CLEAR CREEK/CENTRAL CITY SUPERFUND SITE

EXPLANATION OF SIGNIFICANT DIFFERENCES

BIG FIVE TUNNEL DISCHARGE

May 2005

INTRODUCTION AND STATEMENT OF PURPOSE

This document explains the significant difference between the remedy for the Big Five Tunnel discharge selected in the Clear Creek/Central City Superfund Site (SITE) Operable Unit 3 (OU 3) Record of Decision (ROD), signed September 30,1991, and the planned remedy for the Big Five Tunnel discharge, located at the west end of Idaho Springs, Clear Creek County, Colorado. The Colorado Department of Public Health and Environment (CDPHE) is the lead agency for the SITE and is conducting the Remedial Action at the Big Five Tunnel under a Cooperative Agreement with the United States Environmental Protection Agency (EPA). EPA is assisting as the support agency and maintains the lead for enforcement at the SITE.

Under Section 117 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA or Superfund), as amended, 42 U.S.C. §9601 et seq., EPA is required to publish an Explanation of Significant Differences (ESD) when significant, but not fundamental changes are proposed to the previously selected site remedy. The National Oil and Hazardous Substances Pollution Contingency Plan (NCP), §300.435(c)(2)(l), sets forth the criteria for issuing an ESD and requires that an ESD be published if a remedial action is taken which differs significantly in either scope, performance, or cost from the remedy selected in the ROD for the SITE.

The purpose of this ESD is to include in the OU 3 remedy the collection of the Big Five Tunnel discharge, the conveyance of the discharge to the ARGO water treatment facility for treatment, and the isolation and capping of contaminated pond sediments at the outfall of the Big Five Tunnel. In summary, the circumstances that have led to the need for this ESD include the following:

- An interim waiver was utilized in the OU 3 ROD for the Big Five Tunnel to allow reevaluation of its designation as a priority discharge under Section 304(l) of the Clean Water Act. The Big Five discharge was not removed from the Section 304(l) list, and final action is required.

- Acid mine drainage from the Big Five Tunnel continues to exceed stream standards and adversely impact Clear Creek through diffuse non-point-source discharge and periodic overflows of the pond created by the tunnel outfall.

- Acid mine drainage from the Big Five Tunnel has continued to sustain a pond that poses a potential public health hazard adjacent to the mine portal within the city of Idaho Springs. Periodic discharges from pond overflows due to heavy

precipitation events or seasonal increases in flow from the tunnel have also continued to cause direct discharges of acid mine drainage and sediments with hazardous substances to Clear Creek.

- Construction and operation of the ARGO Tunnel Water Treatment Facility and design and construction of the Virginia Canyon Ground Water Collection and Conveyance system, pursuant to the OU 3 ROD, and potential coordination with other construction projects in the area have provided a cost effective alternative for including the Big Five Tunnel discharge in the individual control strategy for the ARGO Tunnel.

- Remedial action as a part of Operable Unit 2 (OU 2) to cap and stabilize the Big Five mine waste pile, a source of metals loading to Clear Creek, was completed in July 2000. The Big Five Tunnel discharge was not considered under this action. Addressing the discharge under the remedy presented in this ESD will complete remediation of the Big Five area and eliminate it as a source of contamination.

This ESD provides a brief history of the SITE, describes the alternative selected in the OU 3 ROD, and explains how the proposed remedy differs from the alternative. It also discusses the proposed remedy's compliance with all legal requirements and provides details on how the reader may obtain more information on the SITE.

This document presents only a synopsis of information relating to the SITE. This ESD and its supporting documentation will be incorporated into the Administrative Record pursuant to NCP 300.825(a)(2). The Administrative Record file is available for public review at the following locations:

1) Upper Clear Creek Watershed Association
c/o: R.L. Jones
2060 Miner Street, Suite 201
Idaho Springs, Colorado 80452
(303) 567-4324

2) U.S. Environmental Protection Agency
EPA Records Center
999 18th Street
Denver, Colorado 80202
(303) 312-6473

3) Colorado Department of Public Health and Environment
Hazardous Materials and Waste Management Division
4300 Cherry Creek Drive South
Denver, Colorado 80246
(303) 692-3300

For additional information contact:

- Mike Holmes, USEPA Region VIII, (303) 312-6607
- Jim Lewis, CDPHE, (303) 692-3390

