United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R08-87/016
September 1987

EPA

Superfund Record of Decision:

Central City/Clear Creek, CO

TECHNICAL REPORT DATA

(Please read Instructions on the reverse before completing)

1. REPORT NO.	2.	3. RECIPIENT'S ACCESSION NO
EPA/ROD/R08-87/016		

4. TITLE AND SUBTITLE	5. REPORT DATE
SUPERFUND RECORD OF DECISION Clear Creek/Central City, CO First Remedial Action	September 30, 1987
	6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S)	8. PERFORMING ORGANIZATION REPORT NO
9. PERFORMING ORGANIZATION NAME AND ADDRESS	10. PROGRAM ELEMENT NO
	11. CONTRACT/GRANT NO
12. SPONSORING AGENCY NAME AND ADDRESS U.S. Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460	13. TYPE OF REPORT AND PERIOD COVERED Final ROD Report
	14. SPONSORING AGENCY CODE 800/00

15. SUPPLEMENTARY NOTES

16. ABSTRACT

The Clear Creek/Central City site encompasses portions of Clear Creek County and Gilpin County in the Colorado Mineral Belts, CO. More specifically, the focus is on five abandoned mines/tunnels proximal to the cities of Idaho Springs, Black Hawk and Central City and the influence of acid mine drainage from those tunnels on adjacent stream courses. Surface water contamination results from acid mine drainage emanating from the five tunnels and from seepage of ground water through tailings piles both proximal to these tunnels and along stream courses. Approximately 1,200 lbs per day of dissolved and suspended metals are discharged to the Clear Creek drainage from the five mine tunnels. These dissolved and suspended metal loadings have resulted in a significant depletion of aquatic life and have potential impact to sediments and downstream users of surface and ground water. There are ten contaminants of concern including aluminum, arsenic, cadmium, chromium, copper, fluoride, lead, manganese, nickel, silver and zinc.

The selected interim remedy for this site includes: construction of passive treatment systems to treat mine tunnel discharge prior to discharge to surface water. This is the preferred alternative and is contingent upon results of ongoing pilot plant studies. If water quality concentrations cannot be achieved by passive treatment, either a combination system of passive and active treatment systems will be constructed or two
(See Attached Sheet)

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Record of Decision Clear Creek/Central City, CO First Remedial Action Contaminated Media: gw, sw, sediments Key contaminants: arsenic, chromium, metals		

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS (This Report)	21. NO OF PAGES 158
	20. SECURITY CLASS (This page)	22. PRICE

EPA Form 2220-1 (Rev. 4-77) PREVIOUS EDITION IS OBSOLETE

EPA/ROD/R08-87/016
Clear Creek/Central City, CO
First Remedial Action

16. ABSTRACT (continued)

active treatment systems (chemical precipitation or electrochemical precipitation) will be constructed to treat mine tunnel discharge. The estimated capital cost for passive treatment only is $1,663,000 with annual O&M of $115,000.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII
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CLEAR CREEK/CENTRAL CITY SITE
DECLARATION FOR THE RECORD OF DECISION
DECISION SUMMARY
COMMUNITY RELATIONS RESPONSIVENESS SUMMARY

OPERABLE UNIT NO. ONE

Clear Creek and Gilpin Counties, Colorado

September 30, 1987

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Clear Creek/Central City Site
Clear Creek and Gilpin Counties, Colorado
Operable Unit No. One

STATEMENT OF PURPOSE

This decision document represents the selected remedial action for Operable Unit No. One of the Clear Creek/Central City site developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable, the National Contingency Plan.

The State of Colorado has been consulted on the selection of remedy. The State of Colorado has neither concurred nor non-concurred on the selection.

STATEMENT OF BASIS

This decision is based upon the Administrative Record for Operable Unit No. One of the Clear Creek/Central City site (the index of which is attached in Appendix C). The index identifies the items which comprise the Administrative Record upon which the selection of the remedial action is based.

DESCRIPTION OF SELECTED REMEDY

Low pH mine tunnel discharge water is only one of several sources to the degradation of water quality and aquatic habitat at the Clear Creek/Central City site. Data gathered during the remedial investigation has shown that:

- o Runoff from tailings and waste rock piles contain dissolved and suspended metals.

- o Tailings and waste rock piles adjacent to Clear Creek and North Clear Creek are unstable and could collapse into the creeks. These piles have the potential to produce acid. When introduced to water, the pH will rapidly decrease and significant amounts of metals will be released to the environment.

- o Hydrostatic pressure will build up in the tunnels due to cave-ins. After sufficient pressure has built up, the tunnels will blow out, releasing large volumes of dissolved and suspended metals to the creeks.

- o The ground waters in the vicinity of the acid mine discharges are contaminated.

- o There are additional sources of low pH mine tunnel discharges and tailings upstream of the site that could be contributing dissolved and suspended metals to the streams.

All of the above factors contribute to water quality and aquatic habitat degradation and will be studied in the following subsequent operable units:

Operable Unit No. Two - Tailings and Waste Rock Remediation
Operable Unit No. Three - Source Control
Operable Unit No. Four - Blowout Control
Operable Unit No. Five - Regional Ground Water Contamination
Operable Unit No. Six - Upstream Mine Discharges and Tailings

These operable units are subject to change.

The selected remedy for Operable Unit No. One of the Clear Creek/Central City site consists of treatment to meet upstream water quality concentration for contaminants of concern identified in the remedial investigation (RI) in a treatment system discharge line. The upstream water quality concentrations will be used as operational standards for this interim remedy. The upstream water quality concentrations ("upstream levels") consist of the geometric mean of the subset of RI samples taken on Clear Creek immediately upstream of the discharge from the Big Five Tunnel and on North Clear Creek immediately upstream of the discharge from the

Gregory Incline. These upstream levels are not to be considered as final applicable and/or relevant and appropriate requirements for the final site remedy.

Because a determination of the final remedy is contingent upon the completion of the other operable units listed above, the selected remedy is an interim remedy. This interim remedy will consist of construction of passive treatment systems to treat the low pH mine tunnel discharge from each tunnel prior to discharge to surface waters. This is the preferred alternative and is contingent upon the results of ongoing pilot plant studies demonstrating that upstream levels can be met by a passive treatment system. If the upstream levels cannot be met by passive treatment, then either of the following treatment systems will be built:

- a combination system consisting of passive and active treatment systems will be constructed. A phased approach to construction will be utilized.
- two active treatment systems (chemical precipitation or electrochemical precipitation) will be constructed to treat mine tunnel drainage prior to discharge.

These systems will be designed to reduce the mobility, toxicity or volume of dissolved and suspended metals in the mine drainage, increase pH, and meet upstream levels. Upstream levels are listed in the Selected Remedy section.

A pilot-treatment system for passive treatment has been constructed at the Big Five Tunnel. The pilot plant has been constructed to determine the ability of passive-treatment effluent to meet upstream levels for the discharge from a treatment facility at the end of the facility discharge pipe. The pilot plant will also be operated to gather design data for sizing volume requirements, determine optimum dissolved and suspended metal removal for various organic and vegetation types and confirm removal

efficiencies. Results of studies at the pilot plant will provide data required in order to determine final design criteria. Siting studies will evaluate alternate treatment site locations.

The remedy includes the following operation and maintenance activities:

Passive Treatment

- Annual collection of and laboratory analyses of soils and vegetation to measure heavy metal accumulation.
- Annual maintenance of vegetation.
- Replacement of wetland materials and disposal and treatment of metal saturated organic materials and plants every 5 to 10 years.
- Maintenance of pipelines carrying low pH mine tunnel discharge water from tunnels to passive treatment systems.

Active Treatment

- Labor costs for operation and maintenance of the facility.
- Chemical costs and power costs for operation and maintenance of the facility.
- Sludge treatment and disposal costs.
- Maintenance of pipelines carrying low pH mine tunnel discharge water from tunnels to treatment facilities.

Passive Treatment and Active Treatment Combination

- The combination of costs listed above under passive treatment and active treatment.

DECLARATION

The selected remedy is an interim solution requiring the exercise of the "interim remedy" waiver (Section 121(d)(4)(A) of SARA) from contaminant-specific ARARs listed in the ROD Decision Summary. Location and Action Specific ARARs will be met. The "interim remedy" waiver allows for the selection of a remedial action that does not attain ARARs if "the remedial action selected is only part of a total remediation action that will attain such level or standard of control when completed." Upstream water quality concentrations have been selected as the operational standard for the interim remedy. The interim remedy treats low pH mine tunnel discharges in a treatment facility sufficiently to meet upstream water quality concentrations in the treatment facility discharge line. Operable Unit No. One for the Clear Creek/Central City site is only part of the total remedial action required for the site. Future operable units are expected to be completed within 18 months, at which time a final solution will be proposed. The interim remedy is consistent with the final site remedy.

In accordance with SARA section 121(d)(2)(A(ii), EPA intends that the final remedy will at least attain water quality criteria established under the Clean Water Act, where such criteria are relevant and appropriate under the circumstances of the release. Additional data collection and analysis are necessary for EPA to determine whether such national criteria are relevant and appropriate under the circumstances of these releases or whether site-specific modification to national criteria would more appropriately establish a clean-up goal for this site. Until such time that it is determined that site specific modification to individual contaminant criteria are necessary, EPA will consider the more stringent of human health or aquatic life ambient water quality criteria (AWQCs) as an ARAR for the final remedy. This interim remedy will provide protection of human health and the environment.

It is determined that the remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. Therefore, this remedy satisfies the preference for treatment that reduces mobility, toxicity, or volume as a principal element.

September 30, 1987
Date

James J. Scherer
Regional Administrator
Environmental Protection Agency
Region VIII

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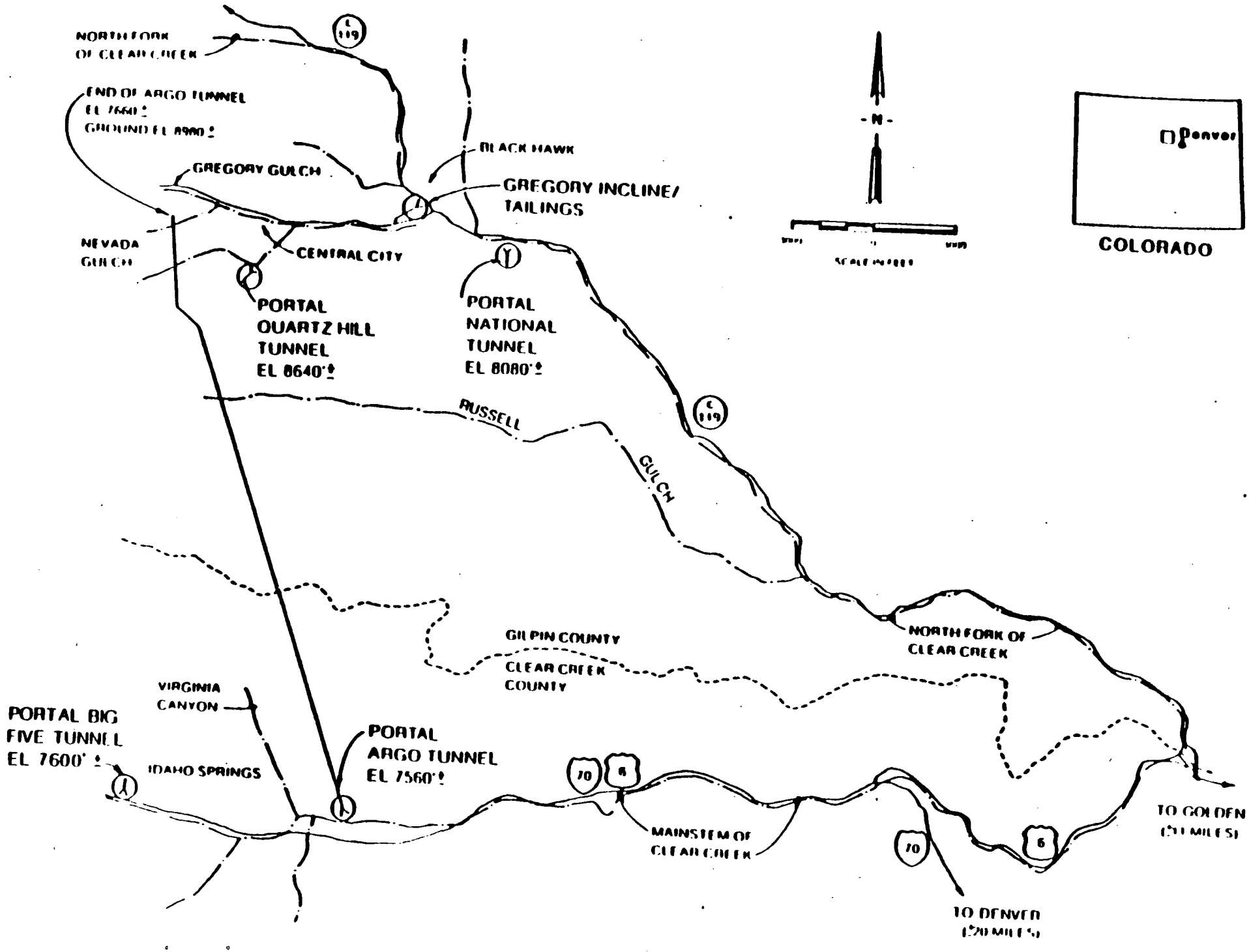
ROD DECISION SUMMARY
CLEAR CREEK/CENTRAL CITY SITE
OPERABLE UNIT NO. ONE

I. SITE NAME, LOCATION, AND DESCRIPTION

The Clear Creek/Central City site was nominated to the Superfund National Priorities List (NPL) in 1982. The site is located approximately 30 miles west of Denver, Colorado and consists of the discharges of acid mine drainage and milling and mining wastes from five mines/tunnels in the Clear Creek and North Clear Creek drainages.

The Clear Creek/Central City site encompasses the northeastern portion of Clear Creek County and southeastern portion of Gilpin County in the northeastern portion of the Colorado Mineral Belt. Specifically, the focus of the investigation was five abandoned mines/tunnels proximal to the cities of Idaho Springs, Black Hawk, and Central City and the influence of acid mine drainage from those tunnels on adjacent stream courses (Figure 1). The tunnels are the Argo Tunnel and Big Five portals on Clear Creek and the National Tunnel, Gregory Incline, and the Quartz Hill Tunnel in the North Clear Creek drainage. The Argo portal is within the city limits of Idaho Springs. The Big Five portal borders the Idaho Springs city limits and is sitauted adjacent to a trailer court. The Gregory Incline is within the Black Hawk city limits. The National Tunnel is within a mile of the City of Black Hawk. The Quartz Hill Tunnel is within a mile of the City of Central City.

Surface water contamination results from acid mine drainage emanating from the five tunnels and from seepage of ground water through tailings piles both proximal to these tunnels and along stream courses. Potential contaminant receptors include inhabitants of the area, downstream surface water and ground water users and wildlife, both terrestrial and aquatic. Recent studies completed by EPA indicate that significant loadings of


NORTH FORK OF CLEAR CREEK
END OF ARGO TUNNEL EL 7660'±
GROUND EL 8980'±
GREGORY GULCH
BLACK HAWK
GREGORY INCLINE/ TAILINGS
NEVADA GULCH
CENTRAL CITY
PORTAL QUARTZ HILL TUNNEL EL 8640'±
PORTAL NATIONAL TUNNEL EL 8080'±
RUSSELL GULCH
GILPIN COUNTY
CLEAR CREEK COUNTY
NORTH FORK OF CLEAR CREEK
VIRGINIA CANYON
PORTAL BIG FIVE TUNNEL EL 7600'±
IDAHO SPRINGS
PORTAL ARGO TUNNEL EL 7560'±
MAINSTEM OF CLEAR CREEK
TO GOLDEN (21 MILES)
TO DENVER (30 MILES)
N
Denver
COLORADO

dissolved and suspended metals (1,200 pounds per day, are discharged to the Clear Creek drainage from the five mine tunnels. A summary of this data is listed in Table 1 and discharge concentrations from the tunnels are compared against Federal Ambient Water Quality Criteria (AWQC) for aquatic life. A summary of instream water quality concentrations immediately upstream of the discharges from the Big Five Tunnel on Clear Creek and the Gregory Incline on North Clear Creek is listed in Table 2. These dissolved and suspended metal loadings have resulted in a significant depletion of aquatic life and have potential impact to downstream users of surface and ground water.

The acidity of the mine drainage is due largely to oxidized ground water passing through ore zones dominated by iron-bearing minerals, primarily pyrite. One method of forming acid mine drainage is sulfide oxidation being catalyzed by aerobic bacteria, particularly the genus Thiobacillus, resulting in the release of sulfuric acid and, consequently, further mineral dissolution. Subsequent discharge from the tunnels releases dissolved and suspended metals to Clear Creek and North Clear Creek, adversely affecting water quality for downstream users.

II. SITE HISTORY

The Clear Creek/Central City historical hard rock mining site is one of the most mined areas in Colorado. Data indicate that up to twenty-five (25) mines and six (6) milling operations are currently operating in Gilpin and Clear Creek counties. The area includes over 800 abandoned mine workings and tunnels. The intensity of mining operations has varied in recent years, due largely to fluctuating market prices for precious metals. Historically, gold mining accounted for 85 percent of the activity, silver, for 10 percent and other minerals, such as copper, lead, and zinc, the remaining 5 percent.

Mining activity in the Central City/Black Hawk area commenced in 1859. Placer gold was found at the mouth of Chicago Creek, near Idaho Springs, in

TABLE 1

DAILY DISCHARGE OF DISSOLVED AND SUSPENDED METALS FROM MINE DRAINAGES

Parameter (Total)	Mean Discharge Concentration µg/L	Aquatic Life AWQC[a] µg/L	Mean Flow of Discharge (cfs)	Mean Flow of Discharge (MGD)	Metals Loading To Stream lbs/day
NATIONAL PORTAL					
Aluminum	243	150[b]			0.08
Arsenic	7	190[c]			0.002
Cadmium	7	0.66[d]			0.002
Chromium	6	7.2[c]			0.002
Copper	185	6.5[e]			0.06
Iron	47,475				15.8
Lead	8	1.3[f]			0.002
Manganese	17,625				5.9
Nickel	212	88[b]			0.07
Silver	2	1.2[g]			0.001
Zinc	6,303	47[h]			2.1
Total	72,073		0.06	0.04	24
GREGORY INCLINE					
Aluminum	3,288	150			7.2
Arsenic	5	190			0.01
Cadmium	11	0.66			0.02
Chromium	8	7.2			0.02
Copper	879	6.5			1.9
Iron	138,333	-			300.0
Lead	20	1.3			0.04
Manganese	27,950	-			59.4
Nickel	192	88			0.4
Silver	3	1.2			0.01
Zinc	6,315	47			13.7
Total	176,977		0.40	0.26	383

TABLE 1 (Cont.)

DAILY DISCHARGE OF DISSOLVED AND SUSPENDED METALS FROM MINE DRAINAGES

Parameter (Total)	Mean Discharge Concentration µg/L	Aquatic Life AWQC[a] µg/L	Mean Flow of Discharge (cfs)	Mean Flow of Discharge (MGD)	Metals Loading To Stream lbs/day
QUARTZ HILL					
Aluminum	63,400	150			1.5
Arsenic	1,474	190			0.04
Cadmium	363	0.66			0.009
Chromium	56	7.2			0.001
Copper	48,733	6.5			1.2
Iron	549,667	-			13.3
Lead	137	1.3			0.003
Manganese	62,100	-			1.5
Nickel	480	88			0.01
Silver	18	1.2			0.001
Zinc	89,300	47			2.2
Total	815,728		0.004	0.0029	20
ARGO TUNNEL					
Aluminum	19,600	150			49.0
Arsenic	135	190			0.3
Cadmium	126	0.66			0.3
Chromium	19	7.2			0.05
Copper	5,170	6.5			13.0
Iron	144,000	-			360.3
Lead	59	1.3			0.2
Manganese	84,050	-			210.3
Nickel	218	88			0.6
Silver	75	1.2			0.2
Zinc	42,375	47			106.0
Total	295,827		0.46	0.3	740

TABLE 1 (Cont.)

DAILY DISCHARGE OF DISSOLVED AND SUSPENDED METALS FROM MINE DRAINAGES

Parameter (Total)	Mean Discharge Concentration µg/L	Aquatic Life AWQC[a] µg/L	Mean Flow of Discharge (cfs)	Mean Flow of Discharge (MGD)	Metals Loading To Stream lbs/day
BIG FIVE					
Aluminum	14,067	150			3.4
Arsenic	8	190			0.002
Cadmium	27	0.66			0.007
Chromium	14	7.2			0.003
Copper	1,420	6.5			0.3
Iron	51,000	-			12.3
Lead	40	1.3			0.01
Manganese	28,733	-			6.9
Nickel	239	88			0.06
Silver	6	1.2			0.002
Zinc	8,253	47			2.0
Total	103,807		0.045	0.029	25

[a] AWQC - Ambient Water Quality Criteria (Clean Water Act).
[b] See Fed. Reg. Vol. 51, No. 47, March 11, 1986, p. 8362.
[c] See Fed. Reg. Vol. 50, No. 145, July 29, 1985.
[d] AWQC for Cadmium, EPA 440/5-84/032, January 1985.
[e] AWQC for Copper, EPA 440/5-84-031, January 1985.
[f] AWQC for Lead, EPA 440/5-84/027, January 1985.
[g] See Fed. Reg. Vol. 45, No. 231, November 28, 1980, p. 79340.
[h] See Fed. Reg. Vol. 51, No. 102, May 28, 1986, p. 19269.

TABLE 2

MEAN UPSTREAM WATER QUALITY CONCENTRATION

Parameter	Units	Clear Creek Above Big Five Tunnel	North Clear Creek Above Gregory Incline
Aluminum (total)	ug/l	172.60	185.49
Arsenic (total)	ug/l	3.93	3.93
Cadmium (total)	ug/l	4.47	3.42
Chromium (total)	ug/l	5.00	4.75
Copper (total)	ug/l	15.54	17.90
Lead (total)	ug/l	3.68	4.58
Manganese (total)	ug/l	317.34	222.96
Nickel (total)	ug/l	8.45	8.05
Silver (total)	ug/l	.66	.76
Zinc (total)	ug/l	110.71	178.03

January of 1859 and in May of the same year, the first lode discovery in the Rockies was made in Gregory Gulch between Central City and Black Hawk. Initially, mining was concentrated in the Gregory Gulch area, including the Gregory Incline. Exploration via adits and shafts rapidly expanded to the south and west of Central City. The Quartz Hill Tunnel was begun in 1860, largely for the purpose of transporting ore from the overlying surface Glory Hole Mine to mills in Central City. The tunnel is over a mile long. National Tunnel construction was initiated in 1905 and continued to 1937. The tunnel is believed to be over 3,100 feet in length. The Argo Tunnel was constructed from 1893 to 1904. The tunnel was built for the dual purpose of mine drainage and ore transport. The total tunnel length is 4.16 miles, extending from the portal in Idaho Springs in a northward direction to beneath the headwaters of Gregory Gulch, west of Central City.

