Five-Year Review Report

Third Five-Year Review Report

For

Clear Creek/Central City Superfund Site

Gilpin and Clear Creek Counties

Colorado

September 2004

Prepared By:

Colorado Department of Public Health and Environment
Hazardous Materials and Waste Management Division
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Denver, Colorado 80246

Approved by: Max H Dodson

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Assistant Regional Administrator
Office of Ecosystems Protection and Remediation

Date: 9/29/04

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List of Acronyms

AOC	Administrative Order on Consent
ARAR	Applicable or Relevant and Appropriate Requirements
CA	Cooperative Agreement
CCWF	Clear Creek Watershed Foundation
CDOT	Colorado Department of Transportation
CDPHE	Colorado Department of Public Health and Environment
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CIP	Community Involvement Plan
DMG	Colorado Division of Minerals and Geology
DOW	Colorado Division of Wildlife
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Difference
IC	Institutional Control
µg/L	microgram per Liter
MCL	Maximum Contaminant Level
NCP	National Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PPA	Prospective Purchaser Agreement
ppm	parts per million
PRP	Potentially Responsible Party
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SSC	State Superfund Contract
TBC	To Be Considered
UAO	Unilateral Administrative Order
USFS	United States Forest Service
WTF	Water Treatment Facility
WQCC	Water Quality Control Commission

Executive Summary

Added to the National Priorities List in 1983, the Clear Creek/Central City Superfund Site consists of several mine waste piles, draining adits, and impacted ground water bodies scattered over roughly 400 square miles. Historic mining resulted in a watershed contaminated with heavy metals, significantly impacting aquatic life and potentially threatening human health.

To ensure protection of human health and to reestablish a viable brown trout population, several remedial actions have been performed. Waste piles have been subject to actions including stabilization, capping, off-site disposal, and diversion of run-on water. In many cases, acid mine drainages have been collected and piped to reduce the potential for human contact. At one adit, a water treatment plant was built and has continued to operate, successfully reducing the point source loading of metals by 99.9 percent.

The remedies completed are functioning as intended. However, remedial actions are not complete at the site. The newly completed Record of Decision for Operable Unit Number 4 details steps that still need to be taken before the remedial action objectives can be achieved.

A determination of the protectiveness of the remedies cannot be made because Site actions are not complete. A determination of protectiveness will be obtained by completing a comprehensive sampling of Clear Creek once the remedy is complete and operational. In the interim, exposure pathways that could result in unacceptable risks to human health are being controlled. The remedies that have been completed at the Site remain protective.

Five Year Review Summary Form

SITE IDENTIFICATION		
Site name (from WasteLAN): Central City/Clear Creek		
EPA ID (from WasteLAN): COD980717557		
Region: 8	State: CO	City/County: Idaho Springs/Clear Creek
SITE STATUS		
NPL Status: ■ Final, □ Deleted, □ Other (specify)		
Remediation Status (choose all that apply): ■ Under Construction, ■ Operating, ■ Complete		
Multiple OUs? ■ Yes, □ No	Construction Complete date:	
Has site been put into reuse: Some properties of certain OUs have continued to be used and/or redeveloped. Please refer to text description for each OU.		
REVIEW STATUS		
Reviewing Agency: □ EPA, ■ State, □ Tribe, □ Other		
Author Name: Mary Scott		
Author Title: Remedial Project Manager	Author Affiliation: CDPHE	
Review period: April 1999 to September 2004		
Date(s) of site inspection: 5/2004 through 9/2004		
Type of Review: ■ Statutory, □ Policy (□ Post-SARA, □ Pre-SARA, □ NPL-Removal Only) □ Non-NPL Remedial Action Site, □ NPL State Tribe Lead		
Review number: □ 1 (first), □ 2 (second), ■ 3 (third), □ Other (specify)		
Triggering action: □ Actual RA Onsite Construction at OU#, □ Actual RA Start at OU#, □ Construction Completion, ■ Previous Five-Year Review,□ Other (specify)		
Triggering action date (from WasteLAN): 3/31/1999		
Due Date (five years after triggering action date): 3/31/2004		

Five-Year Review Summary Form, cont'd
Issues: No serious deficiencies were noted during the five-year review. Issues to be addressed include: lack of proper documentation of the local repository, the remedial actions at the Argo waste pile, and the Big Five tunnel; need for improved consolidation of surface water data and operation and maintenance activities; and the need to complete remedial actions at the Site.
Recommendations and Follow-up Actions: Remedial actions selected under OU3 and OU4 need to be completed as soon as possible, given funding limitations, in order to determine the overall ability of the Site to meet the remedial action objectives. Changes in the selected remedies need to be properly documented. Pertinent data needs to be consolidated to eliminate redundant efforts and to ensure protectiveness into the future.
Protectiveness Statement: A full determination of the protectiveness of the remedies cannot be made because Site actions are not complete. A determination of protectiveness will be obtained by completing a comprehensive sampling of Clear Creek once the remedy is complete and operational. In the interim, exposure pathways that could result in unacceptable risks to human health are being controlled. The remedies that have been completed at the Site remain protective.
Other Comments:

1.0 INTRODUCTION

This five-year review report summarizes the status of actions taken pursuant to the Superfund Records of Decision (RODs) for the Clear Creek/Central City Site (Site) located in Clear Creek and Gilpin Counties, Colorado. This five-year review is a statutory review required of the Site under the Comprehensive Environmental Response, Compensation Liability Act (CERCLA) Section 121 and the National Contingency Plan for Oil and Hazardous Substances (NCP).

The purpose of the five-year review is to determine whether remedial response actions are protective of human health and the environment and to recommend ways to attain or maintain that protection. Additionally, five-year review reports identify issues found during the review, if any, and recommendations to address them. In accordance with the Comprehensive Five-Year Review Guidance, EPA 540-R-01-007, June 2001 (The Guidance) this five-year review does not reconsider decisions made during the remedy selection process but evaluates the implementation and performance of the selected remedies.

The State of Colorado Department of Public Health and Environment (CDPHE) has conducted this five-year review of the remedial actions implemented at the Clear Creek/Central City Superfund Site in Colorado under a Cooperative Agreement with the United States Environmental Protection Agency (EPA) (V 998176-01). This review was conducted from March 2004 through September 2004. This report documents the results of the review. The EPA Region VIII assisted in this review.

This is the third five-year review for the Clear Creek/Central City site. The first five-year review, completed in March 1994, was triggered by the 1989 remedial actions at the Argo tailings and waste rock pile and the Gregory Incline tailings pile. A second five-year review was completed in March 1999. In keeping with the requirements of CERCLA §121 (c) and the NCP, the subsequent five-year review triggers from the signature date of the previous five-year review.

The CDPHE Community Involvement Program is committed to promoting communication between citizens and CDPHE. The Community Involvement Plan (CIP) Revision describes the community involvement and public participation program developed for the Site. This CIP Revision, dated May 1993, was developed in coordination with the United States Environmental Protection Agency (EPA) and updated the previous CIP, dated June 1989. Concurrent with the five-year review, State and EPA community involvement coordinators conducted interviews and revised the plan. The updated plan is attached as Appendix D.

The results of this third five-year review indicate that the remedies implemented to address immediate and long-term health and environmental risks at some operable units are operating as expected and are protective while other operable units are not complete and the protectiveness of those remedies cannot be determined. Since hazardous substances, pollutants, or contaminants remain at the Site, another five-year review will be required in September 2009.

2.0 SITE BACKGROUND

The Clear Creek/Central City Superfund Site (Site) is located on the east slope of Colorado's Front Range, approximately 30 miles west of Denver. The Site is transected by the Colorado Mineral Belt, resulting in rich mineralization. Precambrian gneisses and schists are the predominant host rock and are cut by a network of faults. Tertiary Age veins and stocks within the host rock are the sources of sulfide ores that contain deposits of several minerals including gold, silver, iron, copper, lead, nickel, zinc, cadmium, manganese and others. As a result, the area has been heavily mined, beginning with the discovery of placer gold in Idaho Springs in 1859 and followed quickly by the first lode discovery in Gregory Gulch.

Historic mining resulted in modern era problems. Placer mining resulted in the removal of stream substrate and relocation of stream channels. Mine tunnels continue to drain acidic and metal-laden water. Mine waste and mill tailings piles were left unprotected throughout the watershed. Metals including iron, zinc, copper, cadmium, manganese, lead and arsenic enter into Clear Creek and its tributaries and negatively impact the ecology of the river.

Modern urbanization has also impacted Clear Creek. The towns of Silver Plume, Georgetown, and Idaho Springs have encroached on the creek. Construction of U.S. 6, U.S. 40, and I-70 caused significant channelization of Clear Creek and created runoff of vehicle waste, traction sand, and chemical deicer from the roadway. The legalization of gaming in Black Hawk and Central City has increased traffic, impacted the North Fork of Clear Creek and has altered the landscape with the removal of steeply sloped hillsides to allow casino development.

The Clear Creek drainage basin encompasses roughly 400 square miles and has an elevation ranging from 5,700 feet to over 13,000 feet. The cities of Central City, Black Hawk, Idaho Springs, Silver Plume and Empire reside within the basin near Clear Creek and/or its major tributaries. Designated uses of Clear Creek include recreation, agriculture, and drinking water supply. Downstream, Clear Creek empties into the South Platte River just north of Denver.

The site was added to the Superfund National Priorities List (NPL) in September 1983. Over the next several years, the Environmental Protection Agency (EPA) initiated Remedial Investigations and Feasibility Studies at the Site. Three removal actions were also conducted at the Site by EPA's Emergency Response Branch.

The objectives of the planned Remedial Actions are to protect human health and the environment. The specific remedial action objectives for the Site are to protect humans from the potentially harmful effects of metals, especially lead and arsenic, to which they can be exposed via contact with tailings and waste rock material. A second objective is to protect humans from exposure to harmful levels of metal in contaminated private drinking water supplies. Finally, EPA and CDPHE seek to restore the water quality of Clear Creek to a condition that protects aquatic species. Specific remedial action objectives are listed on Page 56 of the OU3 ROD and Pages 23 through 25 of the OU4 ROD.

EPA designated three Operable Units for the Site. Operable Unit #1 was designated to address treatment of acid mine drainage from five mine tunnels. Operable Unit #2 was designated to address remediation of mine tailings and waste rock in the immediate proximity of the five

discharging tunnels specified in Operable Unit #1. Operable Unit #3 was designated to address control of surge events from the Argo Tunnel.

A Record of Decision (ROD) for Operable Unit #1 (OU1) was signed September 30, 1987. The ROD for Operable Unit #2 (OU2) was signed March 31, 1988. In August 1988, EPA completed the Argo Tunnel Discharge Control Feasibility Study. The purpose of the study was to evaluate alternatives for reducing the sources of water into the Argo tunnel such as alluvial ground water or snow build-up inside mine shafts and for controlling or reducing the likelihood of a sudden surge of acid water, a blowout, from the Argo tunnel. The ROD for Operable Unit #3 (OU3) was delayed pending additional studies, as discussed below.

In June 1988, the U.S. Bureau of Reclamation was assigned the lead for the remedial design of OU2. Remedial action was completed at two of the five tailings and waste rock piles before work on OU2 was temporarily suspended. EPA gave the lead for remedial design for the remaining OU2 properties to CDPHE on September 21, 1995.

In June 1988, the EPA transferred the lead role for the Site, excluding OU2 remedial design, to the Colorado Department of Public Health and Environment (CDPHE) via a Cooperative Agreement (CA V008534-01). CDPHE initiated a comprehensive evaluation of the Site via the Phase II Remedial Investigation and Feasibility Study. The Phase II work expanded the original study area to encompass the entire watershed. Camp Dresser and McKee completed the Phase II Remedial Investigation in September 1990 and the Phase II Feasibility Study in June 1991.

The Record of Decision for the Phase II studies was signed September 30, 1991, and is referred to as the OU3 ROD. The OU3 ROD amended the OU1 ROD and also included a final decision for the original OU3. Major components of the OU3 ROD include:

- Capping or physical barriers and institutional controls for select mine waste piles;
- An alternate drinking water supply where required;
- Treatment of the Burleigh tunnel mine water discharge;
- Treatment of the Argo tunnel mine water discharge;
- No action to control blowouts from mine tunnels;
- A mine adit water conveyance system to carry acid mine drainage from the National and Quartz Hill tunnels and the Gregory Incline to a point below the Black Hawk sewage treatment plant for potential future treatment; and
- Reduction in the heavy metals loading from Woods Creek.

In October 1991, soon after the signing of the OU #3 ROD, the voters of the State of Colorado approved limited stakes gambling in the cities of Black Hawk and Central City. Land values increased rapidly and a significant increase in construction activity ensued. Several private entities have stepped forward to conduct cleanups that had once been targeted for fund-lead cleanups. EPA's remedial planning activities were impacted as a result with a shift of emphasis from fund-lead to enforcement activities.

The OU3 ROD delayed the final decision on treatment of the Gregory Incline, National and Quartz Hill tunnels pending treatability studies. This became the basis of a new operable unit, Operable Unit #4 (OU4).

Table 1: Chronology of Site Events	
Event	Date
NPL listing	September 8, 1983
Time-Critical Removal Actions	March 1987 – August 1991
Remedial Investigation/Feasibility Study Complete	June 8, 1987
OU1 ROD signature	September 30, 1987
OU2 ROD signature	March 31, 1988
Transfer of lead status to CDPHE	June 1988
OU2 Remedial Actions complete	September 1991 – May 2003
Phase II Remedial Investigation/Feasibility Study complete	September 1991
OU3 ROD signature	September 30, 1991
OU3 Administrative Orders on Consent	February 1993 – September 1998
OU3 Potentially Responsible Party Removals complete	June 1993 – November 1996
First Five-Year Review	March 30, 1994
OU3 Unilateral Administrative Orders	July 1994 – September 1997
OU3 Remedial Actions complete	January 1995 – September 1999
OU3 Potentially Responsible Party Remedial Action complete	February 1995 – August 2000
OU3 Non-Time Critical Removal Actions complete	November 1996 – December 1998
Second Five-Year Review	March 26, 1999
OU2 ROD Explanation of Significant Differences	September 1, 1999
Argo Water Treatment Plant Operational and Functional	September 28, 1999
OU3 ROD Amendment	June 5, 2003
OU4 Remedial Investigation/Feasibility Study complete	September 29, 2004
OU4 ROD signature	September 29, 2004

3.0 REGULATORY COMPLIANCE

Consistent with Section 121(c) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, and Section 300.430(f)(4)(ii) of the National Contingency Plan (NCP), the Colorado Department of Public Health and Environment is performing the five-year review for the Site. A statutory five-year review is required when the selected remedial action at a Site results in any hazardous substances, pollutants or contaminants remaining at a site above levels that allow for unlimited use and unrestricted exposure. The five-year review shall be conducted every five years after initiation of such remedial action. The purpose of the five-year review is to ensure that the remedial actions conducted at the Site remain protective of public health and the environment and are functioning as designed.

3.1 Statutory Review

A statutory five-year review is required at any site where unlimited use and unrestricted exposure, based on ROD cleanup levels, have not been attained (EPA, 1991). A five-year review is required no less than every five years after initiation of the selected remedial action. EPA prepared a five-year review for the Site in 1994 and in 1999. Future five-year reviews will be prepared by EPA or upon designation, by CDPHE. Reviews entail a site visit to review the status of the implemented remedy and to determine its protectiveness of human health and the environment. This document presents the results of the 2004 review.

3.2 ARARS

As part of the five-year review, Applicable or Relevant and Appropriate Requirements (ARARs) developed during previous Site evaluations were reviewed. The primary purpose of this review was to determine if any newly promulgated or modified requirements of federal or state environmental laws have significantly changed the protectiveness of the remedies implemented at the site. The ARARs reviewed were those included in the OU2 and OU3 RODs. The OU1 ARARs were not reviewed since OU1 was superceded by OU3. The OU3 ARARs tables are included in Attachment B.

3.2.1 Colorado Water Quality Control Act

Since the signing of the OU2 (March 1988) and OU3 (September 1991) RODs, the Colorado Water Quality Control Commission (WQCC) has adopted several changes in Regulation 38 – Classification and Numeric Standards for the South Platte River Basin.

The temporary modifications for cadmium and zinc in Segments 5 and 7, adopted as a result of the November 2, 1992, hearing, were allowed to expire on March 31, 1997. However, the flow-dependent equations for metals in Segment 7 remained in effect. A site-specific manganese standard based on seasonal hardness in Segments 5 and 7 became effective on March 31, 1997.

In November 2000, the WQCC divided Segment 13 into two segments to address the differences in water quality and uses between the mainstem and tributaries above Black Hawk's water supply (Segment 13a) and the mainstem and tributaries below Black Hawk's water supply to the confluence with Clear Creek (Segment 13b).

Also in November 2000, the manganese standard for all segments classified for aquatic life use was changed from a single chronic total recoverable value of 1,000 µg/L to hardness-based chronic and acute equations. The table value standards for selenium were also modified from 135 µg/L acute and 17 µg/L chronic to 18.4 µg/L acute and 4.6 µg/L chronic. Ambient quality-based standards were removed from Segment 3a (lead change to TVS) and Segment 11 (cadmium changed to TVS).