SITE HISTORY, CONTAMINATION, AND SELECTED REMEDY

The SITE is located on the east slope of Colorado's Front Range, approximately 30 miles west of Denver. The water quality of Clear Creek and its tributaries is impaired by a legacy of historic mining activities including the persistent drainage of low pH metals-laden water from numerous mine tunnels. The Colorado Water Quality Control Commission classified Clear Creek as a Class I cold water stream capable of protecting and maintaining a diversity of cold water biota. Clear Creek has been out of compliance with stream standards set for this classification as a result of persistent drainage from mine tunnels, mine waste piles, and tailings. These impacts have also reduced the abundance and diversity of aquatic biota in the watershed. Table 1 attached to this ESD summarizes the metals concentrations detected in discharge samples collected from the Big Five Tunnel during the Phase I and Phase II Remedial Investigations, by CDPHE in 2001, and by UOS, an EPA START Program contractor, in 2005. Discharge from the Big Five Tunnel is estimated to add 11,000 pounds of metals per year to Clear Creek. The table also includes State Drinking Water Standards for metals and aquatic life standards for metals for comparison with the metals concentrations from the Big Five discharge. Overall, the concentration of metals in the Big Five discharge exceeds the human health and aquatic life standards.

The SITE was selected for addition to the National Priorities List in September 1983 due to the release of heavy metals to the environment. Since that time, EPA and CDPHE have conducted investigations and made decisions regarding the implementation of response actions at specific locations within the 400 square mile SITE boundary. Four RODs have been signed for the SITE.

The OU 1 ROD was signed September 30, 1987, and called for passive treatment or a combination of active and passive treatment for acid water draining from five mine tunnels. The five tunnels include the Big Five and ARGO Tunnels in Idaho Springs, the Gregory Incline and National Tunnel in Black Hawk, and the Quartz Hill Tunnel in Central City.

OU 2 was designated to address the mine waste piles in the immediate proximity to the five discharging tunnels referenced above. The OU 2 ROD was signed on March 31, 1988. OU 4 was designated to address the sources of contamination on the North Fork of Clear Creek. The OU 4 ROD was signed September 29, 2004.

OU 3 was originally designated to address control of surge events of acid mine drainage from the ARGO Tunnel. The signing of the OU 3 ROD was delayed pending the outcome of additional Phase II investigations. In 1988, a Phase II Remedial Investigation (RI) was initiated to take a comprehensive view of the approximately 400 square mile Clear Creek drainage basin. The OU 3 ROD was signed on September 30, 1991, and addressed the problems identified in the Phase II RI. The OU 3 ROD superseded the original OU 1 ROD. The OU 2 ROD remained unchanged by the OU 3 ROD. The OU 3 ROD selected a combination of active treatment for the ARGO Tunnel, passive treatment for the Burleigh Tunnel, collection of Virginia Canyon Ground Water for treatment, provision of an alternate drinking water supply for users of contaminated ground water,

and capping, runon controls, runoff controls, institutional controls, and/or retaining structures as applicable for selected priority mine waste piles. The OU 3 ROD utilized an interim waiver of applicable or relevant and appropriate requirements (ARARs) to defer a decision on treatment of the Big Five Tunnel, Quartz Hill Tunnel, National Tunnel, and Gregory Incline. The OU 4 RI, Feasibility Study (FS), and ROD have since evaluated and addressed the National and Quartz Hill Tunnels and Gregory Incline through a combination of active and passive treatment systems. The Big Five Tunnel requires a final decision.

The OU 3 ROD stated that: *"The interim waiver of applicable or relevant and appropriate requirements (ARARs) was invoked for the Big Five discharge. The Big Five discharge is currently designated as a priority discharge under Section 304 (l) of the Clean Water Act because it was originally believed that the discharge was impairing the attainment of the water quality standards for Clear Creek".*

As specified under the Statutory Determinations portion at the end of the OU 3 ROD, the selected alternative detailed under the OU 3 ROD was not intended to be the final remedy of the SITE. Because the action presented under the OU 3 ROD was an interim action, the statutory preference for remedies that reduce toxicity, mobility, or volume as a principal element would be addressed by the final response action for the SITE. Review of the SITE and of the interim remedy would be ongoing as the EPA and CDPHE continued to develop final remedial alternatives for the SITE.

Treatment of the Big Five discharge after it is conveyed to the existing ARGO Water Treatment Facility will remove it as a priority discharge under Section 304(l) and meet the ARARs. Inclusion of the Big Five Tunnel discharge in the individual control strategy and discharge control mechanism for treatment of the ARGO Tunnel discharge will meet regulatory requirements. The interim waiver will no longer be necessary and will be withdrawn. Therefore, addressing the Big Five discharge as an element of the final response action at the SITE with respect to eliminating the toxicity of this discharge to human health and the environment, as discussed in this ESD, is appropriate.