In 1982, the Clear Creek/Central City site was ranked as Site No. 174 of the original National Priority list (NPL) of 400 sites. The site was added to the NPL in 1983. EPA began a Remedial Investigation (RI) of the site in June, 1985. During the course of the Remedial Investigation, EPA determined, in accordance with 40 CFR 300.68(c), that an operable unit should be conducted to address treatment of mine drainages prior to discharge to surface waters to assure continued protection of the public health and environment.

A removal action was initiated by EPA at the Gregory Incline and Tailings in March 1987 to protect public health and the environment from hazards associated with the possible collapse of a retaining crib wall that would have allowed the tailings to slide into North Clear Creek. EPA was concerned that collapse of the tailings retaining crib would wash a large load of metals laden tailings downstream into Clear Creek and contaminate the City of Golden, Colorado municipal water supply. EPA also was concerned that a collapse could cause short-term flooding in the Black Hawk area due to North Clear Creek being dammed for a short time. To protect the public and the environment from these hazards, EPA removed an old deteriorated crib retaining wall and decreased the slope of the tailings

deteriorated crib retaining wall and decreased the slope of the tailings pile to stabilize it. EPA then constructed a temporary gabion-basket retaining wall.

Surface water contamination results from low pH mine discharges emanating from the five tunnels and from seepage of ground water through tailings piles both proximal to these tunnels and along stream courses. The low pH mine discharges results in the degradation of water quality and aquatic habitat. Data gathered during the Remedial Investigation has shown that:

- Runoff from tailings and waste rock piles contains dissolved and suspended metals.
- There are tailings and waste rock piles adjacent to Clear Creek and North Clear Creek that are unstable and could collapse into the creeks. These tailings are acidic in nature. When introduced to water, the pH will rapidly decrease and significant amounts of dissolved and suspended metals will be released to the stream.
- Hydrostatic pressure will build up in the tunnels due to cave-ins. After sufficient pressure has built up, the tunnels will blow out, releasing large volumes of metals to the creeks.
- Ground water in the vicinity of the tunnels is contaminated.
- There are additional sources of acid mine drainage and tailings upstream that could be contributing dissolved and suspended metals to the creeks.

All of the above factors contribute to water quality and aquatic habitat degradation and will be addressed in the following subsequent operable units:

Operable Unit No. Two - Tailings and Waste Rock Remediation
Operable Unit No. Three - Source Control
Operable Unit No. Four - Blowout Control
Operable Unit No. Five - Regional Ground Water Contamintation
Operable Unit No. Six - Upstream Mine Tunnel Discharges and Tailings

Current Site Status

The concentrations of most metals (aluminum, cadmium, copper, lead, manganese, nickel, silver, and zinc) detected in the mine tunnel discharges exceed Maximum Contaminant Levels (MCLs) established under the Safe Drinking Water Act (SDWA) for drinking water and Ambient Water Quality Criteria (AWQC) established under the Clean Water Act for protection of aquatic life. In several instances, the AWQC for protection of aquatic life are exceeded in the mine tunnel discharges by more than two orders of magnitude. Conversely, with respect to the MCLs for drinking water, the respective dissolved and suspended metal concentrations in Clear Creek and North Clear Creek are often within the established criteria. It is important to emphasize, however, that most dissolved and suspended metal concentrations in the receiving streams exceed AWQC for protection of aquatic life, which are more stringent than MCLs for drinking water for these particular contaminants of concern. Table 1 is a computation of the daily loading of dissolved and suspended metals in the mine discharges from each of the five mine tunnels in the study and compares mean discharge concentrations to AWQC.

A public health evaluation was conducted to identify compounds which could pose a significant health threat. All available data from surface water and ground water sampling and tailings/waste rock analyses were evaluated. Results indicate that of the elements detected, there were 10 contaminants of primary concern due to their widespread extent, potential health and environmental effects, and relative concentration. The contaminants of concern were identified as aluminum, arsenic, cadmium, chromium, copper, fluoride, lead, manganese, nickel, silver, and zinc.

The public health evaluation assessed the following risks associated with exposure to surface water from ingestion and direct contact by humans and aquatic life. The results of the public health evaluation follow and are summarized in Table 3.

TABLE 3

SUMMARY OF RISK ASSESSMENT RESULTS FOR HUMAN EXPOSURE TO CONTAMINANTS AT THE CLEAR CREEK/CENTRAL CITY SITE

Exposure Pathway	Total Excess Upper-Bound Lifetime Cancer Risk[a]	
	Average Case	Maximum Plausible Case
Direct contact and incidental ingestion of water while swimming		
Clear Creek	5×10^{-6} [b]	2×10^{-5}
Ingestion of fish		
Clear Creek	4×10^{-5}	9×10^{-4}
North Clear Creek	NE	NE
Ingestion of drinking water from alluvial wells		
Clear Creek Subbasin	1×10^{-2}	NE
North Clear Creek Subbasin	7×10^{-3}	NE

NE = not estimated.

[a] It is the Agency's policy that the selected remedy will at least attain a level of control for such hazardous substances, pollutants, or contaminants that falls within a total risk range of 10^{-4} to 10^{-7} over a 70-year lifetime exposure, with a goal of attaining a level of control that reflects a 10^{-6} risk. (See Superfund Public Health Evaluation Manual.)

[b] Five additional cancer deaths out of a population of 1 million over a 70-year lifetime exposure.

- Concentrations of dissolved and suspended metals in Clear Creek water, at the intake for the City of Golden water supply, are below MCLs specified in the Safe Drinking Water Act (SDWA).

- Ingestion of drinking water from ground water wells screened in the Clear Creek and North Clear Creek alluvial aquifers results in an upper-bound lifetime cancer risk of $1x10^{-2}$ and $7x10^{-3}$ from exposure to the geometric mean concentrations of arsenic in the Clear Creek sub-basin ground water and the North Clear Creek sub-basin ground water, respectively. Maximum concentrations of arsenic in both sub-basins exceed MCLs as did the maximum concentrations of cadmium, chromium, copper, lead, and zinc. The geometric mean concentrations of cadmium and lead are both above the MCLs. Residents of the cities of Idaho Springs, Black Hawk, and Central City are on public water supply systems that meet MCLs.

- Incidental ingestion of arsenic while swimming in Clear Creek may result in an upper bound risk of $5x10^{-6}$ and $2x10^{-5}$, under the average and maximum plausible scenarios, respectively. However, it should be noted that arsenic concentrations in Clear Creek are similar to concentrations of arsenic in other Colorado rivers.

- Direct contact with mine discharge water at the Big Five mine and Argo Tunnel may not irritate hands, but may cause eye irritation.

- Under the maximum plausible scenario, ingestion of fish from Clear Creek may result in doses greater than the cancer risk criteria for cadmium, copper, silver, and zinc. Ingestion of fish caught from North Clear Creek may also result in doses of copper, silver, and zinc that exceed the cancer risk criteria. An upper bound lifetime excess cancer risk of $9x10^{-4}$ was calculated for ingestion in fish from Clear Creek under the maximum plausible scenario, based on arsenic. Because arsenic is metabolized in fish to a less toxic form, the actual risk is probably lower. In addition, as a result of mine drainage from the five tunnel discharges and other upstream discharges, neither creek may support enough fish to result in the assumed intake.

The exposure of aquatic life to acid mine drainage from the tunnel discharges in the Clear Creek and North Clear Creek drainages, and the marsh below National Tunnel were also considered. The major conclusions of this assessment are summarized as follows.

- Several of the chemicals of concern present in Clear Creek, North Clear Creek, and the marsh below the National Tunnel are at concentrations that exceed the Federal AWQC established under the Clean Water Act for the protection of freshwater aquatic life. In particular, concentrations of zinc, copper, and aluminum

consistently exceed the acute and chronic criteria. The pH is lower than the range of pH's suggested by the EPA for the protection of freshwater aquatic life. In addition, concentrations of manganese exceed the lowest observed effect level in rainbow trout. Because aquatic organisms are exposed to a mixture and not individual chemicals, toxic effects may be even greater than indicated by comparison to the criteria. Although some fish may have developed tolerance to the metals in the creeks, it is highly unlikely that the population of fish found in these creeks are free of toxic effects.

EPA conducted a survey of ground water uses in the study area. Samples of ground water were taken from 13 wells and analyzed for SDWA criteria. Only one well failed to meet MCLs set under the Safe Drinking Water Act. The well not meeting SDWA MCLs exceeded cadmium levels. EPA has notified the owners of the wells of the results of the analyses. A Superfund Removal Action is planned to replace the contaminated well water.

III. ENFORCEMENT

EPA has determined that the possibility of participation by potentially responsible parties (PRPs) in the project is minimal. A Potentially Responsible Party Search was conducted for the Clear Creek/Central City site but did not result in identifying PRPs for the mine tunnel discharges, which are the focus of this operable unit. Due to the complexity of the underground tunnels and lack of historical survey information documenting tunnel origin and ending, EPA is unable to trace the contamination sources. The type of investigation that is needed to attempt to determine the origin of the contaminant source is beyond the scope of a PRP search and would consist of a land survey and literature, docket and tax record search conducted to establish which of the mine claims actually cross each of the tunnels as well as a hydrogeologic analysis of which claims logically drain into the tunnels. At this time, EPA does not feel that such an investigation would be fruitful due to the lack of recorded information.

The PRP Search found information on ownership of the mine tailings that will be used in Operable Unit No. Two. EPA has an extensive list of both past and present owners of the mine tailings and the underlying property.

Because of the inability to identify the origin and therefore allocate ownership of the mine discharges, EPA does not expect participation in this operable unit by a financially solvent PRP and for now assumes that the Hazardous Substances Trust Fund (Superfund) will finance the remedial action.

IV. COMMUNITY RELATIONS HISTORY

The Community Relations Responsiveness Summary (Appendix A) describes the community's nature and level of concern regarding the alternatives evaluated in the feasibility study (FS) for Operable Unit No. One.

After release in June 1987 of the FS Report on Operable Unit No. One, EPA held two public meetings in conjunction with the public comment period, June 8 through July 7, 1987. On June 3, 1987 and June 12, 1987, announcements for the public comment period and public meetings were published in the newspapers, the Clear Creek Courant and Weekly Register Call, respectively. EPA distributed the Proposed Plan during the public meetings. The Proposed Plan was the Executive Summary of the FS Report. It gave a brief description of the remedial action alternatives and stated the rationale for the preferred remedy. The Proposed Plan was discussed in articles in the Clear Creek Courant on June 24 and July 1, 1987.

On June 16 and June 17, 1987, EPA held public meetings on the Proposed Plan. The preferred remedy stated in the Proposed Plan was construction of passive treatment systems. In general, the public had mixed reaction to the passive treatment systems, with some area residents supporting the concept while others questioned the need for any remediation. The alternatives selected in the Record of Decision are a logical outgrowth of the Proposed Plan. Variations from the Proposed Plan will be published when the Record of Decision is signed. The Responsiveness Summary to this ROD describes in more detail the nature and level of the community's concern, and include EPA's responses to all comments received during the public review of the Operable Unit No. One feasibility study.

EPA has established information repositories at the EPA library in Denver, the Gilpin County Court House in Central City, the Idaho Springs Public Library and the Idaho Springs City Hall in Idaho Springs, and the Golden Public Library in Golden, Colorado. The Administrative Record is located at the Gilpin County Courthouse and the EPA Library. An index of the Administrative Record is located at each information repository.

V. ALTERNATIVES EVALUATION

The EPA evaluated potential remedial action alternatives to abate the threat posed by contamination in five mine tunnel discharges primarily by progressing through the series of analyses which are outlined in the National Contingency Plan (NCP), in particular, 40 CFR Section 300.68, the Interim Guidance on Superfund Selection of Remedy, December 24, 1986, (OSWER Directive No. 9355.0-19) and the Additional Interim Guidance for FY '87 Records of Decision, July 24, 1987, (OSWER Directive No. 9355.0-21). This process, in part, enables the EPA to address the SARA Section 121 requirements of selecting a remedial action that is protective of human health and the environment, that is cost-effective, that attains Federal and State requirements that are applicable and/or relevant and appropriate, and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Additionally, SARA Section 121 and the guidance documents referenced above require that EPA give preference to remedies which employ treatment which permanently and significantly reduces the mobility, toxicity, or volume of hazardous substances as their principal element.

The selection of remedy process begins by identifying certain site-specific information to be assessed in determining the types of response actions that will be considered for the site. A general list of site-specific information is contained in Section 300.68 (e)(2) of the NCP. This list was used to identify specific site and waste characteristics of the Operable Unit No. One of the Clear Creek/Central City site. Based upon

these site and waste characteristics, the EPA was able to reduce, from the universe of many possible response actions, a set of response actions and associated technologies to be considered for Operable Unit No. One.

Section 121(b)(1) of SARA requires that an assessment of permanent solutions and alternative treatment technologies or resource recovery technologies that, in whole or in part, will result in a permanent and significant decrease in the toxicity, mobility, or volume of the hazardous substance, pollutant, or contaminant be conducted. The alternative treatment and resource recovery technologies considered included, among others, passive treatment and metals recovery from sludges.

Before the technologies were evaluated for remedial action alternatives, they were categorized as either discharge treatment or source control. Source control measures are intended to contain the mine discharges within the five tunnels.

The next step of the selection of remedy process is assembling the technologies and/or disposal options into remedial action alternatives. Pursuant to OSWER Directive No. 9355.0-19, "Interim Guidance on Superfund Selection of Remedy", remedial action alternatives were considered ranging from those that would eliminate the need for long-term management (including monitoring) at the site to alternatives involving treatment that would reduce mobility, toxicity, or volume as their principal element. Remedial action alternatives developed in this way will vary mainly in the degree to which they rely on long-term site management. Further, a containment option involving little or no treatment and a no action alternative were developed as required by Section 300.68(f)(1)(v) of the NCP.

The remedial action alternatives developed in the FS for Operable Unit No. One for the Clear Creek/Central City site are:

No Action

Active Treatment

- o Lime Precipitation
- o NaOH (Caustic) Precipitation
- o Reverse Osmosis
- o Electrodialysis
- o Ion Exchange
- o Freezing
- o Iron Oxidation/Precipitation
- o Sulfide Precipitation
- o Distillation
- o Recycling Bacterial Waste
- o Coagulation/Flotation
- o Evaporation
- o Deep Well Injection
- o Electrochemical Precipitation

Passive Treatment

Source Control

- o Dry/Air Seals
- o Fracture Zone Seals
- o Portal Bulkheads

Controlled Release

Alternatives were subjected to an initial screening to narrow the list of potential remedial actions for further detailed analyses using the criteria of cost, effectiveness, and implementability (acceptable engineering practices) as directed by 40 CFR Section 300.68(g) and the ability to reduce the toxicity, mobility, or volume of contaminants, as directed by SARA. Costs, including Operation and Maintenance (O&M) were considered for each alternative. Each alternative was screened by evaluating engineering feasibility, applicability, and reliability. Effectiveness in protecting human health and the environment was considered. During the initial screening process, the controlled release alternative and the following discharge treatment alternatives were eliminated: reverse osmosis, electrodialysis, ion exchange, freezing, distillation, recycling bacterial waste, evaporation, and deep well injection. The Source Control alternative was recommended for further study, including field

investigations, under Operable Unit No. Three. The remaining alternatives were further considered in the section on Detailed Analysis of Remedial Action Alternatives.

The justification for elimination of these alternatives follows.

Reverse Osmosis: This alternative was eliminated for the treatment of mine tunnel discharges from Clear Creek/Central City study area for the following reasons:

- The majority of dissolved iron in the Argo, Big Five, and National discharges are in the ferric form. Maintenance costs in providing an adequate product flow rate are expected to be extreme due to membrane fouling.
- Sulfate concentrations in the mine tunnel discharges are expected to result in significant operational problems from the formation of calcium sulfates on the membranes.
- Additional treatment or disposal facilities will have to be constructed to provide for disposal of the brine, estimated to be up to 25 percent of the influent.

Electrodialysis: Electrodialysis has demonstrated only marginal dissolved solids removal. The most efficient removal occurs at high temperatures with a 1 percent removal per degree fahrenheit increase in temperature. Increases in temperature compound the problem of scaling on the membranes. Power consumption estimates are 0.2 to 0.4 kwH per 100 mg/L dissolved solids per 1,000 gallons treated plus an additional 3 to 3.5 kwH/1,000 gallons treated for pumping and brine handling. Power cost estimates, based on 3,000 mg/L of dissolved solids and $0.06/kwH translate into $0.09/1,000 gallons. Brine volumes will be in the range of 15 to 25 percent of the influent flow and will require additional treatment by neutralization and precipitation and sludge disposal. Electrodialysis will not be considered further because the technology is only marginally feasible and is not cost-effective for this application.

Ion Exchange: This alternative was eliminated as the primary treatment process for the treatment of mine tunnel discharges for the following reasons:

- The ion exchange process generates a waste stream that may be as high as 25 percent of daily influent treated. Ancillary treatment facilities for these waste present significant additional costs.
- Although the success of the modified DeSal and Two Resin Processes in removing the reduced form of soluble metal species has been demonstrated, discharges from the Argo Tunnel contain significant ferric iron which is expected to clog the weak base resins requiring extensive regeneration and eventually rendering them ineffective as a form of treatment.
- Cost comparison on a dollar/1,000 gallons treated basis shows that cost ranges for ion exchange ($1.00-$7.00/1,000 gallons, 1977 dollars) exceeds that of conventional neutralization/precipitation/clarification ($0.20-$1.30/1,000 gallons, 1977 dollars) without realizing significant additional benefits in metals reduction.
- Both the Modified DeSal and Two Resin processes require treatment of column effluents for the precipitation and removal of metals. Additional treatment of waste backwashes is also required. Both treatment processes will generate sludges that require dewatering and disposal.

Ion exchange will be considered as a tertiary treatment process to remove trace metals.

Freezing: This technology is considered technically unfeasible. A literature review shows that freezing has been effective and economical in recovering cadmium and hexavalent chromium. However, initial concentrations were 100 mg/L. Freezing has not been shown to be technically feasible or cost-effective for removing other heavy metals, especially on a large scale.

Distillation: Operating costs are significantly higher than reverse osmosis, electrodialysis, or ion exchange. Because of attendant high operating costs, this alternative was excluded from further analysis.

Recycling Bacterial Waste: This technology would not be technically applicable for the Clear Creek/Central City study area because:

- Mine tunnel discharge and inhibitors would have to be injected at all surface recharge points. This is not technically feasible considering the length of main tunnels and connecting tunnels.
- Mine tunnel discharges would have to be continuously recycled to upstream surface recharge points until bacterial growth was inhibited.

Evaporation: This technology would not be technically applicable to this site because:

- There is insufficient land area for construction of a reservoir, except for Quartz Hill.
- Depth to water table is minimal and reservoir sites would be in the floodplain.

Deep Well Injection: This alternative, although technically feasible, requires significant geological and geophysical subsurface investigative work and literature review in order to determine a suitable injection location for disposal of acid mine drainage. Deep well injection may lead to aquifer contamination and does not result in reduction in the mobility, volume, or toxicity of contaminants. Even after a suitable site has been identified, costs for permitting, injection well installation, and operation and maintenance are expected to be extreme. (With implementation of land disposal restrictions, under RCRA, the discharge may have to be treated prior to injection. Moreover, long-term viability of an operating injection well is constantly in question because for the potential of formation rejection of injected volumes or plugging of the well.

This alternative will not be analyzed further because it does not reduce toxicity, mobility, and volume of contaminants and because of the expected high costs and uncertainty involved with using this technology.

Controlled Release: Controlled release requires water to be stored for release to streams during high flow periods to take advantage of dilution. This alternative would not be technically applicable because:

- o There is insufficient land area for construction of a reservoir, except for Quartz Hill.
- o Depth to water table is minimal and reservoir sites would be in the floodplain.
- o Dissolved and suspended metals would precipitate with suspended charge and releated particles into bottom sediments. Resuspension would still be possible.

Source Control Alternatives: A literature search and review of available mine maps was conducted in order to investigate the feasibility of various alternatives for source and discharge control of mine discharges from the five tunnels. Available information on the hydrology in the Clear Creek/Central City area indicates the following:

- o The source of discharge from the tunnels is from percolating ground water that directly enters the mines through fractures, intersecting veins or intersecting tunnels, shafts, or cross cuts. The water in intersecting tunnels is also due mainly to ground water inflow.
- o Although some of the mine discharge may be related to runoff, the majority of flow is due to ground water inflow. This is shown by the relatively constant discharge from the mines. If the discharge was mostly influenced by runoff, we would expect the discharge to show a more pronounced seasonal fluctuation.
- o The source or recharge area for the ground water is mainly infiltration over a large area.
- o The water infiltrates mainly through fractures and veins and accumulates in the drainage tunnels. Little of the source is due to point source contributions (such as the intersection of the adits with surface channels).

Given this current state of information, no accurate predictions could be made concerning the feasibility of source control. Therefore, further investigations including field work will be conducted under Operable Unit No. Three.

DETAILED ANALYSIS OF REMEDIAL ACTION ALTERNATIVES

Consistent with Section 300.68(h) of the NCP, the Office of Solid Waste and Emergency Response (OSWER) Directive No. 9355.0-19, and the OSWER Directive No. 9355.0-21, the remedial action alternatives remaining after initial screening were further refined and then subject to detailed analysis. Detailed analysis of each remedial action alternative entailed evaluation based on the criteria derived from the NCP and SARA. These criteria relate directly to factors mandated by SARA in Section 121, including Section 121(b)(1)(A-G). The criteria are as follows:

- Protection of human health and the environment
- Compliance with legally applicable and/or relevant and appropriate requirements
- Reduction of mobility, toxicity, or volume
- Short-term effectiveness
- Long-term effectiveness and permanence
- Implementability
- Cost
- Community acceptance
- State acceptance

The evaluation of alternatives reflects the mandate to utilize permanent solutions and alternative treatment technologies to the maximum extent practicable, as specified in Section 121 of SARA. The alternatives selected for further analyses included:

- No Action
- Passive Treatment

- o Active Treatment
- o A combination of Passive Treatment and Active Treatment

The alternatives are described in the following paragraphs, followed by a comparative matrix evaluation, using the above evaluation criteria.

Description of Alternatives

No Action Alternative: The No Action alternative assumes that there will be no treatment of mine tunnel discharge and that approximately 1,200 pounds per day of aluminum, arsenic, cadmium, chromium, copper, iron, lead, manganese, nickel, silver, and zinc will continue to be discharged into Clear Creek and North Clear Creek. Remedial measures would be constructed to limit the public's exposure to the acid mine drainage, i.e., fencing, piping, etc.

Passive Treatment Alternative: Passive treatment is an innovative treatment technology that involves creation of an artificial wetland to emulate or enhance natural metal ion removal and acidity reduction processes. Passive treatment was evaluated for the five tunnel discharges based upon available area requirements, the ability of passive treatment to significantly reduce the volume, mobility, or toxicity of contaminants, and its ability to eliminate the need for long-term management. A passive treatment pilot plant has been constructed at the Big Five Tunnel to evaluate the effectiveness of wetlands in removing metals from acid mine drainage. Based upon the results of the pilot plant studies, passive treatment systems would be built to treat all five tunnel discharges. There is sufficient land area near each tunnel to install passive treatment systems.

