental covenant or restrictive notice as required by C.R.S. § 25-15-320.

**Systems Operations/Operation & Maintenance (O&M)**

An O&M Plan for the repository is in place. An O&M Plan for the remaining components is planned.

**X.2 OU6: PROGRESS SINCE PREVIOUS FYR**

This section includes the protectiveness determinations and statements from the 2017 FYR (Table 12). There were no recommendations identified from the 2017 FYR.

**Table 12:** Protectiveness Determinations/Statements from the 2017 FYR

OU #	Protectiveness Determination	Protectiveness Statement
6	Will be Protective	The remedy at OU6 is expected to be protective of human health and the environment upon completion. Currently, contaminated surface waters are contained in a series of retention ponds and/or channeled for treatment at the USBR Leadville Mine Drainage Tunnel Treatment Plant via the Leadville Mine Drainage Tunnel.

**X.3 OU 6: FIVE-YEAR REVIEW PROCESS**

**Data Review**

The selected remedy for OU6 is for source remediation. No specific numerical performance standards are part of the RAOs for OU6. The remedy for OU12 is designed to achieve chemical-specific, numerical performance standards for sitewide surface water and groundwater. Therefore, there were no data to review for OU6.

**Site Inspection**

The OU6 site inspection took place on June 16, 2022. Participants are listed in Section III of this FYR Report. Photographs were taken of site features, including monitoring wells and access controls (Appendix G). An inspection checklist has been completed. It is available in Appendix F.

The site inspection began at the waste soil repository area and associated drainage pond constructed in 2013 to receive sitewide contaminated soil and sediment. The repository and pond were surrounded by a fence posted with warning signs. The repository appeared to be in good condition and the sloped sides were reinforced with rock. The site inspection continued with observations of a number of waste rock piles and associated surface water retention ponds and extensive surface runoff diversion features throughout OU6. These included the Pyrenees, RAM, Old and New Mikado, Greenback and Mahalla waste rock piles. Contaminated runoff from these piles is contained in the surface water ditch system that ultimately channels the runoff via the Leadville Mine Drainage Tunnel to the USBR plant for treatment. In addition, participants observed the conveyance system installed as part of the May 2015 time-critical removal action that transports drainage from the Greenback Pond and Marion Pond to the Robert Emmet Mine Shaft, with ultimate treatment at the LMDT.

Participants observed the Marion, Greenback, Mikado and Adelaide-Ward ponds, which were surrounded by fencing and warning signs. Due to four years of drought, the water levels in the ponds visited were well below the berms. An O&M Plan for OU6 is planned. The waste pile caps and the fences around the ponds were in good condition and signs were legible. Participants observed improvements to the OU6 diversion ditches, which have been enlarged and reinforced with riprap rock to disperse flow. The Mineral Belt Trail paved path was also observed and in good condition.

## **X.4 OU6: TECHNICAL ASSESSMENT**

**QUESTION A:** Is the remedy functioning as intended by the decision documents?

The OU6 remedy is in the process of being fully implemented. When complete, the remedy is anticipated to function as intended by site decision documents. The primary objective of the OU6 remedy is to minimize the volume of ARD that can impact surface water and groundwater. Many waste rock piles are located in OU6. In the 1990s, several piles were capped. Surface water retention and diversion channels to contain ARD were constructed. Retention ponds capture ARD from the piles. An overflow system channels contaminated surface water through a series of retention ponds and through the LMDT to the USBR Leadville Mine Drainage Tunnel Treatment Plant.

The 2010 OU6 AROD outlines a phased approach to reducing ARD in OU6. Phase 1, the enhancement to the diversion ditch upgradient to the Greenback, RAM, and Old and New Mikado waste rock piles, was completed in 2016. The Gaw shaft relief well, in conjunction with USBR treatment plant operations, is used to manage water levels in the mine pool. The USBR is in the process of building a new treatment plant in the footprint of the existing plant. Construction is planned over several years. The EPA completed a technical assessment of OU6 in March 2021 to support Phase 2 (waste rock pile capping) and Phase 3 (resizing of collection channels and ponds) remedial design and remedial action activities for OU6.

The city of Leadville's 2013 ordinance serves as an institutional control for Starr Ditch, a portion of OU6 in Leadville. In addition, areas of OU6 are zoned for industrial mining and business uses. Procedures are also in place to notify the EPA and CDPHE should local governments approve a change in land use. More institutional controls through amendments to the Lake County Land Development Code and establishment of resolutions and ordinances are being considered to protect engineered remedies and to reduce unacceptable exposures to contaminated soils in the event the zoning changes to residential.

**QUESTION B:** Are the exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy selection still valid?

The 2003 OU6 ROD did not establish numeric cleanup standards for surface water or groundwater. The RAOs identified in the 2003 OU6 ROD included controlling erosion of contaminated materials into local water courses, controlling the leaching and migration of contaminated materials into surface water and groundwater, and preventing direct unacceptable exposures to elevated concentrations of contaminants in soil and waste rock. Due to the volume of ARD generated at OU6 and the continued deterioration of the mine workings and Leadville Mine Drainage Tunnel, a 2010 AROD modified the remedy to allow for more efficient progress and long-term maintenance of these RAOs. Remedial design activities are underway.

There have been no changes to the ARARs identified in the ROD or since the previous FYR. No newly promulgated standards have been identified that could call into question the protectiveness of the remedy as implemented.

**QUESTION C:** Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has come to light that could call into question the protectiveness of the remedy.

## X.5 OU6: ISSUES/RECOMMENDATIONS

Issues/Recommendations	
<b>OU(s) without Issues/Recommendations Identified in the FYR:</b>	
None	

OU(s): 6	<b>Issue Category: Institutional Controls</b>			
	<b>Issue:</b> Institutional controls are a component of the selected remedy but have not yet been implemented.			
	<b>Recommendation:</b> Finalize additional institutional controls as appropriate.			
<b>Affect Current Protectiveness</b>	<b>Affect Future Protectiveness</b>	<b>Party Responsible</b>	<b>Oversight Party</b>	<b>Milestone Date</b>
No	Yes	Other/Lake County	EPA/State	12/30/2024

## X.6 OU6: PROTECTIVENESS STATEMENT

Protectiveness Statement(s)	
<i>Operable Unit:</i> 6	<i>Protectiveness Determination:</i> Will be Protective
<i>Protectiveness Statement:</i> The remedy at OU6 is expected to be protective of human health and the environment upon completion. Currently, surface water is diverted and contaminated surface waters are contained in a series of retention ponds and/or channeled for treatment at the USBR Leadville Mine Drainage Tunnel Treatment Plant via the Leadville Mine Drainage Tunnel. The area is zoned industrial mining. Additional institutional controls are being considered.	

## XI. OU7: APACHE TAILING IMPOUNDMENTS

OU7, the Apache Tailing Impoundments, consisted of four distinct tailings impoundments on the southern edge of Leadville, adjacent to U.S. Highway 24 (Figure D-8). These impoundments were located in California Gulch, about 1,500 feet downstream from the Yak Tunnel WTP surge pond.

Tailings, placed in the Main Impoundment and possibly the North Impoundment, were generated by a mill on the hillside northeast of the Apache Tailing Impoundments. The mill was also known as the Venir Mill, the California Gulch Mill and the ASARCO Incorporated Leadville Milling unit. Available historical information indicates this mill operated between 1939 and 1956. It produced about 630,000 cubic yards of tailings in the 11.3-acre Main Impoundment and an estimated 14,500 cubic yards of tailings in the 1.8-acre North Impoundment.

The Apache Energy & Minerals Company operated the Apache Mill from the late 1970s into the 1980s. The Apache Mill reprocessed tailings from the Main Impoundment and deposited remaining materials into Tailing Pond No. 2 and Tailing Pond No. 3, which were located west and downstream of the Main Impoundment, and were about 1.5 acres and 0.5 acres in size, respectively. Tailing Ponds No. 2 and No. 3 were consolidated into the Main Impoundment as part of a removal action in 1997.

## XI.1 OU7: RESPONSE ACTION SUMMARY

### Basis for Taking Action

The preliminary 1991 risk assessment evaluated residential risks from exposure to contaminated media. Since the completion of the preliminary 1991 risk assessment, several studies were completed that provided more data on contaminant concentrations, and human and ecological exposures. The 2000 Final Focused Feasibility Study (FFS) assessed the general conditions of the Apache Tailing Impoundments area and evaluated the nature and extent of contamination in OU7. Arsenic, cadmium, lead and zinc were identified in the FFS as potential COCs for the evaluation of the remedial alternatives. Arsenic and lead were used as indicator contaminants for risk in the final risk assessment. These contaminants were selected based on the results of the preliminary risk assessment, which indicated that lead and arsenic were responsible for most human health risks at the Site.

The preliminary 1991 risk assessment identified potential primary sources of metals of concern, the mechanisms of release to the environment, and receptors, in a Conceptual Site Model. The final 1995 risk assessment identified soil ingestion as the exposure pathway of concern for recreational visitors; ingestion of soil and dust was identified as the exposure pathway of concern for commercial/industrial workers. Exposure to other media (e.g., slag piles) and exposure to soil/dust through other pathways (e.g., dermal exposure) are considered to be an insignificant concern for workers and recreational users. The source materials identified at OU7 include tailings and foundation soils (Table 13). These source materials are not considered to be principal threat wastes. Appendix B (Table B-10) provides a chronology of OU7 events.

**Table 13: Contaminated Media, OU7**

Media	Contamination
Tailings	<p>Weathered sulfidic tailings on the surface of the North Impoundment and Main Impoundment contains elevated lead and arsenic concentrations and has a high acid-generating potential.</p> <p>Dark gray sulfidic tailings occurs below the weathered sulfidic tailings on the North Impoundment and Main Impoundment and contain elevated lead and arsenic concentrations.</p> <p>Brown oxide tailings found only on the Main Impoundment contains elevated lead concentrations and arsenic concentrations lower than those concentrations found in sulfidic tailings. Brown oxide tailings has a significant neutralization potential, counteracting acidic sulfidic tailings leachate.</p>
Soil	Foundation soils found at both the Main Impoundment and North Impoundment contain elevated lead concentrations and slightly elevated arsenic concentrations.

### Response Actions

Multiple removal actions took place at OU7 between 1996 and 2000 (Table B-11). Removal actions completed included removal of Tailing Pond No. 2 and Tailing Pond No. 3, consolidation of material removed from Tailing Pond No. 2 and Tailing Pond No. 3 on the Main Impoundment, and placement of erosion protection along the toe of the southwest embankment of the Main Impoundment below the clay-tile culverts and wooden box culvert outfalls. The December 1997 Removal Action Completion Report describes the construction activities in greater detail.

The EPA issued the ROD for OU7 on June 6, 2000, outlining the selected remedy for OU7. The OU7 remedy was selected to eliminate or reduce potential threats to humans and the environment through the construction of a soil cover with a geosynthetic barrier and revegetation, followed by implementation of institutional controls and a Long-Term Monitoring Plan. A clarification of the types of institutional controls needed was documented in a memo to the file and was signed by the EPA on May 16, 2013.

The RAOs identified in the OU7 ROD for the Apache Tailing Impoundments were:

- Control airborne transport of tailings particles
- Control erosion of tailings materials and deposition into local water courses

- Control leaching and migration of metals from tailings into surface water and groundwater

The selected remedy for OU7 included the following components:

- Surface water controls, including the channelization of California Gulch through the southern part of the Main Impoundment and diversion ditches to provide surface water run-on and runoff control
- Application of source surface controls to the impounded tailings, consisting of regrading the impoundment, placing a multi-layer composite cover over the combined tailings area, and revegetating the covered surface
- Institutional controls to warn of potential hazards and to maintain the effectiveness of the remedy by limiting access to or use of the property (current and future use scenarios), including temporary and permanent measures
- A long-term monitoring program to assess the quality of surface water and groundwater after implementation of the remedy

Per the ROD, the O&M program was developed during the remedial design. It involved vegetation monitoring, inspecting and maintaining the cover and surface water controls, and identifying areas showing evidence of erosion or differential settlement of the cover.

The 2000 OU7 ROD did not contain numeric cleanup standards, but was meant to address potential source material contributing to surface water, groundwater and air contamination. The OU12 remedy addresses sitewide surface water and groundwater contamination to monitor the effectiveness of the source control remedies.

### **Status of Implementation**

The majority of construction activities for the final remediation occurred from June through December 2001 at which time construction activities were temporarily suspended for the winter. Earthwork and revegetation activities recommenced with a different contractor at the end of September 2002 and continued into November 2002. Maintenance activities were conducted over a period of several weeks during September 2003. A summary of completed activities includes:

- Installation and maintenance of temporary sediment, diversion and stormwater control structures in accordance with the Storm Water Management Plan and maintenance of such controls during construction activities
- Provision of dust control, as necessary, during all excavating, hauling and placing operations
- Excavation of dispersed tailings and soil adjacent to the Main Impoundment to allow for the construction of temporary sedimentation ponds
- Demolition of existing concrete foundations west of the Main Impoundment
- Relocation of a section of sanitary sewer line around the North Impoundment, connection to an existing sewer line at the east and west ends, including two new sewer lateral connections and abandonment of existing manholes and sewer line.
- Regrading of the tailings impoundments as indicated on the drawings and placement of excavated material in fill areas between the Main and North Impoundments and on top of the Main Impoundment
- Removal and replacement of the overhead power line running east and west between the Main and North Impoundments
- Channelization of California Gulch through the southern portion of the Main Impoundment
- Installation of the multi-layer cover system consisting of a geosynthetic clay liner, geocomposite drainage layer, and an 18-inch soil cover over the regraded tailings impoundments
- Construction of permanent diversion ditches, berms and swales with appropriate erosion protection to provide surface water run-on and runoff control
- Extension or abandonment of monitoring wells or piezometers, as necessary
- Revegetation of the tailings impoundments and other disturbed areas with specified seed mixture.
- Site cleanup and demobilization

OU7 achieved remedial action project completion status on December 17, 2003.

On December 22, 2010, Lake County implemented institutional controls for OU7 in the form of a resolution amending the Lake County Land Development Code and adopting regulations that protect both engineered and non-engineered remedies at OU7. A best management practice handout is provided to all applicants applying for a building permit within OU7. In addition, any disruption of engineered or non-engineered remedies within OU7 requires written approval from CDPHE. The city of Leadville adopted a similar ordinance on May 7, 2013.

The EPA partially deleted OU7 from the NPL on October 24, 2014.

**Systems Operations/Operation & Maintenance (O&M)**

CDPHE conducts annual O&M inspections and maintenance activities, per the October 2016 O&M Plan. Performed by the State of Colorado under an EPA grant funded with Special Account monies, O&M activities include inspection and maintenance of the covers and surface water controls. As a result of the September 2021 inspection, TetraTech, the state O&M Inspection contractor, made several recommendations to improve the functionality and longevity of various remedy components. The O&M issues identified do not currently present concerns for the remedy’s protectiveness. CDPHE in consultation with EPA will determine which of these recommendations will be implemented as part of O&M activities. A summary is provided as follows:

*Apache Tailings Impoundment (ATI) Area CDPHE O&M Contractor Recommendations*

- Continue to monitor erosion feature located on the northern portion of the site
- Continue to monitor animal burrows on the southwest corner of the impoundment
- Have a comprehensive vegetation inspection performed by a certified specialist
- Transplant trees growing on the remedy (e.g., cap and channels)
- Reshape the eastern channel to properly convey flows through the rundown channel
- Reshape the riprap at the base of the southwest drainage channel to facilitate flow. Excess riprap can be placed in areas where geotextile fabric is visible within the channel.
- To prevent interference with flow conveyance, remove trees inside of the channel system and transplant them elsewhere (not on the cap).
- Remove sediment and vegetation to facilitate drainage through the easternmost culvert on-site
- Clean the Starr Ditch culvert approach and trash rack to facilitate drainage
- Plug the borings in the cap of the impoundment with low permeability material to re-establish the integrity of the engineered cap as part of the routine O&M
- Contact the landowner to relocate the liquid containers from the southeastern corner of the OU boundary to an area less susceptible to flooding

**XI.2 OU7: PROGRESS SINCE PREVIOUS FYR**

This section includes the protectiveness determinations and statements from the 2017 FYR Report (Table 14). There were no recommendations identified from the 2017 FYR Report.

**Table 14: Protectiveness Determinations/Statements from the 2017 FYR Report**

OU #	Protectiveness Determination	Protectiveness Statement
7	Protective	The remedy at OU7 is protective of human health and the environment. No completed human or ecological exposure pathways were identified. Institutional controls are in place. CDPHE ensures that the remedy remains functioning as intended through routine O&M activities.

### **XI.3 OU7: FYR PROCESS**

#### **Data Review**

There are no applicable data to review for OU7.

#### **Site Inspection**

The OU7 site inspection took place on June 22, 2022. Participants are listed in Section III of this FYR Report. The OU7 capped surface was in good condition with a vegetated cover. This area is used by Lake County for excess snow disposal. Photographs were taken of site features, including the Apache Tailing Impoundments (Appendix G). An inspection checklist has been completed. It is available in Appendix F. The Apache Tailing Impoundments were intact and had a well-established vegetated cover.

### **XI.4 OU7: TECHNICAL ASSESSMENT**

**QUESTION A:** Is the remedy functioning as intended by the decision documents?

Response actions included the installation and maintenance of surface water diversion and stormwater control structures, excavation, consolidation and capping of tailings and contaminated soil, construction of sedimentation ponds, demolition of existing concrete foundations, relocation of utilities, regrading of the tailings impoundments. A review of documents and site inspections indicate that the remedy is functioning as intended by the OU7 ROD.

Sitewide surface water and groundwater in the vicinity of OU7 is being addressed as part of OU12. The annual O&M review provides information to evaluate the stability, functionality and continued protectiveness of the remedy. The recommendations are addressed as part of the regular O&M activities and CDPHE addresses any maintenance and repairs to ensure the functioning of the remedy. All institutional controls required by site decision documents are in place. The EPA and CDPHE will be notified if local governments approve a change in land use. The EPA partially deleted OU7 from the NPL on October 24, 2014.

**QUESTION B:** Are the exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy selection still valid?

There have been no changes to the ARARs identified in the ROD or since the previous FYR. No newly promulgated standards have been identified that could call into question the protectiveness of the remedy as implemented (see Appendix H for detail). There have been no other changes in exposure assumptions to human health and the environment or toxicity data that would call into question the protectiveness of the remedy. There are currently no proposed reuse plans for OU7 that would affect the protectiveness of the remedy.

**QUESTION C:** Has any other information come to light that could call into question the protectiveness of the remedy?

No additional information has come to light that would call into question the protectiveness of the remedy.

### **XI.5 OU7: ISSUES/RECOMMENDATIONS**

<b>Issues/Recommendations</b>
<b>OU(s) without Issues/Recommendations Identified in the FYR:</b>
OU7

#### **OTHER FINDINGS**

Review, assess and implement as appropriate the recommendations in the 2021 O&M OU2, 5 and 7 Inspection Report.

## XI.6 OU7: PROTECTIVENESS STATEMENT

Protectiveness Statement(s)	
<i>Operable Unit:</i> 7	<i>Protectiveness Determination:</i> Protective
<i>Protectiveness Statement:</i> The remedy at OU7 is protective of human health and the environment. No completed human or ecological exposure pathways were identified. Institutional controls are in place. CDPHE ensures that the remedy remains functioning as intended through routine O&M activities.	

## XII. OU8: LOWER CALIFORNIA GULCH

OU8 is defined as the 500-year floodplain of California Gulch, from immediately below the boundary of the Yak Tunnel WTP (OU1) to California Gulch's point of confluence with the Arkansas River (Figure D-9). OU8 also includes the CZL Tailing Impoundment, which is located outside of the 500-year floodplain. OU8 is about 97 acres in size and 4.3 miles long. Lower California Gulch receives runoff and water from tributaries that drain all or parts of upgradient OUs. Lower California Gulch also receives tributary water from Upper California Gulch and Stray Horse Gulch via Starr Ditch that drain areas of OU4 (Upper California Gulch) and OU6 (Stray Horse Gulch/Evan Gulch watersheds). The land area within OU8 is mostly private property. Highway bridges, road crossings and culverts are located within the 500-year floodplain of Lower California Gulch. Lower California Gulch roughly parallels U.S. Highway 24.

Appendix D contains detailed maps for OU8 areas: Fluvial Tailing Site (FTS) 1 and FTS 2, the CZL Tailing Impoundment, FTS 3, FTS 8 and non-residential soils, FTS 6, the Gaw Waste Rock Pile and non-residential soils (Figure D-10). The land surrounding and within OU8 is zoned for industrial mining or business.

OU8 consists of a former placer and tunnel mining area. Fluvial deposits of tailing occurred as tailings were released from impoundments. Waste rock from underground mining was frequently dumped near mine shafts, as was the case with the Gaw Waste Rock Pile. During high-flow events, stream sediments originating from source areas primarily upstream of OU8 are transported by California Gulch and associated tributaries into and within OU8. The soluble metals contained in runoff have contributed to the contamination of surface water and sediments.

The CZL Tailing Impoundment is about 1 mile west of Leadville and immediately north of the Stringtown Mill Area. The CZL site was an operating flotation mill operation that covered about 1.6 acres at an average depth of 7 feet. The operation processed zinc-lead ores sporadically between 1925 and 1940. The CZL Tailing Impoundment contained an estimated 17,000 cubic yards of tailings.

Non-residential area soils are defined as poorly vegetated areas outside of the fluvial tailings sites and within the OU8 boundary. The studies identified about 6.3 acres of non-residential area soils with elevated levels of contaminants.

Appendix C provides more background information on OU8.

### XII.1 OU8: RESPONSE ACTION SUMMARY

#### **Basis for Taking Action**

Several studies and RIs have been conducted addressing Lower California Gulch (OU8). The following areas were identified as potential contaminant sources in OU8: areas of impounded tailings in the CZL Tailing

Impoundment located in the California Gulch 500-year floodplain, waste rock in the Gaw Waste Rock Pile, fluvial tailings in five fluvial tailings sites, non-residential area soils, and stream sediments. Table 15 lists contaminated media and potential contaminant sources at OU8. Appendix B (Table B-12) provides a chronology of OU8 events.

**Table 15: Contaminated Media, OU8**

<b>Media</b>	<b>Contamination</b>
CZL fluvial tailings impoundment	Elevated concentrations of lead, cadmium, arsenic and zinc, with the potential to generate ARD.
Non-residential soils	Metals concentrations are generally low and decrease with depth to native, undisturbed soils.
Gaw Waste Rock Pile	Surface soil contained lead at slightly elevated concentrations. Outflow from the Gaw shaft demonstrated neutral pH values, with minimally elevated sulfate concentrations. Metals levels were typically below limits of detection.
FTSs 1, 2 and 3	Surface tailings had elevated levels of arsenic, cadmium, lead and zinc. Subsurface tailings had elevated levels of arsenic, cadmium and lead. Foundation soils had elevated levels of silver, cadmium, arsenic, lead and zinc.
FTS6	Surface tailings had elevated levels of arsenic, cadmium, copper, lead, mercury, silver and zinc. Subsurface tailings had elevated levels of arsenic, cadmium, copper, lead, manganese, mercury and zinc. Foundation soils had elevated levels of silver, cadmium, copper, arsenic, lead and zinc. The waste pile has the potential to generate ARD.
FTS8	Surface tailings had elevated levels of arsenic, cadmium, copper, lead and zinc. Subsurface tailings had elevated levels of arsenic, cadmium, lead and zinc. Foundation soils had elevated levels of cadmium.
Stream sediment	Elevated levels of arsenic, cadmium, lead, copper and zinc.

**Response Actions**

To take advantage of the availability of the Oregon Gulch Tailing Impoundment in OU10 as a repository for contaminated materials from OU8, two interim removal actions were approved for OU8 in 1995 and 1998. In the first interim removal action, about 28,000 cubic yards of material were excavated from the CZL Tailing Impoundment, the western portion of FTS2, and the underlying foundation soils and placed in the Oregon Gulch Tailing Impoundment (OU10). The excavated area was backfilled with clean borrow soil, graded and vegetated. Wetlands adjacent to the CZL Tailing Impoundment site were revegetated in summer 1996. In the second interim removal action, about 5,794 cubic yards of fluvial tailings were excavated from poorly vegetated, erosion-prone areas in OU8 (specifically, FTS2, FTS3, FTS6 and FTS8). The excavated tailings were transported and placed in the Oregon Gulch Tailing Impoundment (OU10). In conjunction with channel excavation under the second interim removal action, about 1,339 cubic yards of sediment were removed from accumulated sediment in FTS2 and FTS3. The excavated stream sediment was transported and placed in the Oregon Gulch Tailing Impoundment (OU10). Resurrection conducted both removal actions under EPA oversight.

The EPA issued the ROD for OU8 on September 29, 2000. The ROD established the following RAOs:

- Control airborne transport of tailings particles and contaminated non-residential soils
- Control leaching and migration of metals from tailings, soil, waste rock, and contaminated fluvial and stream sediments into surface and groundwater
- Control erosion of tailings material and soil materials into local water courses
- Control contaminant exposure to animals and aquatic life

The selected remedies for addressing the contaminated media within OU8 are described below.

- *CZL Tailing Impoundment*: No further action was the selected alternative for impounded tailings within OU8. All tailings were removed from the CZL Tailing Impoundment site during the 1995 removal action. No other impounded tailings exist within OU8.

- *Non-Residential Area Soils*: Containment was the selected alternative for non-residential area soils in OU8. Non-Residential Area Soils were to be regraded to promote positive drainage, with addition of soil amendments and revegetation to follow. Institutional controls are required.
- *Gaw Waste Rock*: No action was the selected alternative for waste rock in OU8. No action was selected since sitewide studies and remedial investigations showed that the Gaw Waste Rock Pile was not a source of contamination to surface water or groundwater.
- *Fluvial Tailing Sites (FTS)*: Containment was the selected alternative for fluvial tailings in OU8. This alternative consisted of regrading, revegetation, riprap or erosion-control matting in erosion-prone areas of fluvial tailings, and institutional controls.
- *Stream Sediment*: Sediment removal and channel reconstruction was the selected alternative for stream sediment in OU8. This alternative consists of reconstruction of unstable braided channel areas of FTS3, construction of a channel through FTS6, removal of sediment and channel improvements in erosion-prone areas, and institutional controls.

The 2000 OU8 ROD did not contain numeric cleanup standards but was meant to address potential source material contributing to surface water and groundwater contamination. The OU12 remedy addresses sitewide surface water and groundwater contamination to monitor the effectiveness of the source control remedies.

### **Status of Implementation**

Resurrection completed all OU8 remedial actions in September 2003. Remedial actions included regrading of non-residential soils and FTSs 1, 2, 3, 6 and 8 to promote positive drainage. Soil amendments were added to the regraded areas to promote reestablishment of vegetation, and native wetland plant species were planted along wetland areas. Additional efforts were made to control erosion at the FTSs, including placement of riprap, gabion baskets and 2,400 linear feet of filter fabric at erosion-prone areas along California Gulch.

An area of California Gulch that has been geomorphically unstable and extended through braided channels across FTS3 was reconstructed to divert flow to the south channel. A channel was also constructed through FTS6 to preserve the 500-year floodplain so that it may continue to convey and store floodwaters. Sediment excavation cleared the channel at Removal Site 12 in FTS2 and in other erosion-prone areas of the channel. Channel improvements stabilized the banks on either side of the channel path.

The remedies met the RAOs, since materials were excavated and removed from OU8, by preventing the release of waste material or by containing the contaminated materials, and by controlling the release of waste material to air and water.

In addition, Lake County passed an ordinance on March 2, 2009, that established institutional controls for OU8 (Appendix K). Under this ordinance, the fluvial tailings sites, non-residential soils and constructed elements of the remedies within OU8 are designated as engineered remedies, and the county will not issue a permit for any activity on property that contains a designated engineered remedy unless the permit applicant has secured approval for those activities from CDPHE. For all other parts of OU8 not designated as part of an engineered remedy, the ordinance provides that any excavation or other earth removal activity that exceeds 10 cubic yards requires CDPHE approval for such activity as a condition precedent to the county granting a permit. Finally, the ordinance provides that all permit applicants shall be provided with information regarding best management practices for potentially contaminated soils and the applicant must certify they have received and reviewed this information before a permit will be issued. The City of Leadville adopted a similar ordinance for properties in OU8 within city limits on May 7, 2013. In addition, Newmont/Resurrection recorded environmental covenants on its OU8 properties on July 31, 2012, and October 1, 2012, that further prohibit residential use and restrict groundwater use.

All remedial actions have been completed. Long-term monitoring and maintenance activities are underway. The EPA partially deleted OU8 from the NPL on January 12, 2010.

### **Systems Operations/Operation & Maintenance (O&M)**

Newmont/Resurrection conducts inspections in accordance with the OU4, 8 and 10 O&M Plan, California Gulch Superfund Site, which is Appendix D to the 2008 Consent Decree approved in August 2008. The EPA approved a minor modification to the O&M Plan in 2018 that reduced the frequency of inspections at OU8 from biannually to every five years. The inspection findings are documented in the Annual California Gulch Superfund Site OU4, OU8 and OU10 inspection reports. These reports are available by contacting EPA Region 8.

The following areas in OU8 are inspected:

- FTS1 revegetated tailings and reinforced embankment
- FTS2 reinforced streambanks and revegetation
- FTS3 reconstructed stream channel, reinforced streambanks and revegetation
- FTS6 reconstructed stream channel, Apache/California Gulch Transition and revegetation
- California Gulch reinforced streambank near the Cloud City Ski Club
- California Gulch reinforced streambank near the Airport Gulch
- Revegetated non-residential soils areas

Maintenance activities during the current FYR period have included repairs to gabion baskets, stabilization of channel banks in erosion-prone areas, revegetation of barren surfaces and construction of a ditch to drain run-on water that had been ponding on the surface of tailings at FTS1.

## **XII.2 OU8: PROGRESS SINCE PREVIOUS FYR**

This section includes the protectiveness determinations and statements from the 2017 FYR Report (Table 16). There were no recommendations identified from the 2017 FYR Report.

**Table 16: Protectiveness Determinations/Statements from the 2017 FYR Report**

OU #	Protectiveness Determination	Protectiveness Statement
8	Protective	The remedy at OU8 is protective of human health and the environment. No complete human or ecological exposure pathways were identified. Institutional controls are in place and the remedy is functioning as designed.

## **XII.3 OU8: FYR PROCESS**

### **Data Review**

No data from OU8 were available for review.

### **Site Inspection**

The OU8 site inspection took place on June 22, 2022. Participants are listed in Section III of this FYR Report. OU8 extends along the lower reaches of the California Gulch between OU1 and OU11. Site inspection participants observed portions of California Gulch to look at riprap and other erosion-control mechanisms installed along erosion-prone areas of the channel. Participants also observed the stabilized tailings sites and reinforced embankments. Site inspection observations were documented in the inspection checklist. Site photographs are included in appendices F and G, respectively.

## **XII.4 OU8: TECHNICAL ASSESSMENT**

**QUESTION A:** Is the remedy functioning as intended by the decision documents?

The site inspection and the review of documents, ARARs and risk assumptions indicate that the OU8 remedy has been completed and is functioning as intended by site decision documents. Excavation of fluvial tailings, waste rock, non-residential soil and stream sediments was finished in 2003. Continued maintenance and monitoring

ensure that excavated piles of contaminated materials are stable and do not present a risk of metals loading to California Gulch. All institutional controls required by the decision documents are in place. The EPA and CDPHE will be notified should local governments approve a change in land use. Newmont/Resurrection is responsible for continued O&M activities for OU8. After implementation of all remedial components and achievement of all RAOs, the EPA partially deleted OU8 from the NPL on January 12, 2010.

**QUESTION B:** Are the exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy selection still valid?

The 2000 OU8 ROD addressed potential source material contributing to surface water and groundwater contamination at OU8. It did not contain numeric cleanup standards for surface water or groundwater. The OU12 remedy addresses sitewide surface water and groundwater contamination.

All the RAOs identified in the 2000 OU8 ROD have been achieved. Vegetation of the contaminated material pile surfaces controls airborne transport, erosion, and exposure of animals and aquatic life to contamination. Land use at OU8 has not changed. The exposure assumptions used in the development of the 2000 OU8 ROD remain valid. There have been no changes to the ARARs identified in the ROD or since the previous FYR. No newly promulgated standards have been identified that could call into question the protectiveness of the remedy as implemented.

**QUESTION C:** Has any other information come to light that could call into question the protectiveness of the remedy?

No additional information has come to light that would call into question the protectiveness of the remedy.

## XII.5 OU8: ISSUES/RECOMMENDATIONS

Issues/Recommendations
<b>OU(s) without Issues/Recommendations Identified in the FYR:</b>
OU8

## XII.6 OU8: PROTECTIVENESS STATEMENT

Protectiveness Statement(s)	
<i>Operable Unit:</i> 8	<i>Protectiveness Determination:</i> Protective
<i>Protectiveness Statement:</i> The remedy at OU8 is protective of human health and the environment. No complete human or ecological exposure pathways were identified. Institutional controls are in place and the remedy is functioning as designed.	

## XIII. OU9: RESIDENTIAL POPULATED AREAS

OU9 includes residential area soils in those parts of the Site where the land use is residential or that were zoned as residential/populated areas and as low-density residential areas on or before September 2, 1999 (Figure D-11). Residential area soils are defined in the 1994 Consent Decree with ASARCO Incorporated as soils in the residential area of the Site that may have been impacted by past smelting and mining activities. This encompasses the city of Leadville, Stringtown and outlying areas zoned for residential use. Included are residential properties, yards, parks, vacant lots, schoolyards, playgrounds and community use areas, including unpaved streets and

alleys. For ease in determining compliance with blood monitoring performance standards, OU9 was geographically divided into statistical subunits A through G. In addition, OU9 includes 38 mine waste piles located in populated areas of eastern Leadville. Appendix C provides more information about OU9.

### **XIII.1 OU9: RESPONSE ACTION SUMMARY**

#### **Basis for Taking Action**

Numerous risk assessments were conducted. They included Baseline human health risk assessments (BRAs) (part A, part B and part C), an ecological risk assessment for Terrestrial ecosystems, a surface water human health risk assessment, a groundwater baseline human health risk assessment, and a baseline aquatic ecological risk assessment.

The BRAs concluded that lead was the only COC for OU9 based on lead models and blood-lead monitoring. The non-lead metals (including arsenic and manganese) in residential soils do not pose a significant health risk to residents. These results were supported by a large body of site-specific data. Included were:

- Extensive measurements of lead in soil and dust in residential locations
- An extensive demographics survey
- Data on lead levels in water and paint (both interior and exterior)
- Data on the physical and chemical forms of lead at various locations around the community
- An informative community-wide blood lead study involving 314 children (about 65% of the total population of children at the Site)

These data were used to support two parallel lines of investigation and assessment. The first of these investigations and assessments employed the EPA's Integrated Exposure Uptake and Biokinetic Model (IEUBK) to calculate the expected impact of lead levels in soil and dust on blood lead levels in area children. The second approach compared the measured blood lead values in area children with relevant national blood lead statistics to help evaluate the current effects of actual site exposure to lead.

The Final Residential Soil FS Report, completed in November 1998, evaluated seven remedial alternatives to address the residential soils of properties, yards and open-space areas within OU9 where lead levels exceeded the trigger level of 3,500 mg/kg. The selected FS alternative was the Lake County Community Health Program (LCCHP), a revised version of the Kids First program used during the interim response. The LCCHP combined blood lead monitoring, education, community awareness and residence-specific response actions to reduce the potential for children to be exposed to lead in Leadville and surrounding areas. This program addressed lead in soil and dust, interior and exterior paint, plumbing fixtures, and dietary and household sources. O&M activities include LCCHP Phase 2 administration, which includes the community outreach and education program, and the blood lead monitoring program, along with investigation and remediation activities. Appendix B (Table B-13) provides a chronology of OU9 events.

#### **Response Actions**

Under the Kids First program, time-critical removal actions took place from October 1995 to April 2000. Under the LCCHP, response actions were completed for multiple residences, commercial properties and vacant lots from April 2000 to summer 2009.

From October 1995 to summer 2009, 1,040 properties were investigated. Of those properties, 270 required a soil removal action. Forty properties, which may or may not have had soil removals, have had dust removed or paint repaired/replaced. The EPA conducted the last property assessment and response actions in summer 2009. Subsequent investigations and remediations are performed by the LCCHP Phase 2 Workgroup. Appendix B, Table B-13 provides a complete history of early initial response actions.

Signed on September 2, 1999, the EPA signed a ROD for OU9 and selected a remedy to address the lead contamination. The purpose of this response action is to reduce the risk of lead exposure to children in residential

areas. The selected remedy created the LCCHP with institutional controls to ensure the effectiveness of the LCCHP. The intention was for the LCCHP to take the place of the Kids First program. The OU9 remedy was selected to eliminate or reduce potential threats to humans and the environment posed by concentrations of lead in soil, dust, paint and water that exceed a specific set of trigger criteria.

The RAOs for OU9 were set in the 1999 ROD, in accordance with the 1994 EPA lead guidance that stated that the EPA should "limit exposure to soil lead levels such that a typical (or hypothetical, potentially exposed) child or group of similarly exposed children would have an estimated risk of no more than 5% of exceeding the 10 µg/dL [micrograms per deciliter] blood lead level."

The RAOs were identified as follows:

- No more than 5 percent of children (age 0 to 72 months) who live at the Site, either now or in the future, will have blood lead values exceeding 10 µg/dL.
- Health will be adequately protected if the highest risk level at any sub-location (e.g., a yard for a private residence) is a probability no higher than one percent that a population of children (age 0 to 72 months) residing at that sub-location will exceed a blood lead values exceeding 15 µg/dL.
- Reduce direct exposure of lead incurred by children, which will result in optimal risk reduction through effective use of resources.

In the 1990s, the EPA-Headquarters-approved LCCHP was considered a "pilot project" that involved a number of innovative approaches. The program was evaluated by a group of outside scientists and included ongoing review to ensure that the program was operating as intended and that human health was being protected adequately. The ongoing review included the establishment of performance standards that, when met, would indicate the successful completion of the LCCHP and the beginning of O&M activities. The performance standards were specified in a July 2002 addendum to the OU9 remedial design and are summarized in the 2002 Final Methods and Standards for Evaluating the Performance of the LCCHP.

The EPA issued an ESD on September 30, 2009. It included the need for institutional controls for the mine waste piles left in place in OU9. The ESD RAOs are:

- Prevent construction of any type of residential dwelling or facility for human occupancy on the mine waste piles unless appropriate plans are approved by the EPA or CDPHE
- Maintain the integrity of current or future remedies

### **Status of Implementation**

The LCCHP was implemented as required by the ROD and the Lake County's 2002 Methods and Standards for Evaluating the Performance document. ASARCO continued to execute the LCCHP until July 2005, when ASARCO declared bankruptcy, after which the EPA managed the LCCHP soil investigations and cleanups until 2009. The OU9 Work Group manages the program now, as described below.

Data were collected, evaluated and documented in annual reports beginning in 2002 to determine the effectiveness of the program. The results were analyzed, compared to the performance standards, and expressed as goals for blood lead levels in children. During 2005, the performance standards established by the EPA for the selected remedy were met. This conclusion is supported and documented in the 2005 LCCHP Annual Report, dated April 5, 2006. Property owners were given a final chance to have their properties investigated and cleaned up after performance standards of the LCCHP Phase 1 were met. In 2009, 199 properties were investigated. Thirty-one properties had areas that exceeded the 3,500 mg/kg action level for lead. These properties were remediated if the property owners consented.

On March 15, 2010, Lake County passed a resolution (Appendix K) approving the LCCHP Phase 2 Work Plan and adopting the LCCHP Phase 2 as the institutional control for OU9, which transitioned the OU into the O&M

phase. The county's actions represented the completion of remedial actions for OU9. The LCCHP Phase 2 Work Plan was also designed as the long-term O&M plan for OU9. The OU9 Work Group, which consists of Lake County, CDPHE and the EPA, administers, manages and oversees the LCCHP Phase 2 program. The Work Group approved the LCCHP Phase 2 Work Plan in 2009; the Work Group revised the Work Plan in October 2013.

The OU9 Work Group follows the LCCHP Phase 2 Work Plan. If a blood test indicates an elevated blood lead level, Lake County Public Health makes follow-up appointments to provide education and counseling to families and to evaluate the possible sources of lead at each household. The OU9 Work Group reviews results of the home visit and determines if a formal environmental investigation is warranted. The OU9 Work Group can approve remediation at a property if an environmental investigation demonstrates that OU9 Trigger Criteria for lead is being exceeded, or at their discretion. The criteria in the Work Plan were approved in 2009 and revised in 2013 based on updated information regarding lead toxicity.

The lead cleanup at the Site is being implemented in line with the LCCHP Phase 2 Work Plan, which integrates the EPA's 1994 and 1998 soil lead guidance documents. However, since 1998, the EPA's OLEM has completed a number of directives which updates the scientific considerations to be used at lead cleanups. The updates highlight current science and risk assessment tools that the EPA may consider when implementing lead cleanups. The EPA recognizes this and uses the LCCHP Phase 2 approach which reflects a multi-pathway, community-based education and outreach approach to identifying sources of lead and exposure pathways in Leadville. The EPA will continue to evaluate the LCCHP against updated guidance to determine if any changes are warranted in the LCCHP to ensure future protectiveness.

On December 23, 2009, Lake County passed a resolution that serves as the institutional control for the mine waste piles in OU9. The resolution amended the Lake County Land Development Code Chapter 3.2 (Appendix K). The Lake County Building and Land Use Department (LCBLUD) must provide building permit applicants within the boundaries of the remaining mine waste piles in OU9 with a handout regarding best management practices for managing potentially contaminated soils (including lead and arsenic). Applicants must sign a document attesting that they received, read and understood the handout. No building permit is issued without an applicant's written acknowledgement provided to LCBLUD. Additionally, written proof of approval from CDPHE is required before LCBLUD will issue a building permit. Similarly, the city of Leadville passed an ordinance on May 7, 2013, that acts as an institutional control for the six waste piles in OU9 that are located within city limits.

On May 16, 2013, the EPA signed a ROD Mod for the OU9 remedy that required institutional controls to: 1) reduce or control human exposure to lead and arsenic; and 2) maintain the integrity of and prevent disturbances of the engineered features or structures of the current or future remedies.

On April 4, 2002, the EPA partially deleted OU9 Subunits A and B, residential waste rock piles, and parks and playgrounds from the NPL. The EPA partially deleted remaining portions of OU9 from the NPL on September 21, 2011. Environmental assessments and remediation performed by the OU9 Workgroup continue on a case-by-case basis.

### **Systems Operations/Operation & Maintenance (O&M)**

OU9 entered the O&M phase in 2010, when the EPA, Lake County and CDPHE approved the LCCHP Work Plan. The LCCHP Phase 2 Work Plan was revised in October 2013. It serves as the O&M Plan for OU9.

The LCCHP Phase 2 has been designed to reduce overall lead-related risk to children in Leadville through education of parents and blood-lead monitoring of children and, for people with elevated blood lead levels, additional responses that investigate and address numerous sources. The potential sources of lead exposure that are addressed include contaminated soil, house dust, interior and exterior paint, foreign candy and many other items that contain lead. As part of the LCCHP, those tested whose blood-lead results are elevated are receive educational materials and are monitored by Lake County Health to ensure their blood-lead levels decrease.

### XIII.2 OU9: PROGRESS SINCE PREVIOUS FYR

This section includes the protectiveness determinations and statements from the 2017 FYR Report (Table 17). There were no recommendations identified from the 2017 FYR Report.

**Table 17: Protectiveness Determinations/Statements from the 2017 FYR Report**

OU #	Protectiveness Determination	Protectiveness Statement
9	Protective	The remedy at OU9 is protective of human health and the environment. The remedy is functioning as intended by site decision documents; the exposure assumptions, toxicity data, trigger criteria and RAOs used at the time of the remedy selection are still valid. No other information has come to light that could call into question the protectiveness of the remedy. Institutional controls are in place. O&M continues successfully through the approval and implementation of the LCCHP Phase 2 Work Plan.

### XIII.3 OU9: FYR PROCESS

#### Data Review

Data from the Lake County Blood Lead Program’s blood-lead testing database were reviewed and compared to site RAOs. Table 18 lists the results.

Lake County Health administered 983 blood-lead tests to 583 individuals any age from 1/1/2017 to 12/31/2021. Of the 583 individuals, a total of 438 individual children - age 72 months or less - were tested. Of these 438 children, 9 (2.1%) had blood-lead greater than 10 µg/dl. Of the 9, 3 (0.7%) had blood-leads greater than 15 µg/dl; one child had recently moved to Lake County.

Some children – 72 months or less – were tested in multiple years. In the number above, 438, the children were only counted one time during that five-year period. In the table below, individual children are counted once for each calendar year.

**Table 18: Blood Lead Testing Results, 2017 to 2021**

Year	# of Children Tested (0-72 months)	Concentration Greater than 10 µg/dL	% of Children Tested > 10 µg/dL	Concentration Greater than 15 µg/dL	% of Children Tested > 15 µg/dL
2017	178	1	0.6	0	0.0
2018	149	4	2.7	1	0.7
2019	140	4	2.9	2	1.4
2020	82	0	0.0	0	0.0
2021	99	0	0.0	0	0.0
Average			1.2		0.4

Table 18 shows that the annual average percentages of children ages 0 to 72 months with blood lead levels greater than 10 µg/dL and 15 µg/dL are below the respective percentages of 5% and 1% set in the RAOs. Overall, the average of the average percentages per year during the FYR period are 1.2% and 0.4%, respectively.

Remediations took place on several properties. Other elevated blood lead levels were resolved through education, identification and/or further evaluations. The annual and monthly reports indicated that consumption of foreign candy, lead-based paint, family member's occupation and other factors not related to lead in soil were contributing factors to elevated blood lead levels. Additionally, remodeling of homes built before 1978 that have lead-based paint appears to be linked to elevated blood lead levels in some children and adults.

### **Site Inspection**

The OU9 site inspection took place on June 16, 2022. Participants are listed in Section III of this FYR Report. OU9 was observed and viewed during the site inspection by driving around the city, visiting several area parks and observing a home that underwent lead remediation during this FYR period. Participants also observed the Lake Fork community, where some lead removal had occurred historically. Photographs were taken of some of the site features addressed under OU9 (Appendix G). An inspection checklist has been completed. It is available in Appendix F.

## **XIII.4 OU9: TECHNICAL ASSESSMENT**

**QUESTION A:** Is the remedy functioning as intended by the decision documents?

The site inspection and the review of documents, ARARs and risk assumptions indicate that the OU9 remedy is functioning as intended by OU9's 1999 ROD, 2009 ESD and 2013 minor modification to the ROD.

Performance standards were originally met in 2006. The LCCHP Phase 2 Work Plan is the long-term O&M Plan for OU9. Per the 2017 through 2021 Blood Lead Testing Annual Reports, the O&M activities successfully ensured that blood lead is monitored and that households are abated of lead contamination upon OU9 Work Group approval. Institutional controls are in place through extension of the city of Leadville and Lake County planning and zoning codes to protect engineered remedies in OU9. In addition, the LCCHP Phase 2 Work Plan was accepted by Lake County. It serves as the institutional control for OU9, providing community outreach and education on preventing lead exposures.

**QUESTION B:** Are the exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy selection still valid?

The exposure assumptions and toxicity data used to develop range of plausible action levels for arsenic, published in the BRA Part B, remain valid.

The Site's surface soil lead cleanup levels were established so that a child would have an estimated probability of no more than 5% of exceeding a blood lead level of 10 µg/dL. The EPA's scientific considerations to be used at lead cleanups were outlined in the EPA's 1994 Revised Interim Soil Lead Guidance for CERCLA Sites and Resource Conservation and Recovery Act (RCRA) Corrective Action Facilities (Office of Solid Waste and Emergency Response (OSWER) Directive 9355.4-12) and the 1998 update to the 1994 guidance. Since issuing the 1994 and 1998 guidance, the EPA's experience has demonstrated that lead-contaminated soil responses are more effective when they employ a multi-pathway approach. However, since 1994 and 1998 when those documents were issued, increasing evidence has shown that blood lead levels below 10 µg/dL may also have negative health impacts. The EPA is currently evaluating its lead cleanup policy based on recent studies that suggest adverse health effects are associated with blood levels less than 10 µg/dL. The EPA will continue using current lead policy until the Agency provides modified guidance for sites with lead contamination, after which EPA Region 8 will evaluate the need for revisions to the LCCHP Phase 2 Work Plan. The EPA recognizes this and uses the LCCHP Phase 2 approach which reflects a multi-pathway, community-based education and outreach approach to identifying sources of lead and exposure pathways in Leadville.

**QUESTION C:** Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has come to light that could call into question the protectiveness of the remedy.

## **XIII.5 OU9: ISSUES/RECOMMENDATIONS**

### **Issues/Recommendations**

<b>OU(s) without Issues/Recommendations Identified in the FYR:</b>
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OU9
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### **XIII.6 OU9: PROTECTIVENESS STATEMENT**

<b>Protectiveness Statement(s)</b>	
<i>Operable Unit:</i>	<i>Protectiveness Determination:</i>
9	Protective
<i>Protectiveness Statement:</i> The remedy at OU9 is protective of human health and the environment. The remedy is functioning as intended by site decision documents; the exposure assumptions, toxicity data, trigger criteria and RAOs used at the time of the remedy selection are still valid. No other information has come to light that could call into question the protectiveness of the remedy. Institutional controls are in place. Testing, outreach, education and, if appropriate, remediation will continue successfully through the approval and implementation of the LCCHP Phase 2 Work Plan.	

### **XIV. OU10: OREGON GULCH**

OU10 is defined as the 500-year floodplain of Oregon Gulch, extending about one mile from its headwaters to its confluence with Lower California Gulch. Oregon Gulch is about a half-mile south of Leadville and is immediately west of OU1, the Yak Tunnel WTP and the surge pond (Figure D-12). The Oregon Gulch area is a small V-shaped valley with water that flows in a northwesterly direction. The Oregon Gulch watershed drains about 185 acres, including the 15.8-acre area of OU10 that includes the 14.2-acre Oregon Gulch Tailing Impoundment and 1.6 acres of a portion of the 500-year floodplain. Oregon Gulch is an ephemeral tributary to California Gulch. Before remediation, spring snow melt runoff and summer thunderstorms would result in transport of tailings solids and contaminated surface water into California Gulch.

The Oregon Gulch Tailing Impoundment received tailings from the Newmont/Resurrection-ASARCO mill in California Gulch from about 1942 through 1957. During removal activities in 1995 and 1996, about 28,000 cubic yards of tailings and underlying soil from the CZL Tailing Impoundment on OU4 were relocated to the Oregon Gulch Tailing Impoundment. An additional 550 cubic yards of sediment excavated from the culvert and embankment in California Gulch within OU8 were also deposited on top of the Oregon Gulch Tailing Impoundment in September 1996.

Stream sediment in the lower portion of Oregon Gulch has been contaminated with metals from tailings and runoff complete from the Oregon Gulch Tailing Impoundment embankment. Release of tailings material was due to erosion, that transported it and re-deposited it in the floodplain and stream channel of Oregon Gulch. Release of soluble metals contained in runoff from the embankment and contained in a seep at the toe of the impoundment contributed to the metal contamination of the sediments. The tailings impoundment has not been in operation since 1957.

Land within OU10 is owned by Newmont/Resurrection Mining Company, with the exceptions of Lake County Road 6 and two small parcels of federally-owned land managed by the Bureau of Land Management. Lake County has zoned OU10 for industrial mining land uses.

### **XIV.1 OU10: RESPONSE ACTION SUMMARY**

#### **Basis for Taking Action**

Based on the results of the sitewide RI/FS, the EPA determined that actual or threatened releases of hazardous substances from sediments, soils, tailings and seep water on OU10 may present an imminent and substantial

endangerment to public health, welfare or the environment if not addressed through remedial action. Table 19 lists contaminated media in OU10. Appendix B (Table B-14) provides a chronology of OU10 events.

**Table 19: Contaminated Media, OU10**

Media	Contamination
Sediment	Sediments generally display elevated metal concentrations and high concentrations of pyrite. Sediments collected at the mouth of Oregon Gulch contain elevated cadmium, iron, manganese and zinc.
Mine tailings and soil	Elevated lead and zinc concentrations were found throughout the depth of tailings profiles. Arsenic and cadmium levels decreased as a function of tailings depth. Concentrations in foundation soils underneath the tailings were significantly lower than in the tailings.
Seep water	A seep discharges from the base of the tailings embankment year-round. Water quality of the seep discharge is poor, with low pH levels and elevated levels of dissolved metals.

**Response Actions**

Pursuant to the August 4, 1995, Action Memorandum, Resurrection Mining Company excavated about 3,500 cubic yards of sediment and soil from the channel and floodplain of Oregon Gulch and placed it on top of the Oregon Gulch Tailing Impoundment. The work took place in 1995 and 1996. After sediment removal, Resurrection Company constructed a channel capable of conveying a 100-year flood event and remaining stable for a 500-year flood event. The area outside the channel was also stabilized and revegetated. Resurrection Company also constructed a sedimentation pond in Oregon Gulch downstream of the toe of the tailings impoundment to reduce sediment load in runoff from the tailings embankment.

A cultural resource inventory identified a historic trash dump in lower Oregon Gulch. The dump site begins near the intersection of the gulch and County Road 6 and extends about 500 feet upstream. This area was recommended for nomination to the National Register of Historic Places. The pre-ROD removal action and post-ROD remedial actions were designed and constructed to avoid adverse impacts to this historically significant area.

The EPA issued the ROD for OU10 on August 8, 1997. The 1997 OU10 ROD established the following RAOs:

- Control airborne transport of tailings particles
- Control erosion of tailings materials and deposition in local water courses
- Control leaching and migration of metals from tailings into surface and groundwater

The selected remedy for OU10 consisted of the following components:

- Regrade the impoundment to provide positive drainage and to flatten embankments
- Install geosynthetic barrier to control infiltration, followed by a geocomposite drainage layer
- Install a soil cap with vegetation on top of impoundment
- Install a soil-and-gravel cap on the side slopes
- Construct lined diversion ditches to divert runoff from tailings to the covered tailings surface
- Install a groundwater cutoff trench to prevent groundwater infiltration
- Actively manage seeps by collecting seep and transporting (pumping) to the Yak Tunnel WTP

The EPA issued an ESD on July 29, 2013. It required institutional controls as a remedy component for OU10. The 1997 OU10 ROD did not contain numeric cleanup standards but did specify removal and containment actions to prevent tailings and stream sediments from contributing source contamination to surface water and groundwater at the Site.

**Status of Implementation**

Resurrection completed removal actions in 1996. Resurrection implemented the selected remedy for the Oregon Gulch Tailing Impoundment from July through October 1998. Activities included re-grading the impoundment

surface to provide positive drainage, installing structural fill as needed over the impoundment surface, installing a geosynthetic membrane over the structural fill to control infiltration, and placing an 18-inch-thick soil layer with a vegetated cover over the membrane. A diversion ditch along the eastern side of the impoundment controls run-on and runoff and an upgradient groundwater interception trench limits the infiltration of groundwater into the tailings impoundment. A discharge drain system manages seep flow from the impoundment toe.

The EPA partially deleted OU10 from the NPL on April 16, 2001.

Lake County has zoned OU10 for industrial mining land uses. In addition, Newmont/Resurrection recorded environmental covenants on its OU10 properties on July 31, 2012, and October 1, 2012. The covenants prohibit residential use and restrict groundwater use.

**Systems Operations/Operation & Maintenance (O&M)**

Newmont/Resurrection has implemented O&M activities at OU10 since September 1999. O&M activities for the Oregon Gulch Tailing Impoundment and related systems is required to assure that the remedy remains effective. O&M includes inspection of the tailings impoundment cap and the seep collection and pumping system.

Newmont/Resurrection conducts inspections in accordance with the OU4, 8, 10, Operations and Maintenance Plan, which is Appendix D to the 2008 Consent Decree approved on August 29, 2008. The EPA approved a minor modification to the O&M Plan in 2018 to reduce the frequency of inspections at OU10, other than inspections of the toe drain/interceptor trench, from biannually to annually. The toe drain/interceptor trench pump back system continues to be inspected three times per week. Its findings are documented in the annual California Gulch Superfund Site OU4, OU8 and OU10 inspection reports. These reports are available by contacting EPA Region 8.

The following areas in OU10 are inspected:

- The toe seep collection system, trench collection system and pump house
- The tailings impoundment surface and embankment
- East and South diversion ditches
- The drop channel
- The upper reconstructed channel
- The lower reconstructed channel
- Access road gates

Maintenance during the current FYR period has included repairs to piping, maintenance of the vegetated cover, pump replacements, upgrades to electrical equipment, and maintenance of secured fencing and signage around the pump house and the Oregon Gulch Tailing Impoundment.

**XIV.2 OU10: PROGRESS SINCE PREVIOUS FYR**

This section includes the protectiveness determinations and statements from the 2017 FYR Report (Table 20). There were no recommendations identified from the 2017 FYR Report.

**Table 20: Protectiveness Determinations/Statements from the 2017 FYR Report**

OU #	Protectiveness Determination	Protectiveness Statement
10	Protective	The remedy at OU10 is protective of human health and the environment. Source contamination has been consolidated and contained to prevent migration of contaminants. Any seep or infiltrated run-on or runoff is captured through trenches and pumped to the Yak Tunnel WTP. All RAOs for OU10 have been achieved and Newmont/Resurrection Mining Company continues to implement O&M activities. Institutional controls are in place as environmental covenants.

## **XIV.3 OU10: FYR PROCESS**

### **Data Review**

Resurrection Mining Company samples well OG1TMW3 annually for dissolved cadmium and zinc. This well is located about 1,500 feet downstream of the toe of the impoundment embankment and is sampled to evaluate the performance and effectiveness of the seep collection system. Table I-4 presents the October 2020 sample results compared to historical sample results, starting with samples collected by Colorado Mountain College in 2007 and samples collected by other consulting firms since then. Over time, the concentrations show a continuing decreasing trend in both dissolved zinc and the cadmium concentrations. The 2020 concentrations are much lower than 2007 concentrations, with dissolved zinc detected at 129 milligrams per liter (mg/L) or 129,000 µg/L in 2007, declining to 23.9 mg/L (23,900 µg/L) in 2020. Similarly, the dissolved cadmium concentrations in 2007 were 0.142 mg/L (142 µg/L), declining to 0.037 mg/L (37 µg/L) in 2020. These results suggest that the seep collection system is performing as intended.

### **Site Inspection**

The OU10 site inspection took place on June 16, 2022. Participants did not observe this area due to time constraints. This OU is inspected by Newmont/Resurrection. Features inspected include monitoring wells and access controls. Mr. Runnells reported that a new pump house has been installed, along with new pumps. The cover of Oregon Gulch tailings pile was reported to be well vegetated, and the drainage systems were unobstructed and functioning. Groundwater and surface water that are diverted from the impoundment are collected in the pump house. The water is then pumped to the surge pond to await treatment. An inspection checklist has been completed (Appendix F). Inspection photographs were taken by the EPA's support contractor and are included in Appendix G.

## **XIV.4 OU10: TECHNICAL ASSESSMENT**

**QUESTION A:** Is the remedy functioning as intended by the decision documents?

The site inspection and the review of documents, ARARs and risk assumptions indicate that the OU10 remedy has been completed and is functioning as intended by site decision documents. Excavation of stream sediments finished by 1996. Consolidation and stabilization of the Oregon Gulch Tailing Impoundment finished in 1998. Newmont/Resurrection Mining Company continues to implement O&M activities for OU10. All institutional controls required by site decision documents are in place as are procedures to notify the EPA and CDPHE should local governments approve a change in land use.

**QUESTION B:** Are the exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy selection still valid?

There have been no changes to the ARARs identified in the ROD or since the previous FYR. No newly promulgated standards have been identified that could call into question the protectiveness of the remedy as implemented (see Appendix H for detail). The 1997 OU10 ROD did not establish numeric cleanup standards for surface water or groundwater. The remedy for OU12 encompasses sitewide water quality.

All RAOs identified in the 1997 OU10 ROD have been achieved. These RAOs included controlling airborne transport of tailings particles, controlling leaching and migration of metals from tailings into surface water and groundwater, and controlling erosion tailings material into local water courses. The excavation of stream sediments and consolidation of contaminated materials within the covered Oregon Gulch Tailing Impoundment minimizes the potential for erosion of contaminated material into local waterways and for the leaching and migration of contamination into surface water and groundwater. Diversion and interception trenches also capture run-on, runoff and potential seep flow for treatment at the Yak Tunnel WTP. The geosynthetic membrane and vegetated cover prevent airborne transport and erosion of tailings material. Land use at OU10 has not changed. The exposure assumptions used in the development of the 1997 OU10 ROD remain valid.

**QUESTION C:** Has any other information come to light that could call into question the protectiveness of the remedy?

No additional information has come to light that would call into question the protectiveness of the remedy.

#### **XIV.5 OU10: ISSUES/RECOMMENDATIONS**

<b>Issues/Recommendations</b>
<b>OU(s) without Issues/Recommendations Identified in the FYR:</b>
OU10

#### **XIV.6 OU10: PROTECTIVENESS STATEMENT**

<b>Protectiveness Statement(s)</b>	
<i>Operable Unit:</i> 10	<i>Protectiveness Determination:</i> Protective
<i>Protectiveness Statement:</i> The remedy at OU10 is protective of human health and the environment. Source contamination has been consolidated and contained to prevent migration of contaminants. Any seep or infiltrated run-on or runoff is captured through trenches and pumped to the Yak Tunnel WTP. All RAOs for OU10 have been achieved and Newmont/Resurrection Mining Company continues to implement O&M activities. Institutional controls are in place as environmental covenants.	

#### **XV. OU11: ARKANSAS RIVER VALLEY FLOODPLAIN**

OU11 extends from the confluence of the Arkansas River and California Gulch to an area of about 11 miles downstream from the confluence on the Arkansas River (Figure D-13). It consists of lands impacted by transport of metals and mining wastes via California Gulch and the Arkansas River.

Mine tailings transported downstream were deposited in many locations adjacent to the river. Contaminated water and sediments were carried from the Arkansas River, via irrigation ditches, to meadows and fields both within and outside the 500-year floodplain.

Agricultural land within OU11 is used for wildlife and livestock grazing. The Arkansas River floodplain is currently used for grazing in some locations and recreation and fishing in other locations. Land-use modifications are not expected in the near future. Colorado Parks and Wildlife (CPW) designated the Upper Arkansas River as a Gold Medal fishery in January 2014.

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are not expected in the near future. Colorado Parks and Wildlife (CPW) designated the Upper Arkansas River as a Gold Medal fishery in January 2014.

## **XV.1 OU11: RESPONSE ACTION SUMMARY**

### **Basis for Taking Action**

Based on the results of OU11 screening-level baseline human health and ecological risk assessments completed in 2004 and 2003, respectively, and a supplemental mercury human health and ecological risk assessment completed in 2007, the EPA identified metals in the irrigated meadows and riparian area soils as a potential health threat to herbivores. Low pH conditions and metals result in phytotoxicity and poor plant demographics in the irrigated meadows, fluvial mine wastes and riparian areas. Human health risks were determined to be below a level of concern for current land uses. However, human health risks may be above a level of concern if areas of OU11 are developed for residential uses in the future. Appendix B (Table B-15) provides a chronology of OU11 events.

### **Response Actions**

The EPA's Removal Program stabilized eroding banks containing or protecting fluvial deposits in 1993 and 1994. Beginning in 1996, the program identified and characterized fluvial deposits along nine miles of the Arkansas River, evaluated alternatives for management of the wastes, and installed removal demonstration areas to allow evaluation of the selected alternative.

The EPA signed the OU11 ROD on September 28, 2005. The RAOs established in the 2005 OU11 ROD were:

- Minimizing future human exposures to heavy metals as defined in the human health BRA
- Controlling leaching and migration of metals from contaminated materials into groundwater
- Reducing toxins in plants and improving plant demographics in the irrigated meadows, riparian areas and fluvial mines wastes, as determined to be necessary
- Reducing exposures of wildlife and livestock to heavy metals in soil and vegetation at toxic concentrations from direct exposure or bioaccumulation
- Minimizing erosion of fluvial mine wastes into the Arkansas River, as determined necessary to prevent further harm to aquatic life

Components of the selected remedy in the 2005 OU11 ROD included:

- Treatment and maintenance of irrigated meadows areas. Treatment consisted of lime amendment or lime/organic amendment, deep tilling and seeding.
- Maintenance of tailings deposits treated during prior response actions, as necessary. Maintenance will include inspections and retreatment and/or repairs appropriate to enhance or reestablish vegetation.
- Treatment and maintenance of remaining tailings deposits. Treatment consisted of lime and organic amendment, and deep tilling followed by seeding to physically stabilize the mine wastes through the establishment of vegetation.
- No active revegetation of the (vegetated) riparian areas, although specific riparian areas may be remediated if deemed appropriate during design.
- Institutional controls on irrigated meadows, tailings deposits and riparian areas. Institutional controls are to be implemented to prevent changes in current land use unless the risks under the new land use are demonstrated to be below a level of concern.

A Remedial Work Plan developed in 2007 specified treatments for irrigated meadows, fluvial deposits and adjacent streambanks. Treatments included addition and mixing of lime, fertilizer and compost to mine waste and soils, and seeding with land-use-appropriate species.

Cleanup levels were not established because the remedial action did not reduce contaminant concentrations in site media. The 2007 Remedial Work Plan established performance criteria for treated areas to ensure that the remedial action adequately addresses the risks posed by contamination in OU11. Performance criteria included

soil and vegetation criteria characteristics for irrigated meadows and fluvial deposits and stability characteristics for remediated streambanks. Several vegetation monitoring events have occurred since the remedial action was completed, and the success of the vegetation and the near-term ecological trajectory are well documented. The performance criteria previously established in 2007 were revised in 2013 to account for a lower target organic carbon addition rate for all areas. The impacts of this change were considered minor, and decision document was deemed unnecessary.

**Status of Implementation**

The 2005 ROD called for the implementation of institutional controls on irrigated meadows, tailings deposits and riparian areas. The EPA is currently working with CDPHE to determine an appropriate institutional control for OU11.

The objectives of the institutional controls are to:

- Reduce or control human exposure to contaminants of concern
- Maintain the integrity of and prevent disturbances of the engineered features or structures of the current or future remedies
- Prevent changes in current land use unless the risks under the new land use are demonstrated to be below a level of concern using EPA risk assessment methods.

During 2008 and 2009, a remedial action by the EPA included in-situ treatment of 154 acres of irrigated meadows and 18.5 acres of fluvial deposits, followed by seeding. Vulnerable stream banks next to the fluvial deposits were reconstructed to protect the treated soils and allow establishment of vegetation. Forty acres of demonstration area fluvial deposits that were treated with soil amendments between 1998 and 2000 and used to evaluate the effectiveness of the selected alternative are considered part of the OU11 remedy. The EPA signed the Remedial Action Completion Report for the bank stabilization on September 19, 2013.

In 2020 during the COVID pandemic, the EPA and CDPHE proposed an amendment to the Lake County Land Development Code; the amendment is under review.

**Systems Operations/Operation & Maintenance (O&M)**

The treated areas were monitored from 2009 through 2012, in accordance with the Site’s Monitoring and Maintenance Plan. CPW restored fish habitat along the banks of the Arkansas River in 2014 and 2015. CPW performed maintenance along the banks of the Arkansas to reestablish shoring rock that was relocated by high water in 2015. The remedy is performing as expected. The results of monitoring will be used to determine when and what maintenance is required, whether the remedy meets the RAOs, when the remediated areas are mature and self-sustaining, and to facilitate the EPA’s FYR process.

Maintenance work has included re-treatment of small parts of the demonstration areas, reseeding of bare and sparse vegetation areas, repairs of constructed stream banks, stabilization of native stream banks impacted during 2011 extreme runoff conditions, and removal of construction roads.

The EPA determined that the remedy for OU11 was "Operational and Functional" on April 25, 2017, starting the O&M phase. CDPHE conducts O&M activities through a Special-Account-funded grant.

**XV.2 OU11: PROGRESS SINCE PREVIOUS FYR**

This section includes the protectiveness determinations and statements from the 2017 FYR Report (Table 21) as well as the recommendation from the 2017 FYR Report and the current status of the recommendation (Table 22).

**Table 21: Protectiveness Determinations/Statements from the 2017 FYR Report**

OU #	Protectiveness Determination	Protectiveness Statement
11	Short-term Protective	The remedy at OU11 currently protects human health and the environment. The streambanks have been stabilized to

		minimize erosion, exposure and chemical migration. For the remedy to be protective over the long term, institutional controls need to be implemented to ensure protectiveness
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**Table 22: Status of Recommendations from the 2017 FYR Report**

Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
Institutional controls are a component of the selected remedy but have not yet been implemented.	Implement institutional controls.	Ongoing	ICs are being prepared that would reduce exposure to lead in the event land use were to change to residential.	Not Applicable

### **XV.3 OU11: FYR PROCESS**

#### **Data Review**

The remedial action for OU11 was completed in 2013. The remedy for OU12 is designed to achieve chemical-specific, numerical performance standards for sitewide surface water and groundwater. Therefore, a summary of the sitewide surface water and groundwater data are discussed in the Data Review section, Section XVI.3, for OU12.

#### **Site Inspection**

The OU11 site inspection took place on June 16, 2022. Participants are listed in Section III of this FYR Report. Photographs were taken of site features, including monitoring wells and access controls (Appendix G). The group toured OU11 along the Arkansas River and nearby ranches. General conditions were noted in the site inspection checklist (Appendix F). Overall Arkansas River floodplain conditions were observed to be functioning well downgradient of the confluence with California Gulch. Flows were not impeded. Based on the OU11 inspection, conditions discussed with site-visit personnel and monitoring and maintenance reports, the OU11 remedy was implemented as designed.

### **XV.4 OU11: TECHNICAL ASSESSMENT**

**QUESTION A:** Is the remedy functioning as intended by the decision documents?

The site inspection and the review of documents, ARARs and risk assumptions indicate that the remedy is functioning as intended, in accordance with decision document requirements and design specifications. The EPA stabilized the stream banks in 2013. CPW restored fish habitat along the banks of the Arkansas River in 2014 and 2015 due to high water events from snow melts. O&M responsibilities for OU11 transitioned to CDPHE in May 2017. Monitoring of surface water, sediment and biota is part of the OU12 sitewide remedy. Institutional controls are under consideration.

**QUESTION B:** Are the exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy selection still valid?

There have been no other changes in exposure assumptions to human health and the environment or toxicity data that would call into question the protectiveness of the remedy. There are currently no proposed changes to reuse plans for OU11 that would affect the protectiveness of the remedy.

There have been no changes to the ARARs identified in the ROD or since the previous FYR. No newly promulgated standards have been identified that could call into question the protectiveness of the remedy as implemented.

**QUESTION C:** Has any other information come to light that could call into question the protectiveness of the remedy?

No additional information has come to light that would call into question the protectiveness of the remedy.

## XV.5 OU11: ISSUES/RECOMMENDATIONS

Issues/Recommendations	
<b>OU(s) without Issues/Recommendations Identified in the FYR:</b>	
Not applicable	

Issues and Recommendations Identified in the FYR:
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OU(s): 11	<b>Issue Category: Institutional Controls</b>			
	<b>Issue:</b> Institutional controls are a component of the selected remedy but have not yet been implemented.			
	<b>Recommendation:</b> Implement institutional controls to reduce exposure to COCs, protect engineered remedies and for future changes in land use.			
<b>Affect Current Protectiveness</b>	<b>Affect Future Protectiveness</b>	<b>Party Responsible</b>	<b>Oversight Party</b>	<b>Milestone Date</b>
No	Yes	Other/Lake County	EPA/State	12/30/2024

## XV.6 OU11: PROTECTIVENESS STATEMENT

Protectiveness Statement(s)	
<i>Operable Unit:</i> 11	<i>Protectiveness Determination:</i> Short-term Protective
<i>Protectiveness Statement:</i> The remedy at OU11 currently protects human health and the environment. The streambanks have been stabilized to minimize erosion, exposure and chemical migration. For the remedy to be protective over the long term, institutional controls should be implemented to reduce exposure to COCs, protect engineered remedies and for future changes in land use in the event the land use were to change to residential.	

## XVI. OU12: SITEWIDE WATER QUALITY

The EPA listed the Site on the NPL on September 8, 1983. At that time, the EPA divided the Site into 11 geographic, media-driven OUs. An additional OU – OU12 – was included to address sitewide surface water and groundwater and to measure the improvements on downgradient water quality as source areas are remediated and stabilized at the other 11 OUs. OU12 encompasses the entire 18-square-mile Site. Included in OU12 are the cities of Leadville and Stringtown, portions of the Upper Arkansas River Valley below the confluence of California Gulch with the Arkansas River as well as California Gulch, Stray Horse Gulch, portions of Evans Gulch, and minor tributaries to these drainages. An additional geographic constraint was imposed on OU12 groundwater. OU12 groundwater only includes the shallow alluvial aquifer, not to exceed a depth of 250 feet or contact with bedrock, whichever is the lesser depth below the ground surface.

Residents of Leadville and nearby areas of Lake County are served by Parkville Water District for their drinking water. Areas not served by Parkville use well water. Testing has revealed no drinking water wells exceeding MCLs since the mid-1980s.

## XVI.1 OU12: RESPONSE ACTION SUMMARY

### **Basis for Taking Action**

#### *Human Health Risks*

In the mid-1990s, human health risk assessments by the EPA concluded that contaminants in sitewide surface water and groundwater may pose unacceptable human health risks in the future, should people consume contaminated site water. Sources of contamination of these media include mine wastes that generate ARD. In the 1990s, the EPA considered mine wastes at Upper California Gulch (OU4), Stray Horse Gulch (OU6), the Apache Tailing Impoundments (OU7) and Oregon Gulch (OU10) to constitute the significant sources for ARD at the Site. Since the 1990s, actions have been taken to address these source areas.

#### *Ecological Risk*

As described in the 1995 BRA and the 2004 OU12 ecological risk assessment of contaminants in the Upper Arkansas River, the COCs for trout and macroinvertebrates are zinc and cadmium. Because brown trout are the predominant species in the river, the EPA has focused primary attention on this species. In 2004, the EPA concluded that survival of brown trout fry was likely decreased by historical concentrations of zinc and cadmium that occurred below California Gulch during spring snow melt. This, in turn, was a likely contributing factor to lower-than-expected fish density below California Gulch (compared to above). In recent years, the level of predicted risk to fish has been decreasing and the observed number of fish has been increasing. This is consistent with the completion of remedial activities at mining waste source areas that began in the 1990s. Long-term monitoring of OU12 will determine whether this apparent trend toward recovery is a consequence of decreased site releases.

The EPA also concluded that the survival and reproduction of some species of benthic macroinvertebrates are likely to be decreased by concentrations of zinc and cadmium that often occur below California Gulch during spring snow melt. This in turn leads to a tendency for reduced numbers of sensitive taxa (mainly mayflies) in the river below the confluence with California Gulch compared to above. However, the overall density and diversity of the benthic community does not appear to be substantially impaired. It seems likely that availability of benthic prey items is not limiting fish.

Risk to herbivores and plants along the Arkansas River, although caused by historical irrigation by sitewide surface water, were remediated under the remedy for OU11. None of the risk assessments by the EPA to date provide an assessment of risks to terrestrial receptors from ingestion of potentially contaminated aquatic prey items. This is not considered to be a major omission or source of uncertainty for the following reasons. None of the metals of concern at the Site tend to strongly accumulate in the tissues of aquatic species such as fish or aquatic invertebrates. Ecological risk assessments at other mining sites indicate that exposure of terrestrial receptors is usually most strongly determined by ingestion of contaminated soils or sediments rather than ingestion of aquatic prey items. Table 23 presents COCs by medium for OU12. Although there are a wide range of COCs, zinc and cadmium are considered reasonable indicator parameters with respect to the OU12 groundwater and OU12 surface water, as well as to human health and the environment in the vicinity of OU12.