BASIS FOR THIS ESD DOCUMENT

The circumstances that have prompted and that support the significant differences between the remedy that is proposed in this ESD and the selected remedy presented in the OU 3 ROD are described below.

As previously mentioned, the OU 3 ROD invoked an interim waiver of applicable or relevant and appropriate requirements for the Big Five Tunnel discharge. The Big Five Tunnel discharge is still designated a priority discharge under Section 304(l) of the Clean Water Act. This designation was made because the Big Five was originally identified as a discharge which was impairing the attainment of water quality standards for Clear Creek. The OU 3 ROD suggested that this designation of the Big Five would need to be reevaluated. The waiver was invoked "*to allow time for this reevaluation, and allow time for the development of a wasteload allocation for the Argo Tunnel Individual Control Strategy which may include other nearby point sources such as the Big Five Tunnel.*"

Data collected since the OU 3 ROD was signed continue to demonstrate significant metals load

increases in Clear Creek through Idaho Springs, even though the ARGO Tunnel Water Treatment Plant, operating since April 1998, removes the largest portion of the loading. Treatment of the ARGO Tunnel discharge addressed the largest single point-source discharge of contaminants to Clear Creek. Sampling points in Clear Creek bracketing the various source areas through Idaho Springs and downstream of Idaho Springs and the ARGO Tunnel Water Treatment Facility show that the loading from Virginia Canyon and the Big Five Tunnel continue to cause exceedances of stream standards in that reach of Clear Creek and downstream of Idaho Springs. These sample points are located upstream of the Big Five Tunnel and Idaho Springs, downstream of the Big Five Tunnel and upstream of Virginia Canyon, downstream of Virginia Canyon and upstream of the ARGO Tunnel, and downstream of the ARGO Tunnel and Idaho Springs. Despite some dilution from clearer water from Chicago Creek in this stretch, concentrations of contaminants of concern still increase due to contribution from Virginia Canyon and the Big Five Tunnel. Virginia Canyon ground water and surface water is scheduled to be collected and conveyed to the ARGO Water Treatment Facility pursuant to the OU 3 ROD, with construction to begin in July 2005.

As indicated above, recent sampling data show that the Big Five discharge contributes to exceedances of stream standards (i.e., for zinc) in Clear Creek for a good portion of the year. This typically occurs in the winter months during low flow conditions in Clear Creek. Data summaries and analyses showing increases in metals concentrations in Clear Creek resulting from releases from the Big Five Tunnel and other sources are included in the *November 2001 Clear Creek Surface Water Investigation, Analytical Results Report, CDPHE, October 2001*, and *Upper Clear Creek Watershed Trace-Metals Data Assessment, Clear Creek/Central City Superfund Investigative Area, TDS Consulting, Inc., January 2002.* The addendum to the latter report issued by TDS Consulting in June 2003 continues to show the increases in metals concentrations from the Big Five Tunnel discharge, and the resulting exceedances of stream standards for Clear Creek.

The modifications considered by this ESD are warranted by the following conditions:

1. An interim waiver was utilized in the OU 3 ROD for the Big Five Tunnel to allow reevaluation of its designation as a priority discharge under Section 304(l) of the Clean Water Act. The Big Five discharge was not removed from the Section 304(l) list, and final action is required.

2. Acid mine drainage from the Big Five Tunnel continues to exceed stream standards and adversely impact Clear Creek through point-source and diffuse non-point-source discharge.

3. Acid mine drainage from the Big Five Tunnel has continued to sustain a pond that poses a potential public health hazard adjacent to the mine portal in Idaho Springs. Although no action is planned to address the potential for blowouts from the tunnel, action is necessary to remove the pond and thus prevent periodic discharges from pond overflows due to heavy precipitation events or seasonal increases in flow from the tunnel that cause direct discharges of acid mine drainage and sediments with hazardous substances to Clear Creek.

Idea: please add the "to eliminate the subsurface source of contamination due to hydrologic connection between pond & Clear Creek"

4. At the time of the OU 3 ROD, the determination was made that "*treatment does not attain a level of benefit which is proportional to the cost*" for some discharges.