Observations have shown that concentrations of metals present in acid mine tunnel discharges are reduced as the water flows through natural bogs and wetlands. These observations led to the concept that these natural systems could be designed and constructed to provide a self-sustaining treatment

that would be inexpensive and require minimal maintenance for long-term operation. These "passive" treatment techniques rely upon emulating or enhancing the process of metal ion removal and reduction of acidity. In order to design the natural wetland situation, the concept was expanded to include augmenting or replacing the peat with other organic materials to provide a growth medium, and then transplanting several appropriate species of native vegetation to enhance the continual addition of organic matter to the growth medium.

Investigations of inexpensive, low-maintenance alternative treatment systems have been and are currently being conducted in Colorado and elsewhere. These alternative systems rely upon natural processes including filtration, cation exchange, sorption, coprecipitation, complexation, and biologic extraction to remove metal ions, and aeration or the addition of limestone as a buffer to stabilize the pH. Since the investigation into the heavy metal removal processes is a relatively new field of study, the removal mechanisms, the relationships among the process, and their relative importance are not thoroughly understood.

Studies by the Colorado Mine Land Reclamation Board, U.S. Bureau of Mines, and various universities are currently exploring continual dissolved/suspended metal extraction using systems that consist of two basic phases. The first phase removes metals, primarily iron, by employing the natural processes that occur in self-perpetuating, artificially created peat bogs. In the second phase, cascades are used to exsolve carbon dioxide, and coarse limestone rock is added to the effluent discharge channel to reduce acidity. Results of these studies have aided in the development of preliminary design concepts for low maintenance, passive treatment systems.

Cation exchange processes in peat and Sphagnum moss (humus) are believed to be responsible for the metal ion removal. The cation exchange properties of peat and peat-forming plants are attributed to the carboxyl functional groups found in the humic acids of peats and the pectic compounds in plant

cellular tissue. Pectic compounds are polymers composed primarily of galacturonic acid. They are found in greatest abundance in the middle lamella between the plant tissue cell walls.

Annual vegetation and decaying plants generally remain standing for a period of time until snow, wind, or other phenomena cause them to collapse. These collapsed materials contribute to the formation of peat and decompose slowly under anaerobic or low pH conditions. Metals accumulated in decaying leaves and stems may be retained in the substrate in the formation of new peat, thus the plants may perform an important metal uptake removal function in the wetland. Partially decomposed plants have also been shown to remove metal ions from solution.

Passive treatment sites require placement of a liner before placement of organic material. The liner will be required to prevent ground water contamination. To stay within the intent of RCRA, groundwater monitoring may be necessary.

Active Treatment Alternatives: Alkaline precipitation (by using lime, sodium hydroxide, or sulfide) was evaluated and identified as an alternative that would meet upstream water quality concentrations in a treatment plant discharge line. Laboratory treatability studies of precipitation technologies were conducted. Lime precipitation was selected as the preferred technology. Electrochemical precipitation is an innovative process that may play a role in active treatment. However, additional investigation will be necessary to determine the applicability of electrochemical treatment.

Passive Treatment and Active Treatment Combination Alternative: A combination of passive and active treatment systems would be constructed to treat mine tunnel discharge. The purpose of combining the two treatment systems is to reduce the volume of lime required to precipitate metal

hydroxides and thereby also reduce the volume of sludges that occur in an active treatment facility. The reduction in sludge volume is estimated to be 45 percent.

Comparison of Alternatives

Listed in Table 4, in matrix format, are the key criteria considered in evaluating and comparing alternatives. These are specified in J. Winston Porter's memorandum "Additional Interim Guidance for FY '87 Records of Decision," dated July 21, 1987. The cost summary of alternatives is compared in Table 5.

VI. SELECTED REMEDY

Description of Selected Remedy

The selected remedy for Operable Unit No. One of the Clear Creek/Central City site consists of construction of passive treatment systems to treat mine tunnel discharges prior to discharge to surface waters. This is the preferred alternative and is contingent upon the results of on-going pilot plant studies demonstrating that upstream water quality concentrations can be achieved by a passive treatment system. If the upstream water quality concentrations cannot be achieved by passive treatment, then either of the following treatment systems will be built:

- a combination system consisting of passive and active treatment will be constructed. A phased approach to construction will be utilized.
- two active treatment systems (chemical precipitation or electrochemical precipitation) will be constructed to treat mine tunnel discharges prior to discharge to surface waters.

The selected remedy for treating mine tunnel discharges is cost-effective and is protective of human health and the environment. A pilot treatment

TABLE 4 (cont.)

COMPARISON OF ALTERNATIVES

	No Action	Passive Treatment	Active Treatment	Passive and Active Treatment Combination
5. Implementability	Fences are easily constructed but must be maintained to prevent human contact, upon fence deterioration.	The existing pond at the Big Five Tunnel will have to be drained and filled. Passive treatment is implementable once the pilot plant studies are completed in September 1988. Design and construction will take up to 8 months. Construction involves the use of readily available construction equipment.	The equipment required for this technology is readily available and is used in municipal sewage treatment plants. Construction will take up to 18 months. Construction involves the use of readily available construction equipment.	The passive treatment system will be constructed and operated prior to construction of the active treatment system. Construction involves the use of readily available construction equipment.
6. Cost	Capital costs for construction of fencing, inlet boxes, and piping is estimated to be $33,700. The fencing would have to be replaced every 20 to 30 years.	Capital costs are estimated at $1,663,000. This estimate includes $347,000 for gravity pipelines which may be reduced based on siting studies. Yearly operation and maintenance costs (O&M) are estimated to be $115,000. Net present worth of capital and O&M costs at a 10 percent interest rate was calculated to be $2,747,000.	The capital cost for construction of a North Clear Creek and Clear Creek treatment plant is estimated to be $2,275,000. Annual operation and maintenance costs for the two plants are estimated to be $548,600. The present value of capital and O&M costs based on a 10% interest rate are $7,732,000.	The capital cost for construction of a North Clear Creek and Clear Creek facility is estimated to be $1,864,000. Annual O&M costs for the two facilities are estimated to be $511,200. The present value costs at a 10% interest rate are estimated to be $8,967,000.
7. Community Acceptance	Many residents of Idaho Springs, Central City, and Black Hawk support the No Action alternative because they have been living with mine drainage all their lives. Downstream users and fishing groups do not support the No Action alternative because of water quality and aquatic habitat degradation.	The majority of people favor passive treatment as a low-cost, low maintenance treatment alternative. See Responsiveness Summary.	The community would like to know who is responsible for long-term facility operation. See Responsiveness Summary.	The community would like to know who is responsible for the long-term facility operation. See Responsiveness Summary.
8. State Acceptance	The Colorado Department of Health does not support the No Action alternative. The Colorado Department of Wildlife estimates the economic value of the Fishery Resource potential as $716,000 per year.	The Colorado Department of Health and Colorado Mined Land Reclamation Board are in favor of passive treatment as a low-cost treatment alternative.	The State is concerned about the long-term operation and maintenance costs for running the facility.	The State is concerned about the long-term operation and maintenance costs for running the facility.

TABLE 4

COMPARISON OF ALTERNATIVES

	No Action	Passive Treatment	Active Treatment	Passive and Active Treatment Combination
1. Compliance with ARARs	Does not meet ARARs	The ability to meet upstream levels and, ARARs will be evaluated in a pilot plant. ARARs for disposal of metal laden organic material, including land disposal restrictions, will be complied with. Fixation technologies will be used to ensure that the material passes the EP toxicity test and the treated material will be disposed in a municipal landfill.	Treatability studies have shown that active treatment will remove 99.9 percent of metal ions and meet upstream levels and will not meet all contaminant-specific ARARs. Approximately 1,430 cubic yards of sludge would be produced each year. The sludge passes the EP toxicity test. Sludge disposal will meet ARARs for landfill disposal and any new subtitle D ARARs.	A combination of passive treatment and active treatment will meet upstream levels and will not meet all contaminant-specific ARARs. Approximately 1,430 cubic yards of sludge would be produced each year. The sludge passes the EP toxicity test. Sludge disposal will meet ARARs for landfill disposal and any new Subtitle D ARARs.
2. Reduction of Mobility, Toxicity, and Volume	Does not reduce mobility, toxicity, or volume of contaminants.	The organic material in the wetland will remove significant quantities of heavy metals, thereby reducing mobility, of metals in the tunnel discharge. Heavy metals will build up in the organic material. The buildup will be monitored yearly and the organic material removed and disposed when necessary (estimated at every 5 to 10 years). Fixation or similar technology would be used to reduce mobility and toxicity.	Laboratory treatability studies showed that metal concentrations in the discharge would be reduced by 99.9%. The metals would be concentrated in a lime sludge that would be dewatered and disposed in a landfill. The dewatered sludge passes EP toxicity tests.	Passive treatment will reduce the volume of metal hydroxide sludges produced in the lime precipitation facility by an estimated 45 percent. Laboratory treatability studies showed that metal concentrations in the discharge would be reduced by 99.9 percent. The metals would be concentrated in a sludge that would be dewatered and disposed in a landfill. The dewatered sludge passes EP toxicity tests.
3. Short-Term Effectiveness	Does not reduce risk to aquatic life. Fencing will reduce dermal exposure to public.	Risk to aquatic life will be reduced by reducing metal loading to creeks. Vegetation should acclimate after one growing season. Yearly maintenance may be required to reestablish vegetation.	Construction of a precipitation plant will be immediately effective in protecting the environment.	Both Passive Treatment and Active Treatment comments apply.
4. Long-Term Effectiveness	No reduction in exposure of human and environmental receptors to metals in discharges.	A pilot plant study will assess the amount of buildup of metals in the organic material in order to estimate how often the organic material will have to be replaced.	If properly maintained, construction of a precipitation treatment plant will protect the environment over the long term.	Both Passive Treatment and Active Treatment comments apply

TABLE 4 (cont.)

COMPARISON OF ALTERNATIVES

	No Action	Passive Treatment	Active Treatment	Passive and Active Treatment Combination
9. Overall Protection of Human Health and the Environment	Impacts on human health due to the surface water pathway are minimal due to dilution of metal concentration by the flow in Clear Creek. The no action alternative is not protective of the environment. If fences are not maintained, it is not protective of human health because of exposure to low pH mine tunnel discharge.	Passive treatment significantly improves protection of human health and the environment. Pilot plant studies will determine the extent of protection of the environment.	Active treatment significantly improves protection of human health and the environment.	The combination alternative significantly improves protection of human health and the environment.

TABLE 5

COST SUMMARY

Alternative	Cost Estimates ($1,000)		Present Worth at Discount Rate ($1,000)
	Capital	Annual O&M	10%
1. No Action	33	-	-
2. Passive Treatment	1,663	115	2,549
3. Active Treatment	2,275	549	7,732
4. Passive Treatment and Active Treatment Combination	3,864	511	8,967

plant has been constructed at the Big Five Tunnel in order to gather design data and determine the extent of treatment attainable from passive treatment systems.

Target treatment levels for the interim remedy in the treatment system discharge pipe are upstream water quality concentrations. These are more stringent than Colorado Effluent Limitations (Table 6).

Disposal of Metal Laden Organic Material From Passive Treatment Systems

The material processes of senescence and death of vegetation will provide additional organic matter (humus) annually to remove metals from the discharge. This organic replenishment is estimated to be sufficient to increase metals uptake capacity so that removal and replacement of the organic matter in the treatment systems is planned (and included in the costs) every seven years. The organic matter will contain metals that were removed from the mine tunnel discharges. For disposal considerations, the metals of concern are arsenic, cadmium, chromium, lead, and silver. The accumulation of these metals could result in a material that may be a characteristic waste under RCRA due to metals which exceed the EP toxicity levels. In order to determine if the materials are EP toxic, the materials from the pilot plant will be evaluated using both the EP (extract procedure) toxicity test and the TCLP (toxicity characteristic leaching procedure) tests. If the leachate concentrations exceed standards, treatment with appropriate fixation agents will be performed prior to disposal in a municipal landfill. Because the materials are characteristic wastes, the metals will be made non-hazardous by reducing the leachability of the metals below EP and TCLP levels. This reduction is achievable by using various agents (cement, kiln dust, fly ash, etc.) which fix the metals in a less leachable form.

Current knowledge indicates that passive treatment systems have two removal zones. An aerobic zone removes metal oxyhydroxides and an anaerobic zone removes metals in the sulfide form. The aerobic zone may only be 1 to 3

TABLE 6

METAL REMOVAL ESTIMATE

Metal	Mean Discharge Water Quality mg/L (Total)	Passive Treatment Removal Efficiency (%)	Expected Discharge Water Quality After Passive Treatment (mg/L)	Expected Discharge Water Quality After Active Treatment (mg/L)	Colorado Effluent Limitations (mg/L)[a]	Upstream Water Quality Concentrations (mg/L) North Clear Creek
NATIONAL						
Aluminum	0.2	90	0.02	0.02	-	0.19
Arsenic	0.007	Unknown	?	<0.005	-	0.004
Cadmium	0.007	95	<0.001	<0.001	0.1/0.05	0.004
Copper	0.2	95	<0.01	0.003	0.3/0.15	0.018
Iron	47.5	75	12	<0.05	-	*
Lead	0.008	95	<0.001	<0.001	0.6/0.3	0.005
Manganese	17.6	50	9	0.01	-	0.23
Nickel	0.2	95	<0.01	<0.01	-	0.008
Zinc	6.3	95	<0.3	<0.001	1.5/0.75	0.18
QUARTZ HILL						
Aluminum	63.0	90	6.3	<0.001	-	0.19
Arsenic	1.5	Unknown	?	<0.001	-	0.004
Cadmium	0.4	80	0.8	<0.001	0.1/0.05	0.004
Copper	48.7	80	10	<0.001	0.3/0.15	0.018
Iron	550.0	90	55	<0.001	-	*
Lead	0.1	80	0.02	<0.001	0.6/0.3	0.005
Manganese	62.0	50	31	<0.001	-	0.23
Nickel	0.5	80	0.1	<0.001	-	0.008
Zinc	89.0	80	18	<0.001	1.5/0.75	0.18
GREGORY INCLINE						
Aluminum	3.3	90	0.33	<0.001	-	0.19
Arsenic	0.005	Unknown	?	<0.001	-	0.004
Cadmium	0.011	80	<0.002	<0.001	0.1/0.05	0.004
Copper	0.9	80	0.18	<0.001	0.3/0.15	0.018
Iron	138	90	14	<0.001	-	*
Lead	0.02	80	0.004	<0.001	0.6/0.3	0.005
Manganese	28	50	14	<0.001	-	0.23
Nickel	0.2	80	0.04	<0.001	-	0.008
Zinc	6.3	80	1.26	<0.001	1.5/0.75	0.18

TABLE 6

METAL REMOVAL ESTIMATE

Metal	Mean Discharge Water Quality mg/L (Total)	Passive Treatment Removal Efficiency (%)	Expected Discharge Water Quality After Passive Treatment (mg/L)	Expected Discharge Water Quality After Active Treatment (mg/L)	Colorado Effluent Limitations (mg/L)[a]	Upstream Water Quality Concentrations (mg/L) Clear Creek
ARGO						
Aluminum	19.6	80	<2	0.4	-	0.17
Arsenic	0.135	Unknown	?	<0.005	-	0.004
Cadmium	0.126	80	<0.025	<0.001	0.1/0.05	0.005
Copper	5.2	80	<1	0.003	0.3/0.15	0.016
Iron	144.0	80	14	<0.05	-	*
Lead	0.059	80	<0.01	<0.001	0.6/0.3	0.004
Manganese	84.0	80	42	0.01	-	0.32
Nickel	0.218	80	8	<0.01	-	0.008
Zinc	42.0	80	8	<0.001	1.5/0.75	0.11
BIG FIVE						
Aluminum	14.0	80	1.4	0.02	-	0.17
Arsenic	0.008	Unknown	?	<0.005	-	0.004
Cadmium	0.027	80	<0.005	<0.001	0.1/0.05	0.005
Copper	1.4	80	0.28	0.003	0.3/0.15	0.016
Iron	51.0	80	5	<0.05	-	*
Lead	0.04	80	0.008	<0.001	0.6/0.3	0.004
Manganese	29.0	80	15	0.01	-	0.32
Nickel	0.239	80	<0.05	<0.01	-	0.008
Zinc	8.3	80	1.7	<0.001	1.5/0.75	0.11

Source: CSM, 1987

a) One day maximum; 30 days average, respectively.

* Not a contaminant of concern.

inches deep and the anaerobic zone may be up to 3 feet deep. Sulfides in the anaerobic zone will not resolubilize. As vegetation dies and decays and the wetlands increase in volume, metal ions may change from the hydroxide to the sulfide form. If this process does occur, then periodic removal of metal laden organic material from the passive treatment systems may not be required.

The passive treatment pilot plant that has been constructed at the Big Five Tunnel will be used to study the cation exchange process and to determine the depth of the aerobic and anaerobic zones. The results of the pilot plant investigation will determine the depth and frequency of removal of metal laden organic material from the passive treatment systems.

As part of the cost estimate, removal and fixation of the organic material has been assumed to occur every seven years. Because the materials are non-hazardous, the materials can be disposed in municipal landfills. However, as an added precaution, disposal costs were estimated for containment in lined cells within a fly ash disposal area. A site in Denver, is currently approved by the State of Colorado for disposal of metal fixed wastes.

The disposal estimate is based on removal and fixation of 6,500 cubic yards of material every seven years at $50 per cubic yard. This assumes that the upper 1 foot of material will be removed from 175,000 square feet of passive treatment systems and replaced with clean organic material at $10 per cubic yard (1987 dollars).

Disposal of Lime Treated Sludge from Active Treatment Plants

Treatability studies of mine tunnel discharges showed that lime treated metal hydroxide sludges pass both the EP and TCLP tests and can be disposed in municipal landfills.

Effects of Passive Treatment System Construction on Wildlife

Construction of passive treatment systems will result in creation of food and cover sources for terrestrial and aquatic wildlife. Use of these areas will be dependent upon the extent of open water habitat created and the proximity of these areas to other suitable habitats which could attract wildlife, thereby enhancing the potential for use of passive treatment areas. Waterfowl (particularly species of Anatid ducks, which are residents of the area), songbirds which require wetland, or riparian areas as breeding habitat, and herbivorous vertebrates are among the species most likely to be affected by wetland construction. Creation of wetland habitats 1,200 to 80,000 square feet in extent will not have a significant regional effect on habitat carrying capacity or on population levels of wildlife. Local concentrations of some species can be expected to occur where wetlands are created in close proximity to riverine, riparian, or wetland areas which currently receive use.

Although the potential exists for bioconcentration of some metals in wetland plants which may be used as wildlife forage, bioconcentration and subsequent bioaccumulation of metals in vertebrate and invertebrate wildlife will be dependent upon a variety of site-specific physical, chemical, and ecological factors. These factors may include: the form or chemical species of metals present; the amount of contaminants present (and variation of these amounts throughout wetland areas and over time); the availability of pollutants to organisms capable of uptake; and the ecological significance of passive treatment areas as sources of food for any organism, considering the proportion of its home range which any treatment area represents. In general, the biological significance of metallic contaminants in wildlife food chains at these passive treatment sites is expected to be negligible due to adsorption and complexation processes within detrital materials or sediments which are expected to limit bioconcentration in forage and invertebrate prey organisms. In

addition, wildlife access to these sites will be controlled by fencing to limit exposure. Where feasible, strobe lights will be installed to limit wildfowl access.

Capital and Operation and Maintenance Costs (O&M)

Estimated capital costs, O&M costs, and present worth costs are listed in Table 5.

Schedule

The following schedule is planned for this project:

Approve Remedial Action (sign ROD)	September, 1987
Initiate Design	November, 1987
Complete Design	June, 1989
Initiate Construction	July, 1989

Statutory Determinations

Protectiveness: The Public Health Evaluation showed that there is no immediate danger to public health from mine tunnel discharge at present flow rates because of dilution from flows in Clear Creek. Also, the cities of Idaho Springs, Blackhawk and Central City have municipal water supply systems that meet MCLs. However, mine tunnel discharges have severely impacted water quality for aquatic life and aquatic habitat has been destroyed. Construction of treatment systems will improve water quality and enhance aquatic life.

Consistency With Other Environmental Requirements: Section 121(d)(1) of SARA requires that selected remedial actions attain a degree of cleanup of hazardous substances released into the environment and control of further release at a minimum which assures protection of human health and the environment. Section 121(d)(2) of SARA states that remedial actions shall require a level or standard of control which at least attains legally

applicable and/or relevant and appropriate standards, limitations, criteria, and requirements of Federal environmental laws, and applicable and/or relevant and appropriate promulgated requirements under State environmental or siting laws that are more stringent than Federal requirements. The ARARs analysis is included in Appendix B.

The Feasibility Study for this operable unit identified a range of potential ARARs, including MCLs, and AWQC established under the Clean Water Act. After consideration of public comments, the Agency has determined that the contaminant specific applicable and/or relevant and appropriate requirements for this operable unit are the Maximum Contaminant Levels (MCLs) established under the Safe Drinking Water Act (SDWA) for hazardous substances, pollutants, or contaminants identified in mine discharge in the Clear Creek/Central City Site, Ambient Water Quality Criteria (AWQCs) established under the Clean Water Act for protection of aquatic life and human health, and State Contaminant-Specific ARARs.

The interim remedy will meet upstream water quality concentrations for treating mine tunnel discharges. The remedy is an interim solution for the overall Clear Creek/Central City site requiring the exercise of the "interim remedy" waiver from contaminant-specific ARARs (Section 121(d)(4) of SARA). The upstream water quality concentrations will be used as operational standards for this interim remedy. The upstream water quality concentrations ("upstream levels") consist of the geometric mean of the subset of RI samples taken on Clear Creek immediately upstream of the discharge from the Big Five Tunnel and on North Clear Creek immediately upstream of the discharge from the Gregory Incline. These upstream levels are not to be considered as final applicable and/or relevant and appropriate requirements for the final site remedy. Cleanup of Clear Creek and North Clear Creek to meet contaminant specific ARARs is dependent on further remedial action to be undertaken in future operable units. Future operable units are expected to be completed within 18 months, at which time a final solution will be proposed. The interim remedy is consistent with the final site remedy.

In accordance with SARA section 121(d)(2)(A(ii), EPA intends that the final remedy will at least attain water quality criteria established under the Clean Water Act, where such criteria are relevant and appropriate under the circumstances of the release. Additional data collection and analysis are necessary for EPA to determine whether such national criteria are relevant and appropriate under the circumstances of these releases or whether site-specific modification to national criteria would more appropriately establish a clean-up goal for this site. EPA needs to consider such circumstances as ambient background levels, stream habitat, upstream contaminant contributions and non-point source contributions in making a determination. This interim remedy will provide substantial protection of human health and the environment, while providing the time necessary for EPA to make this determination. Until such time that it is determined that site specific modification to individual contaminant criteria are necessary, EPA will consider the more stringent of human health or aquatic life ambient water quality criteria (AWQCs) as an ARAR for the final remedy.