**Table 23: Contaminated Media, OU12**

Medium	Population	COC
Surface water	Human health	Cadmium Copper Lead Zinc
	Ecological receptors	Cadmium Zinc

Medium	Population	COC
Groundwater	Human health	Arsenic Cadmium Lead Manganese Zinc

Appendix B (Table B-16) provides a chronology of OU12 events.

**Response Actions**

Investigations began in the mid-1980s and continued through 2012. A complete list of investigative reports relevant to OU12 can be found in the OU12 RI Report and in the Administrative Record for OU12. As of fall 2003, response actions designed to reduced metal loading to surface and groundwater have occurred in all areas identified as major sources (waste rock piles, fluvial and mill tailings, and WTPs for the Yak Tunnel and LMDT). These response actions were conducted in individual OUs under RODs or action memoranda. These actions resulted in improvements to surface water and groundwater quality within the individual OUs, and also resulted in improvements to sitewide surface and groundwater downgradient of the individual OUs. The EPA selected the OU12 remedy in the 2009 OU12 ROD, which included institutional controls and long-term monitoring of surface water and groundwater. In addition, the EPA implemented a technical impracticability (TI) waiver for shallow groundwater (e.g., waiving the maximum contaminant levels [MCLs]).

The RAOs for OU12, as listed in the 2009 ROD, include:

- Prevent unacceptable exposure of aquatic organisms in the Arkansas River to COCs
- Prevent unacceptable human exposure to COCs in surface and groundwater

The OU12 remedy includes:

- No action (no additional active remediation) for sitewide surface or groundwater
- Institutional controls to restrict the use of surface and groundwater. The controls will minimize the likelihood of adverse human health effects from the consumption of contaminated site water. Because Arkansas River water meets drinking water standards, the institutional controls will not apply to the Arkansas River.
- Collection and review of long-term monitoring data
- A TI waiver of MCLs for lead and cadmium in the shallow alluvial aquifer down to a depth of 50 feet in California Gulch, Oregon Gulch, Stray Horse Gulch and a small area of the Arkansas Valley floodplain near the confluence of California Gulch (Figure H-1)

Table 24 provides a summary of the cleanup goals for surface water from the ROD, which correspond to Colorado’s 2009 Water Quality Standards for segments of the Upper Arkansas River).

**Table 24: Surface Water COC Cleanup Goals**

COC	Water Quality Standard	2009 OU12 ROD Cleanup Goals for Arkansas River Segments 2b and 2c (µg/L) <sup>a</sup>
Cadmium - Dissolved	June to March	Acute: $1.136672 - [\ln(\text{hardness}) \times 0.041838] \times e^{0.915[\ln(\text{hardness}) - 3.6236]}$
		Chronic: $1.101672 - [\ln(\text{hardness}) \times 0.041838] \times e^{0.7998[\ln(\text{hardness}) - 3.1725]}$
	Seasonal Modification (April to May)	1.34 (µg/L)
Zinc - Dissolved	June to March	Acute: $0.978 \times e^{0.8537[\ln(\text{hardness}) + 2.2178]}$
		Chronic: $0.986 \times e^{0.8537[\ln(\text{hardness}) + 2.0489]}$
	Seasonal Modification (April to May)	649 (µg/L)

COC	Water Quality Standard	2009 OU12 ROD Cleanup Goals for Arkansas River Segments 2b and 2c (µg/L) <sup>a</sup>
<i>Notes:</i> a. Criteria listed in 2009 OU12 ROD, pages DS-48 and DS-49.		

**Status of Implementation**

Remedial action at OU12 is anticipated to be completed in fall 2022. The EPA and CDPHE are currently conducting the long-term monitoring component of the remedy. This effort includes annual sampling events in accordance with the 2018 California Gulch Superfund Site Final Field Sampling Plan. Long-term monitoring began following the EPA's approval of the April 2015 Remedial Design Report. The report summarizes the monitoring plan for sampling surface water, groundwater and aquatic organisms; it was implemented by modifying the previous sampling plan. As stated in the 2009 ROD, the EPA and CDPHE expect that long-term monitoring will show that surface and groundwater quality continue to improve as source areas across the other 11 OUs continue to be remediated and stabilized.

Despite the State Water Quality Board's removal of the seasonal modification to water quality standards for cadmium and zinc in segments 2b and 2c of the Arkansas in 2014, the 2022 water quality standards for these metals and segments in the Arkansas River are being met (see additional detail in the Data Review section). The EPA is working to finalize remaining institutional controls for OU12.

The OU12 2009 ROD required the implementation of institutional controls as environmental covenants on specific parcels, a Lake County Ordinance, Parkville Water District Rules and Regulations, or a Colorado State Engineer notice. Since the 2009 ROD, OU12 institutional controls have been implemented as environmental covenants on Newmont/Resurrection land parcels and by Parkville Water District rules.

The environmental covenants on Newmont/Resurrection properties states:

No use of untreated groundwater from wells located on the property for drinking, domestic, or agricultural purposes shall be allowed. This covenant does not restrict the use of groundwater that is treated to meet the applicable State water quality standards for the beneficial use to which the water is being applied. Treatment must meet any applicable State standards that are in place at the time of use.

Parkville Water Rules and Regulations restricts private wells in the Parkville Water District which serves the city of Leadville, Stringtown, and adjacent areas. More information on this institutional control can be found on page Appendix K-11.

More institutional controls are being considered to restrict groundwater and surface water use within OU12. In 2020, the EPA and CDPHE proposed an amendment of the Lake County Land Development Code with additional measures designed to prevent unacceptable exposures to contaminated waters. The amendment is under review.

**Systems Operations/Operation & Maintenance (O&M)**

The April 2015 Remedial Design Report contains the long-term monitoring plan for sampling surface water, groundwater and aquatic organisms. This plan also serves as the O&M Plan for OU12.

**XVI.2 OU12: PROGRESS SINCE PREVIOUS FYR**

The effectiveness of the OU12 remedy was not evaluated as part of the 2017 FYR. There were no issues and recommendations identified in the 2017 FYR Report for OU12. The remedial design was completed on April 29, 2015. The remedy is currently in remedial action. Its completion is anticipated in September 2022.

This section includes the protectiveness determinations and statements from the 2017 FYR Report (Table 25).

**Table 25: Protectiveness Determinations/Statements from the 2017 FYR Report**

OU #	Protectiveness Determination	Protectiveness Statement
12	Will be Protective	The remedy at OU12 is expected to be protective of human health and the environment upon completion. Surface water and groundwater monitoring is occurring at the Site and the data show that zinc and cadmium concentrations in surface water met Colorado Water Quality standards at the point of compliance. A technical impracticability waiver for groundwater contamination was enacted by the 2009 ROD. For the OU12 remedy to be protective over the long term, institutional controls need to be implemented.

### **XVI.3 OU12: FYR PROCESS**

#### **Data Review**

OU12 addresses sitewide surface water and groundwater to measure the improvements on downgradient water quality as source areas are remediated and stabilized at the other OUs. At the time of the completion of the 2003 OU12 RI/FS, response actions were completed that reduced metal loading to both surface and groundwater in all the major source areas, including:

- Water treatment (OU1 and OU6).
- Consolidated, relocated and/or covered mine wastes (OU2, OU4, OU5, OU6, OU7, OU8, OU9 and OU10).
- Stormwater diversions (OU4, OU5, OU6, OU7, OU8 and OU10).
- In-situ treatment of soils/mine waste (OU11).

The Yak Tunnel was identified as contributing 80% of the metal load to Lower California Gulch. The other contributors were either large tailings piles or impoundments or sulfidic waste rock piles that generated millions of gallons of ARD during storm or snow-melt events each year.

The EPA, CDPHE and Tetra Tech collectively developed the 2015 Remedial Design Report, which includes a surface water monitoring program, a groundwater monitoring program and an aquatic life monitoring program in the California Gulch and Upper Arkansas River watersheds. Figure I-2 shows the OU12 groundwater and surface water monitoring locations. The first annual monitoring event occurred in 2015. Data are reviewed as collected on an ongoing basis by the EPA and CDPHE. The data included for this FYR period are the annual monitoring reports for data collected in 2017, 2018, 2019 and 2021. Due to the COVID-19 public health emergency, annual monitoring was not completed in 2020. This data review focuses on the most current data relative to historical trends to understand whether downstream concentrations are improving as source areas are addressed.

#### *Surface Water Monitoring*

Surface water originating on site flows down California Gulch and into the Arkansas River. All tributaries contributing flow to California Gulch are ephemeral, flowing only in response to spring snowmelt and summer precipitation events. Prior to mining, California Gulch likely was an ephemeral to intermittent stream; however, discharges from the Yak Tunnel WTP and the Leadville Sanitation District WTP now result in nearly continuous flows in California Gulch from the Yak Tunnel WTP outfall to the confluence with the Arkansas River. Routine surface water samples are collected along California Gulch, Stray Horse Gulch/Starr Ditch, and the Arkansas River. These samples are analyzed for a number of metals including those found in Table 25. The data review focuses on zinc and cadmium, as specified in the 2009 OU12 ROD. The single point of compliance (POC) for evaluating long-term remedy effectiveness of overall site remedies is at a location in the Arkansas River between the confluences with California Gulch and the Lake Fork of the Arkansas River. The POC is represented by AR-3A, as this location is located about a half mile downstream of California Gulch and is located within Segment 2b of the Arkansas River. The 2009 OU12 ROD also specified that long-term monitoring include a reference

location, AR-1, on the Arkansas River upstream of the Site. This location is about a quarter mile downstream of Tennessee Creek, and is located within Segment 2a of the Arkansas River, upstream of the Site.

Table 26 summarizes the long-term monitoring program data and objectives.

**Table 26: Long-term Monitoring Requirements and Objectives**

Monitoring	Objective
Surface water sampling in Lower California Gulch and the Arkansas River	<ul style="list-style-type: none"> <li>• Evaluate hydrologic and water quality data in lower California Gulch and assess loading of COCs from California Gulch to Arkansas River Segment 2b</li> <li>• Evaluate seasonal and annual trends in the concentrations and loading of COCs in the Arkansas River</li> <li>• Evaluate water quality data for the upper Arkansas River to understand how changes in COC concentrations potentially influence the aquatic community upstream and downstream of California Gulch</li> </ul>
Groundwater monitoring	<ul style="list-style-type: none"> <li>• Evaluate how changes in hydrologic conditions impact COC concentrations</li> </ul>
Aquatic life monitoring	<ul style="list-style-type: none"> <li>• Evaluate results of fish<sup>a</sup> population and macroinvertebrate monitoring in the upper Arkansas River to document how the aquatic community downstream of California Gulch is influenced by the Site</li> </ul>
<p><i>Notes:</i></p> <p>a. The fish monitoring data were not available for inclusion due to the COVID pandemic in the 2021 Annual Surface Water, Groundwater, and Biological Monitoring Report.</p> <p><i>Source:</i> 2021 Annual Surface Water, Groundwater, and Biological Monitoring Report.</p>	

#### *Lower California Gulch*

Routine monitoring in California Gulch Station CG-6 began in April and continued through August 2021. Station CG-6 is located in Lower California Gulch just before the Arkansas River confluence, to represent the overall water quality trends for California Gulch and its tributaries. Dissolved zinc and cadmium concentrations and loading measured at Station CG-6 during 2021 are illustrated in Figure I-10 and I-11, respectively. As shown in these figures, the dissolved zinc and cadmium concentrations and loads peaked in late April. The concentrations and loads of both metals decreased following the freshet, with zinc trends declining faster than cadmium.

#### *Arkansas River*

The attainment of cadmium and zinc aquatic life standards in the Arkansas River at Stations AR-1 and AR-3A during the most current monitoring events (2021) based on compliance with the current Colorado Water Quality Standards (WQS) is summarized in Table 27 and discussed below. The Site’s annual OU12 surface water, groundwater, fluvial sediment and biological monitoring reports provide more information. The loads and concentrations of the dissolved forms of zinc and cadmium at Stations AR-1 and AR-3A in 2019 and 2021 are illustrated in Figures I-3 through I-9. The meeting of compliance standards for zinc and cadmium in 2021 are illustrated in Figures I-11 and I-12.

**Table 27: Metals Concentration and CO WQS Goals in the Arkansas River, 2021**

Sampling Station/ CO WQS Segment of Upper Ark	Number of Days Samples collected	Number of Days Samples Met CO WQS Chronic Standards		Comments
		Cadmium	Zinc	
AR-1/ 2a	12	10	7	Located <u>upstream</u> of California Gulch.
AR-2/ 2b	1	1	0	Located <u>upstream</u> of California Gulch
AR-3A/2b	12	12	12	Point of Compliance located a half mile downstream of California Gulch
AR-3B/2b	1	1	1	Arkansas River just upstream of the confluence with Lake Fork

AR-4/2c	1	1	1	Arkansas River @ 0.5 miles downstream of confluence with Lake Fork
AR-5/2c	1	1	1	Arkansas River upstream of confluence with Empire Gulch and @ 0.25 miles downstream of Hwy 24 Bridge
<i>Source: 2021 OU12 Annual Report, chart 3-6.</i>				

The results indicate that Colorado water quality standards for cadmium and zinc at the POC location AR-3A are being met. Because the hardness of the water effects the amount of dissolved cadmium and zinc in the water, Colorado WQS use a calculated standard that accounts for the hardness. The standards are calculated, using the applicable formula, for each sample using the measured hardness at the time of sampling. For cadmium, the meeting of compliance standards for AR-1/WQS Segment 2a uses the Table Value Standard, while the sampling results for AR-3A/WQS Segment 2b is compared to the hardness calculated standard that uses the site-specific equation (SSE) formula. The difference in formulas used to calculate the CO WQS compliance standards and the differences in hardness and flow rates explain the variances between AR-1/Segment 2a and AR-3A/Segment 2b's compliance rates.

Because ARARs are frozen at the time of the ROD, the compliance standards were recalculated using the formulas from 2009 for chronic cadmium and chronic zinc in AR-1 (before the POC) and at AR-3A (the POC). The results for AR-3A were similar to the results compared to the CO WQS analysis. The results for AR-1 showed a higher compliance rate to the 2009 ROD's hardness calculated standards than the compliance rate compared to the ever-changing CO WQS.

More specifically, when the sampling results since the 2017 FYR for AR-3A are compared to the ROD chronic standards, only four samples of the 131 AR-3A samples exceeded the chronic standard for cadmium (one sample is a duplicate sample), and one of these samples also exceeded the acute cadmium value. Similarly, only two of 131 samples exceeded the chronic standard for zinc, one of which also slightly exceeded the acute value. All of the exceedances occurred in 2019, an extremely high-water year. However, most of the exceedances were only slightly above the ROD standards adjusted for hardness (Table 28).

**Table 28: Cadmium and Zinc Exceedances Compared to ROD at POC Location AR-3A**

Sample Date	Dissolved Concentration	ROD Hardness-based Chronic Standard (June to March)	ROD Hardness-based Acute Standard (June to March)	Chronic Seasonal Standard (April-May)
<b>Cadmium</b>				
5/21/2019	0.00136	-	-	0.00134
5/30/2019	0.00135	-	-	0.00134
5/30/2019	0.00140	-	-	0.00134
6/13/2019	0.00089	0.00079	0.00080	-
<b>Zinc</b>				
6/4/2019	0.250	0.230	0.271	-
6/13/2019	0.213	0.186	0.218	-
<i>Notes:</i>				
- = sample date not in this time frame.				
All values presented in mg/L.				

Reviewing the AR-1 data compared to the 2009 ROD calculated standards, one exceedance for chronic cadmium (5/5/2017 3.58 µg/l hardness 61 std 1.34 µg/l) out of 89 samples was found; no exceedances for chronic zinc.

According to the 2009 OU12 ROD, water quality would be considered to have attained the ROD standards if 85% of the measurements are equal to or less than the chemical-specific standards. Overall, 97% of the of the cadmium values and 98% of the zinc values attained the surface water standards established in the 2009 OU12 ROD. Since the 2009 ROD, the CO WQS have been revised several times for cadmium and zinc in Arkansas River segments 2a, 2b and 2c. The 2009 ROD standards were compared to the most current state standards and the current state

standards are the same as the ROD standards, with one exception. The acute hardness-dependent standard for cadmium is currently slightly higher (less stringent) than the ROD standard (Appendix H).

*Groundwater*

The 2009 TI waiver waived the MCLs for cadmium and lead at specific portions of the OU12 shallow alluvial groundwater, as shown on the map (Figure H-1) of the TI waiver boundary. Groundwater samples are collected from 29 alluvial groundwater wells on annual basis to monitor groundwater quality in areas along California Gulch and the Arkansas River where interaction between groundwater and surface water is most likely to occur. In addition, some of these wells are located closest to engineered remedies (e.g., the Malta, Apache and CZL Tailing Impoundment). Table 29 lists constituents exceeding a groundwater human health standard and the number of wells with exceedances in 2021.

**Table 29: Summary of Samples Exceeding Groundwater Human Health Standards in 2021**

COC	Number of Exceedances
Arsenic	2
Cadmium	15
Lead	6
Manganese	30
Zinc	14
<i>Source: 2021 OU12 Draft Annual Report, Chart 3-11.</i>	

The highest concentrations observed in California Gulch groundwater monitoring network wells in 2021 are compared to human health standards in Table 30.

**Table 30: Maximum 2021 Groundwater Concentrations Compared to Human Health Standards**

COC	Standard (mg/L)	Maximum Value	
		Well	Reported Concentration (mg/L)
Arsenic	0.01	AP1TMW23	0.0188
Cadmium	0.005	AP1TMW23	0.106
Lead	0.015	AP1TMW16S	0.483
Manganese*	0.05	AP1TMW23	158.0
Zinc*	5	AP1TMW23	83.2
<i>Notes:</i>			
* Secondary drinking water standard contaminant of concern.			
<i>Source: 2021 OU12 Draft Annual Report, Chart 3-12.</i>			

In 2021, wells AP1TMW23 and AP1TMW16S exhibited the highest exceedances; these wells are monitoring the Apache Tailings Impoundment. Previously in 2019, the highest exceedances were observed in the area of the confluence of California Gulch and Arkansas River and downgradient of the CZL Tailings Impoundment.

In general, zinc concentrations observed in select site monitoring wells have decreased by an order of magnitude since 2000, while zinc concentrations in other wells have not changed. Results show that the number of groundwater standard exceedances in 2021 indicate that source areas in California Gulch and Stray Horse Gulch continue to negatively impact groundwater quality.

*Aquatic Life*

CSU collected benthic macroinvertebrate samples at several Arkansas River locations and in California Gulch near the mouth in 2021, including the OU12 reference location (AR-1) and point of compliance (AR-3A). The results of the 2021 CSU macroinvertebrate sampling are summarized in Table I-5. The 2021 results are summarized below:

- Macroinvertebrates were more abundant (# individuals) but less diverse (# taxa) at AR-1 and AR-3A than in the previous year's fall sampling

- The percentage of Heptageniidae (a metal-sensitive family of mayflies) was higher at AR-1 than at AR-3A

Comparison of fall 2021 macroinvertebrate metrics in Arkansas River to long-term averages suggest an increase in abundance upstream of California Gulch (AR-1) and downstream (AR-3A), but a decrease in diversity at both locations. The percentage of Heptageniidae present at both locations increased at AR-1 and decreased at AR-3A.

### **Site Inspection**

The OU12 site inspection took place on June 16, 2022. Participants are listed in Section III of this FYR Report. Photographs were taken of site features, including monitoring wells and access controls (Appendix G). An inspection checklist has been completed. It is available in Appendix F. Monitoring locations in the Arkansas River and California Gulch were observed. The surface water features were unobstructed and wells appeared to be in good condition and were secured with locks.

## **XVI.4 OU12: TECHNICAL ASSESSMENT**

**QUESTION A:** Is the remedy functioning as intended by the decision documents?

The OU12 remedy is fully implemented. The remedy for OU12 includes ongoing long-term monitoring and institutional controls. An IC to address groundwater and surface water restrictions in OU12, including the TI waiver area, is under consideration. The EPA and the State continue to work towards establishing additional institutional controls. Routine surface water and groundwater monitoring are ongoing at the Site. According to the 2009 OU12 ROD, water quality would be considered to have attained the ROD standards if 85% of the measurements are equal to or less than the chemical-specific standards. Overall, 97% of the of the cadmium values and 98% of the zinc values attained the surface water standards established in the 2009 OU12 ROD at the POC.

**QUESTION B:** Are the exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy selection still valid?

The exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of remedy selection are still valid.

The 2009 TI waiver waived the MCLs for metals, specifically cadmium and lead, at specific portions of the OU12 shallow groundwater as depicted on the map of the TI waiver boundary found in the 2009 OU12 ROD. The selected remedy complies with all action-specific ARARs. Since the selected remedy involves no construction, location-specific ARARs do not apply. Colorado removed the seasonal modification to the water quality standards (WQS) for Segments 2b and 2c in 2014. Because these new WQS standards are being met, no newly promulgated standards have been identified that could call into question the protectiveness of the chosen remedy. The state surface water quality standards have been revised several times for cadmium and zinc in Arkansas River segments 2a, 2b and 2c. The 2009 ROD standards were compared to the most current state WQS standards and the current state standards are the same or less stringent as the ROD standards, with one instance where the acute hardness-dependent standard for cadmium is currently slightly higher (less stringent) than the ROD standard (Appendix H).

**QUESTION C:** Has any other information come to light that could call into question the protectiveness of the remedy?

No additional information has come to light that would call into question the protectiveness of the remedy.

## XVI.5 OU12: ISSUES/RECOMMENDATIONS

Issues/Recommendations	
<b>OU(s) without Issues/Recommendations Identified in the FYR:</b>	
None	

<b>OU(s):</b> 12	<b>Issue Category: Institutional Controls</b>			
	<b>Issue:</b> Additional ICs to restrict groundwater and surface water uses have not been implemented as required by the OU12 ROD.			
	<b>Recommendation:</b> Implement additional institutional controls.			
<b>Affect Current Protectiveness</b>	<b>Affect Future Protectiveness</b>	<b>Party Responsible</b>	<b>Oversight Party</b>	<b>Milestone Date</b>
No	Yes	Other/Lake County	EPA/State	12/30/2024

## XVI.6 OU12: PROTECTIVENESS STATEMENT

Protectiveness Statement(s)	
<i>Operable Unit:</i> 12	<i>Protectiveness Determination:</i> Short-term Protective
<i>Protectiveness Statement:</i> The remedy at OU12 is protective of human health and the environment in the short-term. Surface water and groundwater monitoring is occurring at the Site and the data show that zinc and cadmium concentrations in surface water met Colorado Water Quality standards at the POC. A TI waiver for groundwater contamination was enacted by the 2009 ROD. For the OU12 remedy to be protective over the long term, the EPA should complete implementation of the additional institutional controls.	

## XVII. NEXT REVIEW

The next FYR Report for the California Gulch Superfund site is required five years from the completion date of this review.

## APPENDIX A – REFERENCE LIST

2008-2009 Monitoring and Maintenance Report, Operable Unit 11. California Gulch Superfund Site, Leadville, Colorado. Prepared by URS Operating Services, Inc. for EPA Region 8. June 20, 2011.

2015 Surface Water, Groundwater, Fluvial Sediment and Biological Monitoring Report, Operable Unit 12. California Gulch Superfund Site, Leadville, Colorado. Prepared for Colorado Department of Public Health and Environment Hazardous Materials and Waste Management Division by Tetra Tech. February 2017.

2016 Surface Water, Groundwater and Biological Monitoring Report, Operable Unit 12. California Gulch Superfund Site, Leadville, Colorado. Prepared for Colorado Department of Public Health and Environment Hazardous Materials and Waste Management Division by Tetra Tech. June 2017.

2017 Surface Water, Groundwater and Biological Monitoring Report, Operable Unit 12. California Gulch Superfund Site, Leadville, Colorado. Prepared for Colorado Department of Public Health and Environment Hazardous Materials and Waste Management Division by Tetra Tech. June 2018.

2018 Surface Water, Groundwater and Biological Monitoring Report, Operable Unit 12. California Gulch Superfund Site, Leadville, Colorado. Prepared for Colorado Department of Public Health and Environment Hazardous Materials and Waste Management Division by Tetra Tech. June 2019.

2019 Surface Water, Groundwater and Biological Monitoring Report, Operable Unit 12. California Gulch Superfund Site, Leadville, Colorado. Prepared for Colorado Department of Public Health and Environment Hazardous Materials and Waste Management Division by Tetra Tech. July 2020.

2021 Operations and Maintenance Facility Inspection Operable Units 2, 5, and 7. California Gulch Superfund Site, Leadville, Colorado. Prepared for Colorado Department of Public Health and Environment Hazardous Materials and Waste Management Division by Tetra Tech. February 2022.

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Action Memorandum OU6. Removal action for the Stray Horse Gulch OU6 Site, Leadville, CO. June 2016.

Action Memorandum OU9. Removal action for Three Residential Properties, Leadville, CO. September 2016.

Action Memorandum OU6/12. Removal action for the Stray Horse Gulch OU6/12 Site, Leadville, CO. June 2016.

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Baseline Human Health Risk Assessment, California Gulch Superfund Site, Part C, Evaluation of Worker Scenario. Roy F. Weston, Inc. April 1995.

Best Management Practices for Managing Lead, Arsenic and Cadmium Containing Soils in Lake County, Colorado. Lake County Building and Land Use Department. February 28, 2022.

California Gulch Superfund Site Operations and Maintenance Plan Operable Units 2, 5 and 7. Prepared by CDPHE. October 2016.

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City of Leadville, Colorado Ordinance 3, Series 2013. Ordinance to Amend the Leadville Municipal Code and Adopting Regulations Concerning Institutional Controls for Portions of Operable Units 3, 5, 6, 7, 8 and 9 within the California Gulch Superfund Site located within the City. May 2013.

Completion Report, Yak Tunnel Monitoring Wells, California Gulch Superfund Site, Leadville, Colorado. Woodward-Clyde Consultants. February 1992.

Consent Decree. California Gulch Superfund Site, Leadville, Colorado. United States District Court. May 1994.

Construction Completion Report, Apache Tailing Impoundments, Operable Unit 7, California Gulch Superfund Site, Leadville, Colorado. MFG, Inc. December 2003.

Construction Completion Report, California Gulch Operable Unit 11, Remedial Action. Frontier Environmental Services, Inc. January 2011.

Construction Completion Report, Yak Tunnel Operable Unit, California Gulch Superfund Site, Leadville, Colorado. Res-ASARCO Joint Venture. February 1993.

Direct Final Notice of Partial Deletion of Operable Unit 8, California Gulch Superfund Site, Lake County, Colorado. EPA Region 8. October 2009.

Direct Final Notice of Partial Deletion of Operable Unit 9, California Gulch Superfund Site, Leadville, Colorado. EPA Region 8. January 2002.

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Draft Monitoring and Maintenance Plan, Operable Unit 11, California Gulch Superfund Site, Leadville, Colorado. U.S. EPA Region 8. March 16, 2010.

Ecological Risk Assessment for the Terrestrial Ecosystem, California Gulch Superfund Site, Leadville, Colorado. EPA Region 8. January 1997.

Explanation of Significant Differences, Operable Unit 4, California Gulch Superfund Site, Leadville, Colorado. July 2013.

Explanation of Significant Differences, Operable Unit 10, California Gulch Superfund Site, Leadville, Colorado. EPA Region 8. July 2013.

Explanation of Significant Differences, D&RGW Slag Piles and Easement, Operable Unit 3, California Gulch Superfund Site, Leadville, Colorado. EPA Region 8. August 2014.

Explanation of Significant Differences, Malta Gulch Fluvial Tailing/Leadville Corporation Mill/Malta Gulch Tailing Impoundments, Operable Unit 2. California Gulch Superfund Site, Lake County, CO. July 2013.

Explanation of Significant Differences, Residential Populated Areas Operable Unit 9, California Gulch Superfund Site, Lake County, Colorado. EPA Region 8. September 2009.

Explanation of Significant Differences, Upper California Gulch, Operable Unit 4, California Gulch Superfund Site, Leadville, CO. March 2004.

Explanation of Significant Differences, Yak Tunnel, Operable Unit 1, California Gulch Superfund Site, Leadville, Colorado. EPA Region 8. October 1991.

Explanation of Significant Differences, Yak Tunnel, Operable Unit 1, California Gulch Superfund Site Lake County, Colorado. July 2013.

Fifth Five-Year Review Report for California Gulch Superfund Site, Leadville, Colorado. EPA Region 8. September 2017.

Final Focused Feasibility Study, Operable Unit 7, Apache Tailing Impoundments, California Gulch Superfund Site, Leadville, Colorado. MFG, Inc. January 17, 2000.

Final Focused Feasibility Study for Upper California Gulch Operable Unit 4, California Gulch Superfund Site, Leadville, Colorado. TerraMatrix and Shepherd Miller Incorporated. January 1998.

Final Modification of 1994 Consent Decree with ASARCO. U.S. Department of Justice. June 2008.

First Five-Year Review Report for California Gulch Superfund Site. EPA Region 8. February 2, 1996.

Focused Feasibility Study, Operable Unit 6, California Gulch Superfund Site, Leadville, Colorado. HDR Engineering, Inc. September 2002.

Focused Feasibility Study, Operable Unit 12, California Gulch Superfund Site, Leadville, Colorado, HDR. November 2007.

Fourth Five-Year Review Report for California Gulch Superfund Site, Leadville, Colorado. EPA Region 8. September 2012.

Lake County Blood-Lead Program 2010 Blood-Lead Testing Annual Report. Lake County Public Health Agency. 2010.

Lake County Ordinance, Resolution 2013-3. Amending the Lake County Land Development Code and Adopting Regulations Concerning Institutional Control for Operable Units 2 and 5 within the California Gulch Superfund Site. April 2013.

Memorandum of Understanding Between Union Pacific Railroad, Lake County, and EPA on the Mineral Belt Trail Project. Union Pacific Railroad and Lake County Board of Commissioners. July 1998.

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Minor ROD Modification, OU9. California Gulch Superfund Site, Leadville, Colorado. EPA Region 8. May 2013.

Monitoring and Maintenance Report, Operable Unit 11. California Gulch Superfund Site, Leadville, Colorado. URS Operating Services, Inc. June 20, 2011.

National Oil and Hazardous Substances Pollution Contingency Plan; National Priorities List: Partial Deletion of

the California Gulch Superfund Site OU4, 5 and 7. October 24, 2014.

Notice of Intent to Partial Delete Operable Unit 2, California Gulch Superfund Site, EPA Region 8. May 24, 2011.

Operations and Maintenance Facility 2016 Inspection for Operable Units 2, 5 and 7. Prepared by Tetra Tech. February 23, 2017.

Operations & Maintenance Plan for Operable Units 4, 8 and 10; Rebecca Thomas' Comments; MGF, Inc. October 2007.

Overflow Contingency Plan, Leadville Drainage Tunnel – Remedial Mikado Pond, Operable Unit 6, California Gulch Superfund Site, Leadville, Colorado. EPA Region 8.

Partial deletion of the of the California Gulch Superfund Site. OU1 (Yak Tunnel/Water Treatment Plant) and OU3 (Denver & Rio Grande Western Railroad Company (D&RGW) Slag Piles/Railroad Easement/Railroad Yard) by the EPA. Federal Register/Vol. 81, No. 26. February 9, 2016.

Partial Deletion of the California Gulch Superfund Site. OU02 by the EPA Federal Register/Vol. 66, No. 99. May 22, 2001.

Partial Deletion of the California Gulch Superfund Site. OUs 4, 5 and 7 by the EPA. Federal Register/Vol. 79, No. 206/Friday, October 24, 2014.

Partial Deletion of the California Gulch Superfund Site. OU 8 by the EPA. Federal Register/Vol. 74, No. 218. November 13, 2009.

Partial Deletion of the California Gulch Superfund Site. OU09 - subunits A and B, residential waste rock piles, and the parks and playgrounds by the EPA. Federal Register/Vol. 67, No. 34. February 20, 2002.

Partial Deletion of the California Gulch Superfund Site. OU10 by the EPA. Federal Register/Vol. 66, No. 32. February 15, 2001.

Partial Deletion of the of the California Gulch Superfund Site. Remaining portions of OU 9 by the EPA. Federal Register/Vol. 76, No. 183. September 21, 2011.

Pollution Report, Operable Unit 2 Leadville Corporation Lab, California Gulch Superfund Site, Leadville, Lake County, Colorado. EPA Region 8. June 2004.

Pollution/Situation Report, Acid Rock Drainage Controls, Operable Unit 6, California Gulch Superfund Site, Leadville, Colorado. EPA Region 8. October 29, 2014.

Pollution/Situation Report, Stray Horse Gulch, Operable Unit 6, California Gulch Superfund Site, Leadville, Colorado. EPA Region 8. December 16, 2013.

Record of Decision, Operable Unit 1, California Gulch Superfund Site, Leadville, Colorado. EPA Region 8. March 29, 1988.

Record of Decision, Operable Unit 2, California Gulch Superfund Site, Leadville, Colorado. EPA Region 8. September 1999.

Record of Decision, Operable Unit 3, California Gulch Superfund Site, Leadville, Colorado. EPA Region 8. May 6, 1998.

Record of Decision, Operable Unit 4, California Gulch Superfund Site, Leadville, Colorado. EPA Region 8. March 31, 1998.

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Record of Decision, Operable Unit 12, California Gulch Superfund Site, Leadville, Colorado. EPA Region 8. September 2009.

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Remedial Action Completion Report, Operable Unit 10, California Gulch Superfund Site, Leadville, Colorado. Shepherd Miller, Inc. and Montgomery Watson Mining Group. November 1999.

Remedial Action Completion Report Record of Preparation Review and Approval, California Gulch Superfund Site Operable Unit 9, Populated Residential Areas. EPA Region 8. January 2011.

Remedial Action Construction Activities for Operable Unit 4 Are Now Complete, California Gulch Superfund Site, Leadville, Colorado. EPA Region 8. Letter. December 2003.

Remedial Action Report, Operable Unit 11, California Gulch Superfund Site, Leadville, Colorado. EPA Region 8. June 13, 2013.

Remedial Action Report, Revision 1, Remedial Action, California Gulch, Operable Unit 5, Arkansas Valley / Colorado Zinc Lead Sites, Lake County, Colorado. Pacific Western Technologies, LTD. February 2010.

Remedial Design Report, Operable Unit 12, California Gulch Superfund Site, Leadville, Colorado. Tetra Tech. April 2015.

Resolution Amending the Lake County Land Development Code and Adopting Regulations Concerning Institutional Controls for Seventeen Mine Waste Pile Located in Operable Unit 9 within the California Gulch Superfund Site. Proceeding of the Board of County Commissioners. County of Lake and State of Colorado. December 2009.

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Second Five-Year Review Report for California Gulch Superfund Site. Prepared for EPA Region 8 by TechLaw, Inc. September 29, 2001.

Third Five-Year Review Report for California Gulch Superfund Site, Leadville, Colorado. Prepared for EPA Region 8 by HDR Engineering, Inc. September 28, 2007.

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Work Plan for the Lake County Community Health Program Phase 2. Lake County Board of County Commissioners, Lake County Public Health Agency, Colorado Department of Public Health and Environment, and EPA Region 8. February 2009.

Work Plan for the Lake County Community Health Program Phase 2 - Revision 1. Lake County Board of County Commissioners, Lake County Public Health Agency, Colorado Department of Public Health and Environment, and EPA Region 8. October 2013.

## APPENDIX B – SITE CHRONOLOGY

Superfund Enterprise Management System (SEMS) document numbers are included in the tables below for reference – SEMS is the EPA’s internal document system. Some documents are publicly available at <https://www.epa.gov/superfund/california-gulch>. If documents are not available on the website, contact EPA Region 8’s Information Service Center at <https://www.epa.gov/aboutepa/epa-region-8s-information-center>.

**Table B-1: Site Chronology**

Site Event	Date
Placer gold discovered in California Gulch and mining began in the Leadville Mining Area District.	1859
The Harrison Reduction Works in OU3, the only smelter reported to have processed gold ores, opened on the northeast corner of Harrison Avenue and Elm Street in 1877; it closed in 1893.	1877-1893
The Grant Smelter was in operation.	1878-1882
Berdell and Witherell Smelter operated near the La Plata slag pile in OU3.	1878-1887
OU2 area was developed with placer claims.	1879-1882
The Cummings and Finn Smelter Works began operations at Big Evans Gulch in 1879. The plant, which also operated under the name of the Fryer Hill Smelting Company, was dismantled in 1886. Other smelters that operated in the Big Evans Gulch Area included the Ohio and Missouri Smelter, the Gage-Hagaman Smelter, and the Raymond, Sherman and McKay Smelter.	1879-1886
The Elgin Smelter operated intermittently.	1879-1903
The Elgin, Grant and Arkansas Valley (AV) smelters in OU5 were constructed. The AV Smelter processed lead ore and reprocessed slag to produce lead, silver and other metals. It operated until 1961.	1879-1961
The AV Smelter operated in OU5.	1882-1960
The Union Smelter was in operation.	1892-1900
Bimetallic Smelting Company leased the La Plata area in OU3 for pyritic smelting of low-grade ores.	1892-1900
The Elgin Smelter works in OU5 were leased and operated by several different companies.	1893-1902
Yak Tunnel driven to dewater mines and facilitate mineral exploration and development in OU1.	1895
The American Smelting and Refining Company purchased the La Plata works in OU3 in 1900.	1900
The Western Zinc Mining and Reducing Company constructed a smelter to the west of Leadville in OU5 that extracted zinc from ores.	1914-1926
Harrison Recovery Works was established to rework the Harrison Street slag pile in OU3.	1917
Last extension to Yak Tunnel occurred – total length of tunnel measures 3.5 to 4 miles into Iron Hill and Breece Hill in OU1.	1923
The CZL Site operated a flotation mill that processed zinc and lead ores sporadically between 1925 and 1940. The tailings impoundment at the CZL Site is only tailings impoundment in OU8.	1925-1940
The Colorado Zinc-Lead Mill in OU5 began processing ores with a custom flotation process to produce zinc, lead, gold, silver and some copper concentrations. The mill closed in 1930 but was remodeled in 1935. Between 1935 and 1938, when it closed for good, the mill processed ores from several local mines and waste dumps. The history of the AV and the Grant/Union smelters indicated disposal of slag at this area.	1926-1938
The mill that generated the tailings placed in the Main Impoundment, and possibly the North Impoundment in OU7, was located on the hillside northeast of the North Impoundment. This mill was known as the Venir Mill, the California Gulch Mill and the ASARCO Leadville Milling unit.	1939-1956
Ore & Chemical Company used OU2 as a disposal area.	1943-1946
The Oregon Gulch Tailing Impoundment in OU10 received tailings from the Newmont/Resurrection-ASARCO mill in California Gulch.	1945-1957
Hecla Mining Company, which later purchased Day Mines (Hecla/Day), leased the OU2 property.	1947-1987
D&RGW purchased the AV Smelter slag pile in OU3 from ASARCO for use as ballast.	1961
Leadville Corporation purchased the OU2 property.	1968
D&RGW purchased the La Plata Slag Pile in OU3 from the Leadville Sanitation District in 1970.	1970
The Apache Mill began operations in the late 1970s and continued operations into the 1980s.	1970s-1980s
A mill facility used a cyanide leach process to extract silver from ore obtained from the Sherman and Diamond Newmont/Resurrection mines. Leadville Corporation purchased the mill in the early 1980s. It continued operating until the mill closed in 1986.	1970s-1986
D&RGW purchased the Harrison Street Slag Pile in OU3 from NL Industries for use as a ballast production.	1983

Site Event	Date
Leadville Silver & Gold operated a pyrite recovery process at OU2.	1983-1988
The EPA listed the Site on the NPL.	9/8/1983
The EPA signed the ROD for OU1.	3/29/1988
The EPA signed the ROD Mod for OU1.	3/23/1989
The EPA signed the ESD for OU1.	10/22/1991
Yak Tunnel WTP began treating Yak Tunnel discharge.	1992
Sitewide Consent Decree – SEMs#303506.	5/16/1994
The EPA signed the Site's first FYR Report.	2/2/1996
ROD signed for OU10 – Oregon Gulch.	8/8/1997
ROD signed for OU4 – Upper California Gulch.	3/31/1998
ROD signed for OU3 – D&RGW Railroad Slag Piles, Easement, Yard, and the Mineral Belt Trail.	5/6/1998
ROD signed for OU2 – Malta Gulch.	9/30/1999
ROD signed for OU7 – Apache Tailing Impoundments.	6/6/2000
ROD signed for OU8 – Lower California Gulch.	9/29/2000
ROD signed for OU5 – slag and soils for Elgin Smelter, Grant/Union Smelter, Western Zinc Smelter and AV South Hillside Slag sites.	9/29/2000
ROD signed for OU5 – tailings, flue dust and non-residential soils for AV Smelter and CZL Mill sites.	10/31/2000
OU10 partially deleted from the NPL.	4/16/2001
Notice of Partial Deletion of OU2 from the NPL.	7/23/2001
The EPA signed the Site's second FYR Report.	9/28/2001
Notice of Partial Deletion of the parks and playgrounds, residential mine waste rock piles, and Subunits A and B in OU9 from the NPL.	4/22/2002
OU7 Apache Tailing Impoundments capped.	6/24/2002
The EPA signed the OU6 ROD, encompassing previous removal actions.	9/25/2003
The EPA signed the ESD for OU4.	3/17/2004
The EPA signed the ROD for OU11 – Arkansas River Floodplain.	9/28/2005
Various response actions performed by parties to the Consent Decree.	1994-2006
The EPA signed the Site's third FYR Report.	9/28/2007
State of Emergency in Lake County due to water levels in the LMDT.	2/1/2008
Relief well installed in the LMDT to pump water to the LMDT treatment plant.	3/1/2008
The second EPA-lead sitewide technical assistance grant was completed.	5/1/2008
Sitewide claim in ASARCO bankruptcy proceeding.	5/1/2008
Final Consent Decree with Newmont USA and Newmont/Resurrection Mining Company	6/26/2008
Final Modification of 1994 Consent Decree with ASARCO	7/2/2008
The EPA signed the ROD for OU12 (Sitewide Water Quality).	9/22/2009
Lower California Gulch (OU8) partially deleted from the NPL.	1/12/2010
The EPA signed the ROD Amendment for OU6.	9/28/2010
Residential areas (OU9) partially deleted from NPL.	9/21/2011
The EPA signed the Site's fourth FYR Report.	9/27/2012
ROD Mod – ASARCO Smelters/Slag/Mill Sites (OU5) – SEMs#1261492.	5/16/2013
ROD Mod – Apache Tailing Impoundments (OU7) – SEMs#1261491.	5/16/2013
ROD Mod – Lower California Gulch (OU8) – SEMs#1261490.	5/16/2013
ROD Mod – Residential Soils (OU9) – SEMs#1261489.	5/16/2013
Repository completion – Stray Horse Gulch (OU6) – SEMs#1265520.	6/13/2013
The EPA signed the ESD for OU1 (Yak Tunnel) – SEMs#1267311.	7/29/2013
EPA signed the Malta Gulch Fluvial Tailing/Leadville Corporation Mill/Malta Gulch Tailing Impoundments (OU2) ESD – SEMs#1267312.	7/29/2013
The EPA signed the ESD for OU4 (Upper California Gulch) – SEMs#1267313.	7/29/2013
ESD Oregon Gulch (OU10) – SEMs#1267314.	7/29/2013
ESD D&RGW Slag Piles and Easement (OU3) – SEMs#1286501.	8/6/2014
Upper California Gulch (OU4), ASARCO Smelters/Slag/Mill Sites (OU5) and Apache Tailing Impoundments (OU7) partially deleted from NPL – SEMs#1310757.	10/24/2014
Yak Tunnel (OU1) and DR&G Slag Piles (OU3) partially deleted from the NPL.	4/11/2016

**Table B-2: Chronology of OU1 Events**

OU1 Event	Date
The EPA placed the California Gulch Superfund site on the NPL.	9/8/1983
Phase I RI Report complete – SEMs#325440, 308998, 309003.	5/1987
FS Report complete – SEMs#314983.	6/1/1987
Proposed Remedial Action Plan complete for OU1 – SEMs#333922.	12/7/1987
ROD signed – SEMs#334261.	3/29/1988
Surge pond and interim treatment plant remedy began.	9/1988
ROD Mod (AROD) – SEMs#316277.	3/23/1989
Unilateral Administrative Order (UAO 89-20) – SEMs#304436.	3/29/1989
Construction of Yak Tunnel WTP began.	2/1990
Surge pond and interim treatment plant remedy completed.	6/1991
ESD signed – SEMs#304397.	10/22/1991
Completion of Yak Tunnel monitoring wells – SEMs#2041904.	2/1/1992
Completion of the Yak Tunnel WTP facility – SEMs#320890-96.	2/1992 to 1/1/1993
First amendment to UAO 89-20 – SEMs#309585.	4/30/1993
Second amendment to UAO 89-20 – SEMs#318526.	6/16/1993
Yak Tunnel bulkhead remedy began.	3/1994
Consent Decree with ASARCO – SEMs#303506.	5/16/1994
Completion of the Yak Tunnel bulkhead remedy.	11/1994
Rising water levels detected in the Yak Tunnel.	5/2002
Dewatering of Black Cloud Mine underway.	3/2006
The EPA and the Site's PRPs signed a Consent Decree for performance of remedy and O&M activities – SEMs#1073144 (this Consent Decree replaced UAO 89-20).	6/26/2008
Environmental covenants placed – SEMs#1242260-62.	7/31/2012 and 10/10/2012
ESD added institutional controls – SEMs#1267311.	7/29/2013
OU partial deletion from the NPL.	4/11/2016
The EPA approved a permanent change for the effluent to be discharged from the Yak Tunnel WTP at a more alkaline pH	5/9/2018

**Table B-3: Chronology of OU2 Events**

OU2 Event	Date
California Gulch Superfund site placed on the NPL.	9/8/1983
Phase I RI Report issued – SEMs#325440, 308998, 309003.	5/1/1987
AOC for EE/CA at the MGTI signed – SEMs#318530.	9/1991
Partial Consent Decree with Hecla Mining Company to settle Hecla's sitewide liabilities – SEMs#301459 and 316075.	1/6/1993 and 8/17/1994
Partial Consent Decree with Leadville Silver and Gold Company to settle its sitewide liabilities – SEMs#316469.	9/3/1993
EE/CA issued for the MGTI – SEMs#309834.	8/2/1993
Action Memorandum issued for removal action at the MGTI – SEMs#315870.	9/10/1993
Action Memorandum issued for time-critical removal action at the LMGFT – SEMs#317241.	8/14/1995
Start date for removal action at the LMGFT (8/14/1995 Action Memorandum).	9/5/1995
Start date for removal action at the MGTI (9/10/1993 Action Memorandum).	10/5/1995
Action Memorandum issued for time-critical removal action at the MTI – SEMs#321257.	8/9/1996
Start date for time-critical removal action at the MGTI (8/9/1996 Action Memorandum).	9/4/1996
Discovery of drums at the Leadville Mill.	11/7/1997
Completion of removal actions identified in Action Memoranda dated 9/10/1993, 8/14/1995 and 8/9/1996.	3/31/1997
Action Memorandum issued for time-critical removal action of Leadville Mill drums – SEMs#346866.	4/15/1998
Time-critical drum removal action completed.	7/2/1998

OU2 Event	Date
Final pollution reports on 9/10/1993, 8/14/1995, 8/9/1996 Action Memorandum issued – SEMs#323615, 323616 and 323617.	8/18/1998
ROD signed – SEMs#211888.	9/30/1999
Notice of intent to partial delete OU2 from the NPL – SEMs#493090, 493091.	2/12/2001
Partial deletion from the NPL – SEMs#1249430.	7/23/2001
The EPA issued a lien on the PRPs' property.	9/23/2002
Lake County passed ordinance that acts as an institutional control – SEMs#1261487.	4/15/2013
ESD signed adding institutional controls – SEMs#1267312.	7/29/2013
O&M Plan finalized – SEMs#1283390.	3/20/2014

**Table B-4: Chronology of Removal Actions at OU2**

Area	Action Memorandum Date	Removal Action Taken	Start Date	Completion Date
MGTI & Leadville Corporation Mill	9/10/1993	1. Grade and revegetate contiguous fluvial tailings. 2. Remove non-contiguous pockets of fluvial tailings and dispose of the material in the MGTL. 3. Provide for long-term maintenance and monitoring.	10/05/1995	3/17/1997
LMGFT	8/14/1995	1. Grade and revegetate contiguous fluvial tailings. 2. Remove non-contiguous pockets of fluvial tailings and dispose of the material in the MGTL. 3. Provide for long-term maintenance and monitoring.	9/05/1995	3/17/1997
MTI	8/09/1996	1. Grade, compact and revegetate the impoundments. 2. Dispose of pyritic materials from the Apache Energy & Minerals property. 3. Provide for long-term maintenance and monitoring of the vegetated cap/cover.	9/04/1996	3/31/1997
Leadville Drums	4/15/1998	4. Stage 42 drums in a secure location. 5. Dispose or recycle oily liquids in accordance with Standards for the Management of Used Oil, 40 CFR 279. 6. Transport hazardous wastes to a Resource Conservation and Recovery Act (RCRA)-approved treatment or disposal facility.	5/26/1998	7/02/1998

**Table B-5: Chronology of OU3 Events**

OU3 Event	Date
California Gulch Superfund site placed on the NPL.	9/8/1983
The EPA's contractor sampled the three slag piles as part of the Site's RI.	1986
Phase I RI Report issued – SEMs#325440, 308998, 309003.	5/1/1987
Soils investigation conducted that included sampling of slag from the Harrison Street Pile, La Plata Pile, and an area west of Leadville (AV Smelter Slag Pile not included).	1988
The EPA conducted second sampling of slag to determine the concentrations of metals in three D&RGW slag piles and to evaluate potential of migration.	5/1989
AOC with D&RGW for RI/FS of slag piles – SEMs#1020621.	12/3/1991
RI/FS completed for seven major lead slag piles and a zinc slag pile – SEMs#305053, 303054, 307275.	12/11/1992
Sitewide Screening Feasibility Study (SFS) completed – SEMs#301445.	9/1/1993
AOC with D&RGW for completion of investigation and remediation activities – SEMs#301431.	9/15/1993
The EPA, the State and D&RGW entered into Consent Decree – SEMs#318593.	12/1993
D&RGW submitted ballast operations plan to the EPA.	7/1995
Ballast operations commenced.	8/1995
D&RGW submitted a feasibility study for the stockpiled fine slag at the AV Smelter slag pile according to Consent Decree terms – SEMs#320758.	5/13/1996

OU3 Event	Date
UP assumed D&RGW's responsibilities at the Site.	1996
ROD signature for OU3 (addressed only the fine slag stockpiled as a subpile of the AV Smelter Slag Pile) – SEMs#323545.	5/6/1998
Request for Partial Deletion of the Mineral Belt Trail from the State of Colorado to the EPA – SEMs#493093.	11/3/2000
Lake County adopted ordinance that acts as an institutional control – SEMs#1100390.	3/3/2009
City of Leadville adopted ordinance that acts as an institutional control – SEMs#1265522.	5/7/2013
ESD requiring institutional controls signed – SEMs#1286501.	8/6/2014
OU3 partial deletion from the NPL.	4/11/2016

**Table B-6: Chronology of OU4 Events**

OU4 Event	Date
California Gulch Superfund Site placed on the NPL.	9/8/1983
Final Yak Tunnel/California Gulch RI Report issued.	1986
PRP began the RI/FS	4/7/1987
Phase I RI Report issued – SEMs#325440, 308998, 309003.	5/1/1987
Newmont/Resurrection entered into a Consent Decree with the United States, the State of Colorado, and other PRPs to perform remediation work in OU4 – SEMs#303506. PRP completed the RI/FS	8/26/1994
EE/CA issued for Upper California Gulch – SEMs#316970.	7/1995
Action Memorandum issued for removal action at the Garibaldi Mine Site – SEMs#317242.	8/04/1995
Start date for removal action at Garibaldi Mine Site (08/04/1995 Action Memorandum).	9/22/1995
Action Memorandum issued for time-critical removal action at a portion of Upper California Gulch – SEMs#320169.	10/31/1995
Completion of removal action at Garibaldi Mine Site (08/04/1995 Action Memorandum).	1/1996
Action Memorandum issued for removal action at the Whites Gulch Sub-basin – SEMs#321250.	7/19/1996
Start date for removal action at the Whites Gulch Sub-basin, Agwalt Mine Site (07/19/1996 Action Memorandum).	8/28/1996
Start date for time-critical removal action at a portion of Upper California Gulch (10/31/1995 Action Memorandum).	10/03/1996
Action Memorandum amendment to July 19, 1996 Memorandum. Amendment deleted the removal action at the Waste Rock Pile UCG-92A – SEMs#321523.	11/18/1996
Completion of the Whites Gulch Sub-basin (Agwalt Mine) and a portion of Upper California Gulch (10/31/1995 and 07/19/1996 Action Memorandum).	7/1997
The EPA issued Proposed Plan.	1/01/1998
OU4 ROD issued – SEMs#1141259.	3/31/1998
Final Pollution Report issued, for non-time-critical removal action for the Garibaldi Mine – SEMs#323550.	6/30/1998
Remedial action – SEMs#2008363.	1998-2001
Construction Completion Report issued – SEMs#2032908.	2/1/2003
ESD deferred remedial action at Oro City to OU12 – SEMs#2008232.	3/17/2004
Consent Decree with Newmont/Resurrection – SEMs#1073144.	6/24/2008
Lake County adopts ordinance that acts as institutional control – SEMs#1261484.	12/22/2010
Environmental Covenants placed on Newmont/Resurrection properties – SEMs#1242260, 1242261, 1242262.	7/31/2012, 10/1/2012
ESD signed that requires institutional controls – SEMs#1267313.	7/29/2013
Partial deletion from the NPL – SEMs#1310757.	10/24/2014

**Table B-7: Chronology of OU5 Events**

OU5 Event	Date
California Gulch Superfund site placed on NPL.	9/8/1983
Phase I RI Report issued – SEMs#325440, 308998, 309003.	5/1/1987
The EPA and ASARCO entered into AOC for performance of soils sampling and air monitoring – SEMs#303835.	9/1/1990

<b>OU5 Event</b>	<b>Date</b>
The EPA issued a UAO and first and second amendments requiring ASARCO to conduct studies and complete RIs – SEMs#303587, 303625, 318527.	8/29/1991, 11/20/1991, and 9/12/1991
Smelter site reconnaissance conducted – SEMs#304533.	1991 - 1993
Surface water RI conducted.	1991
Hydrogeologic RI conducted.	1991 - 1992
SFS conducted to initiate the overall CERCLA FS.	1993
Smelter RI Report issued – SEMs#303553, 303554, 303555.	4/28/1993
ASARCO entered into Consent Decree with United States, the State and other PRPs. ASARCO agreed to perform certain remediation work in OU5, OU7 and OU9 – SEMs#316074, 303506.	8/26/1994
Final Surface Water RI Report issued – SEMs#1077124, 320875.	5/1/1996
Final Hydrogeologic RI Report issued – SEMs#320877.	5/1/1996
FFS – EGWA Sites submitted by ASARCO – SEMs#323796.	4/1/1999
FFS – AV Smelter and Colorado Zinc-Lead Mill Site submitted by ASARCO – SEMs#287877.	2/1/2000
Proposed Plan describing the EPA’s preferred alternative issued – SEMs#367805, 367806.	7/1/2000
ROD issued for AV/CZL Site – SEMs#479438.	9/29/2000
ROD issued for EGWA Site – SEMs#479625.	10/31/2000
ASARCO conducted demolition activities.	2004
MFG remedial design approved – Final Remedial Design Report, AV Smelter and Colorado Zinc-Lead Mill Site – SEMs#2032907.	4/12/2005
ASARCO conducted remedial actions.	2004-2007
PWT remedial design approved – AV Smelter and Colorado Zinc Lead Site, Remedial Action Construction Package.	6/19/2009
Remedial action construction mobilization.	7/2009
Final inspection, remedial action field work completed	10/23/2009
Final Remedial Action Report issued – SEMs#1142161.	2/23/2010
Lake County adopts ordinance that acts as institutional control – SEMs#1261487.	4/15/2013
City of Leadville adopts ordinance that acts as institutional control – SEMs#1265522.	5/7/2013
Minor ROD Mod clarified institutional controls – SEMs#1261492.	5/16/2013
O&M Plan finalized – SEMs#1283390.	3/20/2014
OU5 partially deleted from the NPL – SEMs#1310757.	10/24/2014
California Gulch Superfund site placed on the NPL.	9/8/1983
Phase I RI Report issued – SEMs#325440, 308998, 309003.	5/1/1987
The EPA and ASARCO entered into AOC for performance of soils sampling and air monitoring – SEMs#303835.	9/1/1990
The EPA issued a UAO and first and second amendments requiring ASARCO to conduct studies and complete RIs – SEMs#303587, 303625, 318527.	8/29/1991, 11/20/1991, and 9/12/1991
Smelter site reconnaissance conducted – SEMs#304533.	1991 - 1993
Surface Water RI conducted for the Site.	1991
Hydrogeologic RI conducted for the Site.	1991 - 1992
SFS conducted to initiate the overall CERCLA FS.	1993
Smelter RI Report issued – SEMs#303553, 303554, 303555.	4/28/1993
ASARCO entered into a Consent Decree with the United States, the State and other PRPs. ASARCO agreed to perform certain remediation work in OU5, OU7 and OU9 – SEMs#316074, 303506.	8/26/1994
Final Surface Water RI Report issued – SEMs#1077124, 320875.	5/1/1996
Final Hydrogeologic RI Report issued – SEMs#320877.	5/1/1996
FFS Report – EGWA Sites submitted by ASARCO – SEMs#323796.	4/1/1999
FFS Report – AV Smelter and Colorado Zinc-Lead Mill Site submitted by ASARCO – SEMs#287877.	2/1/2000
Proposed Plan describing the EPA’s preferred alternative issued – SEMs#367805, 367806.	7/1/2000
ROD signed for the AV/CZL Site – SEMs#479438.	9/29/2000
ROD signed for the EGWA Site – SEMs#479625.	10/31/2000
ASARCO conducted demolition activities.	2004
MFG remedial design approved – Final Remedial Design Report, AV Smelter and Colorado Zinc-Lead Mill Site – SEMs#2032907.	4/12/2005
ASARCO conducted remedial actions.	2004-2007

OU5 Event	Date
PWT remedial design approved – AV Smelter and Colorado Zinc Lead Site, Remedial Action Construction Package.	6/19/2009
Remedial action construction mobilization.	7/2009
Final inspection, remedial action field work completed	10/23/2009
Final Remedial Action Report issued – SEMs#1142161.	2/23/2010
Lake County adopted ordinance that acts as an institutional control – SEMs#1261487.	4/15/2013
City of Leadville adopted ordinance that acts as an institutional control – SEMs#1265522.	5/7/2013
Minor ROD Mod clarifying institutional controls – SEMs#1261492.	5/16/2013
O&M Plan finalized – SEMs#1283390.	3/20/2014
OU5 partially deleted from the NPL – SEMs#1310757.	10/24/2014

**Table B-8: Chronology of OU6 Events**

OU6 Event	Date
California Gulch Superfund site placed on the NPL.	9/8/1983
Phase I RI Report issued – SEMs#325440, 308998, 309003.	5/1/1987
Action Memorandum for removal action at 5th Street/Starr Ditch and Runoff, including Garibaldi, North Mike and Oregon gulches – SEMs#301684.	2/12/1991
Action Memorandum issued for time-critical removal action at the Stray Horse Gulch Sediment Dam – SEMs#320168.	11/6/1995
Action Memorandum issued for emergency response removal action for the removal of sediments from the 5th Street Drainage Ditch and Starr Ditch – SEMs#321329.	5/1/1996
Action Memorandum issued for time-critical removal action at the Hamm’s Tailing Impoundment and the Penrose Mine Waste Pile – SEMs#321251.	7/26/1996
EE/CA for Stray Horse Gulch – SEMs#322065.	6/1/1997
Action Memorandum issued for non-time-critical removal action for source control activities at designated mine waste piles – SEMs#322106.	6/24/1997
Addendum to EE/CA for Stray Horse Gulch – SEMs#323567.	5/1/1998
Action Memorandum issued for subsequent non-time-critical removal actions for source control at designated mine waste piles – SEMs#323611.	7/15/1998
Final pollution reports on 11/06/1995, 05/01/1996 Action Memorandums issued – SEMs#323618.	8/19/1998
Action Memorandum issued for a non-time-critical removal action for water management activities at the Newmont/Resurrection #1 Tailing Pile at the Upper End of Evans Gulch – SEMs#323722.	10/26/1998
Final Addendum No. 2 to EE/CA for Stray Horse Gulch – SEMs#301103.	5/1/1999
Addendum to Action Memorandum issued for a non-time-critical removal action for water management activities at the Newmont/Resurrection #1 Tailing Pile at the Upper End of Evans Gulch (10/26/1998) – SEMs#232083.	6/2/1999
Addendum to Action Memorandum issued for subsequent non-time-critical removal actions for source control at designated mine waste piles (07/15/1998) – SEMs#232089.	6/2/1999
Final Pollution Report issued, on 07/26/1996 Action Memorandum for time-critical removal action at the Hamm’s Tailing Impoundment and the Penrose Mine Waste Pile – SEMs#231856.	10/4/1999
Action Memorandum issued for a time-critical removal action in the Greenback – RAM runoff collection system – SEMs#301102.	6/20/2000
Amendment to Action Memorandum issued for a time-critical removal action in the Greenback – RAM runoff collection system (06/20/2000) – SEMs#478818.	8/22/2000
Final Pollution Report on 06/2/2000 Action Memorandum issued – SEMs#479619.	10/16/2000
Final Phase I, II, III, IV Removal Action Completion Report issued – SEMs#1020670, 1020671, 1100381.	12/28/2000
Action Memorandum issued for Ibex/Irene waste pile – SEMs#1162658.	6/25/2001
Action Memorandum issued for Greenback, RAM and Marion Ponds – SEMs#1202497.	7/13/2001
ROD issued – SEMs#2008670.	9/25/2003
Remedial action (removal of Ponsardine Waste Rock Pile, replacement of cribbing).	2002-2004
Construction completion achieved – Ponsardine mine waste relocation and Robert Emmet crib wall rehabilitation – SEMs#1022027.	11/15/2004

OU6 Event	Date
Construction of an outlet structure on the Gaw Shaft under a non-time-critical removal action (Site Activities Report) – SEMS#1068045.	7/14/2005
Action Memorandum issued – relief well installed during state of emergency – SEMS#1092386.	3/12/2008
Memorandum of Understanding with the USBR issued – SEMS#1072292.	6/24/2008
Pilot study on capping alternatives issued – SEMS#1189921.	12/20/2010
AROD signed – SEMS#1167638.	9/28/2010
Action Memorandum for Mikado Pond issued – SEMS#1202497.	7/13/2011
Action Memorandum for Mikado Pond issued – SEMS#1230841.	9/26/2011
Repository remedial design start.	10/13/2011
Repository remedial action start – SEMS#1242264.	7/9/2012
Action Memorandum for Mikado Pond issued – SEMS#1242278.	8/22/2012
Action Memorandum Amendment issued for Marion, Greenback and Adelaide ponds – SEMS#1242277.	9/4/2012
Repository remedial design completion – SEMS#1239588.	9/6/2012
Repository remedial action completion – SEMS#1265520.	6/13/2013
Environmental covenants placed on Newmont/Resurrection properties – SEMS#1242260, 1242261 and 1242262.	7/31/2012 and 10/1/2012
City of Leadville passed ordinance on parts of OU6 within city limits – SEMS#1265522.	5/7/2013
Pollution Report issued for Marion Pond and Shaft – SEMS#1292050.	12/16/2013
Pollution Report issued for Marion and Mikado ponds – SEMS#1292075.	10/29/2014
Action Memorandum issued for Mikado Pond – SEMS#1310761.	11/10/2014
Action Memorandum issued for Stray Horse Gulch – SEMS#1772202-R8.	6/7/2016
EPA placed the California Gulch Superfund site on the NPL.	9/8/1983
Phase I RI Report issued – SEMS#325440, 308998, 309003.	5/1/1987
Action Memorandum issued for removal action at 5th Street/Starr Ditch and Runoff, including Garbaldi, North Mike and Oregon gulches – SEMS#301684.	2/12/1991
Action Memorandum issued for time-critical removal action at the Stray Horse Gulch Sediment Dam – SEMS#320168.	11/6/1995
Action Memorandum issued for emergency response removal action for the removal of sediments from the 5th Street Drainage Ditch and Starr Ditch – SEMS#321329.	5/1/1996
Action Memorandum issued for time-critical removal action at the Hamm's Tailing Impoundment and the Penrose Mine Waste Pile – SEMS#321251.	7/26/1996
EE/CA issued for Stray Horse Gulch – SEMS#322065.	6/1/1997
Action Memorandum issued for non-time-critical removal for source control activities at designated mine waste piles – SEMS#322106.	6/24/1997
Addendum to EE/CA for Stray Horse Gulch issued – SEMS#323567.	5/1/1998
Action Memorandum issued for subsequent non-time-critical removal for source control activities at designated mine waste piles – SEMS#323611.	7/15/1998
Final pollution reports issued on 11/06/1995, 05/01/1996 Action Memorandums –. SEMS #323618	8/19/1998
Action Memorandum for a Non-Time Critical Removal Action for Water Management Activities at the Newmont/Resurrection #1 Tailing Pile at the Upper End of Evans Gulch. SEMS #323722	10/26/1998
Final Addendum No. 2 to EE/CA for Stray Horse Gulch. SEMS #301103	5/1/1999
Addendum to Action Memorandum for a Non-Time Critical Removal Action for Water Management Activities at the Newmont/Resurrection #1 Tailing Pile at the Upper End of Evans Gulch (10/26/1998) – SEMS#232083.	6/2/1999
Addendum to Action Memorandum issued for subsequent non-time-critical removal for source control activities at designated mine waste piles (07/15/1998) – SEMS#232089.	6/2/1999
Final Pollution Report issued on 07/26/1996 Action Memorandum for time-critical removal action at the Hamm's Tailing Impoundment and the Penrose Mine Waste Pile – SEMS#231856.	10/4/1999
Action Memorandum issued for a time-critical removal action in the Greenback – RAM Runoff Collection System – SEMS#301102.	6/20/2000

<b>OU6 Event</b>	<b>Date</b>
Amendment to Action Memorandum issued for a time-critical removal action in the Greenback – RAM Runoff Collection System (06/20/2000) – SEMs#478818.	8/22/2000
Final Pollution Report on 06/2/2000 Action Memorandum issued – SEMs#479619.	10/16/2000
Final Phase I, II, III, IV Removal Action Completion Report issued – SEMs#1020670, 1020671, 1100381.	12/28/2000
Action Memorandum for Ibex/Irene waste pile issued – SEMs#1162658.	6/25/2001
Action Memorandum issued for Greenback, RAM and Marion ponds – SEMs#1202497.	7/13/2001
ROD signed – SEMs#2008670.	9/25/2003
Remedial action completed (removal of Ponsardine Waste Rock Pile, replacement of cribbing).	2002-2004
Construction completion achieved – Ponsardine Mine Waste relocation and Robert Emmet Crib Wall rehabilitation – SEMs#1022027.	11/15/2004
Construction of an outlet structure on the Gaw Shaft under a non-time-critical removal (Site Activities Report) – SEMs#1068045.	7/14/2005
Action Memorandum issued – relief well installed during state of emergency – SEMs#1092386.	3/12/2008
Memorandum of Understanding with the USBR issued – SEMs#1072292.	6/24/2008
AROD signed – SEMs#1167638.	9/28/2010
Pilot Study on capping alternatives issued – SEMs#1189921.	12/20/2010
Action Memorandum for Mikado Pond issued – SEMs#1202497.	7/13/2011
Action Memorandum for Mikado Pond issued – SEMs#1230841.	9/26/2011
Repository remedial design start.	10/13/2011
Repository remedial action start – SEMs#1242264.	7/9/2012
Action Memorandum for Mikado Pond issued – SEMs#1242278.	8/22/2012
Action Memorandum Amendment issued for Marion, Greenback and Adelaide ponds – SEMs#1242277.	9/4/2012
Repository remedial design end – SEMs#1239588.	9/6/2012
Repository remedial action completion – SEMs#1265520.	6/13/2013
Environmental covenants on placed Newmont/Resurrection properties – SEMs#1242260, 1242261 and 1242262.	7/31/2012 and 10/1/2012
City of Leadville passed ordinance for parts of OU6 within city limits – SEMs#1265522.	5/7/2013
Pollution Report for Marion Pond and Shaft issued – SEMs#1292050.	12/16/2013
Pollution Report for Marion and Mikado ponds issued – SEMs#1292075.	10/29/2014
Action Memorandum for Mikado Pond issued – SEMs#1310761.	11/10/2014
Action Memorandum for Stray Horse Gulch issued – SEMs#1772202-R8.	6/7/2016

**Table B-9: Chronology of Initial EPA Response Actions, OU6**

Area(s) Affected	Action Memorandum Date	Response Action Taken	Start Date	Completion Date
5th Street Starr Ditch Harrison Slag Pile	1990 Removal Action	Converted open ditches to covered culverts along both sides of 5th Street.  Fenced Starr Ditch from just south of 5th Street to Monroe Street, just east of the Harrison Street slag pile.	1990	1990
Stray Horse Gulch	11/06/1995 Time-Critical Removal Action	Removed sediment from ditches and culverts around Hamm's Tailing Impoundment, from the 5th Street Drainage Ditch and from Starr Ditch south of 5th Street.  Constructed sediment control dam across the road from the east end of Hamm's Tailing Impoundment.	8/25/1995	8/30/1995
5th Street Drainage Ditch Starr Ditch	5/01/1996  Emergency Response Removal Action	Removed sediment from the 5th Street Drainage Ditch from its headwall to and along Starr Ditch to its confluence with Lower California Gulch.	5/06/1996	5/10/1996
Hamm's Tailing Impoundment Penrose Mine Waste Pile	07/26/1996 Time-Critical Removal Action	Transported mine waste in the Penrose Mine Waste Pile to Hamm's Tailing Impoundment.  Revegetated the Penrose Mine Waste Pile footprint and reshaped the Hamm's Tailing Impoundment to a more uniform and stable configuration.	7/26/1996	9/30/1998
Maid of Erin Wolftone Mine Adams Mill Mahala Mine	06/24/1997  Non-Time- Critical Removal Action (Phase I)	Consolidated about 211,000 cubic yards of waste from Maid of Erin Mine, Wolftone Mine and Mahala Mine waste piles.  Placed liner system and rock cap over the three consolidated waste piles.	6/24/1997	1998

Area(s) Affected	Action Memorandum Date	Response Action Taken	Start Date	Completion Date
Adelaide-Ward Mikados Highland Mary Pyrenees	07/15/1998 Amendment to 06/24/1997 Non- Time-Critical Removal Action (Phase II)	<p>Constructed surface water run-on diversion channels around six mine waste rock piles.</p> <p>Constructed surface water runoff collection channels around four waste rock piles to capture and convey impacted water to retention basins.</p> <p>Constructed surface water retention basins.</p> <p>Constructed detention basins in Lower Stray Horse gulch to convey a 100-year storm event and to remain stable for a 500-year storm event.</p> <p>Rehabilitated Starr Ditch from 3rd Street to 5th Street to convey a 100-year, 24-hour storm event and to remain stable for a 500-year storm event.</p> <p>Revegetated disturbed areas as well as the Hamm's Tailing Impoundment and Penrose Mine Waste Pile.</p>	1998	1999
Ponsardine Mine RAM Greenback Newmont/Resurrection No. 1/Fortune Mine	06/02/1999 Amendment to 06/24/1997 Non- Time-Critical Removal Action (Phase III)	<p>Constructed surface water run-on diversion channels around six mine waste rock piles.</p> <p>Constructed surface water runoff collection channels around four waste rock piles to capture and convey impacted water to retention basins.</p> <p>Constructed surface water retention basins.</p>	1999	1999
Newmont/Resurrection No. 1 Tailing Pile	10/26/1998 to 6/02/1999 Non-Time- Critical Removal Action	Installed sediment control structure in the drainage basin downstream of the Newmont/Resurrection No. 1 Tailing Pile.	6/8/1998	1999

Area(s) Affected	Action Memorandum Date	Response Action Taken	Start Date	Completion Date
Greenback – RAM Runoff	6/20/2000 to 8/22/2000  Time-Critical Removal Action (Phase IV)	Identified suspected blockage in drainage system leading to the Greenback-RAM collection system. Excavated blockages from drainage pathways or modified flow paths.  Installed berm and drainage improvements from the Greenback collection system to direct the flow into a depression.  Advanced a borehole and installed a stand-pipe to convey ARD discharged from the collection systems described above to the Marion shaft adit for conveyance to the Leadville Mine Drainage Tunnel and ultimately to the USBR water treatment facility.  Transferred ponded water in the RAM collection system to the Greenback collection system to relieve the hydraulic pressure on the abandoned railroad grade.  Developed and implemented a Water Quality Monitoring Plan.	6/30/2000	10/13/2000
Ibex/Irene Waste Rock Pile	6/25/2001 Time-Critical Removal Action (Phase V)	Diverted run-on around mine waste pile.  Retained runoff in two impoundments to settle out sediments that could impact Parkville Reservoir.	6/25/2001	Fall 2001
Stray Horse Gulch	2004	Ponsardine relocation.  Robert Emmet crib wall rehabilitation.	2003	2004
Gaw Shaft	2005 Non-Time-Critical Removal Action	Constructed an engineered outlet for the Gaw Shaft.	2005	2005
Stray Horse Gulch	3/12/2008 Time-Critical Removal Action	Installed relief well into the LMDT.	2/2008	2008
Stray Horse Gulch	9/26/2011 Time-Critical Removal Action	Pumped water from Mikado Pond to Marion Pond.	5/2011	5/2011
Stray Horse Gulch	8/22/2012 Time-Critical Removal Action	Cleaned out Marion, Greenback, RAM and Mikado ponds.  Addition of signage and fencing to prevent human exposure to contaminated water in the ponds.	9/2012	9/2012
Action Memorandum Amendment for Marion, Greenback, Adelaide Ponds – SEMS #1242277	9/4/2012			

Area(s) Affected	Action Memorandum Date	Response Action Taken	Start Date	Completion Date
Action Memorandum for Mikado Pond – SEMS #1310761	11/10/2014	Cleaned out Mikado, Greenback and Marion. Added fencing to Mikado and Marion ponds.  Pumped ARD from Mikado and transferred it to IBEX pond.  Repaired underground line from Marion Pond to Marion Shaft.  Added runoffs controls in Greenback and Marion areas.  Removed sediment from Starr Ditch.	5/22/2014	9/30/2014
Action Memorandum for a Time-Critical Removal Action at OU6 and OU12 SEMS# 1772202-R8	6/7/2016	Installed additional bypass drainage system in the Marion Collection area and adjacent areas to drain ARD into the LMDT during spring runoff.  Widened, deepened, armored and realigned existing diversion channel within OU6.  Removal of excess sediment in Greenback, RAM, Marion, Mikado, Adelaide, Highland Mary, and Pyrenees ponds to increase the capacity to hold ARD. Pumping of ARD from retention ponds into the collection system.  Installed permanent pump station at the Gaw well to manage water levels in mine pool.  Installed monitoring system to provide “real-time” conditions of the LMDT as water is pumped from the Gaw relief well or at stations in the tunnel.	5/1/2015	Ongoing

**Table B-10: Chronology of OU7 Events**

OU7 Event	Date
California Gulch Superfund site placed on the NPL.	9/8/1983
Investigation study conducted by Colorado Department of Law.	1986
Investigation study conducted by the EPA.	1987
Phase I RI Report issued – SEMS#325440, 308998, 309003.	5/1/1987
Investigation study conducted by the EPA.	1989
The EPA and the PRPs entered into an AOC for the performance of soil sampling and air monitoring – SEMS#303835	9/25/1990
The EPA issued a UAO that required ASARCO to conduct studies and complete RIs – SEMS #303586.	8/29/1991
Tailings RI performed – SEMS#303571.	7/1/1991
Surface Water RI for the Site conducted.	1991-1192
Hydrogeologic RI for the Site conducted.	1991
SFS conducted to initiate the overall CERCLA feasibility study process – SEMS#301445.	9/1/1993
ASARCO entered into a Consent Decree with the United States, the State and other PRPs. ASARCO agreed to perform certain remediation work in OU5, OU7, and OU9 – SEMS#316074.	8/25/1994
Final Tailing Disposal Area RI Report issued – SEMS#318961 and 318962.	1/1994
Cultural Resources Investigations of the Apache Tailing Area Report issued – SEMS#319927	11/28/1995

<b>OU7 Event</b>	<b>Date</b>
Apache Tailing Impoundment Dewatering Treatability Study Work Plan issued – SEMs#318033.	9/1/1995
Action Memorandum issued for Removal (Response) Action at the Apache Energy & Minerals property – SEMs#321253.	8/8/1996
Final Surface Water RI Report issued – SEMs#1077124, 320875.	5/1/1996
Final Hydrogeologic RI Report issued – SEMs#320877, 320878.	5/1/1996
Action Memorandum issued for Time-Critical Removal Action for Removal of Tailing Pond No. 2 and Tailing Pond No. 3 of the Apache Tailing Impoundment – SEMs#321833.	4/7/1997
Field Investigation Data Report for the Apache Tailing Supplemental RI issued – SEMs#322004.	4/7/1997
Final Pollution Reports for time-critical removal actions at Tailing Pond 2 and Tailing Pond 3 of the Apache Tailing Impoundment, 04/1997, and Apache Energy & Minerals Property, 08/1996 – SEMs#323571.	6/30/1998
FFS Report issued for the Apache Tailing Impoundments – SEMs#371805, 1293985.	1/17/2000
Proposed Plan for the EPA’s preferred alternative remedy issued – SEMs#287726.	1/25/2000
Action Memorandum issued for time-critical removal action for the Apache Tailing Impoundment – SEMs#287713.	1/26/2000
ROD signed – SEMs#301097.	6/6/2000
Construction Completion Report issued – SEMs#1100383.	12/1/2003
Remedial Action completed	12/17/2003
Lake County adopted ordinance that acts as an institutional control – SEMs#1261484.	12/22/2010
City of Leadville adopted ordinance that acts as an institutional control – SEM #1265522.	5/7/2013
Minor ROD Modification issued to clarify institutional controls – SEMs#1261491.	5/16/2013
O&M Plan finalized – SEMs#1283390.	3/20/2014
Partial deletion from the NPL – SEMs#1310757.	10/24/2014

**Table B-11: Chronology of Removal and Remedial Actions, OU7**

<b>Area</b>	<b>Action Memorandum Date and Action</b>	<b>Response Action Taken</b>	<b>Start Date</b>	<b>Completion Date</b>
Apache Energy & Minerals Property	8/08/1996 Time-Critical Removal Action	Transported drums and bags of pyrite to the MTI. Decontaminated and demolished the Apache Mill building and equipment.	08/08/1996	03/1997
Tailing Ponds 2 and 3	4/07/1997 Time-Critical Removal Action	Removed Tailing Pond 2 and Tailing Pond 3, berm material and native soil, and consolidated the material on the Main Impoundment. Pumped surface water ponded on Tailing Pond 2 and Tailing Pond 3 to Yak Tunnel WTP prior to initiating excavation of tailing. Diversion of potentially contaminated surface runoff from the Main Impoundment to a sediment control structure. Protected the toe of the Main Impoundment.	4/21/1997	12/04/1997

Area	Action Memorandum Date and Action	Response Action Taken	Start Date	Completion Date
Main and North Impoundments	1/26/2000  Time-Critical Removal Action	Regraded the material placed on the Main Impoundment during the removal of Tailing Ponds 2 and 3.	01/2000	12/17/2003
		Regraded the eastern embankment and the southwest embankment in the vicinity of the wooden box culvert on the Main Impoundment.		
		Excavated the tailings material overlying the clay-tile culvert at the southern edge of the Main Impoundment.		
		Placed fill over a portion of the North Impoundment.		
Main and North Impoundments	Remedial activity specified in the ROD	Channelization of California Gulch through the southern portion of the main impoundment and construction of diversion ditches to control water run-on and runoff.	06/2001	12/2003
		Regraded impoundments, placed a multi-layer composite cover (including a geosynthetic barrier) over the tailings area, and revegetated the area.		

