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

Prepared by

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Date

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LIST OF ABBREVIATIONS & ACRONYMS

AOC	Administrative Order on Consent
ARAR	Applicable or Relevant and Appropriate Requirement
ARD	Acid Rock Drainage
AROD	ROD Amendment
ASARCO	American Smelting and Refining Company
AV	Arkansas Valley Smelter
AWQC	Ambient Water Quality Criteria
BOR	U.S. Bureau of Reclamation
BRA	Baseline Risk Assessment
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 Assessment
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
HQ	Hazard Quotient
IC	Institutional Control
KF	Kids First Program
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
mg/cm^2	Milligrams per Square Centimeter
mg/kg	Milligrams per Kilogram
MOU	Memorandum of Understanding
MGTI	Malta Gulch Tailing Impoundment
MTI	Malta Tailing Impoundment
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
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
ROD Mod	ROD Minor Modification
RMP	Routine Monitoring Plan
RPM	Remedial Project Manager
SEMS	Superfund Enterprise Management System
SFS	Screening Feasibility Study
SDWA	Safe Drinking Water Act
TI	Technical Impracticability
UAO	Unilateral Administrative Order
UP	Union Pacific
USBR	Unites States Bureau of Reclamation
USGS	United States Geological Survey
UU/UE	Unlimited Use and Unrestricted Exposure
WTP	Water Treatment Plant
WQS	Water Quality Standard

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 found during the review, if any, 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 Contingency Plan (NCP) (40 CFR Section 300.430(f)(4)(ii)), and considering EPA policy.

This is the fifth FYR for the California Gulch Superfund Site (Site). The triggering action for this statutory review is the previous FYR's completion date of September 27, 2012. 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 remedial project manager (RPM) for the Site. Representing the State of Colorado (State), Alissa Schultz and Kyle Sandor are the project managers 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 Solutions Inc. (Skeo). The review began on 6/28/2016.

Approximately 100 miles southwest of Denver, the 18 square mile Site is located in Lake County, Colorado (Figure D-1) 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. The populated areas in the city include residential housing, commercial businesses such as restaurants and shops, and facilities for recreation, historical tourism, athletics, industrial and mining activities. The zoning uses for the area are industrial mining, business, recreational and residential. The Parkville Water District supplies water to the majority of homes and businesses in the area.

The Site consists of the following 12 operable units (OUs), all of which are addressed in this FYR:

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

Former mining operations contributed to metals contamination in surface water, ground water, soil and sediments. The Yak Tunnel Water Treatment Plant in OU1 primarily treats waters draining from the Yak Tunnel and OU4. Extensive piles of mine tailing, slag and waste rock are present on the Site; remedial efforts at OUs 2 through 11 have been designed to control these source areas. Water quality data is collected 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 2020.

Remedies for OUs 1, 2, 3, 4, 5, 7, 8, 9,10 and 11 have been completed and are being monitored and maintained as required. These remedies are generally performing as intended. All of these OUs except OU11 have been partially deleted from the NPL.

Remedial actions, in OU6 and 12, once fully implemented, are expected to perform as intended. OU11 entered the O&M phase on May 1, 2017 and needs institutional controls before the OU can be partially deleted from the NPL.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: California Gulch		
EPA ID: COD980717938		
Region: 8	**State:** CO	**City/County:** Leadville/Lake County
SITE STATUS		
NPL Status: Final		
Multiple OUs? Yes	**Has the Site achieved construction completion?** No	
REVIEW STATUS		
Lead agency: EPA		
Author name: Linda Kiefer, with additional support provided by Skeo		
Author affiliation: EPA Region 8		
Review period: 6/28/2016 – 9/27/2017		
Date of Site inspection: 9/13-14/2016		
Type of review: Statutory		
Review number: 5		
Triggering action date: 9/27/2012		
Due date *(five years after triggering action date)*: 9/27/2017		

II. SITE-WIDE RESPONSE ACTION SUMMARY

Site-Wide 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 tailing, slag and other smelter waster, and acid rock drainage (ARD).

Prior to the Site's NPL listing, groundwater and surface water studies were conducted by private parties, as well as by the United States Geological Survey (USGS) and the EPA. The Site was placed on the NPL in 1983 because of concerns about 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 Site-wide remedial investigation (Phase I RI) was released in May 1987. The 1987 Phase I RI 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. Additionally, soils and groundwater contained elevated levels of arsenic, zinc, lead, copper and cadmium. Subsequent remedial investigation/feasibility studies (RI/FSs) occurred throughout the early 1990s.

Baseline risk assessments (BRAs) characterized risks to human and ecological receptors at the Site assuming that no cleanup 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 discussed below. Many BRAs have been completed for the Site. They are discussed in Appendix C.

Under the Site's 1994 Consent Decree, assessment of Site-wide surface water and groundwater quality was deferred to OU12. EPA issued a Record of Decision (ROD) for OU12 in September 2009. Remedial action activities are currently underway to address contaminated surface water and groundwater. 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 land use-based lead remediation goals are summarized in Table 1.

Table 1: Land Use-Based Lead Remedial Goals

Land Use-Based Remediation Goals	Land Use-Based Lead Remedial Goal (mg/kg)	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
Notes: mg/kg – milligrams per kilogram		

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 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. Initiation

of the Yak Tunnel Water Treatment Plant (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. Additional details on ecological receptor risks can be found in Appendix C.

Site-Wide Response Actions

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

III. PROGRESS SINCE THE LAST REVIEW

Progress since the last FYR, protectiveness determinations from the 2012 FYR, status of recommendations from the 2012 FYR will be discussed below within each individual OU.

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

On July 6th and on July 13th, 2017 EPA published a public notice in the Leadville Herald Democrat (Appendix E) announcing commencement of the five-year review (FYR) process for the Site, providing contact information for Chris Wardell, and Warren Smith from CDPHE, inviting community participation in the FYR process. No one contacted EPA or CDPHE as a result of this advertisement; however, EPA contacted several public officials and known interested parties in Leadville/Lake County. We received two responses to the interview questions that were mailed to the identified interested parties.

Overall, the responses to the FYR questions were positive, noting the past cleanup work completed has been successful, if not remarkable though it has taken time. It was noted that there is improved public perception and confidence that the Site is no longer impairing the Arkansas River, and is a safer area in which to raise families. There was high praise for the EPA Project Manager and the communication received from her.

The community interviews identified several concerns. Some families that have recently moved to the area have environmental concerns regarding their properties. Some people are concerned about economic challenges associated with living and working near a former Superfund Site. There was also some concern shared that in hindsight some of the remedies that were put into place may have been unnecessary, were not cost beneficial, or are difficult to maintain. Additionally, it was stated that there is some public confusion about who is responsible for various remedial activities, and what some those activities actually do. It was suggested that EPA provide more updates on ongoing and past cleanup work, and information on community resources regarding blood-lead-level testing.

Staff from Newmont Mining Company, parent company of the Resurrection Mining Company (Newmont/Resurrection), the PRP for OUs 1, 4, 8 and 10, completed an emailed interview questionnaire on 02/14/2017. They indicated that remedial activities have been effective in decreasing the load of heavy metals being discharged into the Arkansas River, and in lowering the future risks of unplanned, uncontrolled releases. Overall, the remedial activities have resulted in water quality improvements to the Arkansas River. Newmont/Resurrection finds that the community has been, on occasion, confused about who operates the Yak Tunnel water treatment plant and who operates the U.S. Bureau of Reclamation's Leadville Mine Drainage Tunnel Water Treatment Plant. Newmont/Resurrection's staff indicated that the EPA remedial project manager is very competent, readily available, and always willing to discuss ways to address Site-related issues that come up.

Site Inspection

The Site inspection took place September 13 and 14, 2016 to evaluate the remedies at all OUs. In attendance were EPA Region 8 RPM Linda Kiefer, Treat Suomi and Claire Marcussen from EPA contractor Skeo, and Timothy Runnells from the O&M contractor representing the PRP. The purpose of the inspection was to assess the protectiveness of the remedy.

On September 13, 2016, EPA RPM Linda Kiefer led the Site inspection of OUs 2, 3, 5, 6, 7, 9, 11 and 12, with contractor support provided by Treat Suomi and Claire Marcussen (Skeo). The inspection focused on reviewing the conditions of capped waste piles, impoundments, diversion structures and engineering controls at OUs 2, 3, 5, 6 and 7. It also included observation of OU9 removal actions at several residential properties that have been completed over the last five years. The inspection on September 13, 2016 concluded with viewing of several segments of the Arkansas River (OU11) downgradient of the Site. In addition, throughout the inspection, monitoring well locations and several surface water monitoring locations were observed as part of the Site-wide OU12.

On September 14, 2016, EPA RPM Linda Kiefer, EPA contractor support staff Treat Suomi and Claire Marcussen (Skeo), and Timothy Runnells from the O&M contractor representing Newmont/Resurrection, participated in the second day of the Site inspection to review the remedies for OUs 1, 4, 8, and 10. Participants met at the Yak Tunnel WTP (OU1). Tours of OUs 4, 8 and 10 followed.

Sections IV through X below provide details on the Site inspection for each OU. The Site inspection checklist and photos are provided in appendices F and G, respectively. Data review is also encompassed below. Any issues impacting current and/or future protectiveness are highlighted.

IV. OPERABLE UNIT 1: YAK TUNNEL WTP

OU1 consists of the Yak Tunnel and WTP. The Yak Tunnel was constructed to dewater mines and to facilitate mineral exploration and development. EPA estimated that 60,000 feet of tunnels and major laterals and 55 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 ground water and stream sediment may have been impacted by historic releases from the Yak Tunnel.

The Yak Tunnel and Yak Tunnel WTP are located southeast of Leadville (Figure D-3).

IV.1 OPERABLE UNIT 1: RESPONSE ACTION SUMMARY

Basis for Taking Action

Based on the results of the Site's RI/FS, 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 be addressed under OU1.

Response Actions

The EPA released a 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 initially selected in the Site's 1988 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 for OU1 is to decrease the release and threatened release of hazardous substances, pollutants and contaminants from the Yak Tunnel into California Gulch.

The selected remedy included installation of a permanent water treatment system to treat contaminated groundwater from the Yak Tunnel before discharging it to California Gulch. The remedy also included construction of a surge pond and flow-control bulk head within the tunnel, as well as long-term monitoring and institutional controls. The cleanup goals identified for OU1 are the effluent discharge limits established in Table 2, as required by the 2008 Consent Decree for Outfall 001A. The effluent limits from the Consent Decree continue to be used. 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
Notes: µg/L – micrograms per liter		

Status of Implementation

EPA released a proposed remedial action plan for the Yak Tunnel in August 1987. EPA issued a Unilateral Administrative Order (UAO) to ASARCO Incorporated, Newmont Mining Corporation, Res-ASARCO Joint Venture and Newmont/Resurrection on March 29, 1989, for the Yak Tunnel's remedial design and remedial action. EPA made two amendments to the UAO on April 30, 1993, and June 16, 1993.

Construction of a surge pond and permanent water treatment plant 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 water treatment facility to treat waters emanating from the Yak Tunnel was constructed over a two-year period. The Yak Tunnel WTP has been in operation since construction finished in February 1992.

The Yak Tunnel Bulkhead, constructed in 1994, control 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. Additional efforts in 1995 and 1996 reduced metals loading into the Arkansas River from ephemeral tributaries.

Institutional controls – environmental covenants for Newmont/Newmont/Resurrection Mining Company properties – are in place for OU1 (Appendix L). 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 1988 OU1 ROD, 1989 OU1 AROD and 1991 OU1 ESD are in place. On July 29, 2013, an ESD was signed requiring ICs.

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 of Colorado and Newmont/Resurrection, to which the RPM, 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.

A series of software upgrades took place at the Yak Tunnel WTP during this FYR period. In a letter dated October 2, 2014, EPA allowed a temporary modification to the Work Plan for the effluent to be discharged effluent 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 of the addition of sulfuric acid post treatment, a step that was required to bring the plant effluent to 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. The modification has been extended by twelve months to allow CDPHE time to review data, and will to expire in April 2018. Data presented through July 2017 show that OU1 discharge has not exceeded the effluent limits.

IV.2. OPERABLE UNIT 1: PROGRESS SINCE THE LAST REVIEW

This section includes the protectiveness determinations and statements from the previous FYR as well as the recommendations from the previous FYR and the status of those recommendations.

Table 3: Protectiveness Determinations/Statements from the 2012 FYR

OU #	Protectiveness Determination	Protectiveness Statement
1	Short-term Protective	The OU1 remedy is protective of human health and the environment in the short term because contaminated waters draining from the Yak Tunnel are directed to the Yak Tunnel Water Treatment Plant (WTP), which removes heavy metals and adjusts the water's pH before discharging the effluent to surface water. O&M will continue into the foreseeable future at OU1 and there are no exposure pathways of concern. Institutional controls have been implemented and are in the process of being implemented. For the remedy to be protective over the long term, EPA should review whether institutional controls should be included in a decision document for OU1.

Table 4: Status of Recommendations for OU1 from the 2012 FYR

Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
Institutional controls are not currently required by OU1 decision documents.	Review whether a decision document is needed to include the institutional controls at OU1.	Completed	ESD issued	7/29/2013

IV.3 OPERABLE UNIT 1: FIVE-YEAR REVIEW PROCESS

Data Review

The following data are collected to determine the status of the Yak Tunnel Hydrologic System and determine if any changes are warranted to optimize the system:

- Water level elevations behind the Yak Tunnel bulkhead, in monitoring wells and piezometers and mine shafts.
- Yak Tunnel flow and pump rates.
- Piezometer and monitoring well field parameter measurements and water quality.
- Yak Tunnel blockage field parameter measurements and water quality analyses.
- Semiannual Sampling Event: Field and Water Quality Parameters in monitoring wells BBW-5, BBW-10 and the Yak Tunnel.

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 historic high groundwater elevation, the groundwater elevation data continued to indicate a hydraulic gradient towards 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 historic high groundwater elevation.

Water-quality sampling occurs semi-annually from monitoring wells BBW-5 and BBW-10 and 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 2015 *Annual Monitoring Report, Yak Tunnel System for the Yak Tunnel Operable Unit (OU1),* report concluded that, overall, the 2015 water quality data from BBW-5 and Yak Tunnel did not show significant adverse changes from 2014 or historic data.

Water discharged from the Yak Tunnel WTP goes directly to Upper California Gulch surface water and is required to meet EPA's surface water quality standards established in the 2008 Consent Decree. Effluent waters are sampled before being discharged from the plant. EPA monitors the effluent results monthly. No exceedance of surface water quality standards was detected in discharged effluent from the Yak Tunnel WTP during 2016.

Site Inspection

The OU Site inspection took place on September 14, 2016. Participants are listed in Section III of this FYR Report. Mr. Runnells from the Newmont/Resurrection's O&M contractor led the inspection of the treatment system, the Yak Tunnel portal and the surge pond. Mr. Runnells described the upgrades to the plant, which include software, electronic control boards, lighting and treatment system improvements. Mr. Runnells explained that, in 2014, EPA approved a request to discharge effluent from the Yak Tunnel WTP at a pH above the previously permitted level. The plant is under a temporary modification to the discharge permit for 42 months to determine if the elimination of sulfuric acid from post treatment has any notable impacts on metals concentrations in California Gulch downstream of the plant's outfall. The plant was in good working operation at the time of the Site inspection. 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 E). An inspection checklist has been completed. It is available in Appendix D.

IV.4 OPERABLE UNIT 1: TECHNICAL ASSESSMENT

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

Yes. 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 finished 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 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. Under the 2008 Consent Decree, Newmont/Resurrection agreed to operate and maintain the OU1 remedy features. EPA signed an ESD clarifying that institutional controls are required on July 29, 2013. All institutional controls required by Site decision documents are in place as are procedures to notify 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 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 within secured and signed perimeter fencing. The Yak Tunnel portal discharges via piping that carries the discharge directly to the WTP. EPA partially deleted OU1 from the NPL in April 2016.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

Yes. 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).

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

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

IV.5 OPERABLE UNIT 1: ISSUES/RECOMMENDATIONS

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

IV.6 OPERABLE UNIT 1: PROTECTIVENESS STATEMENT

Protectiveness Statement		
Operable Unit: 1	*Protectiveness Determination:* Protective	*Planned Addendum Completion Date:* Not Applicable
Protectiveness Statement: 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. OPERABLE UNIT 2: MALTA GULCH FLUVIAL TAILING/LEADVILLE CORP. MILL/MALTA GULCH TAILING IMPOUNDMENTS

OU2 is located to the southwest of the City of Leadville (Figure D-4). It consists of three waste features: the Malta Tailing Impoundment (MTI), the Malta Gulch Tailing Impoundments (MGTI) and the Lower Malta Gulch Fluvial Tailing (LMGFT). Fluvial tailing is the tailing that have been washed downstream of the impoundments. The MTI consists of three small impoundments occupying 4.6 acres and estimated to contain approximately 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.

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 approximately 23 acres in size, located at the upper end of Malta Gulch and contains an estimated 1.5 million tons of waste. Ore & Chemical Company created the first tailing 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 tailing 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 tailing 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. When Ore & Chemical Company operated the mill, the tailing impoundments were not entirely effective for containment; approximately 600,000 tons of the tailing washed or flowed down Lower Malta Gulch. Thus, the LMGFT was created. The LMGFT is about 26 acres in size. It consists of fluvial tailing deposits with an estimated volume of 30,000 cubic yards.

V.1 OPERABLE UNIT 2: RESPONSE ACTION SUMMARY

Basis for Taking Action

Based on the results of the Site's 1993 engineering evaluation/cost assessment (EE/CA), EPA determined that principal threats at OU2 were 1. the potential for casual use, through direct contact with the tailing materials which is contaminated with heavy metals; 2. and the potential release of heavy metals, cyanide and sulfates to groundwater as a result of precipitation events. Table 5 indicates the types of contamination found in the different media at OU2.

Table 5: Types of Contamination in Each Media for OU2

Media	Contamination
Tailing Impoundments	Elevated lead and zinc
Fluvial Tailing	Elevated lead

Response Actions

In September 1991, EPA and Hecla/Day signed an Administrative Order on Consent (AOC) for the performance of an EE/CA at the MGTI. Its purpose was to determine the nature and extent of releases and to determine an appropriate response action.

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 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/response actions were performed at OU2 (Table B-4). Beginning in 1995, the fluvial tailing were excavated from Lower Malta Gulch and deposited in the MGTI. 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 tailing, neutralized acidic leachate, and capped and revegetated the area.

The removal actions have served to prevent or control 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.

EPA issued the ROD for OU2 on September 30, 1999. The OU2 1999 ROD indicated that the OU2 removal actions greatly reduced or eliminated any potential risk posed to human health or the environment from releases

of hazardous substances found at the MGTI, the Lower Malta Gulch 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. 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

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 and Mining Safety. 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/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 cover.
- Inspect impoundments.
- Review the zoning definition to ensure consistency with the remedy.
- Review the status of the Colorado Division of Mining and Geology permit and use of the mill and impoundments.
- Upon termination of the Colorado Division of Mining and Geology permit, ensure that final facility reclamation is protective of human health and the environment.
- Monitor groundwater in June of each year at nine locations for metals and other inorganic parameters.

CDPHE conducts annual O&M inspections and maintenance activities per the March 20, 2015 O&M Plan. O&M activities are performed under an EPA grant funded with Special Account monies. As a result of the September 2016 inspection, TetraTech, the State O&M Inspection contractor, made several recommendations for maintenance of remedy features. The State will determine which of these recommendations will be conducted as part of O&M.

V.2. OPERABLE UNIT 2: PROGRESS SINCE THE LAST REVIEW

This section includes the protectiveness determinations and statements from the previous FYR as well as the recommendations from the previous FYR and the current status of those recommendations.

Table 6: Protectiveness Determinations/Statements from the 2012 FYR

OU #	Protectiveness Determination	Protectiveness Statement
2	Short-term Protective	The remedy at OU2 is protective of human health and the environment in the short term because 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 found at the Malta Gulch Tailing Impoundment, the Lower Malta Gulch and the Malta Tailing Impoundment portions of OU2. In addition, institutional controls exist through the Industrial Mining designation. The State requires permits for mining. For the remedy to be protective over the long term, the EPA should review whether additional institutional controls are needed for OU2.

Table 7: Status of Recommendations for OU2 from the 2012 FYR

Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
Institutional controls are mentioned in the ROD as "present ICs" in the form of zoning.	Review whether additional institutional controls are needed for at OU2.	Completed	ESD was issued requiring additional institutional controls.	7/29/2013

V.3 OPERABLE UNIT 2: FIVE-YEAR REVIEW PROCESS

Data Review

There are no applicable data to review for OU2.

Site Inspection

The inspection of OU2 took place on September 13, 2016. Participants are listed in Section III of this FYR Report. The capped impoundments were intact. Fencing and warning signs were in good condition. Photographs were taken of Site features including the impoundments (Appendix E). An inspection checklist has been completed. It is available in Appendix D.

V.3 OPERABLE UNIT 2: TECHNICAL ASSESSMENT

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

Yes. 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 No Further Action 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 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?

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

V.4 OPERABLE UNIT 2: ISSUES/RECOMMENDATIONS

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

V.5 OPERABLE UNIT 2: PROTECTIVENESS STATEMENT

Protectiveness Statement		
Operable Unit: 2	*Protectiveness Determination:* Protective	*Planned Addendum Completion Date:* Not Applicable
Protectiveness Statement: 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. OPERABLE UNIT 3: DENVER & RIO GRANDE WESTERN RAILROAD COMPANY (D&RGW) SLAG PILES/RAILROAD EASEMENT/RAILROAD YARD

OU3 includes three slag piles – Arkansas Valley Smelter (AV), La Plata and Harrison Street – owned by the Denver & Rio Grande Western Railroad Company (D&RGW), an easement that runs diagonally through the City of Leadville, and a portion of the rail yard known as Poverty Flats (Figure D-5). Union Pacific (UP) acquired D&RGW's properties nationwide in 1996 taking over the responsibilities outlined in the 1993 CD with D&RGW.

AV Smelter Slag Pile

The AV Smelter Slag Pile covers approximately 40 acres just west of the Stringtown Mill Area. The pile generally 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 approximately 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 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 portion of the rail yard formerly owned by D&RGW is located near the north end of Leadville, encompasses an area of roughly 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 portion of railroad track that runs diagonally through Leadville. It consists of approximately 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.

VI.1 OPERABLE UNIT 3: 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), 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.

Table 8 indicates the types of contamination found in the OU3 media.

Table 8: Contaminated Media at 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

EPA issued the Stockpiled Fine Slag – Arkansas Valley Smelter Slag Pile ROD (1998 OU3 ROD) on May 6, 1998. It required no further action since the area is zoned for industrial/mining uses. EPA issued an ESD on August 6, 2014, to add institutional controls as a component to the OU3 remedy because contamination is present above UU/UE. Only fine slag, a separate stockpile at the AV Smelter Slag Pile consisting of slag with a particle size of 3/8 inch or less, is addressed by the ROD. Based on consideration of CERCLA requirements, detailed analyses of alternatives and public comments, 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

As part of its ballast operations, Union Pacific (UP) relocated approximately 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 proposing 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 the summer and fall of 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 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.

On August 6, 2014, EPA issued an ESD that required institutional controls on OU3 properties.

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. EPA deleted OU3 from the NPL on April 11, 2016.

Systems Operations/O&M
The 1998 OU3 No Action ROD did not require maintenance of the fine slag piles. The 1998 Memorandum of Understanding (MOU) entered into between UP, Lake County and 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 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).

VI.2. OPERABLE UNIT 3: PROGRESS SINCE THE LAST REVIEW
This section includes the protectiveness determinations and statements from the previous FYR as well as the recommendations from the previous FYR and the status of those recommendations.

Table 9: Protectiveness Determinations/Statements from the 2012 FYR

OU #	Protectiveness Determination	Protectiveness Statement
3	Short-term Protective	The remedy at OU3 is protective of human health and the environment in the short term because no complete human or ecological exposure pathways were identified. For the remedy to be protective over the long term, additional studies at OU3 should be performed to determine whether additional response actions are needed at OU3.

Table 10: Status of Recommendations for OU3 from the 2012 FYR

Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
Contaminated soil may be a media of potential concern at OU3.	Review whether additional response actions are needed at OU3.	Completed	The need for institutional controls was included in an ESD for OU3 on August 6, 2014. Institutional controls in the form of ordinances were adopted by Lake County on 3/3/2009 and the City of Leadville on 5/7/2013.	8/6/2014

VI.3 OPERABLE UNIT 3: FIVE-YEAR REVIEW PROCESS

Data Review

There are no applicable data to review for OU3.

Site Inspection

The OU3 inspection took place on September 13, 2016. 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) is open vacant land available for sale. The property has since sold. The new owner contacted CDPHE as directed in the ICs. A material management plan for the proposed development has been approved by CDPHE. All other slag piles in this OU had been relocated to the Arkansas Valley 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.

VI.3 OPERABLE UNIT 3: TECHNICAL ASSESSMENT

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

Yes. The Site inspection and the review of documents, ARARs and risk assumptions indicate that the remedy is functioning as intended by the OU3 No Action ROD.

All institutional controls required by Site decision documents are in place. 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?

Yes. 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 at 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?

No. The OU3 ROD focused on fine slag at the AV Smelter Slag Pile. Redevelopment proposals for the Harrison Street and Poverty Flats properties highlighted that fine slag may not be the only contaminated media of concern at OU3. As a result, an ESD signed August 6, 2014, required institutional controls. In addition, 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, that limits unacceptable exposures to slag and contaminated soils. EPA partially deleted OU3 from NPL in 2016.

VI.4 OPERABLE UNIT 3: ISSUES/RECOMMENDATIONS

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

VI.5 OPERABLE UNIT 3: PROTECTIVENESS STATEMENT

Protectiveness Statement		
Operable Unit: 3	*Protectiveness Determination:* Protective	*Planned Addendum Completion Date:* Not Applicable
Protectiveness Statement: 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. OPERABLE UNIT 4: UPPER CALIFORNIA GULCH

Upper California Gulch, OU4, is part of the Leadville Historic Mining District and is located southeast of Leadville (Figure D-6). 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 approximately 8 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 remedial investigation 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 tailing 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 tailing and fluvial tailing 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 tailing piles are largely un-vegetated, with grasses and lodgepole pine growing on a quarter of the tailing surface. A wetland area exists along the Upper California Gulch channel within the OU4 boundaries. Oro City is considered a cultural and historic resource within the Leadville Historic Mining District.

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

VII.1 OPERABLE UNIT 4: RESPONSE ACTION SUMMARY

Basis for Taking Action

Based on the results of the OU4 1994 RI/FS, EPA determined that actual or threatened releases of hazardous substances at and from waste rock and fluvial tailing 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 tailing piles and may leach to surface water or groundwater via acid rock drainage.

Response Actions

Resurrection Mining Company completed removal activities from 1995 to 1996 prior to the issuance of the 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 additional response activities in Garabaldi 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.

EPA issued the ROD for OU4 on March 31, 1998. The RAOs established in the 1994 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:

- Garabaldi 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 tailing.
  - Construction of eight sediment dams within the channel and approximately 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, 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 Site-wide 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, EPA issued an ESD to add institutional controls as a component of the Site remedy.

Status of Implementation

Response actions at Nugget Gulch, Whites Gulch, AY Minnie and Iron Hill began in 1998 and finished in 2001.

On December 22, 2010, Lake County implemented ICs on 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 the CDPHE. In addition to the ICs provided by the 2008 CD, the environmental covenants, and the Lake County regulations, all of OU4 is zoned Industrial Mining by Lake County which serves to limit future changes of land use without County approval and notification to the EPA and the 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. EPA deleted OU4 from the NPL on October 24, 2014.

Systems Operations/O&M

Newmont/Resurrection conducts inspections in accordance with the OU4, 8, 10, Operations and Maintenance Plan, California Gulch Superfund Site (O&M), 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. These reports are available by contacting EPA Region 8.

VII.2. OPERABLE UNIT 4: PROGRESS SINCE THE LAST REVIEW

This section includes the protectiveness determinations and statements from the previous FYR as well as the recommendations from the previous FYR and the current status of those recommendations.

Table 11: Protectiveness Determinations/Statements from the 2012 FYR

OU #	Protectiveness Determination	Protectiveness Statement
4	Short-term Protective	The remedy at OU4 is protective of human health and the environment in the short term. Exposure pathways that could result in unacceptable risks are being controlled. For the remedy to be protective over the long term, EPA should review whether a decision document is needed to incorporate institutional controls at OU4.

Table 12: Status of Recommendations for OU4 from the 2012 FYR

Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
Institutional controls are not currently required by OU4 decision documents.	Review whether a decision document is needed to incorporate institutional controls at OU4.	Completed	ESD calling for institutional controls was completed.	7/29/2013

VII.3 OPERABLE UNIT 4: FIVE-YEAR REVIEW PROCESS

Data Review

There are no applicable data to review for OU4.

Site Inspection

The OU4 inspection took place on September 14, 2016. 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.

An unpaved roadway crosses through OU4. Based on the results of the previous FYR, erosion along the downslope side of the road has been addressed by installing wire-covered rock and log-reinforced barriers. 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 portions of the Site, primarily for recreational activities. Some trespassing, by unauthorized prospectors, has been observed in the vicinity of Oro City. The local police department now routinely monitors the area to discourage trespassing.

VII.3 OPERABLE UNIT 4: TECHNICAL ASSESSMENT

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

Yes. 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. So are procedures to notify EPA and CDPHE should local governments approve a change in land use. In addition, the 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 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?

Yes. 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 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.

Land use at OU4 has not changed. The exposure assumptions used in the development of the 1998 OU4 ROD remain valid.

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

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

VII.4 OPERABLE UNIT 4: ISSUES/RECOMMENDATIONS

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

VII.5 OPERABLE UNIT 4: PROTECTIVENESS STATEMENT

Protectiveness Statement		
Operable Unit: 4	*Protectiveness Determination:* Protective	*Planned Addendum Completion Date:* Not Applicable
Protectiveness Statement: 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. OPERABLE UNIT 5: ASARCO SMELTERS/SLAG/MILL SITES

OU5 includes five smelter Sites – the Elgin Smelter, the Grant/Union Smelter, the Western Zinc Smelter, the Arkansas Valley 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) (Figure D-7).

One smelter and the mill are co-located as the AV/CZL Site, located approximately 1.5 miles southwest of Leadville on the north bank of California Gulch. The combined area covers approximately 70 acres. The entire AV/CZL Site lies above the 500-year floodplain of Lower California Gulch. This Site is also adjacent to portions of OU3 that includes the AV Smelter Slag Pile. The AV Smelter, which is part of the Leadville Historic Mining District, operated from 1879 until 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 the mill operation were tailing that were discharged below the mill presumably into the CZL Tailing Impoundment (OU8). The mill closed in 1930 and was remodeled in 1935, when it was reopened to process ores from several local mines and waste dumps until 1938 when the operations ceased.

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 located near the confluence of Georgia Gulch and California Gulch, northeast of the Colorado Mountain College campus. The Western Zinc Smelter, which operated from 1914 until 1926, is located in the western part of Leadville, approximately 75 feet west of McWethy Drive and approximately 100 feet south of the Lake County fairgrounds. The Western Zinc Mining and Reducing Company used the facility to extract zinc from ores.

Also, referred to as the Tramway Slag Pile, the Arkansas Valley South Hillside 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 approximately 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 slag, coke/charcoal, limestone, ore, matte, tailing 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.

VIII.1 OPERABLE UNIT 5: RESPONSE ACTION SUMMARY

Basis for Taking Action

The final Site-wide BRAs conducted from 1991 to 1996 identified slag, non-residential soils and residential area soils as potential media of concern. 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. Most 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. The contaminated medium at OU5 are listed in Table 13.

Table 13: OU5 Contaminated Medium

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 bag-house 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 level
	Arkansas Valley South Hillside Slag Pile	Elevated lead and arsenic levels

Response Actions

In September 1990, EPA and ASARCO Incorporated signed an AOC for sampling at the Site. In 1991, 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 of Colorado and other PRPs to perform certain remediation work in OUs 5, 7 and 9.

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

The RAOs established in the two RODs for OU5 include:

- Control airborne transport of tailing particles, flue dust and soil.
- Control erosion of tailing, flue dust and contaminated materials into local water courses.
- Control leaching and migration of metals from tailing, flue dust and soil into surface water.
- Control leaching and migration of metals from tailing, flue dust and soil into groundwater.
- Control contamination exposure to humans, animals and aquatic life.
- Prevent direct exposure of population to elevated contaminant levels in surficial soil.

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

- Excavation of flue dust and relocation to a single-lined, fully encapsulated repository.
- Consolidation of tailing 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 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 OU5 RODs for the EGWA Sites and AV/CZL Sites 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 Site-wide surface water and groundwater contamination to measure effectiveness of source control remedies. 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. Tailing 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. EPA assumed lead responsibility for implementation of the OU5 remedy through a settlement agreement between ASARCO Incorporated and the federal government signed in 2007. EPA completed OU5 remedial activities in 2010. O&M activities include inspection and maintenance of the covers and surface water controls.

The OU5 RODs for both the EGWA Sites and the AV/CZL Sites included institutional controls as part of the remedy. After the original overlay district concept for implementation of institutional controls proved infeasible, an alternate course of action was developed during the current 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. EPA partially deleted OU5 from the NPL on October 24, 2014.

Systems Operations/Operation & Maintenance

The O&M Plan was finalized on March 20, 2014. CDPHE conducts annual O&M inspections and maintenance activities, funded through an EPA grant with Special Account monies.

As a result of the September 2016 inspection, TetraTech, the State O&M Inspection contractor, made several recommendations for maintenance of remedy features. The State will determine which of these recommendations will be conducted as part of O&M.

VIII.2. OPERABLE UNIT 5: PROGRESS SINCE THE LAST REVIEW

This section includes the protectiveness determinations and statements from the previous FYR as well as the recommendations from the previous FYR and the status of those recommendations.

Table 14: Protectiveness Determinations/Statements from the 2012 FYR

OU #	Protectiveness Determination	Protectiveness Statement
5	Short-term Protective	The remedy at OU5 is protective of human health and the environment in the short term because source contamination has been addressed through engineered remedy components and planned institutional controls will 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, institutional controls will be put in place to protect the remedies at OU5. For the remedy to be protective over the long term, the O&M Plan should be updated and implemented.

Table 15: Status of Recommendations for OU5 from the 2012 FYR

Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
O&M has not occurred as directed by the O&M Plan.	Update the O&M Plan from the remedial design and implement as necessary.	Completed	An O&M plan was created.	3/20/2014
Institutional controls are a component of the selected remedy but have not been implemented.	Implement institutional controls.	Completed	Environmental covenants were placed on Newmont/Resurrection properties within OU5 on 4/15/2013 and 5/7/2013. In addition, Lake County and the City of Leadville passed ordinances in 2013 that act as institutional controls for all of OU5.	5/7/2013

VIII.3 OPERABLE UNIT 5: FIVE-YEAR REVIEW PROCESS

Data Review

There are no applicable data to review for OU5.

Site Inspection

The OU5 inspection of OU5 took place on September 13, 2016. Participants are listed in Section III of this FYR Report. Photographs were taken of Site features (Appendix F). An inspection checklist has been completed. It is available in Appendix D.

All contaminated materials at OU5 have been consolidated and put under a protective cover. The cover was revegetated in 2009 just prior to completion of the engineered remedy at OU5.

VIII.3 OPERABLE UNIT 5: TECHNICAL ASSESSMENT

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

Yes. 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 and its 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. 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.

EPA completed construction of the engineered remedy in 2010. All institutional controls required by Site decision documents are in place. EPA and CDPHE will be notified should local governments approve a change in land use. In addition, EPA signed a minor ROD Mod on May 16, 2013, that clarified the institutional controls. 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?

Yes. 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?

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

VIII.4 OPERABLE UNIT 5: ISSUES/RECOMMENDATIONS

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

VIII.5 OPERABLE UNIT 5: PROTECTIVENESS STATEMENT

Protectiveness Statement		
Operable Unit: 5	*Protectiveness Determination:* Protective	*Planned Addendum Completion Date:* Not Applicable
Protectiveness Statement: 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 EPA and CDPHE should local governments approve a change in land use.		

IX. OPERABLE UNIT 6: STRAY HORSE GULCH AND EVANS GULCH WATERSHEDS

OU6 is located east of Leadville and is 3.4 square miles in size (Figure D-8). OU6 consists of several consolidated mine waste piles (including Hamm's Tailing Impoundment and the Penrose Mine Waste Pile) and approximately 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 tailing piles by number and areas addressed by the pre-ROD removal action phases (Figure D-6) as well as a detailed view of the Stray Horse Gulch area of OU6 (Figure D-12).

The headwaters of Stray Horse Gulch are located 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 approximately 6.5 acres with a volume of approximately 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 and contained about 173,000 cubic yards of waste rock.

Historically, during heavy periods of precipitation or snow melt, tailing 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 is 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 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.

IX.1 OPERABLE UNIT 6: RESPONSE ACTION SUMMARY

Basis for Taking Action

The Site-wide final BRA evaluated soil, slag, waste rock and tailing in upland areas, as well as fluvial tailing and sediments in riparian areas. Contaminants evaluated included arsenic, antimony, barium, beryllium, cadmium, chromium, copper, lead, nickel, manganese, mercury, silver, thallium and zinc. EPA selected lead and arsenic as

indicator chemicals for cleanup based on the human health risk posed by these two contaminants at the Site. Contaminated media on OU6 are presented in Table 16.