Location specific and action specific ARARs will be met. Land disposal criteria established under 40 CFR Section 268 are applicable for disposal of metal laden organic material. New requirements established for mining wastes under Subtitle D of RCRA will be applicable. Also, portions of the site are within Historical Districts and criteria established under the National Historic Preservation Act are applicable (36 CFR Section 800).

The State of Colorado provided EPA with a list of applicable and/or relevant and appropriate State standards, requirements, limitations, or criteria ("State requirements") for this operable unit on May 14, 1987. The State amended its list on July 27, 1987 to add two additional requirements. EPA has reviewed the proposed State requirements under the criteria set forth in Section 121(d) of CERCLA, and determined that certain provisions within the State requirements generally are applicable or relevant and appropriate (see Appendix B).

Cost Effectiveness and Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Possible: The principal threats posed by mine tunnel discharges are metals contamination of surface water, ground water, and sediments. Passive treatment is an innovative technology that is expected to reduce dissolved and suspended metal loading by at least 50 to 90 percent in the discharge, depending on the metal. If passive treatment does not meet upstream water quality concentrations, then either active treatment or a combination of active treatment and passive treatment will be implemented.

The installation of either of these treatment systems meets the statutory preference for permanent solutions that reduce the mobility, toxicity, or volume of metals in the discharge.

APPENDIX A

RESPONSIVENESS SUMMARY
OPERABLE UNIT NO. 1 OF THE
CLEAR CREEK/CENTRAL CITY SITE
CLEAR CREEK AND GILPIN COUNTIES, COLORADO

SEPTEMBER 1987

This community relations Responsiveness Summary for Operable Unit No. 1 of the Clear Creek/Central City site was prepared by the U.S. Environmental Protection Agency (EPA) to describe the issues raised by residents of Clear Creek and Gilpin Counties regarding EPA's activities in the area and to summarize EPA's responses to those issues. EPA is conducting a Remedial Investigation and Feasibility Study (RI/FS) at the site to determine the nature and extent of contamination that may have resulted from historic mining activities in the area, and to develop ways of remediating any contamination found.

A Responsiveness Summary is required under Superfund law to document public concerns about proposed remedial actions and EPA's responses to those concerns. This Responsiveness Summary summarizes public comments for the period that began with the initiation of the Remedial Investigation (RI) of the site in April 1985, through the public comment period on the Operable Unit No. 1 FS Report that closed on July ., 1987. EPA activities, however, are always open to public review, and this Responsiveness Summary reflects comments received through September 25, 1987. This report is divided into the following sections:

Section I. Introduction and Background. This section provides a brief introduction to the site and EPA's preferred alternatives for remedial action.

Section II. The Community Relations Program at the Clear Creek/Central City Site. This section provides a brief history of

community relations activities conducted by EPA during the RI/FS at the site.

Section III. Summary of Public Comments Received and EPA's Responses. This section summarizes comments received by EPA on Operable Unit No. 1, categorized as follows:

- o Comments and EPA's Responses. Comments received from inception of the RI/FS on mine drainage through late September 1987 and EPA's responses to those comments; and
- o Remaining Comments. Comments received for which EPA will provide more complete answers after further study.

I. INTRODUCTION AND BACKGROUND

Since February 1985, EPA has been investigating public health and environmental risks posed by metals in mine drainages as a part of the RI/FS at the Clear Creek/Central City site in Gilpin and Clear Creek Counties. There has been one RI at the site; the FS has been divided into operable units.

The Proposed Plan that EPA offered for public comment in July 1987 included passive treatment of mine drainage with the possible inclusion of additional active treatment later if the need is identified. After considering all the technical factors and public comments, EPA determined that the appropriate remedy should include both passive and active treatment.

Community response to the Proposed Plan has been guarded. Residents expressed misgivings about the need to solve a problem they feel does not exist -- many area residents would prefer to see the Federal government spend money to revitalize the economy by helping to reopen mining, rather than to clean up mine wastes that have not in their minds presented a discernible threat.

Three other alternatives EPA offered for comment are described below.

- **No Action** would involve only fencing areas where mine drainage is accessible to the public or enclosing the drainage in pipes. No other treatment program would be initiated.
- **Active Discharge Treatment** would involve the use of lime to remove the metals from contaminated discharges. Sludge would be produced as a by-product that would have to be disposed. Some active treatment may be considered later for the remaining contaminants that passive treatment does not remove.
- **Source Control** would involve controlling the discharges by sealing them in the mines or lining streams that feed the mines to prevent additional water from seeping in.

Several activities with high visibility in the community have been undertaken during the studies thus far. They are described below.

- Gregory Tailings: A removal action was initiated by EPA at the Gregory Incline and Tailings in March 1987 to protect the public from hazards associated with the possible collapse of the tailings into North Clear Creek. EPA was concerned that collapse of the tailings would wash a large load of metals downstream into Clear Creek, contaminate the Golden municipal water supply that is drawn from Clear Creek, and result in a massive fish kill. EPA also was concerned that a collapse could cause short-term flooding in the Black Hawk area.

  To protect the public and the environment from these hazards, EPA decreased the slope of the tailings pile to stabilize it and constructed a temporary retaining wall. EPA originally planned to implement a remedy at the Gregory Tailings through an Expedited Response Action (ERA) in the Fall of 1986. Engineering reports were released in April and June 1986, followed by a public comment period July 7-28, 1986. EPA was unable to proceed with construction at that time, however, due to the shortage of funds that preceded

reauthorization of the Superfund program. The temporary retaining wall was built under the EPA Emergency Response program.

- Residential Wells Survey: During the RI/FS, EPA found that shallow ground water, the source of water for shallow domestic wells, is contaminated in places with metals including lead, arsenic, cadmium, zinc, copper, nickel, and chromium. In March and April 1987, EPA conducted a survey of area households to find out if residents are using shallow wells. The survey revealed that only a small number of wells exist, and one private well was contaminated with elevated levels of cadmium. The owner of that well has been informed of the elevated levels of cadmium in the well water. A Superfund Removal Action to address this well is being developed by the Emergency Removal Branch.

- Passive Treatment Pilot Project: A pilot project for passive treatment of mine discharge at the Big Five Tunnel portal is now underway. This project involves construction of a concrete box at the mine portal to hold some of the mine discharge in front of the portal. An artificial wetland will be created in the box to study the efficiency of this technology further in reducing the metal loadings and neutralizing the acid drainage. EPA expects to use the results of this project to refine estimates of land requirements and the types of vegetation most suited to the implementation of this technology for Operable Unit No. 1.

The draft RI Report and the draft FS Report on mine drainages were completed and released to the public in June 1987. The RI Report describes the results of EPA's investigation of the entire site. The FS Report discusses and evaluates methods of cleaning up mine drainage.

II. THE COMMUNITY RELATIONS PROGRAM AT THE CLEAR CREEK/CENTRAL CITY SITE

EPA's community relations activities at the Clear Creek/Central City site began in the fall of 1982 when the site was placed on the NPL. Since that time, community concern about EPA's activities at the site has tended to be moderate, with occasional periods of high interest caused by residents' concern about the action at the Gregory Tailings and about the Big Five pilot project. In addition, many local people have been concerned about the fate of at least two local property owners who may have some liability for cleanup costs, both of whom are private citizens who live at the site and have many friends in the communities. In response, EPA representatives have met many times with local officials, residents, and the press to listen to concerns and provide information. Much of the community concern has focused on residents' expressed feelings that mine wastes do not present a problem worthy of the high level of attention given to this site. In addition, there is a general antagonism toward the Federal government because of mining regulations that area residents feel have restricted mining activity in the area.

On several occasions, new information about on-going work at the site has been the subject of extensive news and editorial coverage in local newspapers, particularly due to EPA's action at the Gregory Tailings in the Spring of 1987. Residents expressed concern about the cost of and necessity for conducting the project, particularly in light of the possibility that the property owner, a local resident, might have to repay the government later for the costs. The pilot passive treatment project at the Big Five Tunnel portal has been closely followed in the local newspapers as well. Area residents and the local newspapers have expressed relatively less interest in the mine drainage problem than in the Gregory Tailings or the Big Five Tunnel projects.

In preparing the draft Revised Community Relations Plan (CRP) completed in January 1986, EPA conducted discussions with local officials and community members in September 1985. The original CRP was prepared in the fall of 1982. To facilitate the flow of information to the communities, information

repositories were established at the Gilpin County Court House in Central City, the Idaho Springs Public Library in Idaho Springs, and the EPA Library in Denver in the Fall of 1985. In December 1985, EPA prepared and distributed to residents an initial Fact Sheet describing the site and the potential contaminants of concern.

EPA prepared and distributed a second Fact Sheet in July 1986 regarding the Expedited Response Action planned at the Gregory Tailings for the Fall of 1986. The Agency held a public comment period on the proposed action, and had a public meeting with local residents. As described in Section II of this Responsiveness Summary, that action was later conducted as a Superfund Removal Action in the Spring of 1987. In response to public concern about the cost of the Removal Action, the potential liability of the property owner, who is a life-long resident of the community, the potential loss of an historic site, and the potential for other similar actions in the area, EPA expanded the number of information repositories to include the Golden Public Library in Golden, and the Idaho Springs City Hall in Idaho Springs.

Later, in August 1987, EPA placed the full Administrative Record in the Central City Courthouse and the EPA Library. An index to the Administrative Record was placed in the other three repositories. In addition, EPA revised the draft CRP, and signed a Memorandum of Understanding concerning the Gregory Tailings Removal Action with the Colorado State Historical Society to assure that the action that EPA undertook at the site was carried out in accord with state guidelines for preserving historic sites in the area.

During the survey of shallow domestic wells in the Spring of 1987, EPA prepared a letter to residents and a question-answer Fact Sheet -- both designed to provide residents with information about the survey and its purpose -- to be handed out by the individuals taking the survey. Agency representatives also met with local officials and area residents to discuss the survey.

The Colorado Historical Society has determined that the Big Five Tunnel portal is eligible to become a national historic landmark. Thus, EPA submitted to the State Advisory Council on Historic Preservation drawings of the passive treatment system at the Big Five Tunnel portal. Upon recommendation of the Advisory Council, EPA changed the location and materials of the fence to be built around the passive treatment plant. These changes were deemed important in preserving historic aspects of the tunnel.

After release in June 1987 of the FS Report on Operable Unit No. 1, EPA published a question-answer Fact Sheet and held two public meetings in conjunction with the public comment period from June 8 through July 7, 1987. The first meeting, in Central City on June 16, had a turnout of about seventeen people, and only one person asked a question of EPA. A local property owner later commented to EPA that he felt the public notice for this meeting was insufficient. He requested an extension of the public comment period. About forty people attended the second meeting on June 17 in Idaho Springs. These people had numerous questions and comments, and the atmosphere at the meeting seemed to be one of questions and reservations about EPA's plans at the site. Once again, residents expressed doubt about the necessity for treating mine drainages when they are not perceived as causing any problems. They also said that the cost of the treatment cast further doubt on the need for remediation, and expressed concern about the effects of EPA's activities on the local economy. These concerns are described in greater detail in Section III.

III. SUMMARY OF PUBLIC COMMENTS RECEIVED AND EPA'S RESPONSES

This section summarizes public concerns expressed about Operable Unit No. 1 during remedial planning at the site through the end of the public comment period. Community comments generally centered on local economic issues that may be affected by EPA's actions at the site, and on policy questions about how EPA first became involved in the area and how EPA sets its priorities. Several people, most notably the Clear Creek County Metal Mining Association

(CCCMMA) and other area residents at the site, commented that the metals in mine drainage have economic value. Many comments that EPA received on the draft FS Report were made by two owners of mining property at the site, both of whom live in communities at the site.

Aside from local county and municipal governments, the CCCMMA is the only citizens' group that has expressed interest in EPA's activities. The CCCMMA includes a broad membership throughout the site and areas downstream. The residents and CCCMMA suggested that EPA evaluate reclamation of these metals from the drainage as a way of reducing the public health and environmental risks at the same time economic return is provided to the communities.

A major concern at the site has been the extent to which EPA's Superfund activities may adversely impact area property owners and the general prospects for future mining. A number of citizens have expressed support for area property owners both encouraging EPA to limit the financial liabilities any local property owners may have to bear and discouraging EPA from destruction or removal of the wastes before the minerals can be exploited. These people and others suggested also that EPA should reevaluate its cleanup priorities -- they said that blowout control is the most important health and environmental issue at the site and should be addressed first. Blowouts are large explosive releases of mine drainage from mines whose tunnels were temporarily blocked for a period of time through natural silting or collapse of mine workings. The Argo Tunnel has experienced blowouts in the past, with resulting contamination of Clear Creek downstream to Golden.

During the public meetings, EPA responded that it would examine the economic benefits of metals reclamation from the mine drainage. The Agency also agreed that blowout control is an important issue. Noting that blowout control is currently under study, EPA said that mine drainage remediation is an initial remedial step that is relatively easily developed and implemented and treats the baseline, or constant, flow while the difficult question of blowout control is studied.

The first subsection below provides a summary of comments and EPA's responses; the second subsection summarizes remaining comments for which EPA will be able to provide more complete responses after further study.

A. Summary of Comments Received During the Public Comment Period and Afterwards and EPA's Responses

This section categorizes questions and comments received during the public comment period and afterwards, and EPA's responses to those comments in the categories below.

- Policy Issues. Residents questioned how and why the site was listed on the National Priorities List (NPL), how the Superfund process would work as decisions are made and actions taken, how EPA selected water quality standards for the site, and how EPA would acquire land for a passive treatment facility.

- Remedial Alternative Issues. In general, residents expressed the opinion that the mine drainage contains metals with significant economic value, suggested that EPA address blowout control as a first priority, and urged EPA to consider reopening the Argo Tunnel as a means of blowout and drainage control. The Colorado Department of Health (CDH) supported passive treatment as being relatively cost-effective, but strongly recommended that EPA consider other methods of remediation -- such as source control -- that will have even lower long-term costs.

- Technical Issues. CDH recommended that EPA begin tunnel mapping to expedite investigations of source control, ground water, and blowout control, and suggested additional tailings characterization and surface geologic mapping be undertaken. Residents commented that the ground water may contribute to the contamination problem, and asked how much land would be needed for a passive treatment facility at the Argo Tunnel portal.

- Health Issues. Two residents made health-related comments: one said he had lived at the site for fifty years without negative effects, and the other suggested that EPA include private wells in its investigation.

- Community Issues. The Central City Board of Trustees asked EPA to keep it better informed of activities planned to take place within the city limits.

- Cost Issues. A representative of a resident property owner of Black Hawk asked whether EPA would leave the question of liability open for a long time, and another resident commented that studies at the site are costing too much money.

1. Policy Issues

- Comment: The Mayor of Idaho Springs noted that when the site was first considered for the National Priorities List (NPL), it initially received a low Hazard Ranking System (HRS) score. He asked what prompted the rescoring of the site after the initial low score.

  EPA's Response: The preliminary score at the site was based on a review of available reports. A later field investigation produced information about the Argo Tunnel blowouts and the importance of this section of Clear Creek as a critical habitat for aquatic life. "Critical habitat" refers to the environmental factors that make it possible for the stream to support the life cycle of animals, including obtaining food, protecting themselves, and reproducing.

- Comment: A local property owner asked when the HRS site score was changed sufficiently to cause it to be included on the NPL, and whether the HRS data were available for review. The Mayor of Idaho Springs also expressed a desire to see the HRS data, and another resident asked whether the score can be changed.

EPA's Response: During the Preliminary Assessment, EPA reviewed initial scoring data, which was based on available reports. The reviewers determined that a Field Investigation would be needed. The Field Investigation produced the information about the Argo Tunnel blowouts and the role of Clear Creek as a critical habitat for aquatic life. The site was proposed for inclusion on the NPL in 1982. The change in the initial score occurred during the time when the site was evaluated for inclusion on the NPL, not at some later date. EPA has placed the HRS scoring information in the site information repositories as part of the Administrative Record, but at this time it is not possible to change the score.

- Comment: The Mayor of Idaho Springs asked to see the EPA criteria used for ranking the site. He said that if the blowout led to a higher HRS ranking, then blowout potential should receive priority treatment.

EPA's Response: The HRS scoring is part of the Administrative Record that is placed in the information repositories. Blowout study is underway and the Blowout Control FS Report is scheduled to be issued for public comment in July 1988. Because of the technical complexity of the blowout issue, the study cannot be accelerated further.

- Comment: A local property owner asked when EPA expects to select a remedy for mine drainage and whether it will decide to make this selection prior to completion of the one-year pilot project at the Big Five Tunnel portal. The Mayor of Idaho Springs asked whether construction for the pilot passive treatment project at the Big Five Tunnel would begin as soon as the remedial action has been selected.

EPA's Response: EPA expects to select a remedy for mine drainage by the end of September 1987. The primary purpose of the Big Five

project is to refine the technology to determine how much land will be needed, and what kinds of vegetation and organic material will be most appropriate. Initiation of the project is not dependent upon the decision for remedial action on mine drainage. EPA is initiating the pilot project at the Big Five Tunnel portal prior to making a final decision on the remedial action for mine drainage because the pilot study will provide EPA with valuable information about how a passive treatment system should be set up in that area. Seasonal considerations required that the pilot project be initiated during the summer months. The project is included as a part of the Proposed Plan EPA released on June 8, 1987.

- Comment: A resident asked whether EPA has established a baseline or background figure for water quality in Colorado.

  EPA's Response: The State of Colorado has established water quality standards for all Colorado streams. EPA is committed to cleaning up the discharges from mine drainages in order to meet Colorado stream standards wherever possible. Colorado stream standards are based on protection of human health and aquatic life. These standards may be higher than background at some points.

- Comment: The Mayor of Idaho Springs said the criteria used by EPA to evaluate drinking water quality were too stringent. He added that use of overly stringent concentrations makes the situation appear worse than it really is.

  EPA's Response: EPA responded that national standards for drinking water were established by Congress under the Federal Safe Drinking Water Act. These standards are applied uniformly across the country.

- Comment: The Mayor of Idaho Springs questioned why some area drainages were included in the FS Report and others were not. He said that even with cleanup of the five mines, other point source and non-point source problems would continue to exist. He suggested EPA look at other sources of contamination. He asked whether EPA has considered the economic feasibility of restoring Clear Creek water quality.

  EPA's Response: Regarding the concern about continuing sources of contamination, EPA responded that its studies show that drainage from the five tunnels is a principal contributor in the degradation of the water quality of Clear Creek and North Clear Creek. Mine drainage treatment is just one of the remedial actions that EPA expects to take, however, and other concerns will be addressed in later studies. Concerning the question of the economic feasibility of restoring Clear Creek water quality, the Colorado Department of Wildlife has estimated that the economic value of Clear Creek as a fishery resource is $736,000 per year, if Clear Creek is restored to a viable fishery. EPA has considered the economic feasibility of restoring the water quality, but it was not a major consideration in the final decision-making process.

- Comment: The Mayor of Idaho Springs said that the creeks are no longer stocked with fish below Idaho Springs as they were previously. He suggested that the RI/FS Report should have considered this fact in its evaluation of fish populations below Idaho Springs.

  EPA's Response: EPA has considered this issue. The Colorado Department of Wildlife no longer stocks fish below Idaho Springs because of reduced fish habitat and poor water quality. If the aquatic habitat is improved, the stream will probably be restocked.

- Comment: A local property owner asked how EPA plans to acquire land for a passive treatment facility, and questioned whether EPA has condemnation authority.

  EPA's Response: EPA has not yet pursued options for acquiring land for a passive treatment facility. If the Agency encounters a problem in its efforts to obtain land in one area, it will explore other options. Although it is not presently contemplating condemnation proceedings, if necessary, EPA can exercise condemnation authority. EPA is hopeful that passive treatment locations will constitute a compatible land use.

- Comment: A local property owner asked whether EPA's decision is subject to appeal on the grounds that it is not in the best interest of the local economy.

  EPA's Response: One reason that EPA is asking for public comment now is to be as responsive as possible to community needs in the decision-making process. EPA's decisions can be changed through a formal process, although there is no defined period during which appeals can be made.

- Comment: A local property owner said that individuals who may wish to appeal a decision need more concrete information about EPA's plans at the site in order to comment.

  EPA's Response: EPA responded that the plans EPA has presented in the FS Report were as concrete as the Agency had at that time.

- Comment: A local property owner asked if the affected property owners, the cities, or the counties have input to the final decision about the treatment.

EPA's Response: EPA encourages community comments. All comments received are reviewed during the decision process. EPA expects to continue to interact with affected property owners as the process continues to unfold.

2. Remedial Alternative Issues

- Comment: Several commenters expressed the opinion that there is commercial value to the sludge produced through the active discharge treatment process. One commenter asked whether EPA will consider the possibility of resource recovery, adding that the Agency should consider the potential value of precious metals in the sludge, and in the mine water. Another commenter said that processing could reduce the volume of the sludge as much as 50 percent and the value of the metals would offset the costs of disposal. The President of the Clear Creek County Metal Mining Association recommended that EPA undertake a program of research on passive discharge treatment systems to investigate methods of metals reclamation. The Colorado Department of Health (CDH) supported this recommendation. It said sludge and precipitate reprocessing for gold and silver recovery should be evaluated by assaying the wastes to determine how much precious metal they contain, and by identifying potential reprocessing technologies and costs. In earlier studies, the State determined the drainage was non-hazardous.

  EPA's Response: At the public meeting, EPA responded that although it has not considered the issue of metals reclamation from mine drainage, the Superfund Amendments and Reauthorization Act (SARA) requires evaluation of resource recovery and reclamation, and the Agency will consider this issue before selecting the final remedy. Referring to the comment that an earlier State study had shown the sludge to be non-hazardous, EPA said it is required to comply with the laws as they

cencitv

200083
March 24, 1987
Pages: 1
Memorandum
Data quality review training, April 14, 1987
From: Diane Short, Richard Cheatham, REM II
To: Region 8 EPA

200084
March 24, 1987
Pages: 1
Record of communication
Removal action: Gregory tailings, Black Hawke, CO/Health Safety
From: Cindy Coe, OSHA Health Regs. Team
To: Sharon Kercher, EPA

exist at the time of treatment. A past determination that the drainage is non-hazardous may no longer be valid.

- o Comment: CDH said it supports the concept of passive treatment because its long term costs are lower than for active treatment. CDH added, however, that more discussions are needed on the role of passive treatment in the treatment sequence. CDH said the same comment applies to iron oxidation/precipitation, coagulation/flotation, reverse osmosis, and ion exchange unit treatment processes. CDH expressed the opinion that detailed costs presented in Section 3 of the FS Report may not reflect these unit treatment processes, and are thus too low.

  EPA's Response: EPA has subsequently met with CDH and reviewed the unit treatment processes. The pilot plant that has been constructed at the Big Five Tunnel will evaluate the removal efficiency of passive treatment. Active treatment will be added as a polishing step.