**Table B-12: Chronology of OU8 Events**

OU8 Event	Date
California Gulch Superfund site placed on the NPL.	9/8/1983
Final Yak Tunnel/California Gulch RI Report issued – SEMs#314479.	2/28/1986
Phase I RI Report issued – SEMs#325440, 308998, 309003.	5/1/1987
The EPA and the PRPs entered into AOCs for the performance of soil sampling and air monitoring – SEMs#1152479, 303835.	9/28/1990
The EPA issued a Unilateral Order on Consent that required ASARCO to conduct studies and complete RIs – SEMs#309951.	8/29/1991
Newmont/Resurrection entered into a Consent Decree with the United States, the State and other PRPs to perform remediation work – SEMs #303506.	5/16/1994
EE/CA issued for the Lower California Gulch Colorado-Lead Zinc site – SEMs#316972.	7/1995
Action Memorandum issued for removal action at the CZL Tailing Impoundment site – SEMs#317240.	8/4/1995
Start date for removal action at CZL Tailing Impoundment site (08/04/1995 Action Memorandum).	9/4/1995
Completion of removal action at CZL Tailing Impoundment site (08/04/1995 Action Memorandum).	1/1996
Action Memorandum issued for removal action at FTSs 1, 2, 3, 6 and 8 – SEMs#323578.	6/11/1998
Final Pollution Report on 08/04/1995 Action Memorandum – SEMs#323548.	6/30/1998
Start date for removal action at FTSs 1, 2, 3, 6 and 8 (06/11/1998 Action Memorandum).	8/28/1996
Completion of removal action at FTSs 1, 2, 3, 6 and 8 (06/11/1998 Action Memorandum).	11/7/1998
Final Pollution Report on 06/11/1998 Action Memorandum – SEMs#287865.	2/5/1999
	9/10/1997
Final FFS Report issued – SEMs#322589, 287786.	5/22/2000
ROD signed – SEMs#479443.	9/29/2000
	7/1/2003
Construction Completion Report issued – SEMs#2032901, 2008364.	9/2/2003
Lake County ordinance implemented as institutional control – SEMs#1100390.	3/2/2009
Partial deletion from the NPL – SEMs#10000241.	1/12/2010
	7/31/2012
Environmental covenants placed on Newmont/Resurrection properties – SEMs#1242260, 1242261, 1242262.	and 10/1/2012
City of Leadville adopted ordinance as an institutional control – SEMs#1265522.	5/7/2013

**Table B-13: Chronology of OU9 Events**

<b>OU9 Event</b>	<b>Date</b>
California Gulch Superfund site placed on the NPL.	9/08/1983
Investigation study conducted by Colorado Department of Law.	1986
Emergency response at a private well – SEMs#314010.	5/22/1986
Phase I RI Report issued – SEMs#325440, 308998, 309003.	5/1/1987
The EPA and settling defendants entered into AOC for performance of soils sampling and air monitoring – SEMs#348081.	9/28/1990
The EPA issued UAO that required ASARCO to conduct studies and complete RIs related to the Demographics Work Plan, the Final Sampling Plan for Sampling and Analysis of Lead Occurrence Within and Immediately Adjacent to Residences, the Soil Investigation Work Plan, the Mine Waste Pile RIs, and other issues – SEMs#309951.	8/29/1991
The EPA issued a UAO that required Newmont/Resurrection Mining Company to conduct and complete final Soils Investigation Work Plan – SEMs#303602.	9/10/1991
The EPA entered into an AOC with ASARCO and Newmont/Resurrection Mining Company for performance of metals speciation program – SEMs#304400.	9/24/1991
Draft Final Report – Lead Speciation Study issued – SEMs#303552.	10/12/1992
Partial Consent Decree among United States, the State and settling defendants settling federal and state claims for past response costs incurred prior to February 1, 1991, and February 1, 1992 – SEMs#321558.	9/4/1993
Final RI pursuant to UAO dated 09/10/1991 submitted by Newmont/Resurrection Mining Company – SEMs#315809, 315810, 315811.	7/15/1994
Consent Decree with ASARCO and Newmont/Resurrection Mining Company to define areas of responsibility for the two companies and the U.S. government and to develop the Kids First Work Group – SEMs#316074.	8/26/1994
Metals Speciation Data Report submitted – SEMs#318995.	09/01/1994
EE/CA work plan prepared to evaluate lead concentrations in soils within parks and playground areas in OU9 – SEMs#318878.	11/01/1994
Initiation of LCHP/ASARCO outreach program for Kids First program.	5/25/1995
Draft Final Report for Lead Speciation not approved by the EPA – SEMs#319507.	12/05/1995
Action Memorandum issued for time-critical removal action for two residences, Kids First program, in OU9 – SEMs#318303.	10/16/1995
Draft Mine Waste EE/CA issued – SEMs#321328.	12/01/1995
Action Memoranda issued for time-critical removal actions at five separate residences, Kids First program, in OU9.	1996
Human Health Risk Assessment issued – SEMs#319625, 319626, 316598.	1/2/1996
Responses to Comments #2, Mine Waste EE/CA from ASARCO – SEMs#321243.	7/23/1996
Action Memorandum issued for PRP-financed removal actions addressing Mine Waste Rock Piles – SEMs#321255.	8/15/1996
Action Memoranda issued for time-critical removal actions at 15 separate residences, Kids First program, in OU9.	1997
Final Pollution Report issued for 20 time-critical removal actions performed under the Kids First program, OU9 during the period starting July 31, 1996, through October 30, 1997 – SEMs#323537.	5/26/1998
Action Memoranda issued for time-critical removal actions at 18 separate residences, Kids First program, in OU9.	1998
Action Memorandum Amendment issued for time-critical removal action for PRP-financed removal actions addressing mine waste rock piles located in the residential populated areas in OU9, dated August 15, 1996 – SEMs#323547.	7/01/1998
Final Pollution Report issued for 20 time-critical removal actions performed under the Kids First program, OU9 during the period starting October 31, 1997, through November 6, 1998 – SEMs#323750.	12/15/1998
Action Memoranda issued for time-critical removal actions at nine separate residences, Kids First program, in OU9.	1999
ROD for Residential Populated Areas issued – SEMs#211891.	9/02/1999
Final Pollution Report issued for three time-critical removal actions performed under the Kids First program in OU9 during the period starting June 22, 1999, through September 30, 1999 – SEMs#211908.	10/12/1999
Final Pollution Report issued for four time-critical removal actions performed under the Kids First program in OU9 during the period starting September 13, 1999, through November 1, 1999 – SEMs#231993.	12/01/1999
Action Memoranda issued for time-critical removal actions at two residences, Kids First program.	2000

<b>OU9 Event</b>	<b>Date</b>
LCCHP initiated to take the place of the interim Kids First program.	6/1/2000
Petition for a Partial Deletion of portions of OU9 – SEMS#493093, 493110.	11/03/2000
Remedial design for LCCHP.	1/2001
Leadville Kids First Program Report, 1994-1999 progress and results issued – SEMS#1081471.	2/28/2001
Waste Rock Pile completion report issued – SEMS#493113.	7/31/2001
Partial deletion of OU9 subunits	4/22/2002
LCCHP Guidelines established – SEMS#2037052.	5/2002
OU9 Performance standards met, noted in the 2005 Annual Report – SEMS#2041224.	4/1/2006
LCCHP Phase 2 Work Plan completed.	3/2009
ESD issued for 17 waste rock piles – SEMS#1118478.	9/30/2009
Lake County Board of County Commissioners amended Land Development Code; institutional controls for 17 mine waste piles – SEMS#1183308.	12/23/2009
Lake County Board of County Commissioners approved LCCHP Phase 2, the institutional control for OU9 – SEMS#1161221.	3/16/2010
Voluntary residential yard cleanups completed – SEMS#1152050, 1152052, 1193006.	Fall 2010
Notice of Intent to Partially Delete published in Federal Register.	5/24/2011
Remaining portions of OU9 partially deleted from the NPL – SEMS#1202469, 1202470.	9/21/2011
City of Leadville adopted institutional controls – SEMS#1265522.	5/7/2013
Minor ROD Mod issued, clarifying institutional controls – SEMS#1261489.	5/16/2013
LCCHP Phase 2 Revision 1 approved – SEMS#1275059.	10/23/2013
Action Memorandum issued for three residences – SEMS#1777574.	9/19/2016

**Table B-14: Chronology of OU10 Events**

<b>OU10 Event</b>	<b>Date</b>
California Gulch Superfund site placed on the NPL.	9/08/1983
Phase I RI Report issued – SEMS#325440, 308998, 309003.	5/1/1987
Newmont/Resurrection entered into a Consent Decree and agreed to perform certain remediation work – SEMS#303506.	5/16/1994
EE/CA issued for stream sediments in Oregon Gulch – SEMS#316972.	7/1/1995
Action Memorandum issued for PRP-financed removal action at the Oregon Gulch Stream Sediments site – SEMS#317240.	8/04/1995
Removal Action Completion Report issued – SEMS#322119.	6/1/1997
ROD issued – SEMS#322208.	8/08/1997
O&M Plan and Final Remedial Design Report issued – SEMS#323629.	6/03/1998
Remedial Action Completion Report issued – SEMS#287878.	11/15/1999
Vegetation Monitoring Report issued – SEMS#481036.	12/05/2000
The EPA issued Notice of Intent to Partially Delete.	2/15/2001
OU10 partially deleted from the NPL – SEMS#100000238.	4/16/2001
ESD issued, clarifying institutional controls – SEMS#1267314.	7/29/2013
California Gulch Superfund site placed on the NPL.	9/08/1983
Phase I RI Report issued – SEMS#325440, 308998, 309003.	5/1/1987
Newmont/Resurrection entered into a Consent Decree and agreed to perform certain remediation work – SEMS#303506.	5/16/1994
EE/CA issued for stream sediments in Oregon Gulch – SEMS#316972.	7/1/1995
Action Memorandum issued for PRP-financed removal action at the Oregon Gulch Stream Sediments site – SEMS#317240.	8/04/1995
Removal Action Completion Report issued – SEMS#322119.	6/1/1997
ROD issued – SEMS#322208.	8/08/1997
O&M Plan and Final Remedial Design Report issued – SEMS#323629.	6/03/1998
Remedial Action Completion Report issued – SEMS#287878.	11/15/1999
Vegetation Monitoring Report issued – SEMS#481036.	12/05/2000
The EPA issued a Notice of Intent to Partially Delete.	2/15/2001
OU10 partially deleted from the NPL – SEMS#100000238.	4/16/2001
ESD issued, clarifying institutional controls – SEMS#1267314.	7/29/2013

**Table B-15: Chronology of OU11 Events**

OU11 Event	Date
California Gulch Superfund site placed on the NPL.	9/08/1983
Investigation study conducted by Colorado Department of Law.	1986
Phase I RI Report issued – SEMs#325440, 308998, 309003.	5/1/1987
Emergency response due to high spring run-off threatening severe erosion of a stretch of the Arkansas Riverbank.	6/1993
Emergency removal of river tailings – SEMs#478615.	10/28/1993
Two time-critical removal actions to stabilize the embankments of two properties abutting the Arkansas River – SEMs#2003514, 2003519.	9/1994
Emergency removal of river tailings – SEMs#478617.	11/01/1994
Action Memorandum issued for time-critical removal action – SEMs#322266.	9/15/1997
Amendment to 09/15/1997 Action Memorandum issued – SEMs#323546.	8/04/1998
Action Amendment issued for time-critical removal action issued – SEMs#232091.	6/17/1999
Action Amendment issued for time-critical removal action issued – SEMs#478219.	6/09/2000
Amendment to Action Memorandum dated 06/09/2000 issued – SEMs#478215.	8/11/2000
FS Report issued – SEMs#1049484.	12/1/2004
ROD issued – SEMs#2032941.	9/28/2005
Remedial action started.	9/13/2006
Remedial Work Plan issued – SEMs#1151714.	4/02/2007
Risk/health assessment and risk addendum (risks from mercury) issued – SEMs#1151711.	4/09/2007
Remedial design completed.	9/17/2007
Removal action completed – SEMs#1061008, 1061009, 1061010.	10/26/2007
Remedial action construction started.	6/2008
Monitoring and maintenance started.	7/2009
Construction Completion Report issued – SEMs#1151713.	1/11/2010
Monitoring and Maintenance Plan issued – SEMs#1167694.	3/23/2010
Remedial Action Maintenance Summary issued – SEMs#1283400.	3/16/2011
Remedial Action Report issued – SEMs#1267353.	9/19/2013

**Table B-16: Chronology of OU12 Events**

OU12 Event	Date
EPA emergency workers extended public water supply system lines to residences with private wells.	1986
Preliminary Human Health Risk Assessment issued – SEMs#303951.	12/1/1991
Consent Decree with Asarco Incorporated, Newmont/Resurrection Mining Company, Newmont Mining Corporation, and the Res-Asarco Joint Venture – SEMs#316074, 303506.	8/25/1994
Baseline Human Health Risk Assessments, Part C issued – SEMs#316598.	4/1/1995
Final Baseline Aquatic Ecological Risk Assessment issued – SEMs#320591.	9/1/1995
Baseline Human Health Risk Assessments, Part A issued – SEMs#319625.	1/2/1996
Baseline Human Health Risk Assessments, Part B issued – SEMs#319626.	1/2/1996
Ecological Risk Assessment for the Terrestrial Ecosystem: Evaluation of Risks to Plants and Herbivores in the Upper Arkansas Floodplain issued – SEMs#321677.	1/1/1997
Hydrogeological Remedial Investigation Report issued – SEMs#320877.	5/1/1996
Surface Water Remedial Investigation Report issued – SEMs#1077124, 320875.	5/1/1996
Groundwater Baseline Human Health Risk Assessment issued – SEMs#321132.	6/1/1996
Aquatic Biological Assessment Data for the Upper Arkansas River Basin near Leadville, 1995 to 1998 – SEMs#323620.	9/1/1998
Final Monitoring Plan for Sitewide Groundwater issued – SEMs#1020443.	11/1/2002
Site Characterization Report for the Upper Arkansas River Basin issued – SEMs#1022097, 1023119, 1052364.	10/31/2002
Preliminary Report on the Biological Data for the Upper Arkansas River issued – SEMs#1022089.	2/1/2003
Draft Interim Remedial Investigation Report (OU12) issued – SEMs#2032904.	5/28/2003
Draft Interim Focused Feasibility Study (OU12) issued – SEMs#2032902.	5/28/2003
A Synopsis of 17 Years Trout Population Biometrics in the Upper Arkansas River issued – SEMs#2036964.	6/27/2003

<b>OU12 Event</b>	<b>Date</b>
Addendum issued – Ecological Risk Assessment for the Terrestrial Ecosystem: Evaluation of Risks to Plants and Herbivores in the Upper Arkansas Flood Plain – SEMS#1048636.	7/1/2003
Restoration Alternatives Report for the Upper Arkansas River Basin issued – SEM #2037490.	12/31/2003
Characterization of Risks to Aquatic Receptors from Mining-Related Contaminants in Upper Arkansas River Flood Plain issued – SEMS#1052325.	3/17/2004
Aquatic Biological Monitoring Program for the Upper Arkansas River, 1994-2004 – SEMS#1052392.	2/23/2005
OU12 Groundwater/Surface Water Data Evaluation issued – SEMS#1052368.	9/1/2005
Quantitative Exposure-Response Model for Mortality in Brown Trout Fry Exposed to Zinc – SEMS#1052393.	11/11/2005
Preliminary Evaluation of Potential Site-Specific Zinc and Cadmium Standards for the Upper Arkansas, Segments 2b and 2c – SEMS#1052370.	9/1/2006
RI completed – SEMS#1052320.	1/1/2007
Human Health Risk Assessment completed.	6/20/2007
FFS completed – SEMS#1096312.	11/1/2007
ROD issued, including TI waiver - SEMS#1102149	9/22/2009
Restoration Plan and Environmental Assessment for the Upper Arkansas River Watershed completed – SEMS#1293995.	4/14/2010
ROD issued, including TI waiver – SEMS#1102149.	9/22/2010
Environmental covenants placed on Newmont/Resurrection properties – SEMS#1242260, 1242261, 1242262.	7/31/2012 and 10/1/2012
Remedial design completed – SEMS#1558339.	4/29/2015
Action Memorandum for OU12 issued – SEMS#1772202-R8SDM.	6/7/2016

## APPENDIX C – SITE BACKGROUND

### **Sitewide Physical Characteristics and Location**

The Site is in the Southern Rocky Mountain Physiographic Province of the United States, which is characterized by fault-block mountain ranges separated by intermountain valleys. The Site consists of about 18 square miles in Lake County, about 100 miles southwest of Denver (Figure D-1). It includes the city of Leadville and a section of the Arkansas River from the confluence of California Gulch downstream to the confluence of Two-Bit Gulch Creek. Leadville is on the east side of the Arkansas River Valley, at the base of Mount Evans, near the confluence of Evans Gulch with the Arkansas River. About 2,600 people live in Leadville, according to the 2010 U.S. Census.

The Site's elevation ranges from 9,300 feet at the confluence of Two-Bit Gulch and the Arkansas River at the southwestern boundary of the Site to over 12,000 feet near Ball Mountain east of Leadville, Colorado. The topographic features of Lake County strongly influence the climatic variations in the Leadville area. The elevation of Leadville is about 10,000 feet above mean sea level. Normal temperatures range from 30°F to 86°F, with an average minimum temperature of 21.9°F. Average annual precipitation is 18 inches, with the wettest months being July and August and the driest months being December and January. Summer precipitation is usually associated with convective showers. The annual peak snowmelt usually occurs in June. The average frost-free season is 79 days.

### **Sitewide Land and Resource Use**

Land uses at the Site include housing, commercial businesses such as restaurants and shops, and facilities for recreation, historic tourism, athletics, industrial and mining activities. The zoning districts for the area include industrial mining, business, recreational and residential districts. The Parkville Water District supplies water to the majority of homes and businesses in the area.

The Site has been the location of mining, mineral processing and smelting activities that have produced gold, silver, lead and zinc for more than 130 years. Mining activities in Leadville began in 1859, when gold-bearing placer deposits were found along California Gulch. Since that time, mining activity was almost continuous, although there have been production cessations or slowdowns because of economic conditions or labor issues. An estimated 26 million tons of ore were produced in the Leadville Historic Mining District from 1859 through 1986. Today, nearly all of the mines within the Site are inactive, and all of the mills and smelters have been either decommissioned or demolished.

### **Sitewide History of Contamination**

Many mining methods were used at the Site, including placer mining, exposed fissure veins and underground mining. Waste rock was excavated and left near the mine entrances while metal ores were processed by crushing, milling and smelting, resulting in the generation of several different types of waste. The types of waste generated as a result of mining activities are described below:

1. *Waste Rock Piles:* Waste rock removed from underground workings was placed near mine entrances. This waste rock often contains elevated levels of heavy metals and sulfide minerals. In the presence of water, sulfide minerals can generate acid, lowering the pH of the water. This low-pH water promotes the leaching of heavy metals from the rock and into surface and groundwater.
2. *Mill Tailings:* At mills on the Site, ores were crushed and separated into metallic concentrates and waste products by physical processes. Metallic concentrates were then shipped elsewhere or further processed at a smelter in the area. Waste products (mill tailings) were generally placed in nearby tailings ponds. Release of contaminants from tailings material can be attributed to seepage from existing tailings deposits and from additional tailings transported by fluvial processes and deposited along the surface water channel. Metal contamination in sediments and surface water is the result of tailings pile runoff and seeps emanating from the toe of some tailings deposits.

3. *Slag and Other Smelter Wastes:* In the smelters, high-grade ores were refined and concentrated into higher-grade products. Waste products from the smelters include slag flue dust and stack emissions, all containing heavy metals. Contaminants in smelter stack emissions often commingled with soils as particulates settled out of the atmosphere. There were 44 known smelters in the district.
4. *ARD:* Groundwater flooded the mines, bringing oxygen into contact with the pyritic ores. These materials, when oxidized, break down and alter the sulfide minerals to form ARD water. This low-pH water leaches heavy metal constituents from rocks and into surface water runoff.

More than 2,000 mine waste piles have been identified on the Site; these are associated with the estimated 26 million tons of ore produced over the history of operations. A few of these waste piles are in residential areas of Leadville. Contamination of soil and surface water drainage in populated areas occurs throughout the Site. Large amounts of water are treated by water treatment facilities on site and off site. Mine tailings from the historical mining activity were also transported downstream via California Gulch to the Arkansas River and deposited in many locations next to the river. Some contaminated sediments were also transported along irrigation channels and deposited in fields in the Arkansas River Valley.

The EPA added the Site to the NPL in 1983. The EPA added the Site to the NPL because of concerns about the impacts of heavy metals in soils and waste rock on humans, and mine drainage on surface waters in California Gulch and the Arkansas River.

#### **Sitewide Basis for Taking Action**

Beginning shortly after site discovery in 1982, private parties, the USGS, and the EPA conducted groundwater and surface water studies at the Site. The initial Phase I RI Report was complete in May 1987, with subsequent RI/FSs performed by Woodward-Clyde in 1990 and 1991. The 1987 Phase I RI Report indicated that surface water in California Gulch exceeded primary drinking water standards for lead and cadmium and that site surface water contained cadmium, copper, lead and zinc at levels that exceeded water quality criteria. Additionally, soils at the Site were found to contain elevated levels of arsenic, zinc, lead, copper and cadmium.

BRAs characterized risks to human and ecological receptors at the Site assuming no cleanup has occurred. Risk-based numerical cleanup goals were also established for the entire populated area as a function of land use. A summary of site risks and numerical cleanup goals is below.

Under the 1994 Consent Decree, assessment of sitewide surface water and groundwater quality relative to appropriate performance standards was deferred to OU12. The EPA issued a ROD for OU12 in September 2009; remedial activities are underway. Although the 1996 BRAs concluded that ingestion of shallow groundwater for potable purposes would result in future risks to residents above a level of concern, shallow groundwater is not currently used for drinking water. Therefore, Site risks and associated numerical cleanup goals applicable to OUs 2 through 11 are limited to soils, sediments and mine wastes (solid media).

Several BRAs have been completed for the Site. They are listed below:

1. *1991 Preliminary Human Health Baseline Risk Assessment for the California Gulch National Priority List (NPL) Site:* The presence of elevated levels of heavy metals in soils in and around the residential and commercial areas of Leadville was discovered during early site investigations. This information informed the preliminary risk assessment, which indicated that contaminant levels were high enough to be of potential human health concern. Lead and arsenic were identified as the primary chemicals of potential human health concern.
2. *1996 Baseline Human Health Risk Assessment for the California Gulch Superfund Site. Part A – Risks to Residents from Lead:* This assessment focused on the risks of lead exposure to young children (ages 0 to 6 years). Because they typically have higher intake rates of environmental media per unit body weight than adults, young children tend to absorb a higher fraction of ingested lead than adults and they tend to be more susceptible to some of the adverse effects of lead than adults. The EPA used site-specific inputs

to the integrated exposure, uptake and biokinetic model (IEUBK model) along with structural equation modeling of empirical blood lead and environmental lead data, to assess risk to residents from lead. The study concluded that residential lead exposure may result in adverse health effects to soil and future exposure to groundwater.

3. *1996 Baseline Human Health Risk Assessment for the California Gulch Superfund Site. Part B – Risks to Residents from Contaminants other than Lead:* This assessment focused on risks to current and future residents of Leadville from environmental media contaminated with mine-related wastes other than lead. The assessment adopted a preliminary remediation goal approach to the risk analysis, where a concentration for each contaminant of potential concern was identified using a specific level of health risk for each medium. The preliminary remediation goal was then compared to sitewide data to determine if site concentrations exceed the calculated value. The study concluded that non-lead metals in surface soils do not pose a significant health risk to residents while future use of groundwater may cause adverse health effects.
4. *1995 Baseline Human Health Risk Assessment for the California Gulch Superfund Site. Part C: Screening Level Soil Concentrations for Workers and Recreational Site Visitors Exposed to Lead and Arsenic*
  1. *Baseline Human Health Risk Assessment for the California Gulch Superfund Site. Part C: Evaluation of Worker Scenario:* The BRA evaluated risks to current or future workers in the commercial and business district of the community. The study focused on the risks associated with exposure to lead and arsenic in soil and dust through ingestion. The study concluded that risks to current workers from lead and arsenic are likely to be below a level of concern. The study further concluded that some uncertainty exists regarding the magnitude of potential future risks as well as the potential for unacceptable current risks in specific sub-locations within the Site.
  2. *Baseline Human Health Risk Assessment for the California Gulch Superfund Site. Part C: Evaluation of Recreational Scenarios:* The BRA evaluated risks that environmental contamination poses to people who engage in recreational activities (e.g., hunting, hiking, bike riding, and picnicking) in areas in and around the community. This study focused on the risks associated with lead and arsenic at the Site. The study concluded that average lead levels are generally below the recreational action level for areas where recreational scenarios are considered likely.
5. *1995 Final Baseline Aquatic Ecological Risk Assessment for the California Gulch NPL Site:* The Aquatic Ecological Risk Assessment evaluated the impact of mine waste contamination on the aquatic ecosystem at the Site. The mine wastes in the area are associated with increased heavy metal loading to the surface water and sediments within the site drainages and the Arkansas River. The study concluded that discharges of metals from California Gulch continued to result in conditions in the Arkansas River that were of concern, especially near its confluence with California Gulch.

#### Human Health Risks

As discussed above, Part B of the Baseline Human Health Risk Assessment concluded that there are no locations on the Site where antimony, barium, cadmium, beryllium, chromium, copper, mercury, nickel, silver, thallium or zinc are of significant concern in soils. The risk assessment also concluded that the risk of exceedance is small for arsenic and manganese and occur only in the most conservative risk calculations. This combined with the recognition that assumed uptake (bioavailability) of metals used in risk calculations may be higher than actual, led to the conclusion that non-lead metals in surface soils do not pose a significant health risk to residents. Thus, the only COC for human health in soil is lead. To evaluate risk, calculations were performed to identify concentrations (action levels) of lead in soil that were of potential concern. Table 1 summarizes the Site's land use-based lead remediation goals.

**Table C-1: Land Use-Based Lead Remedial Goals**

<b>Land Use-Based Remediation Goals</b>	<b>Land Use-Based Lead Remedial Goal (mg/kg)</b>	<b>Reference</b>
Recreational	16,000	BRA Part C
Worker	6,100-7,700 (plausible action levels)	BRA Part C
Residential	3,500	BRA Part A and OU9 ROD
<i>Notes:</i> mg/kg = milligrams per kilogram		

To identify areas where land use-based remediation goals might be exceeded, the goals were compared to findings of soil concentration values in previous RIs. Average lead levels over an exposure area are compared to the soil remediation goal. Occasional measurements of concentrations above the remediation goal do not necessarily constitute evidence that an area is unsafe.

Review of the prior RIs shows that average lead levels are generally well below the action level of 16,000 mg/kg for areas where recreational scenarios are considered likely. For the worker scenario, the average lead levels are mostly below the central tendency range of plausible action levels (6,100 mg/kg to 7,700 mg/kg) for most areas zoned for commercial land use, with the possible exception of some areas in the historic mining area east of Leadville and in the vicinity of the former AV Smelter southwest of Leadville.

Although the BRA found that arsenic concentrations in soil posed a negligible risk, soil sampling activities performed several years later in support of deletion activities identified several isolated areas where arsenic concentrations exceeded the upper range of plausible action levels for residential land use (120 mg/kg to 340 mg/kg, BRA Part B). The arsenic exceedance occurred where the corresponding lead concentration was below the residential action level of 3,500 mg/kg. These isolated areas are in outlying, undeveloped portions of OU9 (Residential Populated Areas).

#### Ecological Receptor Risks

The 1995 Aquatic Ecological Risk Assessment evaluated risks both to terrestrial and aquatic receptors. Terrestrial receptors included plants that had been irrigated with contaminated surface water and herbivores that had ingested contaminated plants and soil. Historical irrigation activities resulted in risk associated with both these ecological receptor pathways, but remedial actions under OU11 have addressed these risks.

The Upper Arkansas River is a suitable habitat for a wide range of aquatic macroinvertebrates (e.g., annelids, crustaceans, water mites, insects, mollusks and flatworms) and for several species of fish, including four species of salmonids (brown trout, rainbow trout, cutthroat trout and brook trout), and two species of sucker (i.e., white sucker and long-nose sucker). In the 1995 Aquatic Ecological Risk Assessment, the EPA established three assessment endpoints for the Site:

1. Attaining and maintaining a trout population density and diversity below the confluence with California Gulch within the site boundaries comparable to that observed at reference locations upgradient of the confluence of California Gulch with the Arkansas River.
2. Maintaining an adequate prey base for trout comparable to that observed in the reference area locations.
3. Maintaining an aquatic community comparable to reference area locations.

Contamination flowing downstream from California Gulch had adversely affected the Upper Arkansas River for aquatic receptors with impacts most severe at the confluence and dissipating with distance downstream. Initiation of the Yak Tunnel WTP in 1992 improved water quality conditions within the first two years of operation. However, metals were still present at levels of concern. Zinc presented the greatest hazard for aquatic receptors, while levels of cadmium, copper and lead presented lower risks than zinc.

### **Sitewide Initial Response**

Prior to the Site's NPL listing, groundwater and surface water studies were conducted by private parties, the USGS and the EPA.

The contaminated drainage from the Yak Tunnel was identified as the most pressing problem at the Site. It was thus the first to be addressed. The Yak Tunnel remedy – capturing and treating the Yak Tunnel drainage – was designated as OU1. The EPA signed the ROD for OU1 in 1988 and modified it by amendment in 1989. An ESD was signed in 1991.

In 1994, a Consent Decree was executed between the EPA, the State and the following PRPs:

1. ASARCO Incorporated (ASARCO).
2. Joint Venture between ASARCO and Newmont/Resurrection Mining Company (Res-ASARCO).
3. Newmont/Resurrection Mining Company and its parent, Newmont Mining Company (Newmont/Resurrection).

The 1994 Consent Decree specified that RODs selecting response actions pertaining to source remediation would be selected before a ROD would be issued for OU12 (Sitewide Water Quality). As a result, the remedies for OU2 through OU11 were selected prior to selecting the remedy for OU12. The EPA issued the OU12 ROD to address sitewide surface water and groundwater contamination in 2009. Water quality data are collected on an ongoing basis.

### **OU8: Complete OU Background**

OU8, also known as Lower California Gulch, is defined by the 500-year floodplain of California Gulch from immediately below the boundary of the Yak Tunnel WTP (OU1) to the point of confluence of California Gulch with the Arkansas River (Figure D-9). OU8 also includes the CZL Tailing Impoundment outside the 500-year floodplain. OU8 is about 97 acres in size and 4.3 miles long. OU8 borders portions of several other OUs, including OU1 (Yak Tunnel WTP), OU2 (Malta Gulch Fluvial Tailing/Leadville Corp. Mill/Malta Gulch Tailing Impoundments), OU3 (D&RGW slag piles/Railroad Easement/Railroad Yard), OU5 (ASARCO Smelters/Slag/Mill Sites), OU7 (Apache Tailing Impoundments), OU9 (Residential Populated Areas), and OU10 (Oregon Gulch). Lower California Gulch receives runoff and water from tributaries that drain all or portions of these other OUs. Lower California Gulch also receives tributary water from upper California Gulch and Stray Horse Gulch via Starr Ditch that drain areas of OU4 (Upper California Gulch) and OU6 (Starr Ditch/Penrose Dump/Stray Horse Gulch). The land area in OU8 consists mostly of private property. No residences are located in OU8. Highway bridges, road crossings and culverts are located in the 500-year floodplain of Lower California Gulch. Lower California Gulch roughly parallels U.S. Highway 24.

Appendix D contains detailed maps for OU8 (Appendix D), FTS 1 and FTS 2, and the CZL Tailing Impoundment; FTS 3; FTS 8 and non-residential soils; and FTS 6, the Gaw Waste Rock Pile and non-residential soils. The land surrounding and within OU8 is zoned for industrial mining and business uses.

The area composing OU8 was originally a placer gold mining district, starting with the discovery of gold in California Gulch in 1860. When the placer deposits began to be exhausted, underground mining was started to extract gold, silver, lead and zinc ores. Ore was subsequently crushed and separated into metallic concentrates at nearby mills, with mill tailings slurried into tailings impoundments. Fluvial deposits of tailings occurred as tailings was complete from impoundments. Waste rock from underground mining was frequently dumped near mine shafts, as was the case with the Gaw Waste Rock Pile.

Tailings impoundments at the Site have resulted in fluvial deposits of tailings being transported by surface flows and deposited at specific locations in OU8. Likewise, during high flow events, stream sediments originating from source areas primarily upstream of OU8 are transported by California Gulch and associated tributaries into and within OU8. The stream sediment in Lower California Gulch was contaminated with mine wastes and associated metals transported from upstream sources. The soluble metals contained in runoff have contributed to the

contamination of surface water and sediments. Additionally, waste rock from underground mining was frequently dumped near mineshafts within the Site and has added to the contamination.

The CZL Tailing Impoundment is the only tailings impoundment identified in OU8. The CZL Site was an operating flotation mill that processed zinc-lead ores sporadically between 1925 and 1940. The CZL Tailing Impoundment is located about 1 mile west of Leadville and immediately north of Stringtown. The CZL Tailing Impoundment at the Site of the flotation mill operation covered about 1.6 acres, at an average depth of 7 feet. The CZL Tailing Impoundment contained an estimated 17,000 cubic yards of tailings.

The Gaw Waste Rock Pile is located upstream of the Apache Tailing Impoundment (OU7) within OU8. The Gaw Waste Rock Pile represents the only deposit of waste rock identified within OU8.

Five fluvial tailings sites within OU8 were found to have elevated levels of contamination. FTS1, covering about 3.4 acres, is adjacent to the La Plata Slag Pile (part of OU3) and extends downstream in a westerly direction to a point about 1,000 feet upgradient of the CZL Tailing Impoundments. California Gulch flows through the tailings and the gulch has cut a channel through the fluvial deposits. The fine to coarse grained tailings and alluvial/tailings materials ranged from 1-6 feet in depth.

FTS2 lies 200 feet downstream of FTS1 and covers an estimated 3.2 acres. The fluvial tailings material in FTS2 is generally light brown-to-brown clay silts and sands overlying light brown silt that contains cobbles and sand.

FTS3 is immediately downstream of Lake County Road 6 on California Gulch and covers about 4.8 acres. The flow of California Gulch through FTS3 is split into a north and south channel, with most of the flow occurring in the North Channel.

FTS6 is located on California Gulch between the Yak Tunnel Treatment Plant Surge Pond embankment and the Apache Tailing Impoundments, and covers about 4.2 acres. Part of the Gaw Waste Rock Pile is also in FTS6. The pile covers about a half-acre and has an estimated volume of 7,500 cubic yards.

FTS8 extends from the AV Slag Pile (part of OU3) to a point about 6,500 feet downstream to the confluence of California Gulch with the Arkansas River. FTS8 is a series of small discontinuous tailings deposits with a total estimated area of 115 acres. The OU8 ROD addresses about 45 acres of fluvial tailings that lie within the floodplain boundaries of the portion of FTS8.

Non-residential area soils are defined as poorly vegetated areas outside of the fluvial tailings sites and within the OU8 boundary. The studies identified about 6.3 acres of non-residential area soils with elevated levels of contaminants.

Stream sediments were identified as a potential contaminant source in the Site's SFS. The primary concerns were loose and erodible sediments that could be resuspended and carried downstream. The studies estimated that there were about 4,500 cubic yards of stream sediments of potential concern.

### **OU9: Complete History of Initial Responses**

The State, the EPA and certain PRPs have conducted various studies and investigations to evaluate the nature and extent of contamination at the Site. In 1991, remedial investigations began for several areas at the Site, including mine waste rock piles, tailings disposal areas, surface water and aquatics, groundwater, smelter sites, residential/populated area soils, slag piles and terrestrial studies. These studies found lead in soils to be the primary COC in OU9.

ASARCO Incorporated and many community members argued that there are numerous environmental sources of lead in residential areas of Leadville, including mining-related sources such tailings and mine waste piles and other household sources such as lead-containing paint on interior and exterior surfaces of homes and lead found in food, water and residential soils. As recommended by ASARCO Incorporated and the community, the interim response was designed to reduce overall lead-related risk to children in Leadville, including responses that

address sources that would not normally be remediated under CERCLA authorities. As part of the 1994 Consent Decree with the EPA and the State, ASARCO Incorporated agreed to undertake actions to address all sources of lead in lieu of soil removal only at each residence. To determine the effectiveness of the actions, the level of lead in children's blood was voluntarily monitored and performance standards in relation to concentrations of lead in the blood of children were established.

In 1995, ASARCO Incorporated began implementing the Lead Risk Reduction Program, more commonly known as the Kids First program. ASARCO Incorporated agreed to operate the Kids First program as an interim response action until the EPA selected a remedy for OU9. The purpose of the program, a risk reduction response program based on voluntary participation, was to provide information to the community and reduce children's exposure to a variety of sources of lead.

The Kids First program consisted of a variety of services and remedial response activities designed to:

1. Gather information from the community.
2. Identify residences for which response actions are needed.
3. Plan and prioritize the risk reduction responses for these residences.
4. Perform the risk reduction responses.
5. Provide additional information and services to the community.

Initially, the Kids First program targeted residences where sample soil lead levels were found above 3,500 mg/kg, because the EPA established an interim response level of 3,500 mg/kg of lead for Leadville residential soils. The basis for this value is presented in the 1994 Consent Decree, along with a discussion of trigger criteria for other significant environmental media (dust, paint and water). These trigger criteria were used by the Kids First Work Group to identify and prioritize locations for response actions.

Residences with children that had blood lead levels greater than 10 µg/dL, measured during the 1991 blood lead study or any subsequent blood lead monitoring, were targeted for priority response in the program.

Information used in the evaluation of residences and the selection of appropriate response actions (if needed) came from a variety of sources. Response programs included in the Kids First program were:

1. The blood lead monitoring program by Lake County Health Department.
2. A lead information hotline and a door-to-door survey within priority exposure areas.
3. Additional sampling and property assessment.

Lake County Health Department managed the voluntary blood lead monitoring program, which was funded by ASARCO Incorporated. The blood lead monitoring program was a key component of the interim response program. Ongoing blood lead monitoring was provided upon request for children below the age of 72 months (six years) and for pregnant/nursing women. The data were used as one means of identifying individuals who had blood lead levels greater than 10 µg/dL. The data were also used in the finalization of the BRA.

All residents who responded via the hotline, coming into Lake County Health Department or completing door-to-door surveys received information about the program. The responses resulted in the need for more sampling of soils, paint, dust, water, and blood-lead levels. Additional sampling was conducted if a residence:

1. Was located in the 3,500 mg/kg lead soils priority area.
2. Had a child with a blood-lead level greater than 10 µg/dL.
3. Had a pregnant or nursing woman in the home.
4. Was known to have paint in poor condition.
5. Was known to have another possible lead source (e.g., lead pipes, certain hobbies).
6. Was requested by a resident not within the designated priority risk area.

The first year, remediations were performed at 37 properties in accordance with Action Memoranda prepared for each property. The Kids First Work Group developed and approved all action and no-action determinations. The property owners consented on all investigations and remediations.

The Kids First program integrated a variety of lead toxicity intervention and abatement methods. Additionally, the program addressed reducing children’s exposure to lead in soils, dust-containing lead in residences, and additional lead sources such as paint and tap water. For these reasons, the Kids First program was presented as an alternative in the FS when it was revised and renamed the LCCHP.

The remediation of OU9 was divided into many separate removal actions as well as remedial actions. Table C-2 summarizes these actions:

**Table C-2: Response Actions for OU9**

Area	Timeframe	Type of Action	Remedy Implemented
Private well	5/29/1986	N/A	Water connection to the Parkville Water District provided.
Kids First program – individual residences	10/16/1995 to 04/21/2000	Time-critical removal actions	Addressed contaminated media associated with residential properties.
Waste rock piles	08/15/1996 to 7/31/2001	Time-critical removal actions	Addressed elevated levels of contaminants in mine waste rock piles.
Morning Star day care	Fall 2005	Time-critical removal actions	Addressed contaminated media associated with day care.
LCCHP – multiple residences	2000 to 2011	Remedial action	Addressed contaminated media associated with residential properties.

Removal actions under the Kids First program started on October 16, 1995. The LCCHP described in the ROD took the place of the Kids First program. An EE/CA was prepared in 1995 to evaluate removal action alternatives for the 38 mine waste piles and one control pile, for a total of 39 piles identified in the populated areas within OU9. During the RI, eight of the 38 piles were found to be stockpiles of construction materials or to not pose a threat to human health or the environment. However, one pile representing this group was evaluated with the remaining 30 piles as a control to confirm the EE/CA’s findings. An Action Memorandum issued by the EPA in August 1996 selected a non-time-critical removal action requiring the removal of 14 piles with surface lead concentrations greater than 3,500 mg/kg. Implementation of this removal action began in 1997, with the removal of four mine waste piles. The removal of the remaining 10 mine waste piles finished in 1999. The material excavated from the mine waste piles was taken to a repository for disposal and the excavated area was revegetated.

## APPENDIX D – SITE MAPS

Figure D-1: Site Vicinity

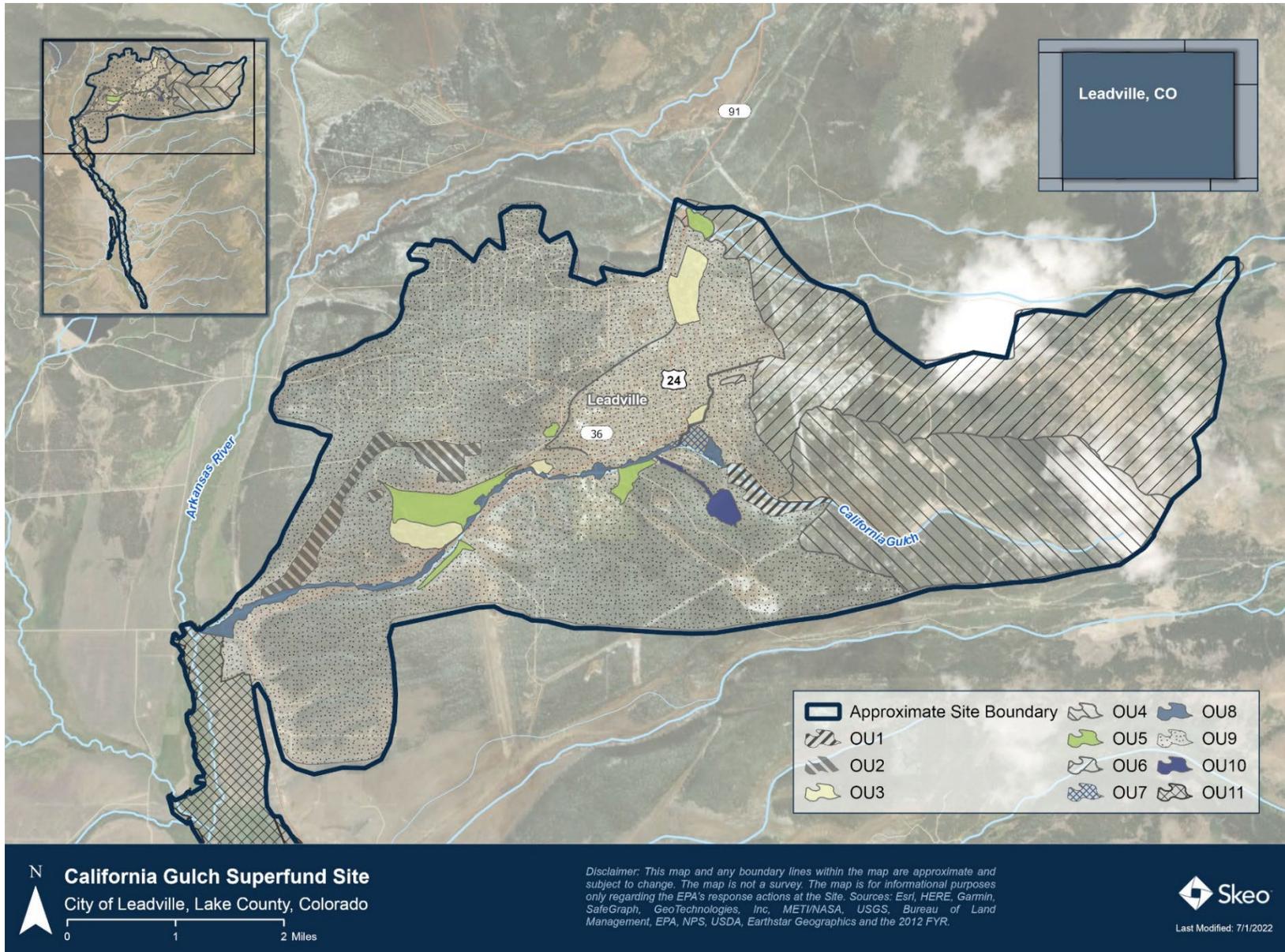
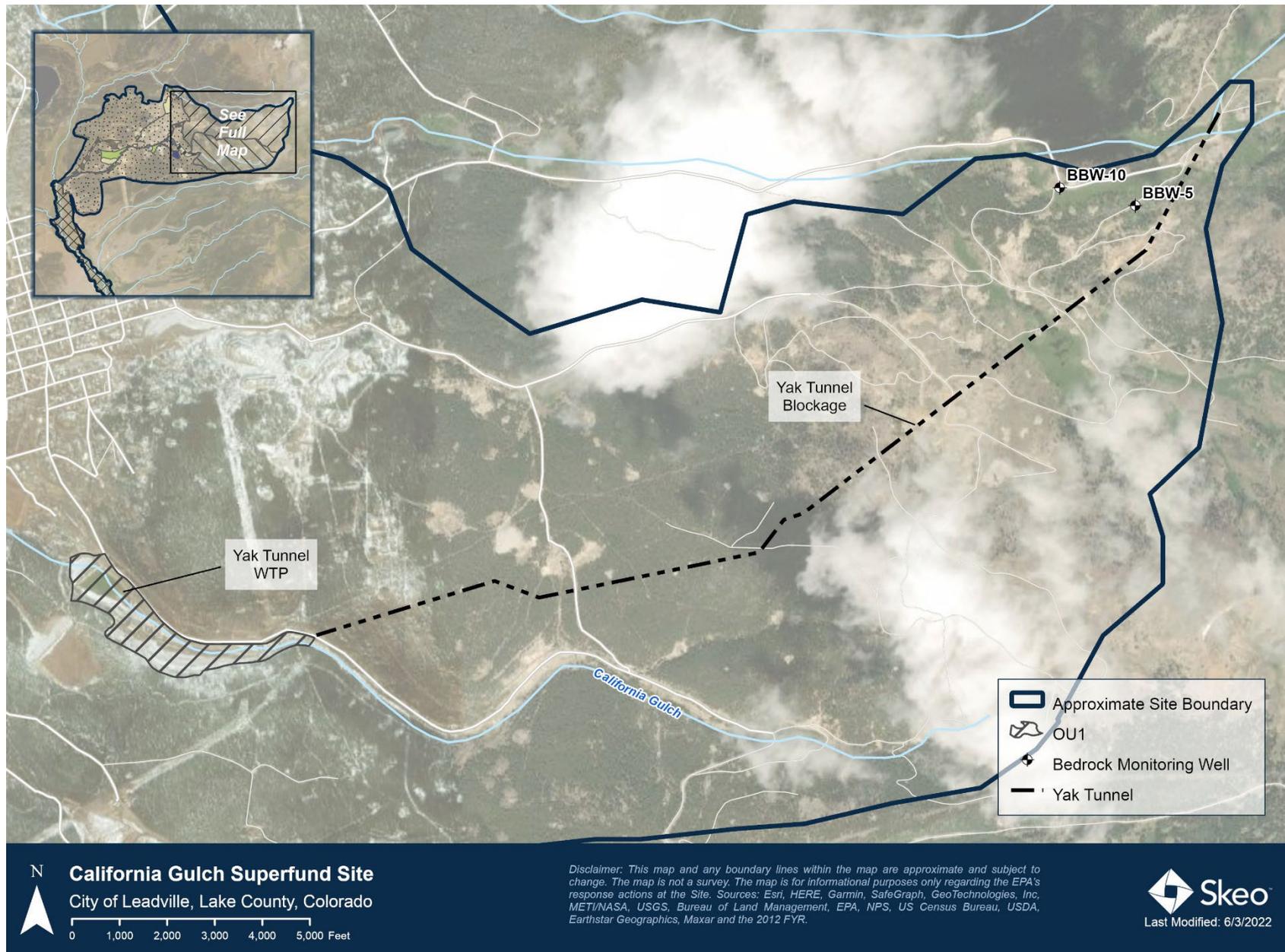
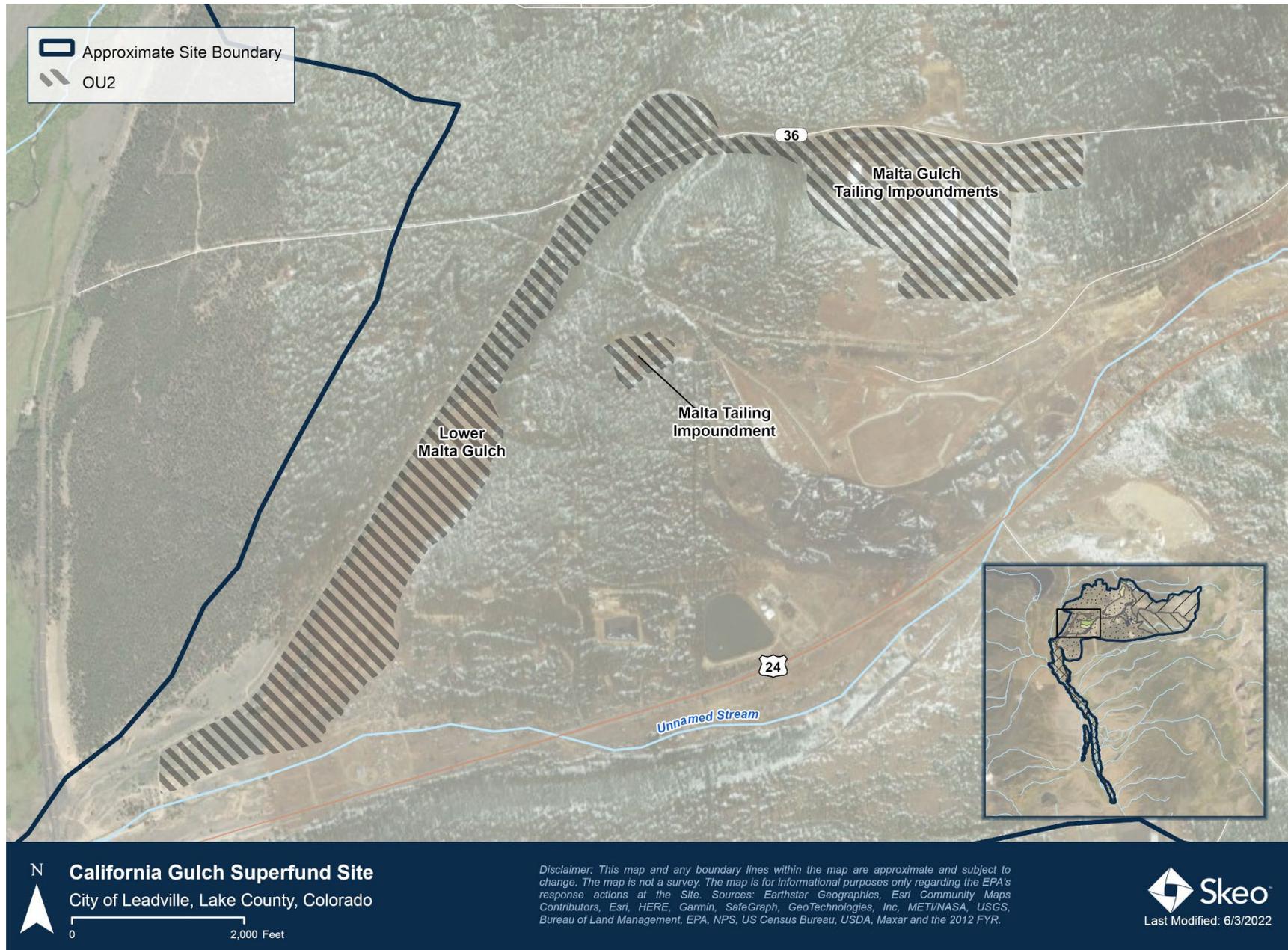


Figure D-2: OU1 Map



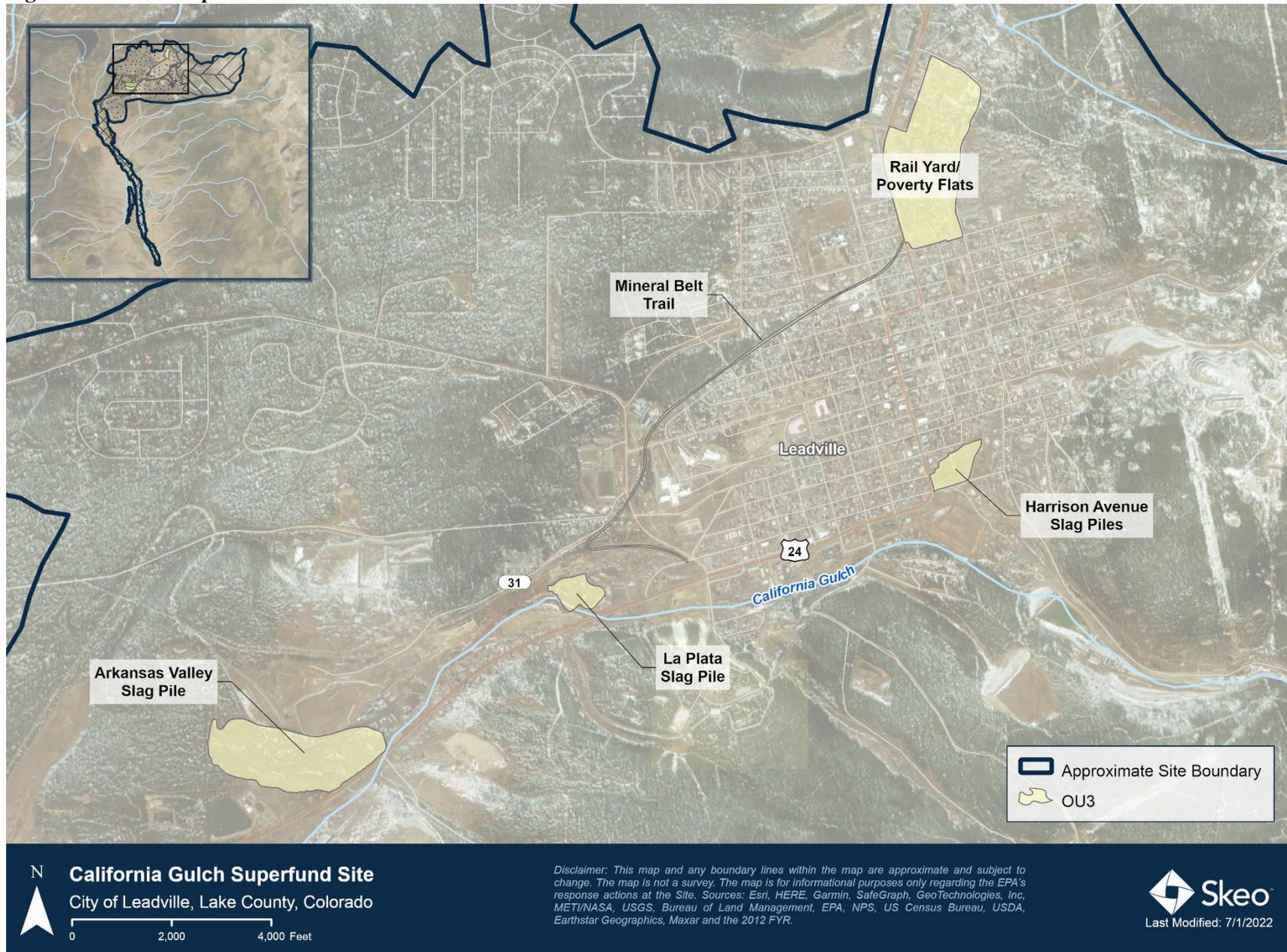
**Figure D-3: OU2 Map**



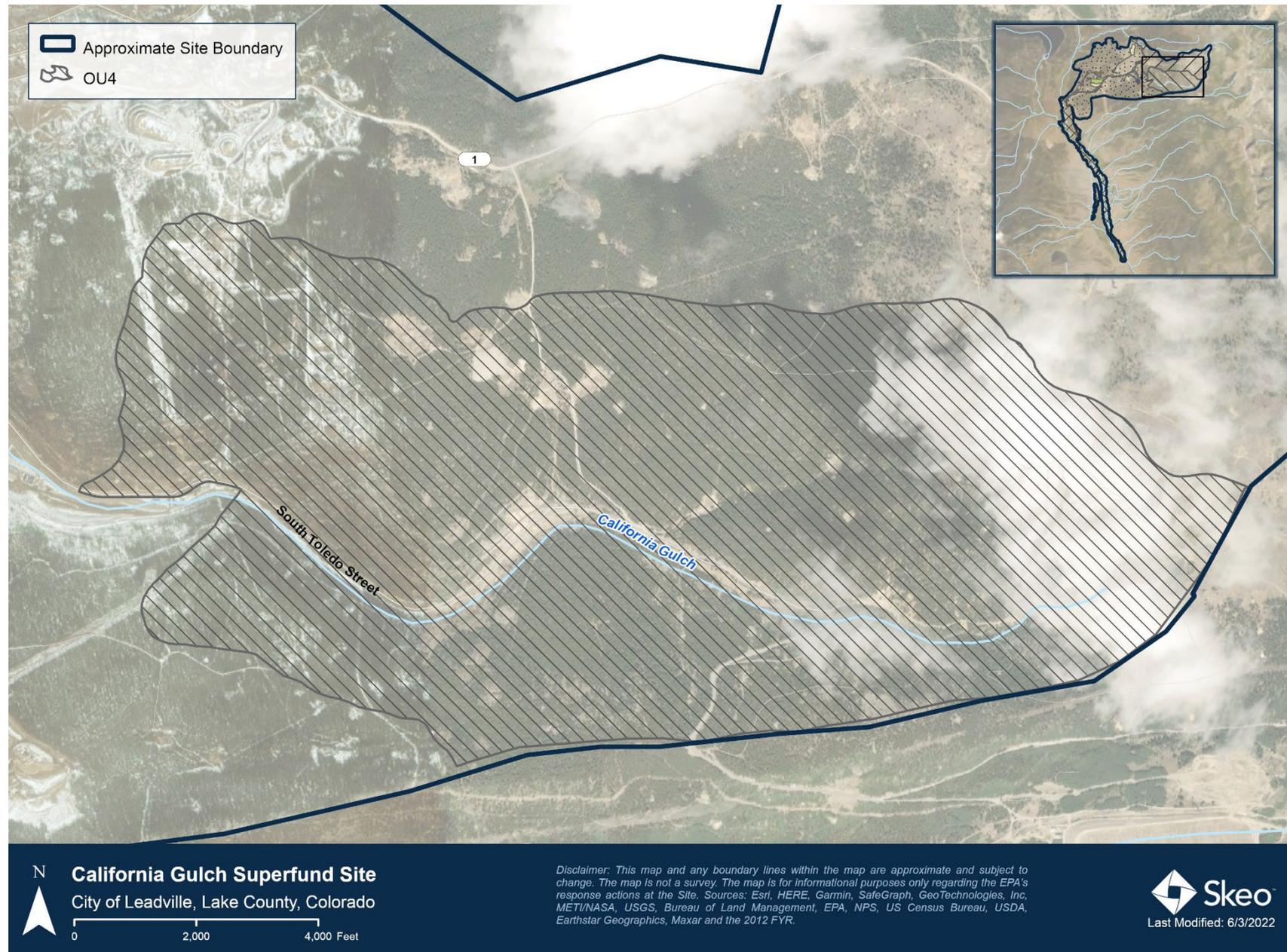
*Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding the EPA's response actions at the Site. Sources: Earthstar Geographics, Esri Community Maps Contributors, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, US Census Bureau, USDA, Maxar and the 2012 FYR.*

 **Skeo**  
Last Modified: 6/3/2022

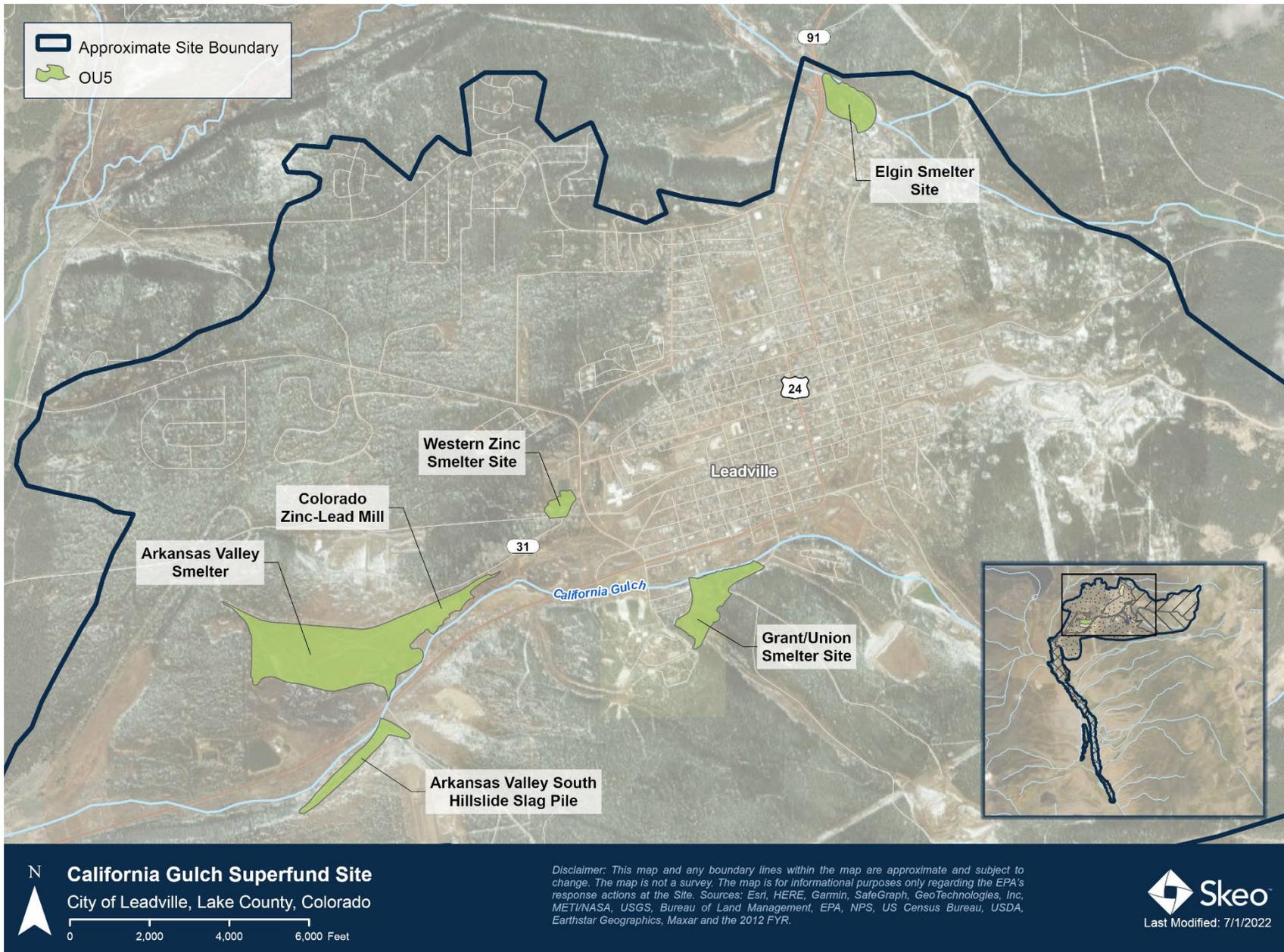
Figure D-4: OU3 Map



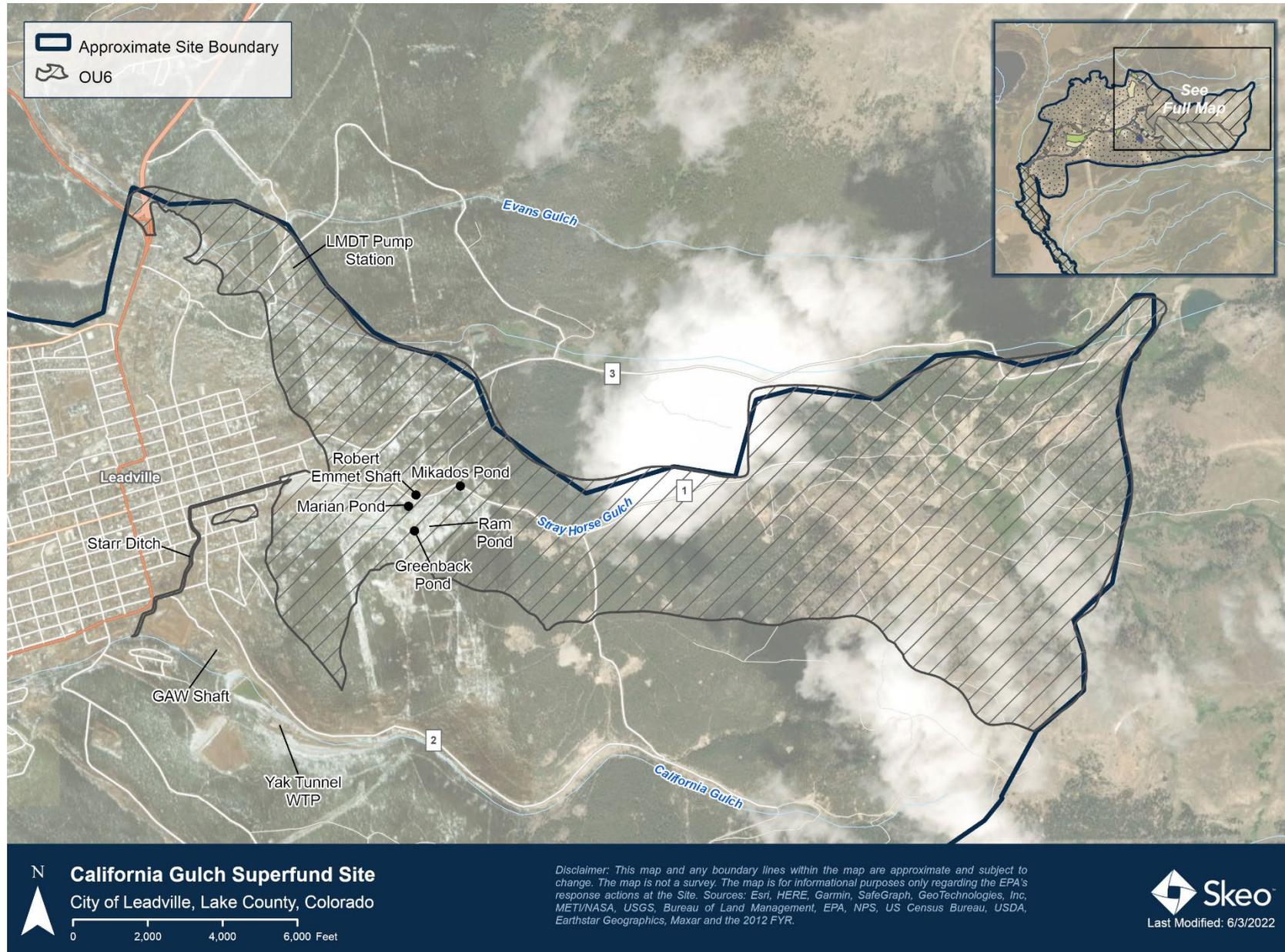
**Figure D-5: OU4 Map**



**Figure D-6: OU5 Map**



**Figure D-7: OU6 Map**



**Figure D-8: OU7 Map**



Figure D-9: OU8 Map

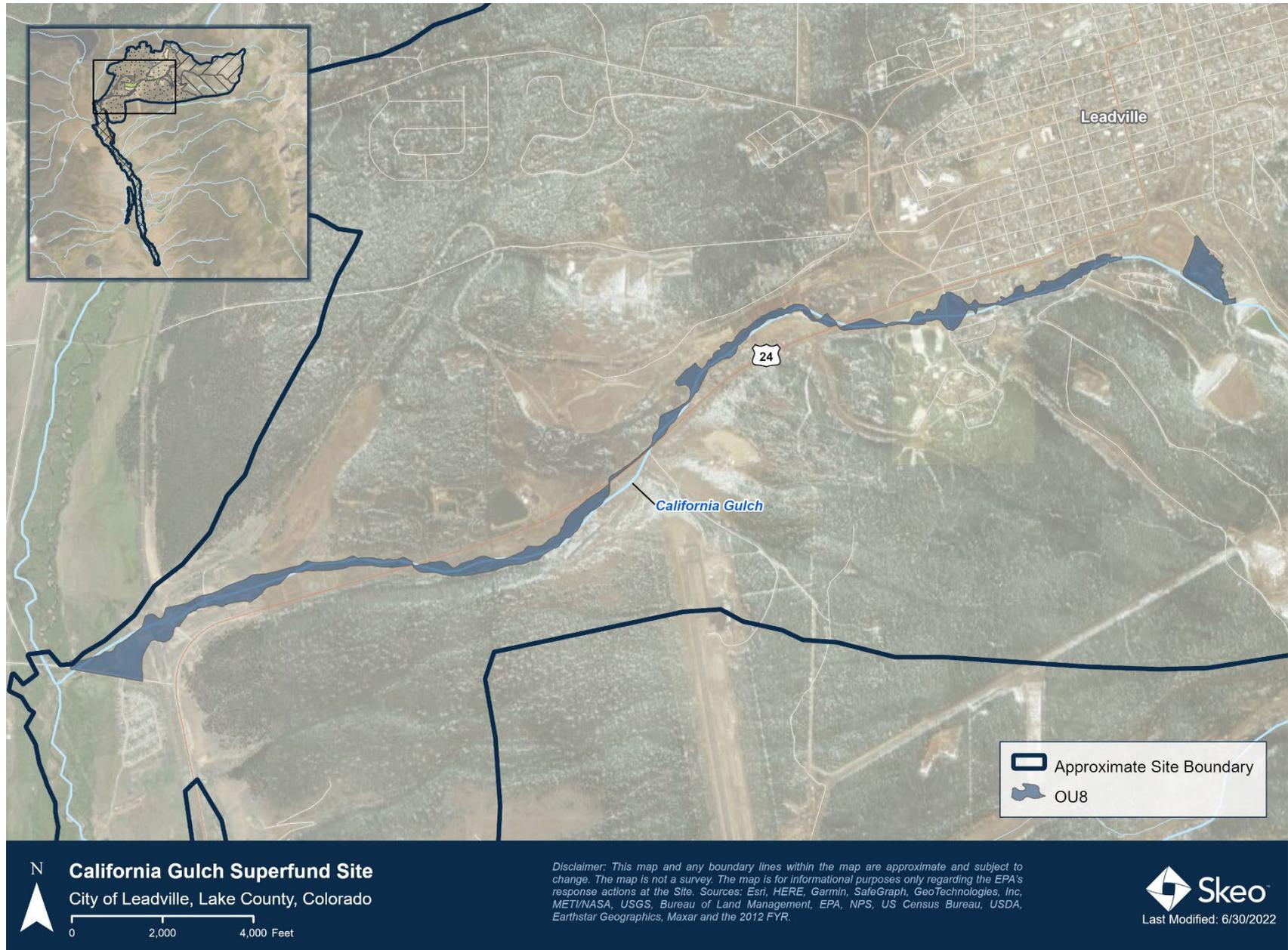
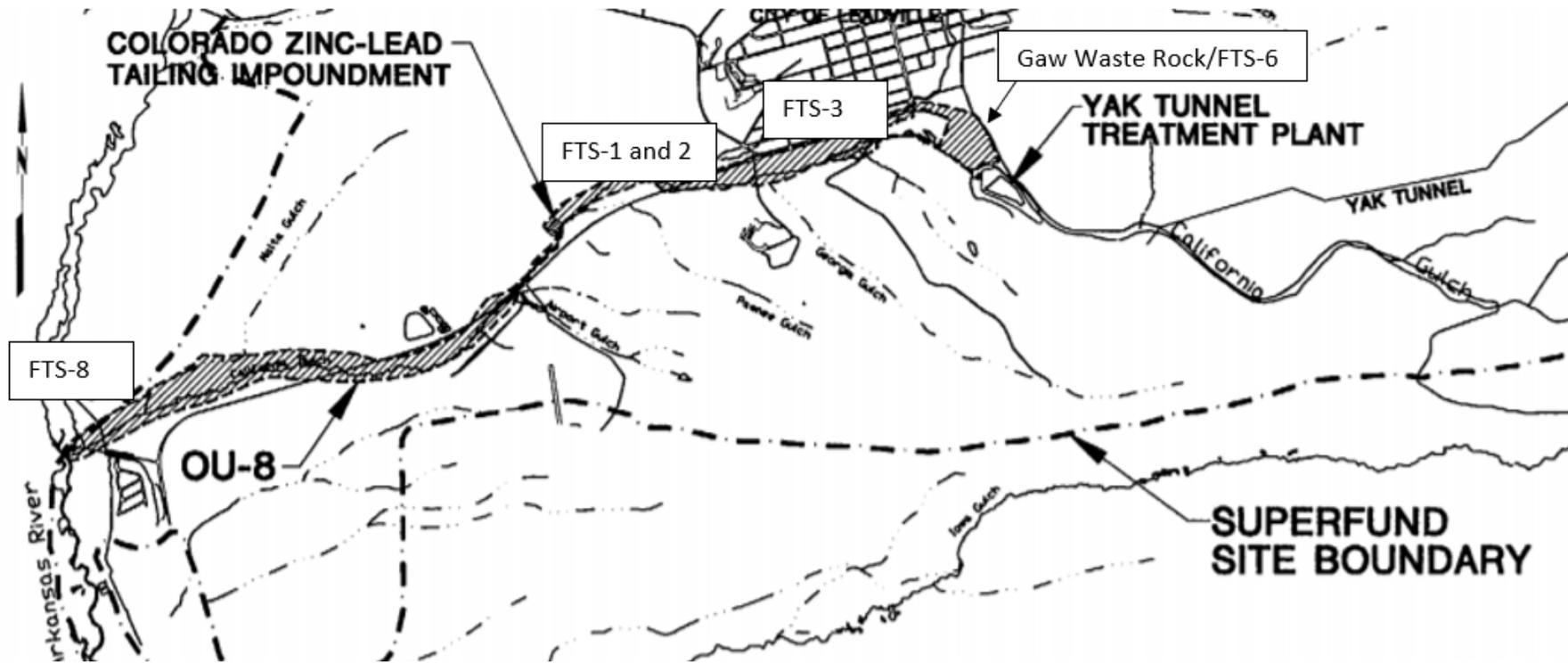
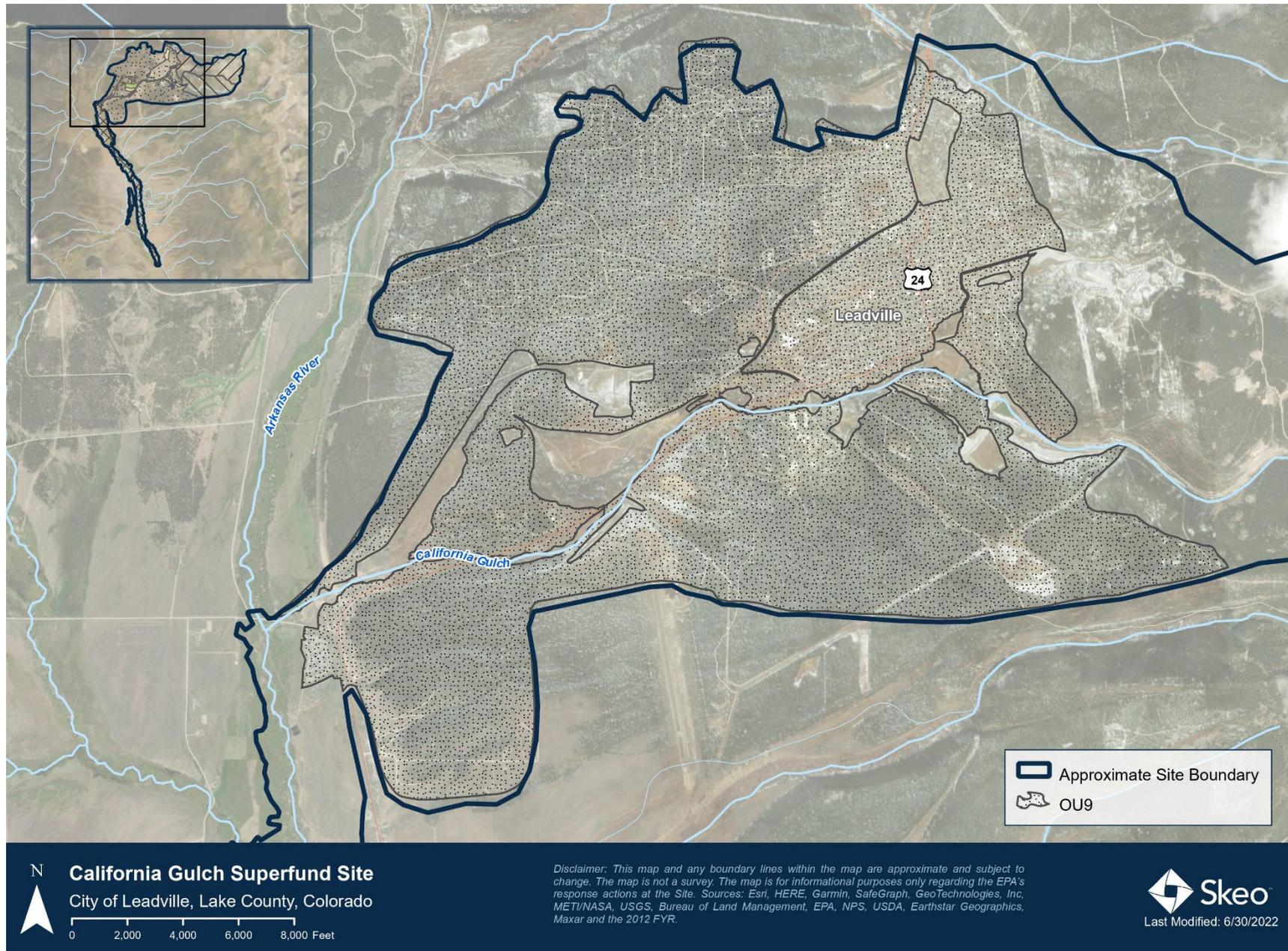


Figure D-10: OU8 Details



Source: Final Engineering Evaluation/Cost Analysis – Colorado Zinc-Lead Tailing Area within Lower California Gulch – OU8. California Gulch Superfund Site. July 1995.