Several segments of Clear Creek were reclassified at the same time. Segments 1, 5, 8, 12, 13a, and 13b were designated Recreation Class 1a. Segments 2 and 13a had the water supply classification applied.

Several Ambient Water Quality Criteria for protection of aquatic life have been revised in the State established Table Value Standards (TVS). The TVS are the default standards and are applied to all surface waters that do not have segment-specific numeric standards applied. A comparison of standards in place at the time of the OU3 ROD and current standards are presented below. An assumed hardness of 100 mg $CaCO_3$/L was used for all hardness-dependent equations, marked with an asterisk.

Ambient Water Quality Criteria for Protection of Aquatic Life (µg/L)				
Chemical	OU3 ROD		August 2004	
	Acute	Chronic	Acute	Chronic
Arsenic	360	190	340	150
Cadmium*	3.9	1.1	4.3	2.2
Chromium III*	1,700	210	570	74
Chromium VI	16	11	16	11
Copper*	18	12	13	9
Lead*	82	3.2	65	2.5
Nickel*	1,800	96	468	52
Silver*	4.1	0.12	2.0	0.32
Zinc*	320	47	117	118

In September 2004, the WQCC adopted temporary modifications for selected trace metals, including cadmium, copper, lead, manganese and zinc, in Clear Creek segments 2, 9a and 9b, 11, and 13b. These temporary modifications were based on ambient water quality. Segment 9b was created to encompass Trail Creek since the water quality in Trail Creek is not representative of the water quality in segment 2, of which it was formerly part. The underlying standards remain unchanged for segments 2, 9a, 11 and 13b, the only segments in the Site that have underlying standards other than TVS, and will be reviewed when the temporary modifications expire on February 28, 2010. The September 2004 Stream Classifications and Water Quality Standards table is included in Appendix B.

The WQCC's Regulation 38 indicates that, for a surface water with a water supply classification, the manganese standard is the less restrictive of: 1) existing water quality as of January 1, 2000, or 2) the federal secondary MCL (SMCL) for dissolved manganese of 50 µg/L. Clear Creek Segment 11 is classified for water supply. The concentration of manganese in Segment 11 has historically exceeded the SMCL, therefore the standard will be the value as of January 1, 2000, when calculated by the Water Quality Control Division of CDPHE. The standard is estimated to be between 600 µg/L and 800 µg/L.

The WQCC also adopted a site-specific zinc standard for segment 5 of Clear Creek, based on protection of cold-water biota.

The surface water remedial action objective developed during the Phase II studies is to "reduce metals loading to streams from point discharges in order to reduce in-stream metals concentrations to levels protective of aquatic life." The OU3 ROD stated:

> "the Selected Alternative may not achieve Colorado state table value standards on Clear Creek below the West Clear Creek confluence. EPA and [CDPHE] will monitor the effectiveness of the remedy after it is implemented to determine if state table value standards are achieved. If they are not achieved, an evaluation will be made to determine if additional cleanup is required, or, it may be determined that a site-specific state stream standard can be established which is protective of the uses of Clear Creek."

Remedial actions have occurred with the objective of providing protection to Brown trout in Clear Creek.

The OU4 ROD identifies remediation goals for both high and low flow periods. These goals are presented below:

Metal	Remediation Goals (µg/L)		
	Flow Regime	North Fork (Segment 13b)	Clear Creek below Idaho Springs (Segment 11)
Zinc (dissolved)	High-Flow	381	200
	Low-Flow	675	300
Copper (dissolved)	High-Flow	7.4	5.2
	Low-Flow	15.1	9.2
Cadmium (dissolved)	High-Flow	1.9	1.4
	Low-Flow	3.5	2.3
Manganese (dissolved)	High-Flow	1,531	600
	Low-Flow	2,021	600

3.2.2 Colorado Air Pollution Prevention and Control Act

Effective July 30, 1994, the Colorado Air Quality Control Commission adopted Part C of Regulation 8 – Colorado State Standards for Hazardous Pollutants. Part C.1.B states: "No person shall cause or permit emissions of lead into the ambient air which would result in an ambient lead concentration exceeding 1.5 micrograms per standard cubic meter ($\mu g/m^3$) averaged over a one-month period."

No activities at the Site are expected to exceed this threshold, however dust abatement has been and will continue to be utilized when construction at waste piles is being implemented.

3.2.4 Safe Drinking Water Act

A new standard for arsenic in drinking water will go into effect January 23, 2006. The new standard will lower the acceptable Maximum Contaminant Level (MCL) from 50 µg/L to 10 µg/L.

This new standard may affect a few residences using private ground water wells for drinking water supplies. The data collected from the drinking water sampling program should be reviewed to determine if arsenic concentrations in any of the wells exceed this new MCL.

3.2.5 To Be Considered Documents

In July 1994, EPA issued Directive #9355.4-12, Interim Guidance on Establishing Soil Lead Cleanup Levels at Superfund Sites. In December 1997, CDPHE issued a policy document titled Proposed Soil Remediation Objectives. Both of these new documents are To Be Considered (TBC) regulations rather than ARARs. Soil clean-up levels used at the Site were derived from site-specific risk-based calculations. This is consistent with approaches allowed in these guidance documents.

EPA and CDPHE will continue to monitor this site and any future changes or modifications in ARARs will be reported in the next five-year review.

4.0 REMOVAL ACTIONS

Since the site was listed on the NPL in 1983, EPA or a responsible party has performed several removal actions in order to address immediate threats to human health and the environment that either would not be addressed by remedial quickly enough, or were on properties subject to near-term redevelopment. These removal actions are listed below.

A. Gregory Incline – In March 1987, EPA initiated a time-critical removal action to prevent the tailings pile from collapsing into North Clear Creek. The work involved replacing the deteriorated wooden retaining wall with a gabion basket retaining wall and decreasing the slope of the pile.

B. Idaho Springs Drinking Water – In September 1987, EPA initiated a time-critical removal action to connect three private residences to public drinking water supply. Prior to this removal action, the residences had been served by private ground water wells containing elevated concentrations of cadmium.

C. Mercury Removal – In August 1991, EPA initiated a time-critical removal action to remove pure mercury from an abandoned trailer located approximately one-quarter mile north of Idaho Springs.

D. Soil contaminated by National Tunnel discharge – On June 2, 1993, Mr. Johnny Andrianakos signed an Administrative Order on Consent (AOC) (CERCLA-VIII-93-22) to remove and dispose of approximately 300 tons of contaminated soil. The soil was disposed of at a mineral reprocessing facility, so there are no remaining maintenance obligations.

E. Millsites 12 and 13, Golden Gilpin Mill – On February 12, 1993, Tommyknockers Casino Corporation signed an AOC (CERCLA-VIII-93-12) to remove contaminated mine waste from two millsites located in Black Hawk. Approximately 6000 cubic yards of material was removed and disposed of at a mineral reprocessing facility or a commercial solid waste landfill. A barrier retaining wall was also constructed at the site in April 1994.

F. Gregory Incline Tailings – On November 19, 1993, Millsite 27, Inc., signed an AOC (CERCLA-VIII-94-05) to remove approximately 35,000 cubic yards of tailings and cap the remainder in place. The waste was taken to the Denver Arapahoe Disposal Site and the property was converted to a paved parking lot. This action negated the necessity for the top two tiers of a gabion basket retaining wall and a storm water control system EPA previously constructed. Millsite 27, Inc., also installed a collection system to capture the acid mine drainage from the Gregory Incline. Water flowing from the Gregory Incline in conveyed in a pipe to North Clear Creek, eliminating contact of the acidic water with remaining tailings. CDPHE is responsible for ongoing maintenance of the pipeline system. Ground water monitoring wells were constructed in April 1994, signifying completion of this removal action.

G. Running Gulch fill removal – On February 25, 1993, Western Diversified Builders (WDB) entered into an AOC (CERCLA-VIII-93-14) to mitigate damages they incurred during construction of a road and parking lot under contract to the City of Black Hawk. During construction, WDB placed fill material into Running Gulch without a Section 404 Clean Water Act permit. Additionally, WDB allowed debris to be placed into a shaft (Senator shaft) connected to the National tunnel, forming a dam. By June 1994, WDB had removed 216 cubic yards of contaminated material from Running Gulch and disposed of it at a commercial solid waste landfill. WDB also installed a pipeline system to convey the National tunnel acid mine drainage to Main Street in Black Hawk. WDB provided money to CDPHE for maintenance of the pipeline.

H. Millsite 39 (National Tunnel waste) – On April 18, 1993, Anchor Coin Development signed an AOC to remove contaminated soil and sediment from a wetland located on Millsite 39 in Black Hawk so they could use the property to construct a parking lot. The material was contaminated by the acid mine drainage from the National tunnel. Anchor Coin removed 650 cubic yards of material and sent it to a mineral reprocessing facility for disposal. The company paid $50,000 toward stream restoration work to compensate for the loss of wetlands on the Millsite 39 property. Anchor Coin also completed the National tunnel drainage system by extending the pipe from Main Street to North Clear Creek. Anchor Coin also provided money to CDPHE for maintenance of the pipeline.

I. Gregory Gulch #1 and #2 tailings piles (OU3) – In May 1995, EPA issued two unilateral orders (CERCLA-VIII-95-16 and 17) to the landowners of the Gregory Gulch #1 and #2 tailings piles, Eureka Creek Development, Gold Rush Casinos, and Central City Development, to repair damage caused when the tailings piles partially collapsed during a flood. The work consisted of stabilizing the slope with rip-rap.

J. National tunnel (OU2) and Clay County (OU3) tailings piles – On June 9, 1995, Houston Resources and Mining Inc., signed an AOC (CERCLA-VIII-95-18) to consolidate 8350 cubic yards of waste rock from the National tunnel portal with 44,700 cubic yards of tailings at the Clay County property. The material was graded, capped with fill material and seeded. Houston Resources and Mining is responsible for maintenance of the cap.

K. North Clear Creek tailings pile (OU3) – On August 21, 1996, Blackhawk Development Company entered into an AOC (CERCLA-VIII-96-29) to pull the tailings back from North Clear Creek and grade and cap the material at the North Clear Creek tailings pile in Gilpin County. Blackhawk Development Company maintains the cap.

L. Lion Creek/ Minnesota mine tailings (OU3) – On September 13, 1995, the USDA Forest Service entered into a Participating Agreement with EPA to effect the cleanup of Forest Service-managed properties located within the boundary of the Site. The Forest Service funded a special account, and EPA funded a cooperative agreement with CDPHE to conduct the cleanups (CA V 998473-01). The 7-acre Minnesota mine tailings property was graded, capped and seeded, and a storm water diversion structure was constructed. Maintenance at the site has been funded out of the special account.

M. Little Bear tailings (OU3) – CDPHE completed the removal action at the Little Bear tailings pile in December 1998. 7500 cubic yards of material were removed and disposed of at a noncommercial solid waste landfill. The work was conducted under the Participating Agreement between the Forest Service and EPA. Per Amendment #1 of the Participating Agreement, the Forest Service will conduct maintenance.

N. Dibbens Mill/Sydney Tunnel – In July 2004, the USDA Forest Service issued an Action Memorandum detailing a time-critical removal action to be completed at the Dibbens Mill and Sydney Tunnel sites. The action was deemed necessary due to the presence of elevated concentrations of lead and mercury in soils.

5.0 REMEDIAL ACTIONS

5.1 Operable Unit 1

5.1.1 Description

OU1 was designated to specifically address treatment of the acid mine drainage from five tunnels:

Table 1
Operable Unit 1

Operable Unit	Source Name at Time of ROD	Location
OU1	National Tunnel	Black Hawk
OU1	Gregory Incline Tunnel	Black Hawk
OU1	Quartz Hill Tunnel	Central City
OU1	Argo Tunnel	Idaho Springs
OU1	Big Five Tunnel	Idaho Springs

5.1.2 Background

Surface water at the Site is impacted by the direct discharge from mine drainage tunnels. These discharges are characterized by low pH values and high concentrations of metals including aluminum, arsenic, cadmium, chromium, copper, lead, manganese, nickel, silver and zinc.

5.1.3 Remedial Objectives

The ROD for OU1 was signed in September 1987 (EPA/ROD/R08-87/016). Recognizing that the tunnels covered under OU1 were only one of several factors contributing to water quality and aquatic habitat degradation, EPA denoted that the OU1 ROD selected remedy was an interim remedy. This interim remedy was to consist of the construction of passive treatment systems to treat the acid mine drainage discharging from each tunnel, contingent on the successful completion of pilot studies. If the pilot studies did not show passive treatment to be effective, the OU1 ROD allowed the flexibility to install active treatment.

5.1.4 Summary of Remedial Action

OU1 called for the conduct of treatability studies of passive systems at the mine adits. Treatability studies performed by the Colorado School of Mines at the Big Five tunnel indicated a large wetlands area would be necessary for successful metals removal to occur, rendering this option unfeasible. Concurrently with these studies, the Phase II investigation was being initiated to evaluate the Site comprehensively. Implementation of the OU1 ROD was delayed pending the outcome of the Phase II work, which is discussed under Operable Unit 3.

5.1.5 Site Visit

Not applicable (Discussed under OU3)

5.1.6 Recommendations

Not applicable (Discussed under OU3)

5.2 Operable Unit 2

5.2.1 Description

OU2 was designated to specifically address the remediation of mine tailings and waste rock in the immediate proximity of the five discharging tunnels addressed in OU1:

Table 2
Operable Unit 2

Operable Unit	Source Name at Time of ROD	Location
OU2	National Waste Pile	Black Hawk
OU2	Gregory Incline Waste Pile	Black Hawk
OU2	Quartz Hill Waste Pile	Central City
OU2	Argo Waste Pile	Idaho Springs
OU2	Big Five Waste Pile	Idaho Springs

5.2.2 Background

Tailings and waste rock piles contribute contaminants in a variety of ways, including: runoff from the piles carrying dissolved and suspended metals; the potential for collapse of unstable piles into the surface waters; and the human uptake of metals from the inhalation of dust or ingestion of materials from the piles.

Fund-lead remedial actions at OU2 were performed under Cooperative Agreement V 998764-01.

5.2.3 Remedial Objectives

The OU2 ROD, dated March 31, 1988 (EPA/ROD/R08-88/019), selected remedial action to include:

- Slope stabilization at the Big Five and Gregory Incline waste piles
- Monitoring of the gabion wall at the Gregory Incline, and
- Run-on control at the Argo, Big Five, Gregory Incline, National, and Quartz Hill waste piles.

Similar to the OU1 ROD, the OU2 ROD indicated the selected remedies were interim remedies, since the net beneficial impact to the Site would not be realized until completion of the other operable units.

5.2.4 Summary of Remedial Action

Remedial action at two of the five waste piles was completed in 1990. Slope stabilization and grading work was performed at the Gregory Incline and run-on control was constructed at the Argo waste pile. In 1990, EPA experienced performance problems with the contractor hired by the U.S. Bureau of Reclamation. The Bureau was the lead agency for remedial design and remedial action for OU #2, via an interagency agreement with EPA. As a result, EPA suspended further work on this OU for a time. EPA gave the lead for OU #2 to CDPHE on September 21, 1995, so that CDPHE could conduct the remedial design and remedial action for the remaining OU #2 tailings and waste rock piles along with the remaining OU #3 piles.

Later, removal actions were conducted by private parties to comprehensively remediate the Gregory Incline and National waste piles as development occurred on the properties. These actions are described in a Section 4.0 of this document.

CDPHE issued an Explanation of Significant Differences (ESD) for OU2 in September 1999. The ESD was necessary because, subsequent to when the OU2 ROD was signed, there had been site-specific information developed on risks from lead and arsenic exposure and EPA had issued new Clean Water Act storm water regulations, both of which impacted the OU2 remedy. The ESD presents the changes that were made to the remedy selected for OU2. Briefly, the changes include:

- Regrading of the Argo waste pile to remove the toe from Clear Creek
- Capping and constructing a retaining wall along a portion of the toe of the Argo waste pile
- Constructing run-off controls along the toe of the Argo waste pile
- Capping the top of the Argo waste pile
- Capping the Big Five waste pile
- Constructing a retaining wall and regarding the Big Five waste pile

More specifically, remedial actions performed include:

A. Argo tailings and waste rock pile – This action was the trigger for the first five-year review. In the spring of 1990, EPA installed a culvert to collect the flow from Rosa Gulch and convey it under the Argo waste pile to the main stem of Clear Creek. Run-on controls were also installed along the back edge of the waste pile. EPA performed maintenance of these controls until CDPHE executed additional remedial actions at this site, and assumed responsibility for maintenance operations.

B. Gregory Incline tailings pile – In the spring of 1990, EPA graded the mine waste pile and installed a system of membrane-lined surface water collection ditches and pipes to prevent storm water from flowing over the pile and becoming contaminated prior to flowing into North Clear Creek. In 1994, this storm water collection system was removed to allow for casino development and a subsequent removal action as discussed above.

C. Big Five waste rock pile – CDPHE, under a cooperative agreement with EPA, performed remedial actions during 2000. The work included construction of retaining walls along both sides of Clear Creek, laying back the slope of the waste rock piles, capping the contaminated material, and constructing surface water drainage features. The City of Idaho Springs entered into a Prospective Purchaser Agreement (PPA) with EPA (CERCLA-VIII-2000-06) when the property was purchased from Mr. Al Hoyl and is responsible for maintenance. The Colorado Department of Transportation (CDOT) owns a right-of-way on a portion of the property.