Table 16: OU6 Contaminated Media

Media	Contamination
Sediment	Based on data from the 1997 EE/CA for Stray Horse Gulch, elevated metals contamination was found in the sampling stations located along Stray Horse Gulch.
Mine Tailing and Waste Rock Piles	The Stray Horse Gulch tailing 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 elevated to significantly elevated arsenic, cadmium, lead and zinc levels.

Response Actions

EPA implemented several response actions at OU6 between 1990 and 2001 (see Table B-9 for a comprehensive list of these response actions), 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 acid rock drainage (ARD) from mine waste piles. Treatment occurs at a facility operated by the U.S. Bureau of Reclamation (BOR) 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.

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 a bulkhead in the LMDT.
- Pumping ARD impounded behind the bulkhead to the surface with conveyance to the U.S. Bureau of Reclamation (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 on future changes in land use.

EPA modified the 2003 OU6 ROD with an AROD on September 28, 2010, to make the following changes in the remedy:

- 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 acid rock drainage generated.
- Phase 3: Enlarge and enhance the current acid rock drainage collection system and retention ponds.

- Eliminate the use of the Leadville Mine Drainage Tunnel and USBR Leadville Mine Drainage Tunnel Treatment Plant from the OU6 remedy, except in the case of emergencies.
- Shift the monitoring of groundwater and water levels in the Leadville Mine Drainage Tunnel to the OU12 Site-wide surface water and groundwater remedy.
- Site and construct a Site-wide repository in OU6.
- Remove implementation of the Leadville Mine Drainage Tunnel bulkhead from the remedy.
- 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 Site-wide surface water and groundwater contamination to monitor the effectiveness of the source control remedies.

Status of Implementation

Since before the 2012 FYR, 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 water treatment facility.
- Remedial design activities.
- Installation of monitoring wells in the LMDT as part of data collection to support remedial design.
- 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.
- Negotiation with USBR for treatment of ARD to be extracted from behind the LMDT bulkhead after its construction.
- 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.

Since the 2012 FYR, the following response activities have occurred:

- Adoption of an ordinance enacting institutional controls at OU6 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, the 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, extend and improve surface water controls, remove sedimentation from retention ponds, pump ARD retention ponds to prevent overtopping, pump water at GAW Shaft, and monitor the mine pool.

- Construction of the repository finished on June 13, 2013; an O&M plan for the repository was written. The repository also receives contaminated residential soils removed from OU9 (See Section XII).

The 2010 AROD is a phased approached to reducing acid rock drainage in OU6. Phase 1, the enhancement to the diversion ditch up gradient to the Greenback, RAM, and Old and New Mikado waste rock piles, was completed in 2016. The effectiveness of reducing ARD that needs to be treated by the LMDT treatment plant is being evaluated to determine the need and extend of Phases 2 and 3.

Systems Operations/O&M

An O&M plan for the repository is in place. An O&M plan for the remaining components will be prepared as part of implementation of the final remedy.

IX.2. OPERABLE UNIT 6: PROGRESS SINCE THE LAST REVIEW

This section includes the protectiveness determinations and statements from the previous FYR as well as the recommendations from the previous FYR and the current status of those recommendations.

Table 17: Protectiveness Determinations/Statements from the 2012 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 and to address any potential exposure pathways that could result in unacceptable risks. 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. Remedial design activities are underway for implementation of an amended remedy intended to ensure protectiveness over the long term.

There were no issues at OU6 identified in the 2012 FYR.

IX.3 OPERABLE UNIT 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 Site-wide surface water and groundwater. Therefore, there were no data to review for OU6.

Site Inspection

The OU6 inspection took place on September 13, 2016. Participants are listed in Section III of this FYR Report. Photographs were taken of Site features, including monitoring wells and access controls (Appendix E). An inspection checklist has been completed. It is available in Appendix D.

The Site inspection began at the waste soil repository area and associated drainage pond constructed in 2013 to receive Site-wide contaminated residential 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 several waste rock piles and associated surface water retention ponds in OU6. These included the RAM, Mikado, Greenback, Marion, Pyrenees, Ponsardine, Hamms and Penrose 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.

The 2012 FYR contained recommendations to improve protectiveness in OU6. In response, EPA removed sediment and performed maintenance activities in the Marion, Greenback, Mikado and Adelaide ponds and added signage and fencing. The waste pile caps and the fences around the ponds were in good condition and signs were legible. During the Site inspection, EPA RPM Linda Kiefer explained that some trespassing on private land occurs, involving people entering the area to conduct unauthorized prospecting. In response, the local police department now visits the area to discourage trespassing, which has minimized human exposure to waste piles.

Participants concluded the inspection by visiting the pilot study where EPA investigated potential capping approaches to be used on waste rock piles in 2009. The objective of the study was to find capping methods that would retain the historical mining landscape aesthetic while simultaneously addressing drainage and surface water diversion issues. The demonstration areas remain in place. Educational signs along the Mineral Belt Trail explain the project and the different alternatives.

IX.3 OPERABLE UNIT 6: TECHNICAL ASSESSMENT

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

Yes. 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 acid rock drainage 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 acid rock drainage were constructed. Retention ponds capture acid rock drainage 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.

2010 OU6 AROD outlines a phased approached to reducing acid rock drainage in OU6. Phase 1, the enhancement to the diversion ditch up gradient to the Greenback, RAM, and Old and New Mikado waste rock piles, was completed in 2016. The effectiveness of reducing ARD that needs to be treated by the LMDT treatment plant is being evaluated to determine the need and extent of Phases 2 and 3.

The City of Leadville's 2013 ordinance serves as an institutional control for Starr Ditch, a portions of OU6 within the City of Leadville. In addition, areas of OU6 are zoned for industrial mining or business use. EPA is evaluating whether additional institutional controls are needed in portions of OU6 outside the City of Leadville. Procedures are also in place to notify 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?

Yes. 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 acid rock drainage 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 currently 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. No other information has come to light that could call into question the protectiveness of the remedy.

IX.4 OPERABLE UNIT 6: ISSUES/RECOMMENDATIONS

Issues/Recommendations
OU(s) without Issues/Recommendations Identified in the FYR:
OU6

IX.5 OPERABLE UNIT 6: PROTECTIVENESS STATEMENT

Protectiveness Statement		
Operable Unit: 6	*Protectiveness Determination:* Will be Protective	*Planned Addendum Completion Date:* Not applicable
Protectiveness Statement: 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. OPERABLE UNIT 7: APACHE TAILING IMPOUNDMENTS

OU7, the Apache Tailing Impoundments, consisted of four distinct tailing impoundments located on the southern edge of Leadville adjacent to U.S. Highway 24 (Figure D-9). These impoundments were located in California Gulch, approximately 1,500 feet downstream from the Yak Tunnel WTP surge pond.

Tailing, placed in the Main Impoundment and possibly the North Impoundment, were generated by a mill located on the hillside northeast of the Apache Tailing Impoundments. The mill was known alternately as the Venir Mill, the California Gulch Mill and the ASARCO Incorporated Leadville Milling unit. Available historical information indicates that this mill operated between 1939 and 1956, producing approximately 630,000 cubic yards of tailing in the 11.3-acre Main Impoundment and an estimated 14,500 cubic yards of tailing 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 tailing from the Main Impoundment and deposited remaining materials into Tailing Ponds No. 2 and 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 under a removal action in 1997.

X.1 OPERABLE UNIT 7: 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 additional 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 tailing and foundation soils (Table 19). These source materials are considered to be non-principal threat wastes.

Table 18: OU7 Contaminated Media

Media	Contamination
Tailing	Weathered sulfidic tailing on the surface of the North and Main Impoundments contains elevated lead and arsenic concentrations and has a high acid-generating potential. Dark gray sulfidic tailing occurs below the weathered sulfidic tailing on the North and Main Impoundments and contains elevated lead and arsenic concentrations. Brown oxide tailing found only on the Main Impoundment contains elevated lead concentrations and arsenic concentrations lower than those found in sulfidic tailing. Brown oxide tailing has a significant neutralization potential, counteracting acidic sulfidic tailing leachate.
Soil	Foundation soils found at both the Main and North Impoundments 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 Ponds No. 2 and No. 3, consolidation of material removed from Tailing Ponds No. 2 and 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 removal and remediation activities at the Apache Tailing Impoundments are summarized in Table B-10.

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. EPA signed a Minor ROD Modification on May 16, 2013, to clarify the types of institutional controls needed.

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

- Control airborne transport of tailing particles.
- Control erosion of tailing materials and deposition into local water courses.
- Control leaching and migration of metals from tailing 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 portion of the Main Impoundment and diversion ditches to provide surface water run-on and runoff control.

- Application of source surface controls to the impounded tailing, consisting of regrading the impoundment, placement of a multi-layer composite cover over the combined tailing 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 following implementation of the remedy.

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

The 2007 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 Site-wide surface water and groundwater contamination to monitor the effectiveness of the source control remedies.

Status of Implementation

Primary remediation activities completed included:

- 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 tailing 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 tailing 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 tailing 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 tailing 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 ICs on 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 the CDPHE. The City of Leadville adopted a similar ordinance on May 7, 2013.

A Minor ROD Modification was signed on May 16, 2013 to clarify the types of ICs needed in OU7. EPA partially deleted OU7 from the NPL on October 24, 2014.

Systems Operations/Operation & Maintenance

The O&M Plan was finalized on March 20, 2014. CDPHE conducts annual O&M inspections and maintenance activities, funded through an EPA grant with Special Account monies.

As a result of the September 2016 inspection, TetraTech, the State O&M Inspection contractor, made several recommendations for maintenance of remedy features. The State will determine which of these recommendations will be conducted as part of O&M.

X.2. OPERABLE UNIT 7: PROGRESS SINCE THE LAST REVIEW

This section includes the protectiveness determinations and statements from the previous FYR as well as the recommendations from the previous FYR and the status of those recommendations.

Table 19: Protectiveness Determinations/Statements from the 2012 FYR

OU #	Protectiveness Determination	Protectiveness Statement
7	Short-term Protective	The remedy at OU7 is protective of human health and the environment because no complete human or ecological exposure pathways were identified, institutional controls are in place, and the remedy is functioning as designed. However, the O&M Plan should be updated and implemented to ensure the long-term protectiveness of the OU7 remedy.

Table 20: Status of Recommendations for OU7 from the 2012 FYR

Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
The O&M Plan needs to be updated and implemented.	Update and implement the O&M Plan for OU7.	Completed	The O&M Plan was updated and implemented.	3/20/2014

X.3 OPERABLE UNIT 7: FIVE-YEAR REVIEW PROCESS

Data Review

There are no applicable data to review for OU7.

Site Inspection

The inspection of OU7 took place on September 13, 2016. Participants are listed in Section III of this FYR Report. The assessment of OU7 conditions relied heavily on the observations of regulatory agency personnel present during the inspection. Photographs were taken of Site features, including the Apache Tailing Impoundments (Appendix E). An inspection checklist has been completed. It is available in Appendix D. The Apache Tailing Impoundments were intact and had a well-established vegetated cover except for several localized areas identified during the annual O&M inspection as requiring revegetation. The O&M contractor is currently addressing this issue.

X.4 OPERABLE UNIT 7: TECHNICAL ASSESSMENT

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

Yes. The review of documents and Site inspections indicate that the remedy is functioning as intended by the OU7 ROD.

Site-wide surface and groundwater in the vicinity of OU7 is being addresses 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 will address those issues to ensure the functioning of the remedy. All institutional controls required by Site decision documents are in place. EPA and CDPHE will be notified if local governments approve a change in land use. 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?

Yes. 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 other information has become available that could call into question the protectiveness of the remedy.

X.5 OPERABLE UNIT 7: ISSUES/RECOMMENDATIONS

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

X.6 OPERABLE UNIT 7: PROTECTIVENESS STATEMENT

Protectiveness Statement		
Operable Unit: 7	*Protectiveness Determination:* Protective	*Planned Addendum Completion Date:* Not Applicable
Protectiveness Statement: 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. OPERABLE UNIT 8: LOWER CALIFORNIA GULCH

OU8, also known as Lower California Gulch, 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-10). OU8 also includes the CZL Tailing Impoundment, which is located outside of the 500-year floodplain. OU8 is approximately 97 acres in size and 4.3 miles long. 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 (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 (Figure D-14), FTS 1 and FTS 2 and the CZL Tailing Impoundment (Figure D-16); FTS 3 (Figure D-17); FTS 8 and non-residential soils (Figure D-18); and FTS 6, the Gaw Waste Rock Pile and non-residential soils (Figure D-19). 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 tailing 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 located 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 approximately 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 tailing.

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

More information on the background of OU8 can be found in Appendix C.

XI.1 OPERABLE UNIT 8: RESPONSE ACTION SUMMARY

Basis for Taking Action

Several studies and remedial investigations have been conducted addressing Lower California Gulch (OU8). The following areas were identified as potential contaminant sources in OU8: areas of impounded tailing in the CZL Tailing Impoundment located in the California Gulch 500-year floodplain, waste rock in the Gaw Waste Rock Pile, fluvial tailing in five fluvial tailing Sites, non-residential area soils, and stream sediments.

Contaminated media and potential contaminant sources at OU8 are presented in Table 21.

Table 21: OU8 Contaminated Media

Media	Contamination
CZL Fluvial Tailing 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.
FTSs1, 2 and 3	Surface tailing had elevated levels of arsenic, cadmium, lead and zinc. Subsurface tailing had elevated levels of arsenic, cadmium and lead. Foundation soils had elevated levels of silver, cadmium, arsenic, lead and zinc.
FTS6	Surface tailing had elevated levels of arsenic, cadmium, copper, lead, mercury, silver and zinc. Subsurface tailing 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 tailing had elevated levels of arsenic, cadmium, copper, lead and zinc. Subsurface tailing 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

In order 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, approximately 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 the summer of 1996. In the second interim removal action, approximately 5,794 cubic yards of fluvial tailing were excavated from poorly vegetated, erosion-prone areas within OU8 (specifically, FTS2, FTS3, FTS6, and FTS8). The excavated tailing was transported and placed in the Oregon Gulch Tailing Impoundment (OU10). In conjunction with channel excavation under the second interim removal action, approximately 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.

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

- Control airborne transport of tailing particles and contaminated non-residential soils.
- Control leaching and migration of metals from tailing, soil, waste rock and contaminated fluvial and stream sediments into surface and groundwater.
- Control erosion of tailing 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 Impoundment Tailing*: No further action was the selected alternative for impounded tailing within OU8. All tailing were removed from the CZL Tailing Impoundment Site in the 1995 removal action. No other impounded tailing 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 Site-wide studies and remedial investigations showed that the Gaw Waste Rock Pile was not a source of contamination to surface water or groundwater.
- *Fluvial Tailing:* Containment was the selected alternative for fluvial tailing in OU8. This alternative consisted of regrading, revegetation, riprap or erosion-control matting in erosion-prone areas of fluvial tailing, 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 currently erosionally unstable 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 Site-wide surface water and groundwater contamination to monitor the effectiveness of the source control remedies.

Status of Implementation

Resurrection Mining Company 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 selected remedies met the RAOs by excavating and removing materials from OU8, by preventing the release of waste material or 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 tailing 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 the CDPHE. For all other portions 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 regarding 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. EPA partially deleted OU8 from the NPL on January 12, 2010.

Systems Operations/Operation & Maintenance

Newmont/Resurrection conducts inspections in accordance with the OU4, 8 and 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. These reports are available by contacting EPA Region 8.

The following areas in OU8 are inspected:

- FTS1 revegetated tailing 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 tailing at FTS1.

XI.2. OPERABLE UNIT 8: PROGRESS SINCE THE LAST REVIEW

This section includes the protectiveness determinations and statements from the previous FYR as well as the recommendations from the previous FYR and the current status of those recommendations.

Table 22: Protectiveness Determinations/Statements from the 2012 FYR

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

There were no outstanding issues or recommendations identified at OU8.

XI.3 OPERABLE UNIT 8: FIVE-YEAR REVIEW PROCESS

Data Review

No data from OU8 were available for review.

Site Inspection

The OU8 Site inspection took place on September 14, 2016. Participants are listed in Section III of this FYR Report. Photographs were taken of Site features, including monitoring wells and access controls (Appendix E). An inspection checklist has been completed. It is available in Appendix D.

OU8 extends along the lower reaches of the California Gulch between OU1 and OU11. Site inspection participants made multiple stops along the course of California Gulch to look at riprap and other erosion-control mechanisms installed along erosion-prone areas of the channel. Nearly all tailing Sites appeared to be stabilized and embankments reinforced. However, a building was being constructed over the Lower California Gulch in the Stringtown Mill Area; it appeared that some of the wetlands area adjacent to California Gulch was filled in for use as a vehicle storage area. Data shows that these activities have not negatively impacted the remedy; surface water concentrations of zinc and cadmium meet the performance standards at the point of compliance (sample location AR-3a) where California Gulch meets the Arkansas River.

XI.4 OPERABLE UNIT 8: TECHNICAL ASSESSMENT

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

Yes. 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 tailing, waste rock, non-residential soil and stream sediments finished in 2003. Continued maintenance and monitoring ensures that excavated piles of contaminated materials are stable and do not present a risk of metals loading to California Gulch. All institutional controls as required by the decision documents are in place. 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, 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?

Yes. 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 Site-wide surface water and groundwater contamination.

All of 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 other information has become available that could call into question the protectiveness of the remedy.

XI.5 OPERABLE UNIT 8: ISSUES/RECOMMENDATIONS

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

XI.6 OPERABLE UNIT 8: PROTECTIVENESS STATEMENT

Protectiveness Statement		
Operable Unit: 8	*Protectiveness Determination:* Protective	*Planned Addendum Completion Date:* Not Applicable
Protectiveness Statement: 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. OPERABLE UNIT 9: RESIDENTIAL POPULATED AREAS

OU9 includes residential area soils in those portions 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 within populated areas of eastern Leadville. More information about OU9 can be found in Appendix C.

XII.1 OPERABLE UNIT 9: RESPONSE ACTION SUMMARY

Basis for Taking Action

Numerous risk assessments were conducted as part of the investigation of many remedial actions. They included Baseline Human Health Risk Assessments: 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 Rick Assessment; and a Baseline Aquatic Ecological Risk Assessment.

The baseline human health risk assessments 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:

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

This data was 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 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 Final Residential Soil FS, completed by Golder Associates 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.

One FS alternative was the Lake County Community Health Program (LCCHP), a revised version of the Kids First (KF) 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.

Response Actions

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

From October 1995 to the summer of 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. EPA conducted the last property assessment and response actions in the summer of 2009. Subsequent investigations and remediations are performed by the LCCHP Phase 2 Workgroup. A complete history of early initial response actions is provided in Appendix B, Table B-13.

Signed on September 2, 1999, the OU9 ROD selected a remedy for addressing lead in soils in residential areas. The selected remedy was the LCCHP with institutional controls to ensure the effectiveness of the LCCHP. The intention was that the LCCHP was to take the place of the KF 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 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 blood lead level.

The RAOs identified are:

- RAO -1: "No more than 5 percent of children (age 0 to 72 months) who live at this Site, either now or in the future, will have blood lead values exceeding 10 µg/dL."
- RAO -2; "Health will be adequately protected if the highest risk level at any sub-location (e.g., a yard of home) 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."
- Added by FS, "Reduce direct exposure of lead incurred by children, which will result in optimal risk reduction through effective use of resources."

However, it is worth noting that, in 2016, EPA's Office of Land and Emergency Management (OLEM) released directive 9200.2-167, which updates the scientific considerations to be used at lead cleanups conducted according to EPA's 1994 *Revised Interim Soil Lead Guidance f or CERCLA Sites and RCRA Corrective Action Facilities* (Office of Solid Waste and Emergency Response [OSWER] Directive 9355.4-12) and the 1998 update to the 1994 guidance. A copy can be found at https://semspub.epa.gov/work/08/1884174.pdf.

Since issuing the 1994 and 1998 guidance, EPA's experience has demonstrated that lead-contaminated soil responses are more effective when they employ a multi-pathway approach. The 2016 directive highlights current science and risk assessment tools that EPA may consider when implementing lead cleanups. *EPA recognizes that the LCCHP Phase 2 is a multi-pathway, community-based education and outreach approach to identifying sources of lead and exposure pathways in Leadville.*

In the 1990s, the LCCHP was considered a "pilot project" that involved a number of innovative approaches, the program was 1. evaluated by a group of outside scientists and 2. included ongoing review to ensure that the program was operating as intended and that human health was being adequately protected. The ongoing review included the establishment of performance standards which when met would indicate the successful completion of the LCCHP and the beginning of O&M. The performance standards were set out 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.

Mine Waste Rock Piles
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 EPA or CDPHE.
- Maintain the integrity of current or future remedies.

Status of Implementation

LCCHP
The LCCHP was implemented as required by the ROD and under the Methods and Standards for Evaluating the Performance of the Program. 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 documented in annual reports beginning in 2002, the data was collected. 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 the calendar year 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 owner 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 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 BLL, follow-up appointments are made by Lake County Public Health 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 was approved in 2009 and revised in 2013 based on updated information regarding lead toxicity.

The lead cleanup at the Site is being implemented following the Lake County Community Health Program (LCCHP) Phase 2 Work Plan, which integrates EPA's 1994 Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities (Office of Solid Waste and Emergency Response [OSWER] Directive 9355.4-12) and the 1998 update to this guidance (Clarification to the 1994 Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities (OSWER Directive 9200.4-27P). However, in 2016, EPA's Office of Land and Emergency Management (OLEM) released Directive 9200.2-167, which

updates the scientific considerations to be used at lead cleanups conducted according to EPA's 1994 and 1998 directives. EPA's experience has demonstrated that lead-contaminated soil responses are more effective when they employ a multi-pathway approach. Thus, the 2016 directive highlights the current science and risk assessment tools that EPA may consider when implementing lead cleanups. EPA is currently evaluating the LCCHP against this current guidance to determine if any changes are warranted in the LCCHP to ensure future protectiveness. A copy of the 2016 directive can be found at https://semspub.epa.gov/work/08/1884174.pdf.

Mine Waste Rock Piles
In September 2009, EPA issued an ESD requiring institutional controls for the mine waste piles remaining in place in OU9. The objectives of the institutional controls are to:

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

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). Each applicant must sign a document attesting that he/she received, read and understood the handout. No building permit is issued without the 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. EPA signed a minor 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 January 30, 2002, EPA partially deleted OU9 Subunits A and B, residential waste rock piles, and parks and playgrounds from the NPL. 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
OU9 entered the O&M phase in 2010 when EPA, Lake County and the CDPHE approved the LCCHP Work Plan. The LCCHP Phase 2 Work Plan was revised in October 2013 and 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 those with elevated levels of blood-lead, 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 contains lead.

XII.2. OPERABLE UNIT 9: PROGRESS SINCE THE LAST REVIEW
This section includes the protectiveness determinations and statements from the previous FYR as well as the recommendations from the previous FYR and the status of those recommendations.

Table 23: Protectiveness Determinations/Statements from the 2012 FYR

OU #	Protectiveness Determination	Protectiveness Statement
9	Protective	The remedy at OU9 is protective of human health and the environment because 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; and 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.

There were no issues or recommendations identified in the 2012 FYR for OU9.

XII.3 OPERABLE UNIT 9: FIVE-YEAR REVIEW PROCESS

Data Review

Data from the Lake County Blood Lead Program's blood-lead testing database was reviewed and compared to the RAOs. The results can be found in Table 24.

Table 24: Blood-Lead Testing Results, 2012 – 2016

Year	# children tested 0-72 months	Greater than 10 µg/dL	Percentage	Greater than 15 µg/dL	Percentage
2012	187	1	0.5%	0	0%
2013	179	3	1.7%	1	0.6%
2014	162	3	1.9%	0	0%
2015	171	2	1.2%	1	0.6%
2016	171	1	0.6%	1	0%
average			1.1%		0.3%

During the years of 2012 to 2016, the average percentages of children age 0 to 72 months with BLL greater than 10 µg/dL and 15 µg/dL are 1.1% and 0.3% respectively; below the respective percentages of 5% and 1% set in the RAOs.

Remediations were performed 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 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 Site inspection took place on September 13, 2016. 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 some of the properties in the Lake Fork community that had been remediated. Photographs were taken of some of the Site features addressed under OU9 (Appendix E). An inspection checklist has been completed. It is available in Appendix D.

XII.4 OPERABLE UNIT 9: TECHNICAL ASSESSMENT

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

Yes. 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 ROD Mod. Performance standards were originally met in 2006. The LCCHP Phase 2 Work Plan is the long-term O&M plan for OU9.

Per the 2012, 2013, 2014 and 2015 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?

Yes. 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 typical child would have an estimated probability of no more than 5 percent of exceeding a blood lead level (BLL) of 10 micrograms per deciliter (µg/dL). This is consistent with EPA's current policy. The 10 µg/dL BLL target concentration is based (in part) on the 1991 Centers for Disease Control and Prevention's (CDC) blood lead "level of concern." In December 2016, EPA issued a memorandum that recommended EPA consider the current scientific literature. The most recent scientific literature on lead toxicology and epidemiology provides evidence that adverse health effects are associated with BLLs less than 10 µg/dL. EPA is in the process of updating its policy based on recent studies. EPA Region 8 will evaluate the need for revisions to the LCCHP Phase 2 Work Plan as the Agency finalizes and updates its lead policy.

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

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

XII.5 OPERABLE UNIT 9: ISSUES/RECOMMENDATIONS

Issues/Recommendations
OU(s) without Issues/Recommendations Identified in the FYR:
OU9

XII.6 OPERABLE UNIT 9: PROTECTIVENESS STATEMENT

Protectiveness Statement		
Operable Unit: 9	*Protectiveness Determination:* Protective	*Planned Addendum Completion Date:* Not Applicable
Protectiveness Statement: 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. OPERABLE UNIT 10: OREGON GULCH

OU10 is defined as the 500-year floodplain of Oregon Gulch extending approximately 1 mile from its headwaters to its confluence with Lower California Gulch. Oregon Gulch is about one-half mile south of the City of Leadville and is immediately west of OU1, the Yak Tunnel WTP and 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 approximately 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 tailing solids and contaminated surface water into California Gulch.

The Oregon Gulch Tailing Impoundment received tailing from the Newmont/Resurrection-ASARCO mill in California Gulch from approximately 1942 through 1957. During removal activities in 1995 and 1996, about 28,000 cubic yards of tailing 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.

The stream sediment within the lower portion of Oregon Gulch has been contaminated with metals from tailing and runoff released from tailing and runoff released from the Oregon Gulch Tailing Impoundment embankment. Release of tailing material was due to erosion and transported and re-deposited 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 had contributed to the metal contamination of the sediments. The tailing 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.

XIII.1 OPERABLE UNIT 10: RESPONSE ACTION SUMMARY

Basis for Taking Action

Based on the results of the Site-wide RI/FS, EPA determined that actual or threatened releases of hazardous substances from sediments, soils, tailing 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. Contaminated media in OU10 are presented in Table 25.

Table 25: OU10 Contaminated Media

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 Tailing and Soil	Elevated lead and zinc concentrations were found throughout the depth of tailing profiles. Arsenic and cadmium levels decreased as a function of tailing depth. Concentrations in foundation soils underneath the tailing were significantly lower than in the tailing.
Seep Water	A seep discharges from the base of the tailing 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 approximately 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. Following 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 tailing impoundment to reduce sediment load in runoff from the tailing embankment.

A historic trash dump in lower Oregon Gulch was identified during a cultural resource inventory. The dump site begins near the intersection of the gulch and County Road 6 and extends approximately 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 any adverse impact to this historically significant area.

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

- Control airborne transport of tailing particles.
- Control erosion of tailing materials and deposition in local water courses.
- Control leaching and migration of metals from tailing 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 tailing to the covered tailing surface.
- Install a groundwater cutoff trench to prevent groundwater infiltration.
- Actively manage seeps by collecting seep and transporting (pumping) to the Yak Tunnel WTP.

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 tailing and stream sediments from contributing source contamination to surface water and ground water at the larger 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 regrading 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 tailing impoundment. A deep discharge drain system manages seep flow from the impoundment toe.

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

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

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. 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 tailing impoundment surface and embankment.
- East and South diversion ditches.
- Drop channel.
- Upper reconstructed channel.
- 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.

XIII.2. OPERABLE UNIT 10: PROGRESS SINCE THE LAST REVIEW

This section includes the protectiveness determinations and statements from the previous FYR as well as the recommendations from the previous FYR and the status of those recommendations.

Table 26: Protectiveness Determinations/Statements from the 2012 FYR

OU #	Protectiveness Determination	Protectiveness Statement
1	Short-term Protective	The remedy at OU10 is protective of human health and the environment in the short term because source contamination has been consolidated and contained to prevent migration of contaminants and any seep or infiltrated run-on or runoff is captured through trenches and pumped to the Yak Tunnel Water Treatment Plant. 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. To ensure long-term protectiveness, EPA should review whether a decision document is needed to incorporate institutional controls.

Table 27: Status of Recommendations for OU10 from the 2012 FYR

Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
Institutional controls are not currently required by OU10 decision documents.	Review whether a decision document is needed to incorporate the institutional controls for OU10.	Completed	An ESD that requires institutional controls was issued.	7/29/2013

XIII.3 OPERABLE UNIT 10: FIVE-YEAR REVIEW PROCESS

Data Review

There are no applicable data to review for OU10.

Site Inspection

The OU10 inspection took place on September 14, 2016. Participants are listed in Section III of this FYR Report. Photographs were taken of Site features, including monitoring wells and access controls (Appendix E). An inspection checklist has been completed. It is available in Appendix D.

Site inspection participants drove to OU10. Mr. Runnells provided a tour of the pump house and an overview of O&M activities. The cover of Oregon Gulch tailing pile was observed to be well vegetated and the drainage systems appeared 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.

XIII.4 OPERABLE UNIT 10: TECHNICAL ASSESSMENT

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

Yes. 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 EPA and CDPHE should local governments approve a change in land use. After implementation of all remedial components and achievement of all RAOs, EPA partially deleted OU10 from the NPL on April 16, 2001.

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

Yes. 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 Site-wide water quality.

All RAOs identified in the 1997 OU10 ROD have been achieved. These RAOs included controlling airborne transport of tailing particles, controlling leaching and migration of metals from tailing into surface water and groundwater, and controlling erosion tailing 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 tailing 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. No other information has come to light that could call into question the protectiveness of the remedy.

XIII.5 OPERABLE UNIT 10: ISSUES/RECOMMENDATIONS

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

XIII.6 OPERABLE UNIT 10: PROTECTIVENESS STATEMENT

Protectiveness Statement		
Operable Unit: 10	*Protectiveness Determination:* Protective	*Planned Addendum Completion Date:* Not Applicable
Protectiveness Statement: 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. OPERABLE UNIT 11: ARKANSAS RIVER VALLEY FLOODPLAIN

OU11 extends from the confluence of the Arkansas River and California Gulch to an area approximately 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 tailing that were 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, and 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.

XIV.1 OPERABLE UNIT 11: RESPONSE ACTION SUMMARY

Basis for Taking Action

Based on the results of OU11 screening-level baseline human health and ecological risk assessments and a supplemental mercury human health risk assessment, 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 for the new scenario if areas of OU11 are developed for residential uses in the future.

Response Actions

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 located 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.

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 tailing 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 tailing 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, tailing deposits and riparian areas. Institutional controls 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 was developed in 2007 to specify 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, yet the per performance criteria previously established were not quite correct and required refinement. Thus, the performance criteria were updated in 2013.

Status of Implementation

The 2005 ROD called for the implementation of institutional controls on irrigated meadows, tailing deposits and riparian areas. EPA is currently working with CDPHE to determine an appropriate institutional control for OU11. During 2008 and 2009, a remedial action by 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. EPA signed the Remedial Action Report for the bank stabilization on September 19, 2013.

Systems Operations/Operation & Maintenance

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 EPA's FYR process.

Maintenance work has included re-treatment of small portions 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 remedy for OU11 was determined to be Operational and Functional on April 25, 2017, starting the O&M phase. O&M is conducted by CDPHE through a special account funded grant.

XIV.2. OPERABLE UNIT 11: PROGRESS SINCE THE LAST REVIEW

This section includes the protectiveness determinations and statements from the previous FYR as well as the recommendations from the previous FYR and the current status of those recommendations.

Table 28: Protectiveness Determinations/Statements from the 2012 FYR

OU #	Protectiveness Determination	Protectiveness Statement
11	Protective	The remedy at OU11 is expected to be protective of human health and the environment upon completion. In the interim, exposure pathways that could result in unacceptable risks are being controlled.

Table 29: Status of Recommendations for OU11 from the 2012 FYR

Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
Institutional controls are a component of the selected remedy but have not been implemented.	Implement institutional controls.	Ongoing		Not Applicable

XIV.3 OPERABLE UNIT 11: FIVE-YEAR REVIEW PROCESS

Data Review

The remedial action for OU11 finished in 2013. The remedy for OU12 is designed to achieve chemical-specific, numerical performance standards for Site-wide surface water and groundwater. Therefore, a summary of the data relevant to OU11 is discussed in the data review section, Section XV.3, for OU12.

Site Inspection

The OU11 Site inspection took place on September 13, 2016. Participants are listed in Section III of this FYR Report. Photographs were taken of Site features, including monitoring wells and access controls (Appendix E). The group toured OU11 along the Arkansas River and nearby ranches. General conditions were noted and photographed (Appendix E). Overall Arkansas River flood plain conditions were observed to be functioning well downgradient of the confluence with California Gulch. Flows were not impeded, although CPW was conducting habitat evaluations during the Site inspection and shared with EPA that, about two years ago, the high water levels from spring runoff had moved several large boulders into the river; the boulders were moved back to stabilize river banks. CPW reported that some erosion has been occurring during high water levels; overall the Arkansas River appears to be recovering downgradient from Leadville. Based on the OU11 inspection, conditions discussed with Site visit personnel, and monitoring and maintenance reports, the OU11 remedy was implemented as designed.

XIV.4 OPERABLE UNIT 11: TECHNICAL ASSESSMENT

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

Yes. 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 stream banks were stabilized by EPA 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 Site-wide remedy.

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

Yes. 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 at 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. No information has come to light that calls into question the protectiveness of the remedy.

XIV.5 OPERABLE UNIT 11: ISSUES/RECOMMENDATIONS

Issues and Recommendations Identified in the FYR:				
OU(s): 11	**Issue Category: Institutional Controls**			
	Issue: Institutional controls are a component of the selected remedy but have not yet been implemented.			
	Recommendation: Implement institutional controls.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	EPA/State	EPA	12/31/2018

XIV.6 OPERABLE UNIT 11: PROTECTIVENESS STATEMENT

Protectiveness Statement		
Operable Unit: 11	*Protectiveness Determination:* Short-term Protective	*Planned Addendum Completion Date:* Not Applicable
Protectiveness Statement: 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.		

XV. OPERABLE UNIT 12: SITE-WIDE WATER QUALITY

EPA listed the Site on the NPL in 1983. At that time, EPA divided the Site into 11 geographic, media-driven OUs. An additional operable unit – OU12 – was included to address Site-wide surface 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 NPL Site. Included in OU12 are the City 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.

XV.1 OPERABLE UNIT 12: RESPONSE ACTION SUMMARY

Basis for Taking Action

In the mid-1990s, human health risk assessments by EPA concluded that contaminants in Site-wide 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 acid rock drainage. In the

1990s, 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 areas.

As described in the 1995 Baseline Risk Assessment and the 2004 OU12 Characterization of Risks to Aquatic Receptors from Mining-Related 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, EPA has focused primary attention on this species.

In 2004, EPA concluded that survival of brown trout fry was likely decreased by historical concentrations of zinc and cadmium that occurred below California Gulch in the spring. 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 hypothesis that remedial activities at the Site have decreased releases to the Arkansas River. However, additional years of observation are needed to determine whether this apparent trend toward recovery is a consequence of decreased Site releases or is related to other variables.

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 in the spring. This in turn leads to a tendency for reduced numbers of sensitive taxa (mainly mayflies) in the river below the confluence with California Gulch than 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 Site-wide surface water, were remediated under the remedy for OU11.

None of the risk assessments by 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 30 presents COCs by medium for OU12. Although there is a wide range of COCs, zinc and cadmium are considered reasonable indicator parameters with respect to the OU12 groundwater, OU12 surface water, as well as human health and the environment in the vicinity of OU12.

Table 30: OU12 Contaminated Media

Medium	Population	COC
Surface Water	Human Health	Cadmium Copper Lead Zinc
	Ecological Receptors	Cadmium Zinc
Groundwater	Human Health	Arsenic Cadmium Lead Manganese Zinc

Response Actions

Investigation of the Site began in the mid-1980s and continues up 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 tailing, and WTPs for the Yak Tunnel and Leadville Mine Drainage Tunnel (LMDT) (Note: the LMDT is not part of the Superfund Site.) These response actions were conducted within 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 Site-wide surface and groundwater downgradient of the individual OUs. EPA selected the OU12 remedy in the 2009 OU12 ROD that included institutional controls and long-term monitoring of surface water and groundwater. In addition, EPA implemented a technical impracticability waiver for shallow groundwater (e.g., waiving the maximum contaminant levels, or 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 Site-wide 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 technical impracticability waiver for shallow groundwater (e.g., waiving the maximum contaminant levels, or MCLs).