Figure D-11: OU9 Map



**Figure D-12: OU10 Map**

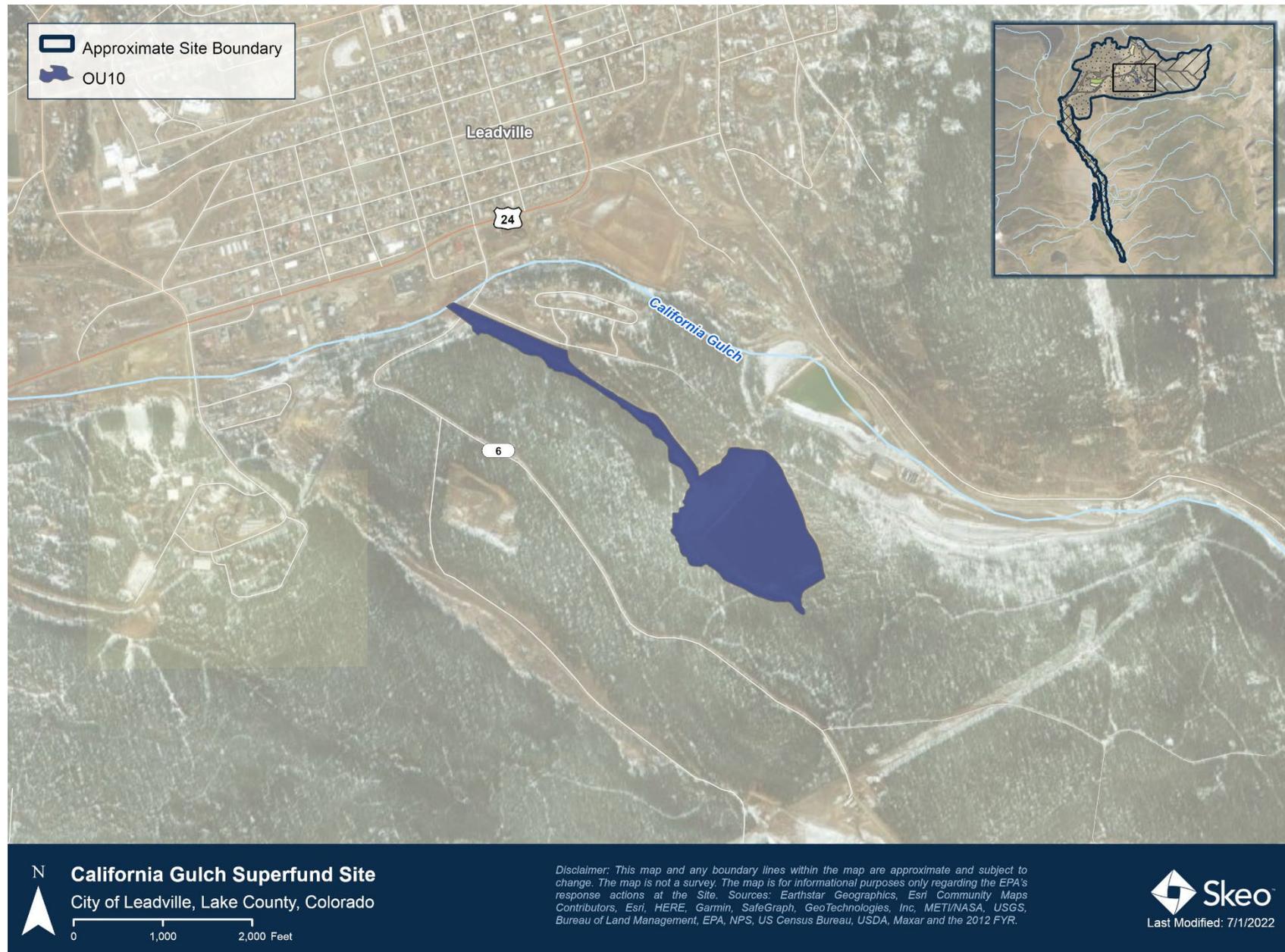
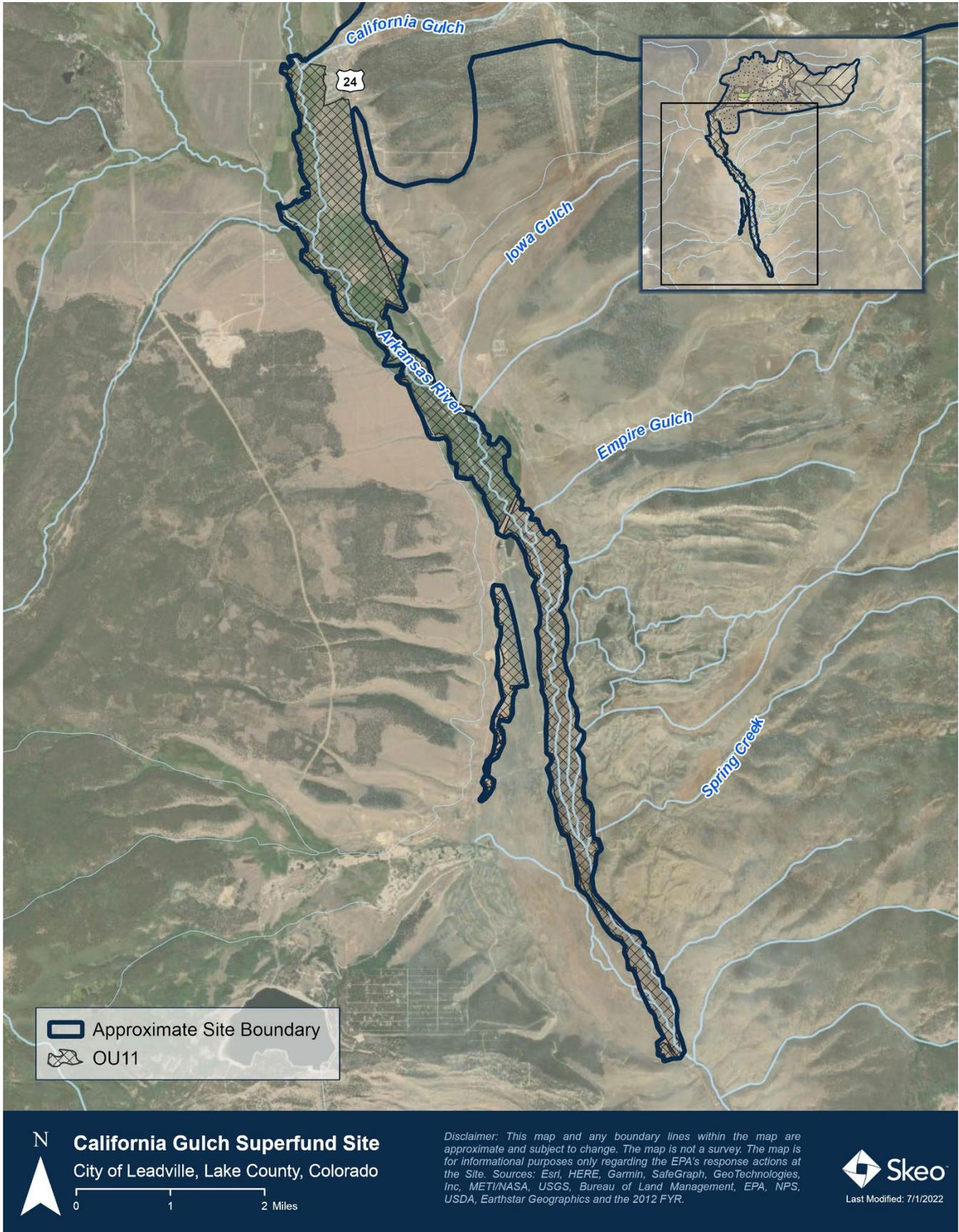


Figure D-13: OU11 Map



## APPENDIX E – PRESS NOTICE

Published in the *Herald Democrat* May 12, 2022



### **The U.S. Environmental Protection Agency, Region 8 Announces the Sixth Five-Year Review for the California Gulch Superfund Site in Lake County, Colorado**

The U.S. Environmental Protection Agency (EPA), in cooperation with the State of Colorado, is conducting the sixth five-year review of the California Gulch Superfund Site in Lake County, Colorado. Five-year reviews provide an opportunity to evaluate the implementation and performance of a remedy to determine whether it remains protective of human health and the environment. The sixth five-year review will be completed in 2022.

The Site comprises about 18 square miles in Lake County, Colorado, in the upper Arkansas River watershed and includes the city of Leadville, various parts of the Leadville Historic Mining District and a section of the Arkansas River from the confluence of California Gulch downstream to the confluence of Two Bit Gulch. It is divided into 11 geographical areas known as Operable Units (OUs), and a twelfth OU consisting of site-wide groundwater. The five-year review will look at all OUs and will encompass the entire site.

Cleanup activities have included construction of the Yak Treatment Plant, consolidation and containment of contaminated soils, sediments and mine-processing wastes, drainage controls to reduce acid-rock runoff, and cleanup at residential properties. Construction at most of the 12 OUs has been completed, and nine OUs have been deleted from the National Priorities List.

We want to hear from you! Community members are encouraged to share information that may be helpful in the five-year review process. Community members who have questions or who would like to participate in a community interview or to submit written comments, are asked to contact Linda Kiefer by June 1, 2022:

Linda Kiefer  
EPA Project Manager  
Phone: 303.312.6689  
Email: [kiefer.linda@epa.gov](mailto:kiefer.linda@epa.gov)

Due to Covid-19 the most current site information is only available online at:  
<https://www.epa.gov/superfund/california-gulch>



	Name	Title	Date	Phone No.
Problems/suggestions	<input type="checkbox"/> Report attached: _____			
Agency _____				
Contact _____				
	Name	Title	Date	Phone No.
Problems/suggestions	<input type="checkbox"/> Report attached: _____			
Agency _____				
Contact _____				
	Name	Title	Date	Phone No.
Problems/suggestions	<input type="checkbox"/> Report attached: _____			
<b>4. Other Interviews (optional)</b> <input type="checkbox"/> Report attached: _____				
<b>III. ON-SITE DOCUMENTS AND RECORDS VERIFIED (check all that apply)</b>				
<b>1. O&amp;M Documents</b>				
<input checked="" type="checkbox"/> O&M manual	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A	
<input checked="" type="checkbox"/> As-built drawings	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A	
<input checked="" type="checkbox"/> Maintenance logs	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A	
Remarks: <u>The Yak Tunnel WTP (OU1) has copies of all O&amp;M documents.</u>				
<b>2. Site-Specific Health and Safety Plan</b>				
	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A	
<input checked="" type="checkbox"/> Contingency plan/emergency response plan	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A	
Remarks: _____				
<b>3. O&amp;M and OSHA Training Records</b>				
	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A	
Remarks: _____				
<b>4. Permits and Service Agreements</b>				
<input type="checkbox"/> Air discharge permit	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A	
<input checked="" type="checkbox"/> Effluent discharge	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A	
<input type="checkbox"/> Waste disposal, POTW	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A	
<input type="checkbox"/> Other permits: _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A	
Remarks: <u>OU1 operates according to the 2008 Consent Decree requirements; NPDES data are readily available for the Yak WTP discharge.</u>				
<b>5. Gas Generation Records</b>				
	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A	
Remarks: _____				
<b>6. Settlement Monument Records</b>				
	<input checked="" type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A	
Remarks: <u>Waste piles (e.g., consolidated soil, sediment, tailings and waste rock) are monitored for settlement and erosion according to the O&amp;M plans.</u>				
<b>7. Groundwater Monitoring Records</b>				
	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A	
Remarks: <u>Sitewide groundwater monitoring results are included in the OU12 Annual Report.</u>				
<b>8. Leachate Extraction Records</b>				
	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A	

Remarks: _____			
9.	<b>Discharge Compliance Records</b>	<input type="checkbox"/> Air	<input type="checkbox"/> Readily available
		<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
		<input checked="" type="checkbox"/> Water (effluent)	<input checked="" type="checkbox"/> Readily available
		<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
Remarks: <u>OU1 discharge is monitored to measure compliance with limits set in the 2008 Consent Decree.</u>			
10.	<b>Daily Access/Security Logs</b>	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date
		<input type="checkbox"/> N/A	
Remarks: <u>Access is monitored and controlled at OU1. The MGTI portion of OU2 is fenced and includes signage regarding the presence of soil contamination. Several OUs required fencing with warning signs (e.g., OU6 waste pile ponds, OU7 impoundment, OU9 soil repository, OU10 pump house). Portions of OU2, OU3, OU8 and OU9 do not require access restrictions while other areas are not fenced but are posted with warning signs (OU4, OU5, OU11).</u>			
<b>IV. O&amp;M COSTS</b>			
1.	<b>O&amp;M Organization</b>	<input type="checkbox"/> State in-house	<input checked="" type="checkbox"/> Contractor for state (OU2, 3, 5, 6, 7, 9, 11 and 12)
		<input type="checkbox"/> PRP in-house	<input checked="" type="checkbox"/> Contractor for PRP (OU1, 4, 8 and 10)
		<input type="checkbox"/> Federal facility in-house	<input type="checkbox"/> Contractor for Federal facility
		<input type="checkbox"/> _____	
2.	<b>O&amp;M Cost Records</b>	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date
		<input checked="" type="checkbox"/> Funding mechanism/agreement in place	<input checked="" type="checkbox"/> Unavailable
Original O&M cost estimate: _____ <input type="checkbox"/> Breakdown attached			
Total annual cost by year for review period if available			
From: _____	To: _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From: _____	To: _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From: _____	To: _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From: _____	To: _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From: _____	To: _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
3.	<b>Unanticipated or Unusually High O&amp;M Costs during Review Period</b>		
Describe costs and reasons: _____			
<b>V. ACCESS AND INSTITUTIONAL CONTROLS</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A			
<b>A. Fencing</b>			
1.	<b>Fencing Damaged</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Gates secured
		<input type="checkbox"/> N/A	
Remarks: <u>Fencing is present at the Yak Tunnel WTP on OU1 and around a few other</u>			

areas, such as the leachate collection ponds in OU6, the capped OU7 Apache Tailing Impoundments, the soil repository for OU9 and the pump house at OU10. Fencing is generally in good condition and access gates are secured when authorized persons are not present. Fencing required repair in OU6 around the Robert Emmet shaft and Marion Pond which is planned to be repaired as part of the routine O&M conducted by CDPHE contractors. Fencing was not warranted at OU2, OU3, OU4, OU5 and OU8.

**B. Other Access Restrictions**

1. **Signs and Other Security Measures**  Location shown on site map  N/A  
 Remarks: Signs are present at OU1 and along stretches of OUs 4, 6 and 9 in locations near the Mineral Belt Trail. This recreational path loops through the Site and includes several educational signs about the Site history as well as current remedial actions (i.e., the capping pilot study area on OU6). The ponds containing ARD are fenced and no trespassing signs are posted. OU7 and OU10 were also fenced and warning signs posted.

**C. Institutional Controls (ICs)**

1. **Implementation and Enforcement**

Site conditions imply ICs not properly implemented  Yes  No  N/A  
 Site conditions imply ICs not being fully enforced  Yes  No  N/A

Type of monitoring (e.g., self-reporting, drive by): The institutional controls are enforced through the issuance of building permits by the city and county.  
 Frequency: As building permits are requested  
 Responsible party/agency: Lake County and the city of Leadville

Contact	_____	_____	_____	_____
	Name	Title	Date	Phone no.

Reporting is up to date  Yes  No  N/A  
 Reports are verified by the lead agency  Yes  No  N/A  
 Specific requirements in deed or decision documents have been met  Yes  No  N/A  
 Violations have been reported  Yes  No  N/A  
 Other problems or suggestions:  Report attached

2. **Adequacy**  ICs are adequate  ICs are inadequate  N/A  
 Remarks: Institutional controls have been fully implemented for 10 of the 12 OUs. OU6 may require more institutional controls once remediation is complete. The EPA is working with CDPHE and private landowners to implement institutional controls for OU11.

**D. General**

1. **Vandalism/Trespassing**  Location shown on site map  No vandalism evident  
 Remarks: Trespassing has reportedly occurred in OU4 and OU6, by people exploring the area for prospecting despite warning signs posted of contamination. The local police department has been tasked with conducting routine visits at these areas to enforce the no trespassing laws.

2. **Land Use Changes On Site**  N/A  
 Remarks: Within OU3, some residential development is occurring and, prior to development, the mine waste was excavated and taken to the OU6 repository for disposal.

3. **Land Use Changes Off Site**  N/A  
 Remarks: \_\_\_\_\_

**VI. GENERAL SITE CONDITIONS**

**A. Roads**  Applicable  N/A

1.	<b>Roads Damaged</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Roads adequate	<input checked="" type="checkbox"/> N/A
Remarks: _____				
<b>B. Other Site Conditions</b>				
Remarks: _____				
<b>VII. LANDFILL COVERS</b>				
<input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A				
<b>A. Landfill Surface</b>				
1.	<b>Settlement</b> (low spots)	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Settlement not evident	
Area extent: _____		Depth: _____		
Remarks: <u>The covers refer to the rock or vegetated soil covers on the mining waste piles, former tailings impoundments, fluvial tailings sites along the California Gulch and tailings along the Arkansas River.</u>				
2.	<b>Cracks</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Cracking not evident	
Lengths: _____		Widths: _____	Depths: _____	
Remarks: _____				
3.	<b>Erosion</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Erosion not evident	
Area extent: _____		Depth: _____		
Remarks: _____				
4.	<b>Holes</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Holes not evident	
Area extent: _____		Depth: _____		
Remarks: _____				
5.	<b>Vegetative Cover</b>	<input type="checkbox"/> Grass	<input checked="" type="checkbox"/> Cover properly established	
<input type="checkbox"/> No signs of stress		<input type="checkbox"/> Trees/shrubs (indicate size and locations on a diagram)		
Remarks: <u>Vegetative cover includes species that can grow at altitude. Occasionally, the cover requires some maintenance where localized barren areas require revegetation, as observed at OU7 and OU10. However, these areas have been identified during annual inspections and the O&amp;M contractor is addressing these areas during the growing season.</u>				
6.	<b>Alternative Cover</b> (e.g., armored rock, concrete)	<input type="checkbox"/> N/A		
Remarks: <u>A variety of covers are being used on the waste piles. They include armored rock, gravel and concrete.</u>				
7.	<b>Bulges</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Bulges not evident	
Area extent: _____		Height: _____		
Remarks: _____				
8.	<b>Wet Areas/Water Damage</b>	<input checked="" type="checkbox"/> Wet areas/water damage not evident		
<input type="checkbox"/> Wet areas		<input type="checkbox"/> Location shown on site map	Area extent: _____	
<input type="checkbox"/> Ponding		<input type="checkbox"/> Location shown on site map	Area extent: _____	
<input type="checkbox"/> Seeps		<input type="checkbox"/> Location shown on site map	Area extent: _____	
<input type="checkbox"/> Soft subgrade		<input type="checkbox"/> Location shown on site map	Area extent: _____	
Remarks: <u>Overflow from waste pile ponds in OU6 is routed to the Robert Emmet area, which then subsequently is directed to the LMDT for treatment. However, for the past four years, water levels have remained low in the waste rock pile ponds, so overflow has not been a concern. Water levels in ponds were well below the berms.</u>				

9.	<b>Slope Instability</b>	<input type="checkbox"/> Slides	<input type="checkbox"/> Location shown on site map
	<input checked="" type="checkbox"/> No evidence of slope instability		
	Area extent: _____		
	Remarks: _____		
<b>B. Benches</b>			
	<input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A		
	(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)		
1.	<b>Flows Bypass Bench</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
	Remarks: <u>Several of the waste covers include benches to slow down the velocity of surface runoff and convey the runoff to the waste pile ponds in OU6.</u>		
2.	<b>Bench Breached</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> N/A or okay
	Remarks: _____		
3.	<b>Bench Overtopped</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> N/A or okay
	Remarks: _____		
<b>C. Letdown Channels</b>			
	<input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A		
	(Channel lined with erosion control mats, riprap, grout bags or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)		
1.	<b>Settlement (Low spots)</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No evidence of settlement
	Area extent: _____		Depth: _____
	Remarks: _____		
2.	<b>Material Degradation</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No evidence of degradation
	Material type: _____		Area extent: _____
	Remarks: _____		
3.	<b>Erosion</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No evidence of erosion
	Area extent: _____		Depth: _____
	Remarks: _____		
4.	<b>Undercutting</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No evidence of undercutting
	Area extent: _____		Depth: _____
	Remarks: _____		
5.	<b>Obstructions</b>	Type: _____	<input checked="" type="checkbox"/> No obstructions
	<input type="checkbox"/> Location shown on site map	Area extent: _____	
	Size: _____		
	Remarks: _____		
6.	<b>Excessive Vegetative Growth</b>	Type: _____	
	<input checked="" type="checkbox"/> No evidence of excessive growth		
	<input type="checkbox"/> Vegetation in channels does not obstruct flow		
	<input type="checkbox"/> Location shown on site map	Area extent: _____	

Remarks: _____			
<b>D. Cover Penetrations</b>		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Gas Vents</b>	<input type="checkbox"/> Active	<input type="checkbox"/> Passive
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs maintenance	<input checked="" type="checkbox"/> N/A
Remarks: _____			
2.	<b>Gas Monitoring Probes</b>	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Routinely sampled	<input type="checkbox"/> Good condition
		<input type="checkbox"/> Needs maintenance	<input checked="" type="checkbox"/> N/A
Remarks: _____			
3.	<b>Monitoring Wells</b> (within surface area of landfill)		
	<input checked="" type="checkbox"/> Properly secured/locked	<input checked="" type="checkbox"/> Functioning	<input checked="" type="checkbox"/> Routinely sampled
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs maintenance	<input type="checkbox"/> Good condition
			<input type="checkbox"/> N/A
Remarks: <u>Wells were identified in and adjacent to covered waste piles and tailings impoundments and were properly labeled and locked.</u>			
4.	<b>Extraction Wells Leachate</b>	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Routinely sampled	<input type="checkbox"/> Good condition
		<input type="checkbox"/> Needs maintenance	<input checked="" type="checkbox"/> N/A
Remarks: _____			
5.	<b>Settlement Monuments</b>	<input type="checkbox"/> Located	<input type="checkbox"/> Routinely surveyed
			<input checked="" type="checkbox"/> N/A
Remarks: _____			
<b>E. Gas Collection and Treatment</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Gas Treatment Facilities</b>		
	<input type="checkbox"/> Flaring	<input type="checkbox"/> Thermal destruction	<input type="checkbox"/> Collection for reuse
	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs maintenance	
Remarks: _____			
2.	<b>Gas Collection Wells, Manifolds and Piping</b>		
	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs maintenance	
Remarks: _____			
3.	<b>Gas Monitoring Facilities</b> (e.g., gas monitoring of adjacent homes or buildings)		
	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs maintenance	<input type="checkbox"/> N/A
Remarks: _____			
<b>F. Cover Drainage Layer</b>		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Outlet Pipes Inspected</b>	<input checked="" type="checkbox"/> Functioning	<input type="checkbox"/> N/A
Remarks: <u>Abandoned piping was observed under a road in OU6. It will be addressed as part of the routine O&amp;M activities.</u>			
2.	<b>Outlet Rock Inspected</b>	<input checked="" type="checkbox"/> Functioning	<input type="checkbox"/> N/A

Remarks: <u>Many of the diversion ditches are lined and reinforced with riprap or gravel. Some of the ditches are concrete lined.</u>			
<b>G. Detention/Sedimentation Ponds</b>		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Siltation</b>	Area extent: _____ Depth: _____	<input type="checkbox"/> N/A
<input checked="" type="checkbox"/> Siltation not evident			
Remarks: <u>Remediation or removal actions have occurred historically to remove excess sediment from waste ponds.</u>			
2.	<b>Erosion</b>	Area extent: _____ Depth: _____	
<input checked="" type="checkbox"/> Erosion not evident			
Remarks: _____			
3.	<b>Outlet Works</b>	<input checked="" type="checkbox"/> Functioning	<input type="checkbox"/> N/A
Remarks: _____			
4.	<b>Dam</b>	<input type="checkbox"/> Functioning	<input checked="" type="checkbox"/> N/A
Remarks: _____			
<b>H. Retaining Walls</b>		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Deformations</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Deformation not evident
Horizontal displacement: _____		Vertical displacement: _____	
Rotational displacement: _____			
Remarks: <u>Some retaining walls were observed along the access roads to the waste piles of OU6 and included cribbing and caging to prevent erosion onto access roads.</u>			
2.	<b>Degradation</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Degradation not evident
Remarks: _____			
<b>I. Perimeter Ditches/Off-Site Discharge</b>		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Siltation</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Siltation not evident
Area extent: _____		Depth: _____	
Remarks: <u>An elaborate network of diversion ditches are constructed throughout OU2, 4, 5, 6, 7, 8, 9 and 10 to divert runoff to ponds and treatment facilities.</u>			
2.	<b>Vegetative Growth</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Vegetation does not impede flow			
Area extent: _____		Type: _____	
Remarks: _____			
3.	<b>Erosion</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Erosion not evident
Area extent: _____		Depth: _____	
Remarks: _____			
4.	<b>Discharge Structure</b>	<input checked="" type="checkbox"/> Functioning	<input type="checkbox"/> N/A
Remarks: <u>The May 2015 time-critical removal action in the Greenback Pond area has included a gravity-fed pipe to discharge overflow to the Robert Emmet area.</u>			
<b>VIII. VERTICAL BARRIER WALLS</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A

1.	<b>Settlement</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Settlement not evident
	Area extent: _____		Depth: _____
	Remarks: _____		
2.	<b>Performance Monitoring</b>	Type of monitoring: _____	
	<input type="checkbox"/> Performance not monitored		<input type="checkbox"/> Evidence of breaching
	Frequency: _____		
	Head differential: _____		
	Remarks: _____		
<b>IX. GROUNDWATER/SURFACE WATER REMEDIES</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
<b>A. Groundwater Extraction Wells, Pumps and Pipelines</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1.	<b>Pumps, Wellhead Plumbing and Electrical</b>		
	<input type="checkbox"/> Good condition	<input type="checkbox"/> All required wells properly operating	<input type="checkbox"/> Needs maintenance <input type="checkbox"/> N/A
	Remarks: _____		
2.	<b>Extraction System Pipelines, Valves, Valve Boxes and Other Appurtenances</b>		
	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs maintenance	
	Remarks: _____		
3.	<b>Spare Parts and Equipment</b>		
	<input type="checkbox"/> Readily available	<input type="checkbox"/> Good condition	<input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided
	Remarks: _____		
<b>B. Surface Water Collection Structures, Pumps and Pipelines</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1.	<b>Collection Structures, Pumps and Electrical</b>		
	<input checked="" type="checkbox"/> Good condition	<input type="checkbox"/> Needs maintenance	
	Remarks: _____		
2.	<b>Surface Water Collection System Pipelines, Valves, Valve Boxes and Other Appurtenances</b>		
	<input checked="" type="checkbox"/> Good condition	<input type="checkbox"/> Needs maintenance	
	Remarks: _____		
3.	<b>Spare Parts and Equipment</b>		
	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Good condition	<input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided
	Remarks: _____		
<b>C. Treatment System</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1.	<b>Treatment Train</b> (check components that apply)		
	<input checked="" type="checkbox"/> Metals removal	<input type="checkbox"/> Oil/water separation	<input type="checkbox"/> Bioremediation
	<input type="checkbox"/> Air stripping	<input type="checkbox"/> Carbon adsorbers	
	<input checked="" type="checkbox"/> Filters: <u>O&amp;M contractor replaces media filters as required.</u>		
	<input checked="" type="checkbox"/> Additive (e.g., chelation agent, flocculent): <u>Addition of lime to increase pH and use of polymer to allow metals to fall out.</u>		



## X. OTHER REMEDIES

If there are remedies applied at the site and not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

## XI. OVERALL OBSERVATIONS

### A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is designed to accomplish (e.g., to contain contaminant plume, minimize infiltration and gas emissions).

The remedy at OU1 is designed to intercept and treat contaminated surface water prior to reaching the Lower California Gulch. The Yak Tunnel WTP has been in continuous operation since 1992 and all effluent discharge meets criteria established in the 2008 Consent Decree. A number of upgrades to the plant hardware, software, electrical conduit, treatment system and surge pond have been completed since the previous FYR. The plant is in good working order and will continue to treat influent from the mine drainage systems linked to Yak Tunnel.

The remedies at OUs 2 through 11 were designed to address metals source contamination prior to the design and implementation of the sitewide groundwater and surface water remedy under OU12. Source control efforts have largely included the excavation and consolidation of contaminated materials, including mine tailings, slag and waste rock. These remedies also included the construction of an extensive network of surface water diversion structures to minimize leaching of metals from these piles and to prevent ARD from further impacting surface water at the Site. Phase I remediation is completed at OU6 to control sources. Phase 2 (waste rock pile capping) and Phase 3 (resizing of collection channels and ponds) is ongoing. An evaluation of whether more work is needed at other source areas will be made based on the results of the OU12 long-term groundwater and surface water monitoring. In addition, implementation of institutional controls for OU11 is currently underway and institutional controls are planned as the OU6 remedy nearing completion.

### B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. O&M activities largely include monitoring and maintenance of the implemented remedies. The Yak Tunnel WTP is routinely monitored as part of day-to-day operations and repairs and maintenance are performed as needed. Some piles of contaminated material have a gravel or vegetative cap; these are maintained by the appropriate parties.

### C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

### D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. The OU1 remedy was optimized in March 2018, modifying the pH in the effluent discharged from the Yak Tunnel WTP to a more alkaline pH, thereby eliminating the need to add sulfuric acid post treatment to bring plant effluent within its previous permitted pH range. OU6 remediation is ongoing and includes improvements to diversion ditches and conveyance systems to address increased volumes of water during high water events (snow melts).

## APPENDIX G – SITE INSPECTION PHOTOGRAPHS



OU1 – Yak Tunnel Water Treatment Plant



OU1 Yak Water Treatment Plant



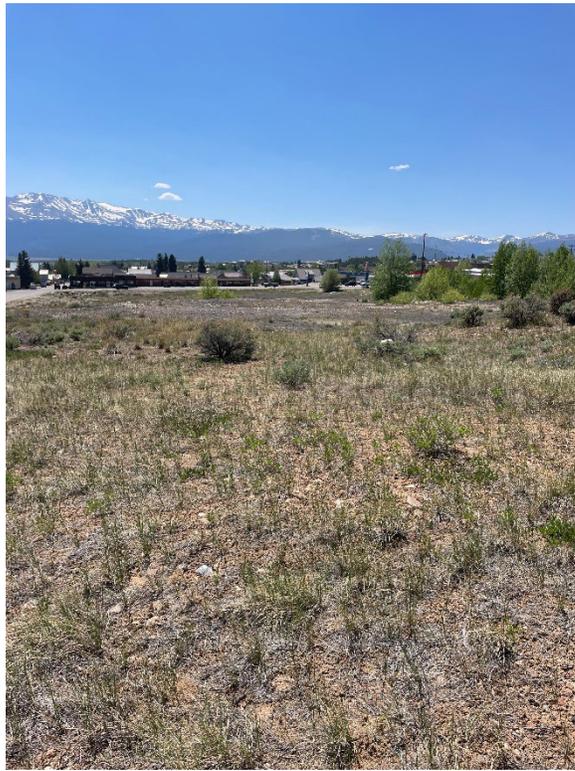
OU1 – Yak Water Treatment Plant Surge Pond



OU2 - Malta Gulch Tailings Impoundment (automobile tires observed in photos)



OU3 – Slag Pile



OU3- Former Harrison Street Slag Pile (location for new courthouse and jail)



OU3 – Mineral Belt Trail with new homes built in the background



OU4 – View from Helen Waste pile showing cribbing along road and drainageway



OU4 – View from Helen Waste pile showing cribbing along road and drainage controls



OU5 – Drainage feature near former smelter area



OU-6 Mikado Waste Rock Pile



OU6 – Mikado Pond and fence



OU6 – Greenback Pond and fencing around pond



OU6 - Mahala Waste Rock Pile



OU6 – Highland Mary Waste Rock Pile



OU6 – Pyrenees Waste Rock Pile and drainage feature



OU6 – Fencing needing repair at Marion Pond



OU6 – Photo of low water levels



OU6 – GAW Pump House



OU6 – Diversion ditch from GAW waste rock pile



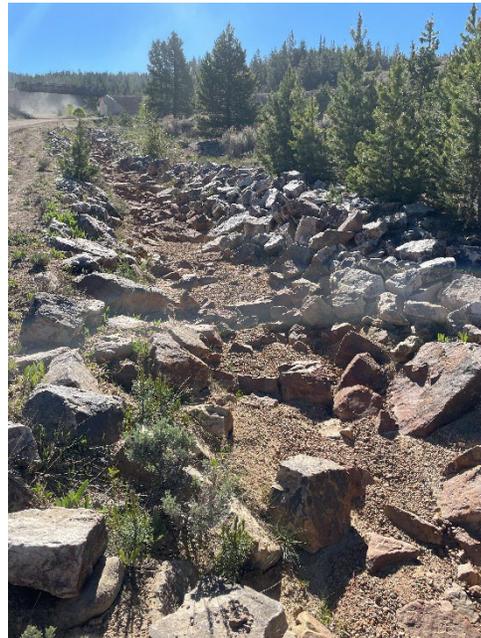
OU6 – Marion Pond



OU-6 RAM Waste Rock Pile



OU6 – Robert Emmett Shaft



OU6 – Surface runoff diversion ditches and structures



OU6 – Diversion structure under road



OU6 – Starr Ditch diversion structures



OU6 – Repository for remediated soils from other OUs and associated pond



OU7 – Apache Tailings Impoundment



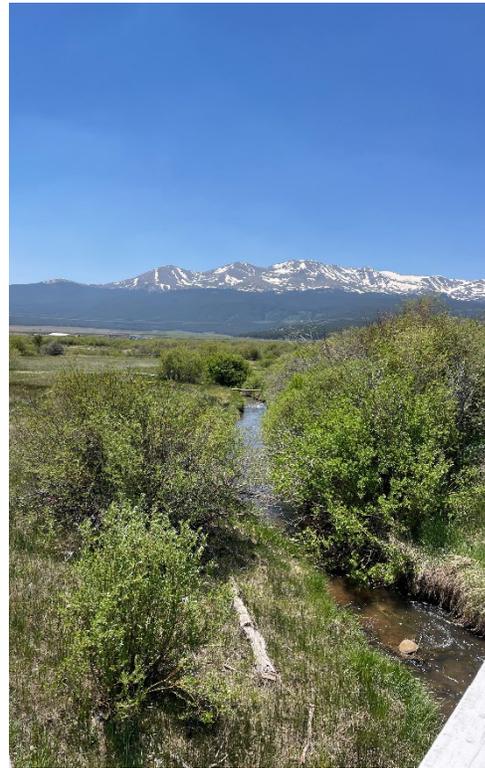
OU9 – Lead remediated residential home and community where lead remediation has occurred



OU11 – Arkansas River near Hayden Ranch



OU-12 – Monitoring well



OU12 – California Gulch sample location CG6



OU-12 – Arkansas River monitoring location Segment 2a



OU12 – Arkansas River monitoring location Segment 2b

## APPENDIX H – DETAILED ARARS REVIEW

CERCLA Section 121(d)(1) requires that Superfund remedial actions attain “a degree of cleanup of hazardous substance, pollutants, and contaminants complete into the environment and of control of further release at a minimum which assures protection of human health and the environment.” The remedial action must achieve a level of cleanup that at least attains those requirements that are legally applicable or relevant and appropriate. Applicable requirements are those cleanup standards, standards of control, and other substantive requirements, criteria or limitations promulgated under federal environmental laws or state environmental or facility citing laws that specifically address a hazardous substance, remedial action, location or other circumstance found at a CERCLA site. Relevant and appropriate requirements are those standards that while not “legally applicable” address problems or situations sufficiently similar to those encountered at the CERCLA site and that their use is well suited to the particular site. Only the state standards that are more stringent than federal requirements may be applicable or relevant and appropriate. To-be-considered (TBC) criteria are non-promulgated advisories and guidance that are not legally binding, but may be considered in determining the necessary remedial action. For example, TBC criteria may be particularly useful in determining health-based levels where no ARARs exist or in developing the appropriate method for conducting a remedial action.

Chemical-specific ARARs are health- or risk-based numerical values or methodologies that, when applied to site-specific conditions, result in the establishment of numerical values. These values establish an acceptable amount or concentration of a chemical that may remain in, or be discharged to, the ambient environment. Examples of chemical-specific ARARs include MCLs under the federal Safe Drinking Water Act (SDWA) and ambient water quality criteria (AWQCs) enumerated under the federal Clean Water Act.

Action-specific ARARs are technology- or activity-based requirements or limits on actions taken with respect to a particular hazardous substance. These requirements are triggered by a particular remedial activity, such as discharge of contaminated groundwater or in-situ remediation.

Location-specific ARARs are restrictions on hazardous substances or the conduct of the response activities solely based on their location in a special geographic area. Examples include restrictions on activities in wetlands, sensitive habitats and historic places.

Remedial actions are required to comply with the ARARs identified in the ROD. In performing the FYR, any newly promulgated standards including revised chemical-specific requirements (such as MCLs, ambient water quality criteria), revised action and location-specific requirements, and state standards if they were considered ARARs in the ROD, are reviewed to establish whether the new requirement indicates that the remedy is no longer protective.

### *Groundwater*

Final performance standards for OU1 through OU11 did not include chemical-specific ARARs for surface water and groundwater. It was agreed that the decision on remediation of OU12 (Sitewide Water Quality) would be made between the EPA and the PRPs, and memorialized in the Consent Decree only after remedies for source remediation was selected and implemented at each OU.

The OU12 ROD identified federal drinking water standards for arsenic, cadmium and lead as groundwater ARARs. However, according to OU12 ROD, shallow groundwater is not expected to meet ARARs within a reasonable timeframe. Thus, the EPA issued a TI waiver for a small portion of the Site for cadmium and lead in the shallow alluvium of Stray Horse, California and Oregon gulches, as well as a portion of the AV floodplain near the confluence of California Gulch (Figure H-1). The OU12 ROD did not waive the MCL for arsenic since there were no exceedances of the arsenic MCL (Table H-1).

**Table H-1: Previous and Current ARARs for OU12 Groundwater COCs**

COC	OU12 2012 ROD ARAR (mg/L) <sup>a,b</sup>	Current MCL (µg/L) <sup>a</sup>	ARAR Change
Arsenic	0.01	0.01	None
Cadmium	0.005 (waived)	0.005	None
Lead	0.015 (waived)	0.015	None
<i>Notes:</i> Obtained from 2009 OU12 ROD, page DS-49. Based on the SDWA MCLs. Current MCLs can be found at <a href="https://www.epa.gov/ground-water-and-drinking-water/table-regulated-drinking-water-contaminants">https://www.epa.gov/ground-water-and-drinking-water/table-regulated-drinking-water-contaminants</a> (last accessed 4/12/2022). mg/L = milligrams per liter µg/L = micrograms per liter			

*Surface Water*

The 1989 OU1 AROD waived attainment of the federal AWQC for the discharge from the Yak Tunnel WTP. Further, in the 1991 ESD, the EPA waived water quality-based effluent limitations and standards for the Upper Arkansas River since, at that time, it was not yet possible to perform a waste load allocation to determine the extent to which the Yak Tunnel discharge and each of the other discharges must be treated to in order for the Arkansas River to meet instream water quality requirements. However, technology-based treatment requirements that represent the minimum level of control had not been waived. According to the 1991 ESD, the WTP effluent must meet best available technology requirements based on acute toxicity testing after two years of operation. The 2008 Consent Decree established effluent discharge limitations that apply to the discharge at Outfall 001 (Consent Decree, Appendix A, Table 1)(Table H-2). These values continue to be used to monitor the concentrations of cadmium, copper, mercury, lead and zinc at Outfall 001.

The 2009 OU12 ROD identified the Colorado Water Quality Control Act (5-CCR-1002.31) and applicable water quality standards established for the on-site segments of the Arkansas River and California Gulch under the Classification and Numeric Standards for the Arkansas River Basin (5 CCR 1002-32) as ARARs for OU12 surface water. The ROD identified seasonal temporary modifications to the 5 CCR 1002-32 table value standards set for cadmium and zinc for the months of April and May in the 2b and 2c segments of the Arkansas River. For the remainder of the year, hardness-dependent concentration values are identified as the water quality standards and replace the table value standards. CDPHE updated the water quality criteria in December of 2021. The hardness-dependent chronic concentrations for cadmium and zinc table value standards have not changed since the ROD was issued (Table H-3). In addition, the hardness dependent acute concentration for zinc has not changed but the current acute hardness dependent criteria for cadmium have become less stringent. The seasonal temporary modifications for segment 2b and 2c expired on December 31, 2013, and renewed in 2021 for both segment 2b and 2c; the seasonal values for segment 2b have not changed since the 2009 OU12 ROD, while more stringent seasonal values were established for 2c. These changes do not affect monitoring performance of the remedy, as the monitoring plan has adopted the most current surface water ARARs.

**Table H-2: Yak Tunnel WTP Effluent Limits**

Parameter <sup>a</sup>	Effluent Limitations			
	30-Day Average <sup>b</sup>	Daily Max <sup>b</sup>	Frequency <sup>c</sup>	Sample Type <sup>b</sup>
Flow, MGD	Report	Report	Daily	Continuous
pH, s.u. <sup>d</sup>	6.0-9.0	Report	Daily	Continuous
Oil and Grease, mg/L <sup>e</sup>	Report	10.0	Daily/Weekly	Visual/Grab
Total Calcium, mg/L	Report	Report	Monthly	Composite
Total Magnesium, mg/L	Report	Report	Monthly	Composite
Hardness, mg eq. CaCO <sub>3</sub> /L <sup>f</sup>	Report	Report	Monthly	Composite
TSS, mg/L	20	30	Monthly	Composite
TSS, lbs/day (kg/day)	240 (109)	360 (163)	Monthly	Composite
Ag- TR, µg/L <sup>h</sup>	Report	Report	Monthly	Composite
Ag- TR, lbs/day (kg/day)	Report	Report	Monthly	Composite
Al- AS, µg/L	Report	Report	Monthly	Composite
Al- AS, lbs/day (kg/day)	Report	Report	Monthly	Composite
As- TR, µg/L	Report	Report	Monthly	Composite
As- TR, lbs/day (kg/day)	Report	Report	Monthly	Composite
Cd- TR, µg/L	50	100	Monthly	Composite
Cd- TR, lbs/day (kg/day)	Report	Report	Monthly	Composite
Cu- TR, µg/L	150	300	Monthly	Composite
Cu- TR, lbs/day (kg/day)	Report	Report	Monthly	Composite
Fe- TR, µg/L	Report	Report	Monthly	Composite
Fe- TR, lbs/day (kg/day)	Report	Report	Monthly	Composite
Hg- T, µg/L <sup>h</sup>	1	2	Monthly	Composite
Hg- T, lbs/day (kg/day)	Report	Report	Monthly	Composite
Pb- TR, µg/L	300	500	Monthly	Composite
Pb- TR, lbs/day (kg/day)	Report	Report	Monthly	Composite
Mn- TR, µg/L	Report	Report	Monthly	Composite
Mn- TR, lbs/day (kg/day)	Report	Report	Monthly	Composite
Se- TR, µg/day	Report	Report	Monthly	Composite
Se- TR, lbs/day (kg/day)	Report	Report	Monthly	Composite
Zn- TR, µg/L	750	1500	Monthly	Composite
Zn- TR, lbs/day (kg/day)	Report	Report	Monthly	Composite
Whole Effluent Toxicity, Acute	g	g	Semi-Annual	Composite
There shall be no discharge of floating solids or visible foam in other than trace amounts.				

T = Total, TR = Total Recoverable, AS = Acid Soluble

a -In addition to monitoring the final discharge at Outfall 001, influent samples shall be taken at the locations described in Section 5.0 and analyzed for all listed parameters

b -See Section 3.0 for definition of terms. For reporting of effluent loading calculations, measurements less than the practical quantitation level shall be considered as zero. For reporting of effluent concentrations, the actual concentration will be reported. If the effluent concentration is less than the PQL, a "–" will be used for the concentration. For influent concentrations, individual water sources will be reported separately. For reporting influent loading calculations, measurements less than the practical quantitation level shall be considered as zero. For reporting of influent concentrations, the actual concentration will be reported. If the influent concentration is less than the PQL, a "–" will be used for the concentration.

c -Operator may request and EPA may allow a change in the monitoring frequency.

d -Daily minimum – daily maximum limitation

e -A grab sample shall also be taken from Outfall 001 if a visual sheen is observed.

f -Hardness shall be calculated using the total calcium and magnesium sample analysis from the monthly samples.

g -Semi-annual acute toxicity in the discharge from Outfall 001 is to be conducted. This testing is alternated between Ceriodaphnia and fathead minnow at each semi-annual test.

h - For the purpose of this plan, the practical quantitation level for total recoverable silver and total mercury is considered to be 1.0 µg/L. Analytical values less than 1.0 µg/L shall be reported as "–" and will be considered to be in compliance with the effluent limitations for total mercury and total recoverable silver. For loading calculations of mercury and silver analytical results, measurements less than the practical quantitation level shall be considered to be zero.

Source: 2008 Consent Decree, Appendix A, Table 1.

**Table H-3: Comparison of 2009 OU12 Surface Water ARARs to Current Standards**

COC	Water Quality Standard	2009 OU12 ROD ARARs for Arkansas River Segments 2b and 2c (µg/L) <sup>a</sup>	Current CDPHE Standards (µg/L) <sup>b</sup> 2b and 2c	Change <sup>c</sup>
Cadmium	June-March	Acute: $1.136672 - [\ln(\text{hardness}) \times 0.041838] \times e^{(0.9151[\ln(\text{hardness})] - 3.6236)}$	Acute: $1.136672 - (\ln(\text{hardness}) \times 0.041838) \times e^{(0.9789[\ln(\text{hardness})] - 3.866)}$	Less stringent
		Chronic: $1.101672 - [\ln(\text{hardness}) \times 0.041838] \times e^{(0.7998[\ln(\text{hardness})] - 3.1725)}$	Chronic: $1.101672 - [\ln(\text{hardness}) \times 0.041838] \times e^{(0.7998[\ln(\text{hardness})] - 3.1725)}$	No change
	Seasonal Modification (April-May)	1.34	NA	NA
Zinc	June-March	Acute: $0.978 \times e^{(0.8537[\ln(\text{hardness})] + 2.2178)}$	Acute: $0.978 \times e^{(0.8537[\ln(\text{hardness})] + 2.2178)}$	No change
		Chronic: $0.986 \times e^{(0.8537[\ln(\text{hardness})] + 2.0489)}$	Chronic: $0.986 \times e^{(0.8537[\ln(\text{hardness})] + 2.0469)}$	No change
	Seasonal Modification (April-May)	649 (µg/L)	NA	NA

*Notes:*

Criteria listed in 2009 OU12 ROD pages DS-48 and DS-49, Segments 2b and 2c are located directly downstream from the confluence of California Gulch.

Based on the water quality standard established for the on-site segments of the Arkansas River and California Gulch under the Classification and Numeric Standards for the Arkansas River Basin (5 CCR 1002-32)

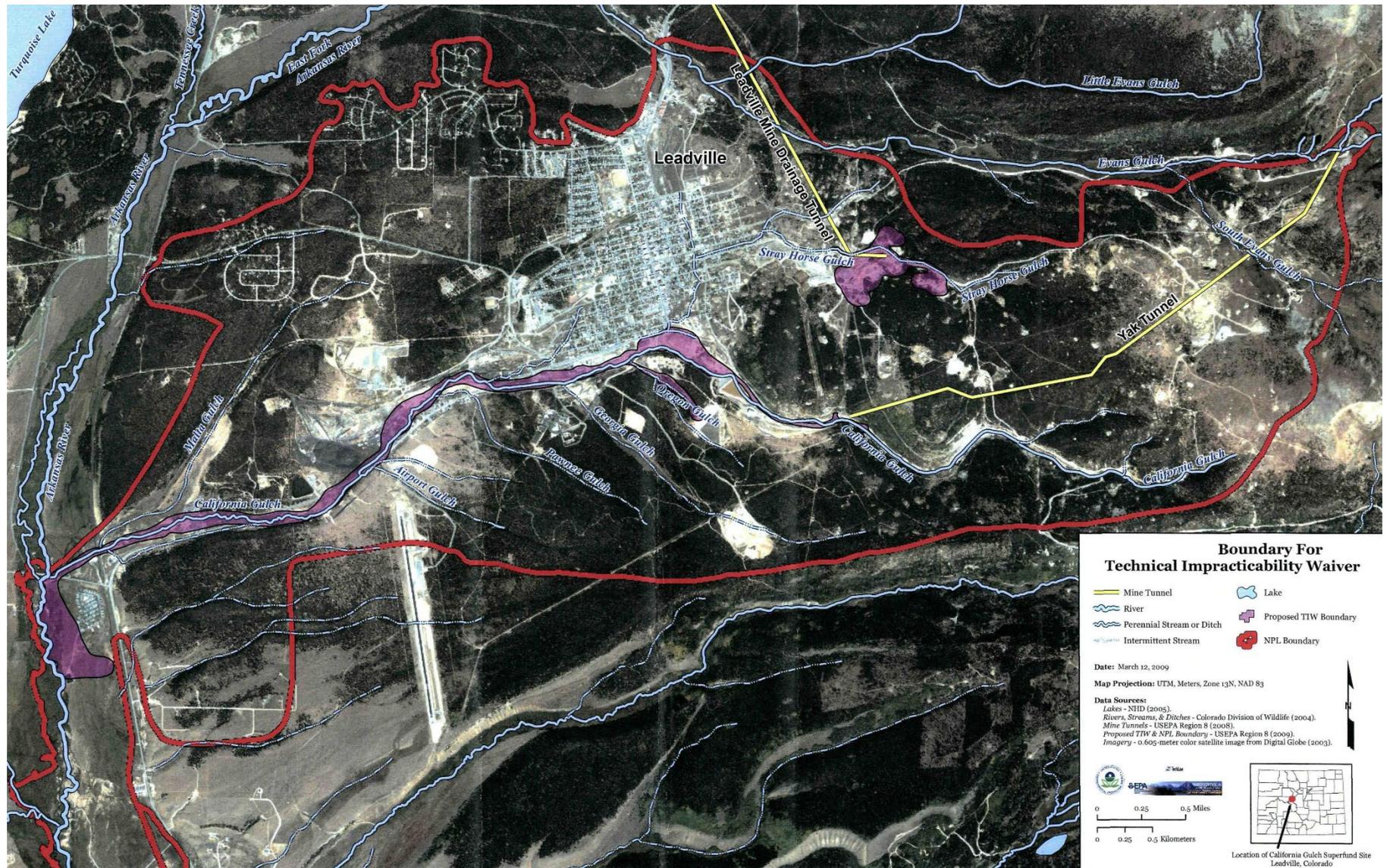
[http://www.sos.state.co.us/CCR/DisplayRule.do?action=ruleinfo&ruleId=2360&deptID=16&agencyID=132&deptName=Department of Public Health and Environment&agencyName=Water Quality Control Commission \(1002 Series\)&seriesNum=5 CCR 1002-32](http://www.sos.state.co.us/CCR/DisplayRule.do?action=ruleinfo&ruleId=2360&deptID=16&agencyID=132&deptName=Department of Public Health and Environment&agencyName=Water Quality Control Commission (1002 Series)&seriesNum=5 CCR 1002-32) (last accessed 4/12/2022).

Based on a comparison assuming a hardness of 100 mg/L calcium carbonate.

NA – not applicable, the seasonal modifications are no longer applied to these segments starting in 2014.

COC	Acute		Chronic	
	ROD	Current	ROD	Current
	2b and 2c	2b and 2c	2b and 2c	2b and 2c
Cadmium	1.7	1.79	1.51	1.51
Zinc	458	458	390	390

**Figure H-1: TI Waiver Area at the Site**



Source: 2009 OU12 ROD

# APPENDIX I –DATA TRENDS

**Table I-1: OU1 Bedrock Groundwater Quality at Monitoring Well BBW-5, 2007 to 2020**

Parameter <sup>a</sup>	7/11/2007	10/11/2007	6/18/2008	6/18/2009	12/31/2009	1/18/2010	6/25/2011	1/10/2011	1/20/2012	6/19/2013	10/29/2013	10/29/2013 <sup>b)</sup>	6/25/2014	6/25/2014 <sup>b)</sup>	10/23/2014	6/17/2015	6/17/2015 <sup>b)</sup>	10/14/2015	6/14/2016	6/14/2016 <sup>b)</sup>
Alkalinity as CaCO3	159	161	153	158	162	128	196	156	172	154	155	156	145	132	169	174	160	163	158	173
Aluminum	<0.03	<0.03	<0.03	0.006	0.002	0.01	0.006	0.007	0.06	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.2	<0.2	<0.2	<0.01	<0.03
Arsenic	0.0373	0.0176	<0.04	0.0189	0.0122	0.0095	<0.0005	0.0306	0.0336	0.0291	0.0463	0.0465	0.0519	0.0557	0.058	0.056	0.058	0.0638	0.0638	0.0654
Cadmium	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.001	<0.001
Calcium	101	100	92.2	86.3	84.2	61.4	56.1	94.8	90.9	110	107	106	114	115	108	142	103	163	100	100
Chloride	0.7	0.7	<3	3	<3	<0.1	20	<2.2	2	<1	<1	<1	1.2	1	0.7	<2	<2	<2	0.7	0.9
Specific Conductance (Field) (µS/cm)	723	768	724	677	620	581	532	749	800	798	867	867	921	921	893	825	819	781	814	814
Copper	<0.01	<0.01	<0.01	0.0007	0.0011	<0.0005	0.0011	<0.0005	0.0007	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.003	<0.003	<0.003	<0.0005	<0.0005
Iron	4.39	4.42	4.12	6.70	6.41	5.84	1.11	6.42	3.88	6.62	5.61	5.48	5.17	5.20	4.89	4.44	4.48	4.37	4.12	4.08
Lead	<0.0001	<0.0001	<0.04	<0.001	<0.001	<0.001	0.0014	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0001	<0.0005	<0.0005	<0.0005	<0.0001	<0.0001
Magnesium	47.3	46.9	43.3	40.0	39.8	36.4	37.6	43.5	41.1	49.9	47.8	47.6	50.8	51.0	48.1	45.3	43.4	46.4	45.3	45.2
Manganese	0.678	0.65	0.614	0.542	0.429	0.373	0.283	0.606	0.585	0.797	0.757	0.750	0.786	0.792	0.742	0.683	0.685	0.669	0.634	0.631
Nickel	<0.01	<0.01	<0.01	0.006	0.0044	<0.01	0.0021	0.004	0.0046	0.0040	<0.0006	0.0031	0.0032	0.0032	0.0025	0.0031	0.0030	<0.003	0.0013	0.0013
pH (Field) (std. units)	7.21	7.13	7.13	7.08	6.36	7.81	7.81	7.27	7.36	7.25	7.30	7.30	7.30	7.30	7.28	7.30	7.30	7.37	7.30	7.30
Potassium	1.6	1.6	1.5	1.5	1.7	2.6	2.6	1.7	1.7	<0.3	<0.3	1.7	1.8	1.7	1.7	1.7	1.7	1.7	1.5	1.5
Silica	10.6	10.2	10.6	12	11.8	9.8	5.5	11.3	12.5	12.6	11.8	11.9	11.6	11.6	11.7	11.7	11.7	11.9	11.3	11.2
Sodium	2.2	2.8	2	2.4	2.6	4.3	3.1	2.4	2.2	2.3	2.2	2.2	2.1	2.2	2.1	2	2.1	2.0	2.0	2.0
Sulfate	250	250	240	220	160	164	154	270	280	320	302	307	316	302	307	297	324	279	281	281
TDS	600	580	320	550	410	350	410	530	440	560	580	580	593	574	591	588	586	580	588	586
Zinc	0.41	0.40	0.44	0.094	0.019	<0.01	0.018	0.134	0.121	0.007	<0.002	0.003	0.216	0.216	0.185	0.180	0.179	0.147	0.112	0.116

Notes: <sup>a</sup>All metals dissolved  
<sup>b</sup>All units mg/L except where indicated  
< indicates result below method detection limit-method detection limit given  
(1) Duplicate Sample  
B = Analyte concentration detected at a value between Method Detection Limit and Practical Quantitation Limit. The associated value is an estimated quantity.

Parameters <sup>a</sup>	10/12/2016	6/15/2017	6/15/2017 <sup>b)</sup>	10/18/2017	10/18/2017 <sup>b)</sup>	6/13/2018	10/9/2018	10/9/2018 <sup>b)</sup>	6/18/2019	10/25/2019	6/19/2020 <sup>b)</sup>	10/14/2020
Alkalinity as CaCO3	153	180	168	167	167	171	173	174	180	175	--	181
Aluminum	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.05	<0.05	--	<0.05
Arsenic	0.0694	0.0700	0.0702	0.0625	0.0635	0.0539	0.0582	0.0611	0.064	0.0519	--	0.0636
Cadmium	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.00005	<0.00005	<0.00005	<0.00005	--	<0.00005
Calcium	101	122	115	165	104	116	101	101	115	117	--	119
Chloride	1.3	1.3	0.9	1.1	0.9	1.0	0.5	1.3	0.9 B	0.8 B	--	1.10 B
Specific Conductance (Field) (µS/cm)	833	890	890	848	848	886	817	817	884	923	--	913
Copper	<0.0005	<0.0008	<0.0008	<0.0008	<0.0008	<0.0004	<0.0008	<0.0008	<0.0008	<0.0008	--	<0.0008
Iron	4.13	4.80	4.48	3.92	3.88	4.06	3.54	3.53	3.86	3.55	--	5.30
Lead	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	--	0.00049B
Magnesium	45.6	56.6	53.5	48.2	47.5	54.4	48.0	47.6	52.7	52.8	--	55.3
Manganese	0.614	0.779	0.728	0.680	0.671	0.751	0.653	0.649	0.71	0.75	--	0.798
Nickel	0.0016	0.0017	0.0016	0.0032	0.0033	0.0046	0.0039	0.004	0.0042	0.0058	--	0.00712
pH (Field) (std. units)	7.40	7.11	7.11	8.53	8.53	8.41	8.22	8.22	6.73	8.19	--	6.92
Potassium	1.3	1.8	1.7	1.6	1.5	1.9	1.6	1.6	1.6	1.6	--	1.85
Silica	11.5	13.5	12.5	12.2	12	13.4	11.7	11.6	11.6	11.9	--	13.5
Sodium	2.1	2.4	2.2	2.2	2.1	2.5	2.2	2.1	2.4	2.3	--	2.49
Sulfate	290	298	295	279	277	306	273	276	325	334	--	317
TDS	551	608	604	592	588	602	580	588	650	694	--	654
Zinc	0.144	0.152	0.151	0.214	0.214	0.274	0.245	0.248	0.269	0.340	--	0.445

Notes: <sup>a</sup>All metals dissolved  
<sup>b</sup>All units mg/L except where indicated  
< indicates result below method detection limit-method detection limit given  
(1) Duplicate Sample  
(2) BBW-5 was not sampled in June 2020 due to a broken pump, the pump was replaced and a sample was collected in October 2020  
B = Analyte concentration detected at a value between Method Detection Limit and Practical Quantitation Limit. The associated value is an estimated quantity.

**Table I-2: Yak Tunnel Blockage Water Quality, 2007 to 2020**

Parameters*	7/10/2007	10/10/2007	6/26/2008	10/22/2008	6/16/2009	10/7/2009	6/7/2010	9/22/2010	6/23/2011	11/1/2011	8/9/2012 <sup>(1)</sup>	11/20/2012 <sup>(2)</sup>	7/24/2013	12/20/2013	10/22/2014 <sup>(1)</sup>	10/22/2014 <sup>(100)</sup>	7/1/2015 <sup>(1)</sup>	7/1/2015 <sup>(100)</sup>	10/4/2015 <sup>(1)</sup>	10/4/2015 <sup>(100)</sup>
Alkalinity as CaCO3	80	64	69	49	37	44	71	47	48	27	69	70	90	80	78.7	70.3	61.9	64.3	88.5	88.5
Aluminum	0.07	<0.03	<0.03	<0.06	0.002	0.3	<0.2	0.04	0.008	0.038	0.03	<0.06	<0.03	<0.03	<0.03	<0.03	<0.2	<0.2	<0.2	<0.2
Arsenic	<0.0005	0.0016	<0.04	<0.08	0.0007	0.003	0.0044	0.004	0.002	0.0049	0.0078	0.0041	<0.01	<0.0002	<0.004	<0.004	0.003	0.002	0.007	0.007
Cadmium	0.034	0.018	0.018	<0.01	0.0176	0.0157	0.0214	0.0254	0.0145	0.0348	0.0164	0.014	<0.005	0.0064	0.0118	0.0125	0.0081	0.0081	0.0109	0.0108
Calcium	263	310	127	323	211	293	277	303	264	268	272	275	277	94.7	235	234	165	165	282	281
Chloride	1.8	1.6	<5	2	10	10	10	<30	<5	<5	1	<1	<1	<1	0.9	0.9	<2	<2	<2	<2
Specific Conductance (Field) (µS/cm)	1612	2080	776	2380	1560	1923	1933	1931	1636	1458	1600	1723	1842	852	1708	1708	1100	1100	1800	1740
Copper	<0.01	<0.01	<0.01	<0.02	0.0014	0.0017	0.0019	0.0035	0.003	0.0064	<0.0005	<0.001	<0.03	<0.0005	<0.01	<0.01	<0.003	<0.003	<0.003	<0.003
Iron	11.7	51.7	<0.02	68	27.9	60.4	63.2	71.3	51.3	88.4	64.7	71.5	63.00	0.25	42.20	42.20	22.50	22.60	76.20	75.90
Lead	<0.0001	0.0009	<0.04	<0.08	0.0001	0.0025	0.001	0.0103	0.0005	0.0008	0.0114	0.0104	<0.005	<0.0001	0.0023	0.0024	0.0015	0.0014	0.0120	0.0119
Magnesium	100	136	43.3	149	84	140	115	125	99.8	116	107	108	106	29.8	81.3	81.4	51.5	51.5	103	103
Manganese	20.1	32.7	4.05	38	19.8	33.2	32.1	34.2	25.1	32.3	28.1	29.9	28.100	3.470	19.3	19.3	11.500	11.500	28.500	28.400
Nickel	0.08	0.14	0.02	0.19	0.0763	0.128	0.126	0.14	0.0968	0.106	0.1093	0.109	<0.03	0.0090	0.07	0.07	0.0374	0.0361	0.0878	0.0943
pH (Field)	5.64	6.52	7.51	6.19	6.25	6.10	6.18	6.63	6.64	6.35	6.58	6.52	6.73	6.52	6.52	6.52	6.67	6.67	6.49	6.49
Potassium	5.1	6.2	2.6	6.5	4.6	6.0	5.5	6.1	4.9	5.4	5.4	5.4	5.4	2.4	4.8	4.8	3.6	3.6	5.5	5.5
Silica	13.3	14.6	8.8	15.3	13.0	14.9	15.4	17.1	16.0	15.6	16.1	15.3	16.0	8.9	14.8	14.8	14.2	14.2	16.3	16.3
Sodium	6.3	6.7	4	7.4	4.9	5.8	5.7	6.1	5.9	5.8	5.4	5	5.3	3.2	5.3	5.0	4.9	4.9	5.1	5
Sulfate	939	1320	410	1600	730	1200	1160	1200	1000	1340	1140	1300	1160	298	928	873	559	573	1210	1230
TDS	1660	1970	680	2170	1370	1990	1900	1940	1600	1970	1710	1880	1860	540	1400	1340	984	964	1810	1810
Zinc	19.6	28.7	7.47	33.1	19.0	31.0	27.6	35.1	21.6	34.8	24.2	26.0	20.7	2.75	14.50	14.30	8.26	8.27	20.5	20.2

Parameters*	6/14/2016 <sup>(1)</sup>	10/12/2016 <sup>(1)</sup>	10/12/2016 <sup>(100)</sup>	6/20/2017 <sup>(1)</sup> (4)	10/17/2017 <sup>(1)</sup>	6/13/2018 <sup>(1)</sup>	6/13/2018 <sup>(100)</sup>	10/9/2018 <sup>(1)</sup>	10/22/2019 <sup>(1)</sup>	6/19/2020 <sup>(1)</sup>	6/19/2020 <sup>(100)</sup>	10/14/2020 <sup>(1)</sup>	10/14/2020 <sup>(100)</sup>
Alkalinity as CaCO3	56	48.7	67.1	59.3	12.1	49.8	52.0	39.1	3.7 B	35.0	38.9	14.3	12.1 B
Aluminum	<0.03	0.03	<0.03	<0.03	0.14	0.03	0.03	0.12	0.21 B	0.07 B	0.08 B	0.244 B	0.232 B
Arsenic	0.0059	0.0109	0.0088	0.0017	0.0087	<0.01	<0.01	0.0099	0.0084	0.0079	0.0073	0.0108	0.0107
Cadmium	0.0103	0.0110	0.0106	0.0148	0.0335	0.015	0.013	0.0236	0.0499	0.017	0.0165	0.0419	0.0422
Calcium	219	284	281	121	276	294	290	251	257	247	238	278	271
Chloride	1.3	1.3	1.3	1.6	0.9	1.4	1.0	1.4	1.0 B	0.9 B	0.7 B	1.41 B	1.25 B
Specific Conductance (Field) (µS/cm)	1669	2090	2090	848	2130	2180	2180	2103	2210	2122	2122	2240	2240
Copper	0.0008	<0.0005	<0.0005	<0.0004	<0.02	<0.02	<0.02	0.014	0.0957	<0.0008	<0.0008	0.0537	0.0545
Iron	49.20	78.50	78.00	16.80	103.00	93.2	92.5	88.4	99.8	85.2	81.6	110	108
Lead	0.0082	0.0049	0.0047	0.0003	0.0051	0.005	0.005	0.0063	0.0106	0.0038	0.0037	0.0104	0.0104
Magnesium	73.9	104	102	38.6	104	111	111	98.2	96.8	93.1	89.2	110	107
Manganese	18.100	27.200	27.100	9.20	34.900	31.9	31.7	29.9	33.2	29.1	27.8	36.1	35.4
Nickel	0.0698	0.1260	0.1054	0.0275	0.11	0.12	0.12	0.107	0.102	0.084	0.080	0.0971	0.0981
pH (Field)	6.74	6.59	6.59	6.82	6.41	6.48	6.48	6.08	5.80	6.19	6.19	6.30	6.30
Potassium	4.4	5.5	5.6	3.4	5.2	5.8	5.8	5.0	4.9	5.0	4.8	5.49	5.37
Silica	14.7	15.5	15.4	12.8	16.3	17.9	17.8	15.9	16.9	16.6	15.9	18.3	17.9
Sodium	4.9	5.2	5.2	4.0	4.9	5.5	5.4	4.9	4.9	5.1	4.9	5.37	5.23
Sulfate	855	1280	1250	460	1370	1220	1250	1110	1230	1120	1120	1270	1220
TDS	1420	1900	1870	698	2010	1910	1910	1880	1980 H	1760	1750	1980	1980
Zinc	15.40	22.9	22.7	7.95	34	29.8	28.9	30.0	33.5	23.0	23.9	35.1	34.9

Notes: \*All metals dissolved  
 All units mg/L except where indicated  
 < indicates result below method detection limit-method detection limit given  
 (1) Sampled at Black Cloud Mine Shaft.  
 (2) Sampled at BIL sampling port at water treatment plant.  
 (3) Duplicate Sample.  
 (4) Sample was collected the day after pump restarted from an extended shutdown. Results are not believed to be reflective of aquifer conditions.  
 B = Analyte concentration detected at a value between Method Detection Limit and Practical Quantitation Limit. The associated value is an estimated quantity.

Source: Yak Annual Monitoring Report 2020. Prepared by Resurrection Mining Company. March 2021.

**Table I-3: Summary of Yak Tunnel Blockage Water Pumping and Water Levels, 2020**

Date	Monthly Volume Pumped (million gallons)	Cumulative Volume Pumped <sup>(1)</sup> (million gallons)	Groundwater Elevation (ft amsl)	Estimated Water Level Elevation (ft) Above Yak Tunnel Blockage	Estimated Groundwater Level Change from 3/21/06 (ft)
3/21/2006	NA	0	10,684	289	NA
1/31/2020	24.8	3,679.2	10,662	267	-22
2/29/2020	26.2	3,705.4	10,657	262	-27
3/31/2020	27.2	3,732.6	10,653	258	-31
4/30/2020	27.5	3,760.1	10,647	252	-37
5/31/2020	21.7	3,781.8	10,650	255	-34
6/30/2020	22.3	3,804.1	10,660	265	-24
7/31/2020	22.0	3,826.1	10,664	269	-20
8/31/2020	26.8	3,852.9	10,660	265	-24
9/30/2020	23.7	3,876.6	10,659	264	-25
10/31/2020	33.4	3,910.7	10,651	256	-33
11/30/2020	31.0	3,941.7	10,645	250	-39
12/31/2020	31.0	3,972.7	10,639	244	-45

(1) Volume pumped since initiation of pumping of Yak Tunnel blockage on March 21, 2006

**Table I-4: OU10 Groundwater Quality from Monitoring Well OG1TMW3**

Date	Dissolved Zinc Concentration (mg/L)	Dissolved Cadmium Concentration (mg/L)	Sample Collected By
6/12/2007	129	0.142	CMC
10/10/2008	106	0.13	MFG
10/06/2009	92.5	0.115	Tetra Tech
11/06/2010	81.9	0.099	AES
10/25/2011	73.9	0.1012	AES
11/19/2012	72.9	0.1025	AES
10/28/2013	64.3	0.0931	AES
10/22/2014	56.4	0.0830	AES
11/10/2015	53.9	0.0756	AES
10/12/2016	42.7	0.0581	AES
10/18/2017	32.2	0.0470	EA
10/11/2018	39.7	0.0556	EA
10/22/2019	33.5	0.0499	EA
10/14/2020	23.9	0.0370	EA

Source: OU-4 and OU-10, 2020 Inspection Report, California Gulch Superfund Site. Prepared by Engineering Analytics, Inc. February 2021.