Construction and operation of the ARGO Tunnel Water Treatment Facility, design and construction of the Virginia Canyon Ground Water Collection and Conveyance system pursuant to the OU 3 ROD, and coordination with other construction projects in the area have provided a cost effective alternative for including the Big Five Tunnel discharge in the individual control strategy for the ARGO Tunnel.

5. The *Five Year Review Report for Clear Creek/Central City Superfund Site, CDPHE September 2004* included a recommendation to make a final decision for the Big Five Tunnel discharge.

DESCRIPTION OF SIGNIFICANT DIFFERENCES

As previously stated, the primary purpose of the remedy selected in the OU 3 ROD was to prevent degradation of downstream surface water quality and aquatic life resources through the treatment of the ARGO Tunnel discharge, the metals contaminated flows exiting Virginia Canyon, and other specific historic mining impacts. Originally, the Big Five Tunnel discharge was not considered for treatment under the OU 3 selected remedy because computer modeling conducted prior to the OU 3 ROD suggested there was minimal impact. Actual sampling data collected since the OU 3 ROD, however, demonstrate that there is a significant impact from the Big Five Tunnel discharge. Based upon this new information and discussions with stakeholders and the local community, the agencies decided that it was warranted to consider the collection and the conveyance of the Big Five discharge as part of the final remedy for the SITE.

The OU 1 ROD specified passive treatment or a combination of active and passive treatment for the Big Five Tunnel discharge. Passive treatment was pilot tested, but was unable to treat the discharge sufficiently to meet regulatory requirements. The OU 3 ROD, which superseded the OU 1 ROD, used an interim waiver of ARARs for the Big Five Tunnel discharge. The OU 3 ROD will be modified with the Big Five Project, the scope of which includes:

- collection of the Big Five Tunnel discharge at the tunnel portal;
- conveyance of the discharge to the ARGO Water Treatment Facility for treatment to the discharge limits specified in the discharge control mechanism for the treatment plant;
- draining the pond outside of the Big Five Mine Tunnel;
- placing waste rock adjacent to the pond back in the pond and additional material to form a stable base;
- capping waste rock and sediments in place in the pond with a suitable cover graded to drain precipitation away from the pond, and maintaining adequate vegetative cover on the cap; and
- operations and maintenance of the collection and conveyance system and pond closure and cap.

Treatment of the Big Five discharge at the ARGO Plant is protective of human health and the environment and will neutralize acidity and remove 99 percent of the metals from the discharge. The treated discharge will meet the Clear Creek aquatic life standards and satisfy the ARARs related to the discharge by incorporating it into the individual control strategy for the ARGO Tunnel. Since this final action for the Big Five Tunnel discharge will meet ARARs, the interim waiver invoked in

the OU 3 ROD is withdrawn. Implementation of the Big Five Project will expedite OU 3 remedial action objectives with respect to water quality goals.

SUPPORT AGENCY COMMENTS

CDPHE is the lead agency for the SITE. EPA has reviewed the revised remedy and supports the implementation of the remedy as presented in this ESD.

STATUTORY DETERMINATIONS

The changes to the remedy selected in the 1991 OU 3 ROD, as presented in this ESD, were made in accordance with all applicable regulatory and statutory requirements as required by Section 121 of CERCLA. A comprehensive evaluation of ARARs was conducted as part of the OU 3 remedy selection, which as noted above, included remedies such as those now being selected for the Big Five Tunnel discharge. ARARs were recently reviewed in the September 2004 *Five Year Review Report.* Treatment of the Big Five discharge will meet all ARARs. Closure of the pond will be performed through a work plan approved by the agencies. That approval will include a condition that the plan meet all applicable and relevant and appropriate state and federal standards.

Considering the new information that has developed and the changes that have been made to the selected remedy, CDPHE and EPA believe that the revised remedy is protective of human health and the environment, complies with federal and state requirements, and is cost effective. In addition, the revised remedy utilizes permanent solutions to the maximum extent practicable for the SITE.

PUBLIC PARTICIPATION ACTIVITIES

For the last two years, CDPHE and EPA have discussed addressing the Big Five Tunnel discharge and the sediment with key stakeholders involved in the Clear Creek community, including the City of Idaho Springs, Clear Creek County, the Clear Creek Watershed Advisory Group, the Upper Clear Creek Watershed Association, the Colorado Department of Transportation, and various landowners. Minutes for the January 8 and February 12, 2004 Upper Clear Creek Watershed Association meetings include a motion passed and other general support for the project to pipe the Big Five Tunnel discharge to the ARGO Water Treatment Facility for treatment. The Responsiveness Summary for the OU 3 ROD includes numerous comments requesting treatment of more acid mine discharges. The Responsiveness Summary for the OU 3 ROD states that "*[S]everal downstream water users voiced support for treatment of the Big Five tunnel by constructing a pipeline which would carry the tunnel discharge to the treatment unit which will be constructed for the Argo tunnel.*" CDPHE and EPA will continue to meet with stakeholders as the remedy moves forward.