- o Comment: CDH expressed the opinion that EPA's rejection of source control alternatives as technically infeasible is premature. It said consideration should be given to doing remedial design investigations for channel paving in Lake Gulch to evaluate its effect on flows from the National Tunnel during Operable Unit No. 1. In any event, CDH concluded, it is critical that source control evaluations be given the highest priority, since source control offers the best opportunity for minimizing long-term costs.

  EPA's Response: EPA plans to investigate source control alternatives for selected areas under Operable Unit No. 3.

- o Comment: One commenter noted that the appropriateness of any proposal would have to be analyzed in detail, particularly with regard to cost effectiveness and the possible destruction of a valuable economic

asset. Given these two considerations, this party recommended the "No Action" proposal.

EPA's Response: Consideration of cost effectiveness is the principal criterion required in the decision- making process. The revised Superfund legislation requires that priority be given to alternatives that reduce the mobility, toxicity and volume of wastes. There is no present indication that mine drainage represents a valuable economic asset. The No Action alternative is not acceptable, as has been explained in the ROD.

- Comment: Referring to the Argo Tunnel, a resident noted that passive treatment is of no value unless the potential for a blowout is controlled.

EPA's Response: EPA will locate the passive treatment facility away from the Argo Tunnel portal so that a blowout would not affect it. Treatment of discharge is a first step in the process of remediation. Because the remedy must go into the design phase, it will be one to one-and-a-half years before the Agency actually builds a permanent passive treatment system. Meanwhile EPA will study blowout control and reach a decision on the most cost-effective manner to protect against blowouts.

- Comment: The Mayor of Idaho Springs suggested that EPA re-evaluate its priorities if blowout was a main consideration in listing the site on the NPL. He suggested that EPA first address blowout control at the site.

EPA's Response: EPA has begun to study blowout control; in the meantime, however, EPA is addressing other important issues related to metals in the environment. Unless the discharges can be plugged, base

. flow from the tunnels will always be an issue, and EPA can proceed with a remedy for it.

- Comment: A resident noted that although the Argo Tunnel blowout increased the HRS ranking, the Executive Summary of the RI/FS Report states that water quality near Golden meets existing drinking water quality standards. He questioned whether it is essential to spend money to treat mine drainage. Another resident noted there are two pathways of human exposure to the contaminants -- wells and municipal water -- and asked what the pathways were that affected human health in the ranking of the site.

  EPA's Response: In considering potential threats to water quality, EPA looks at population within three miles of a site, as well as at all possible pathways of contamination (e.g,. through drinking water) If a pathway from the contamination to the population exists, that will raise the score. In the original HRS scoring, it was suspected that human health was threatened. Subsequent studies indicated, however, that the primary threat was not to human health, but rather to the environment. Under the Superfund law, EPA is responsible for protecting both human health and the environment, however, and must address both types of problems. Study and action are required at the site because the creeks do not meet water quality criteria for aquatic life. The potential also exists for human exposure far downstream if a blowout were to occur.

3. Technical Issues

- Comment: CDH commented that EPA should begin mine tunnel mapping in order to expedite investigations of source control, ground water, and blowout control.

EPA's Response: EPA believes its files do include all available mine maps. The Agency is looking further into the availability of additional maps. EPA has initiated a blowout control study that will use these maps.

- Comment: A resident asked whether the results from EPA's April 1987 tests of aquifer water quality will be available for review.

  EPA's Response: EPA is in the process of writing the reports that include these findings; these findings will be incorporated into the Addendum Report to the RI Report, which will be issued in late 1987. When they are completed, copies will be placed in the information repositories as part of the Administrative Record.

- Comment: A resident stated that a 1975 study by the State showed metals concentrations in area wells, and suggested that ground water may contribute to the contamination problem.

  EPA's Response: EPA believes this may be correct, and will study ground water during Operable Unit No. 6. Meanwhile, EPA's investigation has also shown that the mine drainages have a significant impact on the streams, and the Agency is now addressing this mine drainage problem.

- Comment: A local property owner said that a study done ten to fifteen years ago showed that water 100 to 150 yards downstream from the Argo Tunnel portal does not exceed water quality standards.

  EPA's Response: EPA's findings do not agree with this statement. EPA's water quality monitoring studies show that Ambient Water Quality Criteria are exceeded along Clear Creek as far south as Golden.

- Comment: The Mayor of Idaho Springs asked how much land is needed for passive treatment of the Argo Tunnel drainage.

  EPA's Response: EPA estimates that over 200 square feet of land are needed to treat one gallon per minute of drainage flow. The pilot project at the Big Five Tunnel portal will help EPA further refine these estimates. With a 206-gallon-per-minute flow from the Argo Tunnel, EPA estimates that about one to two acres would be required for the passive treatment facility for the Argo Tunnel. EPA considers the question of siting an important one, and will contact the community again to solicit public comments when it reaches the site selection stage.

- Comment: A local property owner suggested that further consideration of passive treatment should be limited to an evaluation of just one site, and asked whether EPA has considered the Big Five Tunnel site for such tests.

  EPA's Response: The results of the pilot plant program at the Big Five Tunnel site will be applied to other sites in the area.

- Comment: CDH suggested that additional tailings characterization and surficial geologic mapping to complete the inventory of tailings/waste rock piles will be needed to complete the Feasibility Study for tailings remediation.

  EPA's Response: The characterization and mapping have been completed and will be included in the FS Report on Operable Unit No. 2.

4. Health Issues

- Comment: One resident noted that he has lived in the area for fifty

years, and he does not believe that the water quality presents a health hazard.

EPA's Response: The purpose of the RI/FS process is to determine scientifically the risks to human health and the environment that exposure to contaminants at the site may cause. The effects of some metals may not be observed for years. No human health hazard was found in the creeks because the metals are diluted by the flow of the streams. Mine drainage, however, does present human health hazards.

- Comment: The Mayor of Idaho Springs recommended that EPA investigate health effects from possibly contaminated private wells just outside the Superfund boundary.

EPA's Response: EPA conducted a well survey in the Spring of 1987 and determined that an immediate risk does not exist because most people are using public water supplies that meet the criteria of the Federal Safe Drinking Water Act. A ground water study will be completed under Operable Unit No. 6 to evaluate the long-term risks.

5. Community Issues

- Comment: The Central City Council said that EPA should have consulted with the City Council prior to undertaking activities and making plans for work within the city limits, and asked EPA to consult with the City Council on activities already undertaken as well as proposed activities.

EPA's Response: EPA has subsequently met with the City Council and agreed to regular consultant meetings. No significant activity has taken place within the limits of Central City.

- Comment: Representatives of a local property owner requested an extension of the comment period for community review of the draft RI and FS Reports, adding that they believe EPA has not done an adequate job of making the documents available to this individual.

  EPA's Response: EPA notified the commenter by letter that comments would be accepted and considered until mid-September before the ROD is signed. EPA is always open to public comment at any time.

6. Cost Issues

- Comment: A local property owner commented that the site is the focus of too much study, adding that such studies are a waste of the taxpayers' money.

  EPA's Response: Whenever possible, EPA attempts to use other studies and not to duplicate efforts unnecessarily. All of the studies EPA has conducted to date have been essential to gain a thorough understanding of the contamination problem at the site.

- Comment: A representative of a local property owner asked whether the property owner will pay the bill for remediation, or if the question of financial responsibility will be left open for a long period.

  EPA's Response: EPA is conducting a thorough search for all potentially responsible parties; it is not EPA's intent, however, to bankrupt anyone.

B. SUMMARY OF REMAINING COMMENTS

Several commenters asked questions that can be answered more thoroughly

during later studies. These four remaining comments are summarized below, followed by EPA's preliminary response.

- Comment: A local property owner asked if EPA has calculated the role that contaminated ground water plays in contributing metals to the creeks.

  EPA's Response: When EPA began its investigation of the site, it did not expect ground water to be the focus of study. A ground water problem was found, however, and EPA plans to study the problem further under Operable Unit No. 6.

- Comment: A resident asked whether the contamination of Clear Creek from the ground water originates in the bedrock or the alluvium.

  EPA's Response: EPA believes that during periods of high flow, the stream recharges the ground water; during low flow periods, recharge is from the aquifer to the stream. EPA has established that the alluvial ground water is contaminated in some places. It will study bedrock ground water under Operable Unit No. 6.

- Comment: The President of the Clear Creek County Metal Mining Association recommended that EPA consider seriously the option of reopening the Argo Tunnel, cleaning out the cave-ins, and diverting or grouting the water channels. Two commenters recommended that EPA consider the benefits of cleaning out the tunnels as a means of providing economic benefits to the county and the State, and as being the most viable method of preventing future blowouts. One commenter added that records will bear out the fact that most of the deposits above the tunnel are of sufficient value that mines would be reopened if the tunnel were cleaned out. The other commenter added that cleaning out the tunnels must be done carefully to minimize safety

risks. Further, the Mayor of Idaho Springs stated that blowout potential exists at several mine adits in the area.

EPA's Response: EPA has initiated a study on blowout control to protect human health and the environment. Superfund decisions cannot be influenced by economic benefits that result to the community, however. A draft FS Report will be available for public review in July 1988.

- Comment: A local property owner stated that he owns only a small portion of the land at the Argo Tunnel portal, adding that the Bureau of Land Management (BLM) owns 99.97 percent of the tunnel.

EPA's Response: EPA is in the process of finalizing a search to identify potentially responsible parties.

ATTACHMENT 1 TO APPENDIX A
CHRONOLOGY OF COMMUNITY RELATIONS ACTIVITIES AT THE CLEAR CREEK/CENTRAL CITY SITE

The list below summarizes community relations activities at the Clear Creek/Central City site. In addition to the activities listed below, EPA has met with area residents and local officials throughout the RI/FS.

- EPA develops Community Relations Plan (CRP). (October 1982)
- EPA conducts on-site discussions with local officials and area residents. (September 1985)
- EPA establishes information files at three locations in the local communities, at the Gilpin County Court House, the Idaho Springs Public Library, and the EPA Library. (November 1985)
- EPA distributes a kick-off Fact Sheet on the site. (December 1985)
- EPA completes the draft Community Relations Plan. (January 1986)
- EPA releases a question-answer Fact Sheet on the proposed Expedited Response Action at the Gregory Tailings, holds a public comment period, and sponsors a public meeting on the ERA. (July 1986)
- EPA holds a public meeting on the proposed Emergency Removal Action at the Gregory Tailings, and signs a Memorandum of Understanding with the Colorado Historical Society. (March 1987)
- In response to community requests, EPA expands the number of local-area information repositories to include the Golden Public Library and the Idaho Springs City Hall. (May 1987)
- EPA releases a question-answer Fact Sheet on the well survey and writes an open letter to residents. (April 1987)
- EPA revises the draft CRP. (June 1987)
- EPA distributes a question-answer Fact Sheet, holds a public meeting, and has a public comment period on the RI/FS and Proposed Plan for Operable Unit No. 1. (June-July 1987)
- EPA places the Administrative Record in the information repositories at the Gilpin County Court House and the EPA Library. (August 1987)

APPENDIX B

APPLICABLE AND/OR RELEVANT AND APPROPRIATE FEDERAL AND STATE REQUIREMENTS

INTRODUCTION

Under section 121(d) (1) of the Superfund Amendments and Reauthorization Act of 1986 ("SARA"), remedial actions must attain a degree of cleanup which assures protection of human health and the environment. Additionally, Superfund remedial actions that leave any hazardous substance, pollutant, or contaminant onsite must meet, upon completion of the remedial action, a level or standard of control that at least attains standards, requirements, limitations, or criteria that are "applicable and/or relevant and appropriate" under the circumstances of the release. These requirements, known as "ARARs", may be waived in certain instances. (Section 121(d)(4) of SARA.)

ARARs are derived from both Federal and State laws. Under section 121(d) (2) of SARA, the Federal ARARs for a site could include requirements under any of the Federal environmental laws (e.g., the Clean Air Act, the Clean Water Act, and the Safe Drinking Water Act). State ARARs include promulgated requirements under the State environmental or facility siting laws that are more stringent than Federal ARARs and have been identified to EPA by the State in a timely manner.

Subsection 121(d) of SARA requires that Federal and State substantive requirements that qualify as ARARs be complied with by remedies (in the absence of a waiver). State requirements can be waived if a State has not consistently applied or demonstrated the intent to consistently apply a requirement in similar circumstances at other remedial actions within the State (Subparagraph 121(d)(4)(E) of SARA). Federal, State, or local permits do not need to be obtained for removal or remedial actions implemented on site (Subsection 121(e) of SARA).

The definition of "applicable" and "relevant or appropriate" requirements is derived from the National Contingency Plan, 40 C.F.R. § 300.6 (1986) ("NCP"). "Applicable" requirements are those that would be legally applicable to a remedial action except that the action is being taken pursuant to CERCLA authority. Applicable requirements may apply directly or through incorporation by a Federally authorized State program. "Relevant and appropriate" requirements are not legally applicable, but are designed to apply to problems or situations sufficiently similar that their application is appropriate. For example, requirements may be relevant and appropriate if they would be "applicable" but for jurisdictional restrictions associated with the requirement.

There are three types of ARARs. The first type includes "contaminant-specific" requirements. These ARARs set limits on concentrations of specific hazardous substances, pollutants, and contaminants in the environment. Examples of this type of ARAR are ambient water quality criteria and drinking water standards. A second type of ARAR includes location-specific requirements which set restrictions on certain types of activities based on site characteristics. These include restrictions on activities in wetlands, floodplains, and historic sites. The third type of ARAR includes action-specific requirements. These are technology-based restrictions which are triggered by the type of action under consideration. Examples of action-specific ARARs are Resource Conservation and Recovery Act (RCRA) regulations for waste treatment, storage, and disposal.

ARAR IDENTIFICATION PROCESS

EPA and the State of Colorado reviewed, respectively, Federal and State laws, standards, requirements, criteria, and limitations for possible application to the Clear Creek/Central City site. Tables B-1 and B-2 contain a listing of the potential ARARs screened by EPA and the State. These charts identify each potential ARAR and whether or not it is

"applicable" or "relevant and appropriate." The remainder of this analysis describes the three types of ARARs identified for Operable Unit No. One in greater detail.

CONTAMINANT-SPECIFIC ARARs

The contaminant pathways of concern are discharge from five distinct tunnels to Clear Creek and North Clear Creek surface water and subsequent interactions with shallow ground water. The principal contaminants include but are not limited to arsenic, cadmium, chromium, copper, fluoride, lead, nickel, silver and zinc. Humans are a potential receptor of contamination from discharge through exposure to both contaminated acid mine drainage and ground water. Aquatic life is exposed to contaminated surface water.

Contaminant-Specific ARARs

The contaminant-specific ARARs for Operable Unit No. One are described below and listed in Tables B-1 through B-3.

1. Maximum Contaminant Levels for Drinking Water

   The Federal Safe Drinking Water Act and Colorado drinking water authorities provide for the establishment of drinking water standards for public water systems. These standards are "applicable" only to public water systems as defined by the Act and regulations. However, they may be considered "relevant and appropriate" as ARARs for potential ground water and surface water exposure via drinking water (U.S. EPA, Superfund Public Health Evaluation Manual (Oct. 1986)). Because of the connection at the site between surface water and ground water which is an existing or potential source of drinking water, drinking water standards are considered ARARs for Operable Unit No. One.

   The primary "maximum contaminant levels" or MCLs" for inorganic chemicals are considered ARARs. Primary MCLs are enforceable standards establishing maximum permissible levels of contaminants in drinking water. (40 C.F.R. § 141.2(c) (1986)). These standards are health-based, but have an economic component. (42 U.S.C. § 1401(1)(C)). Primary MCLs are currently set for the following chemicals: arsenic, barium, cadmium, chromium, lead, mercury, nitrate, selenium, and silver. (40 C.F.R. § 141.11(b)). The

Federal and State MCLs for these substances are identical. (Colorado Primary Drinking Water Regulations, 5 Colo. Admin. Code 1003-1 (1981)). MCLs are less stringent than AWQC.

The Safe Drinking Water Act also provides for establishment of secondary MCLs. These are designed to "control contaminants in drinking water that primarily affect the aesthetic qualities relating to public acceptance of drinking water." 40 C.F.R. § 143.1 (1986). The regulations note that secondary MCLs "in the judgment of the Administrator (of EPA) are requisite to protect the public welfare." 40 C.F.R. § 143.2(f). Federal secondary MCLs are set for chloride, color, copper, corrosivity, fluoride, foaming agents, iron, manganese, odor, pH, sulfate, total dissolved solids, and zinc. 40 C.F.R. § 143.3. The State of Colorado has not promulgated secondary MCLs.

2. Federal Ambient Water Quality Criteria

Section 304(a) of the Clean Water Act, 33 U.S.C. § 1314(a) (1982), requires EPA to develop water quality criteria related to protection of human health and aquatic life. EPA has developed criteria for numerous substances. The Federal water quality criteria are not legally enforceable and are therefore not "applicable" to the cleanup. However, they may be considered "relevant and appropriate" under the circumstances of the release.

Under section 121(d)(2) (A) of SARA, the remedy selected must "require a level or standard of control which at least attains ... water quality criteria established under section 304 or 303 of the Clean Water Act, where such ... criteria are relevant and appropriate under the circumstances of time release or threatened release." SARA further provides that "(i) in determining whether or not any water quality criteria under the Clean Water Act is relevant and appropriate under the circumstances of the releases, (EPA) shall consider the designated or potential use of the surface or ground water, the environmental media affected, the purposes for which such criteria were developed, and the latest information available." (Section 121(d)(2)(B)(i) of SARA.)

EPA has determined that the ambient water quality criteria for acute and chronic toxicity to fresh water aquatic life and to humans for arsenic, cadmium, chromium, copper, cyanide, iron, lead, mercury, nickel, selenium, silver, and zinc are relevant for Operable Unit No. One. Additional data collection and analysis are necessary for EPA to determine whether such National criteria are appropriate under the circumstances of these releases into Clear Creek and North Clear Creek or whether site specific modifications to national criteria would more appropriately establish a cleanup goal for this site. Until such time that it is determined that site specific modification to individual contaminant criteria are

necessary, EPA will consider the more stringent of human health or aquatic life ambient water quality criteria (AWQCs) as an ARAR for the final remedy.

3. State Water Quality Standards

Section 303 of the Clean Water Act, 33 U.S.C. § 1313, provides for promulgation of water quality standards by the States. The standards consist of designated uses of water and water quality criteria for water based on uses designated. 40 C.F.R. § 131.3(i) (1986). The criteria are "elements of State water quality standards, expressed as constituent concentrations, levels, or narrative statements, representing a quality of water that supports a particular use." 40 C.F.R. § 131.3(b).

a. State Contaminant-Specific ARARS

State contaminant-specific ARARs are listed in Table B-1 and B-3. Table B-1 compares Federal MCLs, AWQC and State Contaminant-specific ARARs. State contaminant-specific ARARs are considered relevant, but to the extent that they are duplicative of Federal AWQC, their appropriateness for this site has to be evaluated.

b. Colo. Admin. Code 1002-8.

The State has also identified the "basic standards" portion of "The Basic Standards and Methodologies" as an ARAR for Operable Unit No. One. (5 Colo. Admin. Code 1002-8.) Section 3.1.11 of these regulations establishes basic standards applicable to all waters of the State. The key portions of these standards which are relevant and appropriate for Operable Unit No. One state:

Substances attributable to human-induced discharges ... shall not be introduced into waters of the State:

a. which can settle to form bottom deposits detrimental to the beneficial uses. Deposits are stream bottom buildup of materials which include but are not limited to anaerobic sludges, mine slurry or tailings, silt, or mud; or

b. which form floating debris, scum, or other surface materials sufficient to harm existing beneficial uses; or

c. which produce color, odor, or other conditions in such a degree as to create a nuisance or harm existing beneficial uses or impart any undesirable taste to significant edible aquatic species or to the water; or

d. in amounts, concentrations, or combinations which are harmful to the beneficial uses or toxic to humans, animals, plants, or aquatic life; or

e. in amounts, concentrations, or combination which produce a predominance of undesirable aquatic life; or

f. in concentrations which cause a film on the surface or produce a deposit on shorelines.

C. Antidegradation Standard

The State of Colorado has also identified its antidegradation standard as an ARAR for the Operable Unit No. One. Section 3.1.8 of The Basic Standards and Methodologies, 5 Colo. Admin. Code 1002-8, provides:

> Existing uses shall be maintained as required by State and Federal law. No further water quality degradation is allowable which would interfere with or become injurious to existing uses.

Under section 3.1.3, the antidegradation standard applies to all waters of the State and is considered relevant and appropriate for Operable Unit No. One.

State regulations do not define the term "existing uses". Under Federal regulations; existing uses are defined as "uses actually attained in the water body on or after November 28, 1975, whether or not they are included in the water quality standards." (40 C.F.R. § 131.10.)

LOCATION-SPECIFIC ARARs

Physical characteristics of the site influence the type and location of remedial responses considered for Operable Unit One. The location-specific ARARs identified for the site in Tables B-1 through B-3 establish consultation procedures with Federal and State agencies and may impose constraints on the location of remedial measures or require mitigation measures.

The location-specific ARARs for Operable Unit No. One relate to historic preservation, fish and wildlife, wetlands, floodplains, and work in navigable waters. The location-specific ARARs influence the type and location of remedial alternatives developed for the site.

1. Historic Preservation ARARs

Both Federal and State laws provide for protection of historical resources. The Central City Historic District is located within the Superfund site. In addition, there may be features eligible for the Federal or State historical registers. All regulations relating to historic preservation will be followed.

2. Fish and Wildlife

The Fish and Wildlife Coordination Act requires EPA to coordinate with Federal and State agencies if the remedy would modify any stream or water body. If any remedy selected involves modification of Clear Creek or North Clear Creek, EPA will work with these agencies to provide for protection of fish and wildlife.

3. Floodplains

Portions of the site along North Clear Creek are in the floodplain. Facilities will be situated out of the floodplain for Operable Unit No. One. Requirements of the Executive Order on Floodplain Management are applicable to this operable unit.

4. Wetlands

The Executive Order on protection of wetlands is applicable for this operable unit.

5. Work in or Affecting Navigable Waters

If the remedy selected for Operable Unit No. One involves work in or affecting navigable waters, EPA will follow all relevant ARARs under Section 404 of the Clear Water Act.

Action-Specific ARARs

The action-specific ARARs for Operable Unit No. One deal with requirements for the degree of discharge treatment required and requirements for disposal of sludges and metal laden organic material.

1. National Pollutant Discharge Elimination System (NPDES)

The degree of treatment required for low pH mine discharges will be sufficient to meet upstream water quality concentrations in Clear Creek and North Clear Creek. The NPDES effluent limitations would not be as stringent.

2. Solid Waste Disposal Act (SWDA)

The SWDA sets criteria for landfilling of sludges and would also impose a land ban on landfilling of metal laden organic material removed from passive treatment systems, if not treated to pass EP toxicity tests. The SWDA is an ARAR. Subtitle D of RCRA is considered relevant and appropriate upon implementation.