A summary of the cleanup goals for surface water, which correspond to Colorado's 2009 Water Quality Standards for segments of the Upper Arkansas River) are below presented in Table 31.

Table 31: Surface water COC Cleanup Goals

COC	Season	2009 OU12 ROD Cleanup Goals for Arkansas River Segments 2b and 2c (µg/L)[a]
Cadmium	WQS (June-March)	Acute: $1.136672-[\ln(\text{hardness}) \times 0.041838] \times e^{0.915[\ln(\text{hardness})]-3.6236)}$
		Chronic: $1.101672-[\ln(\text{hardness}) \times 0.041838] \times e^{0.7998[\ln(\text{hardness})]-3.1725)}$
	WQS Seasonal Modification (April-May)	1.34 (µg/L)
Zinc	WQS (June-March)	Acute: $0.978 \times e^{0.8537[\ln(\text{hardness})]+2.2178}$
		Chronic: $0.986 \times e^{0.8537[\ln(\text{hardness})]+2.0489}$
	WQS Seasonal Modification (April-May)	649 (µg/L)
Notes: *a.* Criteria listed in 2009 OU12 ROD, pages DS-48 and DS-49. µg/L – micrograms per liter. WQS – water quality standard.		

Status of Implementation

OU12 is in remedial action until 2020. EPA and CDPHE are currently conducting the long-term monitoring component of the remedy. This effort includes annual sampling events in accordance with the 2009 California Gulch Superfund Site Final Field Sampling Plan. Long-term monitoring began following EPA 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, 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 Boards' removal of the seasonal modification to water quality standards for cadmium and zinc in segments 2b and 2c of the Arkansas in 2014, current water quality standards for these medals and segments in the Arkansas River are being met. EPA is working to finalize remaining institutional controls for OU12.

Systems Operations/Operation & Maintenance

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.

XV.2. OPERABLE UNIT 12: PROGRESS SINCE THE LAST REVIEW

The effectiveness of the OU12 remedy was not evaluated as part of the 2012 FYR. There were no issues and recommendations identified in the 2012 FYR for OU12. Remedial design was completed on April 29, 2015. The remedy is currently in remedial action which is expected to completed in September 2020.

XV.3 OPERABLE UNIT 12: FIVE-YEAR REVIEW PROCESS

Data Review

The OU12 remedy, which is in the remedial action phase, is long-term monitoring of groundwater and surface water. Remedial action will end in 2020. EPA, CDPHE and Tetra Tech collectively developed the 2015 Remedial Design Report, which includes a Surface Water Monitoring Program, a Groundwater Monitoring Program, a Fluvial Sediment Sampling Program, and an Aquatic Life Monitoring Program in the California Gulch and Upper Arkansas River watersheds. Data are reviewed as collected on an ongoing basis by EPA and CDPHE.

Surface Water Monitoring

Routine surface water samples are collected along California Gulch, Stray Horse Gulch/Starr Ditch and the Arkansas River and analyzed for a number of metals. However, the summary focuses on zinc and cadmium, as these two metals drive aquatic risks.

The results indicate that water quality standards for cadmium and zinc are being met in segments 2b and 2c of the Arkansas River. See Appendix I for data analysis trends.

The surface water quality locations in the Arkansas River are described in Table 32. The point of compliance (POC) for the Arkansas River Station is location AR-3A and a reference location, Station AR-1.

Table 32: Arkansas River Surface Water Quality Locations

Sample Location	Description
AR-1	About a quarter-mile downstream of Tennessee Creek (Segment 2a)
AR-3A (Point of Compliance)	***About a half-mile downstream of California Gulch (Segment 2b)***
AR-4	About a half-mile downstream of Lake Fork (Segment 2c)
AR-5	Upstream of Empire Gulch and about a quarter-mile downstream of Hwy 24 bridge (Segment 2c)

Additional detail is presented in the Site's Annual Surface Water, Groundwater, Fluvial Sediment, and Biological Monitoring Reports.

Groundwater
The 2009 Technical Impracticability (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. Groundwater samples are collected from 17 shallow alluvial groundwater wells on a semi-annual basis (spring and fall) to monitor groundwater quality in the vicinity of source areas. Another 19 wells located closest to engineered remedies (e.g., Malta, Apache and CZL Tailing Impoundments) are monitored once every five years to evaluated remedy effectiveness in support of the FYR. Spring sampling provides data for groundwater influenced by high-flow surface water resulting from snowmelt. Fall sampling provides data on groundwater with less of an influence from surface water.

Fluvial Sediment
Fluvial sediment samples were collected in California Gulch and the Arkansas River. Peak concentrations for zinc were measured at Stations CG-1, CG-3, and CG-5 in 2015. However, the concentrations of metals in fluvial sediment have been stable from 2006 to 2015.

Aquatic Life
The CPW monitored brown trout populations in the Arkansas River and Lake Fork in 2015. While trout populations decreased at both locations upstream of the point of compliance between 2014 and 2015, brown trout populations increased downstream of the point of compliance during this same period.

Colorado State University (CSU) monitored macroinvertebrate populations in the Arkansas River and at the mouth of California Gulch in 2015. In the spring, the abundance and diversity of macroinvertebrates is similar at all Arkansas River locations. However, in the fall, the macroinvertebrate diversity was lower below California Gulch than at other Arkansas River locations. The macroinvertebrate abundance and diversity in California Gulch is noticeably lower than that observed in the Arkansas River. Brown Trout density data indicate that while brown trout density is variable from year to year the density is increasing over time.

Site Inspection
The OU12 inspection of OU12 took place on September 13 and 14, 2016. Participants are listed in Section III of this FYR Report. Photographs were taken of Site features, including monitoring wells and access controls (Appendix E). An inspection checklist has been completed. It is available in Appendix D. Monitoring locations were observed and wells appeared to be in good condition and were secured with locks. Surface water monitoring locations were also observed and were unobstructed.

XV.4 OPERABLE UNIT 12: TECHNICAL ASSESSMENT

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

Yes. The OU12 remedy is in the process of being fully implemented. When complete, the remedy is anticipated to function as intended by Site decision documents. The remedy for OU12 includes the ongoing long-term monitoring and institutional controls. Long-term monitoring is ongoing. However, all necessary institutional controls are not yet in place. EPA and the State continue to work towards establishing the institutional controls. Routine surface water and groundwater monitoring are ongoing at the Site and indicate that contaminant levels in surface water and groundwater have generally declined or remain stable with several exceptions.

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

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

The 2009 Technical Impracticability (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 and since the selected remedy involves no construction, location-specific ARARs do not apply. Colorado removed the seasonal Modification to the WQS for Segments 2b and 2c in 2014. Because these new standards are being met, no newly promulgated standards have been identified that could call into question the protectiveness of the chosen remedy.

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

No. No information has come to light that calls into question the protectiveness of the remedy.

XV.5 OPERABLE UNIT 12: ISSUES/RECOMMENDATIONS

Issues/Recommendations
OU(s) without Issues/Recommendations Identified in the FYR:
OU12

XV.6 OPERABLE UNIT 12: PROTECTIVENESS STATEMENT

Protectiveness Statement		
Operable Unit: 12	*Protectiveness Determination:* Will be Protective	*Planned Addendum Completion Date:* Not Applicable
Protectiveness Statement: 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 shows 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. 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.

Action Memorandum OU6. Removal action for the Stray Horse Gulch OU6 Site, Leadville, CO. November 2014.

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.

Amending the Lake County Land Development Code and Adopting Regulations Concerning Institutional Controls for Operable Units Within the California Gulch Superfund Site. County of Lake and State of Colorado. February 2009.

Annual Blood-Lead Program Report - 2012 and 2013. Lake County Colorado. Prepared by Lake County Public Health Agency. February 2013.

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Annual Monitoring Report - 2015, Yak Tunnel Operable Unit 1 California Gulch Superfund Site, Leadville Colorado. March 2016.

Baseline Human Health Risk Assessment, California Gulch Superfund Site, Leadville, Colorado, Part A, Risks to Residents from Lead. EPA Region 8. June 2, 1996.

Baseline Human Health Risk Assessment, California Gulch Superfund Site, Leadville, Colorado, Part B, Risks to Residents from Contaminants other than Lead. EPA Region 8. January 2, 1996.

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. May 2009.

California Gulch Superfund Site Operations and Maintenance Plan Operable Units 2, 5 and 7. Prepared by CDPHE. March 2014.

CERCLA Information System Site Information accessed from website https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0801478. Accessed October 21, 2016.

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.

Direct Final Notice of Partial Deletion of Operable Unit 9, California Gulch Superfund Site, Leadville, Colorado. EPA Region 8. May 2011.

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.

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.

Minor ROD Modification, OU5. California Gulch Superfund Site, Leadville, Colorado. EPA Region 8. May 2013.

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. US 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 Environmental Protection Agency. Federal Register/Vol. 81, No. 26. February 9, 2016.

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

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

Partial Deletion of the California Gulch Superfund Site. OU 8 by the Environmental Protection Agency. 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 Environmental Protection Agency. Federal Register/Vol. 67, No. 34. February 20, 2002.

Partial Deletion of the California Gulch Superfund Site. OU10 by the Environmental Protection Agency. 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 Environmental Protection Agency. 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.

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

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Record of Decision, Operable Unit 5, AV/CZL Sites, California Gulch Superfund Site, Leadville, Colorado. EPA Region 8. September 2000.

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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.

Routine Monitoring Plan, Yak Tunnel Operable Unit, California Gulch Superfund Site, Leadville, Colorado. Prepared by MFG, Inc. for EPA Region 8. April 2008.

Second Amendment to Administrative Order for Yak Operable Unit Remedial Design/Remedial Action, California Gulch Superfund Site, Leadville, Colorado. EPA Region 8. June 16, 1993.

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.

Transmittal of First Amendment to Administrative Order for Yak Tunnel Operable Unit Remedial Design/Remedial Action (With Unilateral Administrative Order 89-20 Attached), California Gulch Superfund Site, Leadville, Colorado. EPA Region 8. April 30, 1993.

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.

APPENDIX B – SITE CHRONOLOGY

Superfund Enterprise Management System (SEMS) document numbers are included in the tables below for reference. SEMS is EPA's internal document system. Some documents are publicly available at https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.scs&id=0801478 . 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-environmental-information-service-center.

Table B-1: Site Chronology

Site Event	Date
Placer gold discovered in California Gulch and mining began in the 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 in operation.	1878-1882
Berdell and Witherell Smelter operated near the La Plata slag pile in OU3.	1878-1887
OU2 area 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 Smelters in OU5 were constructed. The Arkansas Valley (AV) Smelter processed lead ore and reprocessed slag to produce lead, silver and other metals and operated until 1961.	1879-1961
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 to facilitate mineral exploration and development in OU1.	1895
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 the City 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 3-1/2 to 4 miles into Iron Hill and Breece Hill in OU1.	1923
The CZL Site operated a flotation mill that processed zinc-lead ores sporadically between 1925 and 1940. The tailing impoundment at the CZL Site is only tailing 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 or the Grant/Union smelters indicated disposal of slag at this Site.	1926-1938

Site Event	Date
The mill that generated the tailing 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 Site.	1943-1946
The Oregon Gulch Tailing Impoundment in OU10 received tailing from the Newmont/Resurrection-ASARCO mill in California Gulch.	1945-1957
Hecla Mining Company, which later purchased Day Mines (Hecla/Day), leased OU2 property.	1947-1987
D&RGW purchased the AV Smelter slag pile in OU3 from ASARCO for use as ballast.	1961
Leadville Corporation purchased 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 utilized a cyanide leach process to extract silver from ore obtained from the Sherman and Diamond Newmont/Resurrection mines. The mill was purchased by Leadville Corporation in the early 1980s. It continued operations 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
Leadville Silver & Gold operated a pyrite recovery process at OU2.	1983-1988
EPA listed the Site on the National Priorities List (NPL).	9/8/1983
Record of Decision (ROD) signed for OU1 Yak Tunnel.	3/29/1988
Modifications of the OU1 ROD signed.	3/23/1989
Explanation of Significant Differences (ESD) for OU1 signed.	10/22/1991
Yak Tunnel Water Treatment Plant (WTP) began treating Yak Tunnel discharge.	1992
Site-wide Consent Decree – SEMS#303506.	5/16/1994
First Five-Year Review (FYR) signed.	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 Arkansas Valley South Hillside Slag Sites.	9/29/2000
ROD signed for OU5 – tailing, flue dust and non-residential soils for Arkansas Valley 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
Second FYR signed.	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
ROD signed for OU6 encompassing previous removal actions.	9/25/2003
ESD for OU4 signed.	3/17/2004
ROD signed for OU11 – Arkansas River Floodplain.	9/28/2005
Various response actions performed by parties to the Consent Decree.	1994-2006

Site Event	Date
Third FYR signed.	9/28/2007
State of Emergency in Lake County due to water levels in LMDT.	2/1/2008
Relief well installed in LMDT to pump water to LMDT treatment plant.	3/1/2008
Second EPA-lead Site-wide technical assistance grant completed.	5/1/2008
Site-wide 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
Site-Wide Water Quality (OU12) ROD signed.	9/22/2009
Lower California Gulch (OU8) partially deleted from the NPL.	1/12/2010
ROD Amendment for OU6 signed.	9/28/2010
Residential areas (OU9) partially deleted from NPL.	9/21/2011
Fourth FYR – SEMS#1260282.	9/27/2012
Minor ROD Modification ASARCO Smelters/Slag/Mill Sites (OU5) – SEMS#1261492.	5/16/2013
Minor ROD Modification Apache Tailing Impoundments (OU7) – SEMS#1261491.	5/16/2013
Minor ROD Modification Lower California Gulch (OU8) – SEMS#1261490.	5/16/2013
Minor ROD Modification Residential Soils (OU9) – SEMS#1261489.	5/16/2013
Repository completion – Stray Horse Gulch (OU6) – SEMS#1265520.	6/13/2013
ESD signed Yak Tunnel (OU1) – SEMS#1267311.	7/29/2013
ESD signed Malta Gulch Fluvial Tailing/Leadville Corporation Mill/Malta Gulch Tailing Impoundments (OU2) – SEMS#1267312.	7/29/2013
ESD Upper California Gulch (OU4) – 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 NPL	4/11/2016

Table B-2: Chronology of OU1 Events

OU1 Event	Date
California Gulch Superfund Site placed on the NPL.	9/8/1983
Phase I Remedial Investigation (RI) Report released – SEMS#325440, 308998, 309003.	5/1987
Feasibility Study (FS) Report released – SEMS#314983.	6/1/1987
Proposed Remedial Action Plan released for OU1 – SEMS#333922.	12/7/1987
ROD signed – SEMS#334261.	3/29/1988
Began Surge Pond and Interim Treatment Plant remedy.	9/1988
Modification of ROD (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
Completed Surge Pond and Interim Treatment Plant remedy.	6/1991
ESD signed – SEMS#304397.	10/22/1991
Completion of Yak Tunnel Monitoring Wells – SEMS#2041904.	2/1/1992

OU1 Event	Date
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 Yak Tunnel Bulkhead Remedy.	11/1994
Rising water levels detected in Yak Tunnel.	5/2002
Dewatering of Black Cloud Mine underway.	3/2006
EPA and the potentially responsible parties (PRPs) signed a Consent Decree for performance of remedy and operation and maintenance (O&M) – 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 NPL.	4/11/2016

Table B-3: Chronology of OU2 Events

OU2 Event	Date
California Gulch Superfund Site placed on NPL.	9/8/1983
Phase I RI Report – SEMS#325440, 308998, 309003.	5/1/1987
Administrative Order on Consent (AOC) for Engineering Evaluation/Cost Assessment (EE/CA) at the Malta Gulch Tailing Impoundment (MGTI) – SEMS#318530.	9/1991
Partial Consent Decree with Hecla Mining Company to settle Hecla's Site-wide liabilities – SEMS#301459 and 316075.	1/6/1993 and 8/17/1994
Partial Consent Decree with Leadville Silver and Gold Company to settle its Site-wide 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

OU2 Event	Date
Time-critical drum removal action completed.	7/2/1998
Final Pollution Reports on 9/10/1993, 8/14/1995, 8/9/1996 Action Memorandum – 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
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 Performed at OU2

Area	Action Memorandum Date	Removal Action Taken	Start Date	Completion Date
MGTI & Leadville Corporation Mill	9/10/1993	• Grade and revegetate contiguous fluvial tailing. • Removal non-contiguous pockets of fluvial tailing and dispose of the material in the MGTI. • Provide for long-term maintenance and monitoring.	10/05/1995	3/17/1997
LMGFT	8/14/1995	• Grade and revegetate contiguous fluvial tailing. • Removal non-contiguous pockets of fluvial tailing and dispose of the material in the MGTI. • Provide for long-term maintenance and monitoring.	9/05/1995	3/17/1997
MTI	8/09/1996	• Grade, compact and revegetate the impoundments. • Dispose of pyritic materials from the Apache Energy & Minerals property. • Provide for long-term maintenance and monitoring of the vegetated cap/cover.	9/04/1996	3/31/1997
Leadville Drums	4/15/1998	• Stage 42 drums in a secure location. • Dispose or recycle oily liquids in accordance with Standards for the Management of Used Oil, 40 CFR 279. 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
EPA's contractor sampled the three slag piles as part of the Site RI.	1986
Phase I RI Report – 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

OU3 Event	Date
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 remedial investigation/feasibility study (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
Site-Wide 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
EPA, State and D&RGW enter into Consent Decree – SEMS#318593.	12/1993
D&RGW submitted ballast operations plan to 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
Union Pacific Railroad Company (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 EPA – SEMS#493093.	11/3/2000
Lake County adopts ordinance that acts as an institutional control – SEMS#1100390.	3/3/2009
City of Leadville adopts ordinance that acts as an institutional control – SEMS#1265522.	5/7/2013
ESD requiring institutional controls signed – SEMS#1286501.	8/6/2014
OU3 partially deleted 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.	1986
Phase I RI Report – SEMS#325440, 308998, 309003.	5/1/1987
Newmont/Resurrection enters into a Consent Decree with the United States, the State of Colorado, and other PRPs to perform remediation work in OU4 – SEMS#303506.	8/26/1994
Engineering Evaluation/Cost Analysis (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 deletes the removal action at the Waste Rock Pile UCG-92A – SEMS#321523.	11/18/1996

OU4 Event	Date
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
EPA Proposed Plan issued.	1/01/1998
OU4 ROD issued – SEMS#1141259.	3/31/1998
Final Pollution Report, Non-Time Critical Removal Action for the Garbaldi Mine – SEMS#323550.	6/30/1998
Remedial action – SEMS#2008363.	1998-2001
Construction Completion Report – SEMS #2032908.	2/1/2003
ESD deferring 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 IC – 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 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 – SEMS#325440, 308998, 309003.	5/1/1987
EPA and ASARCO entered into AOC for performance of soils sampling and air monitoring – SEMS#303835.	9/1/1990
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 – 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 – SEMS #303553, 303554, 303555.	4/28/1993
ASARCO entered into Consent Decree with United States, State of Colorado, 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 – SEMS#1077124, 320875.	5/1/1996
Final Hydrogeologic RI Report – SEMS #320877.	5/1/1996
Focused Feasibility Study (FFS) - EGWA Sites submitted by ASARCO – SEMS#323796.	4/1/1999
FFS - Arkansas Valley Smelter and Colorado Zinc-Lead Mill Site submitted by ASARCO – SEMS#287877.	2/1/2000
Proposed Plan describing EPA's preferred alternative issued – SEMS#367805, 367806.	7/1/2000
ROD for AV/CZL Site – SEMS#479438.	9/29/2000
ROD for EGWA Site – SEMS#479625.	10/31/2000
ASARCO conducted demolition activities.	2004

MFG remedial design approved - Final Remedial Design Report, Arkansas Valley Smelter and Colorado Zinc-Lead Mill Site – SEMS#2032907.	4/12/2005
ASARCO conducted remedial actions.	2004-2007
Pacific Western Technologies, Ltd. (PWT) remedial design approved - Arkansas Valley 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 – 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 clarifying institutional controls. SEMS#1261492.	5/16/2013
O&M Plan finalized – SEMS#1283390.	3/20/2014
OU5 partially deleted from NPL – SEMS#1310757.	10/24/2014
California Gulch Superfund Site placed on the NPL.	9/8/1983
Phase I RI Report. SEMS #325440, 308998, 309003	5/1/1987
EPA and ASARCO entered into an AOC for the performance of soils sampling and air monitoring. SEMS #303835	9/1/1990
EPA issued a UAO and 1st and 2nd 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. SEMS #304533	1991 - 1993
Surface Water RI of the California Gulch Superfund Site conducted.	1991
Hydrogeologic RI of the California Gulch Superfund Site conducted.	1991 - 1992
SFS conducted to initiate the overall CERCLA feasibility study.	1993
Smelter RI Report. SEMS #303553, 303554, 303555	4/28/1993
ASARCO entered into a Consent Decree with the United States, State of Colorado, 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. SEMS #1077124, 320875	5/1/1996
Final Hydrogeologic RI Report. SEMS #320877	5/1/1996
Focused Feasibility Study (FFS) - EGWA Sites submitted by ASARCO. SEMS #323796	4/1/1999
FFS - Arkansas Valley Smelter and Colorado Zinc-Lead Mill Site submitted by ASARCO. SEMS #287877	2/1/2000
Proposed Plan describing EPA's preferred alternative issued. SEMS #367805, 367806	7/1/2000
ROD for AV/CZL Site. SEMS #479438	9/29/2000
ROD for EGWA Site. SEMS #479625	10/31/2000
ASARCO conducted demolition activities.	2004
MFG remedial design approved - Final Remedial Design Report, Arkansas Valley Smelter and Colorado Zinc-Lead Mill Site. SEMS #2032907	4/12/2005
ASARCO conducted remedial actions.	2004-2007
Pacific Western Technologies, Ltd. (PWT) remedial design approved - Arkansas Valley 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. SEMS #1142161	2/23/2010
Lake County adopts ordinance that acts as IC. SEMS #1261487	4/15/2013
City of Leadville adopts ordinance that acts as IC. SEMS #1265522	5/7/2013
Minor ROD Mod clarifying ICs. SEMS #1261492	5/16/2013
O&M Plan finalized. SEMS #1283390	3/20/2014
OU5 partially deleted from NPL. SEMS #1310757	10/24/2014

Table B-8: Chronology of OU6 Events

OU6 Event	Date
California Gulch Superfund Site placed on NPL.	9/8/1983
Phase I RI Report – SEMS#325440, 308998, 309003.	5/1/1987
Action Memorandum for Removal Action at 5th Street/Starr Ditch and Runoff including Garbaldi, North Mike and Oregon Gulch – 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 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 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 – 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 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 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 for a Time-Critical Removal Action in the Greenback - RAM Runoff Collection System – SEMS#301102.	6/20/2000
Amendment to Action Memorandum 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 – SEMS#479619.	10/16/2000
Final Phase I, II, III, IV Removal Action Completion Report – SEMS#1020670, 1020671, 1100381.	12/28/2000
Action Memorandum for Ibex/Irene waste pile – SEMS#1162658.	6/25/2001
Action Memorandum for Greenback, RAM and Marion Ponds. SEMS#1202497.	7/13/2001

OU6 Event	Date
ROD issued – SEMS#2008670.	9/25/2003
Remedial action (removal of Ponsardine Waste Rock Pile, replacement of cribbing).	2002-2004
Construction Complete – 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 action (Site Activities Report) – SEMS#1068045.	7/14/2005
Action Memorandum - relief well installed during State of Emergency – SEMS#1092386.	3/12/2008
Memorandum of Understanding with the U.S. Bureau of Reclamation – SEMS#1072292.	6/24/2008
Pilot Study on capping alternatives – SEMS#1189921.	12/20/2010
ROD Amendment (AROD) – SEMS#1167638.	9/28/2010
Action Memorandum for Mikado Ponds – SEMS#1202497.	7/13/2011
Action Memorandum for Mikado Pond – 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 – SEMS#1242278.	8/22/2012
Action Memorandum Amendment for Marion, Greenback, 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, Marion Pond and Shaft – SEMS#1292050.	12/16/2013
Pollution Report, Marion and Mikado Ponds – SEMS#1292075.	10/29/2014
Action Memorandum for Mikado Pond – SEMS#1310761.	11/10/2014
Action Memorandum for Stray Horse Gulch – SEMS#1772202-R8.	6/7/2016
California Gulch Superfund Site placed on the NPL.	9/8/1983
Phase I RI Report. SEMS #325440, 308998, 309003	5/1/1987
Action Memorandum for Removal Action at 5th Street/Starr Ditch and Runoff including Garbaldi, North Mike and Oregon Gulch. 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 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. SEMS #323567	5/1/1998
Action Memorandum 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. 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

OU6 Event	Date
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 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 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 for a Time Critical Removal Action in the Greenback - RAM Runoff Collection System. SMDS #301102	6/20/2000
Amendment to Action Memorandum 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. SEMS #479619	10/16/2000
Final Phase I, II, III, IV Removal Action Completion Report. SEMS #1020670, 1020671, 1100381	12/28/2000
Action Memorandum for Ibex/Irene waste pile. SEMS #1162658	6/25/2001
Action Memorandum for Greenback, RAM and Marion Ponds. SEMS #1202497	7/13/2001
ROD. SEMS #2008670	9/25/2003
Remedial Action (Removal of Ponsardine Waste Rock Pile, replacement of cribbing).	2002-2004
Construction Complete – 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 - Relief well installed during State of Emergency. SEMS #1092386	3/12/2008
Memorandum of Understanding with the U.S. Bureau of Reclamation. SEMS #1072292	6/24/2008
Pilot Study on capping alternatives. SEMS #1189921	12/20/2010
ROD Amendment (AROD). SEMS #1167638	9/28/2010
Action Memorandum for Mikado Ponds. SEMS #1202497	7/13/2011
Action Memorandum for Mikado Pond. SEMS #1230841	9/26/2011
Repository RD Start.	10/13/2011
Repository RA Start. SEMS #1242264	7/9/2012
Action Memorandum for Mikado Pond. SEMS #1242278	8/22/2012
Action Memorandum Amendment for Marion, Greenback, Adelaide Ponds. SEMS #1242277	9/4/2012
Repository RD end. SEMS #1239588	9/6/2012
Repository RA 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 on parts of OU6 in the City limits SMDS #1265522	5/7/2013
Pollution Report, Marion Pond and Shaft. SEMS #1292050	12/16/2013
Pollution Report, Marion and Mikado Ponds. SEMS #1292075	10/29/2014
Action Memorandum for Mikado Pond. SEMS #1310761	11/10/2014
Action Memorandum for Stray Horse Gulch SEMS#1772202-R8	6/7/2016

Table B-9: Chronology of EPA Initial Response Actions for 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 approximately 211,000 cubic yards of waste from Maid of Erin Mine, Wolftone Mine and the 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)	Constructed surface water run-on diversion channels around six mine waste rock piles. Constructed surface water runoff collection channels around four waste rock piles to capture and convey impacted water to retention basins. Constructed surface water retention basins. 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. 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. Revegetated disturbed areas as well as the Hamm's Tailing Impoundment and Penrose Mine Waste Pile.	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)	Constructed surface water run-on diversion channels around six mine waste rock piles. Constructed surface water runoff collection channels around four waste rock piles to capture and convey impacted water to retention basins. Constructed surface water retention basins.	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 acid rock drainage 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 the ponds.	9/2012	9/2012

Area(s) Affected	Action Memorandum Date	Response Action Taken	Start Date	Completion Date
Action Memorandum Amendment for Marion, Greenback, Adelaide Ponds. SEMS #1242277	9/4/2012			
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 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 by-pass 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 EPA.	1987
Phase I RI Report. SEMS #325440, 308998, 309003	5/1/1987
Investigation study conducted by EPA.	1989
EPA and the PRPs entered into an AOC for the performance of soil sampling and air monitoring. SEMS #303835	9/25/1990
EPA issued a Unilateral Administrative Order (UAO) that required ASARCO to conduct studies and complete RIs. SEMS #303586	8/29/1991
Tailing RI performed. SEMS #303571	7/1/1991
Surface Water RI of the California Gulch Superfund Site conducted.	1991-1192
Hydrogeologic RI of the California Gulch Superfund 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, State of Colorado, 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. SEMS #318961 and 318962	1/1994
Cultural Resources Investigations of the Apache Tailing Area Report. SEMS #319927	11/28/1995
Apache Tailing Impoundment Dewatering Treatability Study Work Plan. 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. SEMS #1077124, 320875	5/1/1996
Final Hydrogeologic RI Report. 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. SEMS #322004	4/7/1997
Final Pollution Reports for Time Critical Removal Actions at Tailing Ponds 2 & 3 of the Apache Tailing Impoundment, 04/1997; and Apache Energy & Minerals Property, 08/1996. SEMS #323571	6/30/1998
FFS, Apache Tailing Impoundments. SEMS #371805, 1293985	1/17/2000
Proposed Plan for 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. SEMS #301097	6/6/2000
Construction Completion Report. SMDS #1100383	12/01/2003
Lake County adopts ordinance that acts as IC. SEMS #1261484	12/22/2010
City of Leadville adopts ordinance that acts as IC. SEMS #1265522	5/7/2013
Minor ROD Modification to clarify ICs. SEMS #1261491	5/16/2013
O&M Plan finalized. SEMS #1283390	3/20/2014
Partial deletion from NPL. SEMS #1310757	10/24/2014

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

Area	Action Memorandum Date and Action	Response Action Taken	Start Date	Completion Date
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 Ponds 2 and 3, berm material and native soil, and consolidate the material on the Main Impoundment. Pumped surface water ponded on Tailing Ponds 2 and 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
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. Regraded the eastern embankment and the southwest embankment in the vicinity of the wooden box culvert on the Main Impoundment. Excavated the tailing material overlying the clay-tile culvert at the southern edge of the Main Impoundment. Placed fill over a portion of the North Impoundment.	01/2000	12/17/2003
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. Regraded impoundments; placed a multi-layer composite cover (including a geosynthetic barrier) over the tailing area, and revegetation.	06/2001	12/2003

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. SEMS #314479	2/28/1986
Phase I RI Report. SEMS #325440, 308998, 309003	5/1/1987
EPA and the PRPs enter into AOCs for the performance of soil sampling and air monitoring. SEMS #1152479, 303835	9/28/1990
EPA issues a Unilateral Order on Consent that required ASARCO to conduct studies and complete RIs. SEMS # 309951	8/29/1991
Newmont/Resurrection enters into a Consent Decree with the United States, the State of Colorado, and other PRPs to perform remediation work. SEMS #303506	5/16/1994
EE/CA issued for 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	8/04/1995
Start date for Removal Action at CZL Tailing Impoundment Site (08/04/1995 Action Memorandum).	9/04/1995
Completion of Removal Action at CZL Tailing Impoundment Site (08/04/1995 Action Memorandum).	1/1996
Action Memorandum issued for Removal Action at Fluvial Tailing Sites 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 the Fluvial Tailing Sites 1, 2, 3, 6, and 8 (06/11/1998 Action Memorandum).	8/28/1996
Completion of Removal Action at Fluvial Tailing Sites 1, 2, 3, 6, and 8 (06/11/1998 Action Memorandum).	11/07/1998
Final Pollution Report on 06/11/1998 Action Memorandum. SEMS #287865	2/05/1999
EPA Final Focused Feasibility Study. SEMS # 322589, 287786	9/10/1997 5/22/2000
ROD. SEMS #479443	9/29/2000
Construction Completion Report. SEMS #2032901, 2008364	7/1/2003 9/02/2003
Lake County Ordinance as IC. SEMS #1100390	3/02/2009
Partial deletion from the NPL. SEMS #100000241	1/12/2010
Environmental Covenants placed on Newmont/Resurrection properties. SEMS #1242260, 1242261, 1242262	7/31/2012 and 10/1/2012
City of Leadville adopts ordinance as IC. SDSM #1265522	5/7/2013

Table B-13: Chronology of OU9 Events

OU9 Event	Date
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 – SEMS#325440, 308998, 309003.	5/1/1987
EPA and settling defendants entered into AOC for performance of soils sampling and air monitoring – SEMS#348081.	9/28/1990
EPA issued UAO that required ASARCO to conduct studies and complete RIs related to the Demographics Work Plan; Final Sampling Plan for Sampling and Analysis of Lead Occurrence Within and Immediately Adjacent to Residences; Soil Investigation Work Plan; Mine Waste Pile RIs; and other issues – SEMS#309951.	8/29/1991
EPA issued UAO that required Newmont/Resurrection Mining Company to conduct and complete final Soils Investigation Work Plan – SEMS#303602.	9/10/1991
EPA entered into 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 – SEMS#303552.	10/12/1992
Partial Consent Decree among United States, State of Colorado and settling defendants settling federal and state claims for past response costs incurred prior to February 1, 1991, and February 1, 1992 – SEMS#321558.	9/04/1993
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
Engineering Evaluation/Cost Analysis (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 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 – 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 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 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 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

OU9 Event	Date
Final Pollution Report 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, Residential Populated Areas – SEMS#211891.	9/02/1999
Final Pollution Report 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 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 for time-critical removal actions at two residences, Kids First program.	2000
Lake County Community Health Program (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
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.	9/1/2009
Lake County Board of County Commissioners amends 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 NPL – SEMS#1202469, 1202470.	9/21/2011
City of Leadville adopts institutional controls – SEMS#1265522.	5/7/2013
Minor ROD Mod clarifying institutional controls – SEMS#1261489.	5/16/2013
LCCHP Phase 2 Revision 1 approved – SEMS#1275059.	10/23/2013
Action Memorandum for three residences – SEMS#1777574.	9/19/2016

Table B-14: Chronology of OU10 Events

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

Table B-15: Chronology of OU11 Events

OU11 Event	Date
California Gulch Superfund Site placed on NPL.	9/08/1983
Investigation study conducted by Colorado Department of Law.	1986
Phase I RI Report – SEMS#325440, 308998, 309003.	5/1/1987
Emergency response due to high spring run-off threatening severe erosion of a stretch of the Arkansas River bank.	6/1993
Emergency removal of river tailing – 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 tailing – SEMS#478617.	11/01/1994

OU11 Event	Date
Action Memorandum issued for time-critical removal action – SEMS#322266.	9/15/1997
Amendment to 09/15/1997 Action Memorandum – SEMS#323546.	8/04/1998
Action Amendment issued for time-critical removal action – SEMS#232091.	6/17/1999
Action Amendment issued for time-critical removal action – SEMS#478219.	6/09/2000
Amendment to Action Memorandum dated 06/09/2000 – 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 – SEMS#1151714.	4/02/2007
Risk/health assessment. Risk Addendum – Risks from Mercury – 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 – SEMS#1151713.	1/11/2010
Monitoring and Maintenance Plan – SEMS#1167694.	3/23/2010
Remedial Action Maintenance Summary – SEMS#1283400.	3/16/2011
Remedial Action Report – SEMS#1267353.	9/19/2013
California Gulch placed on NPL.	9/08/1983
Investigation study conducted by Colorado Department of Law.	1986
Phase I RI Report. SEMS #325440, 308998, 309003	5/1/1987
Emergency Response due to high spring run-off threatening severe erosion of a stretch of the Arkansas River bank.	6/1993
Emergency removal of river tailing. SEMS #478615	10/28/1993
Two-time critical removal actions to stabilize the embankments of two properties which abutted the Arkansas River. SEMS #2003514, 2003519	9/1994
Emergency removal of river tailing. 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. SEMS #323546	8/04/1998
Action Amendment issued for Time Critical Removal Action. SEMS #232091	6/17/1999
Action Amendment issued for Time Critical Removal Action. SEMS #478219	6/09/2000
Amendment to Action Memorandum dated 06/09/2000. SEMS #478215	8/11/2000
FS. SEMS #1049484	12/1/2004
ROD. SEMS #2032941	9/28/2005
Remedial action started.	9/13/2006
Remedial Work Plan. SEMS #1151714	4/02/2007
Risk/health assessment. Risk Addendum – Risks from Mercury. 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

OU11 Event	Date
Construction Completion Report SEMS #1151713	1/11/2010
Monitoring and Maintenance Plan SEMS #1167694	3/23/2010
Remedial Action Maintenance Summary SEMS #1283400	3/16/2011
Remedial Action Report SEMS #1267353	9/19/2013

Table B-16: Chronology of OU12 Events

OU12 Event	Date
EPA emergency workers extend public water supply system lines to residences in private wells.	1986
Preliminary Human Health Risk Assessment – 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 – SEMS#316598.	4/1/1995
Final Baseline Aquatic Ecological Risk Assessment – SEMS#320591.	9/1/1995
Baseline Human Health Risk Assessments, Part A – SEMS#319625.	1/2/1996
Baseline Human Health Risk Assessments, Part B – SEMS#319626.	1/2/1996
Ecological Risk Assessment for the Terrestrial Ecosystem: Evaluation of Risks to Plants and Herbivores in the Upper Arkansas Flood Plain – SEMS#321677.	1/1/1997
Hydrogeological Remedial Investigation Report – SEMS#320877.	5/1/1996
Surface Water Remedial Investigation Report – SEMS#1077124, 320875.	5/1/1996
Groundwater Baseline Human Health Risk Assessment – SEMS#321132.	6/1/1996
Aquatic Biological Assessment Data for the Upper Arkansas River Basin near Leadville, CO., 1995-1998 – SEMS#323620.	9/1/1998
Final Monitoring Plan for Site-wide Groundwater – SEMS#1020443.	11/1/2002
Site Characterization Report for the Upper Arkansas River Basin – SEMS#1022097, 1023119, 1052364.	10/31/2002
Preliminary Report on the Biological Data for the Upper Arkansas River – SEMS#1022089.	2/1/2003
Draft Interim Remedial Investigation Report, Operable Unit 12 – SEMS#2032904.	5/28/2003
Draft Interim Focused Feasibility Study, Operable Unit 12 – SEMS#2032902.	5/28/2003
A Synopsis of Seventeen Years Trout Population Biometrics in the Upper Arkansas River – SEMS#2036964.	6/27/2003
Addendum - 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 – SEM #2037490.	12/31/2003
Characterization of Risks to Aquatic Receptors from Mining-Related Contaminants in Upper Arkansas River Flood Plain – SEMS#1052325.	3/17/2004
The Aquatic Biological Monitoring Program for the Upper Arkansas River 1994-2004 – SEMS#1052392.	2/23/2005
OU12 Groundwater/Surface Water Data Evaluation – 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
Focus Feasibility Study completed – SEMS#1096312.	11/1/2007
RI/FS completed.	9/22/2009
Restoration Plan and Environmental Assessment for the Upper Arkansas River Watershed – SEMS#1293995.	4/14/2010
ROD issued, including Technical Impracticability Waiver – SEMS#1102149.	9/22/2010

OU12 Event	Date
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 – SEMS#1772202-R8SDM.	6/7/2016

APPENDIX C – SITE BACKGROUND

Site-Wide Physical Characteristics and Location

The Site lies 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 approximately 18 square miles in Lake County, approximately 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 located 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 Census.