SIGNATURES

Signed by:

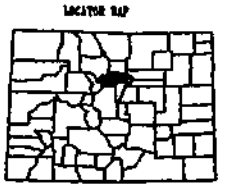
Max H. Dodson
Assistant Regional Administrator
Ecosystems Protection and Remediation
EPA Region 8

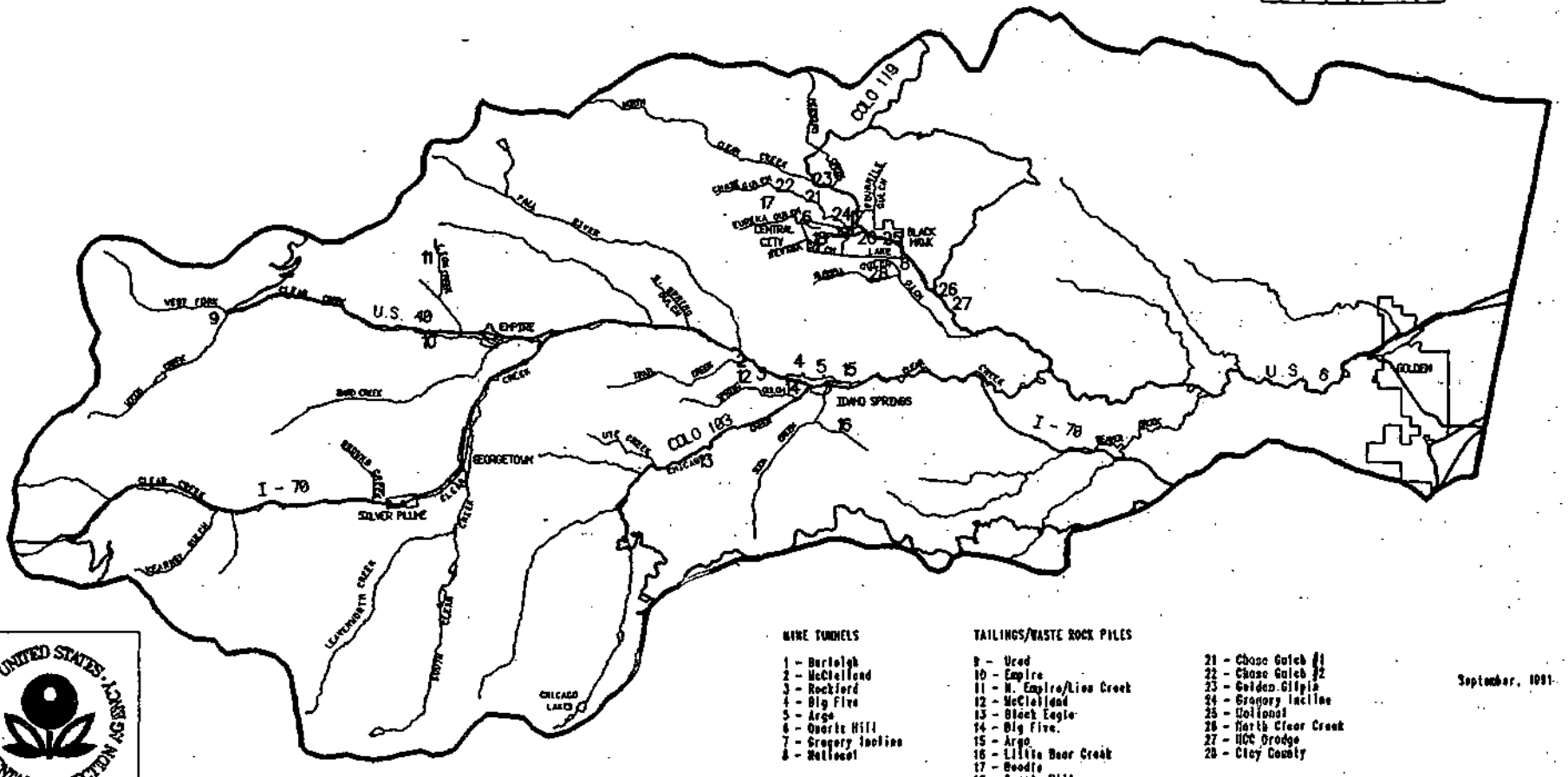
Date

Gary W. Baughman
Division Director
Hazardous Materials and Waste Management Division
Colorado Department of Public Health and Environment