D. Argo waste pile - During 2003, CDPHE implemented the final remedial actions at the Argo waste pile. Material was removed from Clear Creek, a retaining wall was constructed to improve slope stabilization along the western end of the pile, and a drainage control system, consisting of perimeter ditches and retention ponds, was constructed. CDPHE is responsible for operation and maintenance of this remedial action.

The Quartz Hill waste pile remedy has not yet been implemented. CDPHE is currently working with EPA to resolve the complex ownership issues associated with the Quartz Hill waste pile.

5.2.5 Site Visit

A site visit was performed in August 2004. The properties where the National and Gregory Incline waste piles used to reside remain under commercial use. Revegetation of the Big Five waste pile flourishes, and the City of Idaho Springs has completed a bike trail along the top of the pile. Maintenance activities at the Argo waste pile were recently completed to repair damage done to the toe of the pile when Clear Creek experienced unusually high flows during Spring 2003. All of the piles appeared to remain stable, and run-on controls seem effective. Remedial actions have not been conducted at the Quartz Hill waste pile.

5.2.6 Recommendations

The remedy is protective of human health and the environment at the locations were remedial actions have been completed.

Operations and Maintenance (O&M) is required at several of the waste piles. The City of Idaho Springs is performing O&M at the Big Five waste pile under a Prospective Purchaser Agreement. CDPHE is responsible for the O&M of the Argo waste pile. O&M for the Gregory Incline and National waste piles was performed by

their respective respondents during the first five years after completion of the response action, but is no longer required. CDPHE performs periodic cleaning of the National and Gregory Incline pipelines to remove sediment buildup.

5.3 Operable Unit 3

5.3.1 Description

Operable Unit 3 encompasses the entire Clear Creek Watershed, defined as the Site study area. The Phase II investigations selected eight draining tunnels (five of which were discussed in OU1) and twenty-one waste piles (five of which were addressed in OU2) to evaluate for a remedial determination.

Table 3
Operable Unit 3

Operable Unit	Source Name	Location	RA Complete
	Mine Tunnels		
OU1	National	Black Hawk	Delayed until OU4 investigations complete
OU1	Gregory Incline	Black Hawk	Delayed until OU4 investigations complete
OU1	Quartz Hill	Central City	Delayed until OU4 investigations complete
OU1	Argo	Idaho Springs	September 30, 1999
OU1	Big Five	Idaho Springs	Interim waiver
OU3	Rockford	Idaho Springs	No Action
OU3	McClelland	Dumont	No Action
OU3	Burleigh	Silver Plume	Passive wetland discontinued, ROD amended to select No Action alternative
	Waste Piles		
OU2	National	Black Hawk	April 19, 1996 (removal action)
OU2	Gregory Incline	Black Hawk	May 5, 1994 (removal action)
OU2	Quartz Hill	Central City	
OU2	Argo	Idaho Springs	September 2003
OU2	Big Five	Idaho Springs	August 25, 2000
OU3	Urad	Woods Creek	1993
OU3	Empire	Empire	No Action
OU3	North Empire/Lion Creek (aka Minnesota mine)	Empire	November 12, 1996 (removal action)
OU3	McClelland	Dumont	January 6, 1995
OU3	Black Eagle	Chicago Crk	October 13, 1994
OU3	Little Bear Creek	Idaho Springs	December 14, 1998 (removal action)

Table 3
Operable Unit 3

Operable Unit	Source Name	Location	RA Complete
OU3	Boodle Mill	Central City	August 24, 2000
OU3	Gregory Gulch #1	Central City	September 24, 1998 March 29, 1999
OU3	Gregory Gulch #2	Central City	September 28, 1999
OU3	Chase Gulch #1	Black Hawk	January 27, 2000
OU3	Chase Gulch #2	Black Hawk	Estimated RD complete September 30, 2004
OU3	Golden Gilpin	Black Hawk	Millsites 12 & 13 complete April 30, 1994 (removal action) Millsite 11 pending
OU3	North Clear Creek	Gilpin County	November 10, 1996 (removal action)
OU3	North Clear Creek Dredge	Gilpin County	Delayed until OU4 investigations complete
OU3	Clay County	Lake Gulch	April 19, 1996 (removal action)
	Other		
OU3	Drinking Water	Sitewide	September 30, 2003
OU3	Virginia Canyon Groundwater	Idaho Springs	Estimated completion September 30, 2005

5.3.2 Background

OU3 was originally designated to address the control of surge events from the Argo Tunnel. However, in 1988 the CDPHE took over lead agency status and initiated a more comprehensive investigation of the watershed. This investigation became known as the Phase II RI/FS. OU3 was redesignated as the Phase II investigations.

In the fall of 1999, CDPHE prepared and submitted to EPA a grant application to provide additional funds to continue remedial design work for OU3 (CA No. V 008534-01). Subsequent applications have been submitted and awards received for ongoing remedial design work. A grant application was also prepared to fund remedial actions at several source areas listed in OU3 (CA No. V 998176-01).

5.3.3 Remedial Objectives

The OU3 ROD, dated September 1991 (EPA/ROD/R08-91/055), updated decisions previously prescribed in the OU1 ROD and detailed the decisions resulting from the Phase II investigations.

The OU3 ROD superceded the OU1 ROD by:

- Using an Interim Waiver of Applicable or Relevant and Appropriate Requirements (ARARs) for the discharge from the Big Five Tunnel

- Collecting the discharges from the Gregory Incline, National, and Quartz Hill tunnels and piping to North Clear Creek to eliminate overland travel and reduce the potential for direct human contact
- Invoking an interim remedy waiver of ARARs and delaying a decision on final treatment of the Gregory Incline, National, and Quartz Hill tunnels until further investigations have been conducted

Other major components of the OU3 ROD include:

- An alternate drinking water supply for residences where required
- Passive treatment of the Burleigh discharge
- Chemical treatment of the Argo Tunnel discharge instead of man-made wetlands as previously selected in the OU1 ROD
- No action to control surge events from the Argo Tunnel
- Reduction in the heavy metals load from Woods Creek
- A ground water collection system in the Idaho Springs area to address non-point source metals loading to surface water, currently referred to as the Virginia Canyon ground water project
- Capping or physical barriers, and institutional controls, for select mine waste piles (Gregory Gulch piles #1 and #2, Clay County, Boodle Mill, McClelland, North Clear Creek, Chase Gulch #1 and #2, Quartz Hill, Golden Gilpin, Black Eagle, and Little Bear)

5.3.4 Summary of Remedial Action

A. Burleigh tunnel drainage – In 1993, a pilot scale wetland treatment system was constructed at the Burleigh tunnel. After three years of operation and data collection, EPA and CDPHE concluded that a number of factors prevented the system from efficiently removing dissolved zinc from the discharge. When the wetlands were decommissioned in 1999, the control valve system was inadvertently broken and the tunnel discharge infiltrated into the subsurface. Continued monitoring indicates the zinc load discharging from the Burleigh tunnel to Clear Creek is not significant enough to warrant treatment. Therefore, an OU3 amendment to the ROD was issued in September 2003 to select the No Action Alternative as the remedy for the Burleigh tunnel.

B. Woods Creek (Urad) – The Climax Molybdenum Company completed actions in 1992 as described in Section 6.0 of this report.

C. Black Eagle Mill - On July 15, 1994, EPA issued an unilateral order to Jack Pine Mining Company to remediate the Black Eagle Mill by laying back and rip-rapping the tailings slope along Chicago Creek. The tailings onsite were capped and seeded. Jack Pine Mining is responsible for maintenance of the cap and stream bank stabilization.

D. McClelland tailings pile - CDPHE completed a fund lead remedial action of the McClelland tailings pile under a cooperative agreement with EPA (CA V 998175-01). Tailings were removed from contact with the flow of Clear Creek, and the pile was graded, capped and seeded. Clear Creek County has agreed to maintain the cap covering approximately 32,200 yards. Additionally, sediment contaminated by the McClelland tunnel drainage was excavated and consolidated and a drainage collection and conveyance system was constructed. Several entities collaborated on this effort, including Clear Creek County, Coors Brewing Company, Colorado Department of Minerals and Geology, and Colorado Department of Transportation. Clear Creek County is responsible for operation and maintenance of the drainage collection and conveyance system.

E. Gregory Gulch #1 – On September 5, 1997, EPA issued a UAO to Gold Rush Casinos to conduct remedial action at the Gregory Gulch #1 property. 3,000 cubic yards of contaminated tailings were stabilized with a commercial product called "Envirobond." The treated material was then consolidated on the property where it was capped and seeded. Gold Rush Casinos is responsible for maintaining the cap.

F. Gregory Gulch #1 – On September 5, 1997, EPA issued UAOs to Eureka Creek Development and the City of Central (CERCLA-VIII-97-74 and 72) to remediate the remaining portion of the Gregory Gulch #1 tailings pile. 4,352 cubic yards of contaminated tailings were removed and disposed of at a commercial solid waste landfill. Another 2000 cubic yards of material were contained behind a culvert on city-owned Leavitt Street. Central City is responsible for maintaining the culvert so that the tailings remain encapsulated.

G. Gregory Gulch #2 – On September 19, 1997, EPA issued UAOs to American Prometheus Limited Partnership and Colorado Viento Vista Inc. (CERCLA-VIII-97-75 and 76). American Prometheus purchased the Colorado Viento Vista property and completed remediation of the entire property. American Prometheus removed approximately 2,300 cubic yards of material offsite for disposal at a commercial solid waste landfill. Some amount of tailings was left onsite due to the dangers involved with removing them from around an old mine shaft. The remaining material was capped in place. American Prometheus is responsible for maintaining the cap.

H. Argo tunnel drainage - On April 7, 1998 the Argo Tunnel Water Treatment Facility (WTF) began operating full time. The plant was built on land acquired by EPA in a settlement with the landowner, Mr. Jim Maxwell, as detailed in a Consent Decree lodged with the court on June 3, 1997 (Civil Action No. 97-WY-286). The facility was deemed Operational and Functional complete on September 30, 1999. The plant utilizes a neutralization and clarification process to precipitate and remove heavy metals from the acid mine drainage. An average flow of 250 gallons per minute is treated, and approximately 1400 pounds of metals are removed daily. The effluent is discharged directly to Clear Creek, and the solid metal sludge is disposed of at a municipal landfill. Certified operators run the plant under contract to CDPHE. EPA currently funds 90% of

the Long Term Remedial Action costs through a Cooperative Agreement (V 998608-01). Annual operating costs for the WTF are:

Annual O&M Costs for the Argo WTP		
Dates		Total Cost rounded to nearest $1,000
From	To	
July 1, 1999	June 30, 2000	$1,262,000
July 1, 2000	June 30, 2001	$939,000
July 1, 2001	June 30, 2002	$964,000
July 1, 2002	June 30, 2003	$873,000
July 1, 2003	June 30, 2004	$970,000

In an effort to reduce ongoing operation and maintenance costs and to optimize the efficiency of the WTF, CDPHE is converting the facility from a sodium hydroxide-based process to a hydrated lime-based process. It is anticipated this conversion could result in an annual cost savings of approximately $170,000.

I. Chase Gulch #1 – On October 22, 1998, Mr. Roger LeClerc entered into a PPA with EPA (CERCLA-VIII-98-20) when he purchased the property from Mr. Jim Rhunka. The PPA required clean-up of the tailings pile and reimbursement to EPA of $2,500 for response costs. The tailings pile was removed from the site, therefore no maintenance is required.

J. Boodle waste pile – Central City purchased the privately owned portion of the Boodle Mill and acquired the remainder of the property from the U.S. Bureau of Land Management. During 1999 and 2000, Geitner Environmental Management Group, Inc. (GEM), on behalf of the City of Central, removed 13,837 yards of tailings from the wetlands and pond area below the mill building and consolidated and capped them near the up-gradient side of the mill building. Central City is responsible for cap maintenance. They have plans to redevelop the property into a public works facility. The cleanup was performed without a formal enforcement agreement.

K. Drinking water program – Free analysis of drinking water wells in Gilpin and Clear Creek counties for heavy metals was offered to private residences. Sixty wells were sampled. Four wells contained heavy metal concentrations above either the MCL or the health based limits established in the ROD. These residences were temporarily provided bottled drinking water. In 2003, three residences were provided household water treatment systems, and one residence was connected to the municipal water supply. This work was performed by CDPHE under Cooperative Agreement V 998176-01.

L. Repository – In 2000, CDPHE began exploring the possibility of constructing a repository located within the Site. The repository would be located on an existing mining-impacted site and would be used to dispose of mine wastes and sludge from the Argo WTF. A local repository would reduce the cost of Site

cleanups so that more fund-lead remediations could be executed. It may also encourage additional cleanups by private parties and other public entities.

In October 2001, CDPHE's consulting engineer, Golder Associates Inc., completed an evaluation of three potential sites located in the watershed. The sites were evaluated to determine their suitability as a repository. The Druid Mine (former Solution Gold operations) site was recommended.

M. Burleigh tunnel discharge - An amendment to the ROD for OU3 was issued in June 2003. The amendment presents the changes that were made to the remedy selected for Burleigh tunnel discharge. The No Action Alternative was selected. CDPHE is responsible for O&M in the form of ongoing surface water monitoring.

N. Big Five tunnel discharge – On June 17, 2004, CDPHE diverted the adit discharge from the unlined retention pond to flow directly into Clear Creek. This was done to allow the pond to drain so it may be filled and closed. CDPHE initially anticipated collecting the adit drainage and piping it to the Argo WTF for treatment. However, due to the significant cost necessary to reduce this relatively minor load, CDPHE and EPA are evaluating other options.

O. Virginia Canyon ground water - In 1993 CDPHE installed a number of monitoring wells near the mouth of Virginia Canyon in an attempt to determine the feasibility of collecting contaminated ground water and treating along with the Argo Tunnel discharge. The investigation identified ground water contamination in the area but was unable to determine the feasibility of extracting a volume sufficient to minimize loading from the contaminated ground water. CDPHE completed a second ground water investigation within Virginia Canyon in 2001.

During 2003, CDPHE selected AMEC Earth and Environmental to design a surface and ground water interceptor system to capture and convey the surface and alluvial flows to the Argo WTF. Design is planned for completion in 2004. This system is anticipated to be under construction in 2005. Bulk flow measurements and raw water samples were collected between March 24 and June 9 for design purposes**.**

P. Chase Gulch #2 – In May 2004, CDPHE contracted with an engineering firm, WRC Engineering Inc., to provide design services. Design is estimated to be complete in September 2004.

Q. Golden Gilpin - In May 2004, CDPHE contracted with an engineering firm, WRC Engineering Inc. to provide design services. Design is estimated to be complete in September 2004.

As discussed in Section 4.0, Removal Actions were performed at several of the piles listed in the OU3 ROD.

5.3.5 Site Visit

Typically, CDPHE and EPA project managers visit the Site on a regular basis as remedial activities are ongoing. For this five-year review, a site visit was conducted in August 2004. Generally, the remedy is functioning well. Revegatation efforts appear to be successful. There was no evidence of slope movement or gullying at any of the remediated waste piles.

The following observations were made during the site visit:

- Construction activities associated with gaming continued in Black Hawk and Central City.
- Ames Construction, under contract to Central City, has been building a roadway to connect I-70 directly to Central City. This project is commonly referred to as the "Southern Access Road."
- Squatters had taken up residence at the Little Bear site. They indicated they would be leaving shortly.
- Construction of the bike path that runs along the top of the Big Five waste pile has been completed, including a bridge to span Clear Creek.
- The City of Idaho Springs was performing some construction activities in Virginia Canyon to remove sediment and debris that had washed onto the roadway during a recent heavy rain event.

5.3.6 Recommendations

As a result of the five-year review, the following recommendations for OU3 are being made:

- Complete remedial actions identified in the OU3 ROD including: Quartz Hill, Golden Gilpin and Chase Gulch #2 waste piles, Virginia Canyon ground water, Big Five tunnel and the on-site repository.
- Continue to monitor water quality and fish populations in the main stem of Clear Creek to determine if the remedy is meeting the remedial action objectives
- Develop a database to monitor operation and maintenance activities at the Site into the future

5.4 Operable Unit 4

5.4.1 Description

The need for OU4 was identified in the OU3 ROD and was developed to focus on the North Fork of Clear Creek. The focus of OU4 includes three tunnel discharges previously listed in OU3 (National, Gregory Incline and Quartz Hill) and drainages containing large numbers of waste and tailings piles (Nevada Gulch, Gregory Gulch and Russell Gulch). Additionally, non-point loading in the form of ground water is also being studied.

5.4.2 Background

In December 2001 Tetra Tech Rocky Mountain Consultants (TTRMC) was hired as a consultant to CDPHE to continue work on the OU4 Remedial Investigation/ Feasibility Study (RI/FS). This work is being funded under Cooperative Agreement V 988176-01.

A Proposed Plan for OU4 was issued in July 2004.