The elevation of the Site 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 the City of Leadville is approximately 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.

Site-Wide Land and Resource Use

The land uses on the Site include housing, commercial businesses such as restaurants and shops, and facilities for recreation, historical tourism, athletics, industrial and mining activities. The zoning uses for the area are industrial mining, business, recreational and residential. 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.

Site-Wide 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:

- *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.

- *Mill Tailing* - 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 tailing) were generally placed in nearby tailing ponds. Release of contaminants from tailing material can be attributed to seepage from existing tailing deposits and from additional tailing transported by fluvial processes and deposited along the surface water channel. Metal

contamination in sediments and surface water is the result of tailing pile runoff and seeps emanating from the toe of some tailing deposits.

- *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.

- *Acid Rock Drainage* - 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 acid rock drainage 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 located within the 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 on- and off-site water treatment facilities. Mine tailing from the historical mining activity were also transported downstream via California Gulch to the Arkansas River and deposited in many locations adjacent to the river. Some contaminated sediments were also transported along irrigation channels and deposited in fields in the Arkansas River Valley.

The Site was placed on the Superfund program's NPL in 1983, under the authority of CERCLA, which was promulgated in 1980. The Site was placed on the NPL because of concerns about 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.

Site-Wide Basis for Taking Action

Beginning shortly after Site discovery in 1982, private parties, the USGS and EPA conducted groundwater and surface water studies at the Site. The initial Phase I RI was released in May 1987, with subsequent RI/FSs performed by Woodward-Clyde in 1990 and 1991. The 1987 Phase I RI 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. 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 discussed below.

Under the 1994 Consent Decree, assessment of Site-wide surface water and groundwater quality relative to appropriate performance standards was deferred to OU12. EPA issued a ROD for OU12 in September 2009; remedial activities are currently 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, the 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).

A number of BRAs have been completed for the Site and are listed below:

- *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 was used in 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.

- *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 0-6 years) because they typically have higher intake rates of environmental media per unit body weight than adults, they 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. EPA used Site-specific inputs to an integrated exposure, uptake and biokinetic 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.

- *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 Site-wide 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.

- *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*

    - *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.

    - *Baseline Human Health Risk Assessment for the California Gulch Superfund Site. Part C: Evaluation of Recreational Scenarios:* The BRA was conducted to evaluate 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.

- *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 in 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.

<u>Human Health Risks</u>

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. The land use-based lead remediation goals are summarized in Table 1.

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

Land Use-Based Remediation Goals	Land Use-Based Lead Remedial Goal (mg/kg)	Reference
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
Notes: 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.

Inspection of the prior RIs shows that average lead levels are generally well below the action level of 16,000 milligrams per kilogram (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 (6,100-7,700 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 (i.e., 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, 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 up-gradient 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.

Site-Wide Initial Response

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

The contaminated drainage from the Yak Tunnel was identified as the most pressing problem at the Site and was thus the first to be addressed. The Yak Tunnel remedy – capturing and treating the Yak Tunnel drainage – was designated as OU1. 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 EPA, the State of Colorado and the following responsible parties:

- ASARCO Incorporated (ASARCO)
- Joint Venture between ASARCO and Newmont/Resurrection Mining Company (Res-ASARCO)
- 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 Site-Wide Water Quality. As a result, the remedies for OU2 through OU11 were selected prior to selecting the remedy for OU12. EPA issued the OU12 ROD to address Site-wide surface water and groundwater contamination in 2009. Water quality data is 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-10). OU8 also includes the CZL Tailing Impoundment outside the 500-year floodplain. OU8 is approximately 97 acres in size and 4.3 miles long. OU8 borders portions of several other OUs, including OU1 (Yak Tunnel WTP), OU2 (Malta Gulch), OU3 (D&RGW slag piles), 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 which drain areas of OU4 (Upper California Gulch) and OU6 (Starr Ditch/Penrose Dump/Stray Horse Gulch). The land area within OU8 consists predominantly of private property. No residences are located in OU8. 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 (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 or Business.

The area comprising 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 become 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 tailing slurried into tailing impoundments. Fluvial deposits of tailing occurred as tailing was released from impoundments. Waste rock from underground mining was frequently dumped near mine shafts, as was the case with the Gaw Waste Rock Pile.

Tailing impoundments within the Site have resulted in fluvial deposits of tailing 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 tailing 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 approximately one mile west of Leadville and immediately north of Stringtown. The CZL tailing impoundment at the Site of the flotation mill operation covered approximately 1.6 acres at an average depth of 7 feet. The CZL tailing impoundment contained an estimated 17,000 cubic yards of tailing.

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 tailing Sites within OU8 were found to have elevated levels of contamination. Fluvial Tailing Site 1 (FTS1), comprising approximately 3.4 acres, is adjacent to the La Plata Slag Pile (part of OU3) and extends downstream in a westerly direction to a point approximately 1,000 feet up gradient of the CZL Tailing Impoundment. California Gulch flows through the tailing and the gulch has cut a channel through the fluvial deposits. The fine to coarse grained tailing and alluvial/tailing materials ranged from 1-6 feet in depth.

Fluvial Tailing Site 2 (FTS2) lies 200 feet downstream of FTS1 and is estimated to be 3.2 acres. The fluvial tailing material in FTS2 is generally light brown to brown clay silts and sands overlying light brown silt that contains cobbles and sand.

Fluvial Tailing Site 3 (FTS3) is located immediately downstream of Lake County Road 6 on California Gulch and covers approximately 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.

Fluvial Tailing Site 6 (FTS6) is located on California Gulch between the Yak Tunnel Treatment Plant Surge Pond embankment and the Apache Tailing Impoundments comprising approximately 4.2 acres. A portion of the Gaw waste rock pile also lies within FTS6. The pile covers approximately one half acre and is estimated to have a volume of 7,500 cubic yards.

Fluvial Tailing Site 8 (FTS8) extends from the Arkansas Valley Slag Pile (part of OU3) to a point approximately 6,500 feet downstream to the confluence of California Gulch with the Arkansas River. FTS8 is a series of small discontinuous tailing deposits with a total estimated area of 115 acres. Approximately 45 acres of fluvial tailing that lie within the floodplain boundaries of the portion of FTS8 are addressed in the OU8 ROD.

Non-residential area soils are defined as poorly vegetated areas outside of the fluvial tailing 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 Screening Feasibility Study (SFS). The primary concerns were loose and erodible sediments that could be re-suspended 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 of Colorado, EPA and certain PRPs have conducted various studies and investigations to evaluate the nature and extent of contamination within the Site. In 1991, remedial investigations began for several areas within the Site including mine waste rock piles, tailing disposal areas, surface water and aquatics, groundwater, smelter Sites, residential/populated area soils, slag piles and terrestrial studies. These studies have determined 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 the residential areas of Leadville, including mining-related sources such tailing 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 EPA and the State of Colorado, 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 (KF) program. ASARCO Incorporated agreed to operate the KF program as an interim response action until 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 KF program consisted of a variety of services and remedial response activities designed to:

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

Initially, the KF program targeted residences where sample soil lead levels were found above 3,500 mg/kg, because 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 KF Work Group to identify and prioritize locations for response actions.

Residences with children that had blood-lead levels greater than 10 micrograms per deciliter (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 within the KF program were:

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

The 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 (6 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 the Lake County Health Department or door-to-door surveys received information about the program. The responses resulted in the need for additional sampling of soils, paint, dust, water, and blood-lead levels. Additional sampling was conducted if the residence:

- Was located in the 3,500 mg/kg lead soils priority area.
- Had a child with a blood-lead level greater than 10 µg/dL.
- Had a pregnant or nursing woman in the home.
- Was known to have paint in poor condition.
- Was known to have another possible lead source (e.g., lead pipes, certain hobbies).
- 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 KF Work Group developed and approved all action and no-action determinations. The property owners consented on all investigations and remediations.

The KF 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 KF program was presented as an alternative in the FS when it was revised and renamed the Lake County Community Health Program (LCCHP).

The remediation of OU9 was divided into many separate removal actions as well as remedial actions. Table C-2 summarizes these actions:

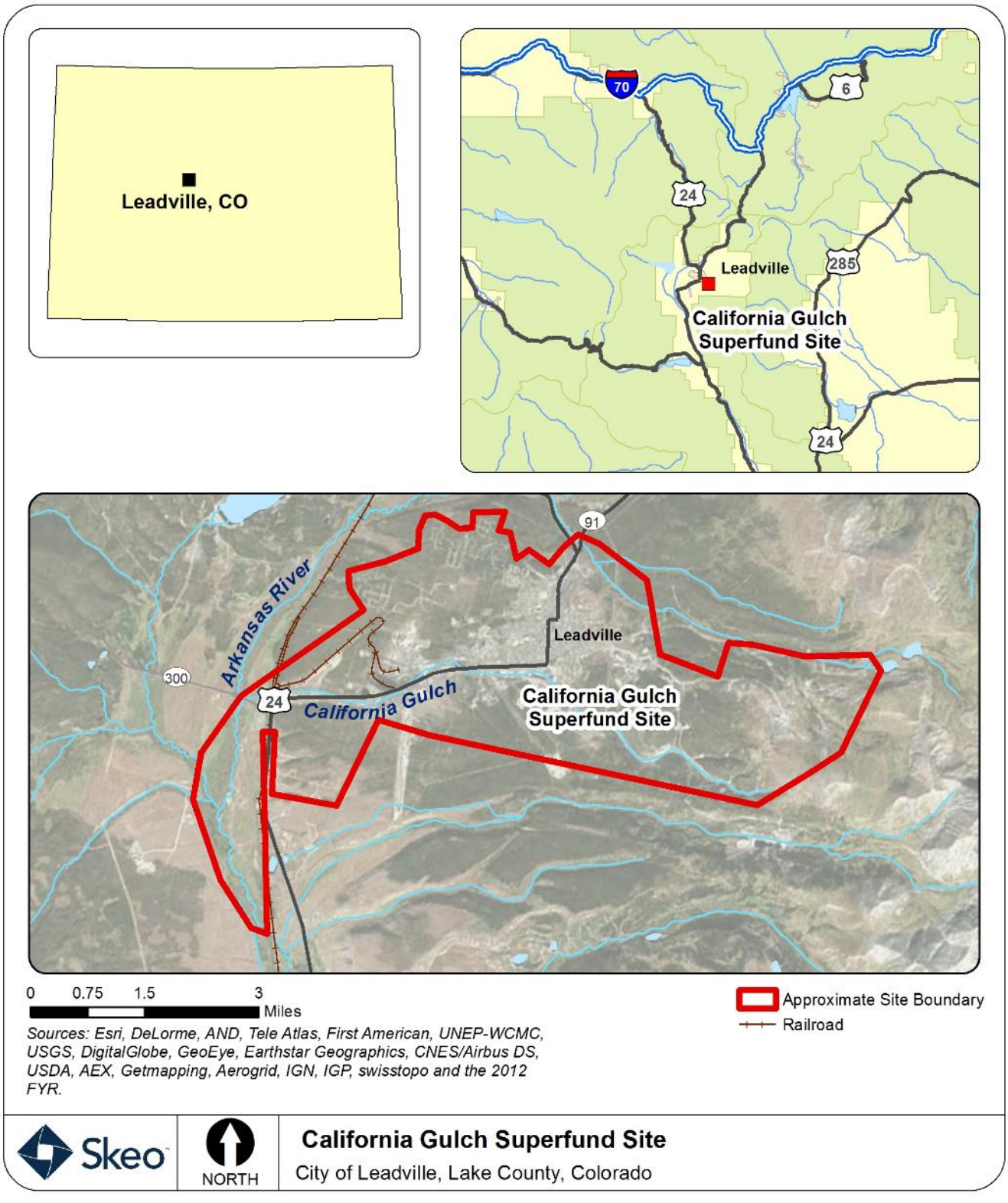
Table C-2: Response Actions for OU9

Area	Timeframe	Type of Action	Remedy Implemented
Private Well	5/29/1986	N/A	Water connection to the Parkville Water District provided.
KF 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 KF program started on October 16, 1995. The LCCHP described in the ROD took the place of the KF 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 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 Location 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 EPA's response actions at the Site, and is not intended for any other purpose.

Figure D-2: Detailed Site Map

Source: http://semspub.epa.gov/src/document/08/1771143

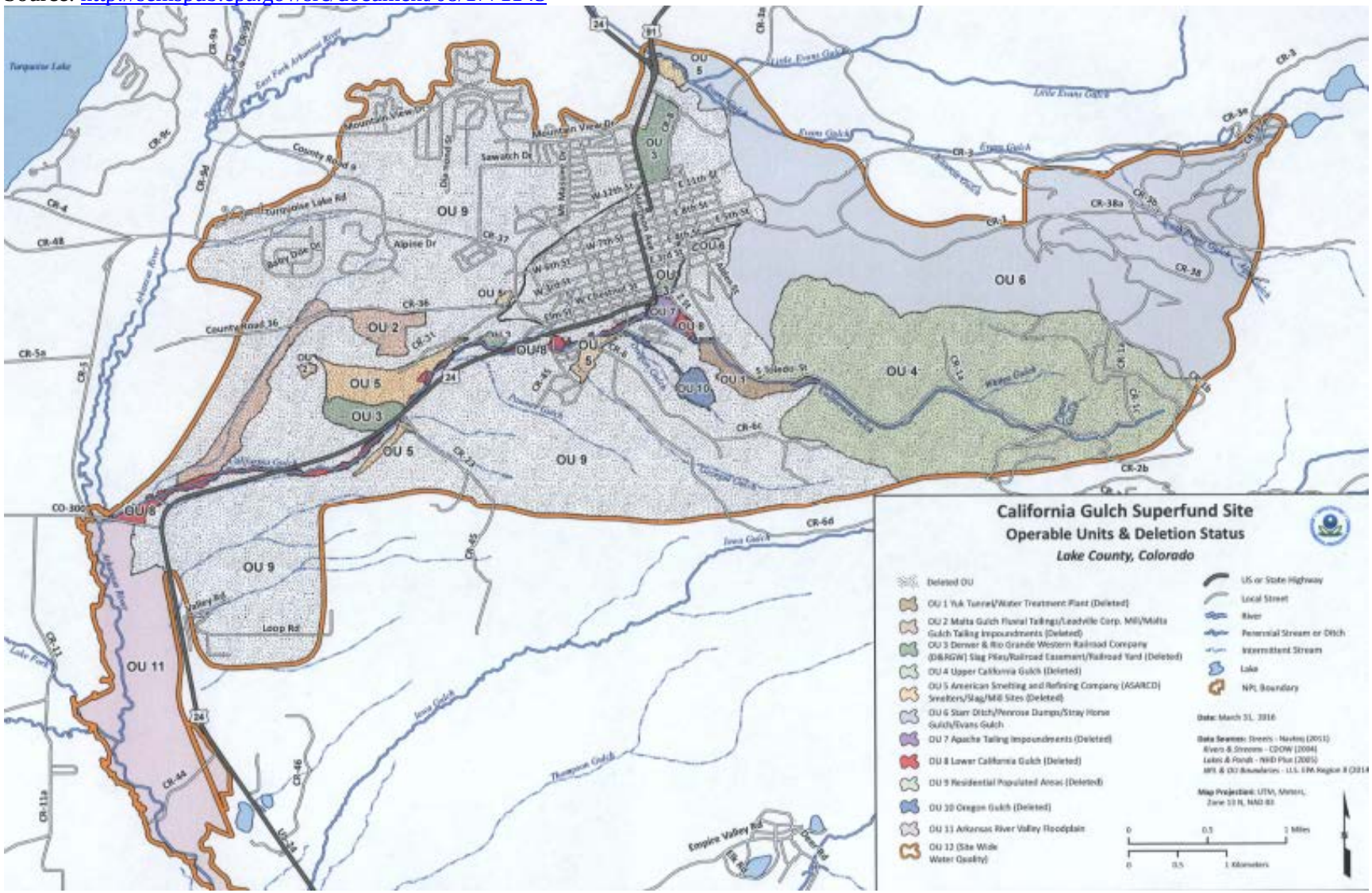
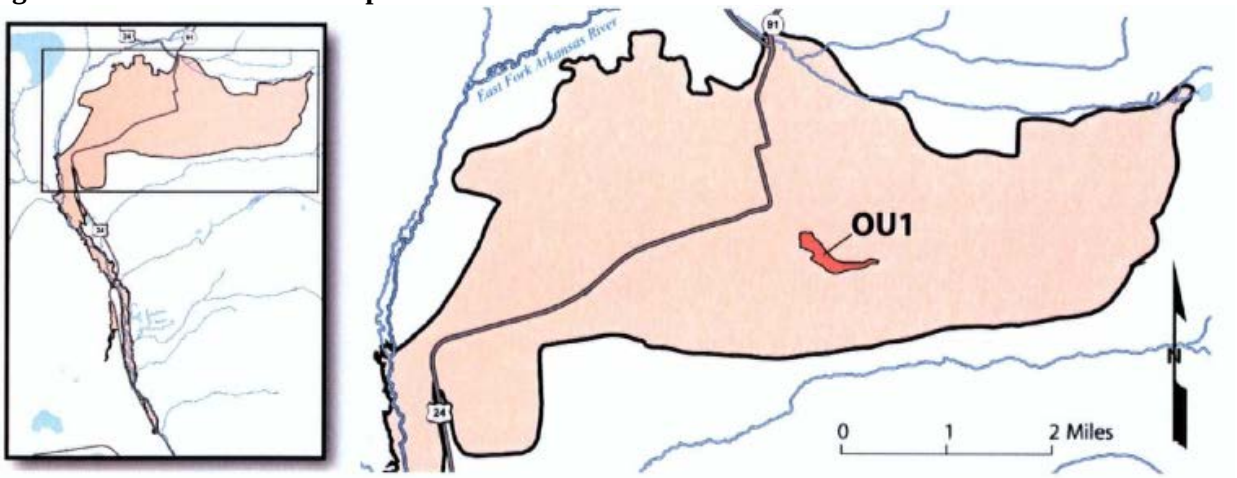
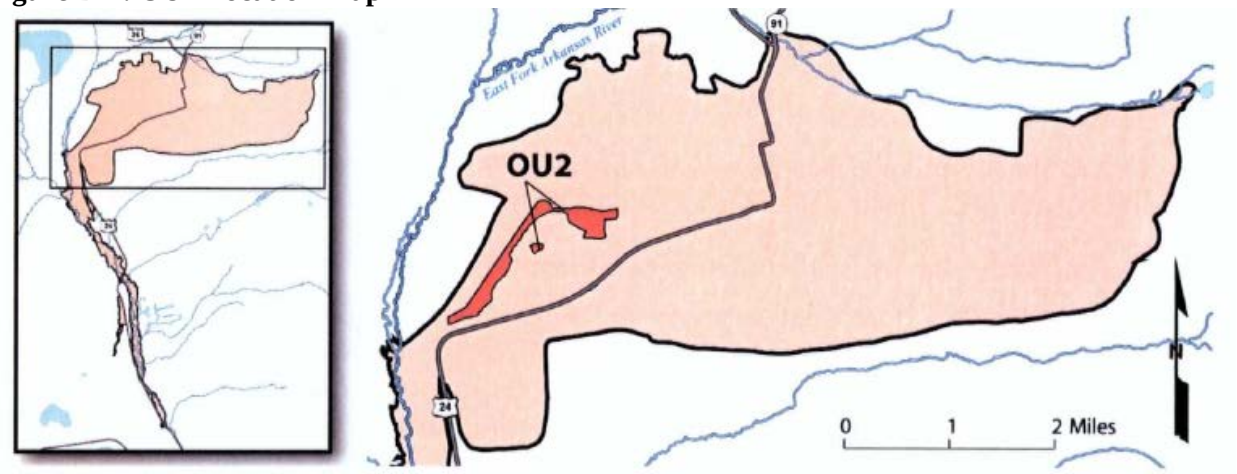


Figure D-3: OU1 Location Map



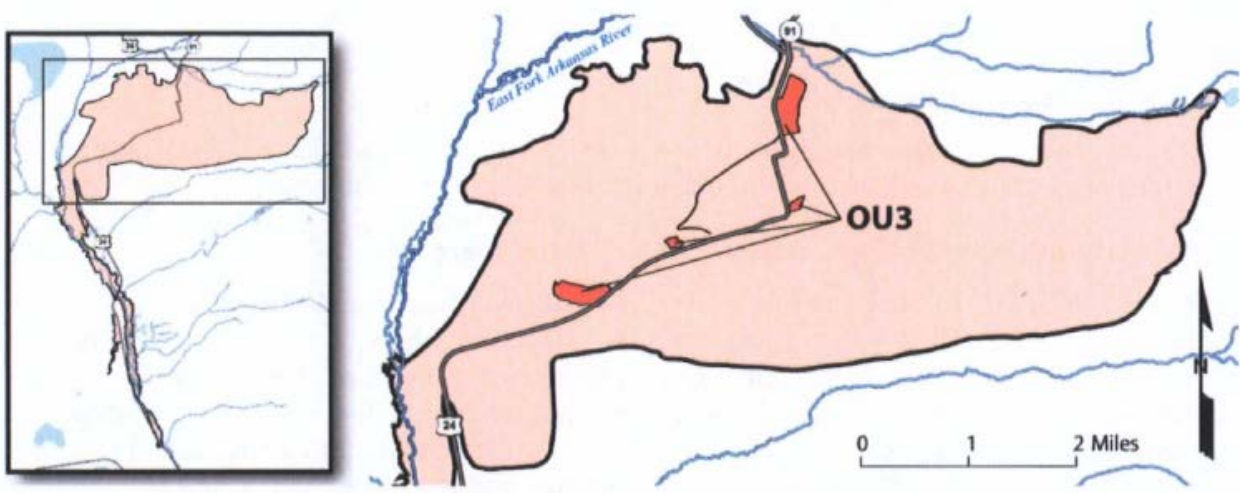
Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site, and is not intended for any other purpose.

Figure D-4: OU2 Location Map



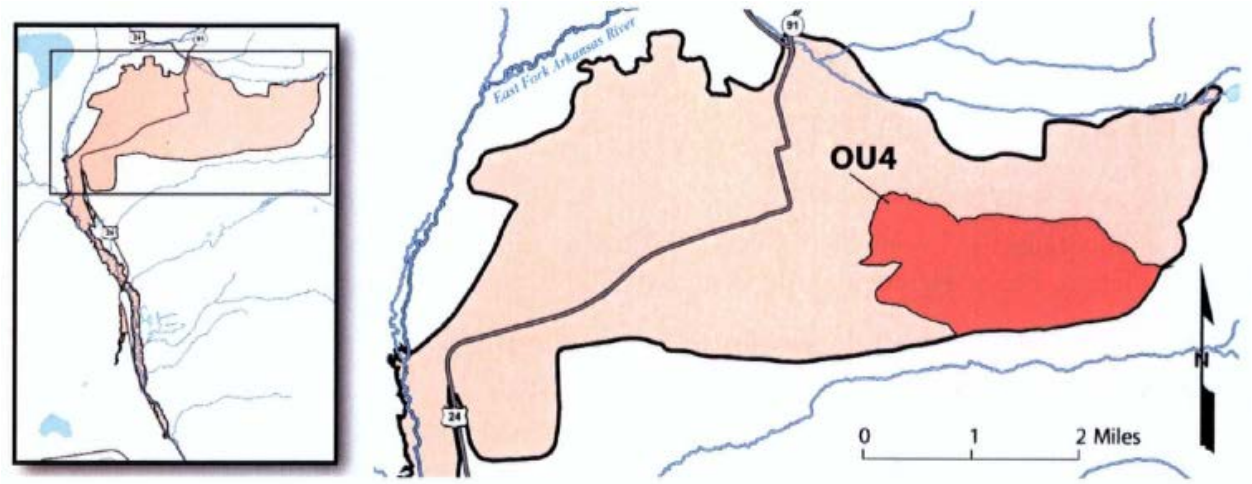
Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site, and is not intended for any other purpose.

Figure D-5: OU3 Location Map



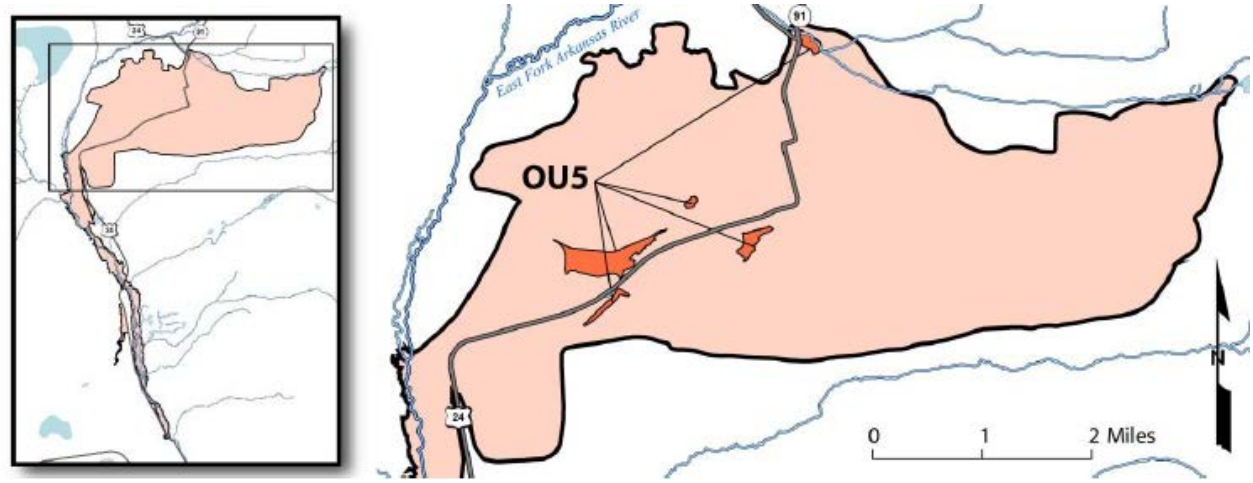
Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site, and is not intended for any other purpose.

Figure D-6: OU4 Location 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 EPA's response actions at the Site, and is not intended for any other purpose.

Figure D-7: OU5 Location 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 EPA's response actions at the Site, and is not intended for any other purpose.

Figure D-8: Detailed Map of OU5 AV Smelter/CZL Mill Sites

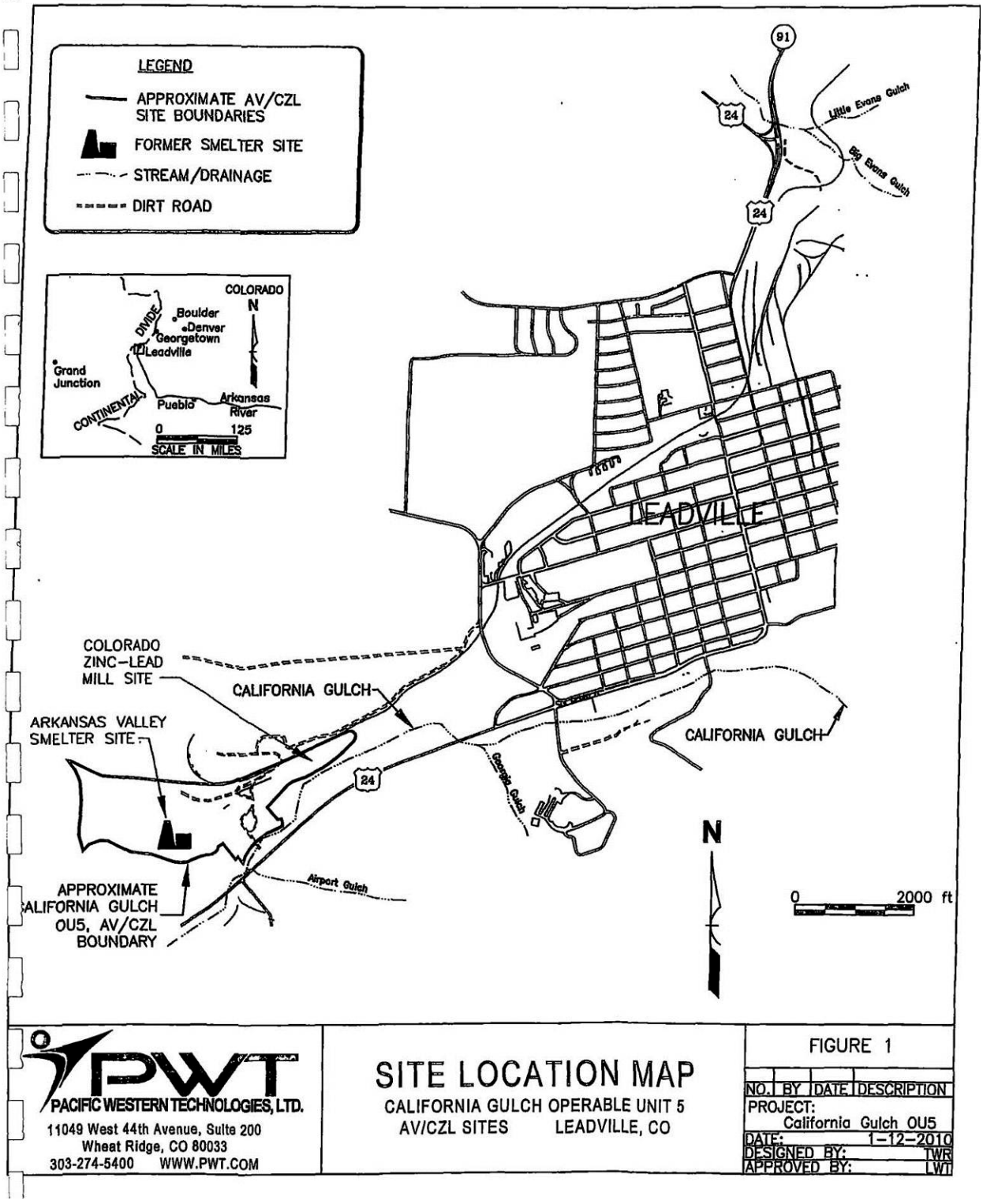


Figure D-9: Detailed Map of OU5 EGWA Sites

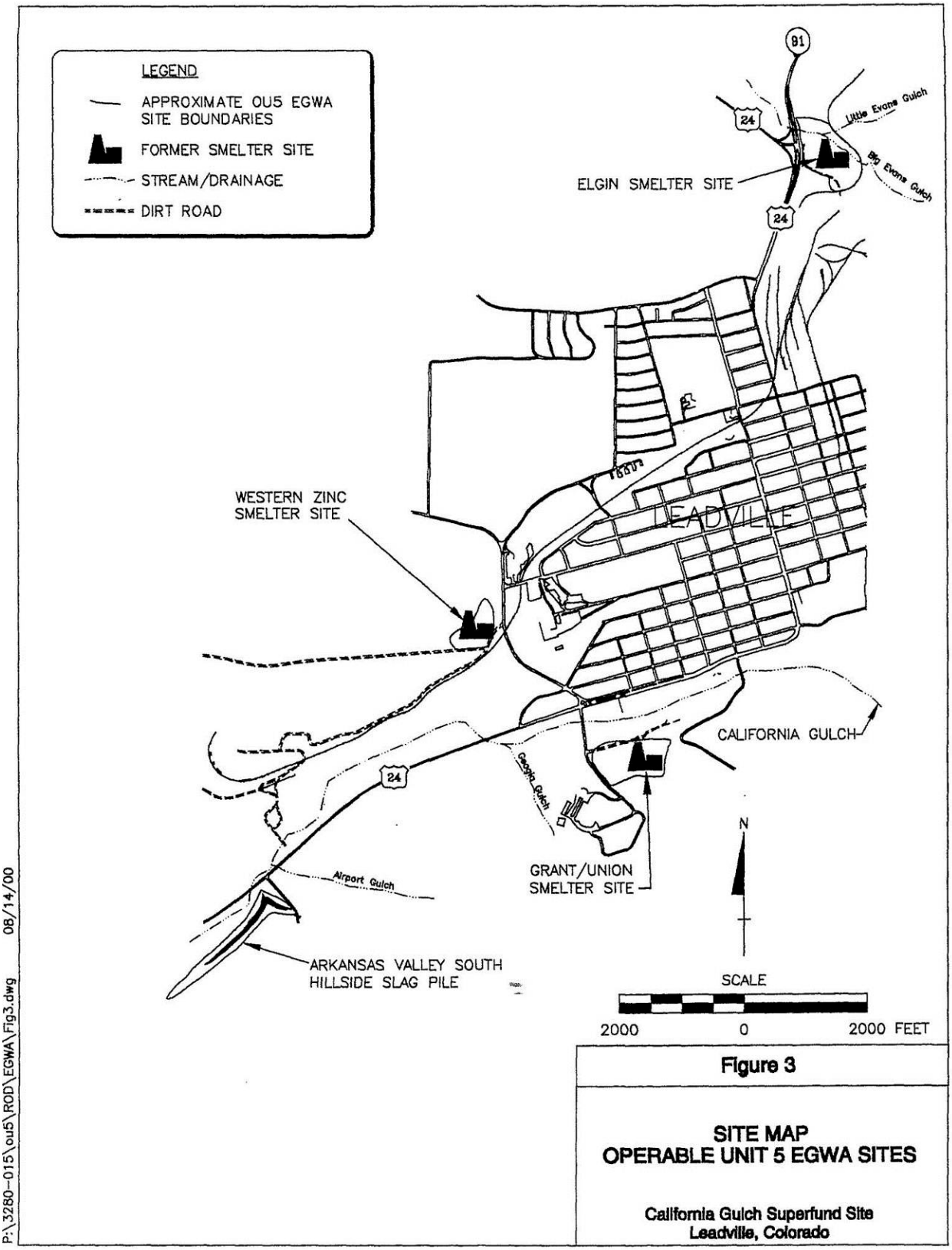
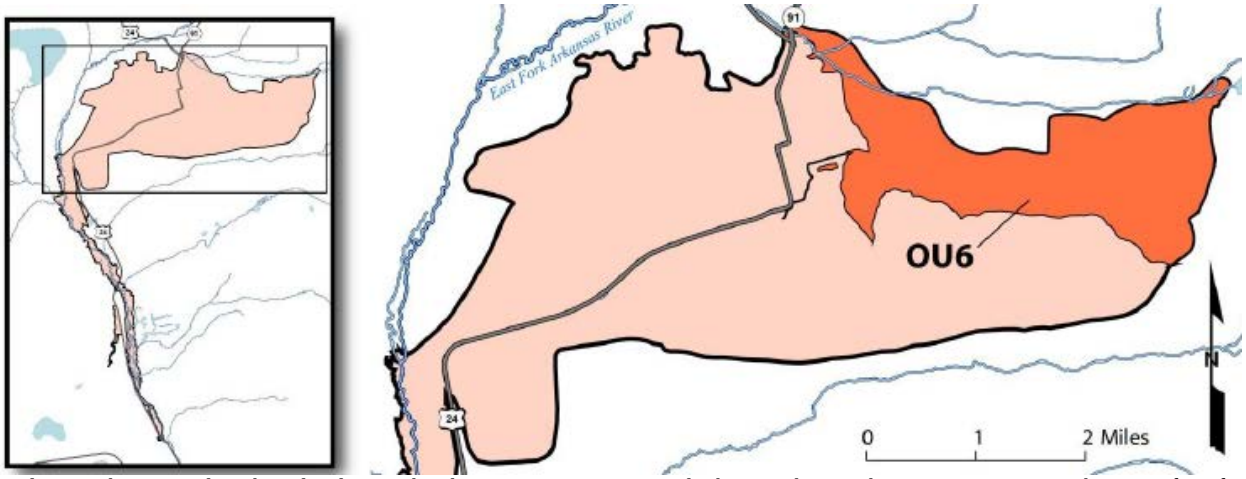


Figure D-10: OU6 Location Map



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 EPA's response actions at the Site, and is not intended for any other purpose.