TABLE B-1

POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE CRITERIA
PERTINENT TO CLEAR CREEK/CENTRAL CITY SITE
mg/L

Contaminant of Concern	MCL[a] (SDWA)	AWQC Human Health[b] (CWA)	AWQC Aquatic Life (CWA)	CDH Contaminant Specific ARARs	CDH Effluent Limitations End of Pipe	Method Detection Limit[c]
Aluminum (Al)	—	—	0.15[d]	—	—	0.025
Arsenic (As)	0.050	0(2.2 ng/L)[e]	0.19[f]	0.05	—	0.003
Cadmium (Cd)	0.010	0.010	0.00066[g,h]	0.003 (OC) 0.0004 (NOC)	0.1/0.05	0.001
Chromium (Cr) (Total)	0.05 (hex)	0.05 (hex) 179.0 (tri)	0.0072 (hex)[f] 0.042 (tri)[f,g]	—	— —	0.010
Copper (Cu)	—	1.0 organoleptic	0.0065[g,i]	—	0.3/0.15	0.003
Fluoride (F)	4.0[j]	—	—	1.4-2.4	—	—
Lead (Pb)	0.050	0.050	0.0013[g,k]	—	0.6/0.3	0.002
Manganese (Mn) (Total)	—	—	—	1.0	—	0.015
Nickel (Ni)	—	0.015	0.088[d,g]	—	—	0.040

TABLE B-1

POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE CRITERIA
PERTINENT TO CLEAR CREEK/CENTRAL CITY SITE
mg/L

Contaminant of Concern	MCL[a] (SDWA)	AWQC Human Health[b] (CWA)	AWQC Aquatic Life (CWA)	CDH Contaminant Specific ARARs	CDH Effluent Limitations End of Pipe	Method Detection Limit[c]
Silver (Ag)	0.050	0.050	0.0012[g,l]	0.0001	—	0.010
Zinc (Zn)	—	5.0 organoleptic	0.047[g,m]	—	1.5/0.75	0.002

a 40 CFR 40, Part 141, Subpart B, 141.11.
b Superfund Public Health Evaluation Manual, December 18, 1985, OSWER Directive 9285.4-1.
c For CDH data.
d Federal Register, Vol. 51, No. 47, March 11, 1986, p. 8362 (proposed value).
e Value in parenthesis equals 10^{-6} carcinogenic risk level.
f Federal Register, Vol. 50, No. 145, July 29, 1985.
g At hardness of 50 mg/L $CaCO_3$, four day average concentration.
h Ambient Water Quality Criteria for Cadmium, EPA 440/5-84/032, January 1985.
i Ambient Water Quality Criteria for Copper, EPA 440/5-84/031, January 1985.
j Federal Register, Vol. 51, No. 63, April 2, 1986, p. 11396.
k Ambient Water Quality Criteria for Lead, EPA 440/5-84/027, January 1985.
l Federal Register, Vol. 45, No. 231, November 28, 1980, p. 79340.
m Federal Register, Vol. 51, No. 102, May 28, 1986, p. 19269.
n Standard Units.
o One day maximum/30 days average, respectively.

Note: All values are "total recoverable" concentrations except for Aquatic AWQC for As, Cd, Cu, Pb which are acid soluble.

TABLE B-2

FEDERAL ARARs

Standard, Requirement, Criteria, or Limitation	Citation	Description	Applicable/ Relevant and Appropriate	Comment
Contaminant-Specific				
Safe Drinking Water Act	40 U.S.C. § 300g			
National Primary Drinking Water Standards	40 C.F.R. Part 141	Establishes health-based standards for public water systems (maximum contaminant levels)	No/Yes	The MCLs for inorganic contaminants are relevant and appropriate. They are less stringent than AWQC for aquatic life.
National Secondary Drinking Water Standards	40 C.F.R. Part 143	Establishes welfare-based standards for public water systems (secondary maximum contaminant levels)	No/Yes	Secondary MCLs for inorganic contaminants are relevant and appropriate.
Maximum Contaminant Level Goals	Pub. L. No. 99-339, 100 Stat. 642 (1986)	Establishes drinking water quality goals set at levels of no known or anticipated adverse health effects, with an adequate margin of safety	No/No	Proposed MCLG's for inorganic contaminants are found in the Nov. 13, 1985, Federal Register. These should be treated as "other criteria, advisories, and guidance."
Clean Water Act	33 U.S.C. §§ 1251-1376			
Water Quality Criteria	40 C.F.R. Part 131 Quality Criteria for Water, 1976, 1980, 1986	Sets criteria for water quality based on toxicity to aquatic organisms and human health	No/Yes	Notices of availability of final criteria documents for nickel and zinc were published in the December 3, 1986, and March 2, 1987 Federal Registers.

TABLE B-2 (cont.)

FEDERAL ARARs

Standard, Requirement, Criteria, or Limitation	Citation	Description	Applicable/ Relevant and Appropriate	Comment
Toxic Pollutant Effluent Standards	40 C.F.R. Part 129	Establishes effluent standards or prohibitions for certain toxic pollutants: aldrin/dieldrin, DDT, endrin, toxaphene, benzidine, PCBs	No/No	These pollutants are not present in effluent.
Identification and Listing of Hazardous Waste	40 C.F.R. Part 261	Defines those solid wastes which are subject to regulation as hazardous wastes under 40 C.F.R. Parts 262-265 and Parts 124, 270, 271.	No/No	Creates no substantive cleanup requirements. Under 40 C.F.R. § 261.4(b)(7), solid waste from the extraction, beneficiation, and processing of ores and minerals is not hazardous waste. However, under CERCLA, SWDA requirements may be relevant and appropriate under the circumstances of the release at the site. In this chart, any solid wastes which pose a threat to public health or welfare or the environment are termed "hazardous materials."
Action-Specific				
Clean Water Act	33 U.S.C. §§ 1251-1376			
National Pollutant Discharge Elimination System	40 C.F.R. Parts 122, 125	Requires permits for the discharge of pollutants from any point source into waters of the United States	Yes/Yes	A permit is not required for on-site CERCLA response actions, but the substantive requirements apply. Permit requirements currently utilized by CDH are less

TABLE B-2 (cont.)

FEDERAL ARARs

Standard, Requirement, Criteria, or Limitation	Citation	Description	Applicable/ Relevant and Appropriate	Comment
Effluent Limitations	40 CFR Part 440	Sets technology-based effluent limitations for point source discharges in the Ore Mining and Dressing Point Source Category.	Yes/Yes	Less stringent than AWQC.
National Pretreatment Standards	40. C.F.R. Part 403	Sets standards to control pollutants which pass through or interfere with treatment processes in publicly owned treatment works or which may contaminate sewage sludge	No/No	The alternatives developed do not include discharge to a publicly owned treatment works.
Solid Waste Disposal Act ("SWDA")	42 U.S.C. §§ 6901-6987			
Criteria for Classification of Solid Waste Disposal Facilities and Practices	40. C.F.R. Part 257	Establishes crieria for use in determining which solid waste disposal facilities and practices pose a reasonable probability of adverse effects on health or the environment and thereby constitute prohibited open dumps	Yes/Yes	The current Subtitle D program is principally aimed at municipal and industrial solid waste and does not fully address mining waste concerns. Subtitle D is currently being revised to address mining wastes. Any new Subtitle D requirements are considered relevant and appropriate.

STATE OF COLORADO

COLORADO DEPARTMENT OF HEALTH
4210 East 11th Avenue
Denver Colorado 80220
Phone (303) 320-8333

88 JAN -6 PM 4:43
EPA, REGION VIII
HAZARDOUS WASTE
MANAGEMENT DIVISION

Roy Romer
Governor

Thomas M. Vernon
Executive Director

December 22, 1987

JAN 1988
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S Hum-Se

U.S. Environmental Protection Agency
Region VIII
One Denver Place
999 18th Street, Suite 500
Denver, Colorado 80202-2405

Attn: Robert Duprey

Dear Bob:

This letter will serve to provide Colorado's concurrence with the proposed remedy for discharge treatment (Operable Unit #1) at the Clear Creek/Central City superfund site, in Clear Creek and Gilpin Counties, Colorado. The remedy selection process is described thoroughly in an attachment to the record-of-decision dated September 30, 1987.

The proposed remedy authorizes pilot investigations of passive wetlands treatment, followed by further refinements using active conventional treatment if pilot testing indicates the need. Discharges from five sources (the Big 5, Argo, Quartz Hill, National and Gregory Tunnels) are now slated for remediation, but control strategies for other surface discharges and ground water contributions will be investigated before a final treatment remedy is selected. Also, while we recognize that source control is not likely to eliminate all discharges in the region, the proposed remedy acknowledges the need to investigate source control's effectiveness for improving water quality and minimizing the volume of flow to be treated in the long term.

The concurrence provided by this letter applies to the technical aspects of the proposed remedy. SARA states that permits are needed for remedial activities that are not entirely on site. The discharge from this operable unit would not be entirely on site and a permit should be required. Policy concerning permitting requirements is currently being discussed by the state and EPA.

If you have any questions, please call Jeff Deckler at 331-4830.

Sincerely,

Tom Looby

Thomas P. Looby
Assistant Director
Colorado Department of Health

cc: Bill Geise, Jr.
Ken Mesch
Dan Scheppers
Jeff Deckler
Walter Sandza

TPL:nr

TABLE B-2 (cont.)

FEDERAL ARARs

Standard, Requirement, Criteria, or Limitation	Citation	Description	Applicable/ Relevant and Appropriate	Comment
Guidelines for the Land Disposal of Solid Wastes	40 C.F.R. Part 241	Establishes requirements and procedures for land disposal of solid wastes	No/Yes	
Standards Applicable to Generators of Hazardous Waste	40 C.F.R Part 262	Establishes standards for generators of hazardous waste	No/Yes	Only relevant and appropriate if sludge disposal alternative developed would involve off-site transportation of hazardous materials.
Standards Applicable to Transporters of Hazardous Waste	40 C.F.R. Part 263	Establishes standards which apply to persons transporting hazardous waste within the U.S. if the transportation requires a manifest under 40 C.F.R. Part 262	No/Yes	Only relevant and appropriate if sludge disposal alternative developed would involve off-site transportation of hazardous materials.
Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities	40 C.F.R. Part 264	Establishes minimum national standards which define the acceptable management of hazardous waste for owners and operators of facilities which treat, store, or dispose of hazardous waste	No/Yes	Part 264 would apply to sludge only if it were a hazardous waste. A R.C.R.A. TSD facility is not being built.

TABLE B-2 (cont.)

FEDERAL ARARs

Standard, Requirement, Criteria, or Limitation	Citation	Description	Applicable/ Relevant and Appropriate	Comment
Interim Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilties	40 C.F.R Part 265	Establishes minimum national standards that define the acceptable management of hazardous waste during the period of interim status and until certification of final closure, or if the facility is subject to post-closure requirements, until post-closure responsibilities are fulfilled	No/No	Remedies should be consistent with the more stringent Part 264 standards as these represent the ultimate RCRA compliance standards and are consistent with CERCLA's goal of long-term protection of public health and welfare and the environment.
Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities	40 C.F.R. Part 266	Establishes requirements which apply to recyclable materials that are reclaimed to recover economically significant amounts of precious metals, including gold and silver	No/Yes	Does not establish additional cleanup requirements.

TABLE B-2 (cont.)

FEDERAL ARARs

Standard, Requirement, Criteria, or Limitation	Citation	Description	Applicable/ Relevant and Appropriate	Comment
Interim Standards for Owners and Operators of New Hazardous Waste Land Disposal Facilities	40 C.F.R. Part 267	Establishes minimum national standards that define acceptable management of hazardous waste for new land disposal facilities	No/No	Remedies should be consistent with the more stringent Part 264 standards as these represent the ultimate RCRA compliance standards and are consistent with CERCLA's goal of long-term protection of public health and welfare and the environment.
Land Disposal Criteria	40 C.F.R. Part 268		Yes/Yes	Requirements for landfill disposal of metal laden organic material apply.
Hazardous Waste Permit Program	40 C.F.R. Part 270	Establishes provisions covering basic EPA permitting requirements	No/No	A permit is not required for on-site CERCLA response actions. Substantive requirements are addressed in 40 C.F.R. Part 264.
Underground Storage Tanks	40 C.F.R. Part 280	Establishes regulations related to underground storage tanks	No/No	Use of undergound storage tanks are not being considered.
Occupational Safety and Health Act	29 U.S.C §§ 651-678	Regulates worker health and safety.	Yes/Yes	Under 40 C.F.R. § 300.38, requirements of this Act apply to all response activities under the NCP.

TABLE B-2 (cont.)

FEDERAL ARARs

Standard, Requirement, Criteria, or Limitation	Citation	Description	Applicable/ Relevant and Appropriate	Comment
Federal Mine Safety and Health Act	30 U.S.C. §§ 801-962	Regulates working conditions in underground mines to assure safety and health of workers.	Yes/Yes	Under 40 C.F.R. § 300.38, all applicable health and safety requirements apply to all response activities under the NCP.
Hazardous Materials Transportation Act	49 U.S.C. §§ 1801-1813			
Hazardous Materials Transportation Regulations	49 C.F.R. Parts 107, 171-177	Regulates transportation of hazardous materials.	Yes/Yes	ARAR only if an alternative developed would involve transportation of hazardous materials.
Location-Specific				
National Historic Preservation Act	16 U.S.C. § 470 40 C.F.R. § 6.301(b) 36 C.F.R. Part 800	Requires Federal agencies to take into account the effect of any Federally-assisted undertaking or licensing on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register of Historic Places.	Yes/Yes	If the remedy would affect any district, site, building, structure, or object listed on or eligible for the National Register.

TABLE B-2 (cont.)

FEDERAL ARARs

Standard, Requirement, Criteria, or Limitation	Citation	Description	Applicable/ Relevant and Appropriate	Comment
Archeological and Historic Preservation Act	16 U.S.C. § 469 40 C.F.R. § 6301(c)	Establishes procedures to provide for preservation of historical and archeological data which might be destroyed through alteration of terrain as a result of a Federal construction project or a Federally licensed activity or program.	Yes/Yes	Portions of the site are in National Historic Preservation Areas.
Historic Sites, Buildings and Antiquities Act	16 U.S.C. §§ 461-467 40 C.F.R.§ 6.301(a)	Requires Federal agencies to consider the existence and location of landmarks on the National Registry of Natural Landmarks to avoid undesirable impacts on such landmarks.	Yes/Yes	Portions of the site are in National Historic Preservation Areas.
Fish and Wildlife Coordination Act	16 U.S.C. §§ 661-666 40 C.F.R. § 6.302(g)	Requires consultation when Federal department or agency proposes or authorizes any modification of any stream or other water body and adequate provision for protection of fish and wildlife resources.	Yes/Yes	Alternatives developed may modify streams.

TABLE B-2 (cont.)

FEDERAL ARARs

Standard, Requirement, Criteria, or Limitation	Citation	Description	Applicable/ Relevant and Appropriate	Comment
Clean Water Act	33 U.S.C. §§ 1251-1376			
Dredge or Fill Requirements (Section 404)	40 C.F.R. Parts 230, 231 33 C.F.R. Part 323	Requires permits for discharge of dredged or fill material into navigable waters.	Yes/Yes	A permit is not required for onsite CERCLA response actions, but substantive requirements would be met if an alternative developed would involve discharge of dredged or fill material into navigable waters. This is not anticipated.
Rivers and Harbors Act of 1899	33 U.S.C § 403			
Section 10 Permit	33 C.F.R. Parts 320-330	Requires permit for structures or work in or affecting navigable waters.	Yes/Yes	A permit is not required for onsite CERCLA response actions, but substantive requirements would be met if an alternative developed would involve structures or work in or affecting navigable waters.
Executive Order on Protection of Wetlands	Exec. Order No. 11,990 40 C.F.R. § 6.302(a) & Appendix A	Requires Federal agencies to avoid, to the extent possible, the adverse impacts associated with the destruction or loss of wetlands and to avoid support of new construction in we ds if a practicable alternativ ists.	Yes/Yes	If an alternative developed would affect a wetland. This is not anticipated.

TABLE B-2 (cont.)

FEDERAL ARARs

Standard, Requirement, Criteria, or Limitation	Citation	Description	Applicable/ Relevant and Appropriate	Comment
Executive Order on Floodplain Management	Exec. Order No. 11,988 40 C.F.R. § 6.302(b) & Appendix A	Requires Federal agencies to evaluate the potential effects of actions they may take in a floodplain to avoid, to the maximum extent possible, the adverse impacts associated with direct and indirect development of a floodplain.	Yes/Yes	If an alternative developed would affect a floodplain. This is not anticipated.

TABLE B-3

COLORADO ARARs
EFFLUENT LIMITATIONS[a]

Contaminant	Unit	Colorado Contaminant Specific ARAR	Title and Section of State Standard	Applicable/ Relevant and Appropriate	Comments
pH	standard units	6.0 - 9.0	5 CCR 1002-3, Sect. 10.1.4.	Yes/Yes	
Fecal Coliform	No./100 ml	200		No/No	Not identified as contaminant of concern
Total Suspended Solids	mg/L	30/20[b]	5 CCR 1002-3, Sect. 10.1.3, 40 CFR Part 440.102	Yes/Yes	
Biological Oxygen Demand	BOD_5	45/30[c]	5 CCR 1002-3, Sect. 10.1.4.	No/No	Not identified as contaminant of concern
Oil and Grease	mg/L	10/No visible sheen	5 CCR 1002-3, Sect. 10.1.4.	Yes/Yes	
Residual Chlorine	mg/L	0.5 maximum	5 CCR 1002-3, Sect. 10.1.4.	No/No	Not identified as contaminant of concern
Cadmium	mg/L	0.1/0.050[b]	5 CCR 1002-3, Sect. 10.1.3; 40 CFR Part 440.103	Yes/Yes	
Copper	mg/L	0.3/0.15[b]	5 CCR 1002-3, Sect. 10.1.3; 40 CFR Part 440.103	Yes/Yes	
Lead	mg/L	0.6/.3[b]	5 CCR 1002-3, Sect. 10.1.3; 40 CFR Part 440.103	Yes/Yes	
Mercury	mg/L	0.002/.001[b]	5 CCR 1002-3, Sect. 10.1.3; 40 CRR Part 440.103	Yes/Yes	
Zinc	mg/L	1.5/.750[b]	5 CCR 1002-3, Sect. 10.1.3; 40 CFR Part 440.103	Yes/Yes	

[a] End of pipe value. If effluent limitations based on in-stream numeric standards are stricter, the stricter numbers apply.
[b] One day maximum/30 day average, respectively.
[c] 7 day average/30 day average, respectively.

TABLE B-3

COLORADO ARARs

CONTAMINANT-SPECIFIC ARARs WATER QUALITY LIMITED

Contaminant	Colorado Contaminant-Specific ARAR[b]	Units	Title and Section of State Standard	Applicable/ Relevant and Appropriate	Comments
Physical and Biological					
pH (standard units)	6.5 - 9.0	Standard Units	5 CCR 1002-3, Sect. 3.8.6, Region 3, Segments 2, 11, 13	Yes/Yes	—
Turbidity	1	turbidity units	5 CCR 1003-1, Article 4	No/No	Not identified as contaminant of concern
Dissolved Oxygen	7.0	mg/L	5 CCR 1002-8, Sect. 3.8.6, Region 3, Segments 2, 11, 13	No/No	Not identified as contaminant of concern
Temperature (°C)	20°/max 3° increase	°C	5 CCR 1002-8, Sect. 3.8.5	Yes/Yes	—
Fecal Coliform	200	No/100 ml	5 CCR 1002-8, Sect. 3.8.5	No/No	Not identified as contaminant of concern
Inorganics					
Ammonia (unionized)	0.020	mg/L	5 CCR 1002-8, Sect. 3.8.6, Region 3, Segments 11, 13	No/No	Not identified as contaminant of concern
Nitrite	0.050	mg/L	5 CCR 1002-8, Sect. 3.8.6, Region 3, Segment 11	No/No	Not identified as contaminant of concern
			5 CCR 1003-1, Article 5	No/No	
Chloride	250	mg/L	5 CCR 1002-8, Sect. 3.8.6, Region 3, Segment 11	No/No	Not identified as contaminant of concern
Sulfate	250	mg/L	5 CCR 1002-8, Sect. 3.8.6, Region 3, Segment 11	No/No	Not identified as contaminant of concern
Cyanide (Free)	0.005	mg/L	5 CCR 1002-8, Sect. 3.8.6, Region 3, Segments 2, 11, 13	No/No	Not identified as contaminant of concern

TABLE B-3 (cont.)

COLORADO ARARs

CONTAMINANT-SPECIFIC ARARs WATER QUALITY LIMITED

Contaminant	Colorado Contaminant-Specific ARAR[b]	Units	Title and Section of State Standard	Applicable/ Relevant and Appropriate	Comments
Boron	0.750	mg/L	5 CCR 1002-8, Sect. 3.8.6, Region 3, Segments 2, 11, 13	No/No	Not identified as contaminant of concern
Sulfur (as H_2S)	0.002	mg/L	5 CCR 1002-8, Sect. 3.8.6, Region 3, Segments 2, 11, 13	No/No	Not identified as contaminant of concern
Residual Chlorine	3	mg/L	5 CCR 1002-8, Sect. 3.8.6, Region 3, Segments 2, 11, 13	No/No	Not identified as contaminant of concern
Metals					
Aluminum	0.150	mg/L		Yes/Yes	
Arsenic	0.050	mg/L	5 CCR 1002-8, Sect. 3.8.6, Region 3, Segments 2, 11, 13 5 CCR 1003-1, Article 5	Yes/Yes	
Barium	1	mg/L	5 CCR 1003-1, Article 5	Yes/Yes	
Beryllium	0.0053	mg/L		Yes/Yes	
Cadmium	0.0004[a] (NCC) 0.003 (CC)	mg/L	5 CCR 1002-8, Sect. 3.8.6, Region 3, Segment 13 protects aquatic life from chronic toxicity.	Yes/Yes	

TABLE B-3 (cont.)

COLORADO ARARs

CONTAMINANT-SPECIFIC ARARs WATER QUALITY LIMITED

Contaminant	Colorado Contaminant-Specific ARAR[b]	Units	Title and Section of State Standard	Applicable/ Relevant and Appropriate	Comments
Chromium (III)	0.039	mg/L	5 CCR 1003-1, Article 5. Total Chromium cannot exceed 50 μg/l	Yes/Yes	
Chromium (VI)	0.011	mg/L		Yes/Yes	
Copper	0.0065[a]	mg/L		Yes/Yes	
Fluoride	1.4 - 2.4	mg/L	5 CCR 1003-1, Article 5	Yes/Yes	
Gross Alpha	15	pCi/L	5 CCR 1003-1, Article 7	No/No	Not identified as contaminant of concern
Iron (Soluble)	0.3	mg/L	5 CCR 1002-8, Sect. 3.8.6, Region 3, Segment 11	Yes/Yes	
Iron (Total)	1.0	mg/L	5 CCR 1002-8, Sect. 3.8.6, Region 3, Segment 2 protects aquatic life from chronic toxicity.	Yes/Yes	
Lead	0.0013[a]	mg/L		Yes/Yes	
Manganese (Soluble)	0.050	mg/L	5 CCR 1002-8, Sect. 3.8.6, Region 3, Segment 11	Yes/Yes	

TABLE B-3 (cont.)