5.4.3 Remedial Objectives

Prior to the initiation of the OU4 RI/FS, two studies were completed on the North Fork of Clear Creek. One study was conducted by EPA in July 1994. This study focused on sediment quality in the North Fork and was used to upgrade the existing water quality fate and transport model for this tributary. The study findings are published in a report entitled, "Chemical and Physical Assessment of North Clear Creek During July, 1994" dated May 1995. CDPHE conducted an evaluation of North Clear Creek in 1994 and 1995. The study findings are published in an April 1997 report entitled, "North Clear Creek Surface Water Investigation."

OU4 efforts will build on previous efforts and continue to evaluate, prioritize and implement clean-up efforts within the Clear Creek watershed basin. The OU4 RI/FS efforts that are underway will focus on the North Fork of Clear Creek evaluating the feasibility of remediating mine wastes and water treatment of discharging adits.

Major objectives of the OU4 Proposed Plan include:

- Reduce in-stream metals concentrations and sediment transport in the North Fork of Clear Creek with the objective of supporting brown trout in the North Fork of Clear Creek and supporting a viable reproducing brown trout population in the mainstem of Clear Creek
- Protect drinking water supplies diverted from the main stem of Clear Creek
- Control and/or reduce run-on and run-off from waste rock/tailings piles to minimize generation of contaminated runoff and/or ground water, and to reduce sediment loading of streams
- Reduce human exposure to arsenic and lead from incidental ingestions of waste rock/tailings and other mine wastes

In support of these objectives, the proposed remedial actions for OU4 outlined in the ROD include:

- Treatment of Gregory Incline discharge and Gregory Gulch ground water at the Bates Hunter Mine water treatment plant.
- Treatment of the National Tunnel discharge at a passive treatment system downstream of Black Hawk along Highway 119.

- Sediment control involving waste pile removal/capping, sediment detention structures on Russell and Nevada Gulches, and other sediment reduction measures in Russell, Gregory and Nevada Gulches, and along the North Fork of Clear Creek itself.

5.4.4 Summary of Remedial Action

None.

5.4.5 Site Visit

Not applicable

5.4.6 Recommendations

Remedial actions at OU4 should be completed as quickly as possible so that final Site decisions can be made and full protectiveness can be evaluated.

6.0 OTHER SITE ACTIVITES

A. Woods Creek – Climax Molybdenum Company owns the Urad facility, a historic molybdenum mine located on Woods Creek, a tributary to the West Clear Creek. Under the requirements of NPDES permit CO-0041467, the company plugged the Urad portals in 1989 and built a water treatment plant to remove metals from seepage from the two tailings ponds in 1993. Through the NPDES permit, the remedial objective for this portion of the Clear Creek watershed is being met and no Superfund action is contemplated at this time.

B. In 1994 EPA's Regional Geographic Initiative program funded stream habitat restoration work in Clear Creek where it travels through Idaho Springs.

C. The Colorado Division of Minerals and Geology (DMG) has performed remediation activities in the watershed utilizing both bond money (Saratoga Mine and Solution Gold) and funding through DMG's Inactive Mine Reclamation program and EPA's Clean Water Act Section 319 program (Alice Mine).

D. General Herckimer (Spring Gulch) waste pile – The Clear Creek Watershed Foundation (CCWF), with funding from EPA, performed some work at the General Herckimer waste pile. Material was pulled back from contact with Clear Creek and the area was graded and covered with wood chips.

E. Little Six #1 – In 2000, the CCWF, with funding from Asarco, removed the Little Six #1 mine waste. The waste was mixed with alkaline fly ash and disposed of it at the Coors, Inc., waste disposal facility located near Keenesburg, Colorado.

F. In 2001, the Federal Highway Administration (FHWA) and the Colorado Department of Transportation (CDOT) created a cooperative effort entitled the Stream and Wetland Ecological Enhancement Program (SWEEP) to evaluate existing and future water related issues associated with development along Clear Creek. This effort was created as an offshoot of the Programmatic Environmental Impact Statement (PEIS) required of CDOT as they evaluate the potential expansion of Interstate 70 between the Eisenhower Tunnel and Floyd Hill, a distance of nearly 30 miles. A summary of the findings can be found in the "Draft Inventory of I-70 Mountain Corridor Water Resource-Related Issues."

G. Little Six #2 – In 2004, the CCWF, with funding from EPA, removed approximately 4900 cubic yards of mine waste material including the Little Six #2 pile. The material was disposed of at the Gem mine site, an area previously disturbed by mining activities located near the head of Gilson gulch. Mining & Environmental Services LLC performed this work under contract with the CCWF.

H. Beginning in 1994, the Upper Clear Creek Watershed Association (UCCWA) conducts sampling of Clear Creek eight times annually at 17 locations. The samples are analyzed at the EPA laboratory. Electronic copies of the up-dated database are sent to interested parties as analytical results are received.

I. Beginning in 1995 and continuing, the Colorado Division of Wildlife (DOW), under an interagency agreement with CDPHE, has conducted a monitoring program for fish and macroinvertebrates in the Clear Creek Basin to determine the impact remedial actions have had on the aquatic ecosystem.

J. In 2004, UCCWA received Clean Water Act Section 319(h) funds to evaluate the watershed to locate non-point sources of loading. This information may eventually lead to the existing water quality standards for some segments of Clear Creek being replaced with standards based on ambient water quality.

7.0 PROGRESS SINCE THE LAST FIVE-YEAR REVIEW

The second five-year review for the Clear Creek/Central City Superfund Site provided the following recommendations:

- Complete the studies of the non-point source metals loading to Clear Creek in the vicinity of Idaho Springs
- Complete the feasibility study for North Clear Creek
- Make a final decision concerning remedial activities at the Burleigh tunnel

These three recommendations have been implemented. An investigation completed in 2001 indicated the non-point source loading in Idaho Springs was the result of contaminated ground water flowing from Virginia Canyon. A design to capture and transport the water to the Argo WTP is underway. The Remedial Investigation/Feasibility Study for North Clear Creek (OU4) was completed September 29, 2004. An amendment to the OU3 ROD selected the no-action alternative for the Burleigh tunnel discharge.

Additional progress made since the March 1999 five-year review includes:

A. On September 1, 1999 an Explanation of Significant Differences was issued to address the change in the selected remedial actions at the Argo and Big Five waste piles.

B. The Argo Tunnel Water Treatment Plant became Operational and Functional on September 28, 1999.

C. American Prometheus Limited Partnership and Colorado Viento Vista Inc., per UAOs issued by EPA on September 19, 1997, completed remedial action at the Gregory Gulch #2 waste pile September 28, 1999.

D. Mr. Roger LeClerc, per a PPA with EPA dated October 22, 1998, completed remedial action at the Chase Gulch #1 waste pile January 27, 2000.

E. Remedial action at the Boodle Mill was completed August 25, 2000 by the City of Central.

F. Remedial action at the Big Five waste pile was completed by CDPHE August 25, 2000.

G. In October 2001, CDPHE completed an evaluation of three potential sites for locating an on-site repository for the disposal of Argo WTP sludge and mine waste.

H. In 2001, CDPHE completed the ground water investigation at Virginia Canyon in Idaho Springs. A design engineer was hired in 2003 to design a collection and conveyance system so that the ground water can be treated at the Argo Tunnel WTP.

I. On September 22, 2003 an amendment to the OU3 ROD was issued to select the no-action alternative for the Burleigh tunnel.

J. Remedial action at the Argo waste pile was completed by CDPHE September 23, 2003.

K. On September 30, 2003 the drinking water program was completed with all the identified impacted residences being provided a long-term source of clean water.

L. On June 17, 2004, CDPHE diverted the flow from the Big Five tunnel around the unlined retention pond. This was done so the pond could be filled and closed. CDPHE and EPA are evaluating the options to deal with the drainage into the future.

M. On September 29, 2004, the OU4 Remedial Investigation/Feasibility Study was completed.

N. The ROD for OU4 was signed September 29, 2004.

O. The remedial design for Chase Gulch #2 will be completed September 30, 2004.

P. The remedial design for Golden Gilpin is in progress.

8.0 FIVE-YEAR REVIEW PROCESS

The five-year review was completed between March and September 2004. Components of the five-year review included:

- Community involvement
- Document review
- Data review
- Site inspection
- Local interviews
- Five-year review report development and review

8.1 Community Involvement

Members of the community were informally notified during July 2004 of the third five-year review occurring. Notification occurred via telephone calls, an announcement at a monthly meeting with interested parties, and at a meeting held to discuss the OU4 Proposed Plan. The Clear Creek/Central City Community Involvement Plan was updated in conjunction with this five-year review, and is included as Attachment D of this report. Once finalized, the community will be notified that the five-year review has been completed, and the results of the review will be provided to all site repositories.

8.2 Document Review

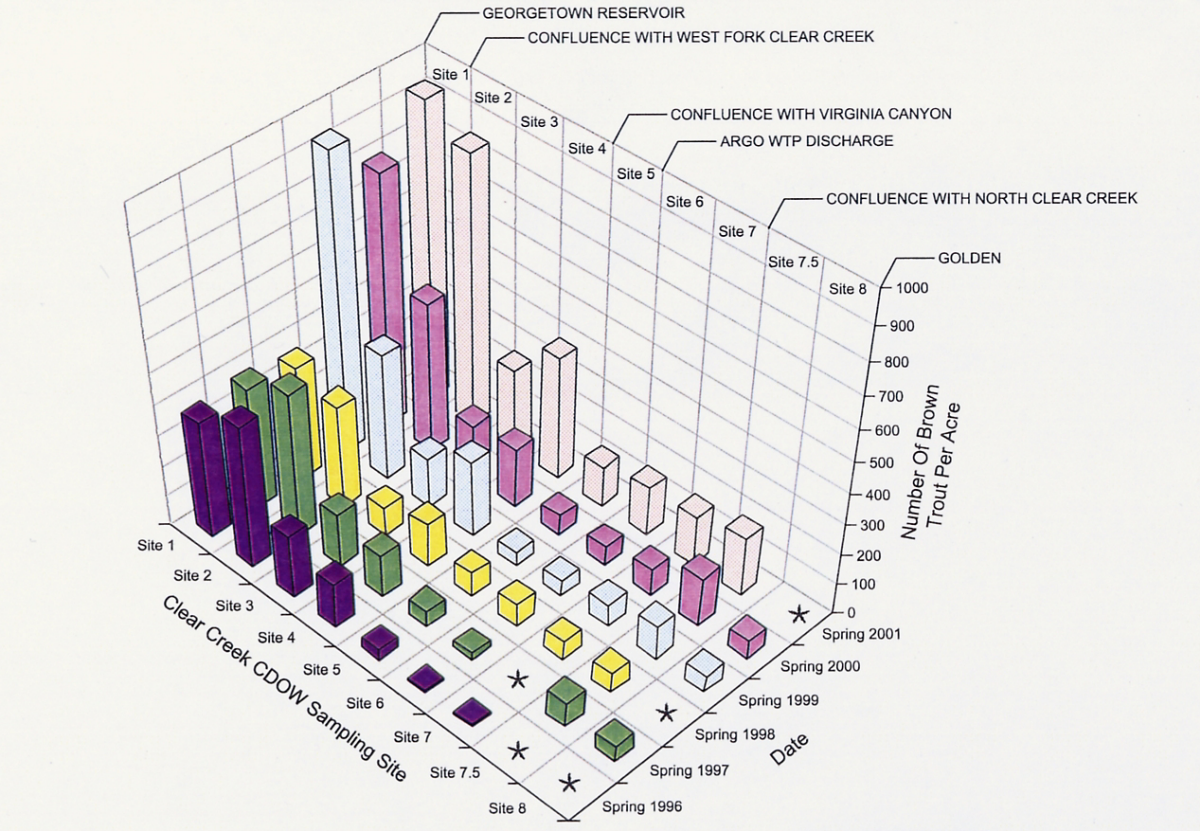
Several relevant documents were examined in support of this five-year review. A list of documents referenced is presented in Section 13. Applicable or Relevant and Appropriate Requirements were also reviewed, as discussed in Section 3.2.

8.3 Data Review

Surface water sampling has been conducted at the Clear Creek/Central City Superfund Site since the early 1980s. In general, most contaminants were detected at their highest concentrations early in the history of the Site. This is evident from looking at two key metals, copper and zinc.

The Upper Clear Creek Watershed Association (UCCWA) has been conducting surface water sampling along the mainstem of Clear Creek since 1994. Several metals are monitored along with nutrients and flow. Copper and zinc concentrations in Clear Creek below the Argo discharge and at Golden were compared to their stream standards. During the first five years of monitoring (1995-1999), copper exceeded the standard of 17 µg/L 78 percent of the time. During the most recent five years (2000-2004), the copper standard was exceeded 42 percent of the time. Similarly, the exceedence rate for zinc decreased from 68 percent to 26 percent (based on a standard of 300 µg/L).

The Colorado Division of Wildlife (DOW) has conducted biological monitoring of the Clear Creek basin since 1995. As seen in the following graph, Clear Creek has experienced a slight increase in trout populations.



8.4 Site Inspection

Since remedial and operation and maintenance activities continue at the Site, various CDPHE and EPA project managers make routine visits to specific portions of the Site. For this five-year review, a Site-wide visit was conducted on August 3, 2004. The purpose of the site visit was to assess the protectiveness of the remedies that have been completed and to evaluate the integrity and success of previously constructed remedy components including:

- waste pile slope stabilization and capping
- revegetation efforts
- discharge or run-on conveyance structures

A more detailed description of Site observations is provided in the discussion of each Operable Unit.

8.5 Local Interviews

Between August 11 and September 13, 2004, CDPHE and EPA community involvement coordinators conducted interviews of various parties in person and by phone. Interviewees included citizens residing within the Site, public officials, the media, and members of UCCWA. The results of the interviews are presented in the 2004 update of the Clear Creek/Central City Community Involvement Plan (attachment D).

9.0 ASSESSMENT

The following conclusions have been determination for the remedies at the Clear Creek/Central City Superfund Site:

9.1 Operable Unit 1

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

The OU3 ROD superceded the OU1 ROD, therefore no remedies were implemented under the heading of OU1.

Question B: Are the assumptions made at the time of the remedy selection still valid?

Not applicable.

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

Not applicable.

9.2 Operable Unit 2

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

The intent of the OU2 ROD to minimize the potential for specific mine waste piles to contribute metal and sediment loading to Clear Creek through collapsing of unstable slopes and through run-off. Additionally, the human uptake of metals from the inhalation of dust or ingestion of materials from the piles was to be minimized. These objectives have been accomplished at four of the five waste piles. The last waste pile, Quartz Hill, has not yet been addressed.

Question B: Are the assumptions made at the time of the remedy selection still valid?

Following the signing of the OU2 ROD, a Baseline Risk Assessment was completed for the Site and human health action levels were established for lead and arsenic in soil. The established action levels were 500 parts per million (ppm) for lead and 130 ppm for arsenic. Since the Big Five and Argo mine waste piles exhibited soil concentrations of lead and arsenic greater than the risk-based action levels, an Explanation of Significant Differences was issued to incorporate capping into the remedy at these two piles. However, due to concerns of the local State Historic Preservation Office, and the property owner, the Argo waste pile was not capped. Access to the pile is controlled, and therefore human exposure is limited.

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

No new ecological risks or changes in land use were discovered during the five-year review.

9.3 Operable Unit 3

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

The remedy has not yet been completely implemented. However, the portions of the operable unit where remedial actions are complete are functioning as intended. The Argo WTP continues to achieve a 99.9 percent reduction in metals loading from the tunnel into Clear Creek. Waste piles that have been regraded and/or capped are stable and show no evidence of erosion into the waterways. Human exposure to site hazards is being minimized by removing direct contact with tunnel discharges. Residences previously identified as being exposed to unacceptable metal concentrations in their drinking water are being supplied safe water.

However, work still needs to be completed at OU3. A ground water collection system in the Idaho Springs area to address non-point source metals loading to surface water, currently referred to as the Virginia Canyon ground water project, still needs to be implemented. Some waste piles still require action, including Quartz Hill, Golden Gilpin, and Chase Gulch #2.

Question B: Are the assumptions made at the time of the remedy selection still valid?

A baseline risk assessment was performed prior to the signing of the OU3 ROD. No new toxicological information was discovered during the five-year review that would indicate the risk assessment is no longer appropriate.

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

No new ecological risks or changes in land use were discovered during the five-year review.

9.4 Technical Assessment Summary

According to the data reviewed, the site inspection, and the interviews, the remedies that have been completed are functioning as intended by the decision documents. There have been no changes in the physical conditions of the Site that would affect the protectiveness of the remedy. There have been no changes in the ARARs impacting the remedy selected and implemented at the Site. There is no information that calls into question the protectiveness of the remedies constructed to date.

Following completion of OU3 remedial actions and implementation of OU4 remedial actions, the concentrations of metals in Clear Creek below Idaho Springs (Segment 11) are expected to be significantly reduced. At that time, compliance with the remedial action objectives can be assessed. CDPHE and EPA may want to participate in a use attainability analysis to determine whether numeric remediation goals are appropriate and whether additional remediation efforts are warranted.

10.0 ISSUES

While no serious deficiencies were discovered during the five-year review, the following outstanding issues should be resolved:

1. The Big Five Tunnel remains under an interim waiver. A final decision needs to be made and adequately documented.

2. The OU2 ESD states capping of the top of the Argo waste pile as the selected remedy. Based on discussions with the State Historic Preservation Office and the property owner, this was not done. Access to the waste pile is controlled, so eliminating the cap does not result in an unacceptable exposure. However, the change in remedy needs to be properly documented.