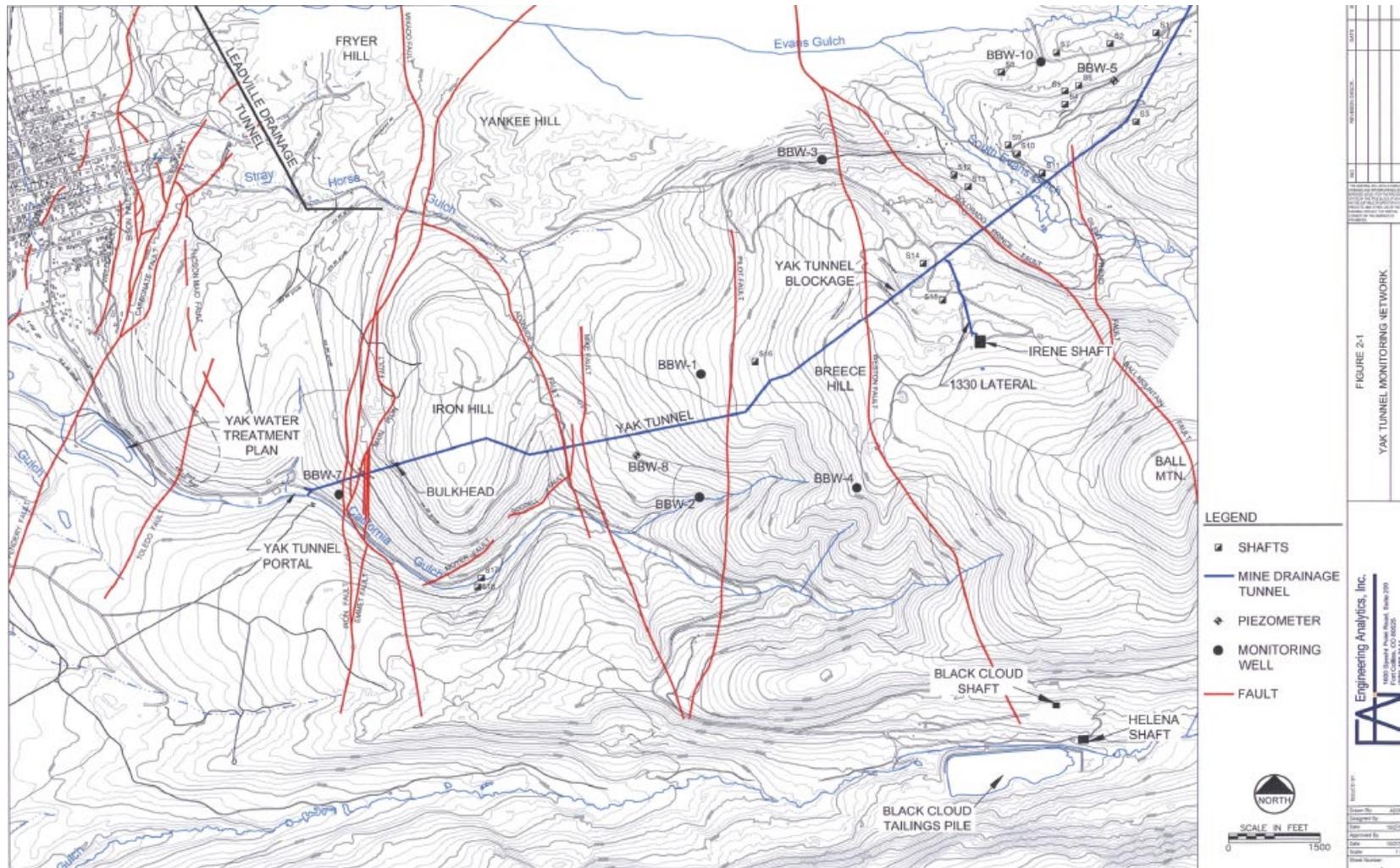
**Table I-5: CSU Macroinvertebrate Sampling Summary in the Arkansas River near Leadville**

CSU Sample Location	OU12 Aquatic Life Monitoring Program Location	Year	Spring*			Fall*			Δ Spring to Fall		
			# Individuals	# Taxa	% Heptageniidae	# Individuals	# Taxa	% Heptageniidae	# Individuals	# Taxa	% Heptageniidae
AR1	AR-1	2014	280.4	<b>30.8</b>	4.0%	NM	NM	NM			
		2015	352.6	30.4	2.1%	316.2	<b>30.0</b>	13.8%	-36.4	-0.4	12%
		2016	336.2	25.6	4.8%	307.6	<b>30.8</b>	11.9%	-28.6	5.2	7%
		2017	315.2	29.6	6.4%	349.4	32.4	10.2%	34.2	2.8	4%
		2018	283.8	24.6	3.0%	347.4	<b>33.2</b>	7.5%	63.6	8.6	5%
		2021	NM	NM	NM	454.6	<b>28.2</b>	12.3%			
		2021 vs Average				<b>99.6</b>	<b>-2.7</b>	<b>1.2%</b>			
AR3	AR-3A	2014	23.8	7.8	2.9%	NM	NM	NM			
		2015	360.0	29.4	2.7%	<b>347.2</b>	23.8	2.8%	-12.8	-5.6	0.1%
		2016	179.8	21.0	7.2%	325.6	27.4	3.0%	145.8	6.4	-4.2%
		2017	<b>337.2</b>	25.8	1.7%	364.2	34.0	7.1%	27.0	8.2	5.4%
		2018	<b>330.6</b>	<b>31.6</b>	2.1%	331.6	30.8	1.3%	1.0	-0.8	-0.9%
		2021	NM	NM	NM	348.8	26.0	1.9%			
		2021 vs Average				<b>5.3</b>	<b>-2.4</b>	<b>-1.3%</b>			
AR5	AR-5	2014	<b>327.0</b>	21.6	0.1%	NM	NM	NM			
		2015	335.0	28.2	1.7%	340.6	29.4	0.9%	5.6	1.2	-0.8%
		2016	343.6	31.2	4.6%	324.6	30.2	2.0%	-19.0	-1.0	-2.7%
		2017	330.6	<b>31.2</b>	5.7%	376.4	<b>35.6</b>	1.9%	45.8	4.4	-3.8%
		2018	NM	NM	NM	<b>468.2</b>	30.2	1.0%			
		2018 vs Average				<b>91.5</b>	<b>-1.2</b>	<b>-0.4%</b>			
CG	CG-6	2014	7.6	3.0	0.0%	NM	NM	NM			
		2015	122.4	10.4	0.0%	88.8	8.6	0.0%	-33.6	-1.8	0.0%
		2016	30.0	5.4	0.0%	275.4	9.2	0.0%	245.4	3.8	0.0%
		2017	271.8	6.2	0.0%	250.6	10.2	0.0%	-21.2	4.0	0.0%
		2018	NM	NM	NM	452.8	13.0	0.0%			
2018 vs Average				<b>185.9</b>	<b>2.8</b>	0.0%					

Notes:

- 1) \* Arithmetic average of 5 measurements with the exception of the fall CG-6 data (4 measurements).
- 2) Bolded and underlined metric represents **maximum value** for specific monitoring event.
- 3) NM = Not Measured.
- 4) For "2021 vs Average", a **RED** value indicates that the 2021 value is less than the 5 year average while a **GREEN** value indicates that the 2021 value was greater than the 5 year average.

**Figure I-1: OU1 Monitoring Locations**



**Figure I-2: OU12 Surface Water Monitoring Locations**

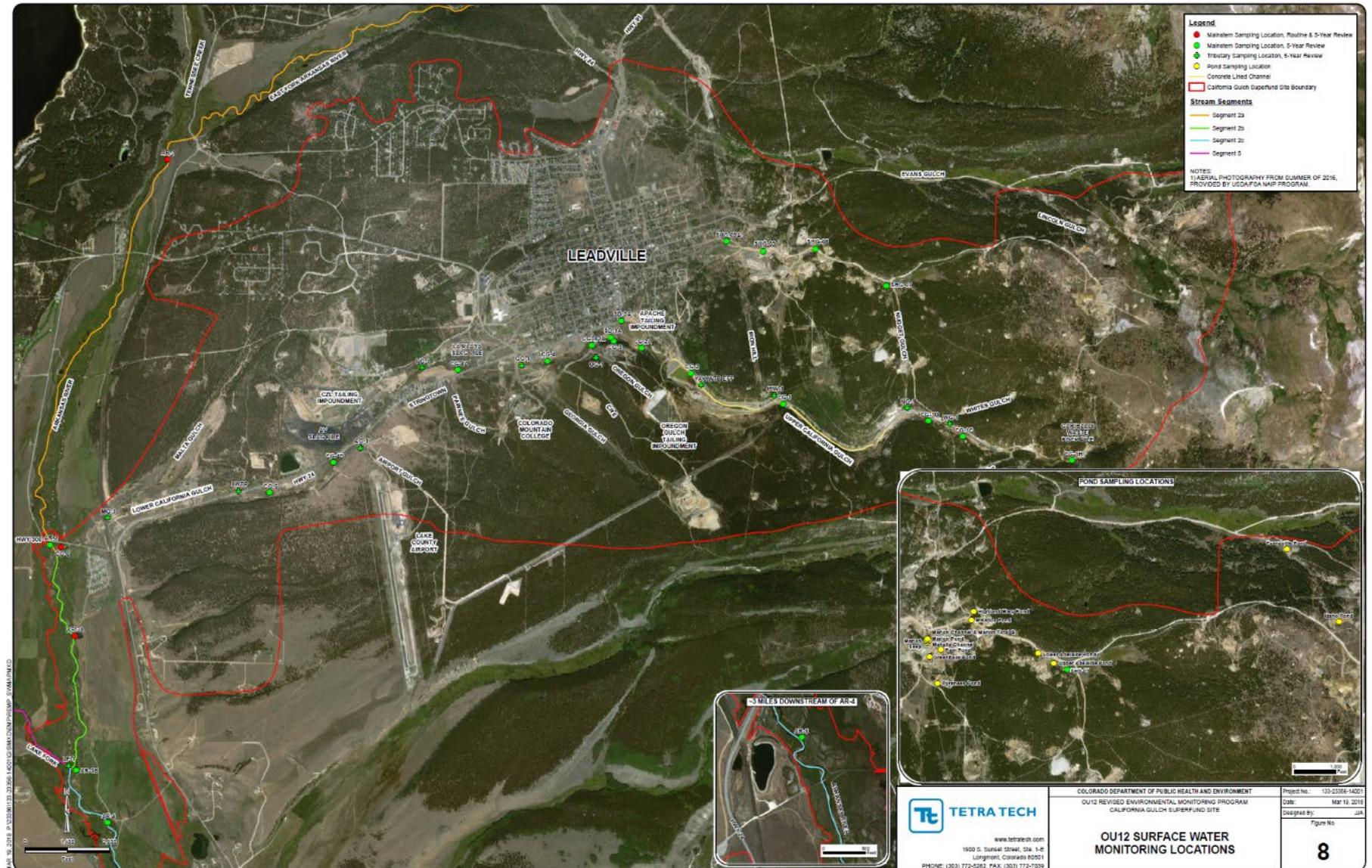
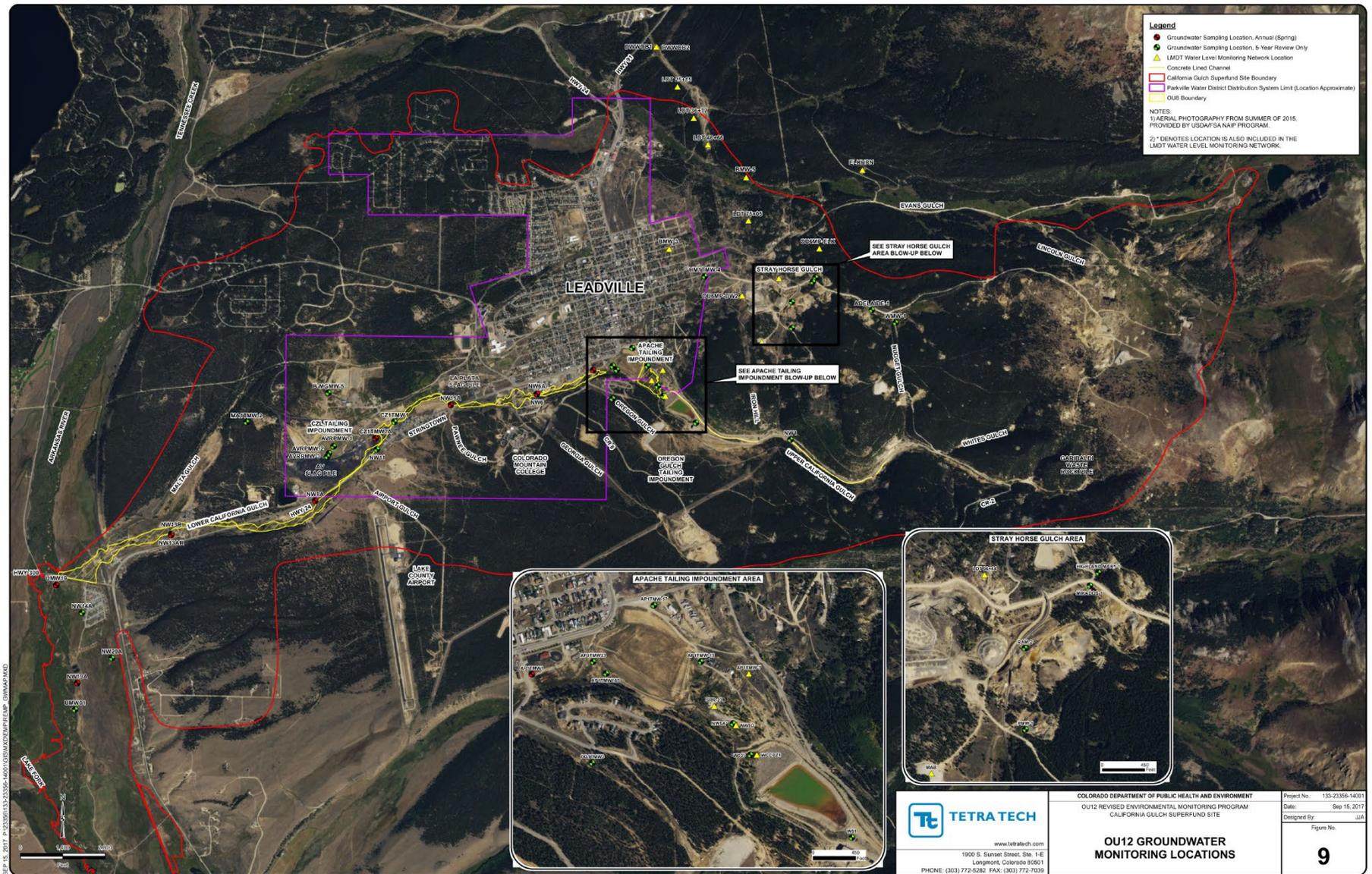
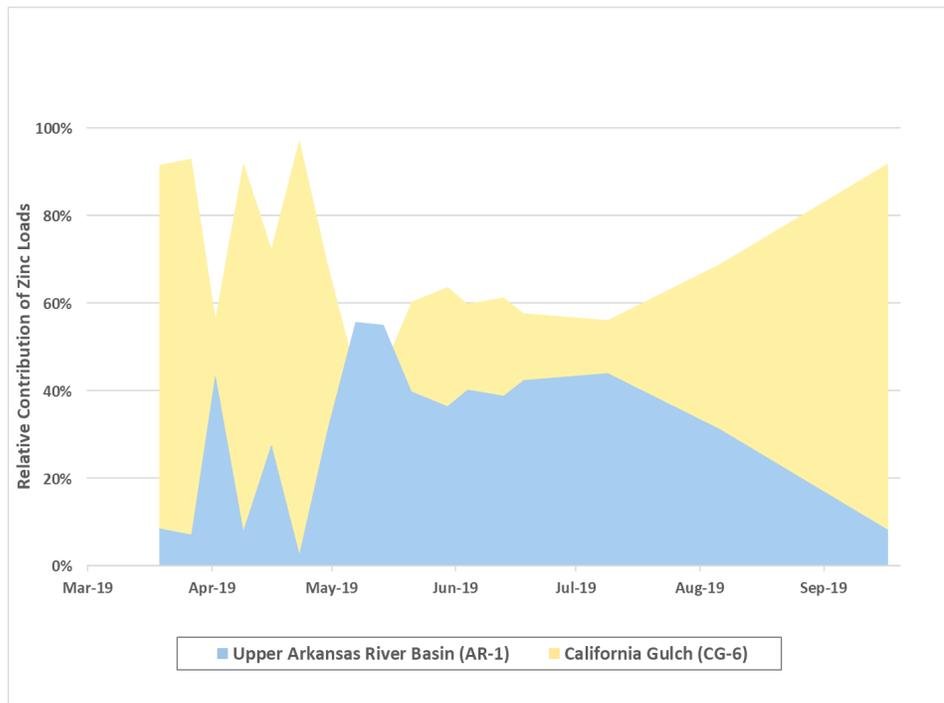


Figure I-3: OU12 Groundwater Monitoring Locations



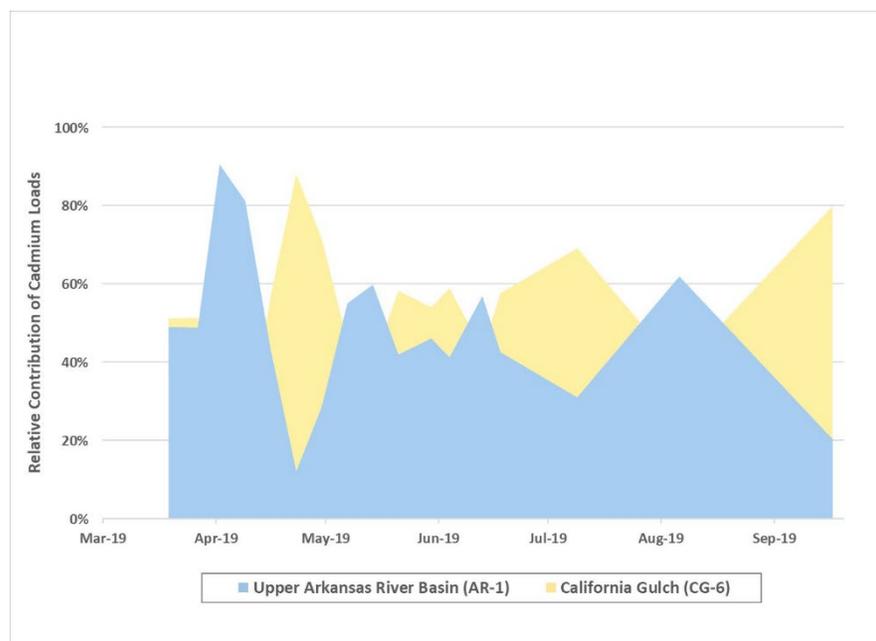


**Figure I-5: Zinc Loading to the Arkansas River from Surface Water Sources at CG-6, 2019**



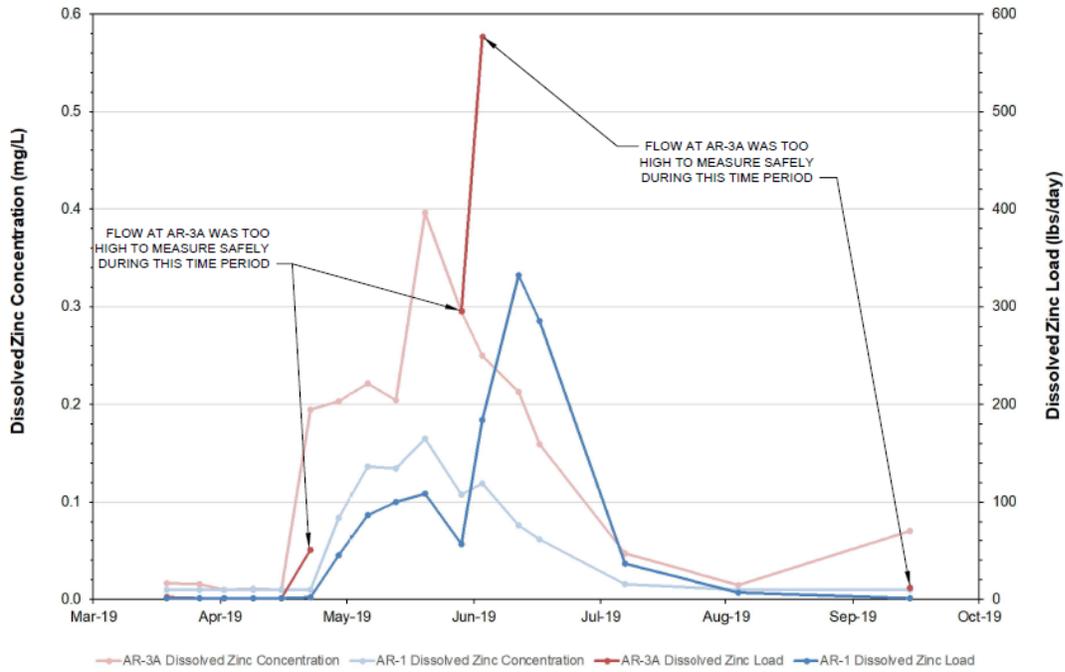
Source: 2019 OU12 Annual Report.

**Figure I-6: Cadmium Loading to the Arkansas River from Surface Water Sources at CG-6, 2019**

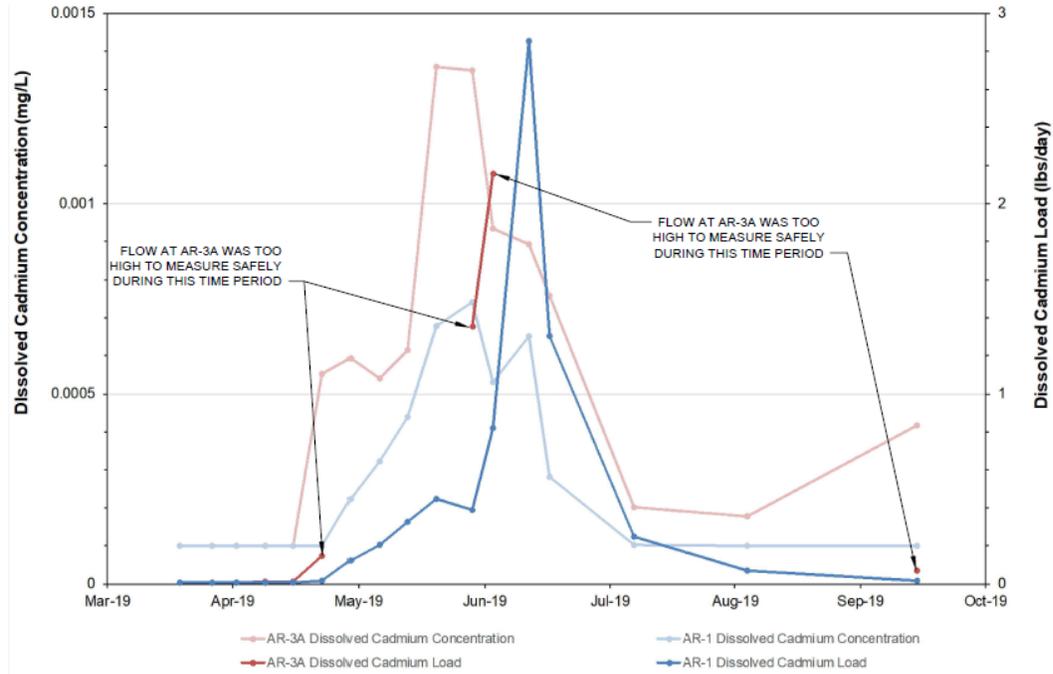


Source: 2019 OU12 Annual Report.

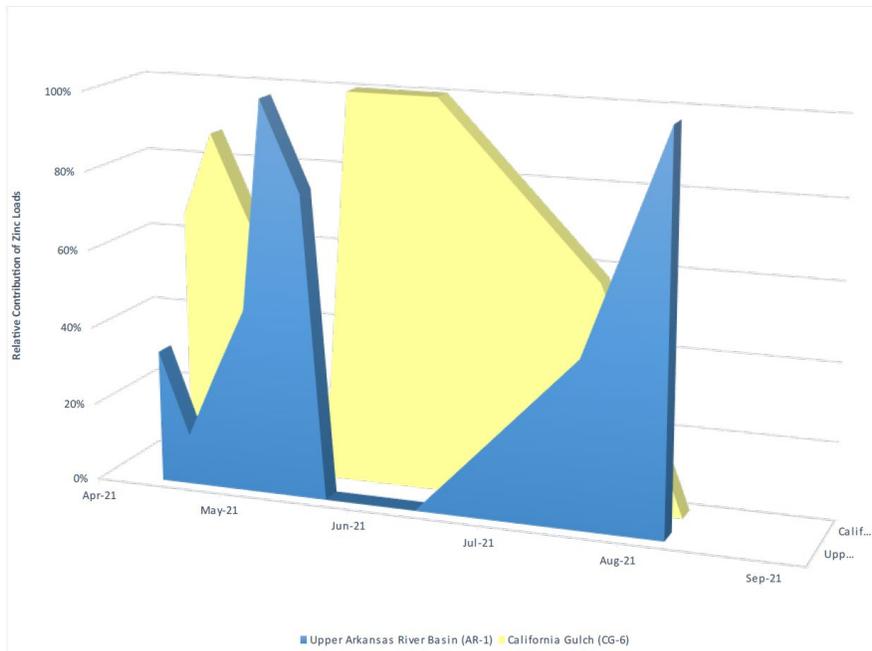
**Figure I-7: Dissolved Zinc Concentrations and Load at AR-1 and AR-3A**



**Figure I-8: Dissolved Cadmium Concentrations and Load at AR-1 and AR-3A**

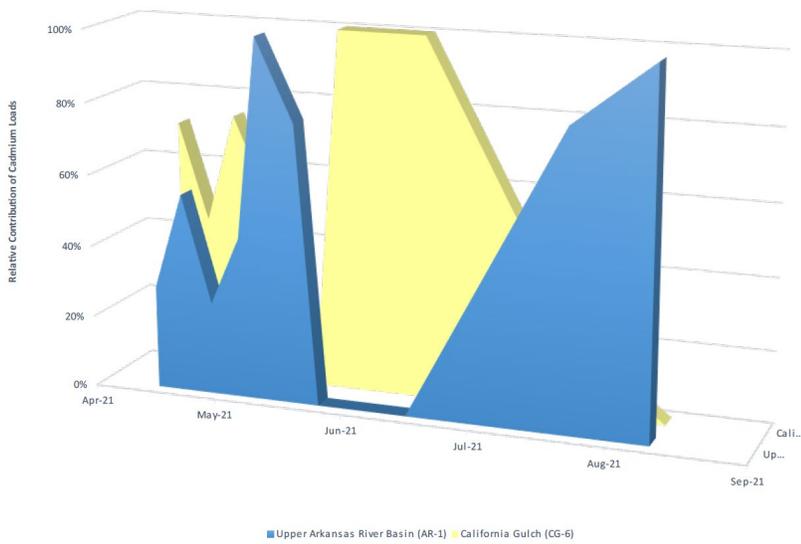


**Figure I-9: Zinc Loading to the Arkansas River from Surface Water Sources at CG-6, 2021**



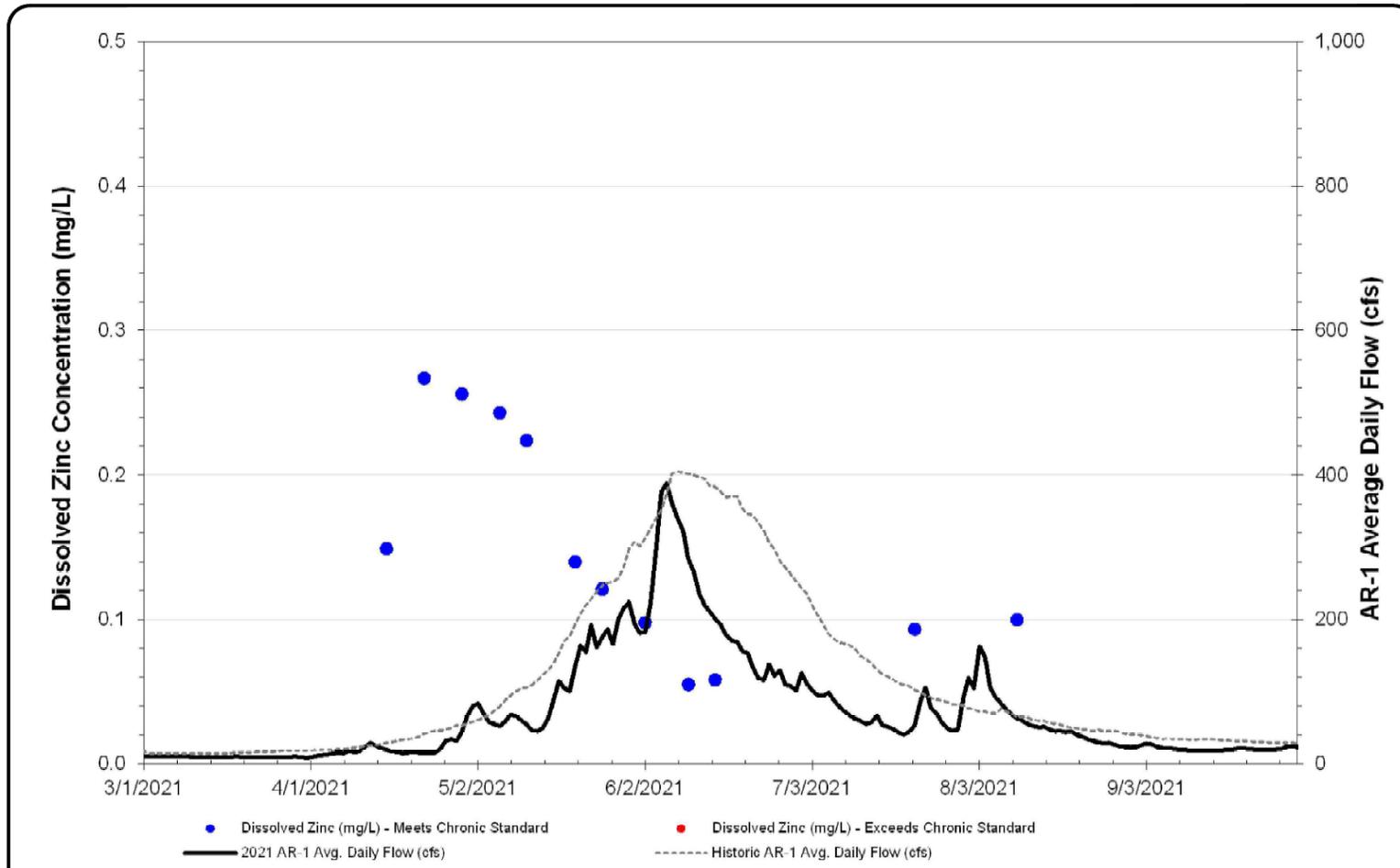
Source: 2021 OU12 Annual Report.

**Figure I-10: Cadmium Loading to the Arkansas River from Surface Water Sources at CG-6, 2021**



Source: 2021 OU12 Annual Report.

**Figure I-11: Flow and Dissolved Zinc Concentrations at AR-3A**



6/24/2022 2:15:31 PM - O:\PROJECTS\LONGMONT\17-6596006\CAD\SHEETFILES\37 FLOW & DISSOLVED ZINC CONCENTRATIONS AR-3A.DWG - ANDRYAUSKAS, JEREMY

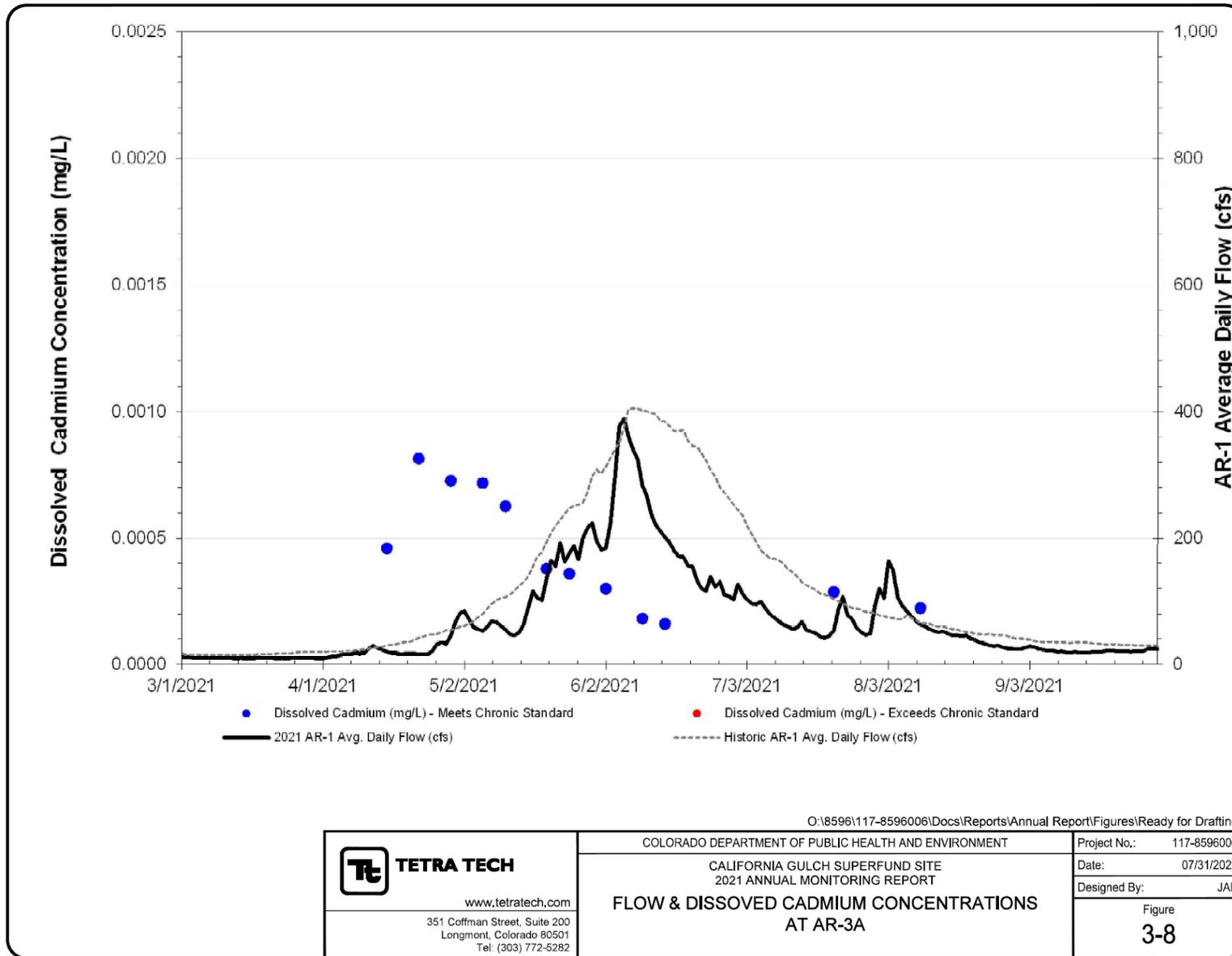
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 <b>TETRA TECH</b> www.tetrattech.com 351 Coffman Street, Suite 200 Longmont, Colorado 80501 Tel: (303) 772-5282	COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT	
	CALIFORNIA GULCH SUPERFUND SITE 2021 ANNUAL MONITORING REPORT	
	<b>FLOW &amp; DISSOLVED ZINC CONCENTRATIONS                  AT AR-3A</b>	
		Project No.: 117-8596006 Date: 07/31/2022 Designed By: JAB
		Figure <b>3-7</b>

Copyright: Tetra Tech

Bar Measures 1 inch

**Figure I-12: Flow and Dissolved Cadmium Concentrations at AR-3A**



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 <b>TETRA TECH</b> www.tetrattech.com 351 Coffman Street, Suite 200 Longmont, Colorado 80501 Tel: (303) 772-5282	COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT CALIFORNIA GULCH SUPERFUND SITE 2021 ANNUAL MONITORING REPORT	Project No.: 117-8596006 Date: 07/31/2022 Designed By: JAB
	<b>FLOW &amp; DISSOLVED CADMIUM CONCENTRATIONS AT AR-3A</b>	

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Bar Measures 1 inch

## APPENDIX J – INTERVIEW FORMS

<b>CALIFORNIA GULCH SUPERFUND SITE FIVE-YEAR REVIEW INTERVIEW FORM</b>	
<b>Site Name:</b> California Gulch	
<b>EPA ID:</b> COD980717938	
<b>Interviewer name:</b>	<b>Interviewer affiliation:</b>
<b>Subject name:</b> Devon Horntvedt	<b>Subject affiliation:</b> Newmont Director, Site Management
<b>Subject contact information:</b> devon.horntvedt@newmont.com	
<b>Interview date:</b> 7/7/22	<b>Interview time:</b> 12:00
<b>Interview location:</b> Email	
<b>Interview format (circle one):</b> In Person    Phone    Mail    Email <input checked="" type="checkbox"/> Other:	
<b>Interview category:</b> Potentially Responsible Party (PRP)	

1.     What is your overall impression of the remedial activities at the Site?

The Site is in excellent shape, with significant upgrades and evaluations of remedial facilities taking place every year. Continuous improvement programs, additional internal company oversight, and excellent on-site management have the Site in as good a shape as it has ever been.
2.     What have been the effects of the Site on the surrounding community, if any?

Largely positive, especially relative to prior to any site activities taking place in the 1980s. The Arkansas river runs much cleaner, and now recreational and other opportunities for the community continue to be built around and expounded upon.
3.     What is your assessment of the current performance of the remedy in place at the Site?

The remedy is performing extremely well. The Arkansas River, the primary receiving body to any environmental site impacts, is as healthy as it has been in modern history.
4.     Are you aware of any complaints or inquiries regarding environmental issues or the remedial action from residents since implementation of the cleanup?

No.
5.     Do you feel well-informed regarding the Site’s activities and remedial progress? If not, how might the EPA convey site-related information in the future?

Yes.
6.     Do you have any comments, suggestions or recommendations regarding the management or operation of the Site’s remedy?

Not at this time.
7.     Do you consent to have your name included along with your responses to this questionnaire in the FYR Report?

Yes.

<b>CALIFORNIA GULCH SUPERFUND SITE FIVE-YEAR REVIEW INTERVIEW FORM</b>	
<b>Site Name:</b> California Gulch	
<b>EPA ID:</b> COD980717938	
<b>Interviewer name:</b>	<b>Interviewer affiliation:</b>
<b>Subject name:</b> Devon Horntvedt	<b>Subject affiliation:</b> Newmont Director, Site Management
<b>Subject contact information:</b> devon.horntvedt@newmont.com	
<b>Interview date:</b> 7/7/22	<b>Interview time:</b> 12:30
<b>Interview location:</b> Email	
<b>Interview format (circle one):</b> In Person      Phone      Mail      Email      X      Other:	
<b>Interview category:</b> O&M Contractor/Staff	

1. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)?

The project is going very well. O&M activities have largely reached a steady state except for capital investment in the treatment facilities which are undergoing refurbishment now that they're 30 years into their life. Reuse activities continue to be developed, largely in recreation, in the form of new trail easements and recreational access. Secondly, recreation on the Arkansas River continues to set records as the river system is as healthy as it has been in modern history.

2. What is your assessment of the current performance of the remedy in place at the Site?

The current remedy is performing very well.

3. What are the findings from the monitoring data? What are the key trends in contaminant levels that are being documented over time at the Site?

Contaminant levels in the water drainage have largely remained the same or are trending generally down, but vary due to seasonal precipitation. Regardless of those variations, the treatment systems can handle those variations and produce high quality effluent that meets the discharge standards.

4. Is there a continuous on-site O&M presence? If so, please describe staff responsibilities and activities. Alternatively, please describe staff responsibilities and the frequency of site inspections and activities if there is not a continuous on-site O&M presence.

Yes. There are two on-site WTPs, although only the Yak WTP runs regularly and handles all site water remediation. Two-to-three staff are on site during work hours and typically work 40 to 50 hours per week, and staff are on call 24/7 throughout the week. Responsibilities include everything from day-to-day operations of the WTP to daily sitewide inspections of all pumping and water collection facilities. General sitewide inspections of the site, stormwater controls, institutional controls and all remedial facilities are performed regularly.

5. Have there been any significant changes in site O&M requirements, maintenance schedules or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

There have been no major changes to site O&M requirements.

6. Have there been unexpected O&M difficulties or costs at the Site since start-up or in the last five years? If so, please provide details.

Nothing that hasn't been anticipated. Some of the remedial facilities have reached their end of engineered life and these facilities are constantly being evaluated, upgraded and/or replaced.

7. Have there been opportunities to optimize O&M activities or sampling efforts? Please describe changes and any resulting or desired cost savings or improved efficiencies.

There may be some opportunities to reduce sitewide groundwater monitoring requirements, given so few changes have been noted since the initial and ongoing evaluation and monitoring.

8. Do you have any comments, suggestions or recommendations regarding O&M activities and schedules at the Site?

Not at this time.

9. Do you consent to have your name included along with your responses to this questionnaire in the FYR Report?

Yes.

# APPENDIX K – INSTITUTIONAL CONTROLS

Figure K-1: 2009 County Institutional Control for Operable Units 3 and 8

1100390 - R8 SDMS

351214 3/3/2009 4:00 PM Patricia Berger  
1 of 6 CR5 R\$0.00 D\$0.00 Lake County Recorder

## PROCEEDING OF THE BOARD OF COUNTY COMMISSIONERS

### COUNTY OF LAKE AND STATE OF COLORADO

#### RESOLUTION 2009-XXXX

#### A RESOLUTION AMENDING THE LAKE COUNTY LAND DEVELOPMENT CODE AND ADOPTING REGULATIONS CONCERNING INSTITUTIONAL CONTROLS FOR OPERABLE UNITS WITHIN THE CALIFORNIA GULCH SUPERFUND SITE

WHEREAS, the Board of County Commissioners of the County of Lake, State of Colorado ("Board"), is vested with administering the affairs of Lake County, Colorado, pursuant to state statutes; and

WHEREAS, the Board has initiated a Land Use and Development Application, file number 08-41, proposing that the Lake County Land Development Code (LDC) be amended to meet the requirements of the various Environmental Protection Agency (EPA) Records of Decision or Action Memoranda that require institutional controls for the California Gulch Superfund Site designed to prevent contaminated soils from being handled inappropriately, and to assist the EPA in deleting the California Gulch Superfund Site from the National Priorities List (NPL).

WHEREAS, because the amendment to the LDC was initiated by the Board, no application fee was required to be paid; and

WHEREAS, the Lake County Land Development Code does not currently contain provisions establishing institutional controls for the California Gulch Superfund Site; and

WHEREAS, an amendment to the Lake County Land Development Code is necessary to add standards of review and definitions pertaining to institutional controls for the California Gulch Superfund Site; and

WHEREAS, the Lake County Planning Commission and the Board of County Commissioners held a joint public hearing on this matter on the Feb. day of 23, 2009; and

WHEREAS, the Board of County Commissioners has considered the recommendations of the Lake County Land Use Department and the Planning Commission; and

WHEREAS, the Board of County Commissioners finds that the foregoing amendments to the Lake County Land Development Code are consistent with the goals, objectives, policies and other provisions of the Lake County Comprehensive Plan and the Land Development Code, are necessary because of changing social values, new planning concepts, or other social or economic conditions, and will promote the public health, safety, and general welfare of the citizens of Lake County.

#### NOW THEREFORE BE IT RESOLVED that:

**Section 1.** This Resolution is consistent with the goals, objectives, policies and other provisions of the Lake County Comprehensive Plan and Land Development Code.

**Section 2.** This Resolution is necessary because of changing social values, new planning concepts and other social and economic conditions.

**Section 3.** This Resolution is found to promote the public health, safety and general welfare.

**Section 4.** The Lake County Land Development Code Chapter 3.2, which was repealed in its entirety by Resolution #08-10, is hereby replaced with:



### 3.2. Institutional Controls for the California Gulch Superfund Site

#### 3.2.1. General Provisions

- A) **Purpose.** Pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. 9601 et seq. and the National Contingency Plan 40 C.F.R. Part 300, the U.S. Environmental Protection Agency (EPA) has selected remedies for the various operable units of the California Gulch Superfund Site (Site) where EPA determined that institutional controls are necessary as a supplement to engineering controls, to manage waste left in place, to comply with applicable State laws, and to protect human health and the environment. The purpose of these regulations is to establish institutional controls to meet the requirements of the various EPA Records of Decision or Action Memoranda that require institutional controls, to implement requirements designed to prevent contaminated soils from being handled inappropriately, and to assist EPA in deleting the Site from the National Priorities List (NPL).
- B) **Authority.** These regulations are adopted pursuant to the powers and authority conferred by the laws of the State of Colorado.
- C) **Findings.** The Board of County Commissioners, County of Lake, State of Colorado finds that:
- 1) These regulations are necessary to comply with U.S. Environmental Protection Agency requirements for institutional controls for the various operable units of the California Gulch Superfund Site.
  - 2) Enactment of these regulations is required by EPA in order to achieve deletion of the various operable units from the National Priorities List (NPL).
  - 3) The implementation of these institutional controls which regulate excavation and building activities within certain locations of the California Gulch Superfund Site may minimize the disturbance, transfer, inhalation and ingestion of contaminated soils, thus potentially lessening any risk posed by certain portions of the Site to the public health and safety.
- D) **Definitions.**
- 1) **California Gulch Superfund Site.** Those areas within Lake County consisting of approximately 18 square miles that are designated as the California Gulch Superfund Site by the U.S. Environmental Protection Agency (EPA) pursuant to the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. Section 9601, et seq., as amended. EPA added the California Gulch site to the National Priorities List in 1983. In 1994, the site was divided into 12 geographically based areas, also called operable units or OUs.
  - 2) **Engineered Remedy.** An EPA-approved clean up action that is designed, built or managed to address contaminated areas of a Superfund site. Engineered remedies must remain intact in order to protect the integrity of the remedy and generally cannot be disturbed or constructed upon. The engineered remedies subject to institutional controls for certain operable units of the California Gulch Superfund site will be defined by a map contained in the Lake County Building and Land Use Department, Clerk and Recorder's Office and the Assessor's Office.
  - 3) **Institutional Control (IC).** Institutional controls are non-engineered instruments, such as administrative and/or legal controls, that help to minimize the potential for human exposure to contamination and/or protect

the integrity of a remedy by limiting land or resource use and/or by providing information that helps modify or guide human behavior at a site.

- 4) **National Priorities List.** The National Priorities List (NPL) is the list of hazardous waste sites eligible for long-term remedial action financed under the federal Superfund program. EPA may delete a final NPL site if it determines that no further response is required to protect human health or the environment. Partial deletions may also be conducted at Superfund sites.
  - 5) **Non-Engineered Remedy.** A non-engineered remedy is an EPA-approved remedy comprised of a geographical area of an operable unit that does not include an engineered remedy. Non-engineered remedies can be constructed upon. They may require proper management of potentially contaminated materials in order to protect the integrity of the remedy and to prevent human and environmental exposure. The non-engineered remedies subject to institutional controls for certain operable units of the California Gulch Superfund site will be defined by a map contained in the Lake County Building and Land Use Department, Clerk and Recorder's Office and the Assessor's Office.
  - 6) **Operable Unit 3 (OU3).** This operable unit is fully described by the EPA Record of Decision for Operable Unit 3, dated May 6, 1998. Generally, OU3 encompasses several different slag piles and historic rail yards, including the Harrison Avenue slag pile and a portion of the Mineral Belt Trail.
  - 7) **Operable Unit 8 (OU8).** This operable unit is fully described by the EPA Record of Decision for Operable Unit 8, dated September 2000. Generally, OU8 consists of the 500-year floodplain that is located between the Yak Water Treatment Plant and the point where the gulch enters the Arkansas River. Work on this operable unit was completed in 2002 including removal of tailings, non-residential soils and channel stabilization.
- E) **Variations.** These institutional control regulations are exempted from the variance standards of the Lake County Land Development Code Section 3.21. No variances will be permitted from this section of the Code.

**3.2.2. Best Management Practices Informational Handout.** Each applicant for a building permit within the boundaries of operable unit 3 and operable unit 8 of the California Gulch Superfund Site will be provided with a handout from the Lake County Building and Land Use Department regarding Best Management Practices for managing potentially contaminated soils in Lake County. Each applicant will be obligated to sign a document attesting to the fact that he/she has received, read and understood the Lake County Best Management Practices handout. No building permit will be issued without the applicant's written acknowledgement provided to the Lake County Building and Land Use Department.

### **3.2.3. Institutional Controls**

#### **A) Operable Unit 3 of the California Gulch Superfund Site.**

- 1) **Engineered Remedies.** It shall be unlawful to erect, construct, reconstruct, alter or modify the footprint of any building, structure or improvements on land, including excavation, within an engineered remedy in operable unit 3 of the California Gulch Superfund Site without prior notification and approval from the Colorado Department of Public Health and Environment.

Written proof of approval from the Colorado Department of Public Health and Environment is a condition precedent to issuance of a building permit by the Lake County Building and Land Use Department. The applicant must submit a written request for approval to the Colorado Department of Public Health and Environment with a copy to the Lake County Building and Land Use Department, each via certified mail. The Colorado Department of Public

Health and Environment will provide an initial response within ten (10) days of receipt of the written request and will use best efforts to coordinate with landowners to provide a timely resolution of the request. Applicants are solely responsible for obtaining written approval from the Colorado Department of Public Health and Environment.

- 2) **Non-Engineered Remedies.** It shall be unlawful to excavate and remove any earthen materials including, but not limited to, native dirt, native soil, mine waste rock or mine tailings from the owned parcel on an EPA non-engineered remedy in excess of ten (10) cubic yards in operable unit 3 of the California Gulch Superfund Site without prior approval from the Colorado Department of Public Health and Environment.

Written proof of approval from the Colorado Department of Public Health and Environment is a condition precedent to issuance of a building permit by the Lake County Building and Land Use Department. The applicant must submit a written request for approval to the Colorado Department of Public Health and Environment with a copy to the Lake County Building and Land Use Department, each via certified mail. The Colorado Department of Public Health and Environment will provide an initial response within ten (10) days of receipt of the written request and will use best efforts to coordinate with landowners to provide a timely resolution of the request. Applicants are solely responsible for obtaining written approval from the Colorado Department of Public Health and Environment.

- 3) **Penalty.** Failure to provide proof of prior notification and approval from the Colorado Department of Public Health and Environment for these prohibited activities is subject to a civil penalty of One Hundred dollars (\$100.00). Additionally, the infraction will be reported to the Colorado Department of Public Health and Environment by letter from the Lake County Building and Land Use Department.

**B) Operable Unit 8 of the California Gulch Superfund Site.**

- 1) **Engineered Remedies.** It shall be unlawful to erect, construct, reconstruct, alter or modify the footprint of any building, structure or improvements on land, including excavation, within an engineered remedy in operable unit 8 of the California Gulch Superfund Site without prior notification and approval from the Colorado Department of Public Health and Environment.

Written proof of approval from the Colorado Department of Public Health and Environment is a condition precedent to issuance of a building permit by the Lake County Building and Land Use Department. The applicant must submit a written request for approval to the Colorado Department of Public Health and Environment with a copy to the Lake County Building and Land Use Department, each via certified mail. The Colorado Department of Public Health and Environment will provide an initial response within ten (10) days of receipt of the written request and will use best efforts to coordinate with landowners to provide a timely resolution of the request. Applicants are solely responsible for obtaining written approval from the Colorado Department of Public Health and Environment.

- 2) **Non-Engineered Remedies.** It shall be unlawful to excavate and remove any earthen materials including, but not limited to, native dirt, native soil, mine waste rock or mine tailings in excess of ten (10) cubic yards from an EPA non-engineered remedy in operable unit 8 of the California Gulch Superfund Site without prior approval from the Colorado Department of Public Health and Environment.

Written proof of approval from the Colorado Department of Public Health and Environment is a condition precedent to issuance of a building permit by the Lake County Building and Land Use Department. The applicant must submit

a written request for approval to the Colorado Department of Public Health and Environment with a copy to the Lake County Building and Land Use Department, each via certified mail. The Colorado Department of Public Health and Environment will provide an initial response within ten (10) days of receipt of the written request and will use best efforts to coordinate with landowners to provide a timely resolution of the request. Applicants are solely responsible for obtaining written approval from the Colorado Department of Public Health and Environment.

- 3) **Penalty.** Failure to provide proof of prior notification and approval from the Colorado Department of Public Health and Environment for these prohibited activities is subject to a civil penalty of One Hundred dollars (\$100.00). Additionally, the infraction will be reported to the Colorado Department of Public Health and Environment by letter from the Lake County Building and Land Use Department.

**Section 5.** The Lake County Land Development Code Section 8.2 is hereby amended to add the following new sub-section, 8.2.10:

**8.2.10. Removing Surface Materials or Constructing On an EPA Engineered or Non-Engineered Remedy Without Prior Colorado Department of Public Health and Environment Approval**

- A) **Operable Unit 3 of the California Gulch Superfund Site.** To erect, construct, reconstruct, alter or modify the footprint of any building, structure or improvements on land, including excavation, within an EPA engineered remedy in operable unit 3 of the California Gulch Superfund Site without prior approval of the Colorado Department of Public Health and Environment.

To remove any earthen materials including, but not limited to, native dirt, native soil, mine waste rock or mine tailings from the owned parcel of an EPA non-engineered remedy in excess of ten (10) cubic yards in operable unit 3 of the California Gulch Superfund Site without prior approval of the Colorado Department of Public Health and Environment.

- B) **Operable Unit 8 of the California Gulch Superfund Site.** To erect, construct, reconstruct, alter or modify the footprint of any building, structure or improvements on land, including excavation, within an EPA engineered remedy in operable unit 8 of the California Gulch Superfund Site without prior approval of the Colorado Department of Public Health and Environment.

To excavate and remove any earthen materials including, but not limited to, native dirt, native soil, mine waste rock or mine tailings from the owned parcel of an EPA non-engineered remedy in excess of ten (10) cubic yards in operable unit 8 of the California Gulch Superfund Site without prior approval of the Colorado Department of Public Health and Environment.

**Section 6.** This Resolution shall become effective upon its adoption.

MOVED, READ AND ADOPTED by the Board of County Commissioners of the County of Lake, State of Colorado, at its regular meeting held the [ ] day of [ ], 2009.



BOARD OF COUNTY COMMISSIONERS  
LAKE COUNTY, COLORADO

*Kenneth L. Olsen*  
Kenneth L. Olsen, Chairman

*Carl F. Schaefer*  
Carl F. Schaefer



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Patricia Berger  
Lake County Recorder

*Michael J. Bordogna*  
Michael J. Bordogna

ATTEST:

*Patricia A. Berger*  
Patricia A. Berger, Clerk and Recorder,  
Lake County, Colorado; ~~ex officio~~  
Clerk to the Board

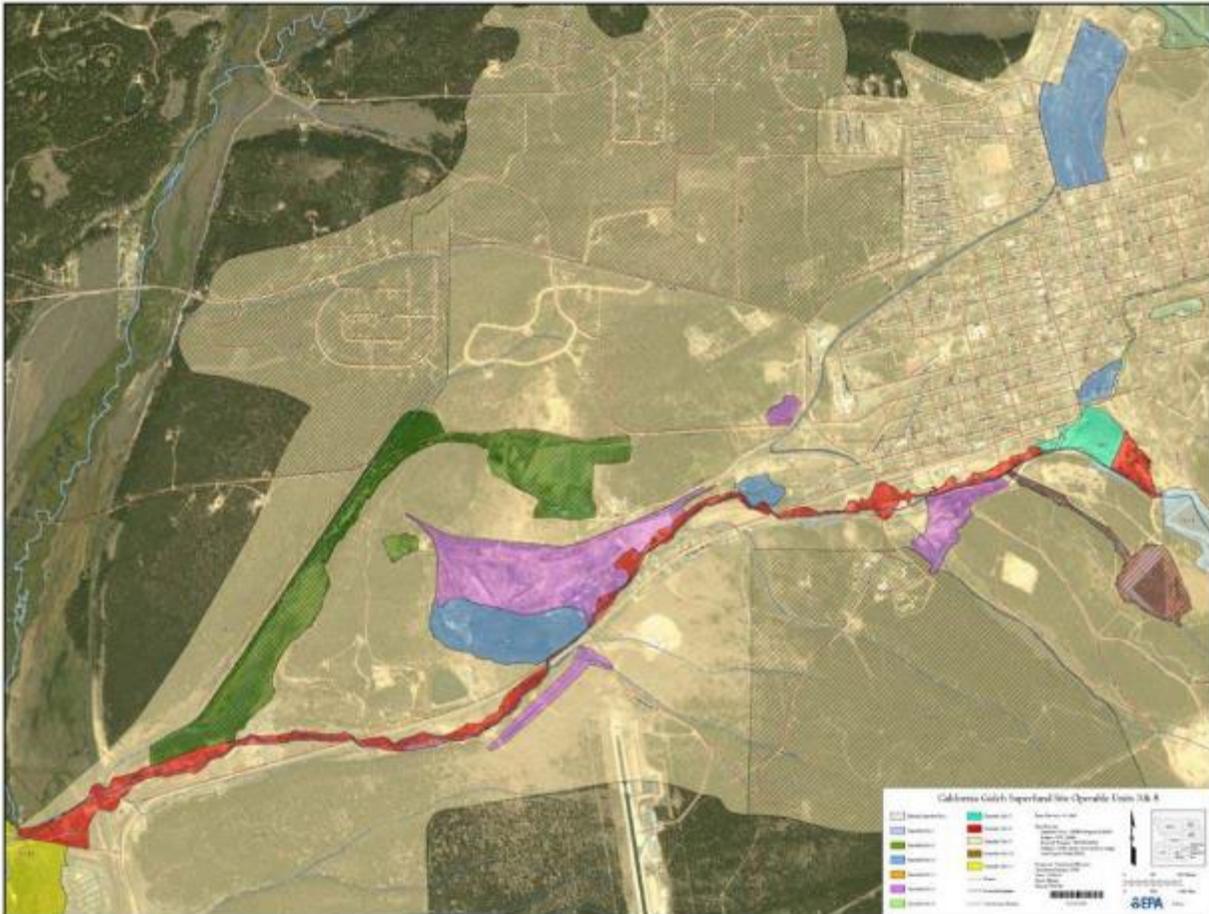


Figure K-2: 2009 County Institutional Control for 17 Mine Waste Piles Located in OU9

PROCEEDING OF THE BOARD OF COUNTY COMMISSIONERS

COUNTY OF LAKE AND STATE OF COLORADO



RESOLUTION 2009-34

**A RESOLUTION AMENDING THE LAKE COUNTY LAND DEVELOPMENT CODE AND ADOPTING REGULATIONS CONCERNING INSTITUTIONAL CONTROLS FOR SEVENTEEN MINE WASTE PILES LOCATED IN OPERABLE UNIT 9 WITHIN THE CALIFORNIA GULCH SUPERFUND SITE**

WHEREAS, the Board of County Commissioners of the County of Lake, State of Colorado ("Board"), is vested with administering the affairs of Lake County, Colorado, pursuant to state statutes; and

WHEREAS, the Board has initiated a Land Use and Development Application, file number 09-22, proposing that the Lake County Land Development Code (LDC) be amended to meet the requirements of the various Environmental Protection Agency (EPA) Records of Decision, Action Memoranda, and Explanation of Significant Differences (ESD) that require institutional controls for the California Gulch Superfund Site designed to prevent contaminated soils from being handled inappropriately, and to assist the EPA in deleting the California Gulch Superfund Site from the National Priorities List (NPL).

WHEREAS, because the amendment to the LDC was initiated by the Board, no application fee was required to be paid; and

WHEREAS, the Lake County Land Development Code does not currently contain provisions establishing institutional controls for or within Operable Unit 9; and

WHEREAS, an amendment to the Lake County Land Development Code is necessary to add standards of review and definitions pertaining to institutional controls for seventeen mine waste piles located in the California Gulch Superfund Site Operable Unit 9; and

WHEREAS, the Lake County Planning Commission and the Board of County Commissioners held a joint public hearing on this matter on the 23rd day of November, 2009; and

WHEREAS, the Board of County Commissioners has considered the recommendations of the Lake County Land Use Department and the Planning Commission; and

WHEREAS, the Board of County Commissioners finds that the foregoing amendments to the Lake County Land Development Code are consistent with the goals, objectives, policies and other provisions of the Lake County Comprehensive Plan and the Land Development Code, are necessary because of changing social values, new planning concepts, or other social or economic conditions, and will promote the public health, safety, and general welfare of the citizens of Lake County.

NOW THEREFORE BE IT RESOLVED that:

Section 1. This Resolution is consistent with the goals, objectives, policies and other provisions of the Lake County Comprehensive Plan and Land Development Code.

Section 2. This Resolution is necessary because of changing social values, new planning concepts and other social and economic conditions.

Section 3. This Resolution is found to promote the public health, safety and general welfare.

Section 4. The Lake County Land Development Code Chapter 3.2 is hereby amended to add the following language:

3.2.1. A) The last sentence shall be amended as follows:



The purpose of these regulations is to establish institutional controls to meet the requirements of the various EPA Records of Decision, Action Memoranda or ESD that require institutional controls, to implement requirements designed to prevent contaminated soils from being handled inappropriately, and to assist EPA in deleting the Site from the National Priorities List (NPL).

D) **Definitions.** Shall be amended to include the following:

- 8) Operable Unit 9 (OU9): Operable Unit 9 includes those portions of the California Gulch site where the land use is residential or that are currently owned as residential/populated areas and as low-density residential areas.

3.2.2. **Best Management Practices Informational Handout.** The first sentence shall be amended as follows:

Each applicant for a building permit within the boundaries of Operable Unit 3, Operable Unit 8 and the seventeen mine waste piles in Operable Unit 9 of the California Gulch Superfund Site will be provided with a handout from the Lake County Building and Land Use Department regarding Best Management Practices for managing potentially contaminated soils in Lake County.

3.2.3. **Institutional Controls.** Shall be amended to include the following:

C. **Seventeen Mine Waste Piles Located in Operable Unit 9 of the California Gulch Superfund Site.**

- 1) EPA issued an ESD (Explanation of Significant Differences) in September 2009 to document significant differences to the Record of Decision (ROD) for Operable Unit 9. The September 2009 ESD documents EPA's decision to require institutional controls for seventeen mine waste piles within Operable Unit 9 that have soils at the surface that are under the 3500 ppm lead residential action level but may have lead contamination at depth that exceeds the residential lead action level. EPA designated the seventeen mine waste piles as engineered remedies in the ESD. EPA has prepared a map that identifies the specific mine waste pile. Those piles are identified as numbers 12, 13, 18, 20, 23, 27, 31, 32, 33, 34, 35, 36, 207, 329, 331, 339 and 340. This map will be located in the Lake County Building Department, Clerk and Recorder's Office and Assessor's Office.
- 2) Engineered Remedies. It shall be unlawful to erect, construct, reconstruct, alter or modify the footprint of any building, structure or improvements on land, including excavation, within an engineered remedy in Operable Unit 9 of the California Gulch Superfund Site without prior notification and approval from the Colorado Department of Public Health and Environment.

Written proof of approval from the Colorado Department of Public Health and Environment is a condition precedent to issuance of a building permit by the Lake County Building Department. The applicant must submit a written request for approval to the Colorado Department of Public Health and Environment with a copy to the Lake County Building Department, each via certified mail. The Colorado Department of Public Health and Environment will provide an initial response Comprised of the acknowledgment of the request and timeline and potential efforts needed by the applicant for successful completion of the request determination. Applicants are solely responsible for obtaining written approval from the Colorado Department of Public Health and Environment.

- 3) Penalty. Failure to provide proof of prior notification and approval from the Colorado Department of Public Health and Environment for these prohibited activities is subject to a civil penalty of \$100.00. Additionally, the infraction will be reported to the Colorado Department of Public Health and Environment by letter from the Lake County Building Department.



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Patricia Berger  
Lake County Recorder

Section 5. The Lake County Land Development Code Section 8.2.10 is hereby amended to add the following:

- C) *Operable Unit 9 of the California Gulch Superfund Site, Mine Waste Piles.* To erect, construct, reconstruct, alter or modify the footprint of any building, structure or improvements on land, including excavation, within an EPA engineered remedy in Operable Unit 9 of the California Gulch Superfund Site without prior approval of the Colorado Department of Public Health and Environment.

Section 6. This Resolution shall become effective upon its adoption.

MOVED, READ AND ADOPTED by the Board of County Commissioners of the County of Lake, State of Colorado, at its regular meeting held the 21st day of December, 2009.



BOARD OF COUNTY COMMISSIONERS  
LAKE COUNTY, COLORADO

*Kenneth L. Olsen*  
Kenneth L. Olsen, Chairman

*Carl F. Schaefer*  
Carl F. Schaefer

*Michael J. Bordogna*  
Michael J. Bordogna

ATTEST:

*Patricia A. Berger*  
Patricia A. Berger, Clerk and Recorder,  
Lake County, Colorado; *ex officio*  
Clerk to the Board

Figure K-3: 2010 County Institutional Control for OU9

1161221 - R8 SDMS

PROCEEDINGS OF THE BOARD OF COUNTY COMMISSIONERS

COUNTY OF LAKE AND STATE OF COLORADO

RESOLUTION 10-04

**A RESOLUTION APPROVING THE LAKE COUNTY COMMUNITY HEALTH PROGRAM PHASE 2 WORK PLAN TO SERVE AS THE INSTITUTIONAL CONTROL FOR OPERABLE UNIT 9 OF THE CALIFORNIA GULCH SUPERFUND SITE**

WHEREAS, on September 2, 1999, the U.S. Environmental Protection Agency (EPA) issued its Record of Decision (ROD) for Operable Unit 9 (OU9) of the California Gulch Superfund Site, which selected the Lake County Community Health Program (or "LCCHP") as the remedy for OU9; and

WHEREAS, in March 2005, performance standards set by EPA in the September 1999 ROD for the initial Lake County Community Health Program were met, as outlined in the 2005 LCCHP Annual Report; and

WHEREAS, EPA, The Colorado Department of Public Health and Environment (CDPHE) and Lake County determined that it was appropriate to continue certain functions of the initial LCCHP to serve as the institutional control for Operable Unit 9 and to continue efforts to reduce risks to resident children from exposure to lead from various sources; and

WHEREAS, Lake County developed and CDPHE and EPA have approved the LCCHP Phase 2 Work Plan, dated 2009, which sets forth the framework, structure and administration of the LCCHP Phase 2; and

WHEREAS, The LCCHP Phase 2 Work Plan transitions LCCHP management responsibilities from Asarco and EPA to Lake County and CDPHE; and

WHEREAS, the Board of County Commissioners has carefully reviewed the provisions of the said Lake County Community Health Program Phase 2 Work Plan, (Exhibit "A"), and finds that it would be in the best interests of the county and its citizens to approve and to implement the same; and

WHEREAS, the Board finds that it is authorized to approve said Work Plan pursuant to the provisions of § 30-11-101, C.R.S.

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Patricia Berger  
Lake County Recorder

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2 of 82  
CRS R30.00 D50.00  
3/16/2010 9:44 AM  
Patricia Berger  
Lake County Recorder

NOW, THEREFORE, BE IT RESOLVED by the Board of County Commissioners of Lake County, Colorado:

Section 1. The Lake County Community Health Program Phase 2 Work Plan, a copy of which is attached hereto, be and the same is hereby approved by this Board.

Section 2. The Lake County Community Health Program Phase 2 Work Plan will serve as the institutional control for Operable Unit 9 of the California Gulch Superfund Site until such time it is determined that the LCCHP Phase 2 is no longer needed pursuant to the process set forth in the Work Plan.

Section 3. This Resolution shall become effective upon its adoption.

ADOPTED this 15 day of March, 2010.



BOARD OF COUNTY COMMISSIONERS  
OF LAKE COUNTY, COLORADO

Kenneth L. Olsen  
Kenneth L. Olsen, Chair

Carl F. Schaefer  
Carl F. Schaefer, Vice Chair

Michael J. Bordogna, Commissioner

ATTEST:  
Patricia A. Berger  
Patricia A. Berger  
Clerk and Recorder  
Lake County, Colorado  
Ex-officio Clerk of said Board

Figure K-4: 2010 County Institutional Control for OUs 4 and 7



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1 of 4 CRS R5000-D5000 Lake County Recorder

PROCEEDING OF THE BOARD OF COUNTY COMMISSIONERS

COUNTY OF LAKE AND STATE OF COLORADO

RESOLUTION 2010-~~23~~

A RESOLUTION AMENDING THE LAKE COUNTY LAND DEVELOPMENT CODE AND ADOPTING REGULATIONS CONCERNING INSTITUTIONAL CONTROLS FOR OPERABLE UNIT 4 AND OPERABLE UNIT 7 WITHIN THE CALIFORNIA GULCH SUPERFUND SITE

WHEREAS, the Board of County Commissioners of the County of Lake, State of Colorado ("Board"); is vested with administering the affairs of Lake County, Colorado, pursuant to state statutes; and

WHEREAS, the Board has initiated a Land Use and Development Application, file number 10-26 proposing that the Lake County Land Development Code (LDC) be amended to meet the requirements of the various Environmental Protection Agency (EPA) Records of Decision or Action Memoranda that require institutional controls for the California Gulch Superfund Site designed to prevent contaminated soils from being handled inappropriately, and to assist the EPA in deleting the California Gulch Superfund Site from the National Priorities List (NPL).

WHEREAS, because the amendment to the LDC was initiated by the Board, no application fee was required to be paid; and

WHEREAS, the Lake County Land Development Code does not currently contain provisions establishing institutional controls for Operable Unit 4 and Operable Unit 7; and

WHEREAS, an amendment to the Lake County Land Development Code is necessary to add standards of review and definitions pertaining to institutional controls for the California Gulch Superfund Site Operable Unit 4 and Operable Unit 7; and

WHEREAS, the Lake County Planning Commission and the Board of County Commissioners held a joint public hearing on this matter on the 13<sup>th</sup> day of December, 2010; and

WHEREAS, the Board of County Commissioners has considered the recommendations of the Lake County Land Use Department and the Planning Commission; and

WHEREAS, the Board of County Commissioners finds that the foregoing amendments to the Lake County Land Development Code are consistent with the goals, objectives, policies and other provisions of the Lake County Comprehensive Plan and the Land Development Code, are necessary because of changing social values, new planning concepts, or other social or economic conditions, and will promote the public health, safety, and general welfare of the citizens of Lake County.

NOW THEREFORE BE IT RESOLVED that:

Section 1. This Resolution is consistent with the goals, objectives, policies and other provisions of the Lake County Comprehensive Plan and Land Development Code.

Section 2. This Resolution is necessary because of changing social values, new planning concepts and other social and economic conditions.

Section 3. This Resolution is found to promote the public health, safety and general welfare.

Section 4. The Lake County Land Development Code Chapter 3.2 is hereby amended to add the following language:

**FILE COPY**

File # 10-26

Exhibit # C

## Section 3.2.1.

D) **Definitions.** Shall be amended to include the following:

**9. Operable Unit 4 (OU4):** This operable unit is fully described by the EPA Record of Decision for Operable Unit 4, dated March 31, 1998. Generally, OU4 is a watershed area located in upper California Gulch above the Yak Tunnel which also contains fluvial tailings and waste rock piles. An ESD prepared by EPA in 2004 exempted the Oro City/Fluvial tailings from the ROD.

**10. Operable Unit 7 (OU7):** This operable unit is fully described by the EPA Record of Decision for Operable Unit 7, dated June 6, 2000. Generally, OU7 consists of the Apache Tailings Impoundment that was consolidated and capped in 2002.

**3.2.2 Best Management Practices Informational Handout.** Shall be amended as follows:

Each applicant for a building permit within the boundaries of Operable Unit 3, Operable Unit 8, the seventeen mine waste piles in Operable Unit 9, Operable Unit 4 and Operable Unit 7 of the California Gulch Superfund site will be provided with a handout from the Lake County Building Department regarding Best Management Practices for managing potentially contaminated soils in Lake County. Each applicant will be obligated to sign a document attesting to the fact that he/she has read and understood the Lake County Best Management Practices handout. No building permit will be issued without the applicant's written acknowledgement provided to the County.

**3.2.3. Institutional Controls.** Shall be amended to include the following:

**D. Operable Unit 4 of the California Gulch Superfund Site.**

**1. Engineered Remedies.** It shall be unlawful to erect, construct, reconstruct, alter or modify the footprint of any building, structure or improvements on land, including excavation, within an engineered remedy in Operable Unit 4 of the California Gulch Superfund Site without prior notification and approval from the Colorado Department of Public Health and Environment.

Written proof of approval from the Colorado Department of Public Health and Environment is a condition precedent to issuance of a building permit by the Lake County Building Department. The applicant must submit a written request for approval to the Colorado Department of Public Health and Environment with a copy to the Lake County Building Department, each via certified mail. The Colorado Department of Public Health and Environment will provide an initial response within 10 days of receipt of the written request and will use best efforts to coordinate with landowners to provide a timely resolution of the request. Applicants are solely responsible for obtaining written approval from the Colorado Department of Public Health and Environment.

**2. Non-Engineered Remedies.** It shall be unlawful to excavate and remove any earthen materials including but not limited to native dirt, native soil, mine waste rock or mine tailings from the owned parcel on an EPA non-engineered remedy in excess of 10 cubic yards in Operable Unit 4 of the California Gulch Superfund Site without prior approval from the Colorado Department of Public Health and Environment.

Written proof of approval from the Colorado Department of Public Health and Environment is a condition precedent to issuance of a building permit by the Lake County Building Department. The applicant must submit a written request for approval to the Colorado Department of Public Health and Environment with a copy to the Lake County Building Department, each via certified mail. The Colorado Department of Public Health and Environment will provide an initial response within 10 days of receipt of the written request and will use best efforts to coordinate with landowners to provide a timely resolution of the request. Applicants are solely responsible for obtaining written approval from the Colorado Department of Public Health and Environment.



**3. Penalty.** Failure to provide proof of prior notification and approval from the Colorado Department of Public Health and Environment for these prohibited activities is subject to a civil penalty of \$100.00. Additionally, the infraction will be reported to the Colorado Department of Public Health and Environment by letter from the Lake County Building Department.

**E. Operable Unit 7 of the California Gulch Superfund Site.**

**1. Engineered Remedies.** It shall be unlawful to erect, construct, reconstruct, alter or modify the footprint of any building, structure or improvements on land, including excavation, within an engineered remedy in Operable Unit 7 of the California Gulch Superfund Site without prior notification and approval from the Colorado Department of Public Health and Environment.

Written proof of approval from the Colorado Department of Public Health and Environment is a condition precedent to issuance of a building permit by the Lake County Building Department. The applicant must submit a written request for approval to the Colorado Department of Public Health and Environment with a copy to the Lake County Building Department, each via certified mail. The Colorado Department of Public Health and Environment will provide an initial response within 10 days of receipt of the written request and will use best efforts to coordinate with landowners to provide a timely resolution of the request. Applicants are solely responsible for obtaining written approval from the Colorado Department of Public Health and Environment.