COLORADO ARARs

CONTAMINANT-SPECIFIC ARARs WATER QUALITY LIMITED

Contaminant	Colorado Contaminant-Specific ARAR[b]	Units	Title and Section of State Standard	Applicable/ Relevant and Appropriate	Comments
Manganese (Total)	1.0	mg/L	5 CCR 1002-8, Sect. 3.8.6, Region 3, Segment 11	Yes/Yes	
Mercury	0.012	mg/L		Yes/Yes	
Nickel	0.050	mg/L		Yes/Yes	
Radium (226 + 228)	5	pCi/L	5 CCR 1003-1, Article 7	No/No	Not identified as contaminant of concern
Selenium	0.010	mg/L	5 CCR 1002-8, Sect. 3.8.6, Region 3, Segment 11 5 CCR 1003-1, Article 5	Yes/Yes	
Silver	0.0001[a]	mg/L	5 CCR 1002-8, Sect. 3.8.6, Region 3, Segments 2, 11, 13	Yes/Yes	
Thallium	0.013	mg/L		No/No	Not identified as contaminant of concern
Uranium	40	pCi/L	5 CCR 1002-8, Sect. 3.8.5	No/No	Not identified as contaminant of concern

TABLE B-3 (cont.)

COLORADO ARARs

CONTAMINANT-SPECIFIC ARARs WATER QUALITY LIMITED

Contaminant	Colorado Contaminant-Specific ARAR[b]	Units	Title and Section of State Standard	Applicable/ Relevant and Appropriate	Comments
Zinc	0.28 (CC) 0.5 (NCC)	mg/L		Yes/Yes	

[a] Standard is hardness dependent. Value is for hardness of 50 mg/L.

[b] Standards apply to surface water at a compliance point, downstream of mixing zone for effluent and receiving water.

TABLE B-3

COLORADO ARARs
LOCATION SPECIFIC ARARs - DISCHARGE TREATMENT

Title and Section of State Standard	Description	Applicable/Relevant and Appropriate	Comment
Colorado Water Quality Control Act Sections 25-8-202 and 25-8-702	Requires Water Quality Control Division approval of the locations of wastevater treatment facilities, before commencing construction.	No/Yes	Applicable to domestic wastewater plants, but relevant and appropriate to industrial wastewater plants
Procedural Regulations for Site Applications for Domestic Wastewater Treatment Works, 5 CCR 1002-12, Sections 2.2.3, 2.2.4 and 2.2.5	Establishes broad siting criteria relative to floodplains and natural hazards. Describes review procedure and decision criteria; summarizes information and data requirements	No/Yes	Relevant and appropriate to treatment works site as a whole
Colorado Hazardous Waste Management Regulations, 6 CCR 1007-3, Parts 260, 261, 262.11	Defines hazardous solid wastes, requires waste characterization	No/Yes	Critical for determining siting requirements
Colorado Hazardous Waste Act, Sections 25-15-101, 203, 208, 302	Establishes broad siting criteria and site evaluation procedures for individual storage or disposal units (i.e. impoundments, landfills)	No/Yes	Relevant and appropriate if waste characterization is hazardous and onsite disposal is proposed. This is not anticipated. Requires consideration of local land uses
Requirements for siting of Hazardous Waste Disposal Sites. 6 CCR 1007-2, Sections 2.1, 2.2, 2.4.1, 2.5.1, 2.5.3 and 2.5.6	Geologic/Hydrologic conditions must assure waste isolation from exposure pathways from 1000 years. Siting must assure short and long term protection of human health and environment.	No/No	No disposal site is planned.

TABLE B-3 (cont.)

COLORADO ARARs
LOCATION SPECIFIC ARARs - DISCHARGE TREATMENT

Title and Section of State Standard	Description	Applicable/Relevant and Appropriate	Comment
Colorado Hazardous Waste Management Regulations, 6 CCR 10070-3, Part 260, Subpart A and 264.18	Siting is restricted in vicinity of recent faulting. No hazardous waste disposal can occur in a 100 year floodplain. Disposal into or below surface water and ground water is prohibited.	No/No	No hazardous waste disposal is contemplated.
Colorado Solid Wastes Disposal Sites and Facilities Act, Sections 30-20-101, 104, 110	Establishes broad siting criteria and site evaluation procedures for individual storage and disposal units (i.e., impoundments, landfills)	No/Yes	Relevant and appropriate if waste characterization is non-hazardous, and onsite disposal is proposed.
Regulations Pertaining to Solid Waste Disposal Sites and Facilities, 6 CCR 1007-2, Sections 1.1, 1.2, 1.3.2, 2.1.1, 4.1, 6.1	Siting must maximize wind protection and minimize upstream drainage area. No solid waste disposal can occur in a 100 year floodplain. Disposal into or below surface water and ground water is prohibited. Impoundment design is controlled by a site's location in relation to the upper-most aquifer and by water quality in that aquifer.	No/No	No hazardous waste disposal site is contemplated.
Regulations Pertaining to Domestic Sewage Sludge, 5 CCR 1003-7, Sections 7 and 8	Siting restrictions for land application of domestic wastewater sludges based on soil texture, proximity to surface water and proximity to diversions for public water systems.	No/No	No land application of domestic wastewater sludges is contemplated.
Colorado State Historical Society, Sections 24-80-201, 202, 211; Sections 24-801-101, 102, 103, 104, 108	Sites within state or federal historic preservation areas will be required to preserve historic character.	No/Yes	A Memorandum of Agreement has been initiated.

TABLE B-3

COLORADO ARARs
ACTION-SPECIFIC ARARs - DISCHARGE TREATMENT

Title and Section of State Standard	Description	Applicable/Relevant and Appropriate	Comment
Colorado Water Quality Control Act, Sections 25-8-101, 102, 103, 203, 204, 205, 304, 501, 502, 503, 601, 602, 603, 605, 606, 607, 608, 609, 610	Establishes state policies toward water quality protection. Defines terms. Authorizes regulations and lists information, data monitoring and operational requirements that must be included. Describes enforcement procedures.	No/Yes	Promulgated guidance on program goals, policies, regulations.
Colorado Wildlife, Sections 33-1-101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 115, 120	Establishes borad program for protecting wildlife, and summarizes broad protective criteria.	No/Yes	Relevant and appropriate as reason to treat discharges.
Colorado Department of Health Administration, Sections 25-1-101, 102, 103, 107(e), (s), (t), 108, 109, 110, 114, 114.1	Establishes safe drinking water authorities for the state.	No/Yes	
Procedural Regulations for Site Applications for Domestic Wastewater Treatment Works, 5 CCR 1002-12, Sections 2.2.3, 2.2.4, 2.2.5	Describes review procedures and decision criteria. Summarizes information, data monitoring, and reporting requirements.	No/Yes	Applies to treatment facility site as a whole
Basic Standards and Methodologies, 5 CCR 1002-8, Sections 3.1.2, 3.1.3, 3.1.4, 3.1.5, 3.1.8, 3.1.9, 3.1.10, 3.1.11, 3.1.13, 3.1.14, 3.8.2, 3.8.3, 3.8.4	Establishes performance standards and procedures for applying contaminant specific ARARs.	No/Yes	

TABLE B-3 (Continued)

COLORADO ARARs
ACTION-SPECIFIC ARARs - DISCHARGE TREATMENT

Title and Section of State Standard	Description	Applicable/Relevant and Appropriate	Comment
Regulations Prohibiting the Discharge of Certain Wastewaters to Storm Sewers and Prohibiting Certain Connections to Storm Sewers, 5 CCR 1007-2, Sections 5.1.1 and 5.1.2	Prohibits industrial discharges to storm sewers without permits.	No/No	
State Discharge Permit System Regulations, 5 CCR 1002-2, Sections 6.2, 6.3, 6.5, 6.6, 6.9, 6.10, 6.12, 6.14	Describes review procedures and decision critieria. Summarizes information, data monitoring and reporting requirements.	No/Yes	Refer to NPDES in Table B-2
Colorado Hazardous Waste Management Regulations, 6 CCR 1007-3, Parts 260, 261, 262.11	Defines hazardous solid wastes, requires waste characterization.	No/Yes	Critical for determining waste handling requirements.
Colorado Solid Waste Disposal Sites and Facilities Act, Sections 101, 104, 109, 110, 113, 114	Establishes broad design criteria and minimum standards for operating individual storage and disposal units. Describes enforcement procedures.	No/Yes	

TABLE B-3 (Continued)

COLORADO ARARs
ACTION-SPECIFIC ARARs - DISCHARGE TREATMENT

Title and Section of State Standard	Description	Applicable/Relevant and Appropriate	Comment
Regulations Pertaining to Solid Wastes Disposal Sites and Facilities, 6 CCR 1007-2, Sections 1.1, 1.2, 1.3.2, 1.3.3, 2.1.1, 2.1.2, 2.1.3, 2.1.4, 2.2.1, 2.2.2, 2.2.3, 2.2.4, 2.2.5, 2.2.9, 2.2.10, 2.2.11, 2.2.12, 2.2.13, 2.3, 2.4.3, 2.4.5, 2.4.6, 3.1.2, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9	Describes specific design criteria and minimum standards for operating individual storage and disposal units. Summarizes information, data, monitoring and reporting requirements.	No/Yes	
Colorado Hazardous Waste Act, Sections 25-15-101, 102, 200.1, 200.2, 200.3, 202, 203, 208, 210, 302, 308, 309, 310	Establishes broad design criteria and minimum standards for operating individual storage and disposal units. Summarizes enforcement procedures.	No/Yes	Relevant and appropriate if wastes characterized as hazardous, and if on-site disposal is considered. This is not anticipated.
Requirements for Siting of Hazardous Waste Disposal Sites, 6 CCR 1007-2, Sections 2.1, 2.2, 2.3.2, 2.3.3, 2.3.4, 2.3.5, 2.4, 2.5.1, 2.5.2, 2.5.4, 2.5.5	Establishes specific design criteria for individual storage and disposal units. Summarizes information, data, monitoring and reporting requirements.	No/No	
Colorado Hazardous Waste Management Regulations, 6 CCR 1007-3, Parts 99; 100.11, 100.12, 100.40, 100.41, 262.12, 262.34, 262.40, 262.43; 264, Subparts A, B, C, D, E, F, G, I, J, K, L, M, N	Establishes specific design criteria and minimum standards for operating individual storage or disposal units. Summarizes information data, monitoring and reporting requirements.	No/Yes	Relevant and appropriate for on-site disposal, and for on-site storage prior to off-site shipment, not for generators.

TABLE B-3 (Continued)

COLORADO ARARs
ACTION-SPECIFIC ARARs - DISCHARGE TREATMENT

Title and Section of State Standard	Description	Applicable/Relevant and Appropriate	Comment
Colorado Basic Standards for Ground Water, 5 CCR 1002-8, Sections 3.11.0 to 3.11.9	Establishes a system for classifying ground water and adopting water quality standards to protect existing and potential beneficial uses.	No/No	The Section 3.11.0 framework, site-specific classifications and standards may be applied when authority to implement exists in any applicable regulatory program (e.g., Solid Waste Regulations).
Colorado Hazardous Waste Management Regulations 6 CCR 1007-3, Parts 262, 263, 264, Subparts C, D and 264.16.	Establishes additional reporting requirements for off-site shipment.	No/Yes	Relevant and appropriate for generators who accumulate (but do not store), in containers and tanks, and for transporters.
Public Utilities Law, Sections 40-1-101, 102, 103; 40-2-101, 108, 110.5, 116; 40-2.1-101, 102, 103, 104, 105, 106; 40-11-101, 102, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117		No/Yes	
Rules and Regulations Governing the Shipping of Hazardous Wastes Within Colorado, 4 CCR 723-17, HMS 1-9	Establishes specific requirements for the shipping of hazardous materials.	No/Yes	Hazardous wastes are a subset of hazardous materials. Shipping of hazardous materials is not anticipated.

TABLE B-3 (Continued)

COLORADO ARARs
ACTION-SPECIFIC ARARs – DISCHARGE TREATMENT

Title and Section of State Standard	Description	Applicable/Relevant and Appropriate	Comment
Rules and Regulations Governing the Transportation of Hazardous Materials Within Colorado, 4 CCR 723-18, HMT 1-9	Establishes specific requirements for the transportation of hazardous materials, especially regarding labelling and placarding.	No/Yes	Hazardous wastes are a subset of hazardous materials. Shipping of hazardous materials is not anticipated.
Colorado Air Quality Control Act, Sections 25-7-101, 102, 105, 106, 107, 108, 109, 110, 114, 117	Establishes broad standards for air quality protection	No/Yes	
Colorado Air Quality Control Regulations, Common Provisions (5 CCR 1001-2) and Regulation 1 (5 CCR 1001-3), Subsections, I, II(A)(1) and III(D), Regulations 8 (5 CCR 1001-10); Ambient Air Standards (5 CCR 1001-14); AAS-1.1	Establishes standards for controlling fugitive particulate emissions and air toxics. Defines terms.	No/Yes	Relevant and appropriate during construction activities.
Colorado Noise Abatement Statute, Sections 25-12-101, 102, 103, 104, 105, 106, 107, 108	Establishes standards for controlling noise	No/Yes	Relevant and appropriate during construction activities.
Colorado Wildlife Enforcement and Penalties, Sections 33-6-101, 102, 103, 104, 105, 108, 109, 110, 111, 113, 114, 116, 117, 119, 120, 124, 126, 128, 129, 130	Prohibits specific actions as ways to protect wildlife.	No/Yes	Relevant and appropriate for protecting wildlife near the site during construction activities.

TABLE B-3 (Continued)

COLORADO ARARs
ACTION-SPECIFIC ARARs - DISCHARGE TREATMENT

Title and Section of State Standard	Description	Applicable/Relevant and Appropriate	Comment
Wildlife Commission Regulations, 2 CCR 406-0, Articles I, III, IV, V, VI, VII, VIII, IX, X, XI	Establishes specific requirements for protection of wildlife.	No/Yes	
Colorado Abatement of Public Nuisance Act, Sections 16-13-301, 302, 305, 307, 308, 309(4), 312		No/No	
Regulations Pertaining to Domestic Sewage Sludge, 5 CCR 103-7, Sections 1-6, 9-14 (Land Application)		No/No	

APPENDIX C

INDEX TO THE ADMINISTRATIVE RECORD

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII
ONE DENVER PLACE — 999 18TH STREET — SUITE 1300
DENVER, COLORADO 80202-2413

August 28, 1987

To: Residents and Other Interested Parties

The Administrative Record (AR), a compilation of all significant documents used in making decisions for the Clear Creek/Central City Superfund site, is now available. Because of the volume of materials, the full AR has been placed in the information files at the following addresses:

Gilpin County Courthouse
203 Eureka
Central City, CO 80427
(303) 569-3251
Hours: Mon.-Fri. 8:00-4:30

U.S. EPA Library
999 18th Street
Denver, CO 80202
(303) 293-1444
Hours: Mon.-Fri. 8:00-4:00

An index of the AR is available at all five information files, including those listed below:

Idaho Springs
City Hall
1711 Miner Street
Idaho Springs, CO 80452
(303) 567-4421
Hours: Mon.-Fri. 8:00-5:00

Idaho Springs
Public Library
219 14th Street
Idaho Springs, CO 80452
(303) 567-2020
Hours: Mon.,Tues.,Thurs. 1:00-7:00
Wed.,Fri. 9:00-5:00
Saturday 10:00-3:00

Golden Public
Library
923 10th Street
Golden, CO 80401
(303) 279-4585
Hours: Mon.-Thurs. 10:00-9:00
Fri.-Sat. 10:00-5:00
Sunday 12:00-5:00

The purpose of the AR is to provide complete documentation of the process and studies prepared for the site. We encourage you to review these materials. If you have any questions about the materials, please give me or Walter Sandza a call. You can reach Walter Sandza at (303) 293-1519. I can be reached at 1-800-332-3321 (toll free) or (303) 293-1699.

Sincerely,

Jane O. Russo

Jane O. Russo
Community Relations Coordinator

cencity

CENTRAL CITY/CLEAR CREEK ADMINISTRATIVE RECORD
CENTRAL CITY/CLEAR CREEK REMEDIAL ACTION DOCUMENTS

100001
December 1, 1967
Pages: 150
Report
Pollution/aquatics S. Flat Basin
By: U. S. Dept. of Interior
To: unknown

100002
December 1, 1967
Pages: 82
Rpt App
Pollution/aquatics S. Flat Basin
By: U. S. Dept. of Interior
To: unknown

100003
December 1, 1975
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Report
Biota & W. Quality S. Flat River
Bluestein & Hendricks
By: Unknown

100004
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Data
CC fish species counts near metro
By: Colo. Div. of Wildlife
To: unknown

100005
July 30, 1982
Pages: 41
Report
EPA fit team report on NCC drainage
By: Donna Toeroek, Fred C. Hart Associates, Inc.
To: Keith O. Schwab (EPA)

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100006
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EPA action memo proceed w/RI/FS
From: William H. Hedeman (EPA)
To: Rita M. Lavelle (EPA)

100007
February 8, 1983
Pages: 48
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Black & Veatch Rem. Plan to EPA
By: Black and Veatch
To: EPA

100008
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McIntosh title search and tail ID
From: James McIntosh
To: Ecology and Environment

100009
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Pages: 40
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CH2M Hill work plan and assign.
By: CH2M Hill
To: unknown

100010
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Pages: 107
Letter
Colo. Dept. Health comments on CC
From: Various authors
To: Various addressees

100011
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Co. mined land reclam on CC RI/FS
By: David Holm (Mined Land Reclaim Div.)
To: John Hardaway

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100012
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CH2M Hill final work plan RI/FS
By: unknown
To: unknown

100013
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By: Robert L. Olsen (CDM)
To: Judith Wong and Walter Sanoza (EPA)

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By: CDM
To: EPA

100015
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(POP)
Project Operations Plan V. 1 orgs
By: CDM
To: unknown

100016
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Letter
Gormley Wk. Plan Recommend on CC
From: James J. Gusek & John T. Gormley
To: Roger Olsen (CDM)

100017
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Pages: 133
Report
Final Work Plan for CC RI/FS V. 1
By: CDM
To: EPA

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100018
October 1, 1985
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STS Soil Boring Logs, Tail. & Tun
By: J. LeClaire (CDM)

100019
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Gormley Drilling Borehole Logs CC
By: Gormley
To: CDM

100020
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Aquatic Ecology Info. Notes Data
By: CDM
To: unknown

100021
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By: unknown
To: unknown

100022
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By: unknown
To: unknown

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By: EPA
To: unknown

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By: unknown
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By: unknown
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By: unknown
To: unknown

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From: John K. Hopkins (CDM)
To: Thomas Looby (CO Dept. of Health)

100028
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By: Olsen & Hopkins (CDM)
To: Clear Creek/Central City files

100029
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Report on Value of Gregory Tail.
By: W. Rex Bull & Thomas R. Wildeman
To: CDM

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100030
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Superfund fact sheet Gregory tail
By: unknown

100031
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By: Gormley
To: CDM

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Low Flows CC: Co. Dept. Health
By: Rich Horstmann (CO Dept. of Health)
To: John Hopkins (CDM)

100033
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Report
Big 5 Pass. Treat. Design & Cost
By: E. A. Howard (CO School of Mines)
To: CDM

100034
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Gormley Geotech Investigations
By: James J. Gusek (Gormley)
To: Roger Olsen (CDM)

100035
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By: James J. Gusek (Gormley)
To: Roger Olsen (CDM)

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By: Henry L. Longest II (EPA)
To: Waste Management Dv Dir.

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To: Attendees of meeting

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From: Patricia Billing (CDM)
To: Paul Chrystowski (ICF)

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To: Thomas Looby (CO Dept. of Health)

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EPA on Historic Memo of Agreement
From: Rick Claggett (Hist. Preserv. Officer)
To: Addressees

100053
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EPA, CO Hist. Soc. and the Adv. Council on Hist. Preservation
From: unknown
To: unknown

100054
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From: Robert Fink (Council on Hist. Preser)
To: Sharon L. Kercher (EPA)

100055
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Draft Remedial Invest. V. 1 Text
By: Roger L. Olsen (CDM)
To: EPA

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100056
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By: Roger L. Olsen (CDM)
To: EPA

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From: Resource Tech. Group
To: CDM

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From: Ronald W. Klusman (CO School of Mines)
To: Roger Olsen (CDM)

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From: Jane O. Russo (EPA)
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To: Kaaren K. Patterson (CO Hist. Soc)

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By: CDM
To: EPA

100064
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Final Draft Rem. Invest. V. 1 Text
By: CDM
To: EPA

100065
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By: CDM
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To: Walter Standza (CDM)

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By: S. L. Carlock (Dept. of Army)
To: John Hookins (CDM)

100069
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Maxwell comments on RI/FS & Argo
From: James N. Maxwell
To: Walter Standza (EPA)

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Idaho Springs comments on RI/FS
From: James Reed (Mayor of Idaho Spr.)
To: Walter Standza (EPA)

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From: Patricia C. Mosch (Clear Creek Co. Metal Mining Assoc.)
To: Walter Standza (EPA)

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From: Jerald J. Dewitt
To: Walter Standza and Jane O. Russo (EPA)

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From: Bruce Schmalz (City of Central City)
To: Walter Standza and Jane O. Russo (EPA)

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From: Robert Fink (Ad. Council on Hist. Pres.)
To: Walter Standza (EPA)

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Trout unltd response to CC RI/FS
From: Kent Fishman (Trout Unltd)
To: Jane Russo (EPA)

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By: Various authors
To: unknown

100077
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From: Ned Noack (Dept. of Health)
To: Jay Silvernale (EPA)

100078
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Information regarding Argo Tunnel
From: Cynthia S. Lead, Adolph Coors Co.
To: Freedom of Information Act Officer, EPA

100079
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Investigation in the vicinities of Idaho Sprngs and Central Cit
for acid mine drainage and tailings
From: J. William Geise, EPA
To: The residents

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Letter
Central City/Clear Creek CERCLA site: request for access
From: J. William Geise, Jr., EPA
To: George Groves, Raquette Real Estate

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Central City/Clear Creek CERCLA site: request for access
From: Stephen P. Cherry, (EPA)
To: George Groves, Raquette Real Estate

100082
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From: Roger L. Olsen, CDM
To: Walter Stanza and Sandra Moreno, EPA

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By: EPA

100084
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USEPA permission form for access to properties concerning the Clear Creek/Central City hazardous waste site investigations
From: EPA
To: various property owners

100085
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Clear Creek County Metal Mining Assn.
From: unknown
To: unknown

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Preliminary Screening Analysis, Gregory Incline & Tailings/Expedited Response
From: Camp Dresser & McKee Inc.
To: EPA

100086
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From: Mark Switak, CDM
To: Walter Standza, EPA

100087
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From: Camp Dresser & McKee
To: EPA

100088
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November 17, 1986 meeting summary and action item
From: Roger Olsen, CDM
To: Walter Standza, EPA

100089
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Agenda for Clear Creek/Central City RI/FS risk assessment meeting
From: Roger Olsen, CDM
To: Walter Standza, Sandra Moreno, Jim Baker and Ned Noack

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From: Barbara Lawlor
To: Jane Russo

100091
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From: Patricia Billig, CDM
To: Distribution

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From: CDM
To: Sandra Moreno, EPA

100093
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From: Roger L. Olsen, CDM
To: Sandra Moreno, EPA

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Clear Creek/Central City FS, February 19, 1987 progress report
From: R. L. Olsen and J. K. Hopkins, CDM
To: Walter Standza, EPA

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From: Jerald J. Devitt, of Devitt and Weiszmann
To: Robert L. Duprey, EPA

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To: Sandra R. Moreno, EPA

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To: Steve Smith, Colorado Second Congressional District Office

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From: Kevin J. Roche
To: EPA

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To: EPA

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From: Sharon L. Kercher, EPA
To: Bill Lorenz, Mayor of Black Hawk

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From: John Hopkins, CDM
To: Sandra Moreno, EPA

100104
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From: R. L. Olsen/J. K. Hopkins
To: Walter Standza, EPA

100105
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From: John Hopkins, CDM
To: P. R. McCllough, Colorado Dept. of Hwys.