Figure D-11: Overview Map of OU6

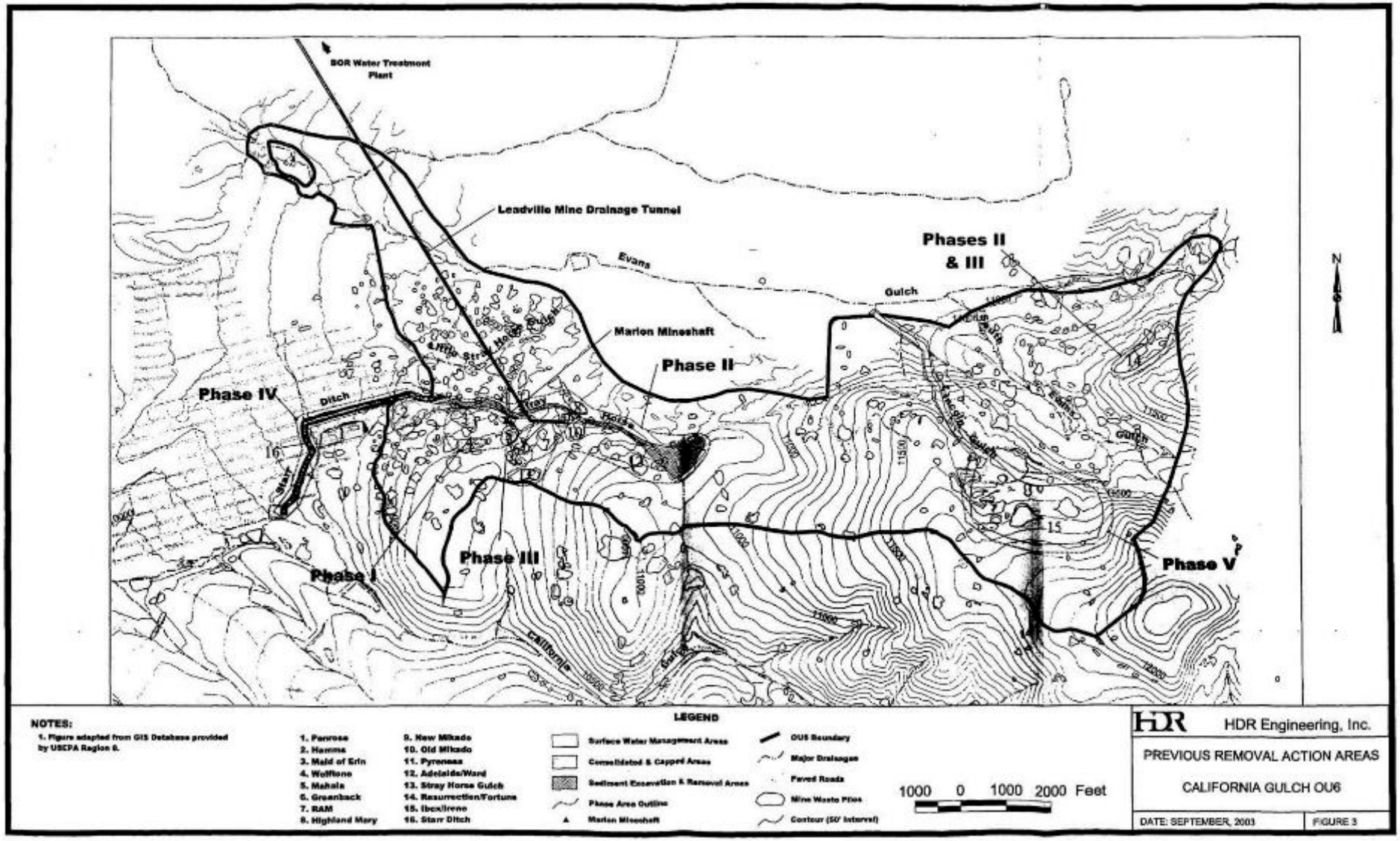


Figure D-12: Detailed Map of Stray Horse Gulch in OU6

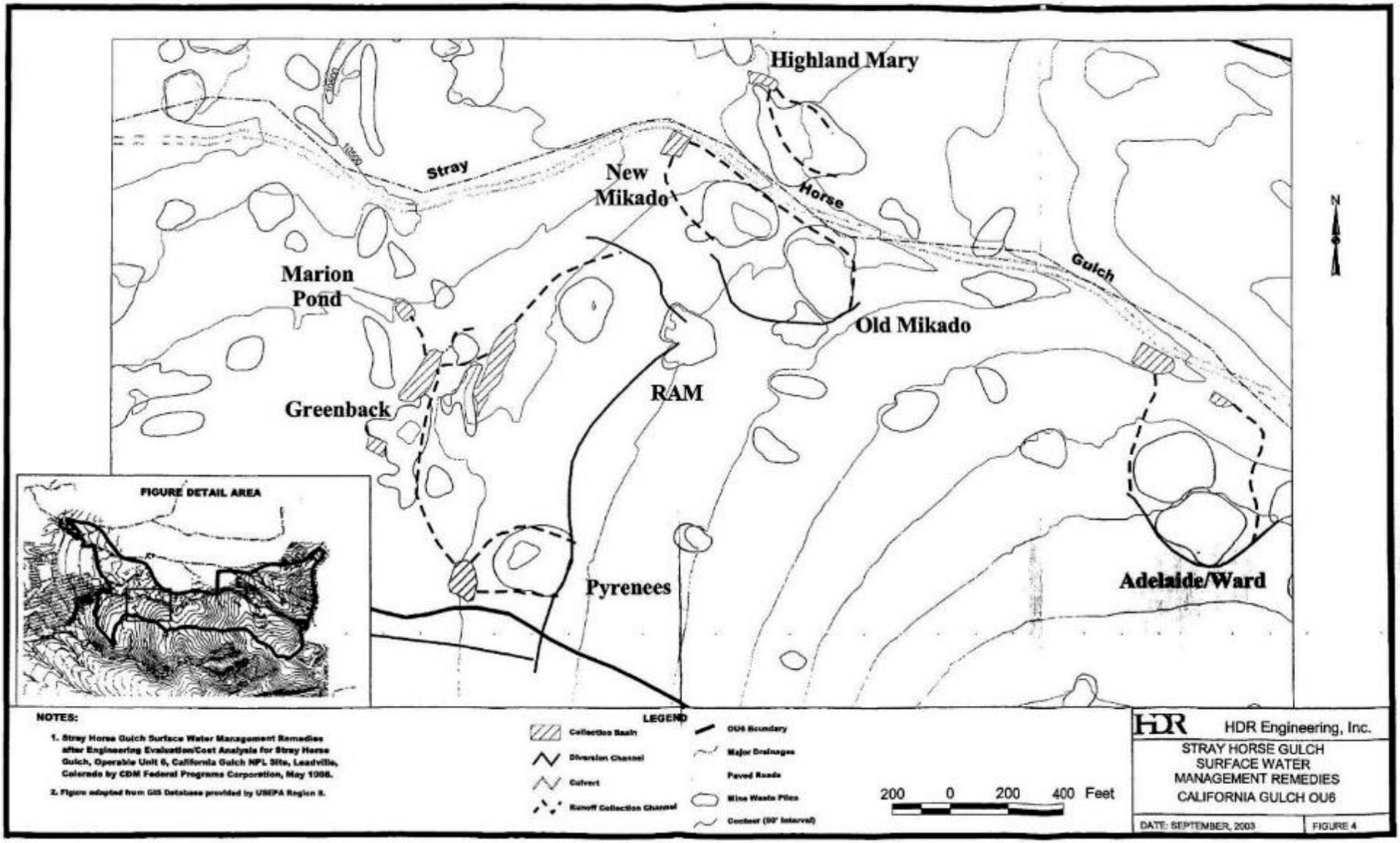
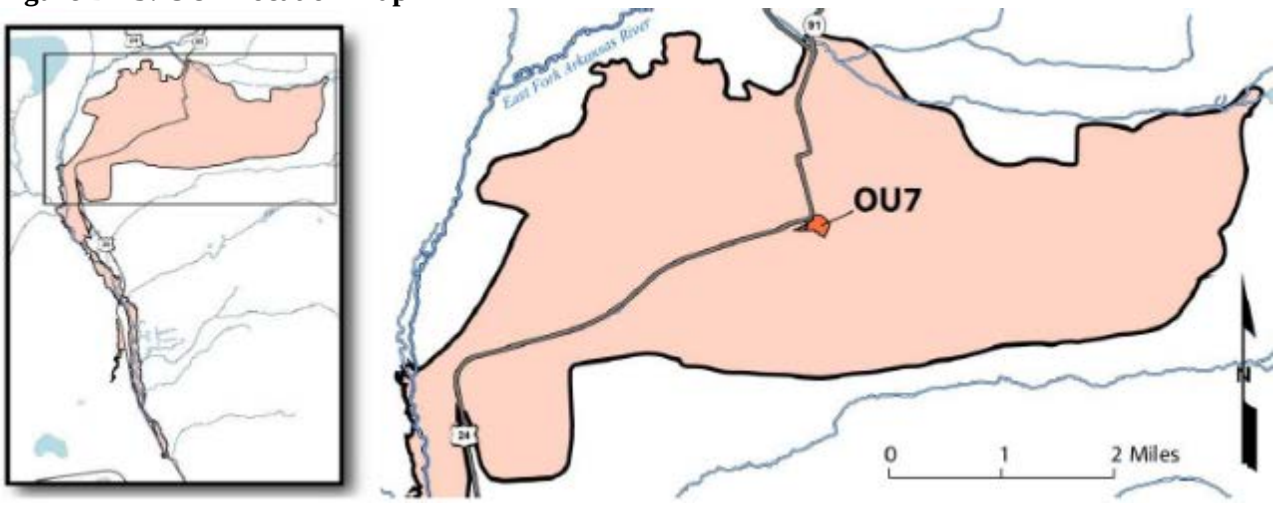


Figure D-13: OU7 Location Map



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 EPA's response actions at the Site, and is not intended for any other purpose.

Figure D-14: OU8 Location 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 EPA's response actions at the Site, and is not intended for any other purpose.

Figure D-15: Overview Map of OU8

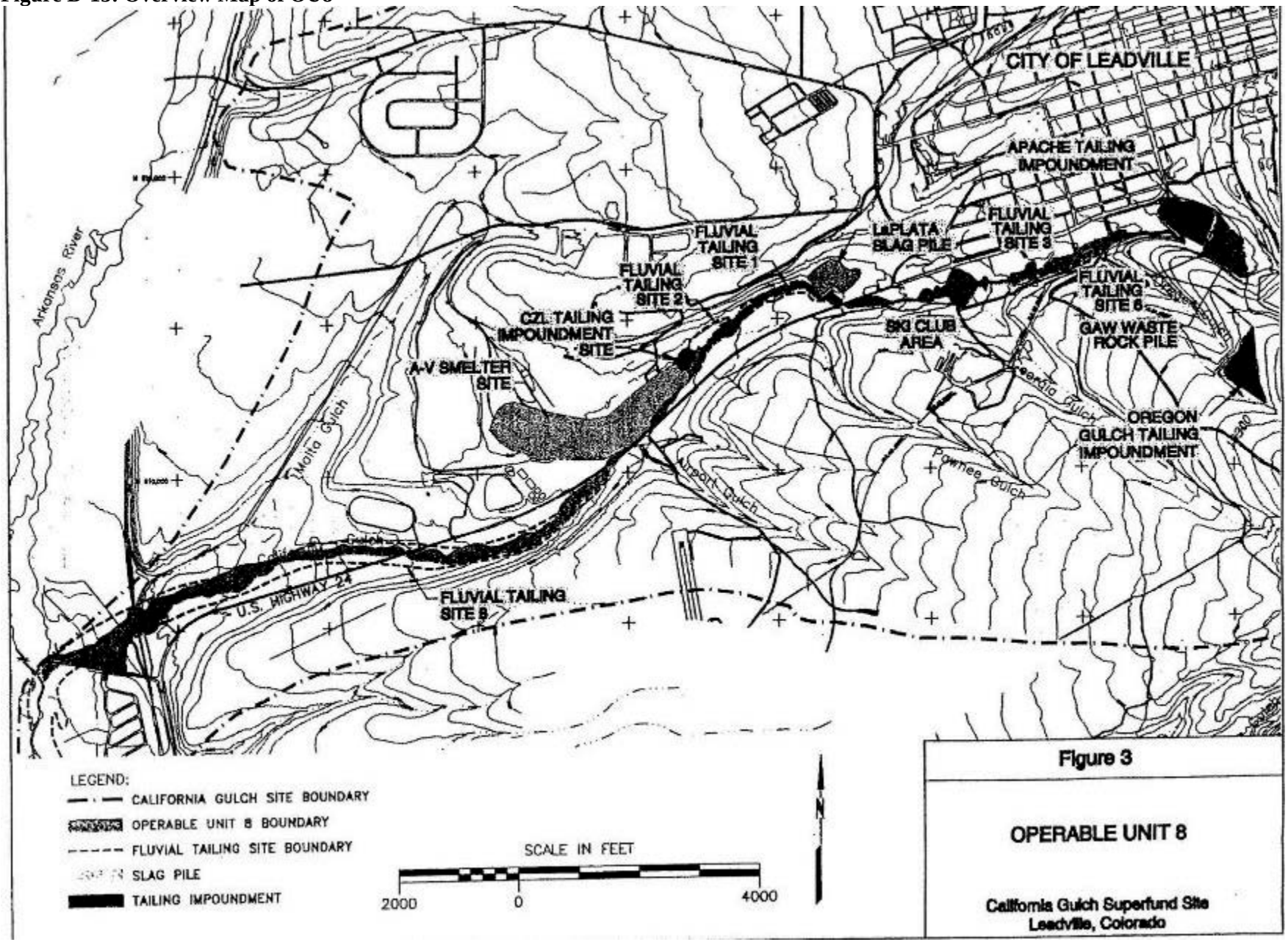


Figure D-16: Detailed Map of Fluvial Tailing Sites 1 and 2 and the CZL Tailing Impoundment on OU8

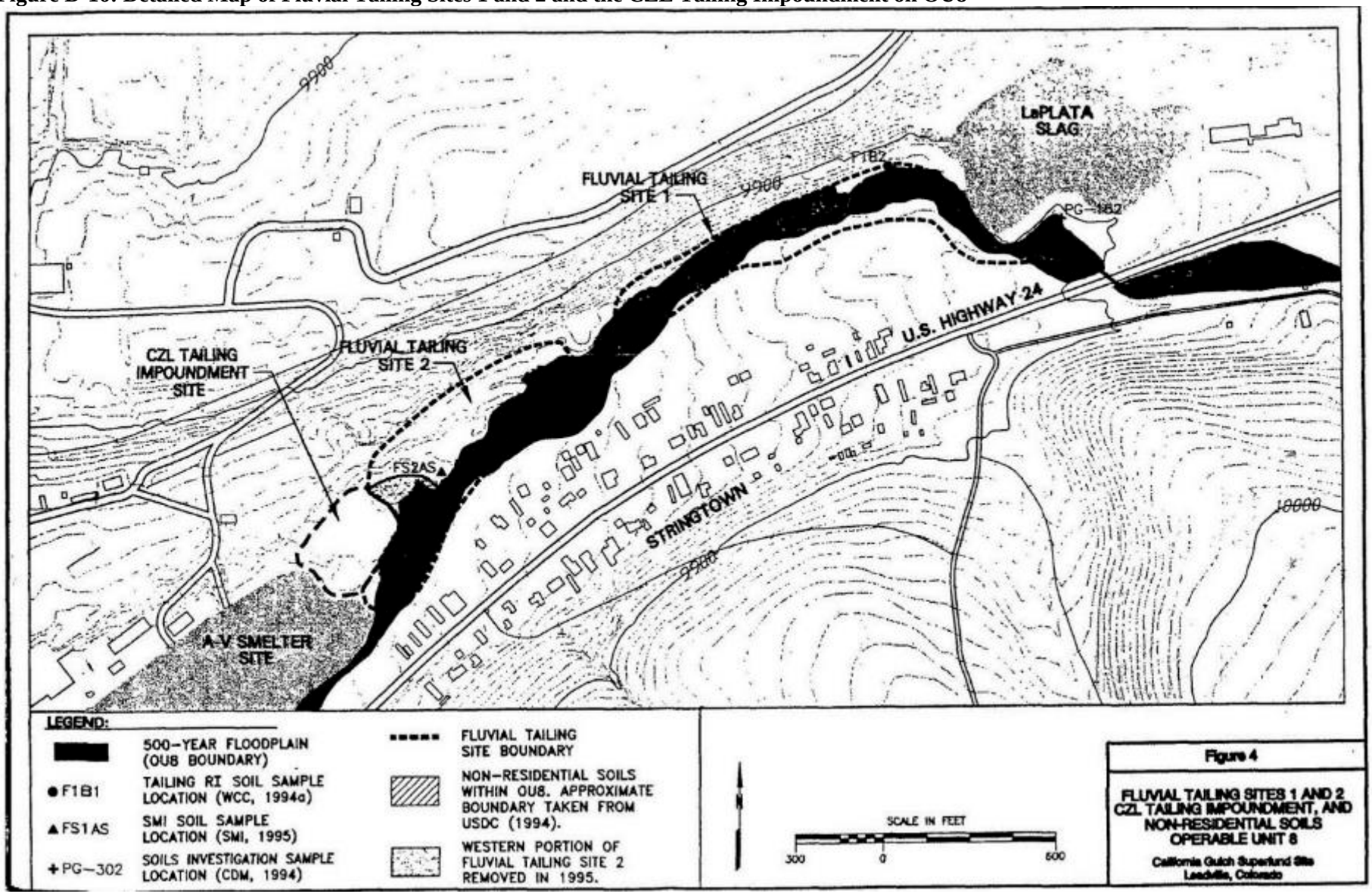


Figure D-17: Detailed Map if Fluvial Tailing Site 3 on OU8

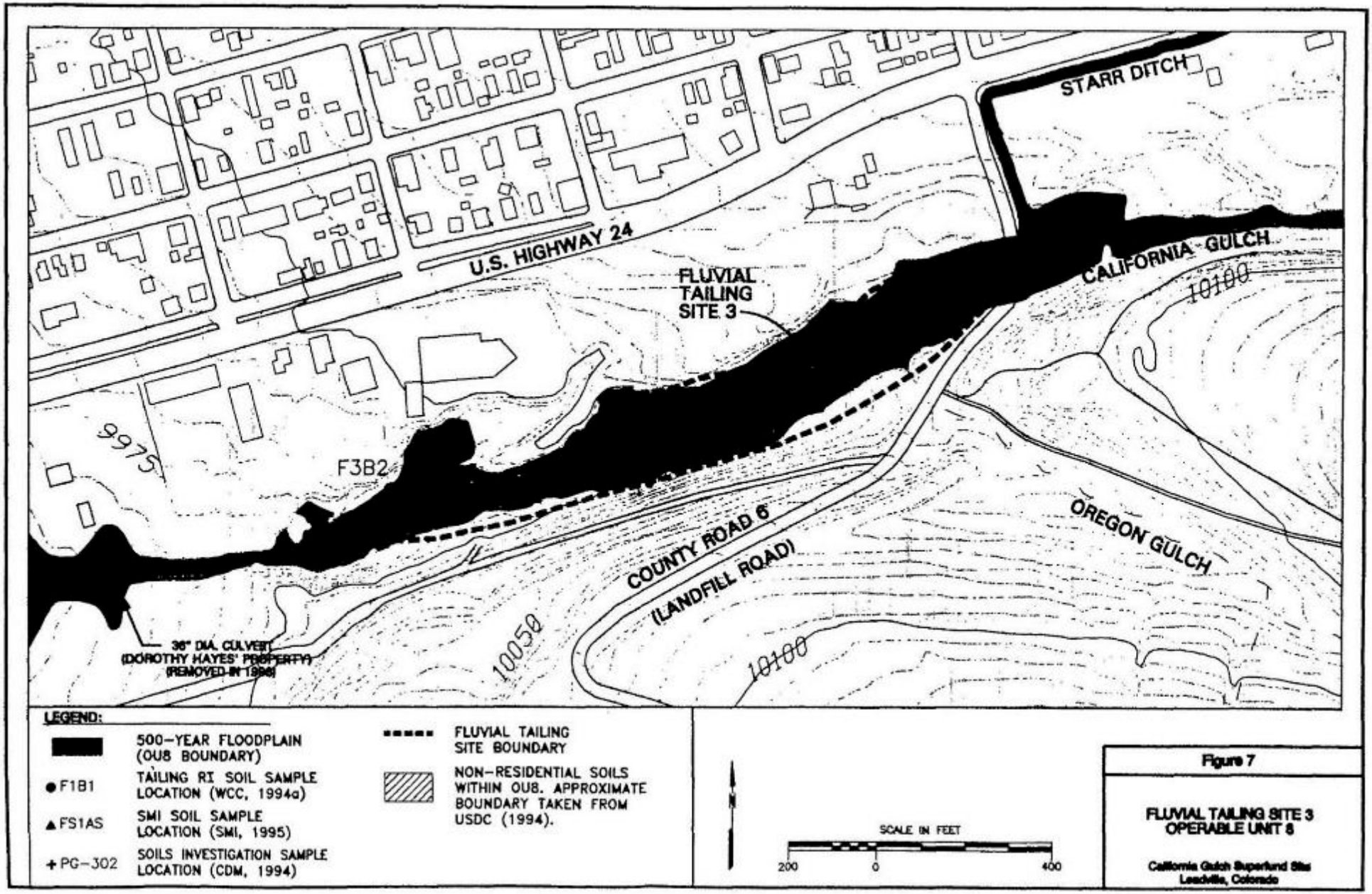


Figure D-18: Detailed Map of Fluvial Tailing Site 8 and Non-Residential Soils on OU8

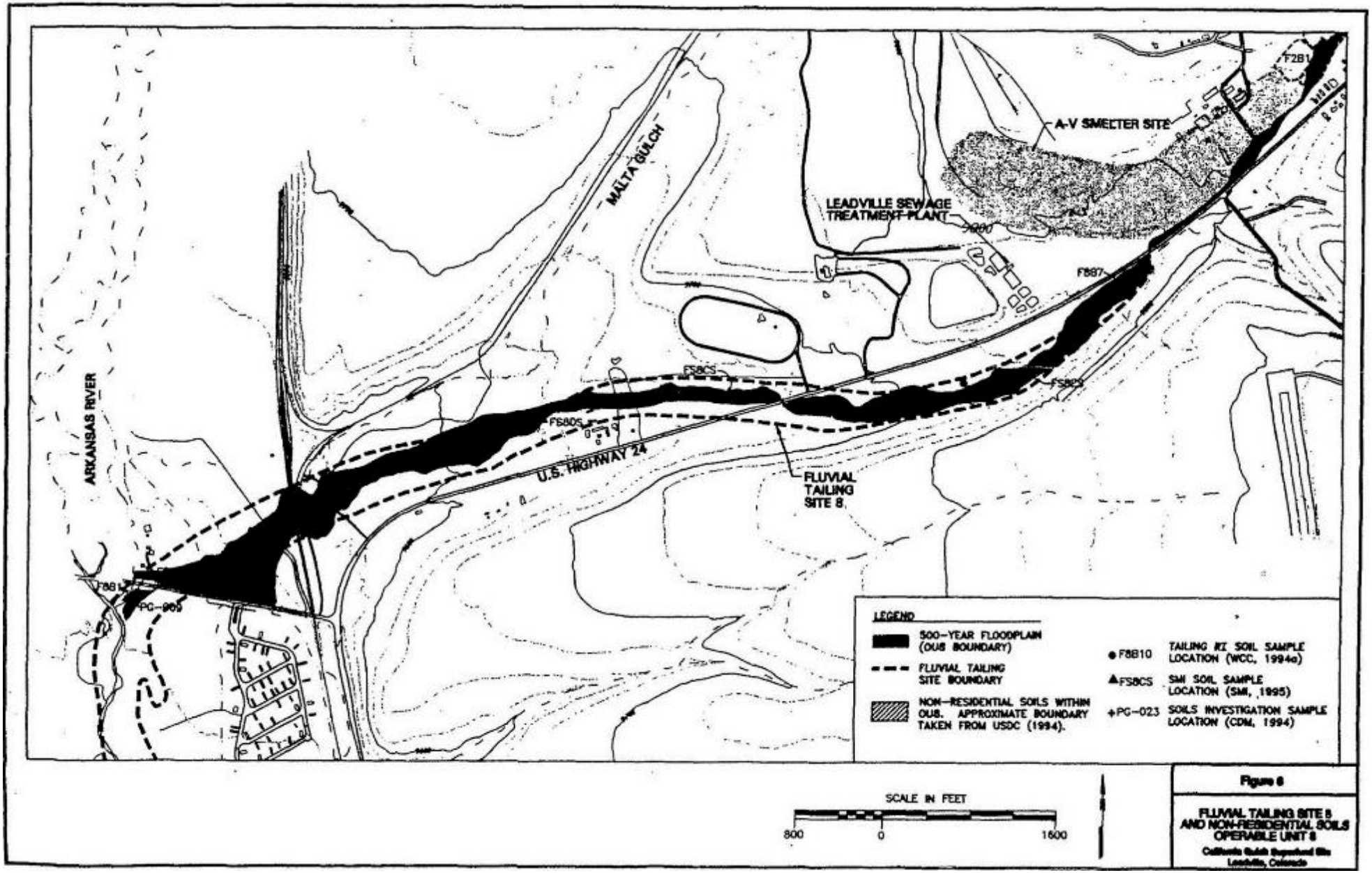


Figure D-19: Detailed Map of Fluvial Tailing Site 6, the Gaw Waste Rock Pile and Non-Residential Soils on OU8

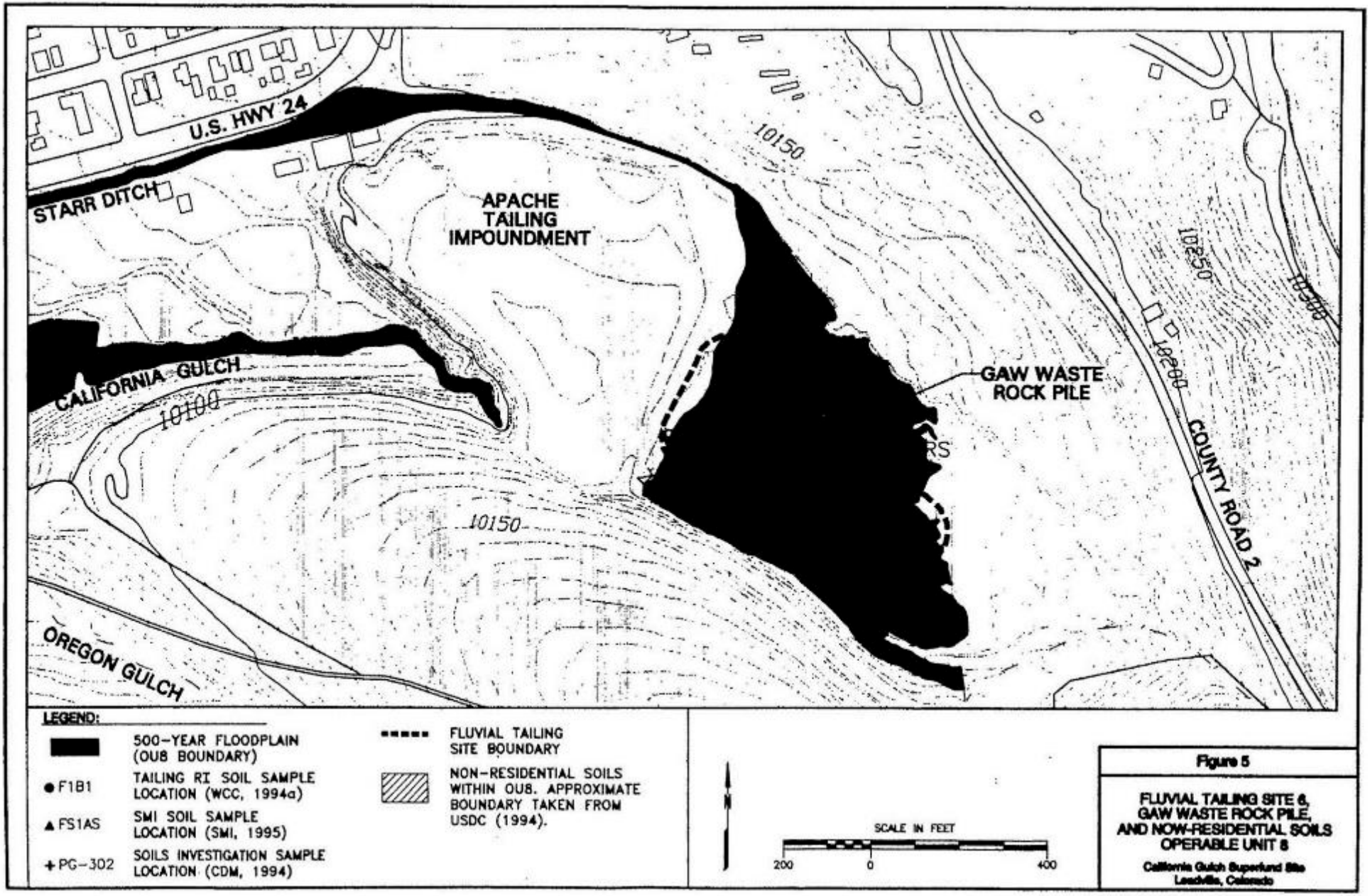
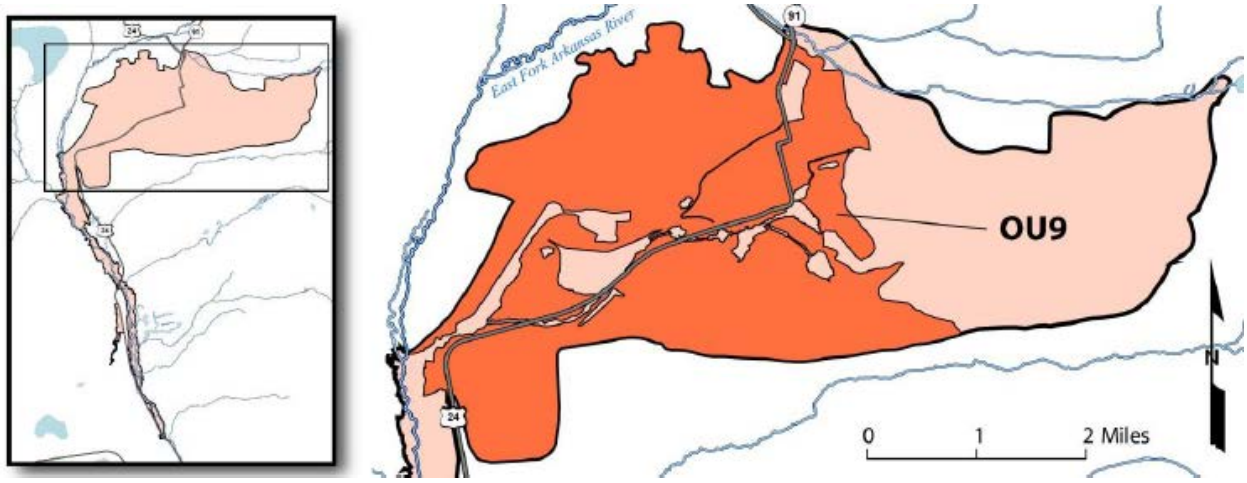
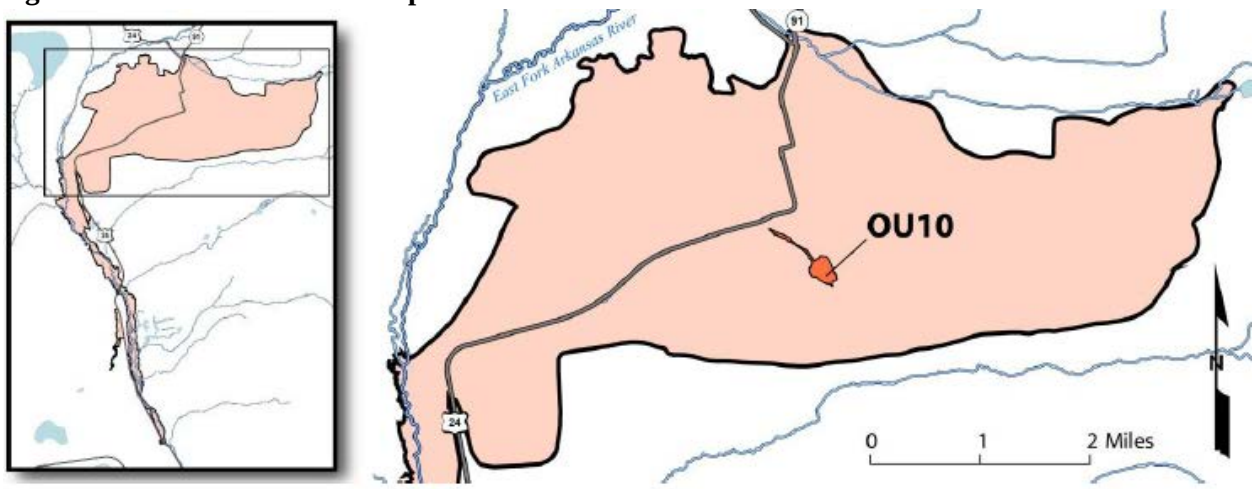


Figure D-20: OU9 Location Map



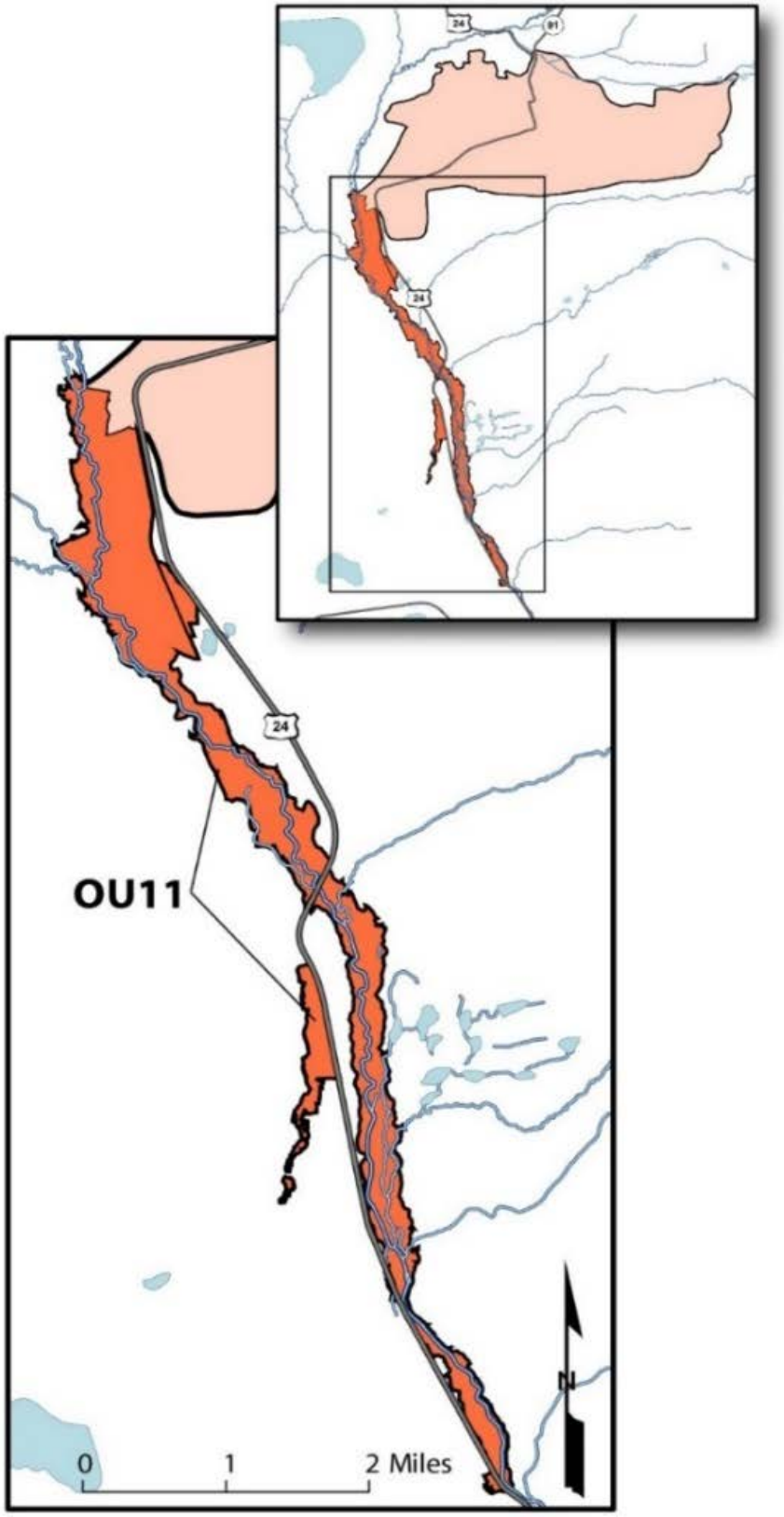
Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site, and is not intended for any other purpose.