3. The local repository, although contemplated under OU3, was not included in the final remedy decision in the ROD. If EPA and CDPHE elect to move forward with this project, an ESD will need to be issued.

4. Remedial actions have not been completed at OU3. These activities need to be completed as soon as reasonably possible, and the ability of the Site to meet remedial action objectives needs to be evaluated.

5. Remedial actions newly identified in the OU4 ROD need to be implemented.

6. A myriad of data exists from surface water sampling conducted by several different entities. Infrequently, the data has been combined to present a comprehensive view of the watershed over time. The data should continue to be consolidated on a regular interval, and a uniform location identification system should be developed.

7. Information detailing the parties responsible for ongoing operation and maintenance activities at different source areas within the Site should be entered into a database, along with a description of what activities to be performed, at what frequency and what the reporting requirements are.

8. Institutional Controls used at the Site are contained within a variety of documents, including PPAs, AOCs, UAOs, and agreements. The information should be consolidated into a database to ensure the IC's remain effective into the future. There may be sites where waste was left in place, and institutional controls were not implemented or need to be modified.

11.0 RECOMMENDATION AND FOLLOW-UP ACTIONS

With EPA and CDPHE oversight, the corresponding recommendations and follow-up actions are as follows:

Recommendations and Follow-Up Actions

Issue	Recommendation and Follow-up Action	Party Responsible	Milestone Date	Affects Protectiveness (Y/N)	
				Current	Future
Lack of O&M records	A database should be developed to record the parties responsible for O&M at each site and to track that required O&M is being performed.	EPA and CDPHE	12/2005	N	Y
Lack of Institutional Controls record-keeping	Evaluate the effectiveness of institutional controls where waste was left in place. Implement IC's as necessary. Develop a database to consolidate the information.	EPA and CDPHE	3/2005	N	Y
Big Five adit discharge still under interim waiver	A final decision on the Big Five adit discharge should be made.	EPA and CDPHE	09/2005	N	N
Scattered surface water data	Surface water data collected by several different entities should be consolidated and the data management centralized in order to maintain a complete record of surface water conditions.	EPA and CDPHE	12/2005	N	N
Argo waste pile not capped	An ESD should be prepared to reflect the change made to the Argo waste pile remedy.	CDPHE	6/2005	N	N
Repository not included in decision documents	The decision to pursue a local repository should be documented in an ESD to the OU3 ROD	CDPHE	9/2005	N	N
OU3 work not completed	Outstanding remedial actions identified in the OU3 ROD need to be completed	CDPHE	On-going	Y	Y
OU4 work not completed	Remedial actions identified in the newly completed OU4 ROD need to be implemented	CDPHE	On-going	Y	Y

12.0 PROTECTIVENESS STATEMENT

A determination of the protectiveness of the remedies cannot be made because Site actions are not complete. A determination of protectiveness will be obtained by completing a comprehensive sampling of Clear Creek once the remedy is complete and operational. In the interim, exposure pathways that could result in unacceptable risks to human health are being controlled. The remedies that have been completed at the Site remain protective.

Remedies implemented include: waste removal, regrading and capping or revegetating piles, waste pile run-on and run-off controls, drainage collection and conveyance systems, active water treatment, and institutional controls.

Institutional controls (IC) implemented at several priority areas in the Site include deed notification requirements, prohibition of drilling for water wells, and residential zoning restrictions. The IC's are defined in Prospective Purchaser Agreements (Chase Gulch #1, Big Five waste pile), Administrative Orders on Consent (Clay County), Unilateral Administrative Orders (Black Eagle, Gregory Gulch #1) and three-party agreements (McClelland).

13.0 NEXT REVIEW

The next five-year review for the Clear Creek/Central City Superfund Site is required by September 2009, five years from the date of this review.

13.0 REFERENCES

General

Camp Dresser & McKee Inc. June 8, 1987. Remedial Investigation Report Clear Creek/Central City Site.

Camp Dresser & McKee Inc. June 8, 1987. Feasibility Study Report Clear Creek/Central City Site.

Camp Dresser & McKee Inc. September 1991. Clear Creek Phase II Feasibility Study Report.

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Colorado Division of Wildlife. March 2002. Clear Creek Biological Monitoring Program October 1995 through March 2001.

J.F. Sato and Associates. February 22, 2002. *Draft* An Inventory of I-70 Mountain Corridor Water Resource-Related Issues for Clear Creek.

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U. S. Environmental Protection Agency. 1997. State of the Watershed Report for Clear Creek.

U. S. Environmental Protection Agency. March 29, 1999. Clear Creek/Central City Superfund Site Second Five-Year Review Report.

U. S. Environmental Protection Agency. 2001. OSWER Directive 9355.7-03B-P. Comprehensive Five-Year Review Guidance.

OU 1

Camp Dresser & McKee Inc. November 23, 1987. Feasibility Study Operable Unit No. One Clear Creek/Central City, Colorado.

United States Environmental Protection Agency. September 30, 1987. Superfund Record of Decision: Central City, Clear Creek Operable Unit 1. EPA/ROD/R08-87/016.

OU 2

Camp Dresser & McKee Inc. November 9, 1987. Feasibility Study Operable Unit No. Two Clear Creek/Central City, Colorado.

United States Environmental Protection Agency. March 31, 1988. Superfund Record of Decision: Central City, Clear Creek Operable Unit 2. EPA/ROD/R08-88/019.

OU 3

Golder Associates Inc. October 31, 2001. Repository Site characterization Assessment, Clear Creek/Central City Superfund Site.

United States Environmental Protection Agency. September 30, 1991. Superfund Record of Decision: Central City, Clear Creek Operable Unit 3. EPA/ROD/R08-91/055.

United States Environmental Protection Agency. September 1999. Explanation of Significant Differences, Clear Creek/Central City Superfund Site, Argo & Big Five Mine Waste Piles.

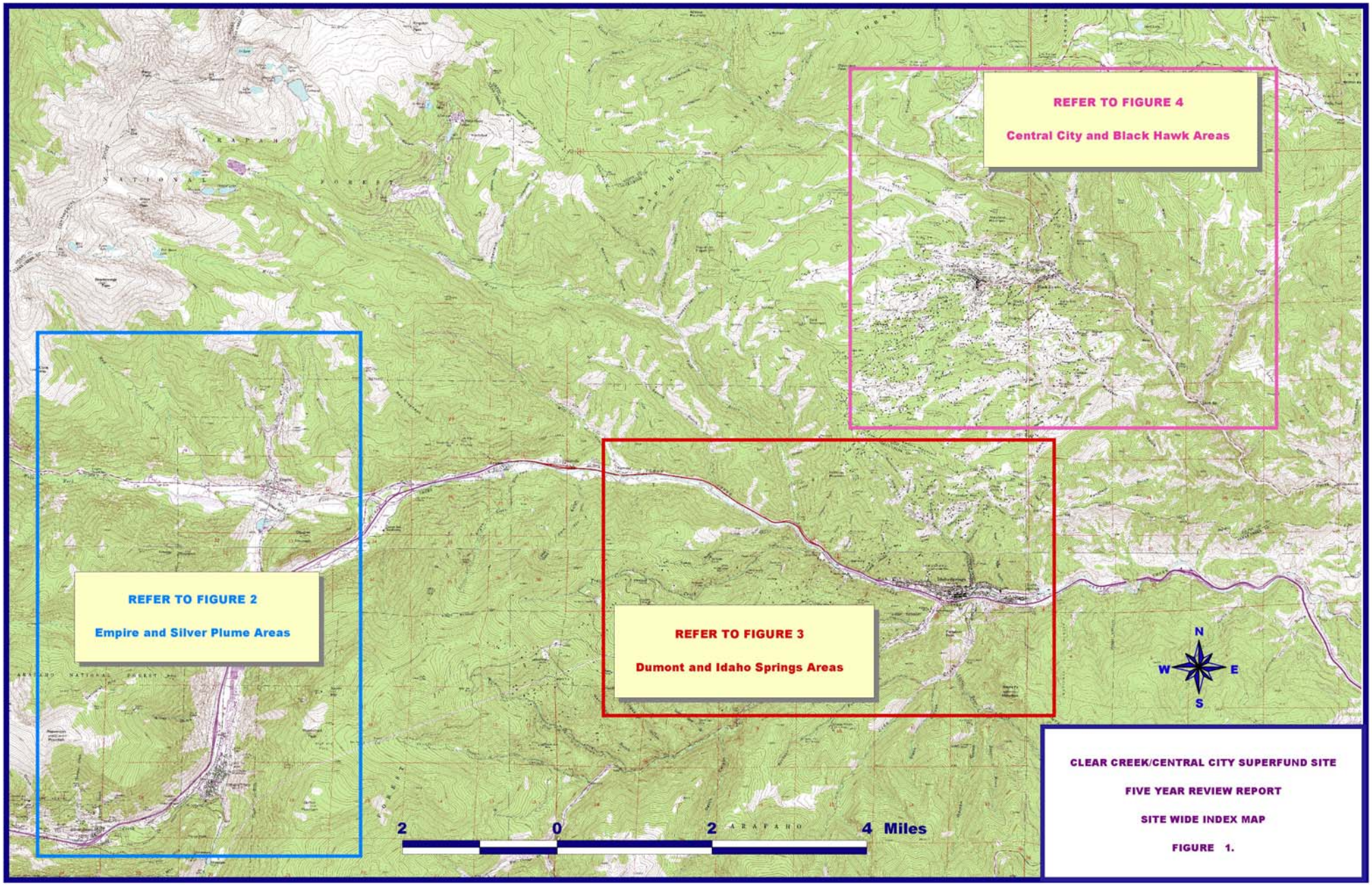
OU 4

Rocky Mountain Consultants, Inc. November 2002. Clear Creek/Central City Superfund Site Operable Unit 4 Draft Remedial Investigation Report.

Rocky Mountain Consultants, Inc. July 2004. Clear Creek/Central City Superfund Site Operable Unit 4 Draft Feasibility Study Report.

APPENDIX A

SITE MAPS


REFER TO FIGURE 4
Central City and Black Hawk Areas
REFER TO FIGURE 2
Empire and Silver Plume Areas
REFER TO FIGURE 3
Dumont and Idaho Springs Areas
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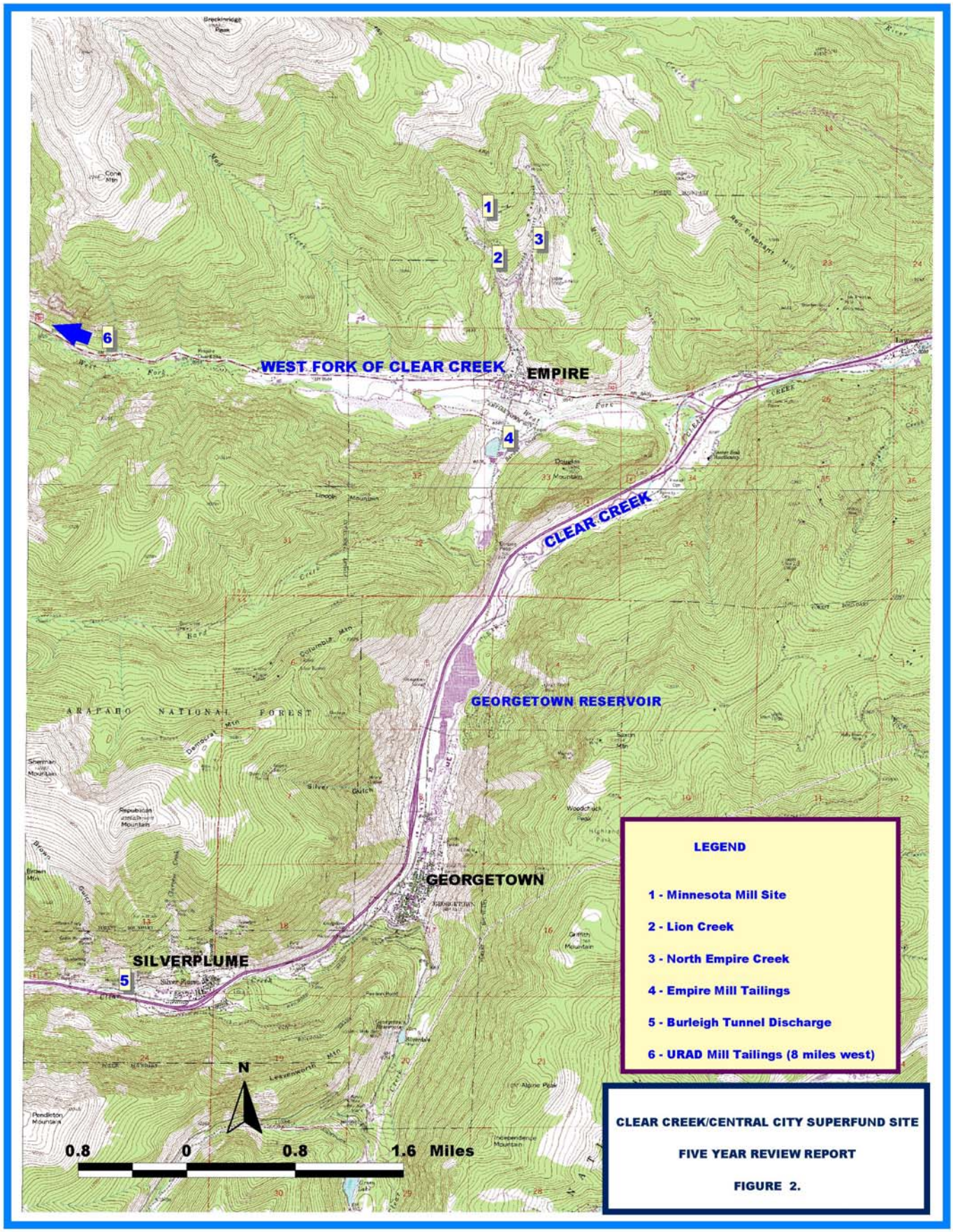
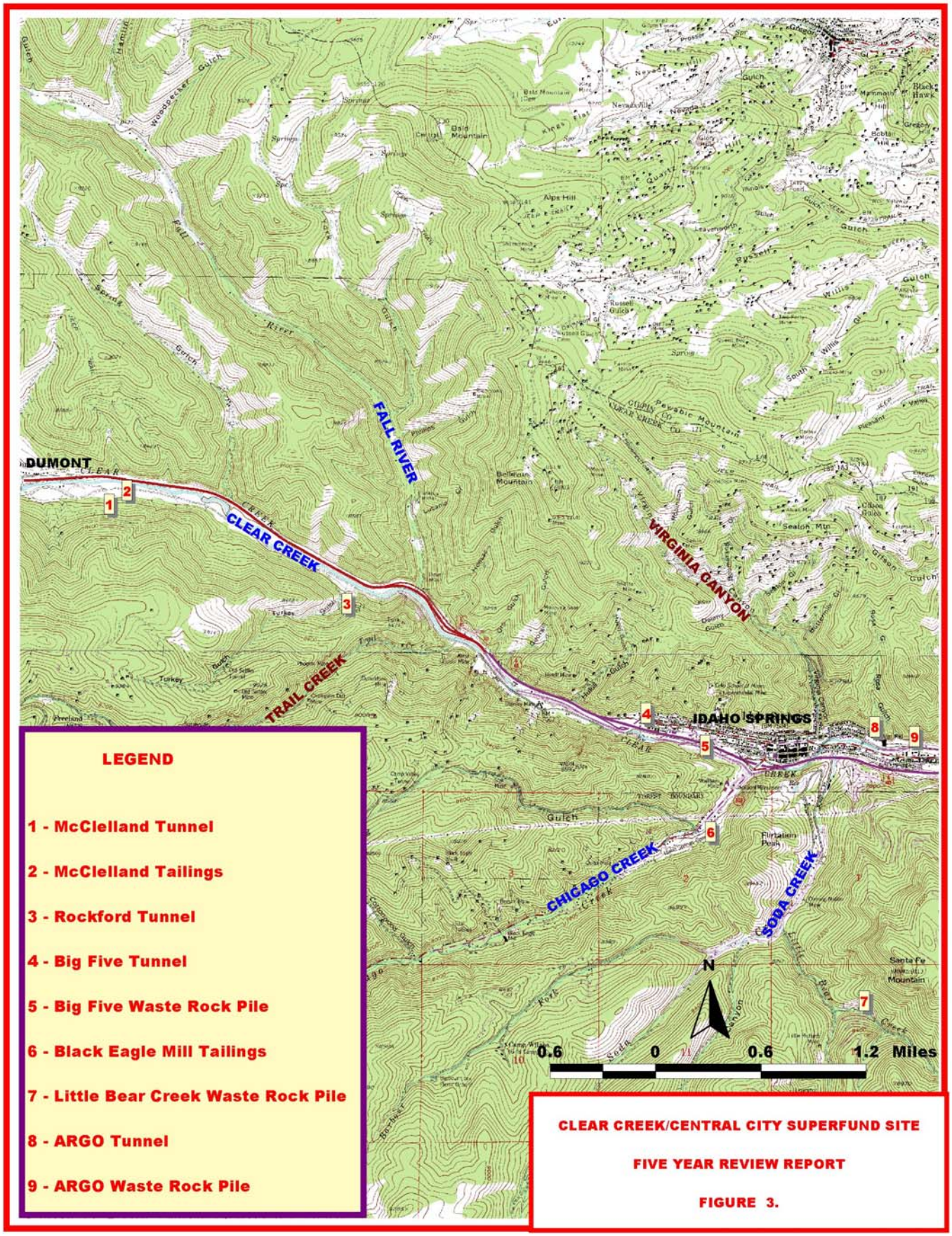
CLEAR CREEK/CENTRAL CITY SUPERFUND SITE
FIVE YEAR REVIEW REPORT
SITE WIDE INDEX MAP
FIGURE 1.