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Letter
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From: Jerald J. Devitt, Devitt & Weiszmann
To: Robert L. Duprey, EPA

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From: Norman R. and Mildred L. Blake
To: Harold W. Zarling, Riedel Environmental Services Inc.

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From: Sharon L. Kercher
To: Harold Zarling, Riedel Environmental Services Inc.

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From: John Hopkins, CDM
To: Walter Sandza and Sandra Moreno, EPA

100110
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From: Jerald J. Devitt, Devitt and Weiszmann
To: Sharon Kercher, EPA

100111
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From: Sharon Kercher, EPA
To: Mr. and Mrs. Marko Lah

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From: Sandra R. Moreno, EPA
To: The Honorable Bill Lorenz, Mayor City of Black Hawk

100113
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To: Kermit's Restaurant

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From: John Hopkins, CDM
To: Sandra Moreno, EPA

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Central City/Clear Creek CERCLA site: request for access
From: Sandra R. Moreno, EPA
To: George Groves, Raquett Real Estate

100117
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Construction of a passive treatment pilot plant structure at t
Big 5 tunnel
From: George Groves
To: EPA

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100118
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Letter
Geotechnical drilling, Big 5 tunnel waste rock
From: J. William Geise
To: Al Hovl, Los Lagos Ranch

100119
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Clear Creek/Central City superfund site
By: EPA

100120
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From: Sandra R. Moreno
To: Alfred G. Hovl, Los Lagos Ranch

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Gregory tailings, Central City/Clear Creek CERCLA site
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To: Sharon Kercher and Walter Sandza, EPA

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From: Alfred G. Hovl
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100123
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From: J. William Geise, EPA
To: Jerald J. Devitt, Devitt and Weiszmann

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From: Bruce Schmaltz, Mayor of Central City
To: Walter Standza and Jane O. Russo, EPA

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From: Bill Geise
To: Norm Blake

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From: C. Jay Silvernail
To: Walter Standza, EPA

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From: Walter Standza, EPA
To: C. Jay Silvernail

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From: Jane Russo
To: C. Jay Silvernail

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From: C. Jay Silvernail
To: Walter Standza

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The transmittal of revised design for the fence at the Big 5 tunnel Clear Creek
From: Walter Standza, EPA
To: Jay Yanz, Colorado Historical Society

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From: J. William Geise, EPA
To: Jerald J. Devitt, Devitt and Weissman

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From: various
To: general public

100133
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Gregory tailings
From: CDM
To: unknown

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Report
Characteristics of contaminants
From: unknown
To: unknown

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Inter-Office communication
Test of water treatment Argo tunnel
From: Don Simoson and Dave Helm, CDH
To: Arden Wallum

100136
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Argo tunnel and Gregory tailing pile
From: June Dreith
To: Superfund file

100137
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From: Mary Cervera
To: Emergency resoonse file

100138
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From: Roger L. Olsen, CDM
To: Ned Noack, Colo. Dept. of Health

100139
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Letter
Technical advisory committee update, Clear Creek/Central City superfund site
From: Roger L. Olsen and Patricia R. Fuller, CDM
To: Ned Noack, Colo. Dept. of Health

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Inter-Office communication
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From: Ned Noack, Colo. Dept. of Health
To: Ken Mesch, Central City, CERCLA

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From: Ned Noack, Colo. Dept. of Health
To: Ken Mesch, Central City, CERCLA file

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From: Ned Noack, Colorado Dept. of Health
To: Ken Mesch

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From: Gary Broetzman, CDH
To: Tom Looby

100144
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From: L. Russell Freeman of James L. Grant and Associates
To: Mr. Peter Kenney, Commission Chairman of Clear Creek County

100145
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Record of communication
CDH/EPA superfund/Colorado Historical Society meeting 11/10/86
From: Ned N.
To: Ken M. and Central City file

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Letter
The Board of County Commissioners of Clear Creek County's interest in the possibility of playing a primary role in the EPA superfund cleanup activities
From: Peggy Stokstad, Peter Kenney and Joe Hruska, Board of County Commissioners
To: Ned Noack, Colo. Dept. of Health

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Pages: 1
Record of communication
Progress, Gregory Incline tailings ERA
From: Ned
To: Ken M., Central City CERCLA

100148
April 1987
Pages: 3
Table
Proposed schedule of deliverables
From: unknown
To: unknown

100149
April 27, 1987
Pages: 1
Record of communication
Domestic well efforts
From: Ned N.
To: Ken M., Central City CERCLA file

100150
June 15, 1987
Pages: 2
Memorandum
Clear Creek/Central City Colo. Remedial Investigation
From: Ellen Mangione and Sharon Norman
To: Ken Mesch

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100151
July 9, 1987
Pages: 5
Inter-Office communication
Preliminary comments draft RI, Clear Creek/Central City site
From: Ned Noack, Colo. Dept. of Health
To: Ken Mesch and Central City CERCLA file

100152
July 13, 1987
Pages: 2
Memorandum
Clear Creek/Central City feasibility study
From: Maureen Dudley
To: Ned Noack, Colo. Dept. of Health

100153
July 27, 1987
Pages: 5
Inter-Office communication
Clear Creek/Central City FS review
From: Ned Noack, Colo. Dept. of Health
To: Dan Scheppers and Ken Mesch

100154
Date unknown
Pages: 2
Questions and comments
Clear Creek Metal Miners Assn. meeting
From: unknown
To: unknown

100155
Date unknown
List
The technical advisory committee of the Clear Creek/Central City site
From: unknown
To: unknown

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CENTRAL CITY/CLEAR CREEK REMOVAL ACTION DOCUMENTS

200001
November 18, 1985
Pages: 1
Letter
Mining Association cooperation
From: E. R. Lewandowski
To: Jane O. Russo

200002
December, 1985
Pages: 4
Fact Sheet
Mining and milling waste at the source of toxic metal contamination
By: EPA

200003
April 11, 1986
Pages: 37
Report
Preliminary screening analysis, Gregory Incline and Tailings, expedited response action
By: CDM

200004
May 12, 1986
Pages: 2
Memorandum
Meeting with historical society
From: Mark Swatek, CDM
To: Walter Sandza, EPA

200005
June 13, 1986
Report
Engineering evaluation and cost analysis of alternative, Gregory Incline and Tailings, expedited response action
From: Mark Swatek, Camp Dresser and McKee, Inc.
To: Walter Sandza, EPA

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200006
July 1, 1986
Pages: 1
Report
Region 8 incident notification
From: Walter Sandza, Superfund remedial
To: unknown

200007
July, 1986
Pages: 4
Fact Sheet
EPA's progress at the Clear Creek/Central City superfund site
By: EPA

200008
July, 1986
Pages: 188
Report
Geotechnical investigations, tailings and waste rock, Clear Creek/Central City site
By: Gormley Consultants, Inc.
To: Camo Dresser McKee, Inc.

200009
July, 1986
Pages: 26
Appendix to Geotechnical investigations tailings and waste rock, Clear Creek/Central City site
By: Gormley Consultants, Inc.
To: Camo Dresser McKee, Inc.

200010
September 8, 1986
Pages: 3
News Release
Public comment. Announced by EPA
By: EPA

200011
July 14, 1986
Pages: 2
Letter
Comments on proposal for fifties mill tailing pond
From: Norman R. Blake
To: unknown

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200012
July 22, 1986
Pages: 2
Letter
Recommendations on the engineering evaluation and cost analysis of alternative and preliminary screening analysis
From: Mona Dawkins, City of Black Hawke
To: Jane O. Russo, EPA

200013
July 24, 1986
Pages: 2
Letter
Response to superfund program fact sheet
From: Marvin Thurber, Clear Creek Water User's Alliance
To: Jane O. Russo, EPA

200014
August 5, 1986
Pages: 4
Memorandum
Review from the agency for toxic substances and disease registry of soil samples
From: Jeffrey A. Lybarger, M.D., Dept. of Health and Human Services
To: Michael A. McGeehin, EPA

200015
August 18, 1986
Pages: 1
Letter
Personal correspondence regarding proposals to contain the hazard at the Gregory incline and tailings
From: Billy Jean Smith
To: James O. Russo

200016
October 17, 1986
Pages: 4
Memorandum
Summary of demographics and community concerns
By: Ann Marshall
To: Roger Olsen

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200017
November 21, 1986
Pages: 1
Letter
Phase I and II reports
By: Sharon Kercher, Emergency Response Branch
To: Maureen Dudley, Colorado Dept. of Health

200018
December 12, 1986
Pages: 2
Letter
Memorandum of agreement for the historical value of the crib wall
From: Sharon L. Kercher
To: Gregory Kendricks, Nat'l Park Service

200019
December 18, 1986
Pages: 4
Letter
Request for comments of the Colo. State Historical Preservation Officer and the advisory council in compliance with 36 CFR PART 800
From: Sharon Kercher, EPA
To: Robert Fink, Advisory Council on Historic Preservation

200020
December 18, 1986
Pages: 4
Letter
Request for comments of the Colo. State Historical Preservation Officer and the advisory council in compliance with 36 CFR Part 800
From: Sharon Kercher
To: Leslie Wildesen, Colo. Historical Society

200021
December 29, 1986
Pages: 1
Letter
Response to documentation request from the Historic American Engineering Record
From: Gregory D. Kendrick, Nat'l Park Service
To: Sharon Kercher, EPA

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200022
December 31, 1986
Pages: 2
Letter
Significance of the crib wall and the need for additional information required by the council to complete their review
From: Robert Fink
To: Sharon Kercher, EPA

200023
January 12, 1987
Pages: 1
Letter
Historical value and the adverse effects of the constuction
From: Leslie Wildesen, Deputy State Historical Preservation Officer
To: Sharon Kercher

200024
January 21, 1987
Pages: 9
Memorandum with attached documentation
Historic American Engineering Record, documentation prepared for Gregory tailings
From: Dave H. Erickson, TAT Region 8
To: Sharon Kercher, EPA

200025
February 4, 1987
Pages: 1
Memorandum
Gregory tailings and incline operable unit of the Clear Creek/ Central City NPL site
From: John R. Giedt
To: Robert L. Duprey

200026
February 4, 1987
Pages: 1
Letter
Enclosure of a memorandum of agreement
From: Sharon L. Kercher
To: Leslie E. Wildesen, Colo. Historical Society

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200027
February 12, 1987
Pages: 1
Letter
The retainment of a portion of the crib wall for the Museum for Historical value
From: Sharon Kercher, EPA
To: Director, Gilpin Historical Society and Museum

200028
February 12, 1987
Pages: 1
Letter
Request from the EPA for the immediate concurrence of the advisory council on the memorandum agreement
From: Sharon L. Kercher
To: Robert Fink, Advisory Council on Historic Preservation

200029
February 17, 1987
Pages: 1
Letter
Transmittal of documentation package per the Historic American Engineering Records requirements
From: Sharon L. Kercher
To: Gregory P. Kendrick, Nat'l Park Service

200030
February 18, 1987
Pages: 1
Letter
Informative letter describing the timber crib wall possible collapse with the unexplanation of the results if this should happen
From: Sharon Kercher, EPA
To: Honorable William Lorenz, Mayor City of Black Hawk

200031
February 18, 1987
Pages: 1
Letter
Informative letter regarding the possible collapse of the crypt wall with possible ramifications of contamination of drinking water
From: Sharon Kercher, EPA
To: Ned Noack, Colo. Dept. of Health

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200032
February 19, 1987
Pages: 1
Letter
Confirmation of telephone conversation of receipt of construction drawings for Gregory tailings
From: Sharon L. Kercher, EPA
To: Kaaren Patterson, Colorado Historical Society

200033
February 26, 1987
Pages: 2
Letter
The Gabian wall placement at the Gregory tailings and questions raised by the Colo. Historical Society
From: Buddy Hines, Robinson Engineering Inc.
To: Peter Barrett, Ecology and Environment, Inc.

200034
February 27, 1987
Pages: 1
Letter
Comments and understandings from the Colo. Historical Society regarding the gabian wall construction
From: Leslie E. Wildesen, Colo. Historical Society
To: Sharon L. Kercher, EPA

200035
March 2, 1987
Pages: 3
Agreement
Memorandum of agreement by and among the US EPA, the Colorado State Historic Preservations Officer and the Advisory Council on Historic Preservation
From: unknown
To: unknown

200036
March 3, 1987
Pages: 8
Memorandum
Request for removal action funding to eliminate the threat posed by the potential collapse of the mine tailings at North Clear Creek
From: Sharon L. Kercher, EPA
To: Robert L. Duprey

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200037
March 6, 1987
Pages: 1
Letter
Information to residents regarding the study and clean-up of the Clear Creek/Central City Superfund site

200038
March 10, 1987
Pages: 1
Letter
Memorandum of agreement regarding emergency response action
From: Robert Fink
To: Sharon Kercher

200039
March 12, 1987
Pages: 7
Report
Drainage calculations for North Clear Creek, Black Hawke, CO
From: Robinson Engineering, Inc., by H. J. Heinz
To: unknown

200040
March 16, 1987
Pages: 1
Letter
Concern about the placement of the Gabian wall and the impact on personal property
From: Sharon L. Kercher, EPA
To: Mr. and Mrs. Marco Lah

200041
March 17, 1987
Pages: 1
Letter
The acceptance by the cultural resources division of the Historic American Engineering Record documentation of the Gregory tailings
From: Gregory Kendrick, Nat'l Park Service
To: Sharon Kercher, EPA

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200042
March 20, 1987
Pages: 3
Letter
Information regarding the need for immediate action required to protect the North Clear Creek
From: Sharon L. Kercher, EPA
To: Curt Musgrave, U.S. Army Corp of Engineers

200043
March 23, 1987
Pages: 1
Letter
Written record of the concerns of John Liou of FEMA
From: Buddy Heinz, Robinson Engineering Inc.
To: Peter Barrett, Ecology and Environmentals

200044
March 24, 1987
Pages: 3
Letter
Authorization by the Department of the Army for the proposed v
of the Environmental Protection Agency
From: Elson E. Strine, Dept. of the Army
To: Sharon Kercher

200045
March 26, 1987
Pages: 1
Consent form
Access to propery
From: Kevin John Roche
To: EPA

200046
March 26, 1987
Pages: 7
Report with attached communications
Flood plain development permit from the City of Black Hawk
By: Peter Barrett
To: Sharon Kercher

toxicity

200047
March 27, 1987
Pages: 2
Letter
Reiteration of initial design plans called for the placement of the Gabian wall and the specific concerns expressed by the mayor of the city of Black Hawk
From: Sharon Kercher, EPA
To: Bill Lorenz, Mayor of the City of Black Hawk

200048
March 27, 1987
Pages: 8
Report
Site health and safety plan for the Gregory tailings project, Black Hawk, Colorado
By: EPA

200049
March 27, 1987 through April 29, 1987
Pages: 60
Record
Dates and times of various activities associated with the Gregory incline and mine tailings happenings
From: B. M. Thomas
To: unknown

200050
April, 1987
Pages: 4
Report
Communications strategy for the Gregory tailings removal action
By: unknown
To: unknown

200051
April 1, 1987
Pages: 3
Memorandum
EP toxicity results for wood trimming samples from Gregory tailings, Black Hawk, CO
From: Rick Chappell
To: Sharon Kercher, EPA

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200052
April 3, 1987
Pages: 2
Memorandum
Toxicity potential of wood cribbing at Gregory tailings
From: Peter Barrett, Ecology & Environment, Inc.
To: Sharon Kercher, EPA

200053
April 11, 1987
Pages: 1
Letter
Mine owner's opinion on the EPA handling of the Gregory incline project
From: Chas E. Fetterhoff
To: Sharon Kercher, EPA

200054
April 13, 1987
Pages: 2
Letter
Placement of riprap material along the bank of the creek behind individual property owner
From: Sharon L. Kercher, EPA
To: Mr. and Mrs. Marko Lah, property owners

200055
April 17, 1987
Pages: 1
Letter
Materials submitted to the National Archives pursuant to the memorandum of agreement
From: Sharon Kercher, EPA
To: Director of the Gilpin Historical Society and Museum

200056
April 23, 1987
Pages: 2
Letter
Change in the final construction plans
From: Sharon Kercher, EPA
To: Leslie Wildesen, Colorado Historical Society

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200057
April 23, 1987
Pages: 1
Memorandum
Removal action at Gregory tailings and decision to remove the crib wall
From: Sharon Kercher, EPA
To: The record

200058
April 23, 1987
Pages: 2
Memorandum
Gregory Tailings: decision not to install riprap on "Concco Bank"
From: Sharon Kercher, EPA
To: The record

200059
April 23, 1987
Pages: 1
Memorandum
Removal action at Gregory tailings and the decision to deviate from alignment at Gabian wall as specified in the design drawings
From: Sharon Kercher, EPA
To: The Record

200060
April 23, 1987
Pages: 1
Memorandum
Removal action at Gregory tailings and decision to use key gravel as backfill behind Gabian wall
From: Sharon Kercher, EPA
To: The Record

200061
May 11, 1987
Pages: 1
Letter
Justification for the change in the final construction plans and request for a photo of the appearance of the finished product
From: Barbara Sudler, State Historic Preservation Officer
To: Sharon L. Kercher, EPA

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200062
May 14, 1987
Pages: 13
Letter with enclosures
Lists of applicable and relevant state requirements, standards, criteria and limitations for the proposed remedial action at the Clear Creek/Central City Superfund site
From: Ken Mesch, CDH
To: EPA

200063
May 18, 1987
Pages: 1
Letter
Landowner responsibility for clean-up costs at the site
From: James J. Scherer, EPA
To: Glen P. Anderson

200064
No date
Pages: 5
Report
Documentation package for Gregory tailings with a description the undertaking
By: EPA

200065
no date
Pages: 1
Vicinity map
The project site
By: unknown
To: unknown

200066
no date
Pages: 3
Report
General information on the site with history included
By: unknown
To: unknown

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200067
no date
Pages: 4
Record
Historical information
By: unknown
To: unknown

200068
no date
Pages: 2
Inventory
HABS/HAER Inventory of the Gregory tailings with the significance noted

200069
no date
Pages: 6
Record
Historic American Engineering Record of the Gregory tailings.
Historical narrative
By: Ecology and Environment, Inc.
To: EPA

200070
no date
Pages: 3
Diagram
Creek isolation alternative concrete box culvert
By: unknown
To: unknown

200071
no date
Pages: 2
Table
The summary of the chemical test results from North Clear Creek above and below the Gregory tailings and from the Gregory waste rock tailings and the ground water
By: unknown
To: unknown

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200072
no date
Pages: 2
Plan
The isolation alternative Gabian wall
From: Robinson Engineering, Inc.
To: EPA

200073
July 18, 1986
Pages: 16
Report
Wrap-up report on the feasibility of reprocessing the Gregory tailings
By: W. Rex Bull and Thomas R. Wildeman, The Colorado School of Mines
To: Camp, Dresser and McKee

200074
July 21, 1986
Pages: 9
Report
Preliminary report on the value of the Gregory tailings
By: W. Rex Bull and Thomas R. Wildeman, Colorado School of Mines
To: Camp, Dresser and McKee

200075
February 13, 1987
Pages: 8
Memorandum
Removal request for the Gregory incline and tailings
By: Peter Barrett, Ecology and Environment, Inc.
To: Floyd Nichols, EPA

200076
February 18, 1987
Pages: 4
Letter
Gregory tailings Central City/Clear Creek CERCLA site
From: Robert L. Duprey, ERA
To: Norman R. Blake

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200077
February 26, 1987
Pages: 1
Receipt
Gregory tailings
Signed: Norman R. Blake

200078
March 4, 1987
Pages: 1
Record of communication
Removal action at Gregory tailings, Black Hawk, CO
From: Clair Tanner, Weekly Register
To: Sharon L. Kercher

200079
March 11, 1987
Pages: 1
Record of communication
Removal action Gregory tailings, Black Hawk, CO. Gabian baskets vs riprap
From: Buddy Hines, Robinson Engineering
To: Sharon Kercher

200080
March 19, 1987
Pages: 1
Record of communication
Removal action: Gregory tailings, Black Hawke, CO
From: Jim Baker, Regional toxicologist
To: Sharon Kercher

200081
March 20, 1987
Pages: 4
Letter
Gregory tailings, Central City/Clear Creek CERCLA site
From: Robert L. Duprey, EPA
To: Gerald J. Devitt of Devitt and Weisman, Attys at law

200082
March 23, 1987
Pages: 1
Record of communication
Removal action: Gregory tailings, Black Hawk, CO
From: Mel Cassidy
To: Sharon Kercher, EPA

APPENDIX D

STATE OF COLORADO CONCURRENCE WITH REMEDY

COLORADO DEPARTMENT OF HEALTH
Drinking Water/Ground Water Section

INTER-OFFICE COMMUNICATION

TO: Dave Shelton

FROM : Paul Ferraro

DATE: December 18, 1987

SUBJECT: Concurrence: Record of Decision, Clear Creek/Central City Operable Unit No. One

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The ARARS and standards in the ROD appear to meet State aquatic, river, health and groundwater standards and requirements, the proposed remediation and contingencies appear to be viable. Therefore, this Division concurs with the subject Record of Decision excepting as follows:

1. Appendix B, page 1 and table B-2 -- OHEP policy is that CPDES permits must be issued at CERCLA/Superfund sites for discharges to State waters from treatment plant/passive-treatment systems. Accordingly, the Division does not agree with the ROD statement that no permits are required.

2. Page 2 (executive summary) and page 12 (main body) -- the Division does not agree with the ROD that geometric means should be used instead of arithmetric means to determine ambient and effluent means for metals, etc., for purposes of compliance with ARARS or standards. In addition to being non-comparable between data sets and in error (low) compared to arithmetric means, the use of geometric means, applied to water contaminants, creates a false tolerance for exceedence of stream standards.

PF/ls

xc: John Leifer
Tom Looby