**2. Non-Engineered Remedies.** It shall be unlawful to excavate and remove any earthen materials including but not limited to native dirt, native soil, mine waste rock or mine tailings in excess of 10 cubic yards from an EPA non-engineered remedy in Operable Unit 7 of the California Gulch Superfund Site without prior approval from the Colorado Department of Public Health and Environment.

Written proof of approval from the Colorado Department of Public Health and Environment is a condition precedent to issuance of a building permit by the Lake County Building Department. The applicant must submit a written request for approval to the Colorado Department of Public Health and Environment with a copy to the Lake County Building Department, each via certified mail. The Colorado Department of Public Health and Environment will provide an initial response within 10 days of receipt of the written request and will use best efforts to coordinate with landowners to provide a timely resolution of the request. Applicants are solely responsible for obtaining written approval from the Colorado Department of Public Health and Environment.

**3. Penalty.** Failure to provide proof of prior notification and approval from the Colorado Department of Public Health and Environment for these prohibited activities is subject to a civil penalty of \$100.00. Additionally, the infraction will be reported to the Colorado Department of Public Health and Environment by letter from the Lake County Building Department.

**Section 5.** The Lake County Land Development Code Section 8-2.10 is hereby amended to add the following:

**D. Operable Unit 4.** To erect, construct, reconstruct, alter or modify the footprint of any building, structure or improvements on land, including excavation, within an EPA engineered remedy in Operable Unit 4 of the California Gulch Superfund Site without prior approval of the Colorado Department of Public Health and Environment.

To excavate and remove any earthen materials including but not limited to native dirt, native soil, mine waste rock or mine tailings from the owned parcel of an EPA non-engineered remedy in excess of 10 cubic yards in Operable Unit 4 of the California Gulch Superfund Site without prior approval of the Colorado Department of Public Health and Environment.



**E. Operable Unit 7.** To erect, construct, reconstruct, alter or modify the footprint of any building, structure or improvements on land, including excavation, within an EPA engineered remedy in Operable Unit 7 of the California Gulch Superfund Site without prior approval of the Colorado Department of Public Health and Environment.

To excavate and remove any earthen materials including but not limited to native dirt, native soil, mine waste rock or mine tailings from the owned parcel of an EPA non-engineered remedy in excess of 10 cubic yards in Operable Unit 7 of the California Gulch Superfund Site without prior approval of the Colorado Department of Public Health and Environment.

Section 6. This Resolution shall become effective upon its adoption.

MOVED, READ AND ADOPTED by the Board of County Commissioners of the County of Lake, State of Colorado, at its regular meeting held the 27<sup>th</sup> day of December, 2010.



BOARD OF COUNTY COMMISSIONERS  
LAKE COUNTY, COLORADO

*Kenneth L. Olsen*  
Kenneth L. Olsen, Chairman

*Carl F. Schaefer*  
Carl F. Schaefer

*Michael J. Bordogna*  
Michael J. Bordogna

ATTEST:

*Patricia A. Berger*  
Patricia A. Berger, Clerk and Recorder,  
Lake County, Colorado; ex officio  
Clerk to the Board

Figure K-5: 2013 County Institutional Control for OUs 2 and 5

PROCEEDINGS OF THE BOARD OF COUNTY COMMISSIONERS

COUNTY OF LAKE AND STATE OF COLORADO



RESOLUTION 2013- 13

**A RESOLUTION AMENDING THE LAKE COUNTY LAND DEVELOPMENT CODE AND ADOPTING REGULATIONS CONCERNING INSTITUTIONAL CONTROL FOR OPERABLE UNITS WITHIN THE CALIFORNIA GULCH SUPERFUND SITE**

WHEREAS, the Board of County Commissioners of the County of Lake, State of Colorado ("Board"), is vested with administering the affairs of Lake County, Colorado, pursuant to state statutes;

WHEREAS, the Board has initiated a Land Use and Development Application, file number 13-04, proposing that the *Lake County Land Development Code* ("LDC") be amended to meet the requirements of the various Environmental Protection Agency ("EPA") Records of Decision or Action Memoranda that require institutional controls for the California Gulch Superfund Site, designed to prevent contaminated soils from being handled inappropriately and to assist the EPA in deleting the California Gulch Superfund Site from the National Priorities List ("NPL");

WHEREAS, because the amendment to the LDC was initiated by the Board, no application fee was required to be paid;

WHEREAS, the LDC does not currently contain provisions establishing institutional controls for Operable Units 2 or 5 (OU2 and OU5) of the California Gulch Superfund Site;

WHEREAS, an amendment to the LDC is necessary to add provisions specific to OU2 and OU5;

WHEREAS, the Lake County Planning Commission and the Board held a joint public hearing on this matter on the 8th day of April, 2013;

WHEREAS, the Board has considered the recommendations of the Lake County Land Use Department and the Planning Commission; and

WHEREAS, the Board finds that the foregoing amendments to the LDC are consistent with the goals, objectives, policies and other provisions of the *Lake County Comprehensive Plan*, and the LDC; are necessary because of changing social values, new planning concepts, or other social or economic conditions; and will promote the public health, safety, and general welfare of the citizens of Lake County.



NOW THEREFORE BE IT RESOLVED that:

Section 1. This Resolution is consistent with the goals, objectives, policies and other provisions of the *Lake County Comprehensive Plan*, and the LDC.

Section 2. This Resolution is necessary because of changing social values, new planning concepts, or other social or economic conditions.

Section 3. This Resolution is found to promote public health, safety, and general welfare.

Section 4. The LDC Chapter 3.2.1(D) is amended to add the following new subsections:

**11. Operable Unit 2 (OU2).** This operable unit is fully described by the EPA Record of Decision for Operable Unit 2, dated September 30, 1999. Generally, OU2 encompasses the Malta Gulch drainage. OU2 was deleted from the National Priorities List in June 2001.

**12. Operable Unit 5 (OU5).** This operable unit is fully described by two EPA Records of Decision for Operable Unit 5, dated September 29, 2000 and October 31, 2000. Generally, OU5 encompasses the ASARCO Smelter/Colorado Zinc-Lead Mill Site - smelter sites around Leadville and one mill site. The smelter sites include the EGWA sites (Elgin Smelter, Grant/Union Smelter, Western Zinc Smelter, and Arkansas Valley South Hillside Slag Pile) and the AV/CAL sites (Arkansas Valley Smelter and Colorado Zinc-Lead Mill).

Section 5. The LDC Chapter 3.2.2 is repealed and replaced with the following:

**3.2.2 Best Management Practices Informational Handout.**

Each applicant for a building permit within the boundaries of Operable Unit 3, Operable Unit 8, the seventeen mine waste piles in Operable Unit 9, Operable Unit 4, Operable Unit 7, Operable Unit 2 and Operable Unit 5 of the California Gulch Superfund site will be provided with a handout from the Lake County Building Department regarding Best Management Practices for managing potentially contaminated soils in Lake County. Each applicant will be obligated to sign a document attesting to the fact that he/she has read and understood the Lake County Best Management Practices handout. No building permit will be issued without the applicant's written acknowledgement provided to the County.

Section 6. The LDC Chapter 3.2.3 is amended to add the following new subsections:

**F. Operable Unit 2 of the California Gulch Superfund Site.**

**1. Engineered Remedies.** It shall be unlawful to erect, construct, reconstruct, alter or modify the footprint of any building, structure or improvements on land, including excavation, within an



engineered remedy in Operable Unit 2 of the California Gulch Superfund Site without prior notification and approval from the Colorado Department of Public Health and Environment.

Written proof of approval from the Colorado Department of Public Health and Environment is a condition precedent to issuance of a building permit by the Lake County Building and Land Use Department. The applicant must submit a written request for approval to the Colorado Department of Public Health and Environment with a copy to the Lake County Building and Land Use Department, each via certified mail. The Colorado Department of Public Health and Environment will provide an initial response within ten (10) days of receipt of the written request and will use best efforts to coordinate with landowners to provide a timely resolution of the request. Applicants are solely responsible for obtaining written approval from the Colorado Department of Public Health and Environment.

**2. Non-Engineered Remedies.** It shall be unlawful to excavate and remove any earthen materials including, but not limited to, native dirt, native soil, mine waste rock or mine tailings from the owned parcel on an EPA non-engineered remedy in excess of ten (10) cubic yards in Operable Unit 2 of the California Gulch Superfund Site without prior approval from the Colorado Department of Public Health and Environment.

Written proof of approval from the Colorado Department of Public Health and Environment is a condition precedent to issuance of a building permit by the Lake County Building and Land Use Department. The applicant must submit a written request for approval to the Colorado Department of Public Health and Environment with a copy to the Lake County Building and Land Use Department, each via certified mail. The Colorado Department of Public Health and Environment will provide an initial response within ten (10) days of receipt of the written request and will use best efforts to coordinate with landowners to provide a timely resolution of the request. Applicants are solely responsible for obtaining written approval from the Colorado Department of Public Health and Environment.

**3. Penalty.** Failure to provide proof of prior notification and approval from the Colorado Department of Public Health and Environment for these prohibited activities is subject to a civil penalty of one hundred dollars (\$100.00). Additionally, the infraction will be reported to the Colorado Department of Public Health and Environment by letter from the Lake County Building and Land Use Department.

***G. Operable Unit 5 of the California Gulch Superfund Site.***

**1. Engineered Remedies.** It shall be unlawful to erect, construct, reconstruct, alter or modify the footprint of any building, structure or improvements on land, including excavation, within an engineered remedy in Operable Unit 5 of the California Gulch Superfund Site without prior notification and approval from the Colorado Department of Public Health and Environment.



Written proof of approval from the Colorado Department of Public Health and Environment is a condition precedent to issuance of a building permit by the Lake County Building and Land Use Department. The applicant must submit a written request for approval to the Colorado Department of Public Health and Environment with a copy to the Lake County Building and Land Use Department, each via certified mail. The Colorado Department of Public Health and Environment will provide an initial response within ten (10) days of receipt of the written request and will use best efforts to coordinate with landowners to provide a timely resolution of the request. Applicants are solely responsible for obtaining written approval from the Colorado Department of Public Health and Environment.

**2. Non-Engineered Remedies.** It shall be unlawful to excavate and remove any earthen materials including, but not limited to, native dirt, native soil, mine waste rock, mine tailings, slag, flue dust, smelter waste, residential area soils and non-residential area soils from the owned parcel on an EPA non-engineered remedy in excess of ten (10) cubic yards in Operable Unit 5 of the California Gulch Superfund Site without prior approval from the Colorado Department of Public Health and Environment.

Written proof of approval from the Colorado Department of Public Health and Environment is a condition precedent to issuance of a building permit by the Lake County Building and Land Use Department. The applicant must submit a written request for approval to the Colorado Department of Public Health and Environment with a copy to the Lake County Building and Land Use Department, each via certified mail. The Colorado Department of Public Health and Environment will provide an initial response within ten (10) days of receipt of the written request and will use best efforts to coordinate with landowners to provide a timely resolution of the request. Applicants are solely responsible for obtaining written approval from the Colorado Department of Public Health and Environment.

**3. Penalty.** Failure to provide proof of prior notification and approval from the Colorado Department of Public Health and Environment for these prohibited activities is subject to a civil penalty of one hundred dollars (\$100.00). Additionally, the infraction will be reported to the Colorado Department of Public Health and Environment by letter from the Lake County Building and Land Use Department.

Section 7. The LDC Chapter 8.2.10 is hereby amended to add the following new subsections:

**F. Operable Unit 2.**

To erect, construct, reconstruct, alter or modify the foot print of any building, structure or improvements on land, including excavation, within an EPA engineered remedy in Operable Unit 2 of the California Gulch Superfund Site without prior approval of the Colorado Department of Public Health and Environment.



To excavate and remove any earthen materials including, but not limited to, native dirt, native soil, mine waste rock or mine tailings from the owned parcel of an EPA non-engineered remedy in excess of ten (10) cubic yards in Operable Unit 2 of the California Gulch Superfund Site without prior approval of the Colorado Department of Public Health and Environment.

**G. Operable Unit 5.**

To erect, construct, reconstruct, alter or modify the foot print of any building, structure or improvements on land, including excavation, within an EPA engineered remedy in Operable Unit 5 of the California Gulch Superfund Site without prior approval of the Colorado Department of Public Health and Environment.

To excavate and remove any earthen materials including, but not limited to, native dirt, native soil, mine waste rock, mine tailings, slag, flue dust, smelter waste, residential area soils and non-residential area soils from the owned parcel of an EPA non-engineered remedy in excess of ten (10) cubic yards in Operable Unit 5 of the California Gulch Superfund Site without prior approval of the Colorado Department of Public Health and Environment.

Section 8. This Resolution shall become effective upon its adoption.

MOVED, READ AND ADOPTED by the Board of County Commissioners of the County of Lake, State of Colorado, this 15<sup>th</sup> day of April, 2013.

BOARD OF COUNTY COMMISSIONERS  
LAKE COUNTY, COLORADO



Mike Bordogna, Chairman

Dolores Semsack

Bruce Hix

ATTEST:

Patricia A. Berger, Clerk and Recorder,  
Lake County, Colorado; ex officio  
Clerk to the Board

Figure K-6: 2013 City Institutional Control for OUs 3, 5, 6, 7, 8 and 9

1265522 - R8 SDMS

CITY OF LEADVILLE, COLORADO  
Ordinance 3, Series of 2013

**AN ORDINANCE OF THE CITY OF LEADVILLE, COLORADO AMENDING THE LEADVILLE MUNICIPAL CODE AND ADOPTING REGULATIONS CONCERNING INSTITUTIONAL CONTROLS FOR THOSE PORTIONS OF OPERABLE UNITS 3, 5, 6, 7, 8, AND 9 WITHIN THE CALIFORNIA GULCH SUPERFUND SITE LOCATED WITHIN THE CITY AND SETTING PENALTIES FOR FAILURE TO COMPLY WITH SUCH REGULATIONS**

**WHEREAS**, pursuant to the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA"), 42 U.S.C. 9601, *et seq.*, and the National Contingency Plan 40, C.F.R. Part 300, the U.S. Environmental Protection Agency ("EPA") has selected remedies for the various operable units of the California Gulch Superfund Site ("Site") where EPA has determined that institutional controls are necessary as a supplement to engineering controls, to manage waste left in place, to comply with applicable State laws, and to protect human health and the environment; and

**WHEREAS**, certain operable units of the Site, specifically operational units 3, 5, 6, 7, 8, and 9 lie partially within the boundaries of the City; and

**WHEREAS**, the Board of County Commissioners of the County of Lake, Colorado ("Board"), previously amended the Lake County Land Development Code ("LDC") to meet the requirements of the various EPA Records of Decision or Action Memorandum that require institutional controls for the Site to prevent contaminated soils from being handled improperly, and to assist the EPA in deleting the Site from the National Priorities List ("NPL"); and

**WHEREAS**, the County, through its Building Division, under intergovernmental agreement with the City ("IGA"), has historically enforced the LDC provisions applicable to the OUs within the City; and

**WHEREAS**, the IGA for building services between the City and the County is no longer in effect; and

**WHEREAS**, the purpose of this Ordinance and the regulations adopted hereby is to establish institutional controls similar to those enacted by the County applicable within the Site on those portions of OUs 3, 5, 6, 7, 8, and 9 lying within the City; to meet the requirements of the various EPA Records of Decision or Action Memoranda that require institutional controls; to implement the requirements designed to prevent contaminated soils from being handled improperly, and to assist the EPA in deleting the Site from the NPL; and

**WHEREAS**, the City is authorized pursuant to Section 31-15-401, C.R.S., to exercise its police powers to promote and protect the health, safety, and welfare of the community and its inhabitants; and

**WHEREAS**, the City Council has determined that this Ordinance furthers the public health, safety, convenience and general welfare of the community.

**NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF LEADVILLE, COLORADO:**

**Section 1.** Section 15.04.020 of the Leadville Municipal Code, concerning amendments to the International Building Code, is hereby amended by the addition of a new subsection numbered 36, to read as follows in its entirety:

36. IBC Section 1803, entitled "Excavation, Grading and Fill" is amended by adding a new subsection 1803.7 to be entitled "Compliance with Institutional Controls" which shall read as follows:

**1803.7 Compliance with Institutional Controls.** Excavations and grading within those portions of Operational Units 3, 5, 6, 7, 8, and 9 of the California Gulch Superfund Site ("Site") lying within the City shall comply with the provisions of Chapter 15.36 of the City of Leadville Municipal Code.

**Section 2.** The Leadville Municipal Code is hereby amended by the addition of a new Chapter 15.36, entitled "Institutional Controls for the California Gulch Superfund Site" which shall read as follows in its entirety:

**Chapter 15.36  
INSTITUTIONAL CONTROLS FOR THE CALIFORNIA GULCH SUPERFUND SITE**

Sections:

- 15.36.010 General provisions.
- 15.36.020 Definitions.
- 15.36.030 Variances not allowable.
- 15.36.040 Best Management Practices informational handout.
- 15.36.050 Institutional Controls for OU3, OU5, OU7 and OU8 and penalty for violation.
- 15.36.060 Institutional Controls for OU9 and penalty for violation.

**15.36.010 General provisions.**

A. These regulations are necessary to comply with U.S. Environmental Protection Agency requirements for institutional controls for the various operable units of the California Gulch Superfund Site located partially within the City.

B. Enactment of these regulations is required by the U.S. Environmental Protection Agency in order to achieve deletion of the various operable units from the National Priorities List.

C. The implementation of these institutional controls which regulate excavation and building activities within certain locations of the California Gulch Superfund Site will ensure that various Site remedies remain protective of human health and the environment and may also minimize the disturbance, transfer, inhalation and ingestion of contaminated soils, thus potentially lessening any risk posed by certain portions of the Site to the public health and safety.

**15.36.020 Definitions.**

The following terms as used in this Chapter shall have the assigned meaning:

*"California Gulch Superfund Site" or "Site"* shall mean those areas within the City that are designated as the California Gulch Superfund Site by the EPA pursuant to the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. § 9601, *et seq.*, as amended. EPA added the California Gulch Superfund Site to the National Priorities List in 1983. In 1994, the site was divided into 12 geographically based areas, also called operable units or OUs.

*"Engineered Remedy"* means an EPA approved clean up action that is designed, built or managed, pursuant to a Record of Decision, to address contaminated areas of a Superfund site. Engineered remedies shall remain intact in order to protect the integrity of the remedy and generally cannot be disturbed or constructed upon. The engineered remedies subject to institutional controls for certain operable units of the California Gulch Superfund site will be defined by a map accessible in the Lake County Building and Land Use Department, Lake County Clerk and Recorder's Office, the Lake County Assessor's Office, and the City Clerk's Office.

*"EPA"* shall mean the U.S. Environmental Protection Agency

*"Institutional Control" or "IC"* means non-engineered instruments, such as administrative and/or legal controls, that help to minimize the potential for human exposure to contamination and/or protect the integrity of a remedy by limiting land or resource use and/or by providing information that helps modify or guide human behavior at a site.

*"National Priorities List" or "NPL"* means the list of hazardous waste sites eligible for long-term remedial action financed under the federal Superfund program. EPA may delete a final NPL site if it determines that no further response is required to protect human health or the environment. Partial deletions may also be conducted at Superfund sites.

*"Non-Engineered Remedy"* means an EPA approved remedy comprised of a geographical area of an OU that does not include an engineered remedy. Non-engineered remedies may require proper management of potentially contaminated materials in order to protect the integrity of the remedy and to prevent human and environmental exposure. The non-engineered remedies subject to institutional controls for certain OUs of the California Gulch Superfund site will be defined by a map contained in the

Lake County Building and Land Use Department, Lake County Clerk and Recorder's Office, the Lake County Assessor's Office, and the City Clerk's Office.

*"Operable Unit" or "OU"* means a designated geographically based area within the California Gulch Superfund Site.

*"Operable Unit 3" or "OU3"* means the OU fully described by the EPA Record of Decision for Operable Unit 3, dated May 6, 1998. Generally, OU3 encompasses several different slag piles and historic rail yards, including the Harrison Avenue slag pile and a portion of the Mineral Belt Trail.

*"Operable Unit 5" or "OU5"* means the OU fully described by two EPA Records of Decision for Operable Unit 5, dated September 29, 2000, and October 31, 2000. Generally, OU5 encompasses the ASARCO Smelter/Colorado Zinc-Lead Mill Site - smelter sites around Leadville and one mill site. The smelter sites include the EGWA sites (Elgin Smelter, Grant/Union Smelter, Western Zinc Smelter, and Arkansas Valley South Hillside Slag Pile) and the AV/CZL sites (Arkansas Valley Smelter and Colorado Zinc-Lead Mill).

*"Operable Unit 6" or "OU6"* means the OU fully described by the EPA Record of Decision for Operable Unit 6, dated September 25, 2003. Within the City, OU6 consists of the western portion of the Penrose Mine Waste Pile that was consolidated and capped in 1996, and also the Stray Horse drainage conveyance along 5<sup>th</sup> Street and the portion of Starr Ditch between 5<sup>th</sup> Street and California Gulch.

*"Operable Unit 7" or "OU7"* means the OU fully described by the EPA Record of Decision for Operable Unit 7, dated June 6, 2000. Generally, OU7 consists of the Apache Tailing Impoundment that was consolidated and capped in 2002.

*"Operable Unit 8" or "OU8"* means the OU fully described by the EPA Record of Decision for Operable Unit 8, dated September 2000. Generally, OU8 consists of the 500 year floodplain that is located between the Yak Water Treatment Plant and the point where the gulch enters the Arkansas River. Work on this operable unit was completed in 2002 including removal of tailing, non-residential soils and channel stabilization.

*"Operable Unit 9" or "OU9"* means the OU fully described by the EPA Record of Decision for Operable Unit 9, dated September 2, 1999 and the Explanation of Significant Differences dated September, 2009. Generally, OU9 consists of those portions of the Site where the land use is residential or that are currently owned as residential/populated areas and as low-density residential areas.

**15.36.030 Variances not allowable.** These institutional control regulations shall not be subject to any authority to vary the building or zoning regulations of the City. No variances are permitted from this Chapter of the Code.

**15.36.040 Best Management Practices informational handout.** Each applicant for a City building permit within the boundaries of OU3, OU5, OU6, OU7, OU8, and the six mine waste piles within the City in OU9 of the California Gulch Superfund Site will be provided with a handout from the City Building Services Department or provider regarding Lake County Best Management Practices for managing potentially contaminated soils in the City and Lake County. Each applicant shall be obligated to sign a document attesting to the fact that he/she has received, read and understood the Lake County Best Management Practices handout. No building permit shall be issued without the applicant's written acknowledgement provided to the City Building Services Department or provider.

**15.36.050 Institutional Controls for OU3, OU5, OU6, OU7, and OU8 and penalty for violation.**  
A. Engineered remedies. It shall be unlawful to erect, construct, reconstruct, alter or modify the footprint of any building, structure or improvements on land, including excavation, within an engineered remedy in OU3, OU5, OU6, OU7, or OU8 of the California Gulch Superfund Site without prior notification and approval from the Colorado Department of Public Health and Environment. Written proof of approval from the Colorado Department of Public Health and Environment shall be a condition precedent to issuance of a building permit by the City Building Services Department or provider. The applicant shall submit a written request for approval to the Colorado Department of Public Health and Environment with a copy to the City Building Services Department or provider, each via certified mail. The Colorado Department of Public Health and Environment will provide an initial response within ten (10) days of receipt of the written request and will use best efforts to coordinate with landowners to provide a timely resolution of the request. Applicants are solely responsible for obtaining written approval from the Colorado Department of Public Health and Environment.

B. Non-engineered remedies. It shall be unlawful to excavate and remove any earthen materials including, but not limited to, native dirt, native soil, mine waste rock or mine tailings, slag, flue dust, or smelter waste from the owned parcel on an EPA non-engineered remedy, in excess of ten (10) cubic yards in OU3, OU5, OU6, OU7, or OU8 of the California Gulch Superfund Site without prior written approval from the Colorado Department of Public Health and Environment. Written approval from the Colorado Department of Public Health and Environment is a condition precedent to issuance of a building permit by the City Building Services Department or provider. The applicant shall submit a written request for approval to the Colorado Department of Public Health and Environment with a copy to the City Building Services Department or provider, each via certified mail. The Colorado Department of Public Health and Environment will provide an initial response within ten (10) days of receipt of the written request and will use best efforts to coordinate with landowners to provide a timely resolution of the request. Applicants are solely responsible for obtaining written approval from the Colorado Department of Public Health and Environment.

C. Violations and penalty.

1. It shall be unlawful to erect, construct, reconstruct, alter or modify the footprint of any building, structure or improvements on land, including excavation, within an engineered remedy in OU3, OU5, OU6, OU7, or OU8 of the California Gulch Superfund Site without prior notification and written approval from the Colorado Department of Public Health and Environment.
2. It shall be unlawful to remove any earthen materials including, but not limited to, native dirt, native soil, mine waste rock or mine tailings from the owned parcel of an EPA non-engineered remedy in excess of ten (10) cubic yards in OU3, OU5, OU6, OU7, or OU8 of the California Gulch Superfund Site without prior written approval from the Colorado Department of Public Health and Environment.
3. Failure to provide prior notification and written approval from the Colorado Department of Public Health and Environment for these otherwise prohibited activities is a violation of this Code and subject to a penalty of a fine of up to One Thousand Dollars (\$1000.00). Additionally, the infraction shall be reported to the Colorado Department of Public Health and Environment by a letter from the City Building Services Department or provider.

**15.36.060 Institutional Controls for Six Mine Waste Piles Located in OU9 and penalty for violation.**

A. Six Mine Waste Piles Located within the City in OU9 of the California Gulch Superfund Site. EPA issued an Explanation of Significant Differences in September 2009 ("ESD") to document significant differences to the Record of Decision ("ROD") for OU9. The September 2009 ESD documents EPA's decision to require institutional controls for a total of seventeen mine waste piles within OU9 that have soils at the surface under the 3500 parts per million lead residential action level, but below the surface may have lead contamination exceeding the residential lead action level. EPA designated the seventeen mine waste piles as engineered remedies in the ESD. EPA has prepared a map that identifies the six OU9 mine waste piles that exist within the City. Those piles are identified as numbers 12, 13, 18, 33, 34, and 329. This map will be located in the Lake County Building and Land Use Department, Lake County Clerk and Recorder's Office, the Lake County Assessor's Office, and the City Clerk's Office.

B. Engineered Remedies. It shall be unlawful to erect, construct, reconstruct, alter or modify the footprint of any building, structure or improvements on land, including excavation, within an engineered remedy in OU9 of the California Gulch Superfund Site without prior notification and written approval from the Colorado Department of Public Health and Environment. Written proof of approval from the Colorado Department of Public Health and Environment is a condition precedent to issuance of a building permit by the City Building Services Department or provider. The applicant shall submit a written request for approval to the Colorado Department of Public Health and Environment with a copy to the City Building Services Department or provider, each via certified mail. The Colorado Department of Public Health and Environment will provide an initial response within ten (10) days of receipt of the written request and will use best efforts to coordinate with landowners to provide a timely resolution of the request. Applicants are solely responsible for obtaining written approval from the Colorado Department of Public Health and Environment.

C. Violation and penalty.

1. It shall be unlawful to erect, construct, reconstruct, alter or modify the footprint of any building, structure or improvements on land, including excavation, within an engineered remedy in OU9 of

the California Gulch Superfund Site without prior notification and written approval from the Colorado Department of Public Health and Environment.

2. Failure to provide prior notification and written approval from the Colorado Department of Public Health and Environment for these otherwise prohibited activities is a violation of this Code and subject to a penalty of a fine of up to One Thousand Dollars (\$1000.00). Additionally, the infraction shall be reported to the Colorado Department of Public Health and Environment by a letter from the City Building Services Department or provider.

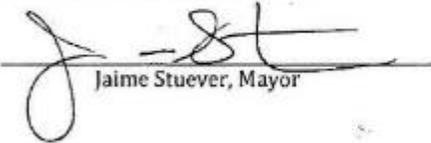
**Section 3. Remaining provisions.** Except as specifically amended hereby, all other provisions of the Leadville Municipal Code and the various secondary codes adopted by reference therein, shall continue in full force and effect.

**Section 4. Severability.** Should any one or more sections or provisions of this ordinance enacted hereby be judicially determined invalid or unenforceable, such judgment shall not affect, impair or invalidate the remaining provisions of this ordinance the intention being that the various sections and provisions are severable.

**Section 5. Repeal.** Any and all ordinances or codes or parts thereof in conflict or inconsistent herewith are, to the extent of such conflict or inconsistency, hereby repealed; provided, however, that the repeal of any such ordinance or code or part thereof shall not revive any other section or part of any ordinance or code provision heretofore repealed or superseded and this repeal shall not affect or prevent the prosecution or punishment of any person for any act done or committed in violation of any ordinance or code hereby repealed prior to the taking effect of this ordinance.

**INTRODUCED, READ, APPROVED AND ORDERED PUBLISHED in full on first reading this 2nd day of April, 2013.**

CITY OF LEADVILLE, COLORADO

  
Jaime Stuever, Mayor

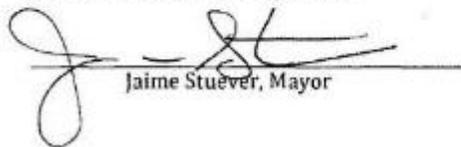
ATTEST:

  
Joseph Swyers, City Clerk

Published in full in *The Herald Democrat*, a newspaper of general circulation in Leadville, Colorado, on the 11th day of April, 2013.

Passed and adopted on final reading and ordered published by title only with amendments on the 7th day of May, 2013.

CITY OF LEADVILLE, COLORADO

  
Jaime Stuever, Mayor

ATTEST:

  
Joseph Swyers, City Clerk

Published by title only with any amendments in *The Herald Democrat*, a newspaper of general circulation in the City of Leadville, Colorado, on the 16th day of May, 2013.

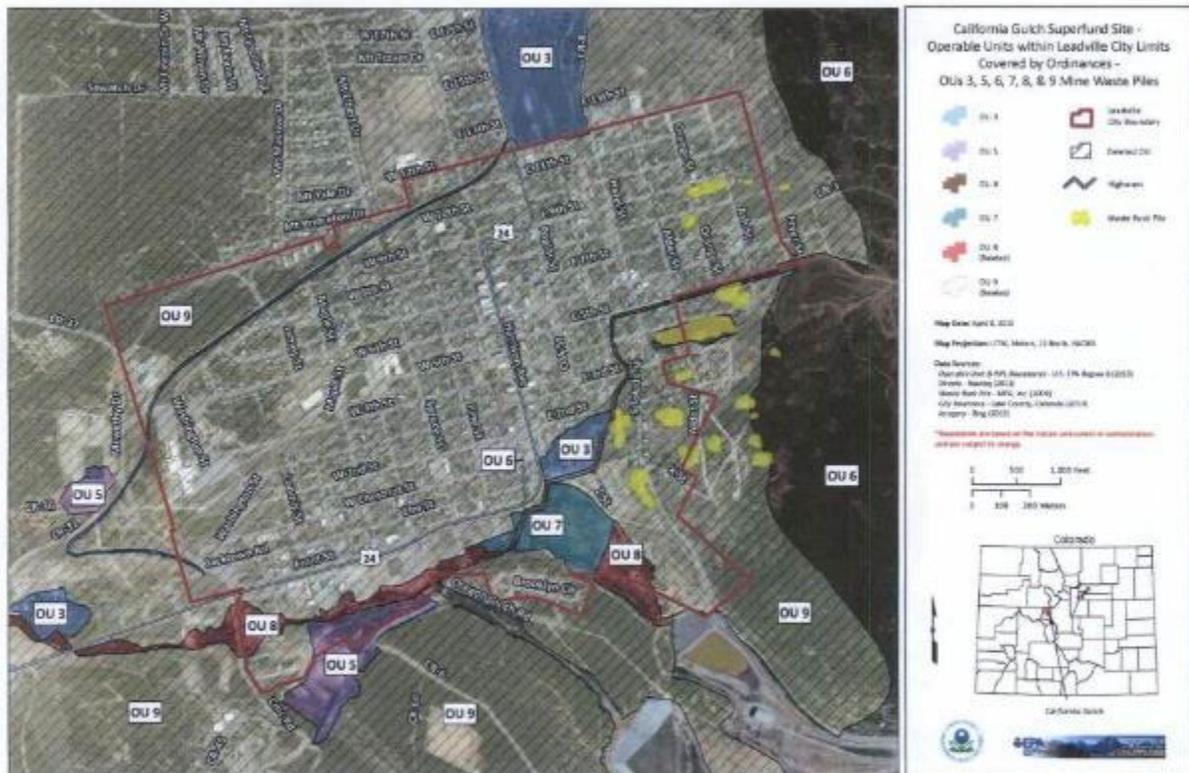


Figure K-7: 2012 Environmental Covenant for Resurrection Mining Company's Zone A properties

1242260 - R8 SDMS

# STATE OF COLORADO

John W. Hickenlooper, Governor  
Christopher E. Urbina, MD, MPH  
Executive Director and Chief Medical Officer

Dedicated to protecting and improving the health and environment of the people of Colorado

4300 Cherry Creek Dr. S.  
Denver, Colorado 80246-1530  
Phone (303) 692-2000  
Located in Glendale, Colorado

Laboratory Services Division  
8100 Lowry Blvd.  
Denver, Colorado 80230-8928  
(303) 692-3090

<http://www.cdphe.state.co.us>



Colorado Department  
of Public Health  
and Environment

August 29, 2012

Hon. Carl Schaefer  
Chairman, Board of County Commissioners  
Lake County Government  
505 Harrison Avenue  
P.O. Box 964  
Leadville CO 80461

RE: Environmental Covenant for Resurrection Mining Company's Zone A Properties

Dear Carl,

The enclosed Environmental Covenant for Resurrection Mining Company's Zone A properties has now been executed by all parties and filed with the Lake County Recorder.

As you know, the Colorado Environmental Covenant statute, C.R.S. § 25-15-321 to 327, requires that local governments notify the CDPHE when they receive applications affecting land use or development of land that is subject to an environmental covenant. In turn, the CDPHE must review the proposed application and provide timely advice to the local government as to whether the application is consistent with the terms of the covenant or restrictive notice.

Therefore, we respectfully request that you forward the enclosed environmental covenant to appropriate Lake County Departments to assist them in identifying applications that affect the land use or development of the parcels described in the covenant.

Please don't hesitate to contact me or Doug Jamison with any questions or comments.

Sincerely,

Craig Gander  
Project Manager  
Superfund and Voluntary Cleanup Unit  
Hazardous Materials and Waste Management Division

cc: Linda Kiefer  
USEPA Region 8  
8EPR-SR  
1595 Wynkoop St.  
Denver, CO 80202-1129

Environmental Covenant for Zone A Property

**This property is subject to an Environmental Covenant held by the Colorado Department of Public Health and Environment pursuant to section 25-15-321, C.R.S.**

ENVIRONMENTAL COVENANT

Resurrection Mining Company ("Resurrection") grants an Environmental Covenant ("Covenant") this 5<sup>TH</sup> day of APRIL, 2011 to the Hazardous Materials and Waste Management Division of the Colorado Department of Public Health and the Environment ("the Department") pursuant to § 25-15-321 of the Colorado Hazardous Waste Act, § 25-15-101, *et seq.* The Department's address is 4300 Cherry Creek Drive South, Denver, Colorado 80246-1530.

WHEREAS, Resurrection is the owner of certain property situated in Lake County, Colorado, more particularly described in Attachment 1, attached hereto and incorporated herein by reference as though fully set forth (hereinafter referred to as "the Property"); and

WHEREAS, pursuant to that Consent Decree among Resurrection, Newmont USA Limited ("Newmont"), the State of Colorado and the United States, which was entered by the U.S. District Court for the District of Colorado on August 29, 2008 in *State of Colorado v. Asarco Incorporated, et al.* ("Consent Decree"), Resurrection has agreed to grant an Environmental Covenant in accordance with the terms thereof.

NOW, THEREFORE, Resurrection hereby grants this Environmental Covenant to the Department, with EPA as a third party beneficiary, and declares that the Property as described in Attachment 1 shall hereinafter be bound by, held, sold, and conveyed subject to the requirements set forth below, which shall run with the Property in perpetuity and be binding on Resurrection, its heirs, successors and assigns, and any persons using the land, as described herein. As used in this Environmental Covenant, the term "Owner" means the record owner of the Property and any other person or entity otherwise legally authorized to make decisions regarding the transfer of the Property or placement of encumbrances on the Property, other than by the exercise of eminent domain.

1) Use Restrictions.

- a. No Residential Use, Day Care Centers or Schools, as defined in Section 10, shall be allowed on the property. No portions of Parks or Open Space (as defined in Section 10 below) that are designed or intended to provide a designated play or recreation area for children shall be allowed. Prohibited play or recreation areas



include designated picnic areas, playgrounds, ball fields, sand boxes and similar areas, but do not include trail systems or walkways.

- b. No use of untreated groundwater from wells located on the property for drinking, domestic, or agricultural purposes shall be allowed. This covenant does not restrict the use of groundwater that is treated to meet then applicable State water quality standards for the beneficial use to which the water is being applied. Treatment must meet any applicable State standards that are in place at the time of use.

2) Inspections.

The Department and EPA as the named third party beneficiary shall have the right of entry to the Property at reasonable times with prior notice for the purpose of determining compliance with the terms of this Covenant. Nothing in this Covenant shall impair any other authority the Department may otherwise have to enter and inspect the Property.

3) Termination.

This Covenant runs with the land and is perpetual, unless terminated or modified pursuant to this Section or Section 4. Owner may request that the Department approve a termination or modification of this Covenant. Consistent with C.R.S. 25-15-319(1)(h), the Department shall terminate this Environmental Covenant in whole or in part when, in addition to satisfying the requirements of C.R.S. 25-15-321(3) and (5), Owner provides the following applicable showings to the Department:

- a. Restrictions on Residential Use and other uses specified in Section 1.a shall be terminated on all or part of the property if Owner demonstrates to the Department that the concentration of lead in the upper 6 inches of soils on the property for which termination is sought does not exceed 3500 parts per million (ppm), and the concentration of arsenic in the upper 6 inches of soils on the property for which termination is sought does not exceed 340 ppm. Such demonstration can be made based on sampling analysis or evidence that the subject property is not impacted by any releases or threatened releases of hazardous substances. Any soil sampling conducted for purposes of terminating this Environmental Covenant shall be conducted in accordance with Attachment 2.
- b. Restrictions on using untreated groundwater from wells located on all or part of the property for drinking, domestic, and agricultural purposes shall be terminated if Owner demonstrates to the Department that concentrations of the constituents listed in Table 1 of Attachment 3 in the subject groundwater do not exceed State water quality standards for drinking, domestic, and agricultural purposes existing at the time of application. Current water quality standards are set forth in Table 1 of Attachment 3. Any ground water sampling conducted for purposes of terminating this Environmental Covenant shall be conducted in accordance with Attachment 3.



- c. In addition to the grounds for termination set forth in Sections 3.a and 3.b, the Environmental Covenants shall also be terminated as to all or part of the Property if it is demonstrated to the Department that the proposed termination will ensure protection of human health and the environment, in accordance with C.R.S. 25-15-319(1)(h).

Consistent with C.R.S. 25-15-321(6), the Department shall provide to Owner a written determination on all applications to terminate an Environmental Covenant within 60 days after receipt of such application.

4) Modifications.

Consistent with C.R.S. 25-15-319(1)(h), the Department shall modify this Environmental Covenant in whole or in part when, in addition to satisfying the requirements of C.R.S. 25-15-321(3) and (5), Owner provides the following applicable showings to the Department:

- a. Restrictions on Residential Use and other uses specified in Section 1.a shall be modified on all or part of the property if Owner demonstrates to the Department that portions of the subject property, where either soil lead levels exceed 3500 ppm or soil arsenic levels exceed 340 ppm, will be covered by a minimum of two inches of asphalt, pavement or concrete, or other structures that prevent human exposure to the soil.
- b. Restrictions on using untreated groundwater from wells located on all or part of the property for drinking, domestic, or agricultural uses shall be modified to eliminate the restriction against one or more of these uses, if Owner demonstrates to the Department that concentrations of the constituents listed in Table 1 of Attachment 3 in the subject groundwater do not exceed State water quality standards in existence at the time of the application for the beneficial use that would be allowed under the modification. Current water quality standards are set forth in Table 1 of Attachment 3. Any ground water sampling conducted for purposes of modifying this Environmental Covenant shall be conducted in accordance with Attachment 3.
- c. In addition to the grounds for modification set forth in Sections 4.a and 4.b, the Environmental Covenants shall also be modified as to all or part of the Property if it is demonstrated to the Department that the proposed modification will ensure protection of human health and the environment, in accordance with C.R.S. 25-15-319(1)(h).

Consistent with C.R.S. 25-15-321(6), the Department shall provide Owner a written determination on all applications to modify an Environmental Covenant within 60 days after receipt of such application.



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Patricia Berger  
Lake County Recorder

5) Conveyances. Within thirty days (30) after any grant, transfer or conveyance of any interest in any or all of the Property, the transferring Owner shall notify the Department and EPA as the named third party beneficiary of such grant, transfer or conveyance.

6) Notice to Lessees. Owner agrees to incorporate either in full or by reference the restrictions of this Covenant in any leases, licenses, or other instruments granting a right to use the Property.

7) Notification for proposed construction and land use. Owner shall notify the Department and EPA as the named third party beneficiary simultaneously when submitting any application to a local government for a building permit or change in land use that would authorize a use prohibited under Section 1.a.

8) No Liability. The Department does not acquire any liability under State law by virtue of accepting this Covenant.

9) Enforcement. The Department and EPA as the named third party beneficiary may enforce the terms of this Covenant pursuant to §25-15-322, C.R.S., and may file suit in district court to enjoin actual or threatened violations of this Covenant.

10) Notices. Any document or communication required under this Covenant shall be sent or directed to:

Notices to the Department shall be provided to:

*[appropriate Program Manager or Unit leader]*  
Hazardous Materials and Waste Management Division  
Colorado Department of Public Health and the Environment  
4300 Cherry Creek Drive South  
Denver, Colorado 80246-1530

Notices to EPA shall be provided to:

EPA Remedial Project Manager  
California Gulch Superfund Site  
United States Environmental Protection Agency, Region 8  
(8EPR-SR)  
1595 Wynkoop Street  
Denver, CO 80202-1129



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Lake County Recorder

Notices to Resurrection shall be provided to:

Law Department  
Resurrection Mining Company  
6363 South Fiddlers Green Circle, Suite 800  
Greenwood Village, CO 80111

And

Director of Reclamation and Closure  
Resurrection Mining Company  
6363 South Fiddlers Green Circle, Suite 800  
Greenwood Village, CO 80111

Either party may change its designated notice recipient upon 5 days prior to notice to the other party.

11) Definitions.

"Day Care Center" means facilities that provide care, protection and supervision for children on a regular basis away from their primary residence for less than 24 hours per day.

1) Examples. Examples of Day Care Centers include preschools, nursery schools, and latch key programs. "Child Care Centers," as defined in C.R.S. §26-6-102(1), are classified as "day care" uses.

2) Exceptions. Day Care Centers do not include facilities operated in connection with an employment use, shopping center or other principal use, where children are cared for while parents or guardians are visiting the premises or in the immediate vicinity for a limited period of time.

"Parks and Open Spaces" means areas consisting mostly of vegetative landscaping or outdoor recreation, community gardens, or public squares, and include open areas designed and developed for use by the occupants of a proposed development and by other persons for uses including but not limited to recreation, parks, and greenbelts. The lands tend to have few structures.

1) Examples. Examples of Parks and Open Space include parks, golf courses, public squares, plazas, playgrounds, ballfields, recreation areas, botanical gardens, and nature preserves.

"Residential Use" means structures or facilities used for Household Living or Group Living, as defined below.

1) Household Living.



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Lake County Recorder

- A) Household Living is characterized by the residential occupancy of a dwelling unit by a household. Tenancy is arranged on a month-to-month or longer basis.
  - B) Examples. Uses include living in houses, duplexes, triplexes, fourplexes and other multidwelling structures, retirement center apartments, manufactured housing and other structures with self-contained dwelling units.
  - C) Exceptions. Lodging in a dwelling unit or where less than two thirds of the units are rented on a monthly or longer basis is considered a hotel or motel use and not residential.
- 2) Group Living.
- A) Group Living is characterized by the residential occupancy of a structure by a group of people who do not meet the definition of Household Living. Tenancy is arranged on a monthly or longer basis, and the size of the group may be larger than a family.
  - B) Examples. The Group Living category includes assisted living facilities, treatment facilities, nursing homes and other institutions and arrangements providing care or boarding for a group of unrelated individuals.
  - C) Exceptions.
    - 1) Lodging where tenancy is generally arranged for periods of less than 30 days is not considered to be residential.
    - 2) Facilities for people who are under judicial detainment and under the supervision of sworn officers are not considered residential.

"Schools" means public and private schools at the primary, elementary, middle, junior high, or high school level that provide state-mandated basic education, including associated play areas, recreational and sport facilities, and before- and after-school care facilities. The term shall include daytime schools, boarding schools and military academies. The term shall not include business or trade schools.

12) Property Modification. Pursuant to the Consent Decree, this Environmental Covenant is intended to cover only that portion of the Property on which the Settling Defendants own the entire fee title. If Resurrection and the Department hereafter agree that, as of the date of this Environmental Covenant, the Settling Defendants did not own the entire fee title in any portion of the Property, the Department will modify Attachment 1 hereto to exclude that portion of the Property from coverage under this Environmental Covenant.





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STATE OF COLORADO )  
 ) ss:  
COUNTY OF DENVER )

The foregoing instrument was acknowledged before me this 20 day of JUNE,  
2012 by GARY W BAUSHMAN on behalf of the Colorado Department of Public Health and  
Environment.

Claudette M. Ferris  
Notary Public

4300 Cherry Creek Rd So  
Address

Denver, CO 80246

My commission expires: October 21, 2015





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**ATTACHMENT 1  
TO ENVIRONMENTAL COVENANT  
THE PROPERTY**

<b>Mineral Survey Number</b>	<b>Claim Name</b>
216	Lime
218	Rock
232	Bulls Eye
236	Dome
278	H.D. Tract Sub "A"
281	T.S. Wells & Wm. Moyer Placer Tract A
281	T.S. Wells & Wm. Moyer Placer Tract C
327	Oro La Plata
350	Nevada
363	Imes
404	Snowstorm
425	Comstock No. 1
444	Gardiner
454	Maud Hicks
463	Little Forepaugh
467	Independent
471	Eclip
489	Great Hope
494	Alice
498	Everett
504	Little Bertha
508	Tankerstown
516	Tribune
531	Prospect
543	San Jose
544	Titan
549	Jesse Clark
559	William Roddick
560	Lingula
561	Maria
589	Ballard
591	Enterprise
595	Silent Friend
596	Little Vinnie
619	Badger State
625	Hawkeye
653	Buckeye
668	Irene
671	Silver Wave
689	Archer
701	Florence
713	Wahnut
716	Glengary
732	Donovan
735	McDermith Placer Tract B
735	McDermith Tract A
735	McDermith Tract D
735	McDermith Tract E



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**Mineral Survey Number**

743  
783  
802  
823  
849  
862  
883  
893  
895  
905  
909  
996  
1005  
1006  
1018  
1028  
1030  
1066  
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1120  
1125  
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1772  
1803  
1907  
1912  
1918  
1928  
1935  
2334

**Claim Name**

John Mitchell  
Hartford Tract Sub B  
Yates  
Mahanoy  
Bazoo  
Unknown Claim Name  
Triumph  
White Cap  
Forfeit  
Honey Comb  
Across The Ocean  
Kathleen  
Delta  
Eagle  
Ishperming  
Ruby  
Silver Nugget  
A. P. Willard  
Olathe Placer  
Royal  
Adelphia  
Ocean Wave  
City  
St. Teresa  
Red Head  
St. Joseph  
Mimie Lee  
Mineral Farms  
Ravenna  
Mabel  
Humboldt (Producing Claim)  
Steel Spring  
Antelope  
Bangkok  
Yellow Jacket  
Little Nellie  
Little Daisy  
Unknown Claim Name  
Hog Eye  
Star of the West  
Sequin  
Vining  
Phat Purse  
Ottawa (Producing Claim)  
Elk  
Rattling Jack  
Oriole  
Deer  
Carlton  
Bessie Wilgus  
Smasher  
Revenue Cutter  
Colonel Sellers



Mineral Survey Number	Claim Name
2633	S.T.X.
2651	Minnesota
2678	Ulster
2688	Elva Elma (Producing Claim)
2715	Kaysierine
2717	Rebel
2730	Fluddin
2840	Minnie
2887	A.B
2920	Old Rye
3092	L.M.
3111	Nettie L.
3141	Daniel O'Connell
3154	Sedalia
3155	Bob Ingersol
3156	N. Rollins
3161	Milton
3162	Ontario
3166	Pauline
3168	Satellite
3169	Ida & Alice
3217	Lillie
3437	Edith Tangent
3487	Leo
3630	Red Porphyry
3822	Bulldozer
3877	Old Maid
4163	Unknown Claim Name
4167	Unknown Claim Name
4244	General Grant
4253	Frank
4254	Laurel W.
4299	K.R.L
4337	Baby
4542	Mosquito
4624	My Day
4626	Hermes
4893	Triangle
5596	Hidden Treasure
5631	Triangle
6269	Unknown Claim Name
6918	Midland
8036	Margaret (Producing Claim)
8514	Unknown Claim Name
8521	Scraps
8727	Sheridan
8982	Grover Cleveland
8990	Terrible No. 1
8990	Terrible No. 2
8990	Terrible No. 4
9099	Lincoln & Joiner
9261	Unknown Claim Name
9522	Whip
53	



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Mineral Survey Number	Claim Name
9530	Eclipse
<del>9530</del> (duplicate)	<del>Eclipse</del>
9958	Smuggler
10087	Little May
11187	Onondago
12343	Intermural (Producing Claim)
13448	G.T.M.
13761	Ralph
16064	Greater New York B (Producing Claim)
17972	Unknown Claim Name
18112	F.X.O.
18184	Lost Team
18417	Unknown Claim Name
18710	Unknown Claim Name
19621	West Fraction
19634	Franklin
2137A	Little Delaware
3672 A.B.	Wilson
377A	Modest Girl
5711 A.M.	Cornelius
872 A.M.	Thunderbolt

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Lake County Recorder

**ATTACHMENT 2  
TO ENVIRONMENTAL COVENANT  
SOIL SAMPLING PROCEDURES**

**Soil Sampling and Analysis Plan**

This attachment specifies the soil sampling procedures for purposes of terminating an Environmental Covenant restricting Residential Uses or other uses specified in paragraphs A.2.a or A.3.a of Appendix F1. Those restricted uses are collectively referred to herein as "Uses." For purposes of this protocol, a "property" is defined as a portion of a claim, an individual claim or contiguous claims on which an Environmental Covenant restricting Uses is proposed to be terminated. A portion of the subject property proposed for Uses may also be subdivided for purposes of terminating or modifying an Environmental Covenant for only the subdivided portion of the property. The following sections describe the soil sampling requirements, methods, sample analysis, and quality assurance to support termination of the Environmental Covenant. Alternate soil sampling protocols and analysis methods may be proposed in a site-specific sampling plan for the property, subject to approval by the State.

**1.1 Soil Sampling Requirements and Protocols**

Soil samples will be collected to a total depth of six inches, except in areas that are covered or will be covered with a minimum 2-inch thick layer of asphalt or concrete or other structures that prevent human exposure to soil, or will be covered within a minimum thickness of six inches of imported clean soil. Soil samples will be collected at two depth intervals: one from 0-2 inches deep and one from 2-6 inches deep. Each of these two soil samples will consist of a composite collected from three subsamples from the same depth interval, as described in Section 1.2 below.

Composite samples for each depth interval (0-2 inches and 2-6 inches) will be collected at four locations per acre, with not less than four composite samples collected for each depth interval a property. The composite samples will be equally spaced within the property. Each composite sample will consist of three subsamples of approximately equal amounts of soil collected from the same depth interval. At each composite sample location, the subsamples will be collected in a triangular pattern with the subsamples spaced approximately five feet apart. The composite sample will consist of the three subsamples collected from the same depth interval.

If any deposits of mining, milling, or smelting related materials (waste rock, tailing, or slag) are known or suspected to be present within the property, the footprint of these areas will be defined as separate sampling areas not to exceed 10,000 square feet each (100 feet by 100 feet). A composite sample (minimum of three subsamples) will be collected from the materials within each sampling area to a single sampling depth of 0-6 inches, or less, if the materials are shallower.

Imported soil shall be sampled as defined below to demonstrate that the imported soil has lead and arsenic concentrations less than 3,500 mg/Kg and 340 mg/Kg, respectively, for Residential Use.



Prior to soil sampling, a site sampling plan will be developed and the sampling areas and sampling locations will be plotted on a site plan. The site sampling plan will show the property boundaries and any existing residential structures, commercial facilities, or improvements. The sampling areas and sampling locations will be identified on the site sampling plan. In addition, any known or suspected deposits of mine, mill or smelter related materials (tailing, waste rock, or slag) will also be delineated on the site sampling plan with sampling locations identified.

### **1.2 Soil Sample Collection and Handling Procedures**

Soil samples will be collected using a plastic or stainless steel trowel, soil probe, hand auger, spade or drive sampler. A pick or spade may be utilized, as necessary, to loosen the soil for sample collection. The specific sampling tool utilized will be dependent on the soil composition and density. Additional sampling equipment may include stainless steel bowls, measuring tape, hand-held GPS, plastic sample bags, camera, log book, pen, pencil, and marker.

At each composite sample location, a subsample will be collected at each apex of a triangle spaced approximately five feet apart. At each subsample location, any loose debris and any sod or dense vegetation will be removed from an area approximately six inches in diameter. Samples will not be collected under or immediately adjacent to trees, shrubs and or structures. A soil sample will be collected at the same subsample location to a depth of 0-2 inches and then 2-6 inches using the sampling tool. Approximately the same volume of soil should be collected at each subsample location for each depth. The soil from each subsample will be collected into a separate clean plastic bag or stainless steel bowl for each sample depth interval. For each composite sample, combine the subsamples from the same depth interval together in a sealed plastic bag and mix by hand in the sealed bag. Label the plastic bag with the property identification, sampling area, depth interval, and date of collection. A chain of custody form will be maintained for all soil samples from the time of collection until its final deposition.

All equipment used for soil sampling will be dedicated or will be decontaminated prior to sample collection. Decontamination equipment will include, pump sprayers, spray bottles, deionized water, phosphate free soap solution, scrub brushes, buckets, disposable gloves, etc. Field personnel will wear disposable polyethylene gloves to avoid sample cross contamination during the collection of soil samples.

### **1.3 Imported Soil**

Soil imported to a property for use within the upper six inches of the final ground surface will be sampled to demonstrate that the lead and arsenic concentrations achieve acceptable concentrations for residential use and that the lead concentrations achieve acceptable concentrations for commercial use, as defined in Appendix F1. For up to 1,000 cubic yards of imported soil delivered to a property, a sample will be collected every 250 cubic yards. For volumes greater than 1,000 cubic yards, a sample of the imported soil will be collected for every 500 cubic yards.

### **1.4 Equipment Decontamination**

Sampling equipment will be decontaminated between sample collection points, if the equipment is not disposable, in order to avoid cross contamination between samples. Field personnel will



wear disposable gloves while decontaminating equipment. The following procedures will be followed to ensure that sampling equipment is decontaminated:

- 1) Visually inspect sampling equipment for soil; a stiff brush will be used to remove any visible material
- 2) Wash the field equipment with phosphate free soap and water, rinse with distilled water, and air dry or wipe with disposable paper towels
- 3) Water used for decontamination will be disposed of on site. All disposable items such as, paper towels, disposable gloves and wash cloths, will be deposited into a garbage bag and disposed of in a solid waste landfill

#### 1.5 Soil Sample Documentation

Field sampling information will be recorded in a field logbook or field sampling forms. Information that will be recorded at each composite soil sampling location will include the location (e.g. determined by hand-held GPS or measured to a defined reference point) and sampling depth interval. The documents to be completed for each composite sample in each sampling area are:

- Site Plan (Plot Plan)
- Chain-of-Custody transmittal form
- Sample tag and/or label
- Sample master log

All pertinent sampling information will be recorded on a field logbook. Entries will be made in the field documents in indelible ink, with all corrections consisting of initialed line-out deletions. Each day's entries will be initialed and dated at the end of each day by the field sampling crew.

At minimum, entries in the field log shall include:

- Date and time
- Site description (i.e., physical address and assessor parcel number)
- Description of weather conditions
- Names of field sampling crew
- Description of site conditions and any unusual circumstances
- Location of sample site, including map reference
- Equipment identification
- Details of actual work effort, particularly any deviations from the aforementioned methods
- Field observations
- Details of photo documentation, if any



#### **1.6 Soil Sample Packaging and Shipping**

Each sample container will be properly labeled in the field. All containers will be checked for proper seal and entered by sample number on the chain of custody form. After collection, composite samples will be placed in an insulated cooler for storage in the field. Samples will be shipped to the laboratory in a cooler with ice. The ice in the cooler will be double-bagged. One copy of the chain of custody form will be enclosed in a plastic bag in each cooler containing the samples identified on the form. The cooler will be taped shut and custody seals will be attached to the outside of the cooler to ensure that the cooler cannot be opened without breaking the seal. The cooler will be shipped using an authorized shipping service to the laboratory for analysis.

#### **1.7 Soil Sampling Quality Control**

Duplicate samples will be collected and submitted to the laboratory to evaluate the precision and reproducibility of sampling and analysis procedures. Duplicate samples will be collected at a minimum of one for every 10 soil composite samples. The duplicate samples will be collected, preserved, packaged, and handled in the same manner as the soil samples. No equipment blanks or field blanks will be collected.

#### **1.8 Laboratory Analytical Protocols**

The soil samples will be analyzed by the laboratory using methods detailed in Test Methods for Evaluating Solid Waste, Revised Methods, SW-846. The laboratory shall be accredited by the Colorado Certification Program. For Residential Development, samples will be analyzed for arsenic and lead. For Commercial Development, soil samples will be analyzed for lead. Soil samples will be digested in accordance with SW-846 EPA Method 3050. After digestion, all samples will be analyzed by EPA Method 6010B.

The report of analytical results will include a cover letter from the laboratory identifying the sample group and any non-complaint quality control results together with the affected samples. Attached to the cover letter will be a summary of sample results and a summary of quality control results. The summary of quality control results will include instrument performance results such as standard recoveries and blanks results; matrix QC results such as spikes, duplicates and procedural blanks; and laboratory control standard recoveries.



**ATTACHMENT 3  
TO ENVIRONMENTAL COVENANT  
GROUNDWATER SAMPLING PROTOCOLS**

**Groundwater Sampling and Analysis Plan**

This attachment specifies the groundwater sampling procedures for purposes of terminating or modifying an Environmental Covenant for groundwater use restrictions, as specified in Appendix F1. For purposes of the protocol, a "property" is defined as a portion of a claim, an individual claim or contiguous claims not exceeding 35 acres in total area for which the groundwater use restrictions of an aquifer are to be terminated. The followings sections describe the groundwater sampling requirements, methods, sample analysis, and quality assurance that will support such termination or modification. Alternate groundwater sampling procedures and analysis methods for a property may be proposed in a site-specific sampling plan for the property, subject to approval by the State.

**1.9 Groundwater Sampling Requirements**

One groundwater sample will be collected from a well completed in the aquifer of the hydrogeologic unit (alluvial, unconsolidated sedimentary deposits, or bedrock) proposed for beneficial use underlying each property. For alluvial or unconsolidated sedimentary deposits, the hydrogeologic unit is defined as the aquifer with the same lithology and within the same surface water hydrologic divide. The bedrock hydrogeologic unit is defined as the aquifer within the same geologic formation and structure. The groundwater use restrictions will be terminated or modified for a property for only that aquifer of the hydrologic unit in which the well is completed.

The groundwater sample from the well will be analyzed for constituents that are relevant to the California Gulch Superfund Site for which numeric groundwater quality standards have been established by the State for the proposed beneficial use at the time of the application for termination or modification of the Environmental Covenant, hereafter referred to as the Numeric Standards. The constituents that are relevant to the California Gulch Superfund Site and the current Numeric Standards are presented in Table 1 for drinking/domestic or agricultural uses. The groundwater in the aquifer will be determined acceptable for the proposed use, and the Environmental Covenant restricting groundwater will be terminated for the property or modified to allow a particular beneficial use, if the constituent concentrations of the sample from the well are less than the Numeric Standards for all beneficial uses (in the event of termination) or the particular beneficial use (in the event of modification).

**1.10 Groundwater Sampling Methods**

The groundwater sample from the well will be collected according to the methods described in SOP No. 4-Ground Water Well Sampling. Non-dedicated or non-disposable sampling equipment will be decontaminated prior to collection of the sample according to the methods described in SOP No. 1-Decontamination. Sample collection documentation, sample



containment, preservation, identification, labeling and shipping will be performed according to the procedures described in SOP No. 7- Sample Handling, Documentation, and Analysis.

**1.11 Laboratory Analytical Methods**

Samples will be analyzed for the parameters for which Numeric Standards have been established for the proposed beneficial use. Sample container, preservation, and holding times are provided in SOP No. 7-Sample Handling, Documentation, and Analysis. The laboratory will be required to process all samples submitted according to the specific protocols for sample custody, holding times, analysis, reporting and associated laboratory quality assurance. Laboratory quality assurance checks will include the use of blank, spiked, split, and duplicate samples, calibration checks, and internal standards. Designated laboratory personnel will be required to ensure that QA/QC procedures are achieved. The laboratory or laboratories for constituent analysis must be accredited by the Colorado Certification Program. Laboratory calculations and data review will be performed by the laboratory in accordance with the procedures described by the analytical method. The laboratory will review the results of the laboratory QC analyses, instrument calibration and maintenance records, calculations, and the record of sample custody (including holding times) within the laboratory.

**Table 1 Groundwater Standards for Beneficial Use**

Parameter	Domestic Water Supply and Drinking Water Standards	Agricultural Standards
Antimony-dissolved	0.006 mg/L	
Aluminum-dissolved		5 mg/L
Arsenic-dissolved	0.01 mg/L	0.1 mg/L
Barium-dissolved	2.0 mg/L	
Beryllium-dissolved	0.004 mg/L	0.1 mg/L
Cadmium-dissolved	0.005 mg/L	0.01 mg/L
Chloride-dissolved	250 mg/L	
Chromium-dissolved	0.1 mg/L	0.1 mg/L
Copper-dissolved	1.0 mg/L	0.2 mg/L
Fluoride-dissolved	4.0 mg/L	2 mg/L
Iron-dissolved	0.3 mg/L	5 mg/L
Lead-dissolved	0.05 mg/L	0.1 mg/L
Manganese-dissolved	0.05 mg/L	0.2 mg/L
Mercury-dissolved	0.002 mg/L	0.01 mg/L
Molybdenum-dissolved	0.035 mg/L	
Nickel-dissolved	0.1 mg/L	0.2 mg/L
Selenium-dissolved	0.05 mg/L	0.02 mg/L
Silver-dissolved	0.05 mg/L	
Sulfate-dissolved	250 mg/L	
Thallium-dissolved	0.002 mg/L	
Zinc-dissolved	5 mg/L	2 mg/L



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pH	6.5 - 8.5	6.5-8.5
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## **SOP-1**

*SOP Date: February 2008*

# **DECONTAMINATION**

## **1.0 INTRODUCTION AND TYPES OF CONTAMINATION**

The purpose of this document is to define the standard procedure for decontamination associated with environmental investigation for the California Gulch Superfund Site. This procedure is intended to be used with other SOPs.

### **1.1 Site and/or Sample Cross-Contamination**

The overall objective of multimedia sampling programs is to obtain samples which accurately depict the chemical, physical, and/or biological conditions at the sampling site. Extraneous contaminant materials can be brought onto the sampling location and/or introduced into the medium of interest during the sampling program (e.g., by contacting water with equipment previously contaminated at another sampling site). Trace quantities of these contaminant materials can thus be captured in a sample and lead to false positive analytical results and, ultimately, to an incorrect assessment of the contaminant conditions associated with the site. Decontamination of non-dedicated or non-disposable sampling equipment (e.g., bailers, pumps, and tubing) and field support equipment (e.g., drill rigs, vehicles) is required. To ensure that sampling cross-contamination is prevented, and that on site contaminants are not carried off site.

## **2.0 PROCEDURES**

### **2.1 Equipment List**

The following is a list of equipment that may be needed to perform decontamination:

- Bmshes
- Wash tubs
- Buckets
- Scrapers
- Steam cleaner or high-pressure washer
- Paper towels
- Alconox detergent (or equivalent)
- Potable water
- Deionized or distilled water
- Garden type water sprayers
- Clean plastic sheeting and/or trash bags

### **2.2 Decontamination**



### 2.2.1 Sampling Equipment

The following steps will be used to decontaminate non-dedicated or non-disposable sampling equipment (including reusable filter apparatus):

Personnel will dress in suitable safety equipment to reduce personal exposure (e.g., latex gloves, safety glasses, etc.).

Gross contamination on equipment will be scraped off at the sampling or construction site.

Equipment that will not be damaged by water will be washed with an Alconox solution or low-sudsing detergent and potable water and scrubbed with a bristle brush or similar utensil (if possible). Equipment will be triple rinsed with potable water followed by a triple rinse with deionized or distilled water.

Following decontamination, equipment will be placed in a clean area, on or in clean plastic sheeting to prevent contact with contaminated soil. If the equipment is not used immediately, the equipment will be covered or wrapped in plastic sheeting or heavy duty trash bags to minimize potential airborne contamination.

### 2.2.2 Submersible Pumps

If non-dedicated submersible pumps are used they will be decontaminated between wells. The outside of the pump and hose will be triple rinsed with deionized or distilled water. Deionized or distilled water will be pumped through the pump and hose. The volume of deionized or distilled water pumped through will be at a minimum equal to three times the volume of fluid that could be contained by the pump and hose.

### 2.2.3 Water Level Probes

Electric water level probes will be decontaminated by rinsing with deionized or distilled water or by wiping the probe during removal with paper towels wetted with deionized or distilled water. The water level probe will be placed in a plastic bag after decontamination.

### 2.2.4 Sensitive Equipment

Sensitive equipment that may be damaged by water will be carefully wiped clean using paper towels and detergent water or spray bottle and towel and rinsed with deionized or distilled water. Care will be taken to prevent any equipment damage.

### 2.2.5 Drilling and Heavy Equipment

Drilling and heavy equipment will be decontaminated at a designated decontamination area for large equipment. The following steps will be used to decontaminate drilling and heavy equipment:

Personnel will dress in suitable safety equipment to reduce personal exposure (e.g., gloves, safety glasses or splash shields, etc.).



Equipment showing gross contamination or having drill cuttings caked on will be scraped off with a flat-bladed scraper at the sampling or construction site.

Equipment, such as drill rigs, augers, drill bits, and shovels will be sprayed with potable water by a high-pressure washer. Care should be taken to adequately clean the insides of the hollow-stem augers and backhoe buckets.

Following decontamination, drilling equipment will be placed on the clean drill rig and moved to a clean area. If the equipment is not used immediately, it should be stored in a designated clean area.

#### **2.2.6 Equipment Leaving the Site**

Vehicles used for non-intrusive activities shall be cleaned on an as needed basis. Construction equipment such as earth moving equipment, trucks, drilling rigs, backhoes, trailers, etc., will be pressure washed at the designated decontamination area before the equipment is removed from the site.

#### **2.2.7 Wastewater**

Used wash and rinse solutions may be discharged to the ground at the sampling site

#### **2.2.8 Other Wastes**

Solid wastes such as paper towels and used filters will be sealed in plastic garbage bags and disposed of in a sanitary landfill.

#### **2.3 Documentation**

Sampling personnel will be responsible for documenting the decontamination of sampling and drilling equipment. The documentation will be recorded with waterproof ink in the sampler's field notebook with consecutively numbered pages. The information entered in the field book concerning decontamination should include the following:

- Decontamination personnel
- Date
- Decontamination observations



## SOP-4

*SOP Date: February 2008*

# GROUNDWATER WELL SAMPLING

## 1.0 PURPOSE AND SCOPE

The purpose of this document is to define the standard procedure for collecting groundwater samples from wells for the California Gulch Superfund Site. This procedure gives descriptions of equipment, field procedures, and QA/QC procedures necessary to collect groundwater samples from wells. The sample locations and frequency of collection are specified in the QAPP.

This procedure is intended to be used together with several other SOPs, as applicable, including:

SOP 1 Decontamination

SOP 7 Sample Handling, Documentation, and Analysis

## 2.0 WATER SAMPLING PROCEDURES

### 2.1 Equipment List

Sample bottles, preservatives, sample labels will be obtained from the analytical laboratory. Several extra sample bottles will be obtained in case of breakage or other problems. Sample bottles can be either pre-preserved or preservatives can be added in the field.

Equipment that may be used during well evacuation:

- Well keys
- Electronic water level probe
- Assorted tools (knife, screwdriver, etc.)
- PVC, Teflon, or stainless-steel bailer (bottom filling)
- PVC hand pump
- Nylon or polypropylene rope
- Bailer tripod
- PVC pump discharge hose
- Gas-powered electric generator
- Stainless-steel submersible pump
- pH meter (with automatic temperature compensation)
- Specific conductivity meter
- Plastic squeeze bottle filled with deionized water
- Polyethylene or glass container (for field parameter measurements)
- Chemical-free paper towels or Kimwipes



- Calculator
- Field notebook
- Waterproof pen
- Plastic sheeting (for placing around well)
- Appropriate health and safety equipment

**Equipment that may be used during well sampling:**

- Electronic water level measurement probe
- PVC, Teflon, or stainless-steel bailers (bottom filling)
- Stainless-steel submersible pump
- PVC pump discharge hose
- Electric generator
- Nylon or polypropylene rope or twine
- Bailer tripod
- pH meter (with automatic temperature compensation)
- Specific conductivity meter
- Plastic squeeze bottle filled with deionized water
- Sample bottles
- Dedicated jug for holding sample for filtering
- Cooler with ice
- Polyethylene or glass jar for field measurement samples
- Sample labels

**Equipment used during sample filtration:**

- Disposable filterware with 0.45-micron filter
- Hand pump or peristaltic pump
- Tygon or silicon tubing (2- to 4 ft lengths)

**Equipment used during decontamination:**

- Deionized or distilled water
- Decontamination buckets/pails
- Paper towels
- Plastic brushes
- Sprayers

**2.2 Sampling Procedures**

This section gives the step-by-step procedures for collecting samples in the field. Observations made during sample collection should be recorded in the field notebook and field data sheet as specified in Section 2.4 of this SOP.

**2.2.1 Decontaminate Equipment**



Before any evacuation or sampling begins, all well probes, bailers, and other sampling devices shall be decontaminated. If dedicated equipment is used, it should be rinsed with deionized water. Dedicated downhole pumps will not be decontaminated. A discussion of equipment and personnel decontamination is contained in SOP No. 1, Decontamination, and in the site Health and Safety Plan.

### 2.2.2 Instrument Calibration

Electronic equipment used during sampling includes a pH meter with temperature scale, a conductivity meter and a turbidity meter. Before going into the field, the sampler shall verify that all of these are operating properly. The pH and conductivity meters require calibration and calibration checks every day prior to use. The turbidity meter requires a calibration check by reading measurements cells of a known value. Calibration times and readings will be recorded in a notebook and/or on Calibration Data Sheet, which are to be kept by the field sampler.

### 2.2.3 Evacuate Well

The purpose of well purging is to remove stagnant water from the well to obtain representative water from the geologic formation being sampled while minimizing disturbance to the collected samples. Before a sample is taken, the well will be purged until a minimum of three well casing volumes have been removed and field parameters have stabilized, or until a maximum of five well volumes have been removed. Purging will be considered completed if the well is pumped or bailed dry. A well should be pumped at a rate no faster than approximately 1 gallon per minute if it has a tendency to dry up prior to evacuating three casing volumes. Evacuated well water may be disposed of at the well site in a manner that does not cause runoff.

Before well purging begins, the following procedures are to be performed at each well:

- Note the condition of the outer well casing, concrete well pad, protective posts (if present), and any other unusual conditions in the area around the well.
- If bailing place clean plastic sheeting around the well.
- Open the well.
- Note the condition of the inner well cap and casing.
- Measure (to nearest 0.01 foot) and record depth of static water level from the measuring point on the well casing and indicate time. Record what the measuring point is (i.e., notch on north side, top of PVC well casing).
- Calculate volume of water in the well casing in gallons based on feet of water and casing diameter. (See Section 2.4.3 for calculation of volumes.)
- From the above calculation, calculate the three casing volumes to be evacuated.
- Obtain an initial sample (which is not retained) from the bailer or purge pump for field measurements (temperature, conductivity, and pH measurements) and observation of water quality.



Evacuate three volumes of water in casing with a bailer or pump. Take temperature, specific conductance, and pH measurements after evacuation of each well volume to confirm that the water chemistry has stabilized. Generally, pH values within  $\pm 0.2$  pH unit and conductivity and temperature readings within  $\pm 10$  percent between consecutive readings indicate good stability of the water chemistry. If the chemistry is not stable, continue purging up to a maximum of five well volumes, measuring pH and specific conductance after each one half well volume.

When evacuating a well using a pump, the pump intake should be placed:

for low recovery wells (wells that can be pumped dry), place pump intake at bottom of screened interval.

for high recovery wells (little drawdown with pumping), place pump at or slightly above the middle of the screened interval to ensure the removal of stagnant water from the well bore.

If the well is bailed or pumped dry during evacuation, it can be assumed that the purpose of removing 3 well volumes of water has been accomplished, that is, removing all stagnant water that had prolonged contact with the well casing or air. If recovery is very slow, samples may be obtained as soon as sufficient water is available.

#### 2.2.4 Obtain Water Samples

Obtain samples for chemical analysis within 2 hours after purging is completed, if possible. For slow recovering wells, the sample shall be collected immediately after a sufficient volume is available (water has recovered to screened interval). The water quality samples shall be taken from within the well screen interval.

The following sampling procedure is to be used at each well:

1. Assemble decontaminated sampling equipment. If bailers are used, new nylon or polypropylene rope will be used for each well for each sampling event. Assemble the filtering apparatus.
2. Make sure that sample labels have been filled out for each well.
3. Lower the bailer slowly and gently into contact with the water in the well. Lower the bailer to the same depth in the well each time, within the screened interval. Retrieve the bailer smoothly and empty the water in a slow steady stream into the containers. If submersible or bladder pumps are utilized to collect samples, start the pump and fill the sample bottles as described below.
4. Triple rinse the sample containers with sample water and then fill the sample bottles. If not enough sample water is available to perform the triple rinse, then at a minimum a single rinse will be performed and will be recorded in the field logbook and/or data sheet. Cap the sample containers quickly. If sample bottles are pre-preserved, fill the sample bottles without rinsing. Add preservative if the bottle is not pre-preserved. Do not allow the sample containers with preservatives to overflow. See Section 2.2.5 for details on field filtering.



5. Slowly pour an unfiltered portion into the sample container for field parameter (pH, specific conductance, temperature, and turbidity) analyses and perform the in-field analyses and record.
6. Place samples on ice in a cooler.
7. Record time of sampling.
8. Replace and lock well cap.
9. Complete field documentation.

### 2.2.5 Filtering Samples

Samples for metals analyses will be filtered during the field sampling event by using a disposable filter apparatus and peristaltic or hand vacuum pump.

The following procedure is to be used for filtering:

Assemble filter device according to manufacturer's instructions.

Prior to the collection of aliquots, flush the filter with approximately 100 to 200 milliliters of groundwater. Filter sample either by pouring sample in the top portion of filter unit or pumping through an in line filter using a peristaltic pump. Sample may also be filtered by attaching the in-line filter to the submersible pump discharge.

Triple rinse the sample containers with filtered sample water and then fill the sample bottles. If not enough sample water is available to perform the triple rinse, then at a minimum a single rinse will be performed and will be recorded in the field logbook and/or data sheet. Cap the sample containers quickly. If sample bottles are pre-preserved, fill the sample bottles without rinsing. Add preservative if the bottle is not pre-preserved. Do not allow the sample containers with preservatives to overflow.