CLEAR CREEK/CENTRAL CITY SUPERFUND SITE

FIVE YEAR REVIEW REPORT

FIGURE 2.



LEGEND

1 - McClelland Tunnel

2 - McClelland Tailings

3 - Rockford Tunnel

4 - Big Five Tunnel

5 - Big Five Waste Rock Pile

6 - Black Eagle Mill Tailings

7 - Little Bear Creek Waste Rock Pile

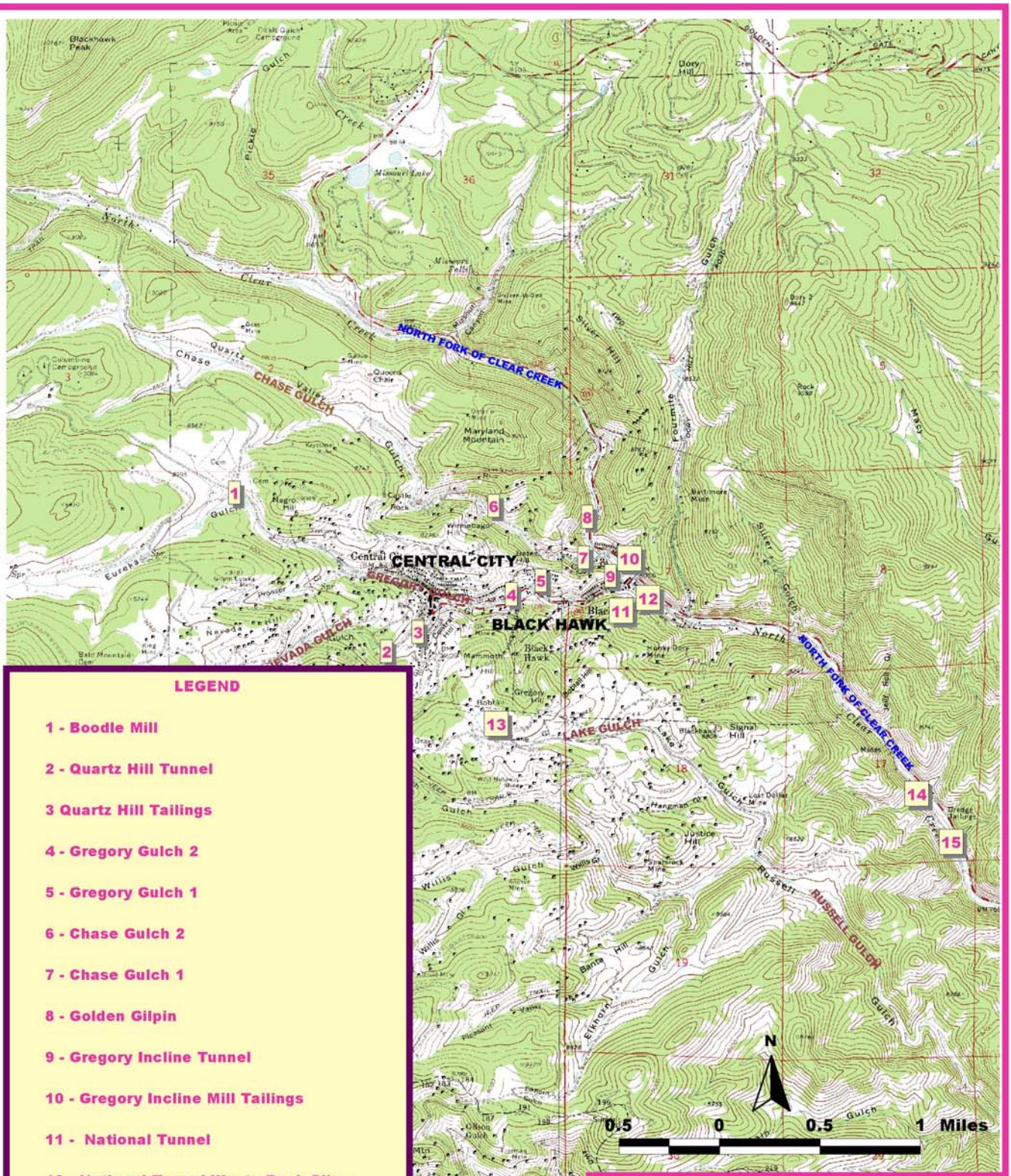
8 - ARGO Tunnel

9 - ARGO Waste Rock Pile

CLEAR CREEK/CENTRAL CITY SUPERFUND SITE

FIVE YEAR REVIEW REPORT

FIGURE 3.



LEGEND

1 - Boodle Mill

2 - Quartz Hill Tunnel

3 Quartz Hill Tailings

4 - Gregory Gulch 2

5 - Gregory Gulch 1

6 - Chase Gulch 2

7 - Chase Gulch 1

8 - Golden Gilpin

9 - Gregory Incline Tunnel

10 - Gregory Incline Mill Tailings

11 - National Tunnel

12 - National Tunnel Waste Rock Pile

13 - Clay County Mill Tailins Pile

14 - North Clear Creek Tailings Pile

15 - North Clear Creek Placer Dredge Piles

CLEAR CREEK/CENTRAL CITY SUPERFUND SITE

FIVE YEAR REVIEW REPORT

FIGURE 4.

APPENDIX B

ARARS TABLES

APPENDIX C

SITE PHOTOGRAPHS

Little Bear

Black Eagle

McClelland

Spring Gulch

Clay County

National

Gregory Incline

Golden Gilpin

Chase Gulch 1

Chase Gulch 2

Boodle Mill

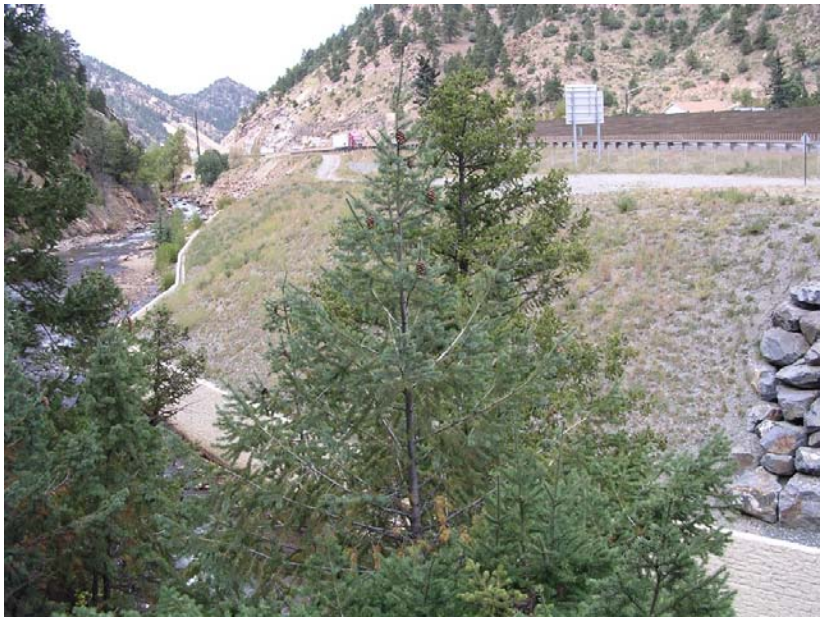
Ouartz Hill

Gregory Gulch 2

Gregory Gulch 1

North Clear Creek

Big Five



Big Five Waste Pile

Minnesota Mine

Urad

Argo Waste Pile

Argo WTP

APPENDIX D

CLEAR CREEK/CENTRAL CITY COMMUNITY INVOLVEMENT PLAN
2004 UPDATE

Central City/Clear Creek Superfund Site

Community Involvement Plan Update

Gilpin and Clear Creek Counties

Colorado

September 2004

Colorado Department of Public Health and Environment
Hazardous Materials and Waste Management Division
4300 Cherry Creek Drive South, B2
Denver, Colorado 80246-1530
303-692-3304

Colorado Department of Public Health and Environment

Central City/Clear Creek Community Involvement Plan Update

SECTION 1
Background

This Community Relations Plan revision for the Central City/Clear Creek Superfund site is intended to reflect the changes, both actual and as perceived by the community, since the original 1989 plan was last revised in May 1994.

This Central City/Clear Creek Community Involvement Plan (**CIP**)* has been prepared pursuant to Sections 113(k)(13)(i-v) and 117 of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (**CERCLA**), as amended by the Superfund Amendments and Reauthorization Act of 1986 (**SARA**) and in accordance with the current U.S. Environmental Protection Agency (**EPA**) Superfund guidance, including the *Superfund Community Involvement Handbook* (April 2002). The handbook outlines the community involvement requirements of the Comprehensive Environmental Response, Compensation and Liability Act and as stipulated in the regulations that interpret the Superfund legislation: the National Oil and Hazardous Substances Pollution Contingency Plan (**NCP**) requires the EPA, or the state in state-lead sites, to develop and manage community involvement efforts at both fund-lead and enforcement-lead sites. At fund-lead sites, cleanup is paid for with 90 percent Superfund money and a 10 percent state match. At enforcement-lead sites, cleanup is paid for by Potentially Responsible Parties (**PRP**s). At federal sites, the federal government is always the lead and pays 100 percent of the costs.

Once the site has been listed on the National Priorities List (**NPL**) for Superfund, community involvement efforts become an integral part of site activities. The site in this case includes the 400 square mile Clear Creek basin and study area, which includes parts of Clear Creek and Gilpin counties. The site, originally made up of five mines, was modified to encompass the entire basin as its study area in 1998. The site was originally listed on the NPL September 8, 1983. For the first two Records of Decision (**RODs)**, the EPA was the lead agency. For RODS 3 and 4, the state assumed the lead.

This revision of the 1994 revision of the Community Involvement Plan, based on community interviews, describes the community involvement and public participation program developed for the Central City/Clear Creek Superfund site jointly by the EPA and the Colorado Department of Public Health and Environment (**CDPHE**). The original plan was developed by the EPA in 1987, a new plan was produced by the state again in June 1989, followed by a broad communications strategy in November 1990. The plan was revised by the state in 1994. The current revision was triggered by two events: the signing of the ROD for the cleanup of the North Fork of Clear Creek (**OU #4)** and the Five Year Review of the whole site.

*Words or acronyms in **bold face** appear in an Acronym list as Appendix F.

Purpose

The purpose of community involvement is to provide opportunities for the community to learn about the site, to ensure the public adequate opportunities for public involvement in site remediation decisions and to determine, based on community interviews and other relevant information, appropriate community involvement activities. The community interviews form the foundation for developing the most effective means of disseminating information to the community.

Objectives of the Community Involvement Plan

- To ensure communication among the community, EPA and the Colorado Department of Public Health and Environment
- To develop and maintain open communication with community leaders, environmental public interest groups, and any other interested or affected groups.
- To provide appropriate opportunities for the community to learn about the Central City/Clear Creek Superfund site and inform them about the environmental remediation actions at the various locations within the site.
- To encourage community involvement by conducting interactive activities and providing accurate, timely information about the clean-up activities and other important technical and administrative matters.
- To insure appropriate opportunities for public involvement by conducting interactive activities and providing accurate, timely information about clean-up activities and other important technical and administrative matters.
- To insure appropriate opportunities for public involvement and to receive feedback from the community.
- To identify and monitor community concerns and information needs.

The information obtained through community interviews represents the interviewee's opinions, concerns and preferences, regardless of whether the responses are factually accurate or technically correct. Comments, while sometimes quoted exactly, are not attributed to individuals in order to promote candor.

SECTION 2

Site Location and Description

Since this site was listed on the NPL in 1983, focus has shifted from the original task of dealing with five specific mining tunnels and their waste piles, recommending passive water treatment (**Phase I**, Record of Decision (ROD) 1). A second ROD addressed the waste piles of those five tunnels. In both of those efforts, EPA was the lead agency. **Phase II** of the project included reassessing the site using a watershed approach and included in Phase II the Remedial Investigation/Feasibility Study (**RI/FS**). The OU #3 ROD calls for remediation of the Argo and Burleigh Tunnels and approximately 20 waste piles, as well as an assessment of private drinking water wells in the area, with the state of Colorado in the lead role. This effort led to ROD 3. The most recent efforts have involved assessing the practicality of cleaning up the North Fork basin of Clear Creek and addressing downstream impacts to the main stem of Clear Creek. This has lead to ROD 4 and this community involvement plan revision. The fourth Record of Decision was signed on September 29, 2004. (See **Figure 1**)

Figure 1. Central City/ Clear Creek Records of Decision and Project Phases

Records of Decision	Project Phases
ROD 1: 5 tunnels, passive water treatment	Phase I Remedial Investigation/Feasibility Study (RI/FS) by EPA
ROD 2: 5 tunnels, waste piles	
ROD 3: Argo and Burleigh tunnels Approximately 20 waste piles	Phase II RI/FS
ROD 4: North Clear Creek and Basin Downstream impacts	OU #4 RI/FS

Site History

Efforts toward the remediation of this site have been joint and cooperative between EPA and the State of Colorado, regardless of which party has had the lead on a particular aspect of the project.

But much has changed in the area since the original site investigation was initiated in 1983. In November 1990 limited stakes gambling was approved by Colorado voters for the towns of Black Hawk and Central City, both in Gilpin County and only a mile or two apart. Relying increasingly on a tourism, rather than a mining economy, Gilpin County began low stakes gaming in October 1991, and much of the property in those towns was bought for casino development and related uses, such as parking, administrative offices, etc. Land, which had been held by families for years, or which had been bought speculatively with a view toward future reprocessing of mine tailings on the properties, increased in value many times over, as did the taxes on that property. Relatively unusable parcels of land within the gaming district were reassessed, and in some cases the new taxes were prohibitive for the owner, even

though there was no perceived market for the property at the new price. Over the years since, large, in some cases international, casinos have come to predominate Black Hawk, while many smaller casinos, in some cases preserving the original store fronts, are more the norm in Central City. As the economy shifted quickly toward gaming, local community shops and services, many in buildings from the early 1900s, were rapidly converted to casinos, and the characteristics of the historic mining towns, changed dramatically.

The results of increased land values also affected the Superfund process in the area. Developers of casinos, many developed independently and then acquired by larger casinos already operating elsewhere, eagerly excavated soil and rock, removed tailings and rerouted water in consultation with state and EPA project staff, to make room for the ancillary services they needed. Roadways were expanded, and Black Hawk and Central City experienced a rapid-onset building boom. The state proposed that a consortium of town and Gilpin County officials draft procedures and criteria for property development that would be provided to individuals along with their building permits, informing them about the Superfund cleanup and the problems and legal liabilities in moving contaminated soils.