Figure D-21: OU10 Location 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 EPA's response actions at the Site, and is not intended for any other purpose.

Figure D-22: OU11 Location 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 EPA's response actions at the Site, and is not intended for any other purpose.

APPENDIX E – PRESS NOTICE

United States Environmental Protection Agency

COLORADO
Hazardous Materials & Waste Management Division
Department of Public Health & Environment

EPA Five-Year Review Planned for the California Gulch Superfund Site

The U.S. Environmental Protection Agency (EPA) is conducting the 5th five-year review of the remedial actions performed under the Superfund program for the California Gulch Superfund Site. The purpose of a five-year review is to evaluate the implementation and performance of a remedy in order to determine if it is or will be protective of human health and the environment. The five-year-review is to be completed by the fall of 2017.

The site comprises about 16.5 square miles in Lake County, Colorado in the upper Arkansas River watershed and includes the towns of Leadville and Stringtown, various parts of the Leadville Historic Mining District and a section of the Arkansas River from the confluence of the California Gulch downstream to the confluence of Two Bit Gulch approximately 11 miles downstream. It is divided into 12 geographical areas known as Operable Units. The Five-Year Review will look at 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 prevent acid mine runoff, and cleanup at residential properties. Construction at most of the 12 operable units has been completed and nine operable units have been deleted.

EPA invites community participation in the five-year review process: As part of the five-year review process, EPA staff are available to answer any questions about the site. Community members are encouraged to contact EPA staff with any information that may help EPA make its determination regarding the protectiveness and effectiveness of the remedies at the site.

Additional site information is available at
Lake County Public Library
1115 Harrison Ave., Leadville, CO 80461
719-486-0569

Or visit the EPA website at:
www.epa.gov/region8/superfund/co/calgulch

Questions? Contact:

Chris Wardell
Community Involvement Coordinator
Environmental Protection Agency
303-312-6062
Email: wardell.christopher@epa.gov

Warren Smith
Community Involvement Manager
Colorado Department of Public Health and Environment
303-692-3373
Email: warren.smith@state.co.us

APPENDIX F – SITE INSPECTION CHECKLIST

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION

Site Name: California Gulch	**Date of Inspection:** 9/13-14/2016
Location and Region: Leadville, Colorado 8	**EPA ID: COD980717938**
Agency, Office or Company Leading the Five-Year Review: EPA	**Weather/Temperature:** 40F, partly cloudy

Remedy Includes: (Check all that apply)

- ☒ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☒ Surface water collection and treatment
- ☐ Other: _____
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☒ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (check all that apply)

1. **O&M Site Manager** _____ (Name) _____ (Title) _____ (Date)
   Interviewed ☐ at site ☐ at office ☐ by phone Phone: _____
   Problems, suggestions ☐ Report attached: _____

2. **O&M Staff** _____ (Name) _____ (Title) _____ (Date)
   Interviewed ☐ at Site ☐ at office ☐ by phone Phone: _____
   Problems/suggestions ☐ Report attached: _____

3. **Local Regulatory Authorities and Response Agencies** (i.e., state and tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices). Fill in all that apply.

   Agency EPA
   Contact Linda Kiefer (Name) RPM (Title) _____ (Date) _____ (Phone No.)
   Problems/suggestions ☐ Report attached: _____

   Agency Colorado Department of Public Health and the Environment (CDPHE)
   Contact Alissa Schultz (Name) _____ (Title) _____ (Date) _____ (Phone No.)
   Problems/suggestions ☐ Report attached: _____

   Agency _____
   Contact _____ (Name) _____ (Title) _____ (Date) _____ (Phone No.)
   Problems/suggestions ☐ Report attached: _____

   Agency _____
   Contact _____ (Name) _____ (Title) _____ (Date) _____ (Phone No.)
   Problems/suggestions ☐ Report attached: _____

   Agency _____

	Contact Name	Title	Date	Phone No.	
	Problems/suggestions ☐ Report attached:				
4.	**Other Interviews** (optional) ☐ Report attached:				
	III. ON-SITE DOCUMENTS AND RECORDS VERIFIED (check all that apply)				
1.	**O&M Documents**				
	☒ O&M manual	☒ Readily available	☒ Up to date	☐ N/A	
	☒ As-built drawings	☒ Readily available	☒ Up to date	☐ N/A	
	☒ Maintenance logs	☒ Readily available	☒ Up to date	☐ N/A	
	Remarks: The Yak Tunnel WTP (OU1) has copies of all O&M documents.				
2.	**Site-Specific Health and Safety Plan**	☒ Readily available	☒ Up to date	☐ N/A	
	☒ Contingency plan/emergency response plan	☒ Readily available	☒ Up to date	☐ N/A	
	Remarks:				
3.	**O&M and OSHA Training Records**	☒ Readily available	☒ Up to date	☐ N/A	
	Remarks:				
4.	**Permits and Service Agreements**				
	☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A	
	☒ Effluent discharge	☒ Readily available	☒ Up to date	☐ N/A	
	☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A	
	☐ Other permits:	☐ Readily available	☐ Up to date	☒ N/A	
	Remarks: OU1 operates according to the 2008 Consent Decree requirements.				
5.	**Gas Generation Records**	☐ Readily available	☐ Up to date	☒ N/A	
	Remarks:				
6.	**Settlement Monument Records**	☒ Readily available	☒ Up to date	☐ N/A	
	Remarks: Waste piles (e.g., consolidated soil, sediment, tailing and waste rock) are monitored for settlement and erosion according to the O&M plans.				
7.	**Groundwater Monitoring Records**	☒ Readily available	☒ Up to date	☐ N/A	
	Remarks: Site-wide groundwater monitoring results are included in the OU12 Annual Report.				
8.	**Leachate Extraction Records**	☐ Readily available	☐ Up to date	☒ N/A	
	Remarks:				
9.	**Discharge Compliance Records**				
	☐ Air	☐ Readily available	☐ Up to date	☒ N/A	
	☒ Water (effluent)	☒ Readily available	☒ Up to date	☐ N/A	
	Remarks: OU1 discharge is monitored to measure compliance with limits set in the 2008 Consent Decree.				
10.	**Daily Access/Security Logs**	☒ Readily available	☒ Up to date	☐ N/A	

Remarks: 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).

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for state

☐ PRP in-house ☒ Contractor for PRP (OU1, 4, 8 and 10)

☐ Federal facility in-house ☐ Contractor for Federal facility

☒ Contractor for EPA (OU2, 3, 5, 6, 7, 9, 11 and 12)

2. **O&M Cost Records**

☐ Readily available ☐ Up to date

☒ Funding mechanism/agreement in place ☒ Unavailable

Original O&M cost estimate: _____ ☐ Breakdown attached

3. **Unanticipated or Unusually High O&M Costs during Review Period**

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing Damaged** ☐ Location shown on site map ☐ Gates secured ☐ N/A

Remarks: Fencing is present at the Yak Tunnel WTP on OU1 and around a few other 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 in good condition and access gates are secured when authorized persons are not present. 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 acid rock drainage 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 ICs 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

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: ICs have been fully implemented for 10 of the 12 OUs. OU6 may require additional ICs once remediation is complete. EPA is currently working with CDPHE and private landowners to implement ICs for OU11.

D. General

1. **Vandalism/Trespassing** ☐ Location shown on site map ☒ No vandalism evident

Remarks: Trespassing has been reported to occur within 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: A building is in the process of being constructed over a portion of the California Gulch in the vicinty of Fluvial Tailing Site 3 in the Stringtown Area. It appears that some of this area has been filled in to allow for old vehicles to be stored. The current data show that these activities have not affected surface water at the compliance point.

3. **Land Use Changes Off Site** ☒ N/A

Remarks: _____

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads Damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A

Remarks: Runoff from diversion ditches in the Upper Stray Horse area has eroded some of the roads. Thus, the diversion ditches are in the process of being realigned. In addition, a mine shaft has opened in the vicinity of the realignment work, prompting EPA to followup with DRMS to address this such that nearby realignment activities are not being impact by the mine shaft opening.

B. Other Site Conditions

Remarks: _____

VII. LANDFILL COVERS ☒ Applicable ☐ N/A

A. Landfill Surface

1. **Settlement** (low spots) ☐ Location shown on site map ☒ Settlement not evident

Area extent: _____ Depth: _____

Remarks: The covers refer to the rock or vegetated soil covers on the mining waste piles, former tailing impoundments, fluvial tailing sites along the California Gulch and tailing along the Arkansas River.

2. **Cracks** ☐ Location shown on site map ☒ Cracking not evident

Lengths: _____ Widths: _____ Depths: _____

Remarks: _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Area extent: _____ Depth: _____

Remarks: CPW has reported some erosion in the Arkansas River during high water levels but nothing significant other than replacing some riprap at meander areas.

4. **Holes** ☐ Location shown on site map ☒ Holes not evident

Area extent: _____ Depth: _____

Remarks: _____

5. **Vegetative Cover** ☐ Grass ☒ Cover properly established

☐ No signs of stress ☐ Trees/shrubs (indicate size and locations on a diagram)

Remarks: 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&M contractor is addressing these areas during the growing season.

6. **Alternative Cover** (e.g., armored rock, concrete) ☐ N/A

Remarks: A variety of covers are being used on the waste piles and include armored rock, gravel and concrete.

7. **Bulges** ☐ Location shown on site map ☒ Bulges not evident

Area extent: _____ Height: _____

Remarks: _____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident

☒ Wet areas	☐ Location shown on site map	Area extent: _____
☐ Ponding	☐ Location shown on site map	Area extent: _____
☐ Seeps	☐ Location shown on site map	Area extent: _____
☐ Soft subgrade	☐ Location shown on site map	Area extent: _____

Remarks: Due to overflow from Greenback Pond in OU6, EPA installed a conveyance system to reroute the overflow to the Robert Emmet area, which then subsequently is direct to the Leadville Mine Drainage Tunnel (LMDT) for treatment.

9. **Slope Instability** ☐ Slides ☐ Location shown on site map

☒ No evidence of slope instability

Area extent: _____

Remarks: _____

B. Benches ☒ Applicable ☐ 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. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay

Remarks: 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.

2. **Bench Breached** ☐ Location shown on site map ☒ N/A or okay

Remarks: _____

3. **Bench Overtopped** ☐ Location shown on site map ☒ N/A or okay

Remarks: _____

C. Letdown Channels ☒ Applicable ☐ 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. **Settlement** (Low spots) ☐ Location shown on site map ☒ No evidence of settlement

Area extent: _____ Depth: _____

Remarks: _____

2. **Material Degradation** ☐ Location shown on site map ☒ No evidence of degradation

Material type:_____ Area extent: _____

Remarks: _____

3. **Erosion** ☐ Location shown on site map ☒ No evidence of erosion

Area extent: _____ Depth: _____

Remarks: _____

4. **Undercutting** ☐ Location shown on site map ☒ No evidence of undercutting

Area extent: _____ Depth: _____

Remarks: _____

5. **Obstructions** Type: _____ ☒ No obstructions

☐ Location shown on site map Area extent: _____

Size: _____

Remarks: _____

6. **Excessive Vegetative Growth** Type: _____

☒ No evidence of excessive growth

☐ Vegetation in channels does not obstruct flow

☐ Location shown on site map Area extent: _____

Remarks: _____

D. Cover Penetrations ☒ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☐ Passive

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs maintenance ☒ N/A

Remarks: _____

2. **Gas Monitoring Probes**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs maintenance ☒ N/A

Remarks: _____

3. **Monitoring Wells** (within surface area of landfill)

☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition

☐ Evidence of leakage at penetration ☐ Needs maintenance ☐ N/A

Remarks: Wells were identified within and adjacent to covered waste piles and tailing impoundments.

4. **Extraction Wells Leachate**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs maintenance ☒ N/A

Remarks: _____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☒ N/A

Remarks: _____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**

☐ Flaring ☐ Thermal destruction ☐ Collection for reuse

☐ Good condition ☐ Needs maintenance

Remarks: _____

2. **Gas Collection Wells, Manifolds and Piping**

☐ Good condition ☐ Needs maintenance

Remarks: _____

3. **Gas Monitoring Facilities** (e.g., gas monitoring of adjacent homes or buildings)

☐ Good condition ☐ Needs maintenance ☐ N/A

Remarks: _____

F. Cover Drainage Layer ☒ Applicable ☐ N/A

1. **Outlet Pipes Inspected** ☒ Functioning ☐ N/A

Remarks: Piping was observed at the recent time-critical removal action conducted at the Greenback pond area.

2. **Outlet Rock Inspected** ☒ Functioning ☐ N/A

Remarks: Many of the diversion ditches are lined and reinforced with riprap or gravel and some were concrete lined.

G. Detention/Sedimentation Ponds ☒ Applicable ☐ N/A

1. **Siltation** Area extent: _____ Depth: _____ ☐ N/A

☒ Siltation not evident

Remarks: Remedation or removal actions have occurred historically to remove excess sediment from waste ponds.

2. **Erosion** Area extent: _____ Depth: _____

☒ Erosion not evident

Remarks: _____

3. **Outlet Works** ☒ Functioning ☐ N/A

Remarks: _____

4. **Dam** ☐ Functioning ☒ N/A

Remarks: _____

H. Retaining Walls ☒ Applicable ☐ N/A

1. **Deformations** ☐ Location shown on site map ☒ Deformation not evident

Horizontal displacement: _____ Vertical displacement: _____

Rotational displacement: _____

Remarks: 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.

2. **Degradation** ☐ Location shown on site map ☒ Degradation not evident

Remarks: _____

I. Perimeter Ditches/Off-Site Discharge ☒ Applicable ☐ N/A

1. **Siltation** ☐ Location shown on site map ☒ Siltation not evident

Area extent: _____ Depth: _____

Remarks: 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.

2. **Vegetative Growth** ☐ Location shown on site map ☒ N/A

☐ Vegetation does not impede flow

Area extent: _____ Type: _____

Remarks: _____

3. **Erosion** ☐ Location shown on site map ☒ Erosion not evident

Area extent: _____ Depth: _____

Remarks: _____

4. **Discharge Structure** ☒ Functioning ☐ N/A

Remarks: The May 2015 time-critical removal action in the Greenback Pond area has included a gravity-fed pipe to discharge overflow to Robert Emmet area.

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident

Area extent: _____ Depth: _____

Remarks: _____

2. **Performance Monitoring** Type of monitoring: _____

☐ Performance not monitored

Frequency: _____ ☐ Evidence of breaching

Head differential: _____

Remarks: _____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Groundwater Extraction Wells, Pumps and Pipelines ☐ Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing and Electrical**

☐ Good condition ☐ All required wells properly operating ☐ Needs maintenance ☐ N/A

Remarks: _____

2. **Extraction System Pipelines, Valves, Valve Boxes and Other Appurtenances**

☐ Good condition ☐ Needs maintenance

Remarks: _____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks: _____

B. Surface Water Collection Structures, Pumps and Pipelines ☒ Applicable ☐ N/A

1. **Collection Structures, Pumps and Electrical**

☒ Good condition ☐ Needs maintenance

Remarks: _____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes and Other Appurtenances**

☒ Good condition ☐ Needs maintenance

Remarks: _____

3. **Spare Parts and Equipment**

☒ Readily available ☒ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks: _____

C. Treatment System ☒ Applicable ☐ N/A

1. **Treatment Train** (check components that apply)

☒ Metals removal ☐ Oil/water separation ☐ Bioremediation

☐ Air stripping ☐ Carbon absorbers

☒ Filters: O&M contractor plans to replace media filters in January 2017.

☒ Additive (e.g., chelation agent, flocculent): Addition of lime to increase pH and use of polymer to allow metals to fall out.

☐ Others: _____

☒ Good condition ☐ Needs maintenance

☒ Sampling ports properly marked and functional

☒ Sampling/maintenance log displayed and up to date

☒ Equipment properly identified

☐ Quantity of groundwater treated annually: _____

☒ Quantity of surface water treated annually: 200 million

Remarks: _____

2. **Electrical Enclosures and Panels** (properly rated and functional)

☐ N/A ☒ Good condition ☐ Needs maintenance

Remarks: Panels were present at OU1 and OU10. Both are in good condition.

3. **Tanks, Vaults, Storage Vessels**

☐ N/A ☒ Good condition ☐ Proper secondary containment ☐ Needs maintenance

Remarks: _____

4. **Discharge Structure and Appurtenances**

☐ N/A ☒ Good condition ☐ Needs maintenance

Remarks: _____

5. **Treatment Building(s)**

☐ N/A ☒ Good condition (esp. roof and doorways) ☐ Needs repair

☒ Chemicals and equipment properly stored

Remarks: The building has been upgraded to LED lighting instead of incandescent lighting to save on energy use. The treatment plant is also undertaking a pilot study to evaluate elmination of acid in the treatment process by using greener technologies. Additional pipeline is also being installed to address contingencies if another pipeline requires repair.

6. **Monitoring Wells** (pump and treatment remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs maintenance ☒ N/A

Remarks: _____

D. Monitoring Data

1. **Monitoring Data**

☒ Is routinely submitted on time ☒ Is of acceptable quality

2. **Monitoring Data Suggests:**

☐ Groundwater plume is effectively contained ☒ Contaminant concentrations are declining

E. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs maintenance ☒ N/A

Remarks: _____

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 OUl 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. Several upgrades to the plant software and treatment process 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 Site-wide groundwater and surface water remedy under OU12. Source control efforts have largely included the excavation and consolidation of contaminated materials, including mine tailing, 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 acid rock drainage from further impacting surface water at the Site. Additional remediation is ongoing at OU6 where EPA is currently realigning some diversion ditches and constructing conveyance systems within OU6 to address increased volume of ARD during seasons of high water (high snow melt) and to address overflow from Greenback Pond. In addition, more consolidation and capping of waste is likely to minimize acid rock drainage generation. An evaluation of whether additional work is needed at other source areas will be made based on the results of the OUl2 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 is completed.
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. None.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. The OU1 remedy is currently being optimized to utilize greener technologies. OU6 remediation is ongoing to include improvements to diversion ditches and conveyance systems to address increased volumes of water during high water events (snow melts).

Site Inspection Participants

Linda Kiefer, EPA

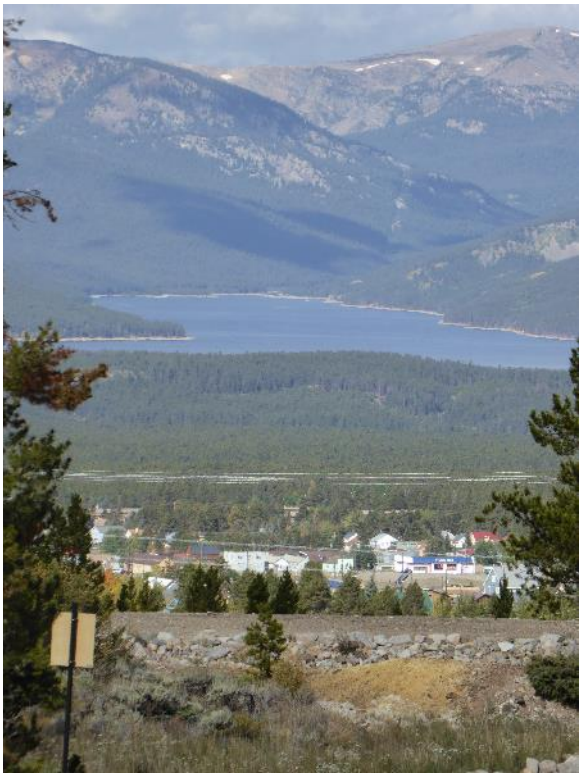
Treat Suomi, Skeo

Claire Marcussen, Skeo

Timothy Runnells, O&M contractor representing the PRP, Newmont Mining Company, parent company of the Newmont/Resurrection (participated in Site inspection for OUs 1,4,8 and 10)

APPENDIX G –SITE INSPECTION PHOTOS

OU9 – pond at residential soil repository, which drains to little Evans Gulch



City of Leadville, seen from OU9 residential soil repository

OU9 – new signage at residential soil repository

OU9 – road and fencing next to residential soil repository

OU6 – ditch

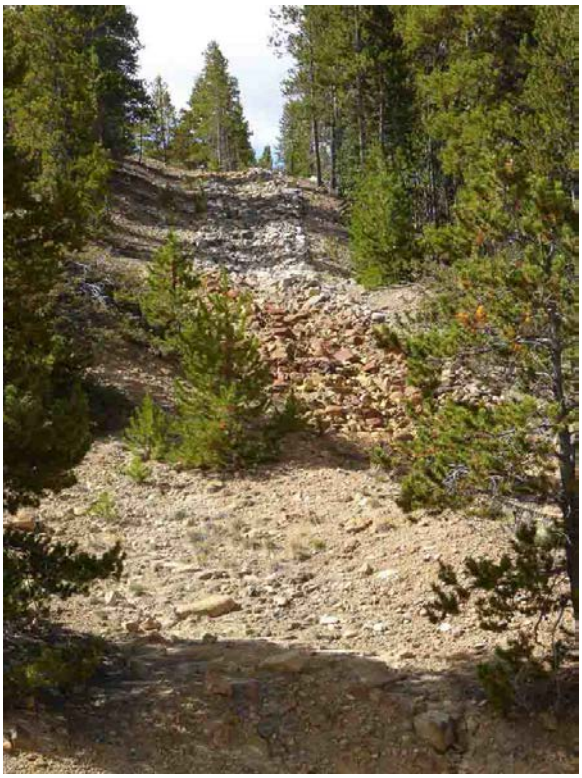
OU6 – private property sign at Evans Gulch Area

Retention pond at upper part of OU6 Evans Gulch Area (water line shows pond level is low even during spring runoff; pond capacity is much greater than the water line)

OU6 – Mikado waste rock piles

OU6 – Mikado Pond

OU6 – fence at Mikado Pond



OU6 – reinforced Mikado Pond drainage ditch

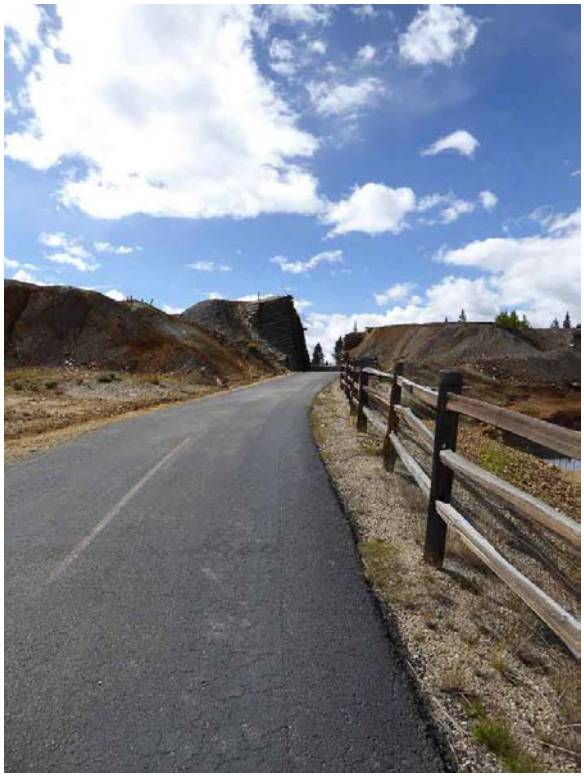
OU6 – signage at Mikado Pond

OU6 – Robert Emmet Mine, receiving drainage from Greenback Pond overflow

OU6 – Mahala Pile

OU6 – piping leading from Greenback Pond to Robert Emmet Mine

OU6 – Greenback Pond with fencing, next to Mineral Belt Trail



OU6 – Mineral Belt trail, next to Greenback Pond

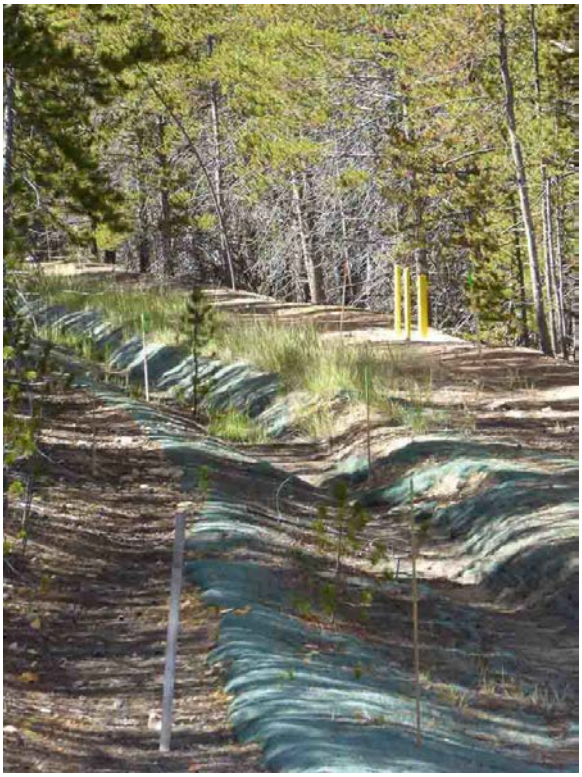
OU6 – Marion Pond with fencing

OU6 – View of Marion Pond from Greenback Pond

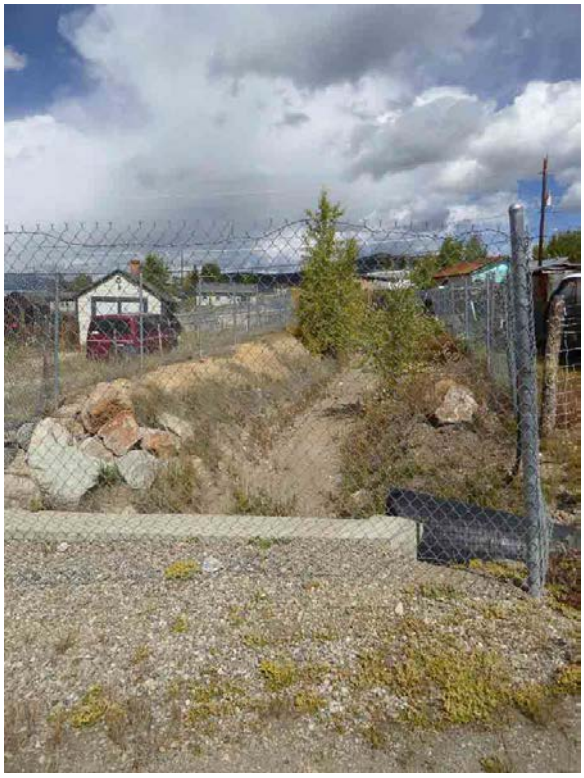
Mineral Belt Trail information resources, near OU6

OU6 – ditch at Upper Stray Horse Gulch

OU6 – locked monitoring well

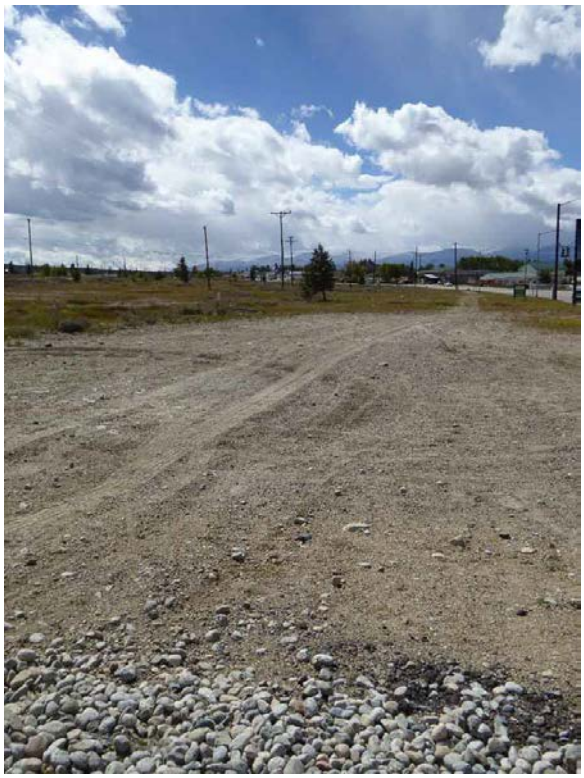


OU6 – ditch in Upper Stray Horse Gulch with new monitoring well



OU6 – Starr Ditch

OU3 – Poverty Flats/Old Railroad Property



OU3 – Poverty Flats/Old Railroad Property

OU5 – sports complex on former zinc smelter area

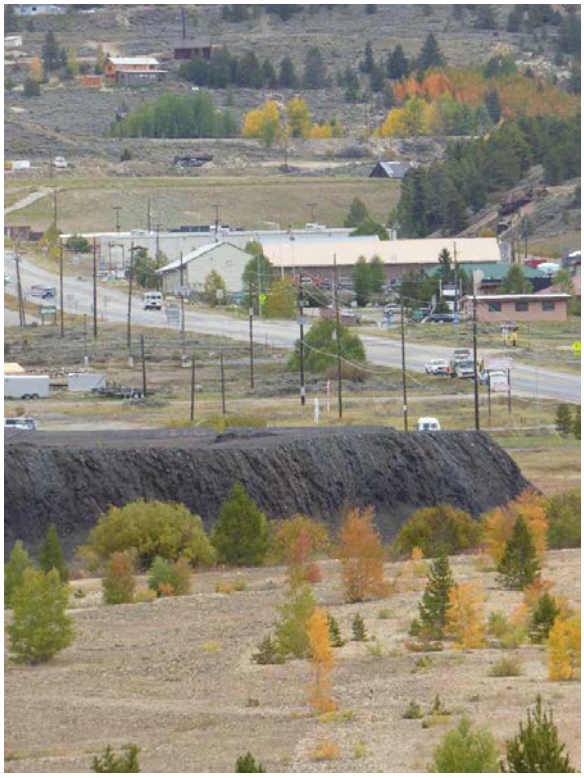

OU2 – Malta Gulch Tailing Impoundment

OU2 – wells

OU7 – Apache Tailing Impoundment

OU3 – former location of Harrison Street Slag Pile

OU8 – view of area in Stringtown where wetlands have been filled in for car storage area



OU3 – La Plata Slag Pile (nonhazardous)

OU5 – former Western Zinc Smelter, now community park

OU11 – gate and signage

OU11 – vegetation along Arkansas River

OU11 – Arkansas River

OU11 – vegetation along Arkansas River

Bridge at end of OU8 and beginning of OU11

Confluence of California Gulch and Arkansas River, where OU8 and OU11 meet

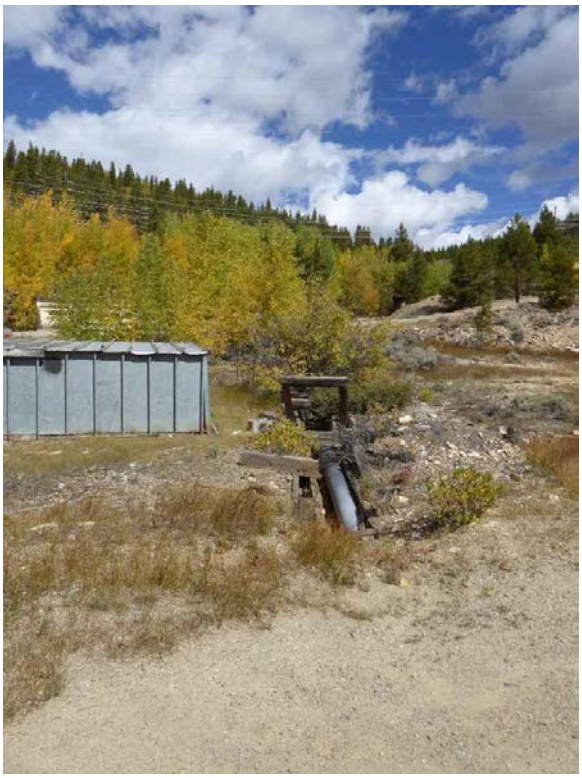
OU9 – yard in Lake Fork Trailer Park cleaned up under voluntary program

OU9 – entrance to Lake Fork Trailer Park

OU9 – cleaned-up yard

OU1 – Yak Tunnel water treatment plant

OU1 – Yak Tunnel water treatment plant



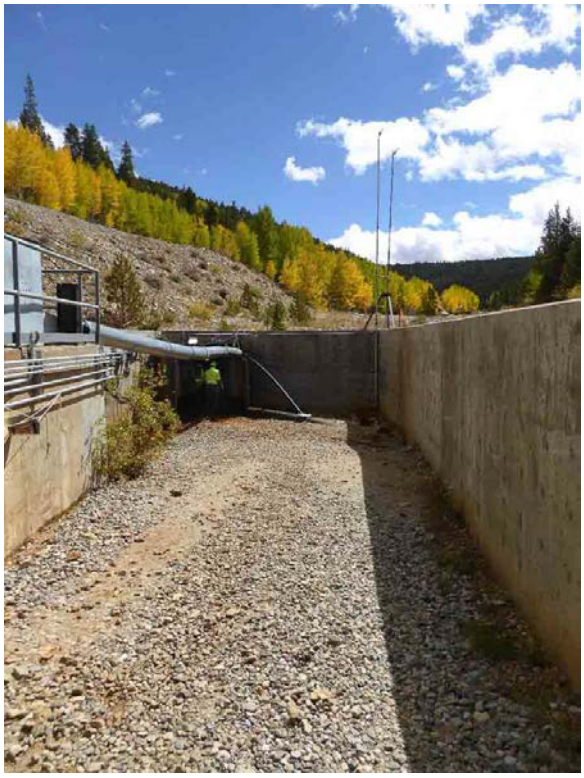
Outflow under road where new flow from OU6 goes through OU4 to California Gulch

OU1 – view from Yak Tunnel toward Yak Tunnel water treatment plant

OU1 – new equipment in Yak Tunnel

OU1 – Yak Tunnel

OU1 – new communication equipment at Yak Tunnel



OU1 – entryway to Yak Tunnel

Yak Tunnel (right side) and California Gulch (left side)

Yak Tunnel (right side) and California Gulch (left side)

Location of new pipeline installation

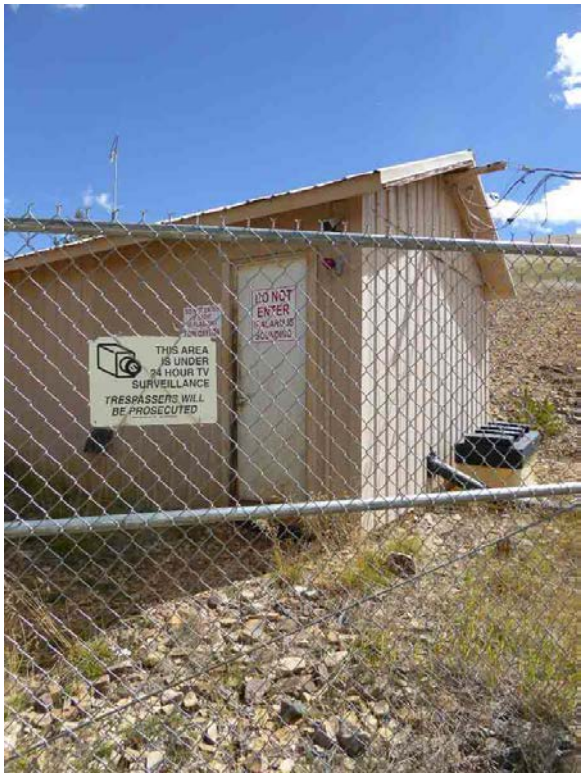
OU4 – concrete ditch

OU4 – concrete ditch with tailing piles in background

OU4 – new piping at Black Cloud Mine

OU4 – historic building

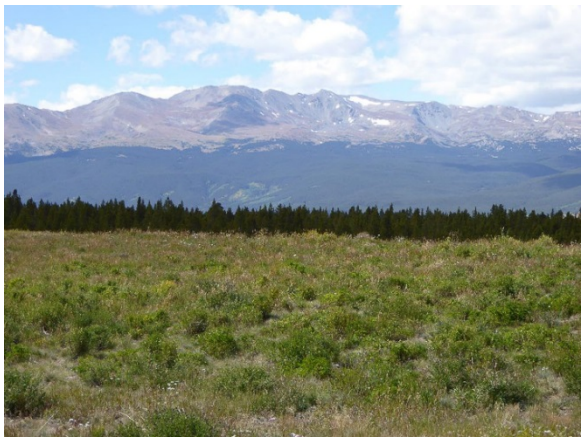
OU10 – piping at Oregon Gulch leading to surge pond



OU10 – pump house at Oregon Gulch

OU10 – pump house at Oregon Gulch

OU10 – revegetated Oregon Gulch Tailing Impoundment



OU10 – revegetated Oregon Gulch Tailing Impoundment

OU10 – revegetated Oregon Gulch Tailing Impoundment

OU10 – revegetated Oregon Gulch Tailing Impoundment

OU8 – new building in Stringtown built across California Gulch

OU8 – stabilized fluvial tailing downgradient of Stringtown

OU8 – view of area in Stringtown where wetlands have been filled in and used for car storage

View of OU8

OU8 – filled-in wetland area used for car storage

OU8 – well

OU8 – wetlands with stabilized tailing piles in background

OU1 – exterior of Yak Tunnel water treatment plant

APPENDIX H – DETAILED ARARs REVIEW AND LEAD GUIDANCE

ARARs Review

CERCLA Section 121(d)(1) requires that Superfund remedial actions attain "a degree of cleanup of hazardous substance, pollutants, and contaminants released 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 criteria are non-promulgated advisories and guidance that are not legally binding, but may be considered in determining the necessary remedial action. For example, to-be-considered 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 which, 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 maximum contaminant levels (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 Site-wide Water Quality (OU12) would be made between EPA and the PRPs and memorialized in the Consent Decree only after remedies for source remediation were selected and implemented at each OU.