Place the used filter membrane or disposable filter equipment in a Ziploc<sup>®</sup> bag for disposal with the personal protective equipment.

Any reusable filtering equipment will be decontaminated in accordance with SOP No. 1.

### 2.3 Sample Handling

Sample containers and preservatives are specified in SOP No. 7, Sample Handling, Documentation and Analysis. Samples will be labeled and handled as described in SOP No. 7.

### 2.4 Documentation

#### 2.4.1 Groundwater Data Sheet

A groundwater data sheet for groundwater samples (Appendix A) will be completed at each sampling location. The data sheet will be completely filled in. If items on the sheet do not apply



to a specific location, the item will be labeled as not applicable (NA). The information on the data sheet includes the following:

- Well number
- Date and time of sampling
- Person performing sampling
- Depth to water before sampling
- Volume of water evacuated before sampling
- Conductivity, temperature, and pH during evacuation (note number of well volumes)
- Time samples are obtained
- Number of samples taken
- Sample identification number(s)
- Preservation of samples
- QC samples taken (if any)
- How the samples were collected (i.e., bailer, pump, etc.)

#### 2.4.2 Field Notes

Field notes shall be kept in a bound field book. The following information will be recorded using waterproof ink:

- Names of personnel
- Weather conditions
- Date and time of sampling
- Location and well number
- Condition of the well
- Decontamination information
- Initial static water level and total well depth
- Calculations (e.g., calculation of evacuated volume)
- Calibration information
- Sample methods, or reference to the appropriate SOP

#### 2.4.3 Well Volume Calculations

The following equation shall be used to calculate the volume of water to be removed during well evacuation.

For 2 inch well:

$$\text{Evacuation Volume [gal]} = \frac{(\text{Total Depth [ft]} - \text{Water Level Depth [ft]}) \times 0.1632 \text{ gal/ft}}{\text{gallons/well casing volume}}$$

For 4-inch well:

$$\text{Evacuation Volume [gal]} = (\text{Total Depth [ft]} - \text{Water Level$$



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Depth [ft] x 0.6528 gal/ft

= gallons/well casing volume

For 6-inch well:

Evacuation Volume [gal] = (Total Depth [ft] - Water Level  
Depth [ft]) x 1.4688 gal/ft

= gallons/well casing volume

Multiply the volume of one well casing volume by 3 to obtain the minimum volume of water to be evacuated.



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**APPENDIX A  
GROUNDWATER DATA SHEET**





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Was a rinsate sample collected?  
)

Yes  No  (sample control number \_\_\_\_\_)

Notes: \_\_\_\_\_



## **SOP-7**

*SOP Date: February 2008*

# **SAMPLE HANDLING, DOCUMENTATION, AND ANALYSIS**

## **1.0 PURPOSE AND SCOPE**

The purpose of this document is to define the standard protocols for sample handling, documentation, and analysis for the California Gulch Superfund Site. This procedure is intended to be used together with other SOPs and is referenced in all SOPs that apply to sampling.

## **2.0 PROCEDURES FOR SAMPLE HANDLING, DOCUMENTATION, AND ANALYSIS**

### **2.1 Sample Identification and Labeling**

Samples collected during monitoring, investigations, or remediation activities will be assigned unique sample identification numbers. Each sample identification number will identify the organization collecting the sample or the program under which it is collected, sampling location, type of sample, and sampling sequence for each sample. These numbers are required for tracking the handling, analysis, and verification or validation status of all samples collected during monitoring. In addition, the sample identification numbers will be input into the project database to identify analytical results received from the laboratory.

Sample identification numbers that are assigned will be divided into four fields as shown in the following example:

**M-CGW1-01-900423**

The first field is one character in length and identifies the company conducting the sampling. The second field is an alphanumeric code identifying the location of the sample and the last letter of this field indicates the matrix (e.g., CGM1 indicates California Gulch Well No. 1, the second W indicates a water matrix). The next field identified is the type of sample being collected; this is used to identify whether the sample is a primary or grab sample, a composite sample, field duplicate, field blank, or equipment rinsate. The final field contains the date in a year-month-day format. For example, the sample identified above was collected on April 23, 1990.

Each sample that is collected in the field will be labeled for future identification. Sample labels will be filled out as completely as possible by a member of the sampling team prior to the start of the day's field sampling activities. The date, time, sampler's signature, and the last field of the sample identification number should not be completed until the sample is actually collected. All sample labels will be filled out using waterproof ink. At a minimum, each label will contain the following information:



Sampler's company affiliation;  
Site location;  
Sample identification;  
Date and time of sample collection;  
Method of preservation used;  
Sample matrix; and  
Sampler's initials.

## 2.2 Sample Containers, Preservatives, and Holding Times

### 2.2.1 Sample Containers

Proper sample preparation practices will be observed to minimize sample contamination and potential repeat analyses due to anomalous analytical results. Prior to sampling, commercially-cleaned sample containers will be obtained from the analytical laboratory. The bottles will be labeled as described in the previous section to indicate the type of sample and sample matrix to be collected. Sample bottles can be either pre-preserved from the laboratory or preservatives can be added in the field during sample collection.

### 2.2.2 Sample Preservation

Samples are preserved in order to prevent or minimize chemical changes that could occur during transit and storage. Sample preservation should be performed immediately upon sample collection to ensure that laboratory results are not compromised by improper coordination of preservation requirements and holding times. Samples will be preserved immediately and stored on ice in coolers prior to shipping. Sample preservation requirements are based on the most current publication of 40 CFR, Part 136.3 and are provided in Table 1.

### 2.2.3 Sample Holding Times and Analyses

Sample holding times are established to minimize chemical changes in a sample prior to analysis and/or extraction. A holding time is defined as the maximum allowable time between sample collection and analysis and/or extraction, based on the nature of the analyte of interest and chemical stability factors. Holding times applicable for analytes are listed in Table 1. Samples should be sent to the laboratory as soon as possible after collection by hand delivery or an overnight courier service to minimize the possibility of exceeding holding times.

For most samples, preservation by cooling to 4°C is required immediately after collection while the samples are held for shipment and during shipment to the laboratory.

## 2.3 Sample Preparation and Shipping

After collection, samples will be labeled and prepared as described in the previous discussion, and placed on ice in an insulated cooler. The sample containers will be placed in re-closeable plastic storage bags. Samples will then be placed right side up in a cooler with ice for delivery to the laboratory. The ice in the cooler will be double-bagged. The coolers will be taped shut and



chain-of-custody seals will be attached to the outside of the cooler to ensure that the cooler cannot be opened without breaking the seal. Final packaging and shipping will be conducted in compliance with current IATA Resolution 618 and DOT 49 CFR Part 171 Regulations.

All samples will be shipped for laboratory receipt and analysis within the holding times specified in Table 2. This may require daily shipment of samples with short holding times.

#### 2.4 Sample Documentation and Tracking

This section describes the information that should be provided in field notes and sample Chain-of-Custody documentation.

##### 2.4.1 Field Notes

Documentation of observations and data acquired in the field provide information on sample acquisition, field conditions at the time of sampling, and a permanent record of field activities. Field observations and data collected during routine monitoring activities will be recorded with waterproof ink in a permanently bound weatherproof field log book with consecutively numbered pages or on field data sheets as specified in the project SOPs.

Field notebook and/or data sheet entries will, at a minimum, include the information listed below. Relevant SOPs should be consulted to supplement this list.

- Project name;
- Location of sample;
- Date and time of sample collection;
- Sample identification numbers;
- Description of sample (matrix sampled);
- Sample depth (if applicable);
- Sample methods, or reference to the appropriate SOP;
- Field observations;
- Results of any field measurements, such as depth to water, pH, temperature, specific conductance; and
- Personnel present.

Changes or deletions in the field book or on the data sheets should be recorded with a single strike mark, and remain legible. Sufficient information should be recorded to allow the sampling event to be reconstructed without having to rely on the collector's memory.

All field books will be signed on a daily basis by the person who has made the entries. Anyone making entries in another person's field book will sign and date those entries.

##### 2.4.2 Sample Chain-Of-Custody

During field sampling activities, traceability of the sample must be maintained from the time the samples are collected until laboratory data are issued. Establishment of traceability of data is



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meical for resolving future problems if analytical results are called into question and for minimizing the possibility of sample mix-up. Initial information concerning collection of the samples will be recorded in the field log book or on data sheets as described above. Information on the custody, transfer, handling and shipping of samples will be recorded on a Chain-of-Custody (COC) form.

The sampler is responsible for initiating and filling out the COC form. The COC will be signed by the sampler when he or she relinquishes the samples to anyone else. A COC form will be completed for each set of water quality samples collected, and will contain the following information:

- Sampler's signature and affiliation
- Project number
- Date and time of collection
- Sample identification number
- Sample type
- Analyses requested
- Number of containers
- Signature of persons relinquishing custody, dates, and times
- Signature of persons accepting custody, dates, and times
- Method of shipment
- Shipping air bill number (if the samples are shipped)
- Any additional instructions to the laboratory.

The person responsible for delivery of the samples to the laboratory will sign the COC form, retain the third copy of the form, document the method of shipment, and send the original and the second copy of the form with the samples. Upon arrival at the laboratory, the person receiving the samples will sign the COC form and return the second copy to the Project Manager. Copies of all COC documentation will be compiled and maintained in the central files. The original COC forms will remain with the samples until the time of final disposition. After returning samples for disposal, the laboratory will send a copy of the original COC to the Operator. This will then be incorporated into the central files.

Table 1 Sample Containers, Preservation Methods, and Holding Times

Analyte	Container <sup>(1)</sup>	Filtration <sup>(2)</sup>	Preservation	Holding Time <sup>(3)</sup>
pH	P,G	No	Cool, 4°C	7 days <sup>(4)</sup>
Specific conductance	P,G	No	Cool, 4°C	28 days
Total alkalinity (as CaCO <sub>3</sub> )	P,G	Yes	Cool, 4°C	7 days <sup>(1)</sup>
Total dissolved solids	P,G	Yes	Cool, 4°C	7 days
Total suspended solids	P,G	No	Cool, 4°C	7 days
Chloride	P,G	Yes	None required	28 days
Mercury	P,G	Yes	HNO <sub>3</sub> to pH <2	28 days
Nitrate as N	P,G	Yes	Cool, 4°C	2 days
Nitrite	P	No	Cool, 4°C	48 hours
Nitrate-Nitrite	P	No	H <sub>2</sub> SO <sub>4</sub> to pH <2	28 days
Total Phosphorus	P,G	Yes	Cool, 4°C, H <sub>2</sub> SO <sub>4</sub> to pH <2	28 days
Orthophosphate	P	Yes	Cool, 4°C	48 hours
Radionuclides (total)	P,G	No	HNO <sub>3</sub> to pH <2	6 months
Radionuclides (dissolved)	P,G	Yes	HNO <sub>3</sub> to pH <2	6 months
Silica	P	Yes	Cool, 4°C	28 days
Sulfate	P,G	Yes	Cool, 4°C	28 days
Dissolved metals	P,G	Yes	Cool, 4°C, HNO <sub>3</sub> to pH <2	6 months
Total metals	P,G	No	Cool, 4°C, HNO <sub>3</sub> to pH <2	6 months
Total recoverable metals	P,G	No	Cool, 4°C, HNO <sub>3</sub> to pH <2	6 months

<sup>(1)</sup> Bottle code: P=polyethylene bottle with polyethylene-lined lid, G=glass bottle with Teflon-lined polyethylene lid.

<sup>(2)</sup> Samples requiring filtration must be filtered in the field using a 0.45 µm membrane filter before preservative is added.

<sup>(3)</sup> Holding times start at date of sample collection.

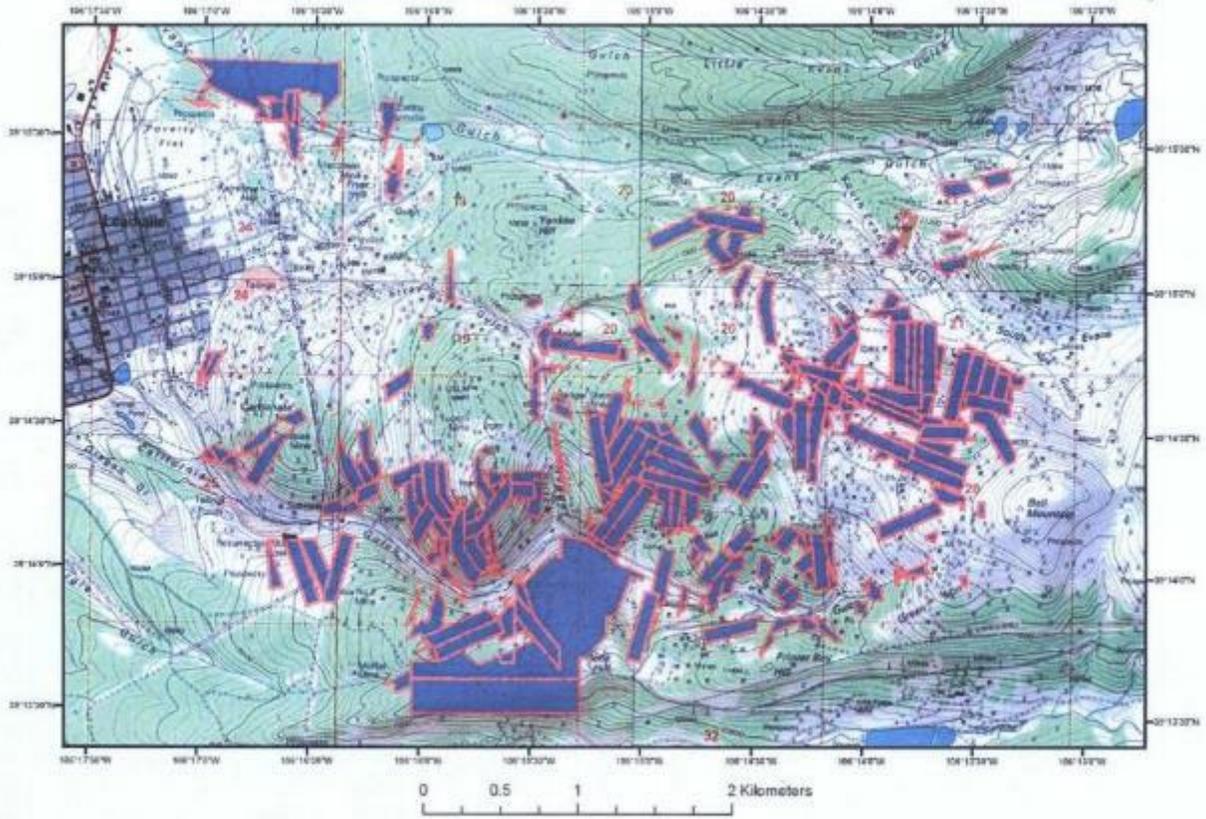
<sup>(4)</sup> Sample pH and alkalinity should be analyzed as soon as possible after collection. However, for practical purposes, the holding times have been set at seven days. The 14 day holding time specified in 40 CFR 136.3, Table II, is considered to be inappropriate for the high carbonate waters of the system.

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Jessica Berger  
 Lake County Recorder

# A Zone





Environmental Covenant for Black Cloud Mine Tailings Property

**This property is subject to an Environmental Covenant held by the Colorado Department of Public Health and Environment pursuant to section 25-15-321, C.R.S.**

ENVIRONMENTAL COVENANT

Resurrection Mining Company ("Resurrection") grants an Environmental Covenant ("Covenant") this 5<sup>th</sup> day of April, 2011 to the Hazardous Materials and Waste Management Division of the Colorado Department of Public Health and the Environment ("the Department") pursuant to § 25-15-321 of the Colorado Hazardous Waste Act, § 25-15-101, *et seq.* The Department's address is 4300 Cherry Creek Drive South, Denver, Colorado 80246-1530.

WHEREAS, Resurrection is the owner of certain property situated in Lake County, Colorado, more particularly described in Attachment 1, attached hereto and incorporated herein by reference as though fully set forth (hereinafter referred to as "the Property"); and

WHEREAS, pursuant to that Consent Decree among Resurrection, Newmont USA Limited ("Newmont"), the State of Colorado and the United States, which was entered by the U.S. District Court for the District of Colorado on August 29, 2008 in *State of Colorado v. Asarco Incorporated, et al.* ("Consent Decree"), Resurrection has agreed to grant an Environmental Covenant in accordance with the terms thereof.

NOW, THEREFORE, Resurrection hereby grants this Environmental Covenant to the Department and EPA as a third party beneficiary, and declares that the Property as described in Attachment A shall hereinafter be bound by, held, sold, and conveyed subject to the requirements set forth below, which shall run with the Property in perpetuity and be binding on Resurrection, its heirs, successors and assigns, and any persons using the land, as described herein. As used in this Environmental Covenant, the term "Owner" means the record owner of the Property and any other person or entity otherwise legally authorized to make decisions regarding the transfer of the Property or placement of encumbrances on the Property, other than by the exercise of eminent domain.

1) Use Restrictions.

No uses or activities that would in any manner interfere with or adversely affect the implementation, integrity, or protectiveness of the reclamation and closure actions that have been or will be performed or instituted on the property including, without limitation, revegetated areas, retaining ponds, adits, roads, ditches, pipelines, utility corridors, waste disposal facilities, tailings ponds, monitoring wells, signs and governmental use



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Patricia Berger  
Lake County Recorder

restrictions and controls, shall be allowed. These restrictions will not apply to any future mineral prospecting, exploration or mining activities conducted on the property in accordance with the Colorado Mined Land Reclamation Act and implementing regulations.

2) Inspections.

The Department and EPA as the named third party beneficiary shall have the right of entry to the Property at reasonable times with prior notice for the purpose of determining compliance with the terms of this Covenant. Nothing in this Covenant shall impair any other authority the Department may otherwise have to enter and inspect the Property.

3) Termination.

This Covenant runs with the land and is perpetual, unless terminated or modified pursuant to this Section or Section 4. Owner may request that the Department approve a termination or modification of this Covenant. Consistent with C.R.S. 25-15-319(1)(h), the Department shall terminate this Environmental Covenant in whole or in part when, in addition to satisfying the requirements of C.R.S. 25-15-321(3) and (5), Owner provides the following applicable showings to the Department:

- a. Restrictions on uses or activities that would disturb or have the potential to disturb caps, covers or revegetated areas, or interfere or have the potential to interfere with or adversely affect the implementation, integrity, or protectiveness of the reclamation actions that have been or will be performed or instituted on the property shall be terminated if the waste in place within the area proposed for disturbance is removed or response facilities on the property are dismantled with the approval of EPA and the State.
- b. In addition to the grounds for termination set forth in Section 3.a, the Environmental Covenants shall also be terminated as to all or part of the Property if it is demonstrated to the Department that the proposed termination will ensure protection of human health and the environment, in accordance with C.R.S. 25-15-319(1)(h).

Consistent with C.R.S. 25-15-321(6), the Department shall provide to Owner a written determination on all applications to terminate this Environmental Covenant within 60 days after receipt of such application.

4) Modification.

The Department shall modify this Environmental Covenant in whole or in part when, in addition to satisfying the requirements of C.R.S. 25-15-321(3) and (5), Owner demonstrates to the Department that the proposed modification will ensure protection of human health and the environment, in accordance with C.R.S. 25-15-319(1)(h).



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Patricia Berger  
Lake County Recorder

Consistent with C.R.S. 25-15-321(6), the Department shall provide Owner a written determination on all applications to modify this Environmental Covenant within 60 days after receipt of such application.

- 5) Conveyances. Within thirty days (30) after any grant, transfer or conveyance of any interest in any or all of the Property, the transferring Owner shall notify the Department and EPA as the named third party beneficiary of such grant, transfer or conveyance.
- 6) Notice to Lessees. Owner agrees to incorporate either in full or by reference the restrictions of this Covenant in any leases, licenses, or other instruments granting a right to use the Property.
- 7) Notification for proposed construction and land use. Owner shall notify the Department and EPA as the named third party beneficiary simultaneously when submitting any application to a local government for a building permit or change in land use that would authorize a land use prohibited under Section 1.
- 8) No Liability. The Department does not acquire any liability under State law by virtue of accepting this Covenant.
- 9) Enforcement. The Department and EPA as the named third party beneficiary may enforce the terms of this Covenant pursuant to §25-15-322, C.R.S., and may file suit in district court to enjoin actual or threatened violations of this Covenant.
- 10) Notices. Any document or communication required under this Covenant shall be sent or directed to:

Notices to the Department shall be provided to:

*[appropriate Program Manager or Unit leader]*  
Hazardous Materials and Waste Management Division  
Colorado Department of Public Health and the Environment  
4300 Cherry Creek Drive South  
Denver, Colorado 80246-1530

Notices to EPA shall be provided to:

EPA Remedial Project Manager  
California Gulch Superfund Site  
United States Environmental Protection Agency, Region 8  
(8EPR-SR)  
1595 Wynkoop Street  
Denver, CO 80202-1129







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Patricia Berger  
Lake County Recorder

**ATTACHMENT 1  
TO ENVIRONMENTAL COVENANT  
THE PROPERTY**

<b>Mineral Survey Number</b>	<b>Claim Name</b>
1536	Clear Grit
1778	Ella Beeler
2249	Montreal
2619	Slide
3160	American Liberty
3398	Constance
3391	Jane Eugene
3604	Almeda
3605	Josie
4033	Helena
4724	Bank
4727	Little Fred
4728	Eagle
4728	Iowa
5740	Harry Steele
9304	Tyrant Lode
15908	Lady Alice

Black Cloud Zone

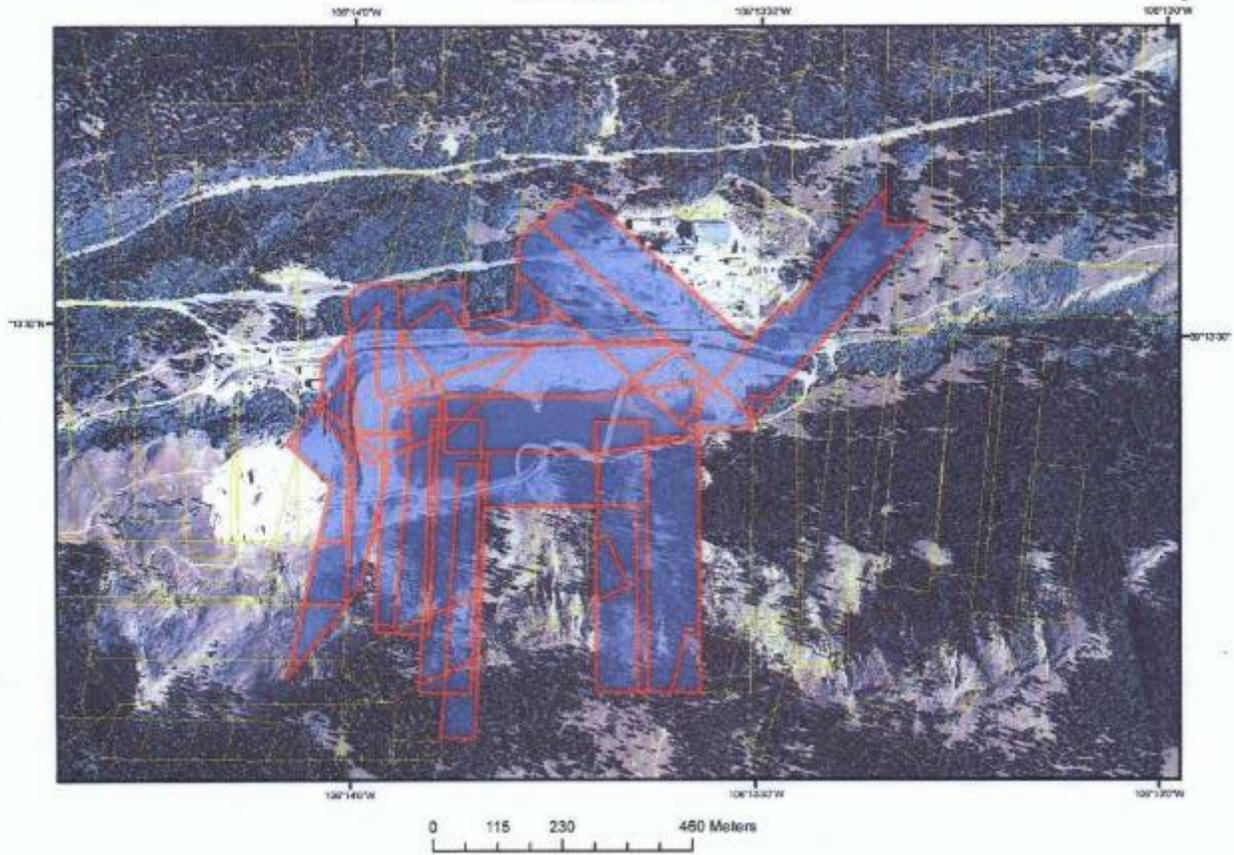


Figure K-8: 2012 Environmental Covenant for Resurrection Mining Company's Zone B properties

1242261 - R8 SDMS

## STATE OF COLORADO

John W. Hickenlooper, Governor  
Christopher E. Urbina, MD, MPH  
Executive Director and Chief Medical Officer

Dedicated to protecting and improving the health and environment of the people of Colorado

4300 Cherry Creek Dr. S.      Laboratory Services Division  
Denver, Colorado 80246-1530      8100 Lowry Blvd.  
Phone (303) 692-2000      Denver, Colorado 80230-6928  
Located in Glendale, Colorado      (303) 692-3090  
<http://www.cdphe.state.co.us>



Colorado Department  
of Public Health  
and Environment

October 10, 2012

Hon. Carl Schaefer  
Chairman, Board of County Commissioners  
Lake County Government  
505 Harrison Avenue  
P.O. Box 964  
Leadville CO 80461

RE: Environmental Covenant for Resurrection Mining Company's Zone B Properties

Dear Carl,

The enclosed Environmental Covenant for Resurrection Mining Company's Zone B properties has now been executed by all parties and filed with the Lake County Recorder.

As you know, the Colorado Environmental Covenant statute, C.R.S. § 25-15-321 to 327, requires that local governments notify the CDPHE when they receive applications affecting land use or development of land that is subject to an environmental covenant. In turn, the CDPHE must review the proposed application and provide timely advice to the local government as to whether the application is consistent with the terms of the covenant or restrictive notice.

Therefore, we respectfully request that you forward the enclosed environmental covenant to appropriate Lake County Departments to assist them in identifying applications that affect the land use or development of the parcels described in the covenant.

Please don't hesitate to contact me or Doug Jamison with any questions or comments.

Sincerely,

A handwritten signature in black ink, appearing to read "Craig Gander".

Craig Gander  
Project Manager  
Superfund and Voluntary Cleanup Unit  
Hazardous Materials and Waste Management Division

cc: Linda Kiefer  
USEPA Region 8  
8EPR-SR  
1595 Wynkoop St.  
Denver, CO 80202-1129



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Patricia Berger  
Lake County Recorder

Environmental Covenant for Zone B Property

**This property is subject to an Environmental Covenant held by the Colorado Department of Public Health and Environment pursuant to section 25-15-321, C.R.S.**

ENVIRONMENTAL COVENANT

Resurrection Mining Company ("Resurrection") grants an Environmental Covenant ("Covenant") this 29<sup>th</sup> day of July, 2012 to the Hazardous Materials and Waste Management Division of the Colorado Department of Public Health and the Environment ("the Department") pursuant to § 25-15-321 of the Colorado Hazardous Waste Act, § 25-15-101, *et seq.* The Department's address is 4300 Cherry Creek Drive South, Denver, Colorado 80246-1530.

WHEREAS, Resurrection is the owner of certain property situated in Lake County, Colorado, more particularly described in Attachment 1, attached hereto and incorporated herein by reference as though fully set forth (hereinafter referred to as "the Property"); and

WHEREAS, pursuant to that Consent Decree among Resurrection, Newmont USA Limited ("Newmont"), the State of Colorado and the United States, which was entered by the U.S. District Court for the District of Colorado on August 29, 2008 in *State of Colorado v. Asarco Incorporated, et al.* ("Consent Decree"), Resurrection has agreed to grant an Environmental Covenant in accordance with the terms thereof

NOW, THEREFORE, Resurrection hereby grants this Environmental Covenant to the Department with EPA as the third party beneficiary, and declares that the Property as described in Attachment 1 shall hereinafter be bound by, held, sold, and conveyed subject to the requirements set forth below, which shall run with the Property in perpetuity and be binding on Resurrection, its heirs, successors and assigns, and any persons using the land, as described herein. As used in this Environmental Covenant, the term "Owner" means the record owner of the Property and any other person or entity otherwise legally authorized to make decisions regarding the transfer of the Property or placement of encumbrances on the Property, other than by the exercise of eminent domain.

1) Use Restrictions.

- a. No Residential Use, Day Care Centers or Schools, as defined in Section 10, shall be allowed on the property. No portions of Parks or Open Space (as defined in Section 10 below) that are designed or intended to provide a designated play or recreation area for children shall be allowed. Prohibited play or recreation areas

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include designated picnic areas, playgrounds, ball fields, sand boxes and similar areas, but do not include trail systems or walkways.

- b. No use of untreated groundwater from wells located on the property for drinking, domestic, or agricultural purposes shall be allowed. This covenant does not restrict the use of groundwater that is treated to meet then applicable State water quality standards for the beneficial use to which the water is being applied. Treatment must meet any applicable standards that are in place at the time of use.
- c. No uses or activities that would disturb or have the potential to disturb caps, covers or other revegetated areas, or otherwise interfere or have the potential to interfere with or adversely affect the implementation, integrity, or protectiveness of the response actions that have been or will be performed or instituted on the property including, without limitation, water treatment plants, retaining ponds, adits, roads, ditches, pipelines, utility corridors, waste disposal facilities, monitoring wells, signs and governmental use restrictions and controls, shall be allowed. These restrictions will not apply to any future mineral prospecting, exploration or mining activities conducted on the property in accordance with the Colorado Mined Land Reclamation Act and implementing regulations.

2) Inspections.

The Department and EPA as the named third party beneficiary shall have the right of entry to the Property at reasonable times with prior notice for the purpose of determining compliance with the terms of this Covenant. Nothing in this Covenant shall impair any other authority the Department may otherwise have to enter and inspect the Property.

3) Termination.

This Covenant runs with the land and is perpetual, unless terminated or modified pursuant to this Section or Section 4. Owner may request that the Department approve a termination or modification of this Covenant. Consistent with C.R.S. 25-15-319(1)(h), the Department shall terminate this Environmental Covenant in whole or in part when, in addition to satisfying the requirements of C.R.S. 25-15-321(3) and (5), Owner provides the following applicable showings to the Department:

- a. Restrictions on Residential Use and other uses specified in Section 1.a shall be terminated on all or part of the property if Owner demonstrates to the Department that the concentration of lead in the upper 6 inches of soils on the property for which termination is sought does not exceed 3500 parts per million (ppm), and the concentration of arsenic in the upper 6 inches of soils on the property for which termination is sought does not exceed 340 ppm. Such demonstration can be made based on sampling analysis or evidence that the subject property is not impacted by any releases or threatened releases of hazardous substances. Any soil sampling conducted for purposes of terminating this Environmental Covenant shall be conducted in accordance with Attachment 2.



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Lake County Recorder

- b. Restrictions on using untreated groundwater from wells located on all or part of the property for drinking, domestic, or agricultural purposes shall be terminated if Owner demonstrates to the Department that concentrations of the constituents listed in Table 1 of Attachment 3 in the subject groundwater do not exceed State water quality standards for drinking, domestic, or agricultural purposes existing at the time of application. Current water quality standards are set forth in Table 1 of Attachment 3. Any ground water sampling conducted for purposes of terminating this Environmental Covenant shall be conducted in accordance with Attachment 3.
- c. Restrictions on uses or activities that would disturb or have the potential to disturb caps, covers or revegetated areas, or interfere or have the potential to interfere with or adversely affect the implementation, integrity, or protectiveness of the response actions that have been or will be performed or instituted on the property shall be terminated if the waste in place within the area proposed for disturbance is removed, or response facilities on the area proposed for disturbance are dismantled with the approval of EPA and the State.
- d. In addition to the grounds for termination set forth in Sections 3.a and 3.b, the Environmental Covenants shall also be terminated as to all or part of the Property if it is demonstrated to the Department that the proposed termination will ensure protection of human health and the environment, in accordance with C.R.S. 25-15-319(1)(h).

Consistent with C.R.S. 25-15-321(6), the Department shall provide to Owner a written determination on all applications to terminate an Environmental Covenant within 60 days after receipt of such application.

4) Modifications.

Consistent with C.R.S. 25-15-319(1)(h), the Department shall modify this Environmental Covenant in whole or in part when, in addition to satisfying the requirements of C.R.S. 25-15-321(3) and (5), Owner provides the following applicable showings to the Department:

- a. Restrictions on Residential Use and other uses specified in Section I.a shall be modified on all or part of the property if Owner demonstrates to the Department that portions of the subject property, where either soil lead levels exceed 3500 ppm or soil arsenic levels exceed 340 ppm, will be covered by a minimum of two inches of asphalt, pavement or concrete, or other structures that prevent human exposure to the soil.
- b. Restrictions on using untreated groundwater from wells located on all or part of the property for drinking, domestic, or agricultural uses shall be modified to eliminate the restriction against one or more of these uses, if Owner demonstrates to the Department that concentrations of the constituents listed in Table 1 of



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Patricia Berger  
Lake County Recorder

Attachment 3 in the subject groundwater do not exceed State water quality standards in existence at the time of the application for the beneficial use that would be allowed under the modification. Current water quality standards are set forth in Table 1 of Attachment 3. Any ground water sampling conducted for purposes of modifying this Environmental Covenant shall be conducted in accordance with Attachment 3.

- c. In addition to the grounds for modification set forth in Sections 4.a and 4.b, the Environmental Covenants shall also be modified as to all or part of the Property if it is demonstrated to the Department that the proposed modification will ensure protection of human health and the environment, in accordance with C.R.S. 25-15-319(1)(h).

Consistent with C.R.S. 25-15-321(6), the Department shall provide Owner a written determination on all applications to modify an Environmental Covenant within 60 days after receipt of such application.

5) Conveyances. Within thirty days (30) after any grant, transfer or conveyance of any interest in any or all of the Property, the transferring Owner shall notify the Department and EPA as the named third party beneficiary of such grant, transfer or conveyance.

6) Notice to Lessees. Owner agrees to incorporate either in full or by reference the restrictions of this Covenant in any leases, licenses, or other instruments granting a right to use the Property.

7) Notification for proposed construction and land use. Owner shall notify the Department and EPA as the named third party beneficiary simultaneously when submitting any application to a local government for a building permit or change in land use that would authorize a land use prohibited under Sections 1.a or 1.c.

8) No Liability. The Department does not acquire any liability under State law by virtue of accepting this Covenant.

9) Enforcement. The Department and EPA as the named third party beneficiary may enforce the terms of this Covenant pursuant to §25-15-322. C.R.S., and may file suit in district court to enjoin actual or threatened violations of this Covenant.

10) Notices. Any document or communication required under this Covenant shall be sent or directed to:

Notices to the Department shall be provided to:

*[appropriate Program Manager or Unit leader]*  
Hazardous Materials and Waste Management Division  
Colorado Department of Public Health and the Environment  
4300 Cherry Creek Drive South



Denver, Colorado 80246-1530

Notices to EPA shall be provided to:

EPA Remedial Project Manager  
California Gulch Superfund Site  
United States Environmental Protection Agency, Region 8  
(8EPR-SR)  
1595 Wynkoop Street  
Denver, CO 80202-1129

Notices to Resurrection shall be provided to:

Law Department  
Resurrection Mining Company  
1700 Lincoln Street, Suite 3600  
Denver, CO 80203

And

Director of Reclamation and Closure  
Resurrection Mining Company  
1700 Lincoln Street, Suite 3600  
Denver, CO 80203

Either party may change its designated notice recipient upon 5 days prior to notice to the other party.

11) Definitions.

"Day Care Center" means facilities that provide care, protection and supervision for children on a regular basis away from their primary residence for less than 24 hours per day.

1) Examples. Examples of Day Care Centers include preschools, nursery schools, and latch key programs. "Child Care Centers," as defined in C.R.S. §26-6-102(1), are classified as "day care" uses.

2) Exceptions. Day Care Centers do not include facilities operated in connection with an employment use, shopping center or other principal use, where children are cared for while parents or guardians are visiting the premises or in the immediate vicinity for a limited period of time

"Parks and Open Spaces" means areas consisting mostly of vegetative landscaping or outdoor recreation, community gardens, or public squares, and include open areas designed and developed for use by the occupants of a proposed development and by other persons for uses



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Lake County Recorder

including but not limited to recreation, parks, and greenbelts. The lands tend to have few structures.

1) Examples. Examples of Parks and Open Space include parks, golf courses, public squares, plazas, playgrounds, ballfields, recreation areas, botanical gardens, and nature preserves.

“Residential Use” means structures or facilities used for Household Living or Group Living, as defined below.

1) Household Living.

- A. Household Living is characterized by the residential occupancy of a dwelling unit by a household. Tenancy is arranged on a month-to-month or longer basis.
- B. Examples. Uses include living in houses, duplexes, triplexes, fourplexes and other multidwelling structures, retirement center apartments, manufactured housing and other structures with self-contained dwelling units.
- C. Exceptions. Lodging in a dwelling unit or where less than two thirds of the units are rented on a monthly or longer basis is considered a hotel or motel use and not residential.

2) Group Living.

- A. Group Living is characterized by the residential occupancy of a structure by a group of people who do not meet the definition of Household Living. Tenancy is arranged on a monthly or longer basis, and the size of the group may be larger than a family.
- B. Examples. The Group Living category includes assisted living facilities, treatment facilities, nursing homes and other institutions and arrangements providing care or boarding for a group of unrelated individuals.
- C. Exceptions.
  - 1. Lodging where tenancy is generally arranged for periods of less than 30 days is not considered to be residential.
  - 2. Facilities for people who are under judicial detainment and under the supervision of sworn officers are not considered residential.

“Schools” means public and private schools at the primary, elementary, middle, junior high, or high school level that provide state-mandated basic education, including associated play areas,







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Lake County Recorder

**ATTACHMENT 1  
TO ENVIRONMENTAL COVENANT  
THE PROPERTY**

<b>Mineral Survey Number</b>	<b>Claim Name</b>
217	Stone
274	Seventy-Six
300	Wm. Moyer Placer
341	Thompson Placer
378	Robinson Placer (all less tract 1,2,3)*
378	Robinson Placer Tract 3
410	Montgomery
441	Mike
442	Thomas Starr
443	Goodell
455	Uncle Sam
457	Eliza
460	Hope
469	Quartzite
475	Swamp Angel
490	Gilt Edge
502	Wild Cat
518	Little Johnny
545	Little Stella
563	Graham Placer
592	John Leary
643	Black Prince
735	McDermitt Placer Tract C
749	Humboldt
790	A.Y.
845	Rubie
917	Black
918	Ulster
947	Arnold Placer
969	Iron Rock
975	Minnie
989	Cleora Tract A
1036	Chas G. Arnold Placer
1124	Little Hattie
1326	Capitol
1427	Garden City
1619	Alma
1627	Antioch
2163	Lady Adele
2291	Charlie B.
2296	Smasher
2309	Fortune
2364	Chapman Placer Mine Tract 3
2496	Accident
3004	R.J.
3069	Helen
3438	Fanny
3500	Golden Gate



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Lake County Recorder

**Mineral Survey Number**

3556  
3901  
4080  
4668  
4668  
5541  
6279  
7230  
13097  
13167  
15320  
17841  
18136  
18590  
1610 A.M.  
768 A.M.

**Claim Name**

Champion  
Lupe, Lupe(No. End), Lupe(So. End)  
Gaw Placer  
Cache  
Loop (Part of Cache,Hoop & Loop)  
Carr  
Xmas  
Bonnie Kate  
Constance  
Free Coinage  
Mabel  
Ausable  
Adirondack  
Hand Saw  
Confident  
Ocean Wave

Note: \* Environmental Covenant will be provided on surveyed portion of Robinson Placer that encompasses the Oregon Gulch Tailing Impoundment seep collection system and conveyance channel



**ATTACHMENT 2  
TO ENVIRONMENTAL COVENANT  
SOIL SAMPLING PROCEDURES**

**Soil Sampling and Analysis Plan**

This attachment specifies the soil sampling procedures for purposes of terminating an Environmental Covenant restricting Residential Uses or other uses specified in paragraphs A.2.a or A.3.a of Appendix F1. Those restricted uses are collectively referred to herein as "Uses." For purposes of this protocol, a "property" is defined as a portion of a claim, an individual claim or contiguous claims on which an Environmental Covenant restricting Uses is proposed to be terminated. A portion of the subject property proposed for Uses may also be subdivided for purposes of terminating or modifying an Environmental Covenant for only the subdivided portion of the property. The following sections describe the soil sampling requirements, methods, sample analysis, and quality assurance to support termination of the Environmental Covenant. Alternate soil sampling protocols and analysis methods may be proposed in a site-specific sampling plan for the property, subject to approval by the State.

**1.1 Soil Sampling Requirements and Protocols**

Soil samples will be collected to a total depth of six inches, except in areas that are covered or will be covered with a minimum 2-inch thick layer of asphalt or concrete or other structures that prevent human exposure to soil, or will be covered within a minimum thickness of six inches of imported clean soil. Soil samples will be collected at two depth intervals: one from 0-2 inches deep and one from 2-6 inches deep. Each of these two soil samples will consist of a composite collected from three subsamples from the same depth interval, as described in Section 1.2 below.

Composite samples for each depth interval (0-2 inches and 2-6 inches) will be collected at four locations per acre, with not less than four composite samples collected for each depth interval a property. The composite samples will be equally spaced within the property. Each composite sample will consist of three subsamples of approximately equal amounts of soil collected from the same depth interval. At each composite sample location, the subsamples will be collected in a triangular pattern with the subsamples spaced approximately five feet apart. The composite sample will consist of the three subsamples collected from the same depth interval.

If any deposits of mining, milling, or smelting related materials (waste rock, tailing, or slag) are known or suspected to be present within the property, the footprint of these areas will be defined as separate sampling areas not to exceed 10,000 square feet each (100 feet by 100 feet). A composite sample (minimum of three subsamples) will be collected from the materials within each sampling area to a single sampling depth of 0-6 inches, or less, if the materials are shallower.

Imported soil shall be sampled as defined below to demonstrate that the imported soil has lead and arsenic concentrations less than 3,500 mg/Kg and 340 mg/Kg, respectively, for Residential Use.



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Patricia Berger  
Lake County Recorder

Prior to soil sampling, a site sampling plan will be developed and the sampling areas and sampling locations will be plotted on a site plan. The site sampling plan will show the property boundaries and any existing residential structures, commercial facilities, or improvements. The sampling areas and sampling locations will be identified on the site sampling plan. In addition, any known or suspected deposits of mine, mill or smelter related materials (tailing, waste rock, or slag) will also be delineated on the site sampling plan with sampling locations identified.

### 1.2 Soil Sample Collection and Handling Procedures

Soil samples will be collected using a plastic or stainless steel trowel, soil probe, hand auger, spade or drive sampler. A pick or spade may be utilized, as necessary, to loosen the soil for sample collection. The specific sampling tool utilized will be dependent on the soil composition and density. Additional sampling equipment may include stainless steel bowls, measuring tape, hand-held GPS, plastic sample bags, camera, log book, pen, pencil, and marker.

At each composite sample location, a subsample will be collected at each apex of a triangle spaced approximately five feet apart. At each subsample location, any loose debris and any sod or dense vegetation will be removed from an area approximately six inches in diameter. Samples will not be collected under or immediately adjacent to trees, shrubs and or structures. A soil sample will be collected at the same subsample location to a depth of 0-2 inches and then 2-6 inches using the sampling tool. Approximately the same volume of soil should be collected at each subsample location for each depth. The soil from each subsample will be collected into a separate clean plastic bag or stainless steel bowl for each sample depth interval. For each composite sample, combine the subsamples from the same depth interval together in a sealed plastic bag and mix by hand in the sealed bag. Label the plastic bag with the property identification, sampling area, depth interval, and date of collection. A chain of custody form will be maintained for all soil samples from the time of collection until its final deposition.

All equipment used for soil sampling will be dedicated or will be decontaminated prior to sample collection. Decontamination equipment will include, pump sprayers, spray bottles, deionized water, phosphate free soap solution, scrub brushes, buckets, disposable gloves, etc. Field personnel will wear disposable polyethylene gloves to avoid sample cross contamination during the collection of soil samples.

### 1.3 Imported Soil

Soil imported to a property for use within the upper six inches of the final ground surface will be sampled to demonstrate that the lead and arsenic concentrations achieve acceptable concentrations for residential use and that the lead concentrations achieve acceptable concentrations for commercial use, as defined in Appendix F1. For up to 1,000 cubic yards of imported soil delivered to a property, a sample will be collected every 250 cubic yards. For volumes greater than 1,000 cubic yards, a sample of the imported soil will be collected for every 500 cubic yards.

### 1.4 Equipment Decontamination

Sampling equipment will be decontaminated between sample collection points, if the equipment is not disposable, in order to avoid cross contamination between samples. Field personnel will



wear disposable gloves while decontaminating equipment. The following procedures will be followed to ensure that sampling equipment is decontaminated:

- 1) Visually inspect sampling equipment for soil; a stiff brush will be used to remove any visible material
- 2) Wash the field equipment with phosphate free soap and water, rinse with distilled water, and air dry or wipe with disposable paper towels
- 3) Water used for decontamination will be disposed of on site. All disposable items such as, paper towels, disposable gloves and wash cloths, will be deposited into a garbage bag and disposed of in a solid waste landfill

#### 1.5 Soil Sample Documentation

Field sampling information will be recorded in a field logbook or field sampling forms. Information that will be recorded at each composite soil sampling location will include the location (e.g. determined by hand-held GPS or measured to a defined reference point) and sampling depth interval. The documents to be completed for each composite sample in each sampling area are:

- Site Plan (Plot Plan)
- Chain-of-Custody transmittal form
- Sample tag and/or label
- Sample master log

All pertinent sampling information will be recorded on a field logbook. Entries will be made in the field documents in indelible ink, with all corrections consisting of initialed line-out deletions. Each day's entries will be initialed and dated at the end of each day by the field sampling crew.

At minimum, entries in the field log shall include:

- Date and time
- Site description (i.e., physical address and assessor parcel number)
- Description of weather conditions
- Names of field sampling crew
- Description of site conditions and any unusual circumstances
- Location of sample site, including map reference
- Equipment identification
- Details of actual work effort, particularly any deviations from the aforementioned methods
- Field observations
- Details of photo documentation, if any



#### 1.6 Soil Sample Packaging and Shipping

Each sample container will be properly labeled in the field. All containers will be checked for proper seal and entered by sample number on the chain of custody form. After collection, composite samples will be placed in an insulated cooler for storage in the field. Samples will be shipped to the laboratory in a cooler with ice. The ice in the cooler will be double-bagged. One copy of the chain of custody form will be enclosed in a plastic bag in each cooler containing the samples identified on the form. The cooler will be taped shut and custody seals will be attached to the outside of the cooler to ensure that the cooler cannot be opened without breaking the seal. The cooler will be shipped using an authorized shipping service to the laboratory for analysis.

#### 1.7 Soil Sampling Quality Control

Duplicate samples will be collected and submitted to the laboratory to evaluate the precision and reproducibility of sampling and analysis procedures. Duplicate samples will be collected at a minimum of one for every 10 soil composite samples. The duplicate samples will be collected, preserved, packaged, and handled in the same manner as the soil samples. No equipment blanks or field blanks will be collected.

#### 1.8 Laboratory Analytical Protocols

The soil samples will be analyzed by the laboratory using methods detailed in Test Methods for Evaluating Solid Waste, Revised Methods, SW-846. The laboratory shall be accredited by the Colorado Certification Program. For Residential Development, samples will be analyzed for arsenic and lead. For Commercial Development, soil samples will be analyzed for lead. Soil samples will be digested in accordance with SW-846 EPA Method 3050. After digestion, all samples will be analyzed by EPA Method 6010B.

The report of analytical results will include a cover letter from the laboratory identifying the sample group and any non-complaint quality control results together with the affected samples. Attached to the cover letter will be a summary of sample results and a summary of quality control results. The summary of quality control results will include instrument performance results such as standard recoveries and blanks results; matrix QC results such as spikes, duplicates and procedural blanks; and laboratory control standard recoveries.



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**ATTACHMENT 3  
TO ENVIRONMENTAL COVENANT  
GROUNDWATER SAMPLING PROTOCOLS**

**Groundwater Sampling and Analysis Plan**

This attachment specifies the groundwater sampling procedures for purposes of terminating or modifying an Environmental Covenant for groundwater use restrictions, as specified in Appendix F1. For purposes of the protocol, a "property" is defined as a portion of a claim, an individual claim or contiguous claims not exceeding 35 acres in total area for which the groundwater use restrictions of an aquifer are to be terminated. The following sections describe the groundwater sampling requirements, methods, sample analysis, and quality assurance that will support such termination or modification. Alternate groundwater sampling procedures and analysis methods for a property may be proposed in a site-specific sampling plan for the property, subject to approval by the State.

**1.9 Groundwater Sampling Requirements**

One groundwater sample will be collected from a well completed in the aquifer of the hydrogeologic unit (alluvial, unconsolidated sedimentary deposits, or bedrock) proposed for beneficial use underlying each property. For alluvial or unconsolidated sedimentary deposits, the hydrogeologic unit is defined as the aquifer with the same lithology and within the same surface water hydrologic divide. The bedrock hydrogeologic unit is defined as the aquifer within the same geologic formation and structure. The groundwater use restrictions will be terminated or modified for a property for only that aquifer of the hydrologic unit in which the well is completed.

The groundwater sample from the well will be analyzed for constituents that are relevant to the California Gulch Superfund Site for which numeric groundwater quality standards have been established by the State for the proposed beneficial use at the time of the application for termination or modification of the Environmental Covenant, hereafter referred to as the Numeric Standards. The constituents that are relevant to the California Gulch Superfund Site and the current Numeric Standards are presented in Table 1 for drinking/domestic or agricultural uses. The groundwater in the aquifer will be determined acceptable for the proposed use, and the Environmental Covenant restricting groundwater will be terminated for the property or modified to allow a particular beneficial use, if the constituent concentrations of the sample from the well are less than the Numeric Standards for all beneficial uses (in the event of termination) or the particular beneficial use (in the event of modification).

**1.10 Groundwater Sampling Methods**

The groundwater sample from the well will be collected according to the methods described in SOP No. 4-Ground Water Well Sampling. Non-dedicated or non-disposable sampling equipment will be decontaminated prior to collection of the sample according to the methods described in SOP No. 1-Decontamination. Sample collection documentation, sample



containment, preservation, identification, labeling and shipping will be performed according to the procedures described in SOP No. 7- Sample Handling, Documentation, and Analysis.

**I.11 Laboratory Analytical Methods**

Samples will be analyzed for the parameters for which Numeric Standards have been established for the proposed beneficial use. Sample container, preservation, and holding times are provided in SOP No. 7-Sample Handling, Documentation, and Analysis. The laboratory will be required to process all samples submitted according to the specific protocols for sample custody, holding times, analysis, reporting and associated laboratory quality assurance. Laboratory quality assurance checks will include the use of blank, spiked, split, and duplicate samples, calibration checks, and internal standards. Designated laboratory personnel will be required to ensure that QA/QC procedures are achieved. The laboratory or laboratories for constituent analysis must be accredited by the Colorado Certification Program. Laboratory calculations and data review will be performed by the laboratory in accordance with the procedures described by the analytical method. The laboratory will review the results of the laboratory QC analyses, instrument calibration and maintenance records, calculations, and the record of sample custody (including holding times) within the laboratory.

**Table 1 Groundwater Standards for Beneficial Use**

Parameter	Domestic Water Supply and Drinking Water Standards	Agricultural Standards
Antimony-dissolved	0.006 mg/L	
Aluminum-dissolved		5 mg/L
Arsenic-dissolved	0.01 mg/L	0.1 mg/L
Barium-dissolved	2.0 mg/L	
Beryllium-dissolved	0.004 mg/L	0.1 mg/L
Cadmium-dissolved	0.005 mg/L	0.01 mg/L
Chloride-dissolved	250 mg/L	
Chromium-dissolved	0.1 mg/L	0.1 mg/L
Copper-dissolved	1.0 mg/L	0.2 mg/L
Fluoride-dissolved	4.0 mg/L	2 mg/L
Iron-dissolved	0.3 mg/L	5 mg/L
Lead-dissolved	0.05 mg/L	0.1 mg/L
Manganese-dissolved	0.05 mg/L	0.2 mg/L
Mercury-dissolved	0.002 mg/L	0.01 mg/L
Molybdenum-dissolved	0.035 mg/L	
Nickel-dissolved	0.1 mg/L	0.2 mg/L
Selenium-dissolved	0.05 mg/L	0.02 mg/L
Silver-dissolved	0.05 mg/L	
Sulfate-dissolved	250 mg/L	
Thallium-dissolved	0.002 mg/L	
Zinc-dissolved	5 mg/L	2 mg/L



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pH	6.5 - 8.5	6.5-8.5
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## SOP-1

*SOP Date: February 2008*

# DECONTAMINATION

## 1.0 INTRODUCTION AND TYPES OF CONTAMINATION

The purpose of this document is to define the standard procedure for decontamination associated with environmental investigation for the California Gulch Superfund Site. This procedure is intended to be used with other SOPs.

### 1.1 Site and/or Sample Cross-Contamination

The overall objective of multimedia sampling programs is to obtain samples which accurately depict the chemical, physical, and/or biological conditions at the sampling site. Extraneous contaminant materials can be brought onto the sampling location and/or introduced into the medium of interest during the sampling program (e.g., by contacting water with equipment previously contaminated at another sampling site). Trace quantities of these contaminant materials can thus be captured in a sample and lead to false positive analytical results and, ultimately, to an incorrect assessment of the contaminant conditions associated with the site. Decontamination of non-dedicated or non-disposable sampling equipment (e.g., bailers, pumps, and tubing) and field support equipment (e.g., drill rigs, vehicles) is required. To ensure that sampling cross-contamination is prevented, and that on site contaminants are not carried off site.

## 2.0 PROCEDURES

### 2.1 Equipment List

The following is a list of equipment that may be needed to perform decontamination:

- Bmshes
- Wash tubs
- Buckets
- Scrapers
- Steam cleaner or high-pressure washer
- Paper towels
- Alconox detergent (or equivalent)
- Potable water
- Deionized or distilled water
- Garden type water sprayers
- Clean plastic sheeting and/or trash bags

### 2.2 Decontamination



### 2.2.1 Sampling Equipment

The following steps will be used to decontaminate non-dedicated or non-disposable sampling equipment (including reusable filter apparatus):

Personnel will dress in suitable safety equipment to reduce personal exposure (e.g., latex gloves, safety glasses, etc.).

Gross contamination on equipment will be scraped off at the sampling or construction site.

Equipment that will not be damaged by water will be washed with an Alconox solution or low-sudsing detergent and potable water and scrubbed with a bristle brush or similar utensil (if possible). Equipment will be triple rinsed with potable water followed by a triple rinse with deionized or distilled water.

Following decontamination, equipment will be placed in a clean area, on or in clean plastic sheeting to prevent contact with contaminated soil. If the equipment is not used immediately, the equipment will be covered or wrapped in plastic sheeting or heavy duty trash bags to minimize potential airborne contamination.

### 2.2.2 Submersible Pumps

If non-dedicated submersible pumps are used they will be decontaminated between wells. The outside of the pump and hose will be triple rinsed with deionized or distilled water. Deionized or distilled water will be pumped through the pump and hose. The volume of deionized or distilled water pumped through will be at a minimum equal to three times the volume of fluid that could be contained by the pump and hose.

### 2.2.3 Water Level Probes

Electric water level probes will be decontaminated by rinsing with deionized or distilled water or by wiping the probe during removal with paper towels wetted with deionized or distilled water. The water level probe will be placed in a plastic bag after decontamination.

### 2.2.4 Sensitive Equipment

Sensitive equipment that may be damaged by water will be carefully wiped clean using paper towels and detergent water or spray bottle and towel and rinsed with deionized or distilled water. Care will be taken to prevent any equipment damage.

### 2.2.5 Drilling and Heavy Equipment

Drilling and heavy equipment will be decontaminated at a designated decontamination area for large equipment. The following steps will be used to decontaminate drilling and heavy equipment:

Personnel will dress in suitable safety equipment to reduce personal exposure (e.g., gloves, safety glasses or splash shields, etc.).



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Equipment showing gross contamination or having drill cuttings caked on will be scraped off with a flat-bladed scraper at the sampling or construction site.

Equipment, such as drill rigs, augers, drill bits, and shovels will be sprayed with potable water by a high-pressure washer. Care should be taken to adequately clean the insides of the hollow-stem augers and backhoe buckets.

Following decontamination, drilling equipment will be placed on the clean drill rig and moved to a clean area. If the equipment is not used immediately, it should be stored in a designated clean area.

#### **2.2.6 Equipment Leaving the Site**

Vehicles used for non-intrusive activities shall be cleaned on an as needed basis. Construction equipment such as earth moving equipment, trucks, drilling rigs, backhoes, trailers, etc., will be pressure washed at the designated decontamination area before the equipment is removed from the site.

#### **2.2.7 Wastewater**

Used wash and rinse solutions may be discharged to the ground at the sampling site

#### **2.2.8 Other Wastes**

Solid wastes such as paper towels and used filters will be sealed in plastic garbage bags and disposed of in a sanitary landfill.

#### **2.3 Documentation**

Sampling personnel will be responsible for documenting the decontamination of sampling and drilling equipment. The documentation will be recorded with waterproof ink in the sampler's field notebook with consecutively numbered pages. The information entered in the field book concerning decontamination should include the following:

- Decontamination personnel
- Date
- Decontamination observations



## **SOP-4**

*SOP Date: February 2008*

# **GROUNDWATER WELL SAMPLING**

### **1.0 PURPOSE AND SCOPE**

The purpose of this document is to define the standard procedure for collecting groundwater samples from wells for the California Gulch Superfund Site. This procedure gives descriptions of equipment, field procedures, and QA/QC procedures necessary to collect groundwater samples from wells. The sample locations and frequency of collection are specified in the QAPP.

This procedure is intended to be used together with several other SOPs, as applicable, including:

SOP 1 Decontamination

SOP 7 Sample Handling, Documentation, and Analysis

### **2.0 WATER SAMPLING PROCEDURES**

#### **2.1 Equipment List**

Sample bottles, preservatives, sample labels will be obtained from the analytical laboratory. Several extra sample bottles will be obtained in case of breakage or other problems. Sample bottles can be either pre-preserved or preservatives can be added in the field.

Equipment that may be used during well evacuation:

- Well keys
- Electronic water level probe
- Assorted tools (knife, screwdriver, etc.)
- PVC, Teflon, or stainless-steel bailer (bottom filling)
- PVC hand pump
- Nylon or polypropylene rope
- Bailer tripod
- PVC pump discharge hose
- Gas-powered electric generator
- Stainless-steel submersible pump
- pH meter (with automatic temperature compensation)
- Specific conductivity meter
- Plastic squeeze bottle filled with deionized water
- Polyethylene or glass container (for field parameter measurements)
- Chemical-free paper towels or Kimwipes



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Calculator  
Field notebook  
Waterproof pen  
Plastic sheeting (for placing around well)  
Appropriate health and safety equipment

**Equipment that may be used during well sampling:**

Electronic water level measurement probe  
PVC, Teflon, or stainless-steel bailers (bottom filling)  
Stainless-steel submersible pump  
PVC pump discharge hose  
Electric generator  
Nylon or polypropylene rope or twine  
Bailer tripod  
pH meter (with automatic temperature compensation)  
Specific conductivity meter  
Plastic squeeze bottle filled with deionized water  
Sample bottles  
Dedicated jug for holding sample for filtering  
Cooler with ice  
Polyethylene or glass jar for field measurement samples  
Sample labels

**Equipment used during sample filtration:**

Disposable filterware with 0.45-micron filter  
Hand pump or peristaltic pump  
Tygon or silicon tubing (2- to 4 ft lengths)

**Equipment used during decontamination:**

Deionized or distilled water  
Decontamination buckets/pails  
Paper towels  
Plastic brushes  
Sprayers

**2.2 Sampling Procedures**

This section gives the step-by-step procedures for collecting samples in the field. Observations made during sample collection should be recorded in the field notebook and field data sheet as specified in Section 2.4 of this SOP.

**2.2.1 Decontaminate Equipment**



Before any evacuation or sampling begins, all well probes, bailers, and other sampling devices shall be decontaminated. If dedicated equipment is used, it should be rinsed with deionized water. Dedicated downhole pumps will not be decontaminated. A discussion of equipment and personnel decontamination is contained in SOP No. 1, Decontamination, and in the site Health and Safety Plan.

### 2.2.2 Instrument Calibration

Electronic equipment used during sampling includes a pH meter with temperature scale, a conductivity meter and a turbidity meter. Before going into the field, the sampler shall verify that all of these are operating properly. The pH and conductivity meters require calibration and calibration checks every day prior to use. The turbidity meter requires a calibration check by reading measurements cells of a known value. Calibration times and readings will be recorded in a notebook and/or on Calibration Data Sheet, which are to be kept by the field sampler.

### 2.2.3 Evacuate Well

The purpose of well purging is to remove stagnant water from the well to obtain representative water from the geologic formation being sampled while minimizing disturbance to the collected samples. Before a sample is taken, the well will be purged until a minimum of three well casing volumes have been removed and field parameters have stabilized, or until a maximum of five well volumes have been removed. Purging will be considered completed if the well is pumped or bailed dry. A well should be pumped at a rate no faster than approximately 1 gallon per minute if it has a tendency to dry up prior to evacuating three casing volumes. Evacuated well water may be disposed of at the well site in a manner that does not cause runoff.

Before well purging begins, the following procedures are to be performed at each well:

- Note the condition of the outer well casing, concrete well pad, protective posts (if present), and any other unusual conditions in the area around the well.
- If bailing place clean plastic sheeting around the well.
- Open the well.
- Note the condition of the inner well cap and casing.
- Measure (to nearest 0.01 foot) and record depth of static water level from the measuring point on the well casing and indicate time. Record what the measuring point is (i.e., notch on north side, top of PVC well casing).
- Calculate volume of water in the well casing in gallons based on feet of water and casing diameter. (See Section 2.4.3 for calculation of volumes.)
- From the above calculation, calculate the three casing volumes to be evacuated.
- Obtain an initial sample (which is not retained) from the bailer or purge pump for field measurements (temperature, conductivity, and pH measurements) and observation of water quality.



Evacuate three volumes of water in casing with a bailer or pump. Take temperature, specific conductance, and pH measurements after evacuation of each well volume to confirm that the water chemistry has stabilized. Generally, pH values within  $\pm 0.2$  pH unit and conductivity and temperature readings within  $\pm 10$  percent between consecutive readings indicate good stability of the water chemistry. If the chemistry is not stable, continue purging up to a maximum of five well volumes, measuring pH and specific conductance after each one half well volume.

When evacuating a well using a pump, the pump intake should be placed:

for low recovery wells (wells that can be pumped dry), place pump intake at bottom of screened interval.

for high recovery wells (little drawdown with pumping), place pump at or slightly above the middle of the screened interval to ensure the removal of stagnant water from the well bore.

If the well is bailed or pumped dry during evacuation, it can be assumed that the purpose of removing 3 well volumes of water has been accomplished, that is, removing all stagnant water that had prolonged contact with the well casing or air. If recovery is very slow, samples may be obtained as soon as sufficient water is available.

#### 2.2.4 Obtain Water Samples

Obtain samples for chemical analysis within 2 hours after purging is completed, if possible. For slow recovering wells, the sample shall be collected immediately after a sufficient volume is available (water has recovered to screened interval). The water quality samples shall be taken from within the well screen interval.

The following sampling procedure is to be used at each well:

1. Assemble decontaminated sampling equipment. If bailers are used, new nylon or polypropylene rope will be used for each well for each sampling event. Assemble the filtering apparatus.
2. Make sure that sample labels have been filled out for each well.
3. Lower the bailer slowly and gently into contact with the water in the well. Lower the bailer to the same depth in the well each time, within the screened interval. Retrieve the bailer smoothly and empty the water in a slow steady stream into the containers. If submersible or bladder pumps are utilized to collect samples, start the pump and fill the sample bottles as described below.
4. Triple rinse the sample containers with sample water and then fill the sample bottles. If not enough sample water is available to perform the triple rinse, then at a minimum a single rinse will be performed and will be recorded in the field logbook and/or data sheet. Cap the sample containers quickly. If sample bottles are pre-preserved, fill the sample bottles without rinsing. Add preservative if the bottle is not pre-preserved. Do not allow the sample containers with preservatives to overflow. See Section 2.2.5 for details on field filtering.



5. Slowly pour an unfiltered portion into the sample container for field parameter (pH, specific conductance, temperature, and turbidity) analyses and perform the in-field analyses and record.
6. Place samples on ice in a cooler.
7. Record time of sampling.
8. Replace and lock well cap.
9. Complete field documentation.

### 2.2.5 Filtering Samples

Samples for metals analyses will be filtered during the field sampling event by using a disposable filter apparatus and peristaltic or hand vacuum pump.

The following procedure is to be used for filtering:

Assemble filter device according to manufacturer's instructions.

Prior to the collection of aliquots, flush the filter with approximately 100 to 200 milliliters of groundwater. Filter sample either by pouring sample in the top portion of filter unit or pumping through an in line filter using a peristaltic pump. Sample may also be filtered by attaching the in-line filter to the submersible pump discharge.

Triple rinse the sample containers with filtered sample water and then fill the sample bottles. If not enough sample water is available to perform the triple rinse, then at a minimum a single rinse will be performed and will be recorded in the field logbook and/or data sheet. Cap the sample containers quickly. If sample bottles are pre-preserved, fill the sample bottles without rinsing. Add preservative if the bottle is not pre-preserved. Do not allow the sample containers with preservatives to overflow.

Place the used filter membrane or disposable filter equipment in a Ziploc<sup>®</sup> bag for disposal with the personal protective equipment.

Any reusable filtering equipment will be decontaminated in accordance with SOP No. 1.

### 2.3 Sample Handling

Sample containers and preservatives are specified in SOP No. 7, Sample Handling, Documentation and Analysis. Samples will be labeled and handled as described in SOP No. 7.

### 2.4 Documentation

#### 2.4.1 Groundwater Data Sheet

A groundwater data sheet for groundwater samples (Appendix A) will be completed at each sampling location. The data sheet will be completely filled in. If items on the sheet do not apply



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to a specific location, the item will be labeled as not applicable (NA). The information on the data sheet includes the following:

- Well number
- Date and time of sampling
- Person performing sampling
- Depth to water before sampling
- Volume of water evacuated before sampling
- Conductivity, temperature, and pH during evacuation (note number of well volumes)
- Time samples are obtained
- Number of samples taken
- Sample identification number(s)
- Preservation of samples
- QC samples taken (if any)
- How the samples were collected (i.e., bailer, pump, etc.)

#### 2.4.2 Field Notes

Field notes shall be kept in a bound field book. The following information will be recorded using waterproof ink:

- Names of personnel
- Weather conditions
- Date and time of sampling
- Location and well number
- Condition of the well
- Decontamination information
- Initial static water level and total well depth
- Calculations (e.g., calculation of evacuated volume)
- Calibration information
- Sample methods, or reference to the appropriate SOP

#### 2.4.3 Well Volume Calculations

The following equation shall be used to calculate the volume of water to be removed during well evacuation.

For 2 inch well:

$$\text{Evacuation Volume [gal]} = (\text{Total Depth [ft]} - \text{Water Level Depth [ft]}) \times 0.1632 \text{ gal/ft}$$

$$= \text{gallons/well casing volume}$$

For 4-inch well:

$$\text{Evacuation Volume [gal]} = (\text{Total Depth [ft]} - \text{Water Level$$



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Depth [ft] x 0.6528 gal/ft

For 6-inch well: = gallons/well casing volume

Evacuation Volume [gal] = (Total Depth [ft] - Water Level  
Depth [ft]) x 1.4688 gal/ft

= gallons/well casing volume

Multiply the volume of one well casing volume by 3 to obtain the minimum volume of water to be evacuated.



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**APPENDIX A  
GROUNDWATER DATA SHEET**





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Was a rinsate sample collected?  
)

Yes  No  (sample control number \_\_\_\_\_)

Notes: \_\_\_\_\_



## SOP-7

SOP Date: February 2008

# SAMPLE HANDLING, DOCUMENTATION, AND ANALYSIS

### 1.0 PURPOSE AND SCOPE

The purpose of this document is to define the standard protocols for sample handling, documentation, and analysis for the California Gulch Superfund Site. This procedure is intended to be used together with other SOPs and is referenced in all SOPs that apply to sampling.

### 2.0 PROCEDURES FOR SAMPLE HANDLING, DOCUMENTATION, AND ANALYSIS

#### 2.1 Sample Identification and Labeling

Samples collected during monitoring, investigations, or remediation activities will be assigned unique sample identification numbers. Each sample identification number will identify the organization collecting the sample or the program under which it is collected, sampling location, type of sample, and sampling sequence for each sample. These numbers are required for tracking the handling, analysis, and verification or validation status of all samples collected during monitoring. In addition, the sample identification numbers will be input into the project database to identify analytical results received from the laboratory.

Sample identification numbers that are assigned will be divided into four fields as shown in the following example:

M-CGW1-01-900423

The first field is one character in length and identifies the company conducting the sampling. The second field is an alphanumeric code identifying the location of the sample and the last letter of this field indicates the matrix (e.g., CGM1 indicates California Gulch Well No. 1, the second W indicates a water matrix). The next field identified is the type of sample being collected; this is used to identify whether the sample is a primary or grab sample, a composite sample, field duplicate, field blank, or equipment rinsate. The final field contains the date in a year-month-day format. For example, the sample identified above was collected on April 23, 1990.

Each sample that is collected in the field will be labeled for future identification. Sample labels will be filled out as completely as possible by a member of the sampling team prior to the start of the day's field sampling activities. The date, time, sampler's signature, and the last field of the sample identification number should not be completed until the sample is actually collected. All sample labels will be filled out using waterproof ink. At a minimum, each label will contain the following information:



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Sampler's company affiliation;  
Site location;  
Sample identification;  
Date and time of sample collection;  
Method of preservation used;  
Sample matrix; and  
Sampler's initials.

## 2.2 Sample Containers, Preservatives, and Holding Times

### 2.2.1 Sample Containers

Proper sample preparation practices will be observed to minimize sample contamination and potential repeat analyses due to anomalous analytical results. Prior to sampling, commercially-cleaned sample containers will be obtained from the analytical laboratory. The bottles will be labeled as described in the previous section to indicate the type of sample and sample matrix to be collected. Sample bottles can be either pre-preserved from the laboratory or preservatives can be added in the field during sample collection.

### 2.2.2 Sample Preservation

Samples are preserved in order to prevent or minimize chemical changes that could occur during transit and storage. Sample preservation should be performed immediately upon sample collection to ensure that laboratory results are not compromised by improper coordination of preservation requirements and holding times. Samples will be preserved immediately and stored on ice in coolers prior to shipping. Sample preservation requirements are based on the most current publication of 40 CFR, Part 136.3 and are provided in Table 1.

### 2.2.3 Sample Holding Times and Analyses

Sample holding times are established to minimize chemical changes in a sample prior to analysis and/or extraction. A holding time is defined as the maximum allowable time between sample collection and analysis and/or extraction, based on the nature of the analyte of interest and chemical stability factors. Holding times applicable for analytes are listed in Table 1. Samples should be sent to the laboratory as soon as possible after collection by hand delivery or an overnight courier service to minimize the possibility of exceeding holding times.

For most samples, preservation by cooling to 4°C is required immediately after collection while the samples are held for shipment and during shipment to the laboratory.

## 2.3 Sample Preparation and Shipping

After collection, samples will be labeled and prepared as described in the previous discussion, and placed on ice in an insulated cooler. The sample containers will be placed in re-closeable plastic storage bags. Samples will then be placed right side up in a cooler with ice for delivery to the laboratory. The ice in the cooler will be double-bagged. The coolers will be taped shut and



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chain-of-custody seals will be attached to the outside of the cooler to ensure that the cooler cannot be opened without breaking the seal. Final packaging and shipping will be conducted in compliance with current IATA Resolution 618 and DOT 49 CFR Part 171 Regulations.

All samples will be shipped for laboratory receipt and analysis within the holding times specified in Table 2. This may require daily shipment of samples with short holding times.

## 2.4 Sample Documentation and Tracking

This section describes the information that should be provided in field notes and sample Chain-of-Custody documentation.

### 2.4.1 Field Notes

Documentation of observations and data acquired in the field provide information on sample acquisition, field conditions at the time of sampling, and a permanent record of field activities. Field observations and data collected during routine monitoring activities will be recorded with waterproof ink in a permanently bound weatherproof field log book with consecutively numbered pages or on field data sheets as specified in the project SOPs.

Field notebook and/or data sheet entries will, at a minimum, include the information listed below. Relevant SOPs should be consulted to supplement this list.

- Project name;
- Location of sample;
- Data and time of sample collection;
- Sample identification numbers;
- Description of sample (matrix sampled);
- Sample depth (if applicable);
- Sample methods, or reference to the appropriate SOP;
- Field observations;
- Results of any field measurements, such as depth to water, pH, temperature, specific conductance; and
- Personnel present.

Changes or deletions in the field book or on the data sheets should be recorded with a single strike mark, and remain legible. Sufficient information should be recorded to allow the sampling event to be reconstructed without having to rely on the collector's memory.

All field books will be signed on a daily basis by the person who has made the entries. Anyone making entries in another person's field book will sign and date those entries.

### 2.4.2 Sample Chain-Of-Custody

During field sampling activities, traceability of the sample must be maintained from the time the samples are collected until laboratory data are issued. Establishment of traceability of data is



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essential for resolving future problems if analytical results are called into question and for minimizing the possibility of sample mix-up. Initial information concerning collection of the samples will be recorded in the field log book or on data sheets as described above. Information on the custody, transfer, handling and shipping of samples will be recorded on a Chain-of-Custody (COC) form.

The sampler is responsible for initiating and filling out the COC form. The COC will be signed by the sampler when he or she relinquishes the samples to anyone else. A COC form will be completed for each set of water quality samples collected, and will contain the following information:

- Sampler's signature and affiliation
- Project number
- Date and time of collection
- Sample identification number
- Sample type
- Analyses requested
- Number of containers
- Signature of persons relinquishing custody, dates, and times
- Signature of persons accepting custody, dates, and times
- Method of shipment
- Shipping air bill number (if the samples are shipped)
- Any additional instructions to the laboratory.

The person responsible for delivery of the samples to the laboratory will sign the COC form, retain the third copy of the form, document the method of shipment, and send the original and the second copy of the form with the samples. Upon arrival at the laboratory, the person receiving the samples will sign the COC form and return the second copy to the Project Manager. Copies of all COC documentation will be compiled and maintained in the central files. The original COC forms will remain with the samples until the time of final disposition. After returning samples for disposal, the laboratory will send a copy of the original COC to the Operator. This will then be incorporated into the central files.