5/19/05
Date

CLEAR CREEK BASIN, COLORADO
Site Map





MINE TUNNELS

1 - Burleigh
2 - McClelland
3 - Rockford
4 - Big Five
5 - Argo
6 - Quartz Hill
7 - Gregory Incline
8 - Wellcome

TAILINGS/WASTE ROCK PILES

9 - Urad
10 - Empire
11 - N. Empire/Lion Creek
12 - McClelland
13 - Black Eagle
14 - Big Five
15 - Argo
16 - Little Bear Creek
17 - Woodfe
18 - Quartz Hill
19 - Gregory Gulch #2
20 - Gregory Gulch #1
21 - Chase Gulch #1
22 - Chase Gulch #2
23 - Golden Gilpin
24 - Gregory Incline
25 - Colonial
26 - North Clear Creek
27 - UCC Dredge
28 - City County

September, 1991

TABLE 1.0 ANALYTICAL SUMMARY TABLE BIG FIVE DISCHARGE SAMPLES

Metals concentrations expressed in micrograms/Liter

Sampling Event	As	Cd	Cu	Hg	Mn	Pb	Zn
1985 Phase I RI	10	48	1710	NAF	19,700	91	9770
1989 Phase II RI	10	27	690	NAF	18,800	5	9100
2001 CDPHE	NAF	24	1500	NAF	32,200	NAF	9160
2005 UOS (1)	2	20	2960	0.1	19,500	16	7610
State Drinking Water MCL	10	5	-	2	-	-	-
State Drinking Water MCLG	-	-	1300	-	-	15	-
State Secondary MCL	-	-	100	-	50	-	500
Aquatic Life NEC/WQCD (2)	5 (2)	0.4/3	5/7	0.01 (2)	1000/1493	4/2	47/200

NAF = Not Analyzed For
MCL – Maximum Contaminant Level
MCLG – Maximum Contaminant Level Goal
NEC – No Effect Concentrations are metal concentrations at which aquatic life does not suffer any toxic effects
(1) UOS – START contractor for EPA's Emergency Response Team
(2) WQCD – aquatic standards for Clear Creek Segment 2

CLEAR CREEK/CENTRAL CITY SUPERFUND SITE

EXPLANATION OF SIGNIFICANT DIFFERENCES

BIG FIVE TUNNEL DISCHARGE

May 2005

INTRODUCTION AND STATEMENT OF PURPOSE

This document explains the significant difference between the remedy for the Big Five Tunnel discharge selected in the Clear Creek/Central City Superfund Site (SITE) Operable Unit 3 (OU 3) Record of Decision (ROD), signed September 30,1991, and the planned remedy for the Big Five Tunnel discharge, located at the west end of Idaho Springs, Clear Creek County, Colorado. The Colorado Department of Public Health and Environment (CDPHE) is the lead agency for the SITE and is conducting the Remedial Action at the Big Five Tunnel under a Cooperative Agreement with the United States Environmental Protection Agency (EPA). EPA is assisting as the support agency and maintains the lead for enforcement at the SITE.

Under Section 117 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA or Superfund), as amended, 42 U.S.C. §9601 et seq., EPA is required to publish an Explanation of Significant Differences (ESD) when significant, but not fundamental changes are proposed to the previously selected site remedy. The National Oil and Hazardous Substances Pollution Contingency Plan (NCP), §300.435(c)(2)(l), sets forth the criteria for issuing an ESD and requires that an ESD be published if a remedial action is taken which differs significantly in either scope, performance, or cost from the remedy selected in the ROD for the SITE.

The purpose of this ESD is to include in the OU 3 remedy the collection of the Big Five Tunnel discharge, the conveyance of the discharge to the ARGO water treatment facility for treatment, and the isolation and capping of contaminated pond sediments at the outfall of the Big Five Tunnel. In summary, the circumstances that have led to the need for this ESD include the following:

- An interim waiver was utilized in the OU 3 ROD for the Big Five Tunnel to allow reevaluation of its designation as a priority discharge under Section 304(l) of the Clean Water Act. The Big Five discharge was not removed from the Section 304(l) list, and final action is required.