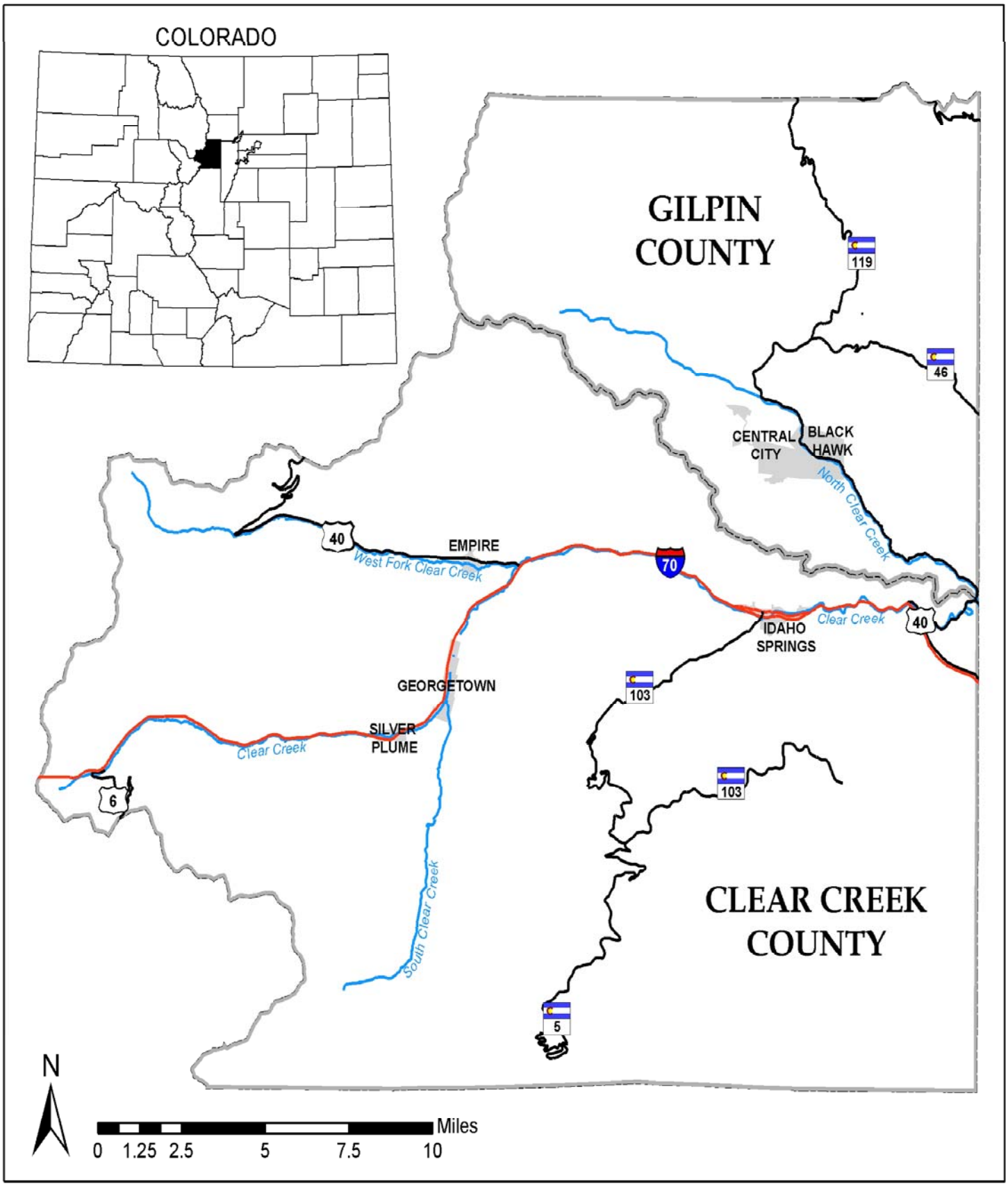
What was developed was a step-by-step document, developed with the assistance of the state, that in 1993 became an ordinance for the town of Black Hawk, and from which soil metals concentrations figures were taken and are now being used as a standard in Gilpin County. Central City adopted the soil concentration levels via a City Council resolution.

Since visitors must drive through Black Hawk to get to Central City, (or "Central," as many residents call it), private funding has been sought and bonds issued for construction of a new highway off I-70 at exit 243 that will take cars directly to Central City. The new 8.4 mile Central City Parkway, or Southern Access Road, costing an estimated $38 million, is scheduled to open in November 2004.

The most recent statistics available indicated adjusted gross proceeds from gaming of $516,479,119.59 in Black Hawk for 2003, $49,646,603.31 in Central City in the same year.

There seems to be some conflict between Central City and Black Hawk over annexation and other issues.

Figure 2


COLORADO
GILPIN COUNTY
CLEAR CREEK COUNTY
CENTRAL CITY
BLACK HAWK
EMPIRE
IDAHO SPRINGS
GEORGETOWN
SILVER PLUME
North Clear Creek
West Fork Clear Creek
Clear Creek
South Clear Creek
119
46
40
70
103
6
5
N
Miles
0 1.25 2.5 5 7.5 10

Search for Potentially Responsible Parties (PRPS)

As with many Superfund sites, the "who is responsible" question is a difficult one. Such investigations seek to find out whether property has a financially viable owner to bear the costs of necessary cleanup. Are the owners of problematic former mining sites liable, even if they did nothing to contribute to the contamination? Should anyone be surprised that the ground is laden with minerals in the Colorado Mineral Belt? At all stages of work on theses sites, some local residents have said that the Superfund process, devised for industrial sites, is not appropriate for mining sites. Early on, residents required convincing that the metals in the soil could potentially cause human health problems, such as learning and behavioral deficits in children and other neurological problems continuing into later life. The desire for historic preservation sometimes clashed with clean-up proposals, and it was important not to allow clean-up efforts to avoid interfering with tourist activities and traffic whenever possible.

No PRPs were identified in Phase I. In Phase II and following, EPA and the state have treated each property individually, location by location. Developers and some mining companies conducted their own cleanups, determined by the state and EPA, using their own funds. Although OU #3 was originally to include a decision on surge protection for the Argo mine, as Phase II developed, OU #3 became a site-wide prioritization for the watershed. Since the introduction of the Argo Water Treatment Plant, no unmanageable surge events have occurred.
Passive treatment has not been implemented at any of the original five tunnels, though a demonstration project west of Idaho Springs and on a pilot scale test on the Burleigh itself were performed.

Capsule Site Description

The site is about 30 to 40 miles directly west of Denver. The site title refers to the Clear Creek watershed and the town of Central City. Because the two Colorado counties involved are Clear Creek and Gilpin, some of those interviewed previously have said that the site name was a source of some confusion.

Gilpin County, the state's second smallest county, had 4,757 residents in 2000, while Clear Creek had 9,322 citizens in 2000. This compares to Colorado's total population that year of 4,335,540. The principal cities in Gilpin County include Black Hawk and Central City. Clear Creek's main communities include Idaho Springs, Silver Plume, Georgetown and Empire. Elevations at the site range from about 5,700 feet at the Golden gauging station to more than 14,000 feet along the Continental Divide. Average annual rainfall ranges from less than 15 inches per year in the foothills to more than 40 inches in the high mountains. The basin is drained by Clear Creek, which has three major tributaries, the South Fork, West Fork and the North Fork.

Clear Creek water is used for a variety of purposes: recreational, industrial, agricultural and municipal. Most of the water appropriations occur between Idaho Springs and Golden. A number of Colorado cities (Georgetown, Idaho Springs, Black Hawk, Arvada, Golden, Northglenn, Thornton and Westminster) use Clear Creek water or water from tributaries of Clear Creek for domestic purposes. Recreational use includes fishing, kayaking, rafting, picnicking, camping and hiking.

Ground water in the Clear Creek basin is in alluvial aquifers along streams, and in shallow fractures, faults and joints which form the fractured bedrock aquifer. The extensive network of mine workings throughout the area provides preferred pathways for ground water.

Vegetation includes Ponderosa pine, juniper and mountain mahogany grasslands on south facing slopes and lower elevations, with Douglas fir communities established on north-facing slopes and at higher elevations. Aspen groves are interspersed, and valley bottom vegetation includes blue spruce, narrow-leaf cottonwood, with willow and river birch at the edge of the floodplains. Alpine tundra is found above the 11,800-foot timberline.

Site Study Organization

Central City/Clear Creek was proposed for the National Priorities List in 1982, listed in 1983. At that time the focus was on five mine tunnels: the Gregory Incline and the National (near the Black Hawk), the Argo and the Big Five in Idaho Springs, the Quartz Hill near Central City, plus a remedy for potential surge events at the Argo tunnel near Idaho Springs. The five mine tunnels were classified at Operable Unit (OU) #1, and its Record of Decision was signed in September 1987. The ROD called for passive treatment of mine discharges as the preferred remedial alternative, if passive discharge could be shown via treatability studies to be effective. The ROD allowed the flexibility to install active and passive treatment systems in combination, if necessary. Passive treatment was tested in a project with the Colorado School of Mines in a constructed wetlands west of Idaho Springs later under OU #3 actions, and at the Burleigh tunnel with a large pilot-scale test. The results showed that passive treatment at the Burleigh was not practical and subsequently, paired with data from other aspects of the project, that the Burleigh's contribution to elevated metals in Clear Creek (zinc, lead and manganese being of greatest concern) was not as significant as originally thought and does not require remediation. The tunnel was dug between 1890 and 1910, extending more than 4.2 miles, for drainage and ore transportation.

Operable Unit #2, which addressed the waste piles adjacent to the five main tunnels, was addressed by a Record of Decision signed in March 1988, calling for run-on and run-off controls and slope stabilization of the mine tailing and waste rock piles.

Originally OU #3 was intended to address surge events at the Argo tunnel. Its Record of Decision was delayed pending the outcome of what became the Phase II Remedial Investigation/Feasibility Study (RI/FS). Consideration of the outcomes of those investigations led to the plan to use passive treatment at the Burleigh, active chemical treatment at a new water treatment serving the Argo tunnel.

Citizens have continually expressed the goal that any action taken should have good cost/benefit. The Phase II RI/FS study came about based on public comment received during early Feasibility Study public meetings. At the time, citizens also objected to future plans to divide the site into multiple OUs (four or more), and EPA and the state, in an accelerated, process decided to combine the remaining OUs into one large OU.

Potential Risks

The threat to public health and the environment at the site has been characterized as heavy metals liberated by mining and the effects of acid mine drainage (**AMD**) into Clear Creek. The metals which

are a primary concern for aquatic life include aluminum, arsenic, cadmium, chromium, copper, manganese, silver and lead. The metals of primary concern for human health are arsenic and zinc.

Ingested lead is thought to delay and impede neurological growth in children from birth to 72 months. Exposure to high amounts of lead can be responsible for reductions in gross intelligence and for other neurological deficits. Although in extreme cases action may be taken to purge lead from the body, the primary recommendation to reduce effects in humans is to remove the source of the lead. Lead can cause many symptoms, including tiredness, paleness, irritability, loss of appetite, sleep disturbance, behavior change, kidney damage and abdominal pain.

Symptoms of arsenic exposure include both carcinogenic (cancer) and noncarcinogenic effects associated with long-term low-level exposures to arsenic. The effects include lung cancer (via inhalation), skin cancer (via ingestion), non-cancerous skin lesions, peripheral nervous system effects and cardiovascular changes. There is also an association between ingestion of inorganic arsenic and lung, liver, kidney and bladder cancers.

In parts of the study area, drinking water from private wells was of concern and, as part of OU #3, EPA and CDPHE offered to test wells at no charge and to provide bottled water as a short-term solution if water was not of drinkable quality. Beginning in 1994, 60 homes were tested, and 4 were found to have water significantly contaminated by metals from Clear Creek. Those four homes received bottled water at no charge until August 2003, when reverse osmosis and other water treatment systems were installed at two homes, and one home was connected to a municipal water supply. No one is currently being supplied with bottled water.

Danger from falls into open mine adits was also mentioned as a human health risk in the 2004 interviews. Problems with abandoned mines are neither in the scope of EPA nor the state health department and should be addressed to the Division of Minerals and Geology (**DMG)** in the state Department of Natural Resources. Currently the appropriate contact person would be Jim Herron (phone 303-866-3813).

Heavy metals present a significant risk to the aquatic population as well. Zinc concentrations consistently exceed aquatic life criteria at many locations in the basin, and copper, cadmium and manganese concentrations frequently exceed standards in specific stream segments. Several of the mine waste piles are also marginally unstable, and the collapse of these mine waste piles would pose a threat to aquatic life.

Contamination also poses a threat to macroinvertebrates, the small insects that are a food source to fish. Some sections of Clear Creek and its tributaries may be lethal to some species of macroinvertebrates, and acute (short-term) effects can be expected in some areas. Other areas have chronic effects which result in a reduced diversity of population that would be expected without mine impacts.

Community Background

Clear Creek and Gilpin Counties historically had mining as the basis of their economy, with a lesser emphasis on ranching. While they are still important, with mining being at least an avocation of many residents, tourism continues to grow, dramatically after the advent of limited stakes gambling. The

Colorado Board of Tourism estimated tourism via the now defunct tourism promotion tax. Figures for receipts were $38,271 in Clear Creek County in FY 1983. Gilpin County reported $28,458 in FY 1993.

The best available information on mining income is the Bureau of Economic Analysis' (U.S. Department of Commerce) personal income totals by category: In 1991 the reported income from Clear Creek County was $25,222,000 because no large, active mines are operating in Gilpin County. Comparable figures for Gilpin County were not available. Clear Creek County has three commissioners, as does Gilpin. The major cities use different titles for their executives: Black Hawk has aldermen, Central City and Idaho Springs have councilmen, Empire and Silver Plume have trustees and Georgetown has selectmen.

Community Issues and Concerns

It should be noted that much of the planning and development in the early years of this project was discussed and developed with the assistance of a Technical Review Committee consisting of local lay and mining professional people with a commitment to improving the watershed. A later group, which received an EPA Technical Advisory Group (**TAG)** grant, was referred to as the Watershed Advisory Group. Their guidance, input and ongoing time commitment should be acknowledged as an essential part of the development of sound and practical clean-up plans. Subsequently, the Upper Clear Creek Watershed Association (**UCCWA**), which meets monthly, continues as an active forum in which project issues could be discussed. A great many of the "gatekeepers" of information on the needs and priorities of the watershed participate in this group, and it has been a sounding board for clean-up possibilities for Superfund site projects. Updates are provided frequently by the state and EPA.

Individuals interviewed for this Community Involvement Plan unanimously volunteered unsolicited praise for the project managers and their staff for keeping UCCWA up-to-date. This sentiment was also spontaneously expressed by some local officials.

Local officials, however, and the media said they could use more information, some asking to receive everything that goes out to the community, as well as alerts about emergencies and notification of enforcement actions.

Historic Issues

It appears that there has always been competition between Gilpin and Clear Creek Counties, currently focusing on the annexation of Hidden Valley and other annexation issues. It was noted that some individuals have held several municipal jobs in both counties, or in two of the main cities. In the early phases of this project, some Gilpin County residents felt that undue attention was paid to Clear Creek issues, at their expense. The easy access to some Clear Creek destination sites which can even be seen from I-70 may have given that county more ability to attract tourists than Gilpin County, which must be reached by Highway 119, a moderately twisting mountain road. The anticipated Central City Parkway may help to balance I-70's accessibility advantage.

Citizens also want to have some of the public meetings in Gilpin County, rather than in Clear Creek, which is likely during the process of implementing the clean-up remedy on OU 4. Residents recognize,

however, that there is more readily available public meeting space in Clear Creek County. Gilpin County commissioners are very willing to have public meetings in their council chamber.

In the early years of this project, there was lively debate over whether the habitat in the North Fork of Clear Creek itself could ever support fish: whether or not it was worth cleaning up in terms of cost/benefit. It was doubtful that a trout fishery could be established. Visitors can see a dramatic color difference between the brown, opaque waters of North Clear Creek as it converges with the clear water of the Clear Creek mainstem, although that is not a reliable indicator of metals concentrations. Nevertheless, the difference between the two streams is evident. That debate continued, both in the community and within the regulatory agencies, over many years, until a Remedial Investigation/Feasibility Study was conducted for Clear Creek OU #4, beginning in 2000. Findings showed that with cleanup of mine property waste piles and sediment reduction, it is anticipated that fish could at least survive in the North Fork, if not breed there. The proposed plan was made available to the public in July 23, 2004 which proposed combined active and passive water treatment with sediment reduction in the tributaries and the North Fork of Clear Creek itself. Several public meetings were held to present the proposed alternatives to citizens and elected officials in July and August.

Everyone interviewed was in favor of the work proposed for the North Fork and thought it was worth doing, although one interviewee expressed concern over whether it would ever get done with the problems in federal funding for the Superfund. A number of people had heard that the Superfund itself was depleted and wanted to know where the money would come from now.

The possibility of utilizing water treatment capacity in an existing private water treatment plant, similar in method to the Argo Water Treatment Plant, is being explored. That would be preferable to the construction of another active water treatment plant.

The Argo Water Treatment Plant is converting its chemical feed system to use lime, instead of sodium hydroxide, to raise the alkalinity (pH) of water treated at the plant. Lime is the less expensive chemical, but it will not reduce the amount of sludge produced by the plant that must be disposed of, currently 20 cubic yards (**cy**) per day, treating 250 gallons per minute (**gpm**). It is anticipated that the plant will have to operate in perpetuity and becomes the ongoing financial responsibility of the state in 5 years. The sludge is currently being disposed of at a landfill near Erie.

Another important issue is the continuing long-term disposal of sludge produced by the plant. The state and EPA have for several years been exploring the possibility of using the Druid mine property as a disposal site, saving both disposal fees and trucking costs and referred to as "the repository." As of this date, arrangements have not been worked out with the owner. Since some of the mining contamination removed from the creek by the treatment plant has Clear Creek County as its source, some people we talked to in Gilpin County don't like the prospect of disposing of "Clear Creek county's waste." "We don't mind disposing of our waste in this county, but why should we dispose of theirs?" was one comment.

One person said we should deal with water treatment now and deal with the tailings piles later. This person said she was "impressed with the progress they've (the state and EPA) been making. It was slow in the beginning, but now they can see results." Seeing this as a whole watershed site has allowed creativity, she added, and made possible the use of 319 grants. Conversely, several people supported

capping more tailings piles. One was not clear on whether Superfund could address contamination problems on private property or why large areas of tailings, like the parking lots in Central City weren't capped.

Several wanted prompt information updates on federal funding for the project, or lack thereof.

One individual commented that they would like to see mine drainage further reduced and more consideration given to wetlands mitigation.

Some suggested the state and EPA should have more contact with other community entities, such as the Historic Society, Chambers of Commerce, Tourism Board and the Colorado School of Mine, with whom we may have overlapping interests and concerns.

The commitment needed to build the Argo Water Treatment Plant was characterized as "huge" by some, and contrasted with "little, labor-intensive projects" that they don't think make much difference. The "bang for the buck" issue ran through many of the interviews.