Table 1 Sample Containers, Preservation Methods, and Holding Times

Analyte	Container <sup>(1)</sup>	Filtration <sup>(2)</sup>	Preservation	Holding Time <sup>(3)</sup>
pH	P,G	No	Cool, 4°C	7 days <sup>(4)</sup>
Specific conductance	P,G	No	Cool, 4°C	26 days
Total alkalinity (as CaCO <sub>3</sub> )	P,G	Yes	Cool, 4°C	7 days <sup>(4)</sup>
Total dissolved solids	P,G	Yes	Cool, 4°C	7 days
Total suspended solids	P,G	No	Cool, 4°C	7 days
Chloride	P,G	Yes	None required	28 days
Mercury	P,G	Yes	HNO <sub>3</sub> to pH <2	26 days
Nitrate as N	P,G	Yes	Cool, 4°C	2 days
Nitrite	P	No	Cool, 4°C	48 hours
Nitrate-Nitrite	P	No	H <sub>2</sub> SO <sub>4</sub> to pH <2	26 days
Total Phosphorus	P,G	Yes	Cool, 4°C, H <sub>2</sub> SO <sub>4</sub> to pH <2	26 days
Orthophosphate	P	Yes	Cool, 4°C	48 hours
Radionuclides (total)	P,G	No	HNO <sub>3</sub> to pH <2	6 months
Radionuclides (dissolved)	P,G	Yes	HNO <sub>3</sub> to pH <2	6 months
Silica	P	Yes	Cool, 4°C	26 days
Sulfate	P,G	Yes	Cool, 4°C	26 days
Dissolved metals	P,G	Yes	Cool, 4°C, HNO <sub>3</sub> to pH <2	6 months
Total metals	P,G	No	Cool, 4°C, HNO <sub>3</sub> to pH <2	6 months
Total recoverable metals	P,G	No	Cool, 4°C, HNO <sub>3</sub> to pH <2	6 months

<sup>(1)</sup> Bottle code: P= polyethylene bottle with polyethylene-lined lid. G= glass bottle with Teflon-lined polyethylene lid.

<sup>(2)</sup> Samples requiring filtration must be filtered in the field using a 0.45 µm membrane filter before preservative is added.

<sup>(3)</sup> Holding times start at date of sample collection.

<sup>(4)</sup> Sample pH and alkalinity should be analyzed as soon as possible after collection. However, for practical purposes, the holding times have been set at seven days. The 14 day holding time specified in 40 CFR 136.3, Table II, is considered to be inappropriate for the high carbonate waters of the system.

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B Zone

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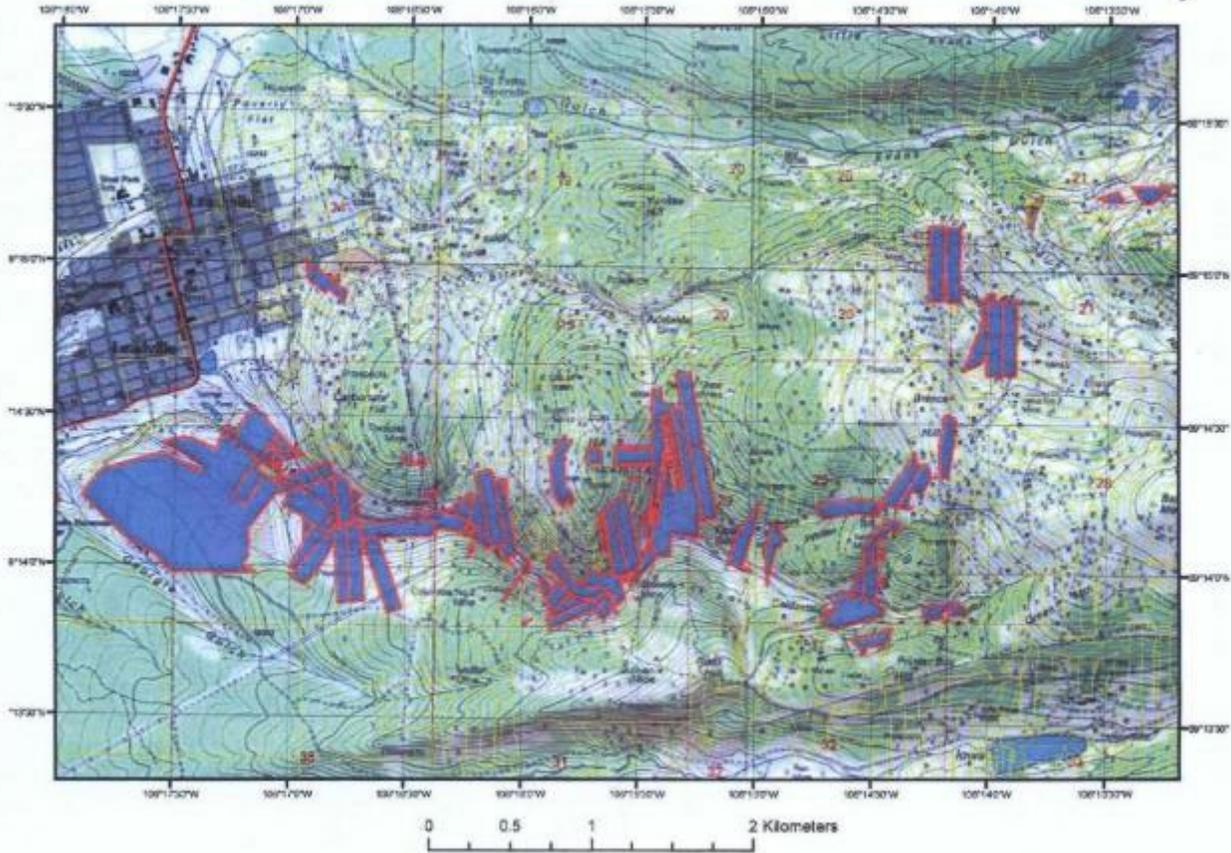


Figure K-9: 2012 Environmental Covenant for Resurrection Mining Company's Zone C properties

1242262 - R8 SDMS

# STATE OF COLORADO

John W. Hickenlooper, Governor  
Christopher E. Urbina, MD, MPH  
Executive Director and Chief Medical Officer

Dedicated to protecting and improving the health and environment of the people of Colorado

4300 Cherry Creek Dr. S.      Laboratory Services Division  
Denver, Colorado 80246-1530      8100 Lowry Blvd.  
Phone (303) 692-2000      Denver, Colorado 80230-8928  
Located in Glendale, Colorado      (303) 692-3090  
<http://www.cdphe.state.co.us>



Colorado Department  
of Public Health  
and Environment

October 10, 2012

Hon. Carl Schaefer  
Chairman, Board of County Commissioners  
Lake County Government  
505 Harrison Avenue  
P.O. Box 964  
Leadville CO 80461

RE: Environmental Covenant for Resurrection Mining Company's Zone C Properties

Dear Carl,

The enclosed Environmental Covenant for Resurrection Mining Company's Zone C properties has now been executed by all parties and filed with the Lake County Recorder.

As you know, the Colorado Environmental Covenant statute, C.R.S. § 25-15-321 to 327, requires that local governments notify the CDPHE when they receive applications affecting land use or development of land that is subject to an environmental covenant. In turn, the CDPHE must review the proposed application and provide timely advice to the local government as to whether the application is consistent with the terms of the covenant or restrictive notice.

Therefore, we respectfully request that you forward the enclosed environmental covenant to appropriate Lake County Departments to assist them in identifying applications that affect the land use or development of the parcels described in the covenant.

Please don't hesitate to contact me or Doug Jamison with any questions or comments.

Sincerely,

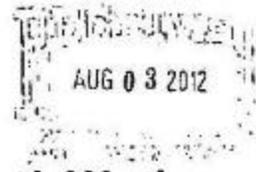
Craig Gander  
Project Manager  
Superfund and Voluntary Cleanup Unit  
Hazardous Materials and Waste Management Division

cc: Linda Kiefer  
USEPA Region 8  
8EPR-SR  
1595 Wynkoop St.  
Denver, CO 80202-1129

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Lake County Recorder



Environmental Covenant for Zone C Property

**This property is subject to an Environmental Covenant held by the Colorado Department of Public Health and Environment pursuant to section 25-15-321, C.R.S.**

ENVIRONMENTAL COVENANT

Resurrection Mining Company ("Resurrection") grants an Environmental Covenant ("Covenant") this 22<sup>nd</sup> day of July, 2012 to the Hazardous Materials and Waste Management Division of the Colorado Department of Public Health and the Environment ("the Department") pursuant to § 25-15-321 of the Colorado Hazardous Waste Act, § 25-15-101, *et seq.* The Department's address is 4300 Cherry Creek Drive South, Denver, Colorado 80246-1530.

WHEREAS, Resurrection is the owner of certain property situated in Lake County, Colorado, more particularly described in Attachment 1, attached hereto and incorporated herein by reference as though fully set forth (hereinafter referred to as "the Property"); and

WHEREAS, pursuant to that Consent Decree among Resurrection, Newmont USA Limited ("Newmont"), the State of Colorado and the United States, which was entered by the U.S. District Court for the District of Colorado on August 29, 2008 in *State of Colorado v. Asarco Incorporated, et al.* ("Consent Decree"), Resurrection has agreed to grant an Environmental Covenant in accordance with the terms thereof

NOW, THEREFORE, Resurrection hereby grants this Environmental Covenant to the Department with EPA as a third party beneficiary, and declares that the Property as described in Attachment 1 shall hereinafter be bound by, held, sold, and conveyed subject to the requirements set forth below, which shall run with the Property in perpetuity and be binding on Resurrection, its heirs, successors and assigns, and any persons using the land, as described herein. As used in this Environmental Covenant, the term "Owner" means the record owner of the Property and any other person or entity otherwise legally authorized to make decisions regarding the transfer of the Property or placement of encumbrances on the Property, other than by the exercise of eminent domain.

1) Use Restrictions.

No use of untreated alluvial groundwater from wells located on the property within 500 feet of California Gulch for drinking, domestic, or agricultural purposes shall be allowed. This covenant does not restrict the use of groundwater that is treated to meet then applicable State water quality standards for the beneficial use to which the water is being applied. Treatment must meet any standards that are in place at the time of use.



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Lake County Recorder

2) Inspections.

The Department and EPA as the named third party beneficiary shall have the right of entry to the Property at reasonable times with prior notice for the purpose of determining compliance with the terms of this Covenant. Nothing in this Covenant shall impair any other authority the Department may otherwise have to enter and inspect the Property.

3) Termination.

This Covenant runs with the land and is perpetual, unless terminated or modified pursuant to this Section or Section 4. Owner may request that the Department approve a termination or modification of this Covenant. Consistent with C.R.S. 25-15-319(1)(h), the Department shall terminate this Environmental Covenant in whole or in part when, in addition to satisfying the requirements of C.R.S. 25-15-321(3) and (5), Owner provides the following applicable showings to the Department:

- a. Restrictions on using untreated alluvial groundwater from wells located on the property within 500 feet of California Gulch for drinking, domestic, and agricultural purposes shall be terminated if Owner demonstrates to the State that concentrations of the constituents listed in Table 1 of Attachment 2 in the subject groundwater do not exceed State water quality standards for drinking, domestic, and agricultural purposes existing at the time of application. Current water quality standards are set forth in Table 1 of Attachment 2. Any ground water sampling conducted for purposes of terminating this Environmental Covenant shall be conducted in accordance with Attachment 2.
- b. In addition to the grounds for termination set forth in Sections 3.a, the Environmental Covenants shall also be terminated as to all or part of the Property if it is demonstrated to the Department that the proposed termination will otherwise be addressed in a manner that will ensure protection of human health and the environment, in accordance with C.R.S. 25-15-319(1)(h).

Consistent with C.R.S. 25-15-321(6), the Department shall provide to Owner a written determination on all applications to terminate an Environmental Covenant within 60 days after receipt of such application.

4) Modifications.

Consistent with C.R.S. 25-15-319(1)(h), the Department shall modify this Environmental Covenant in whole or in part when, in addition to satisfying the requirements of C.R.S. 25-15-321(3) and (5), Owner provides the following applicable showings to the Department:

- a. Restrictions on using untreated alluvial groundwater from wells located on the property within 500 feet of California Gulch for drinking, domestic, or agricultural purposes shall be modified to eliminate the restriction against one or



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more of these uses if Owner demonstrates to the State that concentrations of the constituents listed in Table 1 of Attachment 2 in the subject groundwater do not exceed State water quality standards in existence at the time of the application for the beneficial use that will be allowed as a result of the modification. Current water quality standards are set forth in Table 1 of Attachment 2. Any ground water sampling conducted for purposes of modifying this Environmental Covenant shall be conducted in accordance with Attachment 2.

- b. In addition to the grounds for modification set forth in Section 4.a, the Environmental Covenants shall also be modified as to all or part of the Property if it is demonstrated to the Department that the proposed modification will ensure protection of human health and the environment, in accordance with C.R.S. 25-15-319(1)(h).

Consistent with C.R.S. 25-15-321(6), the Department shall provide Owner a written determination on all applications to modify an Environmental Covenant within 60 days after receipt of such application.

- 5) Conveyances. Within thirty days (30) after any grant, transfer or conveyance of any interest in any or all of the Property, the transferring Owner shall notify the Department and EPA as the named third party beneficiary of such grant, transfer or conveyance.
- 6) Notice to Lessees. Owner agrees to incorporate either in full or by reference the restrictions of this Covenant in any leases, licenses, or other instruments granting a right to use the Property.
- 7) No Liability. The Department does not acquire any liability under State law by virtue of accepting this Covenant.
- 8) Enforcement. The Department and EPA as the named third party beneficiary may enforce the terms of this Covenant pursuant to §25-15-322. C.R.S., and may file suit in district court to enjoin actual or threatened violations of this Covenant.
- 9) Notices. Any document or communication required under this Covenant shall be sent or directed to:

Notices to the Department shall be provided to:

*[appropriate Program Manager or Unit leader]*  
Hazardous Materials and Waste Management Division  
Colorado Department of Public Health and the Environment  
4300 Cherry Creek Drive South  
Denver, Colorado 80246-1530

Notices to EPA shall be provided to:

EPA Remedial Project Manager



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California Gulch Superfund Site  
United States Environmental Protection Agency, Region 8  
(8EPR-SR)  
1595 Wynkoop Street  
Denver, CO 80202-1129

Notices to Resurrection shall be provided to:

Law Department  
Resurrection Mining Company  
1700 Lincoln Street, Suite 3600  
Denver, CO 80203

And

Director of Reclamation and Closure  
Resurrection Mining Company  
1700 Lincoln Street, Suite 3600  
Denver, CO 80203

Either party may change its designated notice recipient upon 5 days prior to notice to the other party.

10) Property Modification. Pursuant to the Consent Decree, this Environmental Covenant is intended to cover only that portion of the Property on which the Settling Defendants own the entire fee title. If Resurrection and the Department hereafter agree that, as of the date of this Environmental Covenant, the Settling Defendants did not own the entire fee title in any portion of the Property, the Department will modify Attachment 1 hereto to exclude that portion of the Property from coverage under this Environmental Covenant.







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**ATTACHMENT 1  
TO ENVIRONMENTAL COVENANT  
THE PROPERTY**

**Mineral Survey Number**  
1243  
1277  
2361  
4229

**Claim Name**  
Coon Valley  
First National  
Alhambra Placer Tract 2  
Bessie Stewart



**ATTACHMENT 2  
TO ENVIRONMENTAL COVENANT  
GROUNDWATER SAMPLING PROTOCOLS**

**Groundwater Sampling and Analysis Plan**

This attachment specifies the groundwater sampling procedures for purposes of terminating or modifying an Environmental Covenant for groundwater use restrictions, as specified in Appendix F1. For purposes of the protocol, a "property" is defined as a portion of a claim, an individual claim or contiguous claims not exceeding 35 acres in total area for which the groundwater use restrictions of an aquifer are to be terminated. The following sections describe the groundwater sampling requirements, methods, sample analysis, and quality assurance that will support such termination or modification. Alternate groundwater sampling procedures and analysis methods for a property may be proposed in a site-specific sampling plan for the property, subject to approval by the State.

**1.1 Groundwater Sampling Requirements**

One groundwater sample will be collected from a well completed in the aquifer of the hydrogeologic unit (alluvial, unconsolidated sedimentary deposits, or bedrock) proposed for beneficial use underlying each property. For alluvial or unconsolidated sedimentary deposits, the hydrogeologic unit is defined as the aquifer with the same lithology and within the same surface water hydrologic divide. The bedrock hydrogeologic unit is defined as the aquifer within the same geologic formation and structure. The groundwater use restrictions will be terminated or modified for a property for only that aquifer of the hydrologic unit in which the well is completed.

The groundwater sample from the well will be analyzed for constituents that are relevant to the California Gulch Superfund Site for which numeric groundwater quality standards have been established by the State for the proposed beneficial use at the time of the application for termination or modification of the Environmental Covenant, hereafter referred to as the Numeric Standards. The constituents that are relevant to the California Gulch Superfund Site and the current Numeric Standards are presented in Table I for drinking/domestic or agricultural uses. The groundwater in the aquifer will be determined acceptable for the proposed use, and the Environmental Covenant restricting groundwater will be terminated for the property or modified to allow a particular beneficial use, if the constituent concentrations of the sample from the well are less than the Numeric Standards for all beneficial uses (in the event of termination) or the particular beneficial use (in the event of modification).

**1.2 Groundwater Sampling Methods**

The groundwater sample from the well will be collected according to the methods described in SOP No. 4-Ground Water Well Sampling. Non-dedicated or non-disposable sampling equipment will be decontaminated prior to collection of the sample according to the methods described in SOP No. 1-Decontamination. Sample collection documentation, sample



containment, preservation, identification, labeling and shipping will be performed according to the procedures described in SOP No. 7- Sample Handling, Documentation, and Analysis.

### 1.3 Laboratory Analytical Methods

Samples will be analyzed for the parameters for which Numeric Standards have been established for the proposed beneficial use. Sample container, preservation, and holding times are provided in SOP No. 7-Sample Handling, Documentation, and Analysis. The laboratory will be required to process all samples submitted according to the specific protocols for sample custody, holding times, analysis, reporting and associated laboratory quality assurance. Laboratory quality assurance checks will include the use of blank, spiked, split, and duplicate samples, calibration checks, and internal standards. Designated laboratory personnel will be required to ensure that QA/QC procedures are achieved. The laboratory or laboratories for constituent analysis must be accredited by the Colorado Certification Program. Laboratory calculations and data review will be performed by the laboratory in accordance with the procedures described by the analytical method. The laboratory will review the results of the laboratory QC analyses, instrument calibration and maintenance records, calculations, and the record of sample custody (including holding times) within the laboratory.

Table 1 Groundwater Standards for Beneficial Use

Parameter	Domestic Water Supply and Drinking Water Standards	Agricultural Standards
Antimony-dissolved	0.006 mg/L	
Aluminum-dissolved		5 mg/L
Arsenic-dissolved	0.01 mg/L	0.1 mg/L
Barium-dissolved	2.0 mg/L	
Beryllium-dissolved	0.004 mg/L	0.1 mg/L
Cadmium-dissolved	0.005 mg/L	0.01 mg/L
Chloride-dissolved	250 mg/L	
Chromium-dissolved	0.1 mg/L	0.1 mg/L
Copper-dissolved	1.0 mg/L	0.2 mg/L
Fluoride-dissolved	4.0 mg/L	2 mg/L
Iron-dissolved	0.3 mg/L	5 mg/L
Lead-dissolved	0.05 mg/L	0.1 mg/L
Manganese-dissolved	0.05 mg/L	0.2 mg/L
Mercury-dissolved	0.002 mg/L	0.01 mg/L
Molybdenum-dissolved	0.035 mg/L	
Nickel-dissolved	0.1 mg/L	0.2 mg/L
Selenium-dissolved	0.05 mg/L	0.02 mg/L
Silver-dissolved	0.05 mg/L	
Sulfate-dissolved	250 mg/L	
Thallium-dissolved	0.002 mg/L	
Zinc-dissolved	5 mg/L	2 mg/L



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pH	6.5 - 8.5	6.5-8.5
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## **SOP-1**

*SOP Date: February 2008*

# **DECONTAMINATION**

## **1.0 INTRODUCTION AND TYPES OF CONTAMINATION**

The purpose of this document is to define the standard procedure for decontamination associated with environmental investigation for the California Gulch Superfund Site. This procedure is intended to be used with other SOPs.

### **1.1 Site and/or Sample Cross-Contamination**

The overall objective of multimedia sampling programs is to obtain samples which accurately depict the chemical, physical, and/or biological conditions at the sampling site. Extraneous contaminant materials can be brought onto the sampling location and/or introduced into the medium of interest during the sampling program (e.g., by contacting water with equipment previously contaminated at another sampling site). Trace quantities of these contaminant materials can thus be captured in a sample and lead to false positive analytical results and, ultimately, to an incorrect assessment of the contaminant conditions associated with the site. Decontamination of non-dedicated or non-disposable sampling equipment (e.g., bailers, pumps, and tubing) and field support equipment (e.g., drill rigs, vehicles) is required. To ensure that sampling cross-contamination is prevented, and that on site contaminants are not carried off site.

## **2.0 PROCEDURES**

### **2.1 Equipment List**

The following is a list of equipment that may be needed to perform decontamination:

- Brushes
- Wash tubs
- Buckets
- Scrapers
- Steam cleaner or high-pressure washer
- Paper towels
- Alconox detergent (or equivalent)
- Potable water
- Deionized or distilled water
- Garden type water sprayers
- Clean plastic sheeting and/or trash bags

### **2.2 Decontamination**



### 2.2.1 Sampling Equipment

The following steps will be used to decontaminate non-dedicated or non-disposable sampling equipment (including reusable filter apparatus):

Personnel will dress in suitable safety equipment to reduce personal exposure (e.g., latex gloves, safety glasses, etc.).

Gross contamination on equipment will be scraped off at the sampling or construction site.

Equipment that will not be damaged by water will be washed with an Alconox solution or low-sudsing detergent and potable water and scrubbed with a bristle brush or similar utensil (if possible). Equipment will be triple rinsed with potable water followed by a triple rinse with deionized or distilled water.

Following decontamination, equipment will be placed in a clean area, on or in clean plastic sheeting to prevent contact with contaminated soil. If the equipment is not used immediately, the equipment will be covered or wrapped in plastic sheeting or heavy duty trash bags to minimize potential airborne contamination.

### 2.2.2 Submersible Pumps

If non-dedicated submersible pumps are used they will be decontaminated between wells. The outside of the pump and hose will be triple rinsed with deionized or distilled water. Deionized or distilled water will be pumped through the pump and hose. The volume of deionized or distilled water pumped through will be at a minimum equal to three times the volume of fluid that could be contained by the pump and hose.

### 2.2.3 Water Level Probes

Electric water level probes will be decontaminated by rinsing with deionized or distilled water or by wiping the probe during removal with paper towels wetted with deionized or distilled water. The water level probe will be placed in a plastic bag after decontamination.

### 2.2.4 Sensitive Equipment

Sensitive equipment that may be damaged by water will be carefully wiped clean using paper towels and detergent water or spray bottle and towel and rinsed with deionized or distilled water. Care will be taken to prevent any equipment damage.

### 2.2.5 Drilling and Heavy Equipment

Drilling and heavy equipment will be decontaminated at a designated decontamination area for large equipment. The following steps will be used to decontaminate drilling and heavy equipment:

Personnel will dress in suitable safety equipment to reduce personal exposure (e.g., gloves, safety glasses or splash shields, etc.).



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Equipment showing gross contamination or having drill cuttings caked on will be scraped off with a flat-bladed scraper at the sampling or construction site.

Equipment, such as drill rigs, augers, drill bits, and shovels will be sprayed with potable water by a high-pressure washer. Care should be taken to adequately clean the insides of the hollow-stem augers and backhoe buckets.

Following decontamination, drilling equipment will be placed on the clean drill rig and moved to a clean area. If the equipment is not used immediately, it should be stored in a designated clean area.

#### **2.2.6 Equipment Leaving the Site**

Vehicles used for non-intrusive activities shall be cleaned on an as needed basis. Construction equipment such as earth moving equipment, trucks, drilling rigs, backhoes, trailers, etc., will be pressure washed at the designated decontamination area before the equipment is removed from the site.

#### **2.2.7 Wastewater**

Used wash and rinse solutions may be discharged to the ground at the sampling site

#### **2.2.8 Other Wastes**

Solid wastes such as paper towels and used filters will be sealed in plastic garbage bags and disposed of in a sanitary landfill.

#### **2.3 Documentation**

Sampling personnel will be responsible for documenting the decontamination of sampling and drilling equipment. The documentation will be recorded with waterproof ink in the sampler's field notebook with consecutively numbered pages. The information entered in the field book concerning decontamination should include the following:

- Decontamination personnel
- Date
- Decontamination observations



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Lake County Recorder

## **SOP-4**

*SOP Date: February 2008*

# **GROUNDWATER WELL SAMPLING**

## **1.0 PURPOSE AND SCOPE**

The purpose of this document is to define the standard procedure for collecting groundwater samples from wells for the California Gulch Superfund Site. This procedure gives descriptions of equipment, field procedures, and QA/QC procedures necessary to collect groundwater samples from wells. The sample locations and frequency of collection are specified in the QAPP.

This procedure is intended to be used together with several other SOPs, as applicable, including:

SOP 1 Decontamination

SOP 7 Sample Handling, Documentation, and Analysis

## **2.0 WATER SAMPLING PROCEDURES**

### **2.1 Equipment List**

Sample bottles, preservatives, sample labels will be obtained from the analytical laboratory. Several extra sample bottles will be obtained in case of breakage or other problems. Sample bottles can be either pre-preserved or preservatives can be added in the field.

Equipment that may be used during well evacuation:

- Well keys
- Electronic water level probe
- Assorted tools (knife, screwdriver, etc.)
- PVC, Teflon, or stainless-steel bailer (bottom filling)
- PVC hand pump
- Nylon or polypropylene rope
- Bailer tripod
- PVC pump discharge hose
- Gas-powered electric generator
- Stainless-steel submersible pump
- pH meter (with automatic temperature compensation)
- Specific conductivity meter
- Plastic squeeze bottle filled with deionized water
- Polyethylene or glass container (for field parameter measurements)
- Chemical-free paper towels or Kimwipes



- Calculator
- Field notebook
- Waterproof pen
- Plastic sheeting (for placing around well)
- Appropriate health and safety equipment

**Equipment that may be used during well sampling:**

- Electronic water level measurement probe
- PVC, Teflon, or stainless-steel bailers (bottom filling)
- Stainless-steel submersible pump
- PVC pump discharge hose
- Electric generator
- Nylon or polypropylene rope or twine
- Bailer tripod
- pH meter (with automatic temperature compensation)
- Specific conductivity meter
- Plastic squeeze bottle filled with deionized water
- Sample bottles
- Dedicated jug for holding sample for filtering
- Cooler with ice
- Polyethylene or glass jar for field measurement samples
- Sample labels

**Equipment used during sample filtration:**

- Disposable filterware with 0.45-micron filter
- Hand pump or peristaltic pump
- Tygon or silicon tubing (2- to 4 ft lengths)

**Equipment used during decontamination:**

- Deionized or distilled water
- Decontamination buckets/pails
- Paper towels
- Plastic brushes
- Sprayers

**2.2 Sampling Procedures**

This section gives the step-by-step procedures for collecting samples in the field. Observations made during sample collection should be recorded in the field notebook and field data sheet as specified in Section 2.4 of this SOP.

**2.2.1 Decontaminate Equipment**



Before any evacuation or sampling begins, all well probes, bailers, and other sampling devices shall be decontaminated. If dedicated equipment is used, it should be rinsed with deionized water. Dedicated downhole pumps will not be decontaminated. A discussion of equipment and personnel decontamination is contained in SOP No. 1, Decontamination, and in the site Health and Safety Plan.

### 2.2.2 Instrument Calibration

Electronic equipment used during sampling includes a pH meter with temperature scale, a conductivity meter and a turbidity meter. Before going into the field, the sampler shall verify that all of these are operating properly. The pH and conductivity meters require calibration and calibration checks every day prior to use. The turbidity meter requires a calibration check by reading measurements cells of a known value. Calibration times and readings will be recorded in a notebook and/or on Calibration Data Sheet, which are to be kept by the field sampler.

### 2.2.3 Evacuate Well

The purpose of well purging is to remove stagnant water from the well to obtain representative water from the geologic formation being sampled while minimizing disturbance to the collected samples. Before a sample is taken, the well will be purged until a minimum of three well casing volumes have been removed and field parameters have stabilized, or until a maximum of five well volumes have been removed. Purging will be considered completed if the well is pumped or bailed dry. A well should be pumped at a rate no faster than approximately 1 gallon per minute if it has a tendency to dry up prior to evacuating three casing volumes. Evacuated well water may be disposed of at the well site in a manner that does not cause runoff.

Before well purging begins, the following procedures are to be performed at each well:

- Note the condition of the outer well casing, concrete well pad, protective posts (if present), and any other unusual conditions in the area around the well.
- If bailing place clean plastic sheeting around the well.
- Open the well.
- Note the condition of the inner well cap and casing.
- Measure (to nearest 0.01 foot) and record depth of static water level from the measuring point on the well casing and indicate time. Record what the measuring point is (i.e., notch on north side, top of PVC well casing).
- Calculate volume of water in the well casing in gallons based on feet of water and casing diameter. (See Section 2.4.3 for calculation of volumes.)
- From the above calculation, calculate the three casing volumes to be evacuated.
- Obtain an initial sample (which is not retained) from the bailer or purge pump for field measurements (temperature, conductivity, and pH measurements) and observation of water quality.



Evacuate three volumes of water in casing with a bailer or pump. Take temperature, specific conductance, and pH measurements after evacuation of each well volume to confirm that the water chemistry has stabilized. Generally, pH values within  $\pm 0.2$  pH unit and conductivity and temperature readings within  $\pm 10$  percent between consecutive readings indicate good stability of the water chemistry. If the chemistry is not stable, continue purging up to a maximum of five well volumes, measuring pH and specific conductance after each one half well volume.

When evacuating a well using a pump, the pump intake should be placed:

for low recovery wells (wells that can be pumped dry), place pump intake at bottom of screened interval.

for high recovery wells (little drawdown with pumping), place pump at or slightly above the middle of the screened interval to ensure the removal of stagnant water from the well bore.

If the well is bailed or pumped dry during evacuation, it can be assumed that the purpose of removing 3 well volumes of water has been accomplished, that is, removing all stagnant water that had prolonged contact with the well casing or air. If recovery is very slow, samples may be obtained as soon as sufficient water is available.

#### 2.2.4 Obtain Water Samples

Obtain samples for chemical analysis within 2 hours after purging is completed, if possible. For slow recovering wells, the sample shall be collected immediately after a sufficient volume is available (water has recovered to screened interval). The water quality samples shall be taken from within the well screen interval.

The following sampling procedure is to be used at each well:

1. Assemble decontaminated sampling equipment. If bailers are used, new nylon or polypropylene rope will be used for each well for each sampling event. Assemble the filtering apparatus.
2. Make sure that sample labels have been filled out for each well.
3. Lower the bailer slowly and gently into contact with the water in the well. Lower the bailer to the same depth in the well each time, within the screened interval. Retrieve the bailer smoothly and empty the water in a slow steady stream into the containers. If submersible or bladder pumps are utilized to collect samples, start the pump and fill the sample bottles as described below.
4. Triple rinse the sample containers with sample water and then fill the sample bottles. If not enough sample water is available to perform the triple rinse, then at a minimum a single rinse will be performed and will be recorded in the field logbook and/or data sheet. Cap the sample containers quickly. If sample bottles are pre-preserved, fill the sample bottles without rinsing. Add preservative if the bottle is not pre-preserved. Do not allow the sample containers with preservatives to overflow. See Section 2.2.5 for details on field filtering.



5. Slowly pour an unfiltered portion into the sample container for field parameter (pH, specific conductance, temperature, and turbidity) analyses and perform the in-field analyses and record.
6. Place samples on ice in a cooler.
7. Record time of sampling.
8. Replace and lock well cap.
9. Complete field documentation.

### 2.2.5 Filtering Samples

Samples for metals analyses will be filtered during the field sampling event by using a disposable filter apparatus and peristaltic or hand vacuum pump.

The following procedure is to be used for filtering:

Assemble filter device according to manufacturer's instructions.

Prior to the collection of aliquots, flush the filter with approximately 100 to 200 milliliters of groundwater. Filter sample either by pouring sample in the top portion of filter unit or pumping through an in line filter using a peristaltic pump. Sample may also be filtered by attaching the in-line filter to the submersible pump discharge.

Triple rinse the sample containers with filtered sample water and then fill the sample bottles. If not enough sample water is available to perform the triple rinse, then at a minimum a single rinse will be performed and will be recorded in the field logbook and/or data sheet. Cap the sample containers quickly. If sample bottles are pre-preserved, fill the sample bottles without rinsing. Add preservative if the bottle is not pre-preserved. Do not allow the sample containers with preservatives to overflow.

Place the used filter membrane or disposable filter equipment in a Ziploc® bag for disposal with the personal protective equipment.

Any reusable filtering equipment will be decontaminated in accordance with SOP No. 1.

### 2.3 Sample Handling

Sample containers and preservatives are specified in SOP No. 7, Sample Handling, Documentation and Analysis. Samples will be labeled and handled as described in SOP No. 7.

### 2.4 Documentation

#### 2.4.1 Groundwater Data Sheet

A groundwater data sheet for groundwater samples (Appendix A) will be completed at each sampling location. The data sheet will be completely filled in. If items on the sheet do not apply



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to a specific location, the item will be labeled as not applicable (NA). The information on the data sheet includes the following:

- Well number
- Date and time of sampling
- Person performing sampling
- Depth to water before sampling
- Volume of water evacuated before sampling
- Conductivity, temperature, and pH during evacuation (note number of well volumes)
- Time samples are obtained
- Number of samples taken
- Sample identification number(s)
- Preservation of samples
- QC samples taken (if any)
- How the samples were collected (i.e., bailer, pump, etc.)

#### 2.4.2 Field Notes

Field notes shall be kept in a bound field book. The following information will be recorded using waterproof ink:

- Names of personnel
- Weather conditions
- Date and time of sampling
- Location and well number
- Condition of the well
- Decontamination information
- Initial static water level and total well depth
- Calculations (e.g., calculation of evacuated volume)
- Calibration information
- Sample methods, or reference to the appropriate SOP

#### 2.4.3 Well Volume Calculations

The following equation shall be used to calculate the volume of water to be removed during well evacuation.

For 2 inch well:

$$\text{Evacuation Volume [gal]} = (\text{Total Depth [ft]} - \text{Water Level Depth [ft]}) \times 0.1632 \text{ gal/ft}$$

= gallons/well casing volume

For 4-inch well:

$$\text{Evacuation Volume [gal]} = (\text{Total Depth [ft]} - \text{Water Level$$



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Depth [ft]) x 0.6528 gal/ft

= gallons/well casing volume

For 6-inch well:

Evacuation Volume [gal] = (Total Depth [ft] - Water Level  
Depth [ft]) x 1.4688 gal/ft

= gallons/well casing volume

Multiply the volume of one well casing volume by 3 to obtain the minimum volume of water to be evacuated.



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**APPENDIX A  
GROUNDWATER DATA SHEET**





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Was a rinsate sample collected?  
)

Yes  No  (sample control number \_\_\_\_\_)

Notes: \_\_\_\_\_



## **SOP-7**

*SOP Date: February 2008*

# **SAMPLE HANDLING, DOCUMENTATION, AND ANALYSIS**

## **1.0 PURPOSE AND SCOPE**

The purpose of this document is to define the standard protocols for sample handling, documentation, and analysis for the California Gulch Superfund Site. This procedure is intended to be used together with other SOPs and is referenced in all SOPs that apply to sampling.

## **2.0 PROCEDURES FOR SAMPLE HANDLING, DOCUMENTATION, AND ANALYSIS**

### **2.1 Sample Identification and Labeling**

Samples collected during monitoring, investigations, or remediation activities will be assigned unique sample identification numbers. Each sample identification number will identify the organization collecting the sample or the program under which it is collected, sampling location, type of sample, and sampling sequence for each sample. These numbers are required for tracking the handling, analysis, and verification or validation status of all samples collected during monitoring. In addition, the sample identification numbers will be input into the project database to identify analytical results received from the laboratory.

Sample identification numbers that are assigned will be divided into four fields as shown in the following example:

M-CGW1-01-900423

The first field is one character in length and identifies the company conducting the sampling. The second field is an alphanumeric code identifying the location of the sample and the last letter of this field indicates the matrix (e.g., CGM1 indicates California Gulch Well No. 1, the second W indicates a water matrix). The next field identified is the type of sample being collected; this is used to identify whether the sample is a primary or grab sample, a composite sample, field duplicate, field blank, or equipment rinsate. The final field contains the date in a year-month-day format. For example, the sample identified above was collected on April 23, 1990.

Each sample that is collected in the field will be labeled for future identification. Sample labels will be filled out as completely as possible by a member of the sampling team prior to the start of the day's field sampling activities. The date, time, sampler's signature, and the last field of the sample identification number should not be completed until the sample is actually collected. All sample labels will be filled out using waterproof ink. At a minimum, each label will contain the following information:



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Sampler's company affiliation;  
Site location;  
Sample identification;  
Date and time of sample collection;  
Method of preservation used;  
Sample matrix; and  
Sampler's initials.

## **2.2 Sample Containers, Preservatives, and Holding Times**

### **2.2.1 Sample Containers**

Proper sample preparation practices will be observed to minimize sample contamination and potential repeat analyses due to anomalous analytical results. Prior to sampling, commercially-cleaned sample containers will be obtained from the analytical laboratory. The bottles will be labeled as described in the previous section to indicate the type of sample and sample matrix to be collected. Sample bottles can be either pre-preserved from the laboratory or preservatives can be added in the field during sample collection.

### **2.2.2 Sample Preservation**

Samples are preserved in order to prevent or minimize chemical changes that could occur during transit and storage. Sample preservation should be performed immediately upon sample collection to ensure that laboratory results are not compromised by improper coordination of preservation requirements and holding times. Samples will be preserved immediately and stored on ice in coolers prior to shipping. Sample preservation requirements are based on the most current publication of 40 CFR, Part 136.3 and are provided in Table 1.

### **2.2.3 Sample Holding Times and Analyses**

Sample holding times are established to minimize chemical changes in a sample prior to analysis and/or extraction. A holding time is defined as the maximum allowable time between sample collection and analysis and/or extraction, based on the nature of the analyte of interest and chemical stability factors. Holding times applicable for analytes are listed in Table 1. Samples should be sent to the laboratory as soon as possible after collection by hand delivery or an overnight courier service to minimize the possibility of exceeding holding times.

For most samples, preservation by cooling to 4°C is required immediately after collection while the samples are held for shipment and during shipment to the laboratory.

## **2.3 Sample Preparation and Shipping**

After collection, samples will be labeled and prepared as described in the previous discussion, and placed on ice in an insulated cooler. The sample containers will be placed in re-closeable plastic storage bags. Samples will then be placed right side up in a cooler with ice for delivery to the laboratory. The ice in the cooler will be double-bagged. The coolers will be taped shut and



chain-of-custody seals will be attached to the outside of the cooler to ensure that the cooler cannot be opened without breaking the seal. Final packaging and shipping will be conducted in compliance with current IATA Resolution 618 and DOT 49 CFR Part 171 Regulations.

All samples will be shipped for laboratory receipt and analysis within the holding times specified in Table 2. This may require daily shipment of samples with short holding times.

#### 2.4 Sample Documentation and Tracking

This section describes the information that should be provided in field notes and sample Chain-of-Custody documentation.

##### 2.4.1 Field Notes

Documentation of observations and data acquired in the field provide information on sample acquisition, field conditions at the time of sampling, and a permanent record of field activities. Field observations and data collected during routine monitoring activities will be recorded with waterproof ink in a permanently bound weatherproof field log book with consecutively numbered pages or on field data sheets as specified in the project SOPs.

Field notebook and/or data sheet entries will, at a minimum, include the information listed below. Relevant SOPs should be consulted to supplement this list.

- Project name;
- Location of sample;
- Data and time of sample collection;
- Sample identification numbers;
- Description of sample (matrix sampled);
- Sample depth (if applicable);
- Sample methods, or reference to the appropriate SOP;
- Field observations;
- Results of any field measurements, such as depth to water, pH, temperature, specific conductance; and
- Personnel present.

Changes or deletions in the field book or on the data sheets should be recorded with a single strike mark, and remain legible. Sufficient information should be recorded to allow the sampling event to be reconstructed without having to rely on the collector's memory.

All field books will be signed on a daily basis by the person who has made the entries. Anyone making entries in another person's field book will sign and date those entries.

##### 2.4.2 Sample Chain-Of-Custody

During field sampling activities, traceability of the sample must be maintained from the time the samples are collected until laboratory data are issued. Establishment of traceability of data is



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crucial for resolving future problems if analytical results are called into question and for minimizing the possibility of sample mix-up. Initial information concerning collection of the samples will be recorded in the field log book or on data sheets as described above. Information on the custody, transfer, handling and shipping of samples will be recorded on a Chain-of-Custody (COC) form.

The sampler is responsible for initiating and filling out the COC form. The COC will be signed by the sampler when he or she relinquishes the samples to anyone else. A COC form will be completed for each set of water quality samples collected, and will contain the following information:

- Sampler's signature and affiliation
- Project number
- Date and time of collection
- Sample identification number
- Sample type
- Analyses requested
- Number of containers
- Signature of persons relinquishing custody, dates, and times
- Signature of persons accepting custody, dates, and times
- Method of shipment
- Shipping air bill number (if the samples are shipped)
- Any additional instructions to the laboratory.

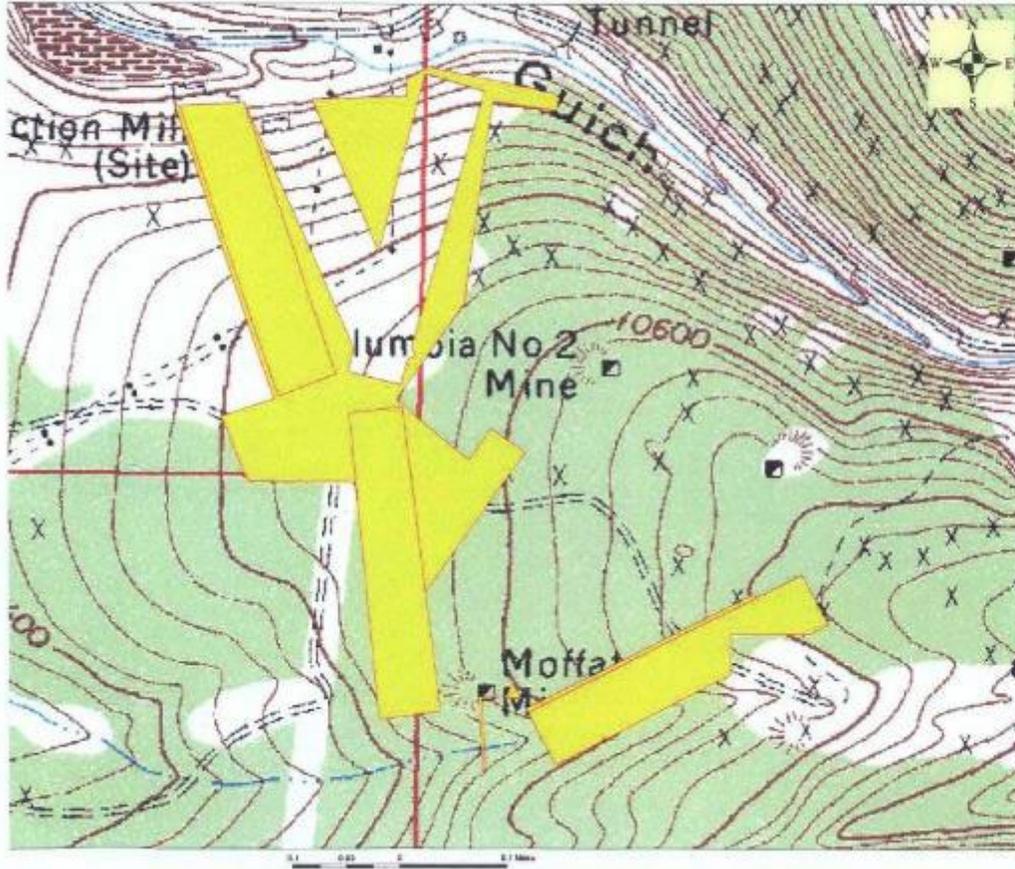
The person responsible for delivery of the samples to the laboratory will sign the COC form, retain the third copy of the form, document the method of shipment, and send the original and the second copy of the form with the samples. Upon arrival at the laboratory, the person receiving the samples will sign the COC form and return the second copy to the Project Manager. Copies of all COC documentation will be compiled and maintained in the central files. The original COC forms will remain with the samples until the time of final disposition. After returning samples for disposal, the laboratory will send a copy of the original COC to the Operator. This will then be incorporated into the central files.

**Table 1 Sample Containers, Preservation Methods, and Holding Times**

Analyte	Container <sup>(1)</sup>	Filtration <sup>(2)</sup>	Preservation	Holding Time <sup>(3)</sup>
pH	P,G	No	Cool, 4°C	7 days <sup>(4)</sup>
Specific conductance	P,G	No	Cool, 4°C	28 days
Total alkalinity (as CaCO <sub>3</sub> )	P,G	Yes	Cool, 4°C	7 days <sup>(4)</sup>
Total dissolved solids	P,G	Yes	Cool, 4°C	7 days
Total suspended solids	P,G	No	Cool, 4°C	7 days
Chloride	P,G	Yes	None required	28 days
Mercury	P,G	Yes	HNO <sub>3</sub> to pH <2	28 days
Nitrate as N	P,G	Yes	Cool, 4°C	2 days
Nitrite	P	No	Cool, 4°C	48 hours
Nitrate-Nitrite	P	No	H <sub>2</sub> SO <sub>4</sub> to pH <2	28 days
Total Phosphorus	P,G	Yes	Cool, 4°C, H <sub>2</sub> SO <sub>4</sub> to pH <2	28 days
Orthophosphate	P	Yes	Cool, 4°C	48 hours
Radionuclides (total)	P,G	No	HNO <sub>3</sub> to pH <2	6 months
Radionuclides (dissolved)	P,G	Yes	HNO <sub>3</sub> to pH <2	6 months
Silica	P	Yes	Cool, 4°C	28 days
Sulfate	P,G	Yes	Cool, 4°C	28 days
Dissolved metals	P,G	Yes	Cool, 4°C, HNO <sub>3</sub> to pH <2	6 months
Total metals	P,G	No	Cool, 4°C, HNO <sub>3</sub> to pH <2	6 months
Total recoverable metals	P,G	No	Cool, 4°C, HNO <sub>3</sub> to pH <2	6 months

<sup>(1)</sup> Bottle code: P=polyethylene bottle with polyethylene-lined lid. G=glass bottle with Teflon-lined polyethylene lid.  
<sup>(2)</sup> Samples requiring filtration must be filtered in the field using a 0.45 µm membrane filter before preservative is added.  
<sup>(3)</sup> Holding times start at date of sample collection.  
<sup>(4)</sup> Sample pH and alkalinity should be analyzed as soon as possible after collection. However, for practical purposes, the holding times have been set at seven days. The 14 day holding time specified in 40 CFR 136.3, Table II, is considered to be inappropriate for the high carbonate waters of the system.

RECTION MINING COMPANY ENVIRONMENTAL COVENANT "C" ZONE PROPERTIES



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Figure K-10: Lake County Building Permit Procedures

## Lake County Building Department

505 Harrison Avenue – P. O. Box 513

Leadville, Colorado 80461

Telephone (719) 486-2875 - Fax (719) 486-4179

### Step by Step Procedures to Apply for a Building Permit Applicable on all construction:

1. Copy of deed.
  2. Copy of Assessors account number and map (located in the Assessor's office.)
  3. Building Permit Application along with three sets of plans (one set can be in a PDF form) and three site plans (one can be in a PDF). Your plans should have the Type of Construction, Use and Occupancy and the Maximum Occupancy.
  4. Building Permit Approval Form with all Agency signatures.
  5. Plan Check List must be completed and signed.
394378048. Payment of Building Permit Fee. This will be calculated in our office. Checks payable to: Lake County Treasurer.

### Other required submission material:

1. Applicant is required to getting a septic permit from the Lake County Health Department (Jackie Littlepage 719-486-7481)
2. Approved Well Permit from the State of Colorado- or where the project is located in a platted subdivision with an approved water supply plan, or on a 35 acre parcel or larger, then a Well Permit Application may be submitted in lieu of the permit an approved well permit from the State of Colorado must be submitted prior to the issuance of the Certificate of Occupancy.
3. Signed acknowledgment that you have received the California Gulch Superfund Site Operable Units 2, 3, 8, 9, 5, 4, and 7 best management practices handout, if you are building in these areas. (Please see map in Building Department.)
4. Letter of approval from the Colorado Department of Public Health and Environment to build Operable Units 2, 3, 8, 9, 4, 5 and 7 of the California Gulch Superfund site, if required.

**All of these requirements MUST BE SUBMITTED or we cannot accept your application.**

**LAKE COUNTY**  
**BUILDING APPLICATION PROCEDURAL INFORMATION**  
**(Please Read!!)**

Lake County has adopted construction regulations and permitting requirements to help assure that structures meet certain minimum standards for safeguarding the occupants, property and the public welfare.

**Permit Required**

Regulations require a building permit to conduct the following activities.

- New building construction
- Additions and alterations to existing structures
- Structural repairs to existing buildings
- Relocation of existing buildings
- Change in use or occupancy of existing buildings
- Abatement of unsafe buildings or structures

***In addition to the Building Permit, some projects may also require an electrical permit, plumbing permit, or a mechanical permit. If applicable, a separate electrical permit is required for the installation of a well.***

***All projects located within the California Gulch Superfund Site Operable Units 2, 3, 8, 9, 4, 5 and 7 may have additional requirements such as approval by the Colorado Department of Public Health and Environment. To build on such properties, the applicant must:***

1. Check the California Gulch Superfund Site map in the Lake County Building and Land Use Department to see if the project site is in either Operable Unit 2, 3, 8, 9, 4, 5, and 7. If not, proceed with standard building permit process.
2. If so, then review Resolution 2009-06 and obtain the Best Management Practices handout.
3. If required, provide letter of approval from the Colorado Department of Public Health and Environment, along with all other required submissions for a Building Permit.
4. Sign the Lake County Building Department Affidavit.

***These are all separate permits and are not included in the Building Permit.***

**Work Exempt**

Lists of common projects that do not require a building permit are:

- One story detached accessory buildings used as a tool or storage shed, or for similar purposes, which do not exceed 200 square feet.
- Fences not over 6 feet high.
- Retaining walls not over 4 feet from top to bottom and do not support a surcharge.

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- Painting, papering, and similar work.
- Barns and storage buildings used for agricultural purposes only.

***Unless specifically authorized, no construction work may be performed on your project until a Building Permit has been issued. Projects commenced without proper authorization are subject to a penalty equal to the base permit fee. Additionally, circumstances may require you to remove part or all of your project up to that point.***

**Manufactured housing (mobile homes) placed in a mobile home park do require a building permit, an electrical permit for electrical service, a plumbing permit for water and sewer and a mechanical permit for gas service is required.**

**Lake County has adopted the following codes:**

- International Building Code, 2012 Edition
- International Residential Code, 2012 Edition, including Appendices E and G
- International Mechanical Code, 2012 Edition
- International Plumbing Code, 2012 Edition
- International Fuel Gas Code, 2012 Edition
- International Existing Building Code, 2012 Edition
- National Electric Code, 2012 Edition
- International Fire Code, 2012 Edition; including Appendices B, C, D, and F.
- International Energy Conservation Code, 2006 edition

**Code Amendments and Design Information**

**Wind and Seismic**

- Basic Wind Speed = 80 mph
- Seismic Zone = C

**Building Foundations**

- Wall reinforcing must meet the minimum requirements specified in the 2012 IRC, with the exception of private dwellings and related structures. They may use #4 bar @ 24" horizontally and vertically for 8" walls.
- Concrete footings shall be a minimum of 8 inches thick and 16 inches wide with two #4 bars continuous. (On overlapping points, a 2' minimum is required).
- Bottom of footings shall be placed a minimum of 4 feet below finished grade.
- Foundation for single story garages and lesser structures shall be evaluated on a case by case basis.

**Soils**

Soils tests are not normally required for dwellings and related construction, although such work may be required when circumstances warrant or when required by a recorded final plat for a subdivision. Commercial and industrial structures of significance require a soil report as part of the submittal for a building permit.

### **Guard Rails**

Open guardrails shall have intermediate rails or an ornamental pattern with spacing less than the diameter of a 6 inch sphere, except in industrial and commercial locations not open to the public.

### **Design Criteria**

All design criteria used for the structure must be clearly stated on the plans. Please include snow loads, floor loads and soil bearing capacity.

- **Plans found to be lacking in design or detail will be rejected, causing your plans to lose their place in the order of review. Submitting a clear, well detailed set of plans will help ensure your permit is issued in a timely fashion. Good planning also helps to prevent costly mistakes in the field.**
- **Payment of the Building Permit Fees must be made at the time of submittal. The fees will be calculated at the time of permit application.**
- **If you disagree with any orders, decisions or determinations made by the Building Official relative to the application and interpretation of the codes, you have the right to appeal such decisions to the "Lake County Building Code Board of Review." Information on this process may be obtained upon request.**

### **Permits**

Separate permits are required for each separate structure. Separate permits are also required for separate types of work such as building, plumbing, mechanical, and electrical. The **Building Permit** authorizes the construction of the foundation system, framing, sheathing and related finish work for the overall building or structure and its attachments such as porches and decks.

### **Application Form**

- Provide all requested information on the application form. This information is needed in order to process your application, so, please write legibly.
- All construction sites must have a physical address. If the project does not have an address or you do not know it, contact the Land Use Planner to have one assigned. The name of a mining claim or a lot number is not an address. If you need to have an address assigned, include on your site plan the name of the property owner, legal description of the lot, property lines, easements, named roads, any existing or proposed structures including buildings, well, septic tank, and leach field.
- A setback distance is the closest perpendicular distance from the property line to the footprint of the structure. Attachments such as porches or a carport must be considered in determining the setback distance. Certain types of work such as, new construction, alterations to the exterior of a building, or changes in occupancy cannot be reviewed without this information. These distances should be discussed with the Land Use Planner prior to the planning process, as they can place limits and/or additional requirements on the project.
- The owner or his representative must sign and date the form.

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### **Approval Form**

- Your project may require approval from a number of different agencies. The Approval Form provides a checklist for the entities usually involved. A member of the Building Department will be happy to aid you in identifying which approvals you will need for your particular project.
- Some subdivisions require approval from their architectural review committees before commencing any construction projects. Make sure the plans you submit have been reviewed and approved by the subdivision's review committee. Having to submit new plans to the Building Department could result in added cost for additional review time.
- In some cases, agencies other than those listed may be involved, such as the Army Corps. of Engineers, U.S. Forest Service or the Colorado Department of Public Health and Environment. Provide copies of any permits or letters of approval from any of these agencies. For individual wells, you must provide a copy of the well permit or permit application where allowed. Water supply by any means other than those listed will have to be explained in detail and submitted for approval as an alternate means of supply.
- All pertinent approvals by other agencies must be obtained prior to submitting plans for review.

### **Approved Plans & Inspection Card**

The sets of approved plans that you receive back are the plans you must use for your construction. They must be kept at the construction site at all times. The inspection card and Building Permit will be contained in a plastic permit holder to protect them. The plastic permit holder must be posted in an obvious location on the construction site and in such a manner as to give the inspector ready access to it. Copies of any other permits that your project requires should be kept in the permit holder, as well. After each inspection, the inspector will leave copies of each field inspection report inside the permit holder. In addition, the project address MUST be posted and clearly visible from the roadway.

## **Lake County Building and Land Use Department**

Building      Land Use      Environmental Health      Code Enforcement

### ELEVATIONS FOR LEADVILLE AND SURROUNDING SUBDIVISIONS

Beaver Lakes Filing #1	9,800 feet
Beaver Lakes Filing #2	10,800 feet
Centennial Heights	9,500 feet
Dowen Tract	9,600 feet
EE Hill Estates	9,600 feet
Four Seasons	10,000 feet
Gem Valley Filings #1 & #2	10,000 feet
Gordon Acres	9,400 feet
Grand West Properties	9,900 feet
Homestake Subdivision	10,000 feet
Homestake Trout Club	10,300 feet
Matchless Estates	10,000 feet
Mt. Massive Trout Club	9,500 feet
Piney Run	10,200 feet
Rockey Acres	9,200 feet
South Arkansas	9,200 feet

Stringtown	9,900 feet
Sylvan Lakes	10,300 feet
Turquoise Lakes Estates	9,800 feet
Twin Lakes	9,400 feet
Twin Lakes Filings	9,600 feet (1-A, 1B & 1-C9)

## Plans Check List

### Lake County Building Department

Parties submitting plans are responsible for providing all information necessary to perform a complete plan review for Code compliance. Incomplete plans will be rejected and may need to be resubmitted only after all requested information is included. Review time for all plans will be the same, whether it is a new submittal or a re-submittal. **Shaded sections are for office use only!**

#### General

- Submittal must include three sets of plans (one of those plans can be in a PDF) with the applicant's name and project address on every sheet. The plans shall be drawn to scale at no less than 1/4" = 1' (except the site plan), drawing sheets shall be 24" x 36".  
Your plans should show they type of construction, the use and occupancy and the maximum occupancy.
- Loads and material strengths used to design the structure are included. (Snow load(s), actual or assumed soil bearing capacity, concrete strength, type and grade of wood members, type and strength of laminated wood members, etc.).
- Any alternate details or construction methods that will not be used must be struck through, clearly indicating it is not pertinent.
- Res or a prescriptive method report has been done and printed results submitted with plans. (This can be done by going to [www.energycodes.gov](http://www.energycodes.gov), downloading the software and entering the required information. Print the results)

#### Site Plan

- Plans show property lines, easements, public access road or street, streams, springs, and wetlands.
- All site improvements, including adjacent parcels, existing and proposed are shown; including structures, waste disposal systems, wells, and driveways.
- Plan is fully dimensioned showing property line lengths, perpendicular distances from the proposed structure to the property line, and distance from the well to the absorption field.
- Plan includes the lot number, subdivision, address, a north arrow, adjacent street names, landmarks and the direction and amount that the site slopes.
- Indicate the distances from the edge of the road to proposed structure.

- A survey report to verify setbacks is required at Homestake Subdivision at the time of foundation and/or footing inspection.

## Architectural

### **Plan Views**

- A complete floor plan is included for each level, including the basement, and rooms are labeled as to use.
- Window and door sizes are shown, emergency egress windows are noted and tempered glass is shown where required.
- Location of smoke detectors, fans, gas appliance vents, plumbing fixtures (including hot tubs, spas, or whirlpool tubs), size of furnace or boiler and water heater, are shown and type of fuels are specified.

### **Elevation Views**

- Full elevational views, including foundation, are provided for all four (4) sides.
- Reference the average, naturally occurring grade at the base of the structure which exists prior to construction on all 4 views using a scale of 1/4 inch = 1 foot.
- Foundation steps, openings and finished grade are shown.
- Attic and crawl space vents are shown.

### **Cross Sections**

- Sectional views of all aspects of the project are provided.
- All ceiling heights and roof slopes are shown.

## Foundation

- A fully dimensioned foundation plan is provided.
- Location, size and details are provided for all walls, footings, piers, and pads.
- Size, spacing, and grades of all reinforcing are shown.
- The locations of all wall openings and foundation steps are shown.
- Any cantilevered walls are fully detailed and stamped by a licensed COLORADO engineer.
- Water proofing and subsurface drainage are indicated.
- Survey Report required at Homestake Subdivision to verify setbacks.

## Structural Framing

- A framing plan is provided for each floor, roof, decks, garages and porches.
- Type, size and spacing of all joists, rafters and stud walls are shown.
- Layout and spacing of trusses are shown, any site-built trusses are detailed and stamped by a COLORADO licensed engineer (certified details or pre-manufactured trusses may be submitted when received from supplier).

- All framing plans shall include the support system, with the location and size of all bearing walls, beams, headers and columns. Please note the posts and beams on either the floor or roof framing plans.
- Type and size of all doors and window headers are shown.
- Lateral bracing provisions are shown.
- Type, thickness and rating of floor and roof sheathing are shown.
- Major framing connections are detailed.
- Width, clear height and rise and run of all stairways are shown including the location and heights of hand and guardrail
- All design loads are noted (roof, floor, and decks).

Modular Homes

- A full foundation plan is required (See "Foundation" requirements above).
- Plans submitted must be stamped by a licensed Colorado Engineer or have the State of Colorado Division of Housing stamp with date.
- Snow load must be stamped by a licensed Colorado Engineer.
- Otherwise, submit a letter from the manufacturer stating the pitch of the roof with applicable snow load and the manufacturer's certification that the plans meet or exceed the requirements set forth by the State of Colorado Division of Housing for a HUD or UBC modular home.

California Gulch Superfund Site

- Evidence of approval by the Colorado Department of Public Health and Environment to build in Operable Units 2, 3, 8, 9, 4, 5 and/or 7 of the California Gulch Superfund Site.

(Owner) Checked off by \_\_\_\_\_ on \_\_\_\_\_ 20\_\_.

(Office) Checked off by \_\_\_\_\_ on \_\_\_\_\_ 20\_\_.

**Lake County Building Department**  
P.O. Box 513 • 505 Harrison Avenue • Leadville, CO 80461  
(719) 486-2875 • Fax (719) 486-4179  
***Building Permit Application and Approval Form***

*Office Use Only*

Building Valuation    \$	Date Received _____
Base Permit Fee    \$	Permit # _____
Plan Review Fee    \$	Check # _____
<u>  </u> Building Permit Fee \$	

**Please Print All Information Legibly**

Contact Information

- |                        |       |
|------------------------|-------|
| 1.) Applicant          | Phone |
| Mailing Address _____  |       |
| 2.) Owner of Property  | _____ |
| Phone                  | _____ |
| Mailing Address        | _____ |
| 3.) Contractor         | Phone |
| 4.) Architect/Engineer | Phone |

**Site Information**

1.) Location of Construction:  Lake County  Twin Lakes

394377432.) Project Address

394376592.) Legal Description:

Section Township Range  
Subdivision

Lot Block Filing

4.) The site is \_\_\_\_\_ is not \_\_\_\_\_ located within the California Gulch Superfund Site

Operable Unit 3 \_\_\_\_\_ OU 8 \_\_\_\_\_ OU 9 \_\_\_\_\_ OU 4 \_\_\_\_\_ OU 7 \_\_\_\_\_

OU 2 \_\_\_\_\_ OU 5 \_\_\_\_\_

**Project Information**

Type of Work

New  Addition  Alteration (Internal or External)  Change of

Occupancy

Use of Structure

Single Family Dwelling  Private Garage  Private Storage Building

Other Private Structure

Commercial

Industrial

**Building Permit Application**

**Page 2**

Other

Work Description \_\_\_\_\_

Previous Use (For Change of Occupancy) \_\_\_\_\_

Type of Construction, Use and Occupancy and Maximum Occupancy: \_\_\_\_\_

**Building Information**

Distance to Property Line

Front Yard Setback:

Rear Yard Setback:

Side Yard Setbacks (Left Side):

(Right Side):

Street Setback:

Area of Lot:

Total Building Height:

Easements: \_\_\_\_\_

Wood Frame  Modular  Steel Frame  Masonry  Other \_\_\_\_\_

Number of Bedrooms:

(New):

(Existing):

Number of Floors:

Number of Bathrooms:

Area of Spaces (in square feet, using outside dimensions)

Unfinished Basement: \_\_\_\_\_ First Floor: \_\_\_\_\_ Second Floor: \_\_\_\_\_  
Finished Basement: \_\_\_\_\_ Garage: \_\_\_\_\_ Carport: \_\_\_\_\_  
Deck: \_\_\_\_\_ Other: \_\_\_\_\_  
Total Area of Enclosed Spaces: \_\_\_\_\_

**Utility Information**

Water Supply  Individual Well  Public System \_\_\_\_\_

Waste Disposal System  Individual System  Public System \_\_\_\_\_

Primary Heating System  Electric  Natural Gas  Propane  Wood  
 Other \_\_\_\_\_

---

I hereby certify that to the best of my knowledge this application information is correct. I understand that no work on the applied for project may be performed until authorization is given by the Building Official and work that is authorized must be inspected at specified stages of the construction and be approved before the work may proceed to the next stage. I further understand that requests for inspections must be made at least 24 hours in advance.

Applicant's Signature \_\_\_\_\_ Date \_\_\_\_\_

## Building Permit Approval Form

**ADDRESS:**

Architectural Review

Subdivision

Date	Approved	Denied	

Comments:

**Water** (please check one)

Call your water company for a locate

- We ask that you provide this signature, so that way the Building Department can confirm there

Parkville Water

2015 Poplar Street 486-1449

\_\_\_\_\_ Water District

Individual Well (include copy of permit or permit application where allowed)

Date	Approved	Denied	
------	----------	--------	--

**Comments:**

**Waste Disposal (please check one)**  **Call your utility company for a locate**

- We ask that you provide this signature, so that way the Building Department can confirm there
  - Leadville Sanitation District 911 U.S. Hwy 24 486-2993
  - Lake County Public Health Jackie Littlepage 112 West 5<sup>th</sup> Street 719-486-7481
  - \_\_\_\_\_ Sanitation District

Date	Approved	Denied	
------	----------	--------	--

**Comments:** \_\_\_\_\_

**Fire Safety**

- We ask that you provide this signature, so that way the Building Department can confirm there
  - Leadville/Lake County Fire Department 816 Harrison Avenue 486-2990

Date	Approved	Denied	
------	----------	--------	--

**Comments:**

**Utility Services (please check one)**  **Call your utility company for a locate**

- We ask that you provide this signature, so that way the Building Department can confirm there
  - XCEL Energy Residential & Commercial – Britt Mace (970) 262-4032  
Send a 11x17 site plan via email:Brittany.Mace@xcelenergy.com
  - Sangre de Cristo Electric Association 29780 Hwy 24, Buena Vista 395-2412

<input type="checkbox"/> Propane or Natural Gas Supplier _____ <input type="checkbox"/> Other _____
--

<b>Date</b>	<b>Approved</b>	<b>Denied</b>	
-------------	-----------------	---------------	--

**Comments:**

<b>Zoning (please check one)</b>			
<input type="checkbox"/> City of Leadville	800 Harrison Avenue 486-2092		
<input type="checkbox"/> Lake County Land Use	505 Harrison Avenue 486-1796		
<i>California Gulch Superfund Site (if applicable)</i>			
Operable Unit 3 _____	Operable Unit 9 _____	Operable Unit 7 _____	
Operable Unit 8 _____	Operable Unit 4 _____	Operable Unit 2 _____	
Operable Unit 5 _____			

<b>Date</b>	<b>Approved</b>	<b>Denied</b>	
-------------	-----------------	---------------	--

**Comments:**

**Plan Review**

Lake County Building Department	505 Harrison Avenue 486-2875
---------------------------------	------------------------------

<b>Date</b>	<b>Approved</b>	<b>Denied</b>	
-------------	-----------------	---------------	--

**Comments:**

**Final Approval:** \_\_\_\_\_ **Date:** \_\_\_\_\_  
*Chief Building Official or Designee*

# Lake County Building Department

## *Affidavit*

Building Permit #: \_\_\_\_\_

Property Address: \_\_\_\_\_

Owner: \_\_\_\_\_

1. During the construction of this project, I understand that I am required to have either a portable toilet on site or arrange for the use of existing facilities. I understand that if these arrangements have not been made the inspector will not perform inspections at my job site.
2. I also understand that I am required to keep the construction site clean and free of construction debris with trash containment available.
3. All construction and/or work for which a permit is required shall be subject to inspection by the Building Official and all such construction and/or work shall remain **accessible and exposed** for inspection purposes until it has been seen and approved by the Building Official.
4. It shall be the responsibility of the permit applicant to cause the construction and/or work to remain **accessible and exposed** for the required inspection(s) and approvals. Neither the

Building Official nor Lake County shall be liable for expense entailed in the removal or replacement of any materials required to allow the required inspections(s).

5. I have received, read and understand the Best Management Practices for Managing Lead, Arsenic and Cadmium Containing Soils in Lake County, Colorado handout, if my project is located within Operable Units 2, 3, 8, 9, 4, 5 and 7 of the California Gulch Superfund Site, as applicable.
6. This building permit is valid under the following conditions:
- Shall become invalid one year from date of issuance.
  - Shall become invalid if the work authorized by such permit is not commenced within 180 days after its issuance.
  - Shall become invalid if the work authorized by this permit is suspended or abandoned for a period of 180 days after the time the work is commenced.
  - The Building Official is authorized to grant two extensions for periods of not more than 180 days each at no cost to the applicant.
  - Any extensions shall be requested in writing and justifiable cause demonstrated.
  - Extension requests must be made within 10 business days of expiration of the permit.
  - If the extension is not made within this time frame a payment of 50% of the base permit fee will be required.
  - Any extensions requested above the two 180 day extensions, as stated above, will require a payment of 50% of the base permit fee.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

### **Lake County Building Department**

P.O. Box 513 · 505 Harrison Avenue · Leadville, CO 80461

(719) 486-2875 · Fax (719) 486-4179

Driveway Permit

***(Resolutions 98-15 and 98-35)***

**PERMIT:** To connect a driveway or parking area to a public roadway, modify an existing driveway, or re-grade an existing driveway. (Roadway Design Standards, Section 254)

**PROPERTY OWNER:** \_\_\_\_\_ **PHONE:** \_\_\_\_\_

**LOCATION OF WORK:** \_\_\_\_\_

**PHYSICAL ADDRESS FOR JOB SITE:**  
\_\_\_\_\_

**APPLICANT:**  
\_\_\_\_\_

**CONTRACTOR:** \_\_\_\_\_ **PHONE:** \_\_\_\_\_

**MAILING ADDRESS:** \_\_\_\_\_

NATURE OF WORK: \_\_\_\_\_

STARTING DATE: \_\_\_\_\_ AUTHORIZED BY: \_\_\_\_\_

**DRIVEWAY PERMIT APPLICATION PROCEDURES**

Submit to the Lake County Building Department/Land Use Office:

- 1) A completed application form;
- 2) A \$50.00 fee; and
- 3) two (2) copies of the site plan.

The Site Plan must be drawn to scale and must include:

- a) The name of the property owner;
- b) The physical address of the property;
- c) All property lines, easements, roads, and existing and proposed structures on the property (including buildings, well, septic tank and leach field); and
- d) The driveway location, dimensions of the driveway, surface material, slope, culvert size, distance to the neighbor's driveways, and distance to intersection or curb return.

*(Office Use Only)*

PERMIT FEE: **\$50.00** CHECK #: \_\_\_\_\_ DATE RECEIVED: \_\_\_\_\_

APPROVED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

INSPECTED BY: \_\_\_\_\_ FINAL INSPECTION DATE: \_\_\_\_\_

## Additional Information

1. Permits must be applied for 48 hours in advance of any excavation/installation, except in the event of an emergency.
2. Repairs to streets shall be completed as soon as possible after construction completion date.
3. If construction disturbs any part of highway rights-of-way, a permit must be secured from the Colorado Department of Transportation.
4. The Permit must be available at job site to be inspected by County authorities at times when construction is in progress.
5. Contractor must supply and maintain adequate barricades and warning devices.
6. A "to scale" drawing showing the location and description of any installation must be presented for approval upon submittal of application for permit.
7. A copy of said drawing shall be furnished to the Building Department/Land Use Office.
8. No permit will be issued without prior acceptance and receipt of drawings.
9. For a period of three months, Contractor will be responsible for street maintenance of that portion of street disturbed by construction.
10. Applicant shall provide evidence from all public utilities (telephone, gas, water and sewer) that the excavation will disturb no public utilities.

### For Questions Regarding Construction Specifications:

Contact Brad Palmer, Road & Bridge Supervisor, at 486-0259.

### To Request an Inspection:

- 1) Call 486-2875;
- 2) State the *name of the property owner and the contractor performing work*;
- 3) State the *address of the job site*; and
- 4) State the type inspection requested (Example: "*driveway inspection*").

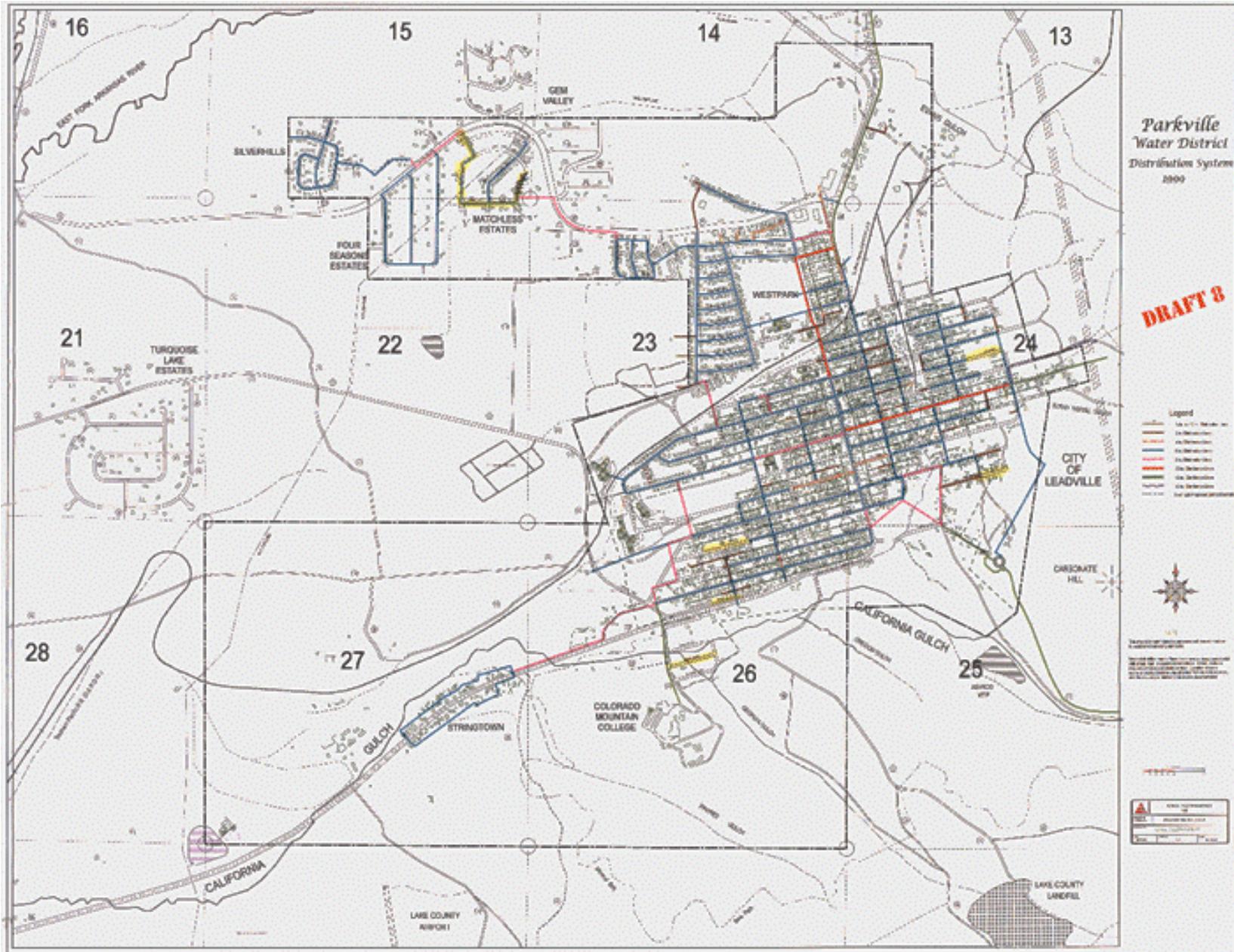
**Figure K-11: OU12 Institutional Control - Parkville Water Restriction on Private Wells in the Parkville Water District**

**RULES AND REGULATIONS OF THE PARKVILLE WATER DISTRICT  
27 October 2006**

ARTICLE 2 – PROHIBITIONS

2.7 – Private Wells. Private lines, wells, mains and service connections existing and in use on the effective date of these Rules and Regulations, or the effective date of any previous Resolution promulgating the Rules and Regulations of the District (“effective date”), shall not be enlarged nor shall the service connections be increased as to number or size in any private line, well, main or service connection, without written permission from the District. For the violation of this provision, the District shall shut off the water and discontinue service to the private line, main or service connection. After the “effective date” no further private wells shall be drilled within the corporate limits of the district without first getting written permission of the District.

Accessed 8/15/2022 <https://www.parkvillewater.org/rules-regulations/>



Source: Parkville Water District – Lake County Maps accessed 8/15/2022 at <https://www.parkvillewater.org/wp-content/uploads/2015/05/dist-map-lg.gif>