- Acid mine drainage from the Big Five Tunnel continues to exceed stream standards and adversely impact Clear Creek through diffuse non-point-source discharge and periodic overflows of the pond created by the tunnel outfall.

- Acid mine drainage from the Big Five Tunnel has continued to sustain a pond that poses a potential public health hazard adjacent to the mine portal within the city of Idaho Springs. Periodic discharges from pond overflows due to heavy

precipitation events or seasonal increases in flow from the tunnel have also continued to cause direct discharges of acid mine drainage and sediments with hazardous substances to Clear Creek.

- Construction and operation of the ARGO Tunnel Water Treatment Facility and design and construction of the Virginia Canyon Ground Water Collection and Conveyance system, pursuant to the OU 3 ROD, and potential coordination with other construction projects in the area have provided a cost effective alternative for including the Big Five Tunnel discharge in the individual control strategy for the Argo Tunnel.

- Remedial action as a part of Operable Unit 2 (OU 2) to cap and stabilize the Big Five mine waste pile, a source of metals loading to Clear Creek, was completed in July 2000. The Big Five Tunnel discharge was not considered under this action. Addressing the discharge under the remedy presented in this ESD will complete remediation of the Big Five area and eliminate it as a source of contamination.

This ESD provides a brief history of the SITE, describes the alternative selected in the OU 3 ROD, and explains how the proposed remedy differs from the alternative. It also discusses the proposed remedy's compliance with all legal requirements and provides details on how the reader may obtain more information on the SITE.

This document presents only a synopsis of information relating to the SITE. This ESD and its supporting documentation will be incorporated into the Administrative Record pursuant to NCP 300.825(a)(2). The Administrative Record file is available for public review at the following locations:

1) Upper Clear Creek Watershed Association
c/o: R.L. Jones
2060 Miner Street, Suite 201
Idaho Springs, Colorado 80452
(303) 567-4324

2) U.S. Environmental Protection Agency
EPA Records Center
999 18th Street
Denver, Colorado 80202
(303) 312-6473

3) Colorado Department of Public Health and Environment
Hazardous Materials and Waste Management Division
4300 Cherry Creek Drive South
Denver, Colorado 80246
(303) 692-3300

For additional information contact:

- Mike Holmes, USEPA Region VIII, (303) 312-6607
- Jim Lewis, CDPHE, (303) 692-3390

SITE HISTORY, CONTAMINATION, AND SELECTED REMEDY

The SITE is located on the east slope of Colorado's Front Range, approximately 30 miles west of Denver. The water quality of Clear Creek and its tributaries is impaired by a legacy of historic mining activities including the persistent drainage of low pH metals-laden water from numerous mine tunnels. The Colorado Water Quality Control Commission classified Clear Creek as a Class I cold water stream capable of protecting and maintaining a diversity of cold water biota. Clear Creek has been out of compliance with stream standards set for this classification as a result of persistent drainage from mine tunnels, mine waste piles, and tailings. These impacts have also reduced the abundance and diversity of aquatic biota in the watershed. Table 1 attached to this ESD summarizes the metals concentrations detected in discharge samples collected from the Big Five Tunnel during the Phase I and Phase II Remedial Investigations, by CDPHE in 2001, and by UOS, an EPA START Program contractor, in 2005. Discharge from the Big Five Tunnel is estimated to add 11,000 pounds of metals per year to Clear Creek. The table also includes State Drinking Water Standards for metals and aquatic life standards for metals for comparison with the metals concentrations from the Big Five discharge. Overall, the concentration of metals in the Big Five discharge exceeds the human health and aquatic life standards.

The SITE was selected for addition to the National Priorities List in September 1983 due to the release of heavy metals to the environment. Since that time, EPA and CDPHE have conducted investigations and made decisions regarding the implementation of response actions at specific locations within the 400 square mile SITE boundary. Four RODs have been signed for the SITE.

The OU 1 ROD was signed September 30, 1987, and called for passive treatment or a combination of active and passive treatment for acid water draining from five mine tunnels. The five tunnels include the Big Five and ARGO Tunnels in Idaho Springs, the Gregory Incline and National Tunnel in Black Hawk, and the Quartz Hill Tunnel in Central City.

OU 2 was designated to address the mine waste piles in the immediate proximity to the five discharging tunnels referenced above. The OU 2 ROD was signed on March 31, 1988. OU 4 was designated to address the sources of contamination on the North Fork of Clear Creek. The OU 4 ROD was signed September 29, 2004.