Voluntary cleanups were touted as creative solutions, and ASARCO's voluntary cleanup of tailing in Virginia Canyon, for which they had no responsibility, was cited as an example.

Gilpin County

Citizens we interviewed seemed to be looking forward to the work on the North Fork of Clear Creek, believing that up to now all attention has been focused on Clear Creek County issues. The 1994 plan update mentioned that the Gilpin County Commissioners felt they were not consulted adequately during the Remedial Investigation. While this did not come up in recent interviews, we need to continue to be forthcoming and inclusive.

Road Safety

Issues about environmental cleanup evoked safety questions related to the Colorado Department of Transportation (**CDOT**) from a couple of people interviewed. There was considerable concern about traffic, particularly the slowdowns approaching the tunnels, and about the risks presented by the high number of hazardous materials loads being trucked across I-70. Some believe that one truck rollover into Clear Creek could undo years of our work. Transportation safety concerns surfaced in several conversations. No one expressed concerns about Highway 119 to Black Hawk and Central City being risky. Several people also wanted first responders (police and fire) as well as rafting operations to have more training in what to do if they encounter a hazardous chemical spill. These concerns that impact the creek will be passed on to CDOT.
Some entities would like to be notified of hazardous waste spills.

Interagency Participation

Danger from abandoned mines was brought up. A number of citizens mentioned that we should be protecting citizens from the hazards of open mine adits. We explained that neither EPA nor the state health department are authorized to address mine safety issues and referred people to Jim Herron at the Department of Natural Resources, Division of Minerals and Geology.

A February 2002 survey taken at the UCCWA meeting revealed the perceptions that the Colorado Division of Wildlife hasn't been participating adequately in current clean-up efforts. This concern persists.

Information transfer

Overall, everyone we contacted believes that information on the cleanup is much better disseminated now than it was ten years ago. Meetings, open houses, newspapers, government newsletters and web sites were cited.

Citizens in both counties read both the Denver daily papers and their local county weeklies, although some said they only skimmed the weeklies. A paper, the Gilpin County News, began publication in August 2004. As stated earlier, much of the information comes through the Upper Clear Creek Watershed Association.

The newspaper staff we talked to, however, said they would like to receive more information, not only press releases from the agencies, but any newsletters and fact sheets that are published and sent to citizens. This would provide the newspaper staff with additional information, and they know what the public is hearing. They would also like to be notified about enforcement actions. One reporter said she would much prefer to ask questions of the technical specialists, rather than the community involvement specialists. It was suggested that we also contact downstream papers, such as the Sentinel, and specialty papers like Rock and Coal, and the Clear Creek Mining Association publication in addition.

While all the people we interviewed had good basic information about clean-up activities, the majority said more regular communications in print would be useful. Many suggested the newspapers, others expressed the concern that the newspapers are primarily distributed in the population centers and don't get to outlying residences. Gilpin County has a newsletter that goes out quarterly with the utility bills, reaching almost everyone. They were open to putting brief information announcements in that that newsletter.

One official said she was only interested in information to answer questions she gets from citizens. "People are not really that concerned," according to that individual, adding that he/she hardly ever gets a call on the subject. Another official said "send everything, we'll sort it out." The consensus seemed to be in favor of distributing more information. Another said "anything visible to the public" ought to be explained. One person said about the clean-up efforts "things may make sense operationally, but not politically."

Someone suggested that using the "reverse 911" system was quicker and more effective than using call down lists in emergencies.

Review of the utility of internet communications were mixed. Some people said they visit our websites and are happy to download information, even long documents. They would like more information on the web sites and to have it updated more frequently. Others said they never used our web sites and didn't know how to find them.

Open houses for information transfer were suggested, with the report that those held by CDOT were well attended.

The Upper Clear Creek Watershed Association was unanimously praised as an information exchange and provider, but little was said about getting information to the downstream users who rely on Clear Creek for part or all of their water supply. Most of the watershed association's information is distributed at their meetings or by email, with little hard copy information, and includes downstream users. That was suggested as an efficient format that saved resources.

It was mentioned that realtors need information on liability for former mining sites, and that we should consider providing it.

Someone said we should "toot our own horn more" and spread the word about the successes we have had in the cleanup to date.

With more visitors coming to the area from abroad, one person suggested posting safety signs in the universal graphic visual symbols, as well as English, to discourage people from drinking unpotable water or "wading in the mine drainage pools."

Some people were interested in more air quality information. This will be passed along to the state's Air Quality Control Division.

One individual remarked that there were too many state and EPA staff at the Commissioners' briefing and the following proposed plan public meeting, and that that incurred a lot of cost to reach only a small audience. Written information could be more widely disseminated.

It was suggested that the state and EPA contact several groups, such as the Bear Creek Watershed Association, EMERGE, etc.

Technology

It was pointed out that we know a lot more about the creek than we did ten years ago and can now make better decisions with that information. Those who used the internet would like more "heads up" communications about the release of forthcoming documents, scheduled meetings, and construction season agendas.

One interviewee suggested that we interface more with the schools, offering to present environmental specialties at career days and addressing science classes.

Duration of Cleanups

One individual asked whether we could do some of the cleanups as "time critical cleanups," enabling us to skip some of the many steps required through the traditional Superfund process.

One person suggested centralizing all mine water treatment at a facility like the Argo, rather than treating it at several locations.

Summary of Most Frequent Comments

1. Everyone we spoke to seemed to be very familiar with what has been going on for the last five years. A few people seemed to be familiar with only what was being done on the Central City side, but most had a general knowledge of the entire site.

2. There also seemed to be a trend toward people receiving their information primarily from the Upper Clear Creek Watershed Association and the Watershed Foundation. They use e-mail to send out their newsletter and other information, which seems to be a quick and effective way to stay in touch with people.

3. In general, most people wanted to receive more information via e-mail. Several suggestions were made about sending short messages when the project gets ready to do some specific work, or sending a message to let the reader know something like a larger document was going to be mailed out. City officials commented with short more regular updates they could decide what to put into their newsletters to share with the public.

4. Many people also liked going to the web site and felt CDPHE maintained a very helpful web page. Most of these same people also used EPA's web page. All of the people who commented on this did indicate that we need to get the word out to the public, i.e., that it is available and how to access it.

5. Some people shared the feeling that our public meetings were not that beneficial, since there were often more "agency" people than "spectators".

6. Several of those interviewed did look at the local newspapers and a few looked at either the Denver Post or Rocky Mountain News. Those papers more frequently read include the Clear Creek Courant, Weekly Register Call, and the Canyon Courier in Evergreen. We did learn of a new paper in Central City, the Gilpin County News. Other newspapers mentioned included the Mountain Ear (Nederland) and the High Timber Times.

7. Many felt presentations at meetings like the Watershed Association/Foundation, commissioners' meetings, etc., were also a better way to get information out. Other suggestions made included going to schools (senior, junior or middle schools), career days/fairs, meeting with realtors and the metal miners (association?).

8. We should add information to our Superfund display in the Visitors Center in Idaho Springs.

9. On any signs we use, if possible, we should include international symbols, common idioms.

10. One individual suggested notifying the rafting companies if there is a hazardous waste spill in Clear Creek. If it affects enough people, they suggested, there should be a reverse 911 call. This is an issue for the local Fire Department, not for Superfund, and we will pass it along.

Highlights of the CIP/Recommendations

*Publish written project updates more frequently and distribute in print or electronically, as appropriate.

*Send out a list of activities scheduled for the upcoming construction season in the spring, then report on accomplishments at the end of the season.

*Send project updates, fact sheets and newsletters to the press, as well as to the public.

*Update EPA and CDPHE web sites more frequently.

*Submit information to Gilpin County to include with their newsletter in utility bill mailings.

*Consider producing warning signs in both English and international graphic symbols.

*Make an effort to try to utilize local workers for Superfund clean-up activities. This might include making more of an outreach effort for bid submittals (taken from 1994 CIP update).

*Develop site-specific fact sheets for OU 4, including clear clean-up goals.

*Develop better contacts with metropolitan downstream water users through a variety of existing forums.

*Explore the availability of meeting rooms in the casinos in Gilpin County.

*Business cards for all CDPHE staff, when reordered, should include the basic web address.

*Make more use of email for information transfer.

*EPA did a workshop on landowner liability in the early 1990s. A similar presentation should be considered now.

Appendix A
Officials

Colorado Department of Public Health and Environment
Hazardous Materials and Waste Management Division
4300 Cherry Creek Drive South
Denver, CO 80246
(303) 759-5355 fax
(303) 692-3300 or **1-888-569-1831 (toll free)**

Ron Able
Project Mgr.
OU #4, North Fork
(303) 692-3381
E-mail: ron.able@state.co.us

Doug Jamison
Golden Gilpin & Argo Mine
Waste Piles
(303) 692-3404
E-mail: doug.jamison@state.co.us

Mary Scott
Argo Water Treatment Plant
Chase Gulch Mine Waste Pile
(303) 692-3413
E-mail: mary.scott@state.co.us

Jim Lewis
Virginia Canyon &
Mine Waste Repository
E-mail: jim.lewis@state.co.us

Marion Galant
Community Involvement Manager
(303) 692-3303
E-mail: marion.galant@state.co.us

U.S. Environmental Protection Agency (EPA), Region VIII
999 18th Street, Suite 500
Denver, CO 80202

Michael Holmes
Remedial Project Manager
(303) 312-6607
E-mail: michael.holmes@epa.gov

Christina Progess
Remedial Project Manager
(303) 312-6009
E-mail: christina.progess@epa.gov

Peggy Linn
Community Involve-
ment Coordinator
(303) 312-6622
E-mail: peggy.linn@epa.gov

Federal Elected Officials

Senate

House of Representatives

Sen. Wayne Allard
525 Dirksen
Senate Office Building
Washington DC 20510
(202) 224-5941

U.S. Rep. Mark Udall
115 Cannon House Office Building
Washington D.C. 20515
(202) 225-2161
fax (202) 226-7840

Sen. Ben Nighthorse-Campbell
380 Russell
Senate Office Building
Washington DC 20510
(202) 224-5852
fax: (202) 228-4609

State Elected Officials

State Tom Plant (District 13)
200 E. 14th Ave 3rd Floor
Denver, CO 80203
Phone: (303) 866-2587
tom.plant.house@state.co.us

State Rep. Glenn Scott (District 62)
200 East Colfax #217
Denver, CO 80203
303-866-2471
glenn@denver.net

County Elected Officials

Clear Creek County

Robert Poirot, commissioner
Jo Ann Sorensen, commission chair
Harry Dale, commissioner

Clear Creek County Courthouse
Box 2000
Georgetown, CO 80444
303-569-3251 (local)
303-679-2300 (metro)
fax 303-679-2440

Gilpin County

Jeanne Nicholson, commissioner
Ken Eye, commissioner
Web Sill, commissioner
Gilpin County Courthouse
203 Eureka
Box 366
Central City, CO 80427
303-582-5214
fax 303-582-5440

City Officials

Black Hawk

Mayor **Kathryn Eccker**
Allen Price, Alderman
Tom Kerr, Alderman
Richard Cottrell, Alderman
David Spellman, Alderman
Kathleen Doles, Alderman
Paul G. Bennett, Alderman
Manager **David Blanchard**

Black Hawk City Hall
Box 17
Black Hawk, CO 80422
303-582-5221
fax 303-582-0429

Central City

Mayor **Buddy Schmalz**
Francis O'Neill, councilman
John Starkey, councilman
Jim Voorhies, councilman
William "Chip" Wiman, councilman
City Manager **Lynette Hailey**

Central City - City Hall
Box 249
Central City, CO 80427
303-582-5251
fax 303-582-5817

Appendix B

Central City/Clear Creek Superfund Site Interview Questions 2004

Name: Interview date:

Are you familiar with the cleanup activities related to the Central City/Clear Creek Superfund site?

If yes—What activities, if any, are you aware of that are associated with the site?

What is your overall impression of the cleanup that has been completed to date?

How do you prefer to get information on this site?

Is there particular information that you would like to have, or have more frequently?

How would you prefer to receive site information? (Wait for response, then…)

What do you think of…

Short, very focused mailings, sent frequently
Longer, general informational mailings, sent periodically
E-mail messages
Newspaper articles—which papers?
Radio or TV interviews—which stations?
From community members
Family or friends
Public meetings held by CDPHE or EPA
Information sessions held by CDPHE or EPA or UCCWA?
A knowledgeable person in the community
A web site (Have you looked for information on the CDPHE or EPA web site?

Do you need any information about the remedy for the five-year review process?

Do you know how to reach CDPHE or EPA regarding questions on these processes?

How would you prefer to receive site information?

Is there any need to provide information in a language other than English?

Do you have any comments?

Who else should we talk to?

Appendix C

Local Media

Newspapers

Gilpin County News
PO Box 93
Blackhawk CO 80422
Aaron Storm, Editor
aaron.storm@mindspring.com
303-582--0133

Canyon Courier
27902 Meadow Drive #200
Evergreen, CO 80439
303-674-5534
fax 303-674-4104
www.news@evergreenco.com

Denver Rocky Mountain News
Todd Hartman
100 Gene Amole Way
Denver, CO 80204
303-892-5000
hartmant@RockyMountainNews.com

Weekly Register-Call
Debra Krause, Editor
220 Spring St.
Box 609
Central City, CO 80427
303-582-5333
fax 303-582-3932
(newspaper of record for the county)
wklyregcall@aol.comT

Denver Post
Joey Bunch
1560 Broadway
Denver, CO 80202
303-820-1240
303-820-1010
jbunch@denverpost.com

Clear Creek Courant
Meghan Murphy, Editor
1634 Miner Street
PO Box 2020
Idaho Springs, CO 80452
303-567-4491
fax 303-567-0520
(newspaper of record for the county)
meghan@evergreenco.com

The Mountain-Ear

Kay Turnbaugh, publisher
Box 99
Nederland CO 80466
303-258-7075
Kayturnbaugh@themountainear.com

Golden Transcript
Joe Ross, Executive Editor
1000 10th St.
Golden CO 80401
303-279-5541
fax 303-279-7157
newsroom@jeffconews.com

Pay Streak
Newsletter of the Clear Creek County Metal Mining Association
Ed Lewandowski, editor
Box 403
Idaho Springs, CO 80452

Canyon Courier
27902 Meadow Drive #200
Evergreen C0 80439
(303) 674-5534
fax (303) 674-4104
news@evergreenco.com

Appendix D

INFORMATION REPOSITORIES

Gilpin County Courthouse
Administration Department, 2nd Floor
203 Eureka
Central City, CO 80427
Phone: 303-582-5214

Colorado Department of Public Health and Environment

Records Center, HMWMD
4300 Cherry Creek Drive South,
Building B2
Denver, CO 80246
Or call Diana at 303-692-3322

Upper Clear Creek Watershed Association
c/o R. L. Jones
Idaho Springs Visitor Center and Mining Museum
2060 Miner Street, Suite 201
Idaho Springs, CO 80452
Phone: 303-567-4324

Environmental Protection Agency

EPA Records Center
999 18th Street, Suite 300
Denver, CO 80202
Phone: 303-312-6473

Appendix E
Publications Since Last Community Involvement Plan

Publications:

Proposed Plan for Operable Unit No.4 of the Central City/Clear Creek Superfund site, July 2004

Black Eagle Fact Sheet, August 1994

Clear Creek/Central City Superfund Fact Sheet, August 1994

Fact Sheet, National Tunnel Cleanup, June 1995

Clear Creek Update, July 1995

Clay County/National Tunnel Mine Waste Cleanup Fact Sheet, June 1995

Press Release—State Proceeding with Cleanup of Mine Tailings Piles, February 1995

Cleanup Proposal Lion Creek/Minnesota Tailings Site, June 1996

Cleanup to Begin at Minnesota Mine Tailings Site, June 1996

Clear Creek Superfund Site newsletter, August 1996

Superfund Update, Initiation of Work on OU #4 November 2000

Superfund Update, OU #4 RI/FS April 2003

Record of Decision, Operable Unit 4, Central City/ Clear Creek Superfund site, September 2004

Executive Summary, Operable Unit 4, Remedial Investigation, June 2004

Record of Decision OU #4, September 29, 2004

Five-Year Review, September 2004

Appendix F

Acronyms and Glossary

ARARs	Applicable, or Relevant and Appropriate Requirements—federal, state and local laws and ordinances that apply to the activities planned
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (the Superfund law)
CR	Community Relations
CRC	Community Relations Coordinator
CIP	Community Involvement Plan
CDPHE	Colorado Department of Public Health and Environment
cy	cubic yards
EPA	United States Environmental Protection Agency
FS	Feasibility Study
HMWMD	Hazardous Materials and Waste Management Division
NCP	National Oil and Hazardous Substances Contingency Plan
NPL	National Priorities List
O&M	Operations and Maintenance
OU	Operable Unit
PA	Preliminary Assessment
ppm/ppb	parts per million/parts per billion
PRP	Potentially Responsible Party
RA	Remedial Action
RCRA	Research Conservation and Recovery Act of 1976 (federal hazardous/solid waste law)
RD	Remedial Design
RI	Remedial Investigation
ROD	Record of Decision
RPM	Remedial Project Manager
SARA	Superfund Amendments and Reauthorization Act of 1986
SI	Site Investigation
TAG	Technical Assistance Grant