The OU 12 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, 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 Arkansas Valley flood plain near the confluence of California Gulch. 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)[a,b]	Current MCL (µg/L)[a]	ARAR Change
Arsenic	0.01	0.01	None
Cadmium	0.005 (waived)	0.005	None
Lead	0.015 (waived)	0.015	None

Notes:

a. Obtained from 2009 OU12 ROD, page DS-49.

b. Based on the SDWA MCLs. Current MCLs can be found at https://www.epa.gov/ground-water-and-drinking-water/table-regulated-drinking-water-contaminants (last accessed 8/15/2016).

Surface Water

The 1989 OU1 AROD waived attainment of the federal AWQC for the discharge from the Yak Tunnel WTP. Further, the 1991 ESD 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). 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 Waste 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 WQS and replace the table value standards. The hardness dependent concentrations for cadmium and zinc table value standards have not changed since the ROD was issued (Table H-2). However, the seasonal temporary modifications for segment 2b and 2c expired on December 31, 2013 and were not renewed and the hardness dependent value for chronic exposure to zinc has become more stringent. These changes do not effect monitoring performance of the remedy as the monitoring plan has adopted the most current surface water ARARs.

Table H-2: Previous and Current ARARs for OU12 Surface Water COCs

COC	Season	2009 OU12 ROD ARARs for Arkansas River Segments 2b and 2c (µg/L)[a]	Current[a] ARARs (µg/L)[b]	ARARs Change
Cadmium	WQS (June-March)	Acute: 1.136672-[ln(hardness) x 0.041838] x $e^{0.915[ln(hardness)]-3.6236)}$	Acute: 1.136672-(ln(hardness) x 0.041838) x $e^{0.915[ln(hardness)]-3.6236)}$	None
		Chronic: 1.101672-[ln(hardness) x 0.041838] x $e^{0.7998[ln(hardness)]-3.1725)}$	Chronic: 1.101672-[ln(hardness) x 0.041838] x $e^{0.7998[ln(hardness)]-3.1725)}$	None
	WQS Seasonal Modification (April-May)	1.34 (µg/L)	Seasonal Modification expired for Segment 2b on December 31, 2013 and deleted for Segment 2c on June 30, 2013	NA
Zinc	WQS (June-March)	Acute: 0.978 x $e^{0.8537[ln(hardness)]+2.2178}$	Acute: 0.978 x $e^{0.8537[ln(hardness)]+2.2178}$	None
		Chronic: 0.986 x $e^{0.8537[ln(hardness)]+2.0489}$	Chronic: 0.986 x $e^{0.8537[ln(hardness)]+2.0469}$	More stringent
	WQS Seasonal Modification (April-May)	649 (µg/L)	Seasonal Modification expired for Segment 2b on December 31, 2013 and deleted for Segment 2c on June 30, 2013	NA

Notes:

a. Criteria listed in 2009 OU12 ROD, pages DS-48 and DS-49.

b. Based on the 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): 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 8/16/2016).

Sediment and Soil

The decisions documents for OU1 through OU12 did not establish chemical-specific ARARs for soil or sediment.

Lead Guidance

The lead cleanup at the Site is being implemented following the Lake County Community Health Program (LCCHP) Phase 2 Work Plan, which integrates EPA's 1994 Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities (Office of Solid Waste and Emergency Response [OSWER] Directive 9355.4-12) and the 1998 update to this guidance (Clarification to the 1994 Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities (OSWER Directive 9200.4-27P). However, in 2016, EPA's Office of Land and Emergency Management (OLEM) released Directive 9200.2-167, which updates the scientific considerations to be used at lead cleanups conducted according to EPA's 1994 and 1998 directives. EPA's experience has demonstrated that lead-contaminated soil responses are more effective when they employ a multi-pathway approach. Thus, the 2016 directive highlights the current science and risk assessment tools that EPA may consider when implementing lead cleanups. EPA is currently evaluating the LCCHP against this current guidance to determine if any changes are warranted in the LCCHP to ensure future protectiveness. A copy of the 2016 directive can be found at https://semspub.epa.gov/work/08/1884174.pdf.

APPENDIX I – OU12 DATA ANALYSIS TRENDS

Figure I-1: Flow and Dissolved Zinc Surface Water Concentrations at AR-1

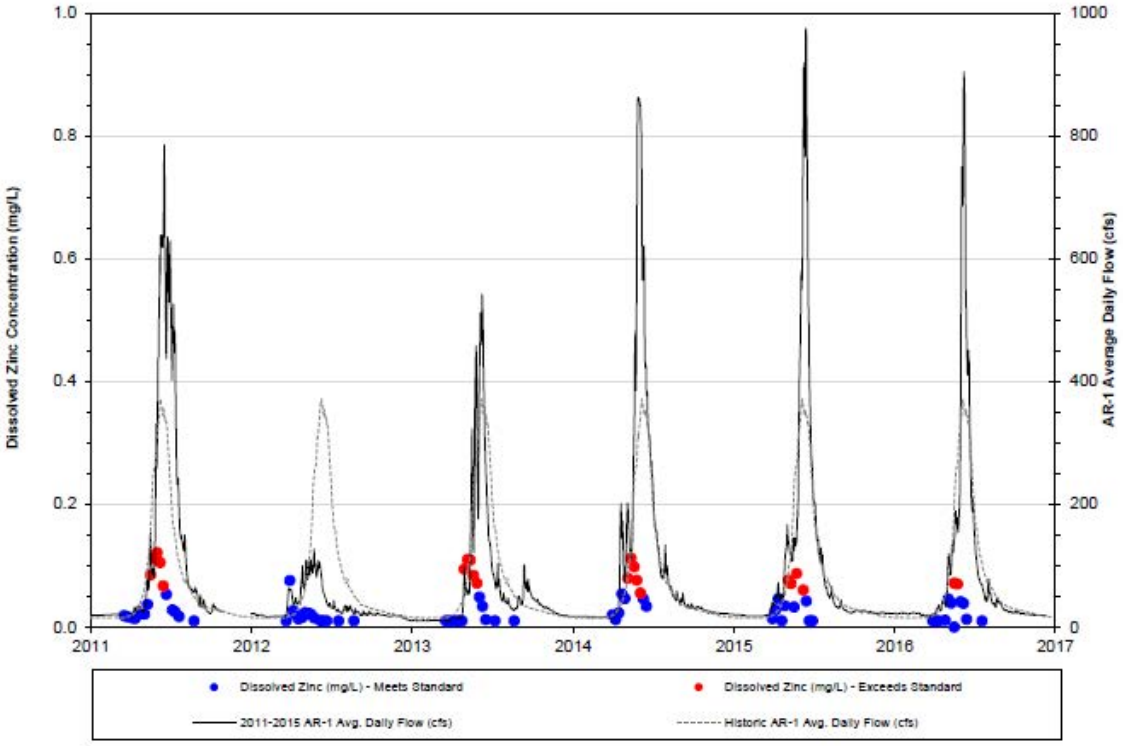


Figure I-2: Flow and Dissolved Cadmium Surface Water Concentrations in AR-1

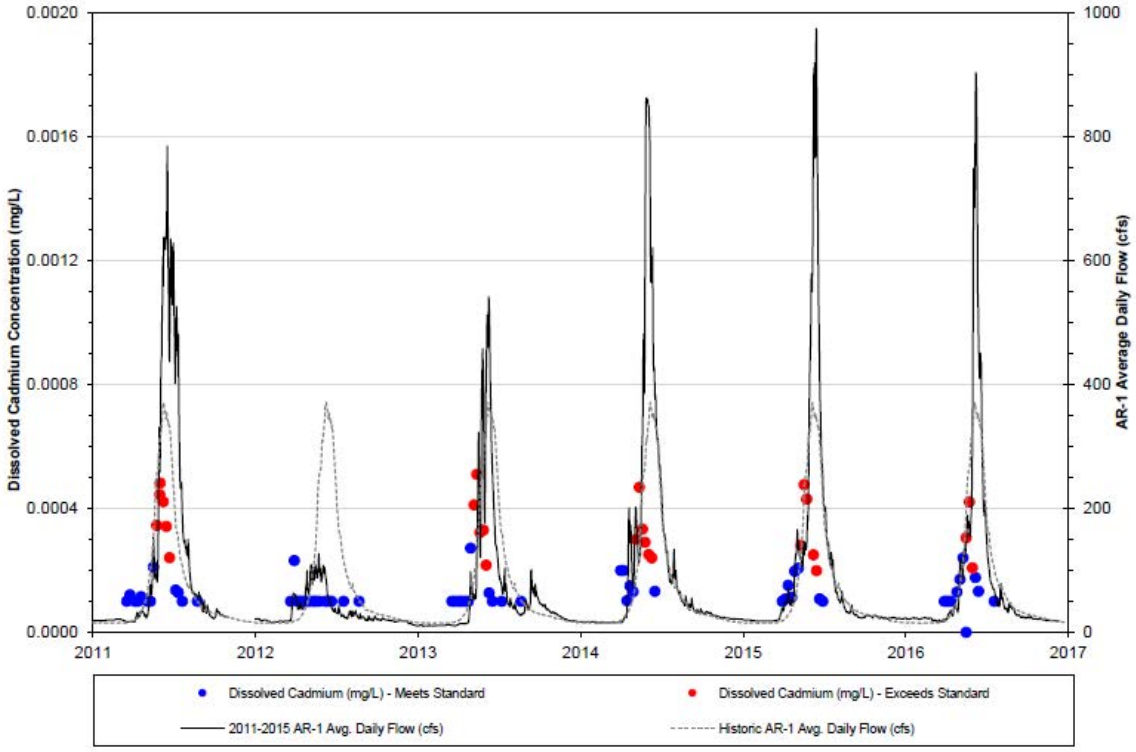


Figure I-3: Flow and Dissolved Zinc Surface Water Concentrations at AR-3A

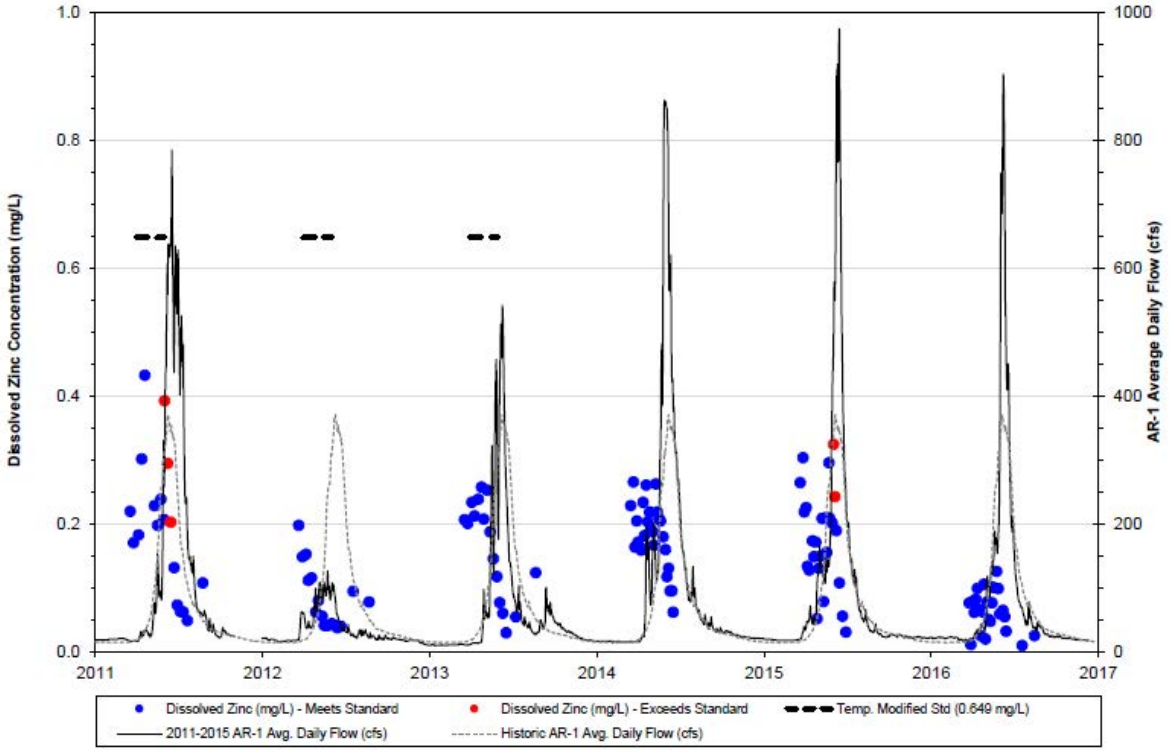


Figure I-4: Flow and Dissolved Cadmium Surface Water Concentrations in AR-3A

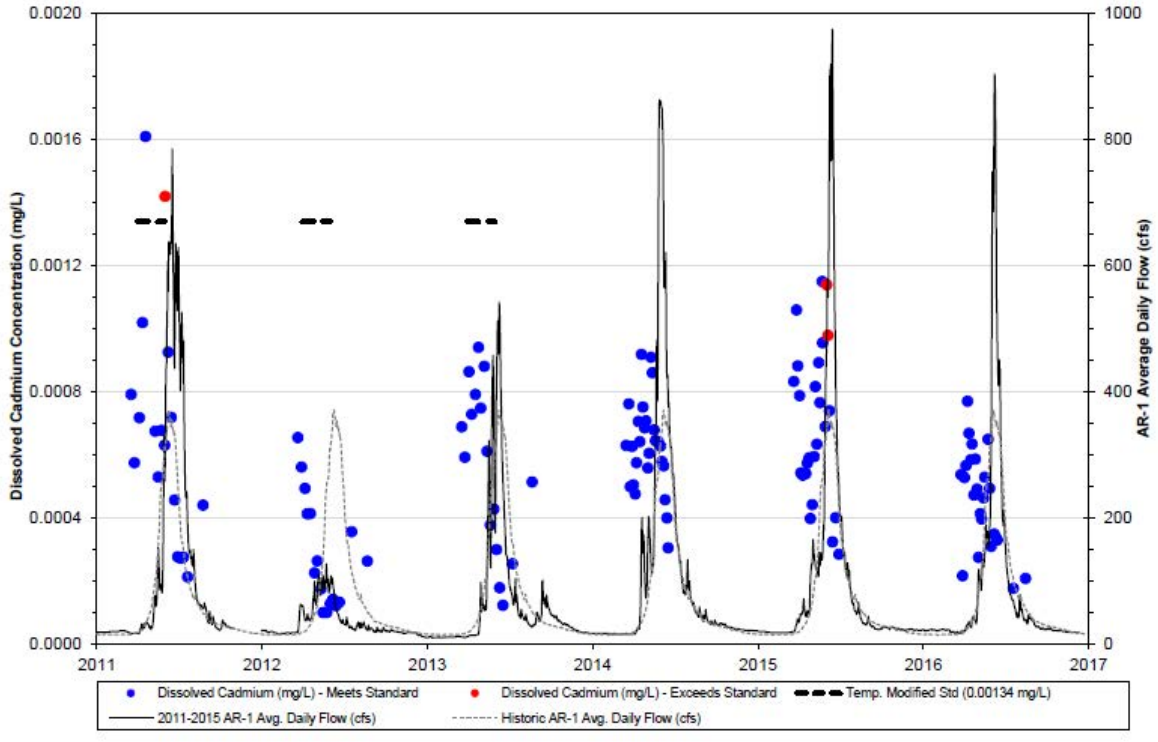


Figure I-5: Flow and Dissolved Zinc Surface Water Concentrations in AR-4 & AR-5

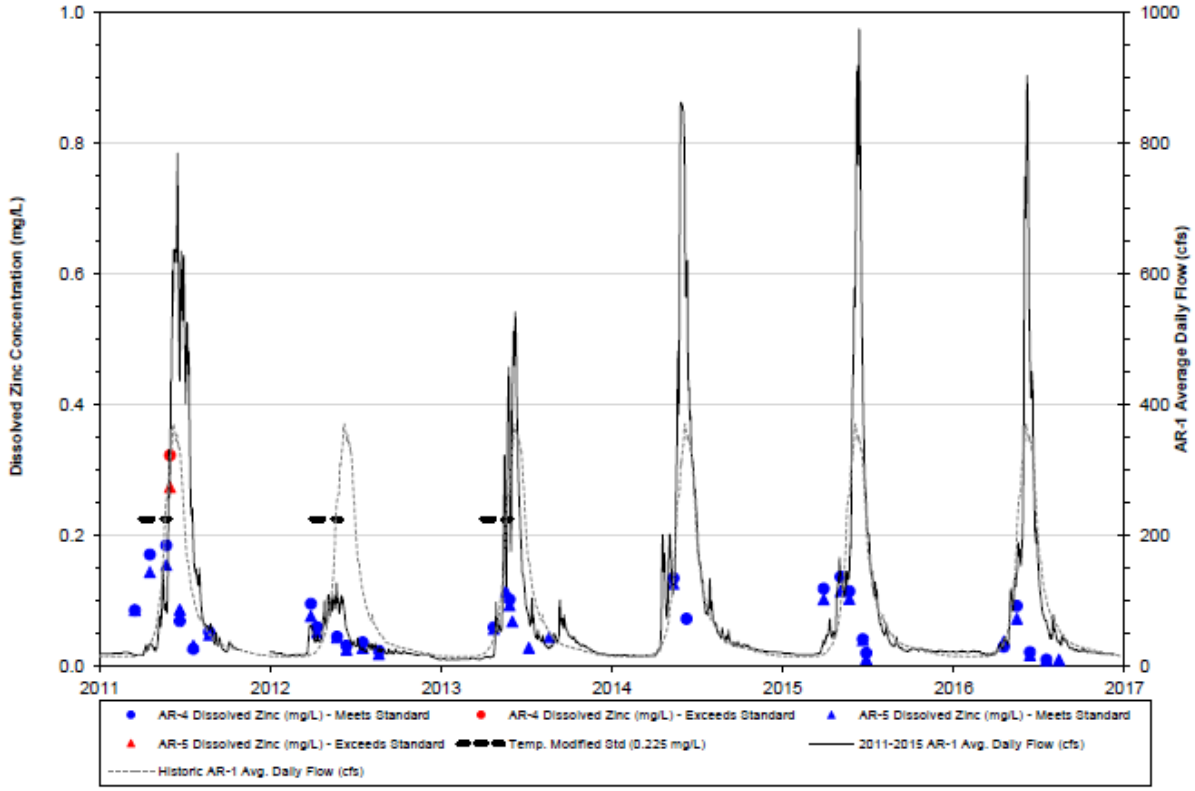
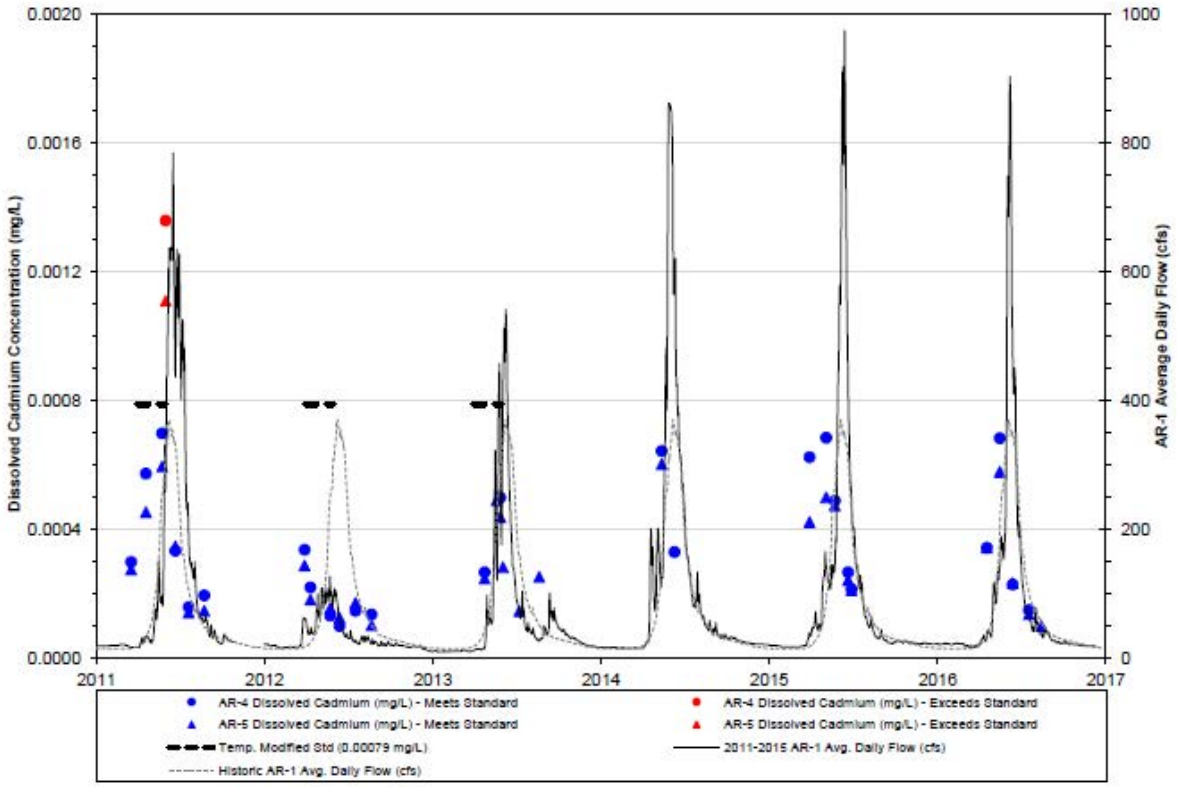


Figure I-6: Flow and Dissolved Cadmium Surface Water Concentrations in AR-4 & AR-5



APPENDIX J – INTERVIEW FORMS

California Gulch Superfund Site — Five-Year Review Interview Form

Site Name: California Gulch | **EPA ID No.:** COD980717938
Subject Name: Lawrence Fiske | **Affiliation:** Newmont/Resurrection
Time: Written Response | **Date:** 10/10/2016
Interview Location: Written Response

Interview Format: In Person | Phone | Mail | Other: Email

Interview Category: Potentially Responsible Parties (PRPs)

1. What is your overall impression of the remedial activities at the Site?
   Generally positive on the work done by Newmont/Resurrection. Newmont/Resurrection's remedial activities have resulted in less zinc, iron and other metals being discharged and the event that triggered the superfund listing has a very low chance of happening again. Generally, Newmont/Resurrection remedial activities are also visually better (e.g., no red water, erosion areas, etc.). Some of the remedial activities by other parties are not as visually appealing or may not be as protective as those required of Newmont/Resurrection. Overall, the remedial activities have resulted in water quality improvements to the Arkansas River, which is a benefit.

2. What have been the effects of the Site on the surrounding community, if any?
   Improved public perception, and confidence that the Site is no longer impairing the Arkansas River and is a safer area to raise families.

3. What is your assessment of the current performance of the remedy in place at the Site?
   Generally works well. However, in hindsight some remedies that were put into place may have been unnecessary, costly for the benefit obtained, or are expensive and/or difficult to maintain.

4. Are you aware of any complaints or inquiries regarding environmental issues or the remedial action from residents since implementation of the cleanup?
   There is some public confusion on who is responsible for various remedial activities and what some of the remedial activities actually do. For example, Newmont/Resurrection has received questions about the LMDT blockage, what the Yak WTP actually treats the water for, and water quality and responsibilities in the Evans and Stray Horse Gulches.

5. Do you feel well-informed regarding the Site's activities and remedial progress? If not, how might EPA convey site-related information in the future?
   We do not receive much information on activities occurring in the OUs that are not Newmont/Resurrection's responsibility.

6. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy?
   The EPA remedial project manager is very competent, readily available, and always willing to discuss questions for improving or modifying the remedy and other issues that come up.

7. Do you consent to have your name included along with your responses to this questionnaire in the FYR report?
   Yes.

California Gulch Superfund Site — Five-Year Review Interview Form

Site Name: California Gulch **EPA ID No.:** COD980717938
Subject Name: Sarah Dallas **Affiliation:** City of Leadville
Subject Contact Information: 800 Harrison Ave
Leadville, CO 80461
719-486-2092
adminservices@leadville-co.gov
Time: Written Response **Date:** 02/28/2017
Interview Location: Written Response

Interview Format: In Person Phone Mail Other: Email

1. What is your overall impression of the remedial activities at the Site?
   It appears that the activities have successfully curbed a large amount of contaminated water run-off, particularly in the spring season run-off, from former accounts of the brown/red run-off seen. Most, if not all, known caps have stayed intact and the appearance is that the efforts for reclamation are proving to be successful.

2. What have been the effects of this Site on the surrounding community, if any?
   There is still concerns about environmental contamination, issues persist of newly located families perceptions and concerns about the former superfund site, possible correlations to high levels of lead in children under the age of 6, and finally the economic challenges faced by a community formerly classified as a superfund site.

3. What is your assessment of the current performance of the remedies in place at the Site?
   There has not been much, or any, public information and governmental information sent to the City for review. I am not currently educated to discuss my assessment without more information.

4. Are you aware of any complaints or inquiries regarding environmental issues or the remedial action from residents since implementation of the cleanup?
   I've had a concerned citizen on the East side near South Toledo Street call and email with several concerns. They are concerned that development will encroach and move remediated soils, causing disturbances and re-contamination. I've also been contacted by property owners wanting to move forward with development of property in former remediated sections of town. The city of Leadville and Lake County did pass best management practices for soil removal and adhere to those regulations. It appears that more public awareness and informative follow-up might be necessary.

5. Do you feel well-informed regarding the Site's activities and remedial progress? If not, how might EPA convey site-related information in the future?
   I do not feel well-informed. I believe a bi-annual update or annual written update that can be filed and shared with elective officials would help. It would also be helpful to know what the future plans and stages of a former super-fund site will be. Having clear expectations and understanding goes a long way.

6. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy?
   Again, reiteration of ongoing communication from the EPA with the City of Leadville.

APPENDIX K – INSTITUTIONAL CONTROLS

Figure K-1: 2009 County Institutional Control for Operable Units 3 and 8

351214 3/3/2009 4:00 PM Patricia Berger
1 of 6 CRS 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-[redacted]

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:

351214 3/3/2009 4:00 PM Patricia Berger
2 of 6 CRS R$0.00 D$0.00 Lake County Recorder

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) ***Variances.*** 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 [redacted] day of [redacted], 2009.

BOARD OF COUNTY COMMISSIONERS
LAKE COUNTY, COLORADO

Kenneth L. Olsen, Chairman

Carl F. Schaefer

351214 3/3/2009 4:00 PM Patricia Berger
6 of 6 CRS R$0.00 D$0.00 Lake County Recorder

Michael J. Bordogna

ATTEST:

Patricia A. Berger, Clerk and Recorder,
Lake County, Colorado; ex officio
Clerk to the Board

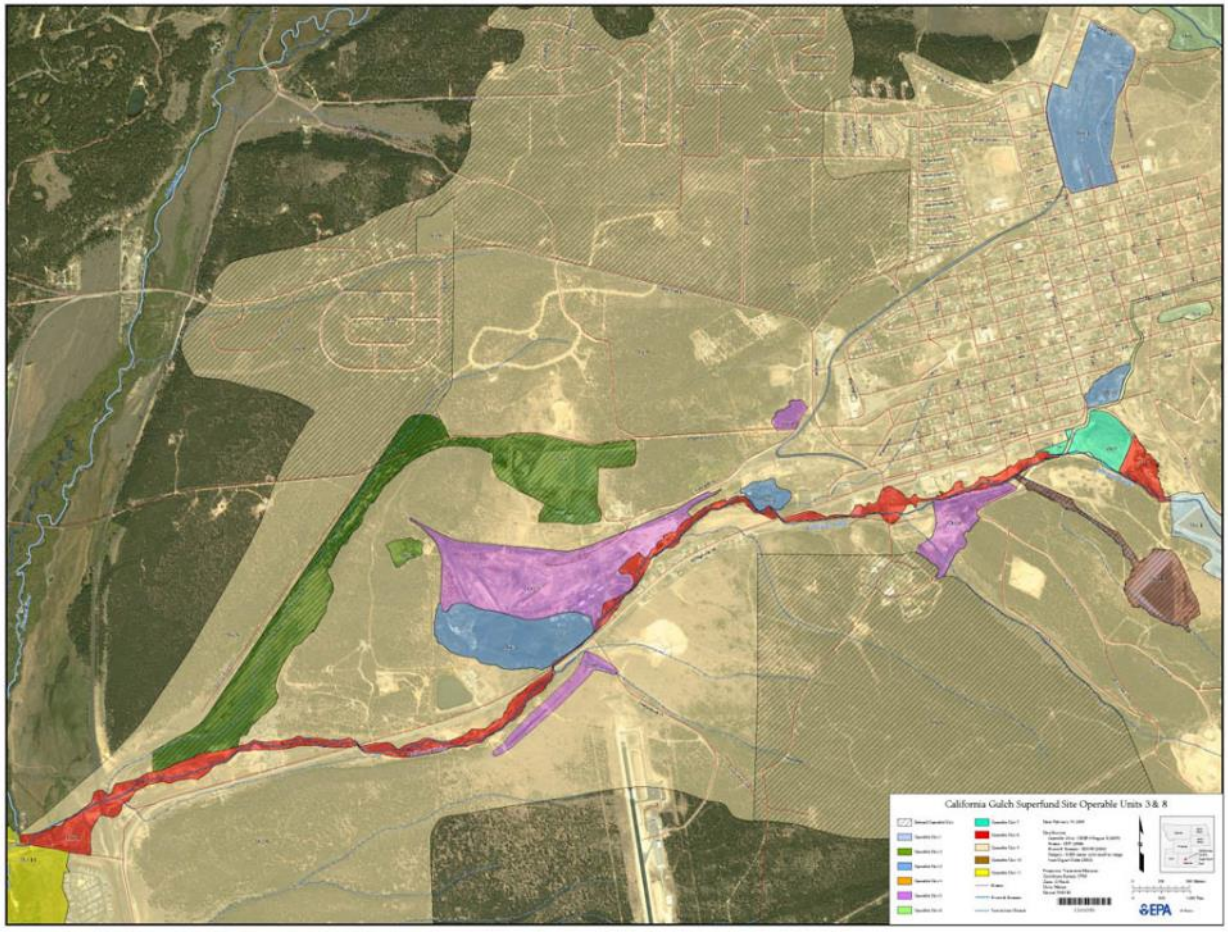


Figure K-2: 2009 County Institutional Control for 17 Mine Waste Piles Located in OU9

353410 12/23/2009 1:20 PM Patricia Berger
1 of 3 CRS R$0.00 D$0.00 Lake County Recorder

PROCEEDING OF THE BOARD OF COUNTY COMMISSIONERS

COUNTY OF LAKE AND STATE OF COLORADO

RESOLUTION 2009-34

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 GUICH 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 herby 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.

353410 12/23/2009 1:20 PM Patricia Berger
3 of 3 CRS R$0.00 D$0.00 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, Chairman

Carl F. Schaefer

Michael J. Bordogna

ATTEST:

Patricia A. Berger, Clerk and Recorder,
Lake County, Colorado; ex officio
Clerk to the Board

Figure K-3: 2010 County Institutional Control for OU9

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.

353903
2 of 82 CRS 3/16/2010 9:44 AM
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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, Chair

Carl F. Schaefer, Vice Chair

Michael J. Bordogna, Commissioner

ATTEST:

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

355712 12/22/2010 4:00 PM Patricia Berger
1 of 4 CRS RS0.00 DS0.00 Lake County Recorder

PROCEEDING OF THE BOARD OF COUNTY COMMISSIONERS

COUNTY OF LAKE AND STATE OF COLORADO

RESOLUTION 2010-

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 GUICH 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 13th 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 herby amended to add the following language:

FILE COPY

File # 10-26

Exhibit # C

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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, I 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.

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Patricia Berger
Lake County Recorder

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 [redacted] day of [redacted], 2010.

BOARD OF COUNTY COMMISSIONERS
LAKE COUNTY, COLORADO

Kenneth L. Olsen, Chairman

Carl F. Schaefer

Michael J. Bordogna

ATTEST:

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

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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.

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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 15th 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

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.

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 5th Street and the portion of Starr Ditch between 5th 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.

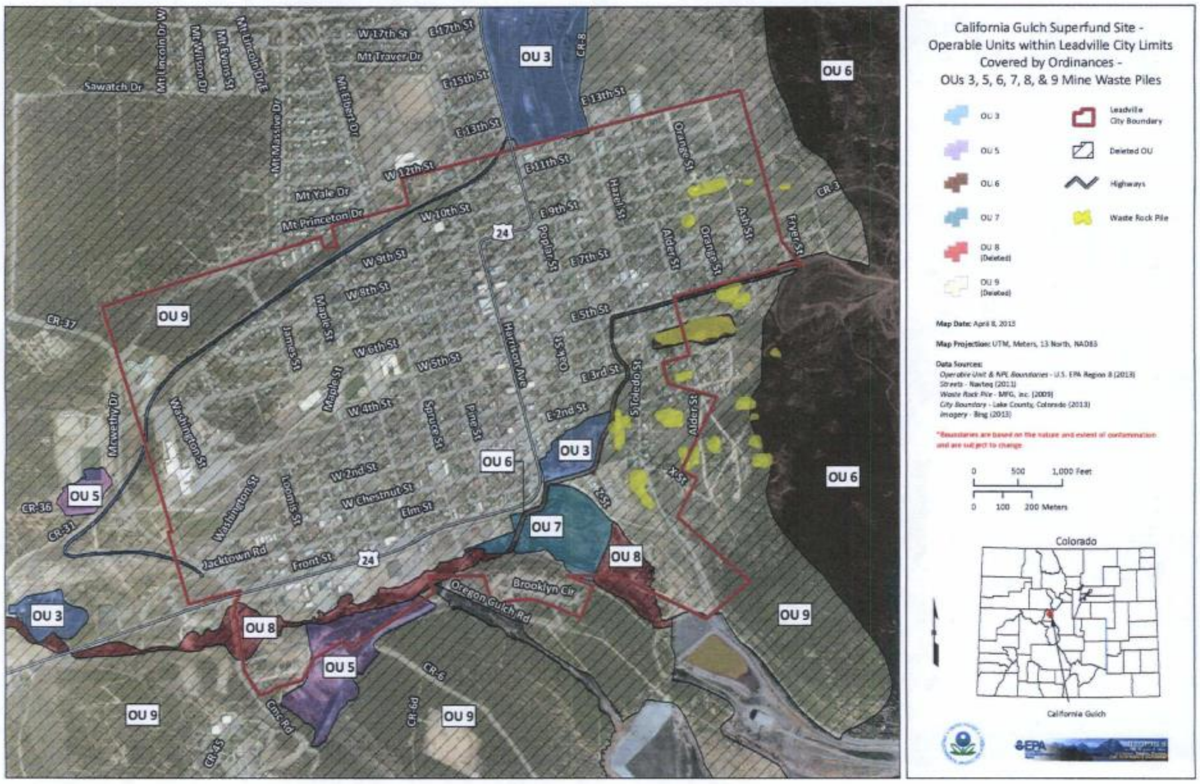
California Gulch Superfund Site - Operable Units within Leadville City Limits Covered by Ordinances - OUs 3, 5, 6, 7, 8, & 9 Mine Waste Piles
OU 3
OU 5
OU 6
OU 7
OU 8 (Deleted)
OU 9 (Deleted)
Leadville City Boundary
Deleted OU
Highways
Waste Rock Pile
Map Date: April 8, 2013
Map Projection: UTM, Meters, 13 North, NAD83
Data Sources:
Operable Unit & NPL Boundaries - U.S. EPA Region 8 (2013)
Streets - Navteq (2011)
Waste Rock Pile - MFG, Inc. (2009)
City Boundary - Lake County, Colorado (2013)
Imagery - Bing (2013)
0 500 1,000 Feet
0 100 200 Meters
Colorado
California Gulch
OU 3
OU 5
OU 6
OU 7
OU 8
OU 9
W 9th St
W 8th St
W 6th St
W 5th St
W 4th St
W 2nd St
W Chestnut St
Elm St
E 9th St
E 7th St
E 5th St
E 3rd St
E 2nd St
Harrison Ave
Front St
Brooklyn Cir
Oregon Gulch Rd
Mt Princeton Dr
Mt Yale Dr
Sawatch Dr
CR-37
CR-36
CR-6

Figure K-7: 2012 Environmental Covenant for Resurrection Mining Company's Zone A properties

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 80230-6928
(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 govemments 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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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 5TH 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 Cout 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 hereinafler be bound by, held, sold, and conveyed subject to the requirements set forth below, which shall rim 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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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 govemment 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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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.

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 swom 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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Resurrection has caused this instrument to be executed this 5th day of April, 2011.

Resurrection Mining Company

By: [signature]

Title: Vice President

STATE OF Colorado)°
) ss:
COUNTY OF Arapahoe)

The foregoing instrument was acknowledged before me this 5th day of April, 2011 by Stephen P. Gottschalk on behalf of Resurrection Mining Company

[signature]
Notary Public

16363 So. Fiddlers Green Circle, Ste. 80
Address

Greenwood Village, CO 80111

GLORIA L. DAWSON NOTARY PUBLIC STATE OF COLORADO

My commission expires: May 1, 2011

Accepted by the Colorado Department of Public Health and Environment this 20th day of June, 2012

By: [signature]

Title: Director, HMWMD

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STATE OF COLORADO)
) ss:
COUNTY OF DENVER)

The foregoing instrument was acknowledged before me this 2 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 Dr S
Address

Denver, CO 80246

My commission expires: October 21, 2015

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ATTACHMENT 1

TO ENVIRONMENTAL COVENANT

THE PROPERTY

Mineral Survey Number	Claim Name
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	Walnut
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	Claim Name
743	John Mitchell
783	Hartford Tract Sub B
802	Yates
823	Mahanoy
849	Bazoo
862	Unknown Claim Name
883	Triumph
893	White Cap
895	Forfeit
905	Honey Comb
909	Across The Ocean
996	Kathleen
1005	Delta
1006	Eagle
1018	Ishperming
1028	Ruby
1030	Silver Nugget
1066	A. P. Willard
1095	Olathe Placer
1120	Royal
1125	Adelphia
1161	Ocean Wave
1253	City
1271	St. Teresa
1319	Red Head
1323	St. Joseph
1350	Mimie Lee
1359	Mineral Farms
1444	Ravenna
1451	Mabel
1455	Humboldt (Producing Claim)
1461	Steel Spring
1481	Antelope
1488	Bangkok
1491	Yellow Jacket
1501	Little Nellie
1532	Little Daisy
1542	Unknown Claim Name
1543	Hog Eye
1552	Star of the West
1584	Sequin
1588	Vining
1593	Phat Purse
1594	Ottawa (Producing Claim)
1654	Elk
1772	Rattling Jack
1803	Oriole
1907	Deer
1912	Carlton
1918	Bessie Wilgus
1928	Smasher
1935	Revenue Cutter
2334	Colonel Sellers

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Mineral Survey Number	Claim Name
2633	S.T.X.
2651	Minnesota
2678	Ulster
2688	Elva Elma (Producing Claim)
2715	Kayserine
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

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Mineral Survey Number		Claim Name
9530		Eclipse
~~9530~~	(duplicate)	~~Eclipse~~
9958		$muggler
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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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. Altemate 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 stmctures 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 pattem 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 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 stmctures, 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, shmbs and or stmctures. 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, scmb bmshes, 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

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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 bmsh 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

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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 instmment 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 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 stmcture. 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 ofmodification).

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

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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

pH	6.5 – 8.5	6.5-8.5

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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 tripled 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 constmction 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-intmsive activities shall be cleaned on an as needed basis. Constmction equipment such as earth moving equipment, tmcks, 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 Otner 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 conceming decontamination should include the following:

Decontamination personnel
Date
Decontamination observations

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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 polypropolene 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 polypropolene 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 mnoff.

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 aroimd 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 measuriiig 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 ±0.2 pH unit and conductivity and temperature readings within ±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 instmctions.

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

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:

Evacuation Volume [gal] = (Total Depth [ft] - Water Level Depth [ft]) x 0.1632 gal/ft

= gallons/well casing volume

For 4-inch well:

Evacuation Volume [gal] = (Total Depth [ft] - Water Level

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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GROUNDWATER DATA SHEET

IDENTIFICATION
Sample Location_____ Date _____ Time _____Page__of_

Sample Control Number_____ Samplers: _____
WEATHER CONDITIONS
Ambient Air Temperature: ____ °C ☐ _____ °F ☐ Not Measured? ☐
Precipitation: None ☐ Rain ☐ Snow ☐ Heavy ☐ Moderate ☐ Light ☐ Sunny ☐ Partly Cloudy ☐
WELL MEASUREMENTS (Measurements made from top of PVC casing)

Depth to Static Water:_____feet Total Depth of Well:_____ feet Feet of water:_____
2-inch = 0.163 gal/ft 4-inch = 0.65 gal/ft 6-inch = 1.47 gal/ft
1 Casing Volume:_____ gallons 3 Casing Volumes:_____ gallons
Depth Pump Installed:_____ feet Volume water purged_____ Gallons

Well purged with: _____

FIELD PARAMETER MEASUREMENTS DURING PURGING

Time	Volume (gallons)	pH	Cond. (µS/cm)	Temp.° °C ☐ °F ☐	Turbidity (visual estimate)	Comments

Final Sample Parameters

Sample Date	Sample Time	Volume (gallons)	pH	Cond. (µS/cm)	Temp. °C ☐ °F ☐	Turbidity (NTU)

Was a duplicate sample collected? Yes ☐ No ☐ (sample control number_____
)
Was a field blank collected? Yes ☐ No ☐ (sample control number_____
)

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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 botties 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 perfonned 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 ovemight 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 reconstmcted 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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cmcial for resolving future problems if analytical results are called into question and for minimizing the possibility of sample mix-up. Initial information conceming 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 infonnation:

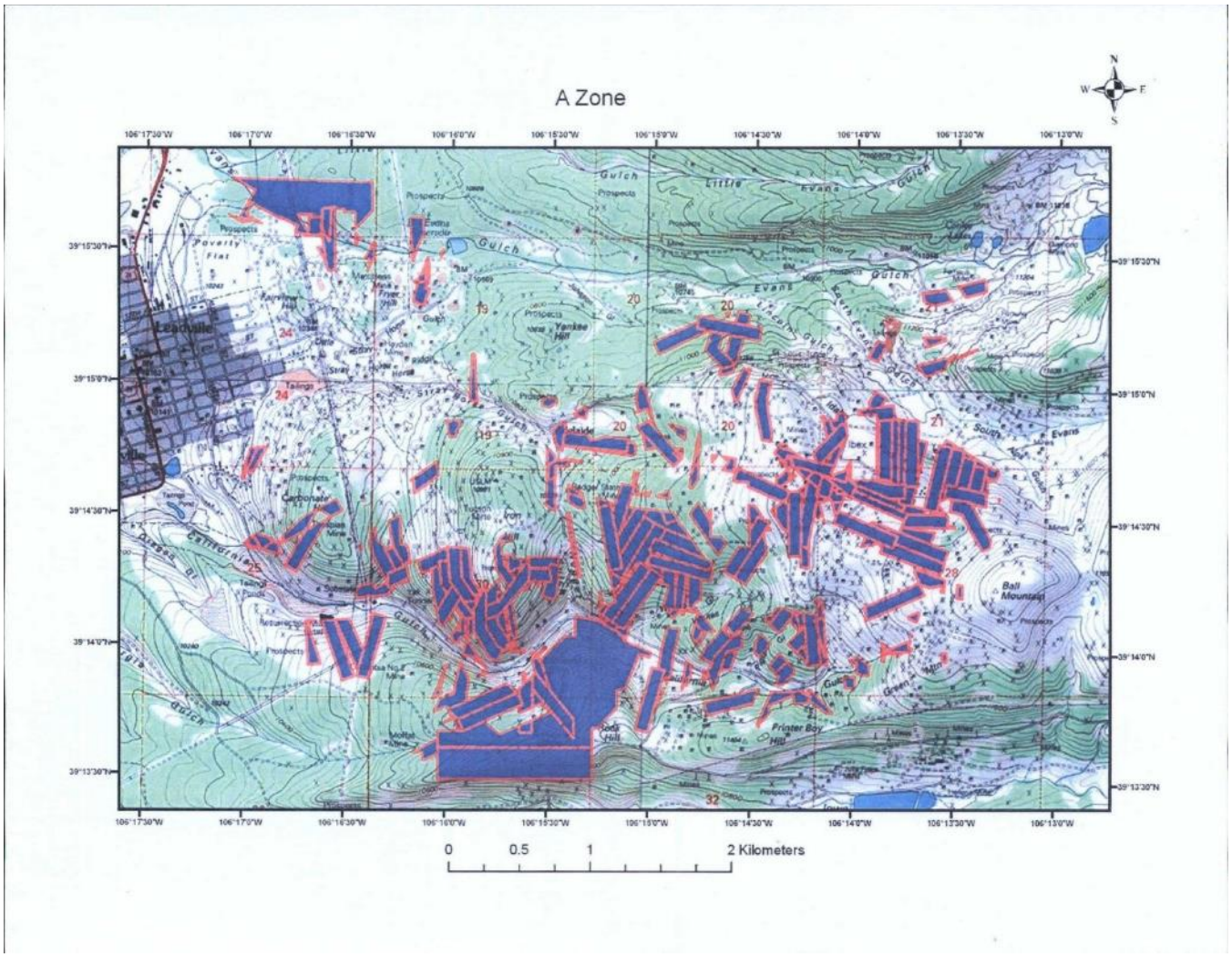
Sampler's signature and affiliation
Project number
Date and time of collection
Sample identification number
Sample type
Analyses requested
Number of containers
Signature of persons relinquishing custody, dates, and times
Signature of persons accepting custody, dates, and times
Method of shipment
Shipping air bill number (if the samples are shipped)
Any additional instmctions 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 retum 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 retuming 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[1]	Filtration[2]	Preservation	Holding Time[3]
pH	P,G	No	Cool, 4°C	7 days[4]
Specific conductance	P,G	No	Cool, 4°C	28 days
Total alkalinity (as $CaCO_3$)	P,G	Yes	Cool, 4°C	7 days[4]
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_3 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_2SO_4 to pH <2	28 days
Total Phosphorus	P,G	Yes	Cool, 4°C, H_2SO_4 to pH <2	28 days
Orthophosphate	P	Yes	Cool, 4°C	48 hours
Radionuclides (total)	P,G	No	HNO_3 to pH <2	6 months
Radionuclides (dissolved)	P,G	Yes	HNO_3 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_3 to pH <2	6 months
Total metals	P,G	No	Cool, 4°C, HNO_3 to pH <2	6 months
Total recoverable metals	P,G	No	Cool, 4°C, HNO_3 to pH <2	6 months

[1] Bottle code: P=polyethylene bottle with polyethylene-lined lid. G=glass bottle with Teflon-lined polyethylene lid.
[2] Samples requiring filtration must be filtered in the field using a 0.45 µm membrane filter before preservative is added.
[3] Holding times start at date of sample collection.
[4] 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.


A Zone
N
W
E
S
106°17'30"W
106°17'0"W
106°16'30"W
106°16'0"W
106°15'30"W
106°15'0"W
106°14'30"W
106°14'0"W
106°13'30"W
106°13'0"W
39°15'30"N
39°15'0"N
39°14'30"N
39°14'0"N
39°13'30"N
Little Evans Gulch
Evans Gulch
Yankee Hill
Leadville
Ball Mountain
Printer Boy Hill
Carbonate Hill
0
0.5
1
2 Kilometers

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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 5TH 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 mn 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 govemmental 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 mns 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 pf 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).

Consistent with C.R.S. 25-15-321(6), the Department shall provide Owner a written detennination 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 constmction and land use. Owner shall notify the Department and EPA as the named third party beneficiary simultaneously when submitting any application to a local govemment 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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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) 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 titie in any portion of the Property, the Department will modify Attachment I hereto to exclude that portion of the Property from coverage under this Environmental Covenant.

Resurrection has caused this instrument to be executed this 5th day of April, 2011.

Resurrection Mining Company

By: _____

Titie: Vice President

STATE OF Colorado)
) ss:
COUNTY OF Arapahoe)

The foregoing instrument was acknowledged before me this 5th day of April, 2011 by _____ on behalf of Resurrection Mining Company

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Gloria L. Dawson
Notary Public

6363 So. Fiddler's Green Circle Ste. 800
Address

Greenwood Village, CO 80111

My commission expires: May 1, 2011

Accepted by the Colorado Department of Public Health and Environment this 20th of June, 2012.

By: Gary W. Baughman

Title: Director, HMWMD

STATE OF COLORADO)
) ss:
COUNTY OF DENVER)

The foregoing instmment was acknowledged before me this 20 day of June, 2012 by GARY W BAUGHMAN on behalf of the Colorado Department of Public Health and Environment.

Claudette M. Torres
Notary Public

4300 Cherry Creek Dr S
Address

Denver, CO 80246

My commission expires: October 21, 2015

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ATTACHMENT 1

TO ENVIRONMENTAL COVENANT

THE PROPERTY

Mineral Survey Number	Claim Name
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

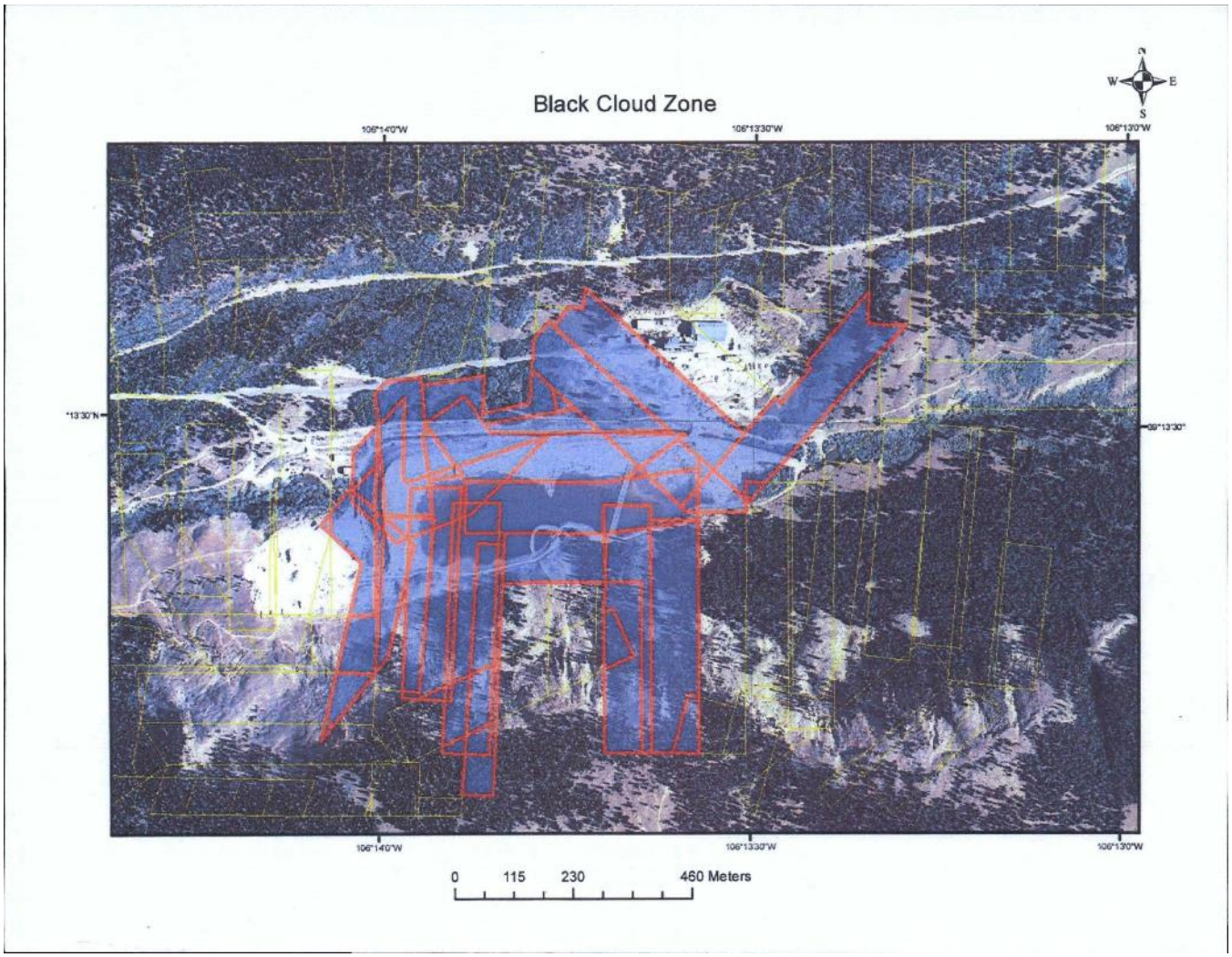
Black Cloud Zone
N
W
E
S
106°14'0"W
106°13'30"W
106°13'0"W
0
115
230
460 Meters

Figure K-8: 2012 Environmental Covenant for Resurrection Mining Company's Zone B properties

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

http://www.cdphe.state.co.us

Laboratory Services Division
8100 Lowry Blvd.
Denver, Colorado 80230-6928
(303) 692-3090

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,

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

359747 10/1/2012 11:01 AM Patricia Berger
1 of 36 COV R$202.00 D$0.00 Lake County Recorder

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 27th 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 hereinafler be bound by, held, sold, and conveyed subject to the requirements set forth below, which shall mn 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 mns 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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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 stmctures 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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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

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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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including but not limited to recreation, parks, and greenbelts. The lands tend to have few stmctures.

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 stmctures 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 stmctures, retirement center apartments, manufactured housing and other stmctures 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 stmcture 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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recreational and sport facilifies, 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.

Resurrection has caused this instrument to be executed this 27th day of July, 2012.

Resurrection Mining Company

By: _____

Title: Vice President and Secretary

STATE OF Colorado)
) ss:
COUNTY OF Arapahoe)

The foregoing instrument was acknowledged before me this 27th day of July, 2012 by Stephen P. Gottesfeld on behalf of Resurrection Mining Company

GLORIA L. DAWSON NOTARY PUBLIC STATE OF COLORADO

Gloria L. Dawson
Notary Public

16363 So. Fiddlers Green Circle
Address

Greenwood Village, CO 80111

My commission expires: July 15, 2015

Accepted by the Colorado Department of Public Health and Environment this 4th day of September, 2012

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By: Gary L. Baughman

Title: Director, HMWMD

STATE OF COLORADO)
) ss:
COUNTY OF DENVER)

The foregoing instrument was acknowledged before me this 6 day of SEPTEMBER, 2012 by GARY BAUGHMAN on behalf of the Colorado Department of Public Health and Environment.

Claudette M. Farris
Notary Pubhc

4300 Cherry Creek Dr S
Address

Denver, CO 80246

My commission expires: October 21, 2015

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ATTACHMENT 1

TO ENVIRONMENTAL COVENANT

THE PROPERTV

Mineral Survey Number	Claim Name
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	McDermtih 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. Amold 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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Mineral Survey Number	Claim Name
3556	Champion
3901	Lupe, Lupe(No. End), Lupe(So. End)
4080	Gaw Placer
4668	Cache
4668	Loop (Part of Cache,Hoop & Loop)
5541	Carr
6279	Xmas
7230	Bonnie Kate
13097	Constance
13167	Free Coinage
15320	Mabel
17841	Ausable
18136	Adirondack
18590	Hand Saw
1610 A.M.	Confident
768 A.M.	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

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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. Altemate 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 stmctures 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 pattem 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 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 stmctures, 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, shmbs and or stmctures. 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, scmb bmshes, 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

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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 bmsh 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, particulariy any deviations from the aforementioned methods

Field observations

Details of photo documentation, if any

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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 instmment 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 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 stmcture. 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

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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

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 constmction site.
Equipment that will not be damaged by water will be washed with an Alconox solution or low-sudsing detergent and potable water and scmbbed with a bristle bmsh 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 tripled 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 constmction 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. Constmction equipment such as earth moving equipment, tmcks, 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 conceming decontamination should include the following:

Decontamination personnel
Date
Decontamination observations

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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 polypropolene 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 heaitb 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 polypropolene 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 mnoff.

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.

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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 confinn that the water chemistry has stabilized. Generally, pH values within ±0.2 pH unit and conductivity and temperature readings within ±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

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:

Evacuation Volume [gal] = (Total Depth [ft] - Water Level Depth [ft]) x 0.1632 gal/ft

= gallons/well casing volume

For 4-inch well:

Evacuation Volume [gal] = (Total Depth [ft] - Water Level

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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GROUNDWATER DATA SHEET

IDENTIFICATION

Sample Location_____ Date _____ Time _____Page__of_

Sample Control Number_____ Samplers: _____

WEATHER CONDITIONS

Ambient Air Temperature: ____ °C ☐ _____ °F ☐ Not Measured? ☐

Precipitation: None ☐ Rain ☐ Snow ☐ Heavy ☐ Moderate ☐ Light ☐ Sunny ☐ Partly Cloudy ☐

WELL MEASUREMENTS (Measurements made from top of PVC casing)

Depth to Static Water:_____fect Total Depth of Well:_____ feet Feet of water:_____

2-inch = 0.163 gal/ft 4-inch = 0.65 gal/ft 6-inch = 1.47 gal/ft

1 Casing Volume:_____ gallons 3 Casing Volumes:_____ gallons

Depth Pump Installed:_____ feet Volume water purged_____ Gallons

Well purged with: _____

FIELD PARAMETER MEASUREMENTS DURING PURGING

Time	Volume (gallons)	pH	Cond. (µS/cm)	Temp.° °C ☐ °F ☐	Turbidity (visual estimate)	Comments

Final Sample Parameters

Sample Date	Sample Time	Volume (gallons)	pH	Cond. (µS/cm)	Temp. °C ☐ °F ☐	Turbidity (NTU)

Was a duplicate sample collected? Yes ☐ No ☐ (sample control number_____
)

Was a field blank collected? Yes ☐ No ☐ (sample control number_____
)

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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 ovemight 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

cmcial for resolving future problems if analytical results are called into question and for minimizing the possibility of sample mix-up. Initial information conceming 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:

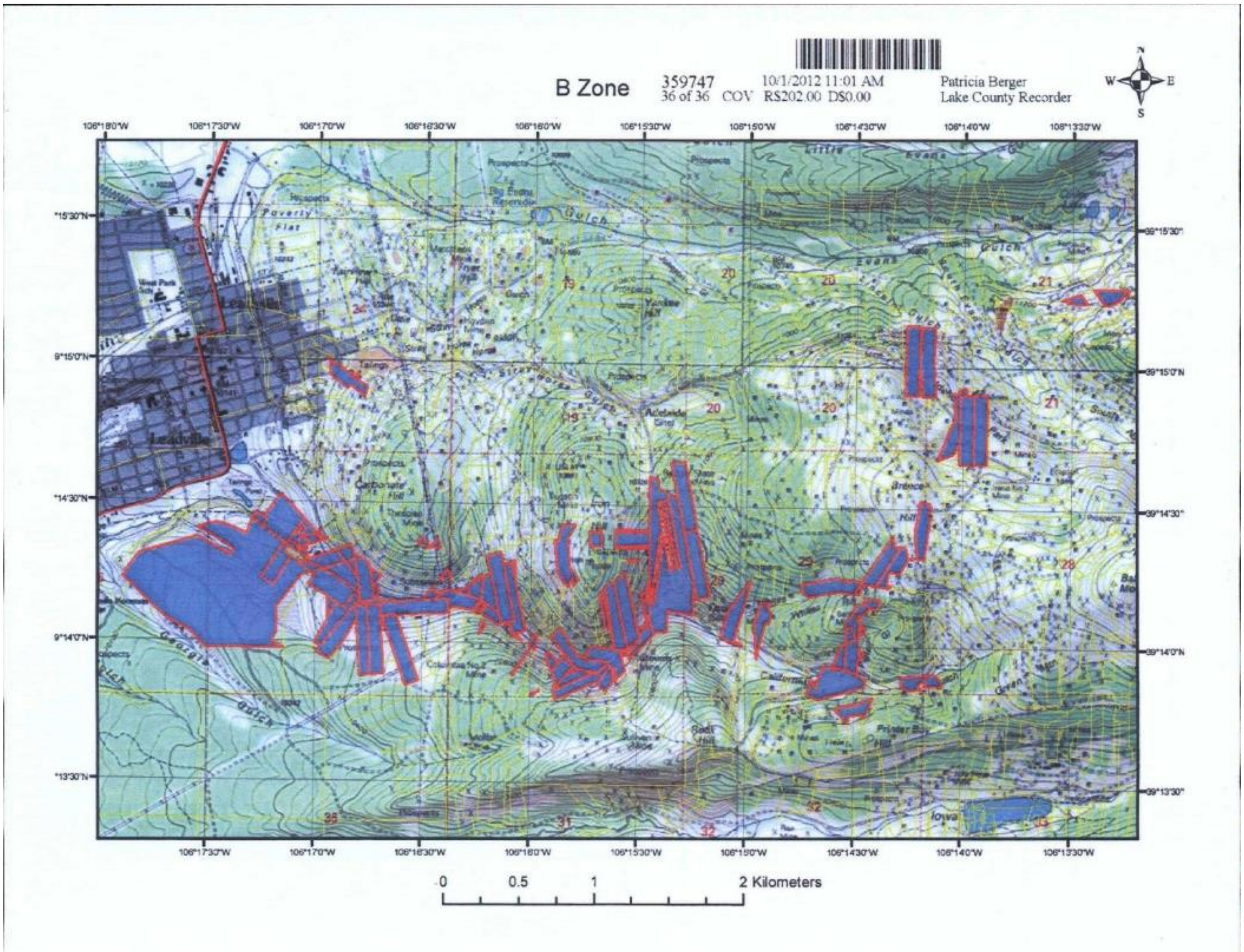
Sampler's signature and affiliation
Project number
Date and time of collection
Sample identification number
Sample type
Analyses requested
Number of containers
Signature of persons relinquishing custody, dates, and times
Signature of persons accepting custody, dates, and times
Method of shipment
Shipping air bill number (if the samples are shipped)
Any additional instmctions 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 retum 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 retuming 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[1]	Filtration[2]	Preservation	Holding Time[3]
pH	P,G	No	Cool, 4°C	7 days[4]
Specific conductance	P,G	No	Cool, 4°C	26 days
Total alkalinity (as $CaCO_3$)	P,G	Yes	Cool, 4°C	7 days[4]
Total dissolved solids	P,G	Yes	Cool, 4°O	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_3 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_2SO_4 to pH <2	28 days
Total Phosphorus	P,G	Yes	Cool, 4°C, H_2SO_4 to pH <2	28 days
Orthophosphate	P	Yes	Cool, 4°C	48 hours
Radionuclides (total)	P,G	No	HNO_3 to pH <2	6 months
Radionuclides (dissolved)	P,G	Yes	HNO_3 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_3 to pH <2	6 months
Total metals	P,G	No	Cool, 4°C, HNO_3 to pH <2	6 months
Total recoverable metals	P,G	No	Cool, 4°C, HNO_3 to pH <2	6 months

[1] Bottle code: P=polyethylene bottle with polyethylene-lined lid. G=glass bottle with Teflon-lined polyethylene lid.
[2] Samples requiring filtration must be filtered in the field using a 0.45 pm membrane filter before preservative is added.
[3] Holding times start at date of sample collection.
[4] 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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Patricia Berger
Lake County Recorder
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Figure K-9: 2012 Environmental Covenant for Resurrection Mining Company's Zone C properties

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

http://www.cdphe.state.co.us

Laboratory Services Division
8100 Lowry Blvd.
Denver, Colorado 80230-6928
(303) 692-3090

Colorado Department of Public Health and Environment

October 10, 2012

Hon. Carl Schaefer
Chairman, Board of County Commissioners
Lake County Govemment
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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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 22nd 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 Enviromental 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 mn 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 ovmer 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 Califomia 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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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 mns 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 imtreated 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 instmments granting a right to use the Properfy.

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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Califomia 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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Resurrection has caused this instrument to be executed this 27th day of July, 2012.

Resurrection Mining Company

By: _____

Title: Vice President and Secretary

STATE OF Colorado)
) ss:
COUNTY OF Arapahoe)

The foregoing instrument was acknowledged before me this 27th day of July, 2012 by Stephen P. Gottesfeld on behalf of Resurrection Mining Company

_____
Notary Public

16363 So. Fiddler's Green Circle
Address Greenwood Village, CO 80111

My commission expires: July 15, 2015

GLORIA L. DAWSON NOTARY PUBLIC STATE OF COLORADO

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Accepted by the Colorado Department of Public Health and Environment this 6th day of September, 2012

By: Carol J. Baughman

Title: Director, HMWMD

STATE OF COLORADO)
) ss:
COUNTY OF DENVER)

The foregoing instmment was acknowledged before me this 6 day of SEPTEMBER, 2012 by CAROL BAUGHMAN on behalf of the Colorado Department of Pubhc Health and Environmeht.

Claudette M. Torres
Notary Public

4300 Cherry Creek Dr So
Address

Denver, CO 80246

My commission expires: October 21, 2015

7-27-12

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ATTACHMENT 1

TO ENVIRONMENTAL COVENANT

THE PROPERTY

Mineral Survey Number	Claim Name
1243	Coon Valley
1277	First National
2361	Alhambra Placer Tract 2
4229	Bessie Stewart

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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 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.

1.1 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 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).

1.2 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

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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 intemal 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, instmment 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

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 Califomia Gulch Superfimd 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 constmction site.
Equipment that will not be damaged by water will be washed with an Alconox solution or low-sudsing detergent and potable water and scmbbed with a bristle bmsh 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 airbome 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 tripled 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 constmction 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-intmsive activities shall be cleaned on an as needed basis. Constmction equipment such as earth moving equipment, tmcks, 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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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 Califomia 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 polypropolene 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 polypropolene 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 bmshes
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 ±0.2 pH unit and conductivity and temperature readings within ±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 instmctions.

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 bottie 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

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:

Evacuation Volume [gal] = (Total Depth [ft] - Water Level Depth [ft]) x 0.1632 gal/ft

= gallons/well casing volume

For 4-inch well:

Evacuation Volume [gal] = (Total Depth [ft] - Water Level

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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GROUNDWATER DATA SHEET

IDENTIFICATION

Sample Location_____ Date _____ Time _____Page__of_

Sample Control Number_____ Samplers: _____

WEATHER CONDITIONS

Ambient Air Temperature: ____ °C ☐ _____°F ☐ Not Measured? ☐

Precipitation: None ☐ Rain ☐ $now ☐ Heavy ☐ Moderate ☐ Light ☐ Sunny ☐ Partly Cloudy ☐

WELL MEASUREMENTS (Measurements made from top of PVC casing)

Depth to Static Water:_____feet Total Depth of Well:_____ feet Feet of water:_____

2-inch = 0.163 gal/ft 4-inch = 0.65 gal/fl 6-inch = 1.47 gal/ft

1 Casing Volume:_____ gallons 3 Casing Volumes:_____ gallons

Depth Pump Installed:_____ feet Volume water purged_____ Gallons

Well purged with: _____

FIELD PARAMETER MEASUREMENTS DURING PURGING

Time	Volume (gallons)	pH	Cond. (µS/cm)	Temp.° °C ☐ °F ☐	Turbidity (visual estimate)	Comments

Final Sample Parameters

Sample Date	Sample Time	Volume (gallons)	pH	Cond. (µS/cm)	Temp. °C ☐ °F ☐	Turbidity (NTU)

Was a duplicate sample collected? Yes ☐ No ☐ (sample control number_____
)

Was a field blank collected? Yes ☐ No ☐ (sample control number_____
)

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Was a rinsate sample collected? Yes ☐ No ☐ (sample control number_____
)

Notes: _____

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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 mmbered 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 reconstmcted 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

cmcial for resolving fiture problems if analytical results are called into question and for minimizing the possibility of sample mix-up. Initial information conceming 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 instmctions to the laboratory.

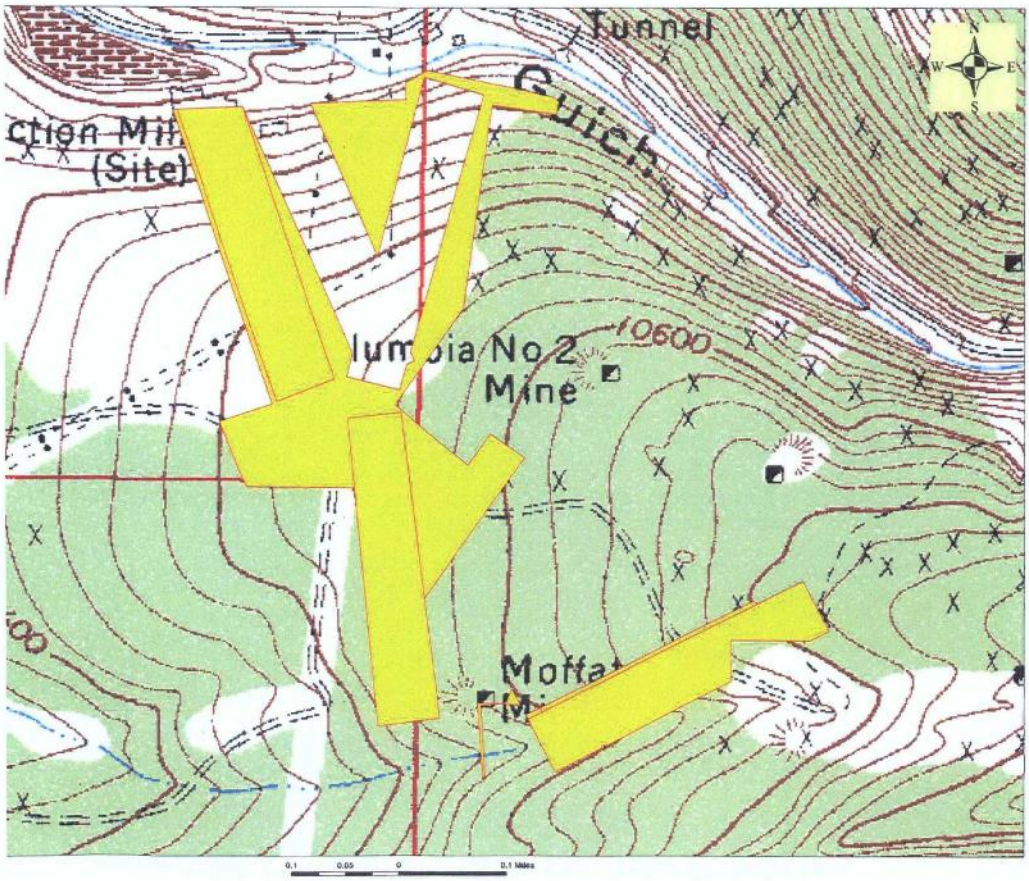
The person responsible for delivery of the samples to the laboratory will sign the COC form, retain the third copy of the form, document the method of shipment, and send the original and the second copy of the form with the samples. Upon arrival at the laboratory, the person receiving the samples will sign the COC form and retum 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 retuming 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[1]	Filtration[2]	Preservation	Holding Time[3]
pH	P,G	No	Cool, 4°C	7 days[4]
Specific conductance	P,G	No	Cool, 4°C	28 days
Total alkalinity (as $CaCO_3$)	P,G	Yes	Cool, 4°C	7 days[4]
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_3 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_2SO_4 to pH <2	28 days
Total Phosphorus	P,G	Yes	Cool, 4°C, H_2SO_4 to pH <2	28 days
Orthophosphate	P	Yes	Cool, 4°C	48 hours
Radionuclides (total)	P,G	No	HNO_3 to pH <2	6 months
Radionuclides (dissolved)	P,G	Yes	HNO_3 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_3 to pH <2	6 months
Total metals	P,G	No	Cool, 4°C, HNO_3 to pH <2	6 months
Total recoverable metals	P,G	No	Cool, 4°C, HNO_3 to pH <2	6 months

(1) Bottle code: P=polyethylene bottle with polyethylene-lined lid. G=glass bottle with Teflon-lined polyethylene lid.
(2) Samples requiring filtration must be filtered in the field using a 0.45 µm membrane filter before preservative is added.
(3) Holding times start at date of sample collection.
(4) 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



359748
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Patricia Berger
Lake County Recorder

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 <u>three</u> sets of plans (one set can be in a PDF form) and <u>three</u> site plans (one can be in a PDF). *<u>Your plans should have the Type of Construction, Use and Occupancy and the Maximum Occupancy.</u>***
4. **Building Permit Approval Form with <u>all</u> 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.

- 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.

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, 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 $
Base Permit Fee $
Plan Review Fee $
_Building Permit Fee $

Date Received _____
Permit #
Check # _____

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

☐ 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 5th 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

☐ Propane or Natural Gas Supplier _____

☐ Other _____

Date	Approved	Denied	

Comments:

***Zoning** (please check one)*

☐ City of Leadville 800 Harrison Avenue 486-2092

☐ Lake County Land Use 505 Harrison Avenue 486-1796

California Gulch Superfund Site (if applicable)

Operable Unit 3_____ Operable Unit 9_____Operable Unit 7_____

Operable Unit 8_____ Operable Unit 4 _____Operable Unit 2_____

Operable Unit 5_____

Date	Approved	Denied	

Comments:

Plan Review

Lake County Building Department 505 Harrison Avenue 486-2875

Date	Approved	Denied	

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*").