OU 3 was originally designated to address control of surge events of acid mine drainage from the ARGO Tunnel. The signing of the OU 3 ROD was delayed pending the outcome of additional Phase II investigations. In 1988, a Phase II Remedial Investigation (RI) was initiated to take a comprehensive view of the approximately 400 square mile Clear Creek drainage basin. The OU 3 ROD was signed on September 30, 1991, and addressed the problems identified in the Phase II RI. The OU 3 ROD superseded the original OU 1 ROD. The OU 2 ROD remained unchanged by the OU 3 ROD. The OU 3 ROD selected a combination of active treatment for the ARGO Tunnel, passive treatment for the Burleigh Tunnel, collection of Virginia Canyon Ground Water for treatment, provision of an alternate drinking water supply for users of contaminated ground water,

and capping, runon controls, runoff controls, institutional controls, and/or retaining structures as applicable for selected priority mine waste piles. The OU 3 ROD utilized an interim waiver of applicable or relevant and appropriate requirements (ARARs) to defer a decision on treatment of the Big Five Tunnel, Quartz Hill Tunnel, National Tunnel, and Gregory Incline. The OU 4 RI, Feasibility Study (FS), and ROD have since evaluated and addressed the National and Quartz Hill Tunnels and Gregory Incline through a combination of active and passive treatment systems. The Big Five Tunnel requires a final decision.

The OU 3 ROD stated that: *"The interim waiver of applicable or relevant and appropriate requirements (ARARs) was invoked for the Big Five discharge. The Big Five discharge is currently designated as a priority discharge under Section 304 (l) of the Clean Water Act because it was originally believed that the discharge was impairing the attainment of the water quality standards for Clear Creek".*

As specified under the Statutory Determinations portion at the end of the OU 3 ROD, the selected alternative detailed under the OU 3 ROD was not intended to be the final remedy of the SITE. Because the action presented under the OU 3 ROD was an interim action, the statutory preference for remedies that reduce toxicity, mobility, or volume as a principal element would be addressed by the final response action for the SITE. Review of the SITE and of the interim remedy would be ongoing as the EPA and CDPHE continue to develop final remedial alternatives for the SITE.

Treatment of the Big Five discharge after it is conveyed to the existing ARGO Water Treatment Facility will remove it as a priority discharge under Section 304(l) and meet the ARARs. Inclusion of the Big Five Tunnel discharge in the individual control strategy and discharge control mechanism for treatment of the ARGO Tunnel discharge will meet regulatory requirements. The interim waiver will no longer be necessary and will be withdrawn. Therefore, addressing the Big Five discharge as an element of the final response action at the SITE with respect to eliminating the toxicity of this discharge to human health and the environment, as discussed in this ESD, is appropriate.

BASIS FOR THIS ESD DOCUMENT

The circumstances that have prompted and that support the significant differences between the remedy that is proposed in this ESD and the selected remedy presented in the OU 3 ROD are described below.

As previously mentioned, the OU 3 ROD invoked an interim waiver of applicable or relevant and appropriate requirements for the Big Five Tunnel discharge. The Big Five Tunnel discharge is still designated a priority discharge under Section 304(l) of the Clean Water Act. This designation was made because the Big Five was originally identified as a discharge which was impairing the attainment of water quality standards for Clear Creek. The OU 3 ROD suggested that this designation of the Big Five would need to be reevaluated. The waiver was invoked *"to allow time for this reevaluation, and allow time for the development of a wasteload allocation for the Argo Tunnel Individual Control Strategy which may include other nearby point sources such as the Big Five Tunnel."*

Data collected since the OU 3 ROD was signed continue to demonstrate significant metals load

increases in Clear Creek through Idaho Springs, even though the ARGO Tunnel Water Treatment Plant, operating since April 1998, removes the largest portion of the loading. Treatment of the ARGO Tunnel discharge addressed the largest single point-source discharge of contaminants to Clear Creek. Sampling points in Clear Creek bracketing the various source areas through Idaho Springs and downstream of Idaho Springs and the ARGO Tunnel Water Treatment Facility show that the loading from Virginia Canyon and the Big Five Tunnel continue to cause exceedances of stream standards in that reach of Clear Creek and downstream of Idaho Springs. These sample points are located upstream of the Big Five Tunnel and Idaho Springs, downstream of the Big Five Tunnel and upstream of Virginia Canyon, downstream of Virginia Canyon and upstream of the ARGO Tunnel, and downstream of the ARGO Tunnel and Idaho Springs. Despite some dilution from cleaner water from Chicago Creek in this stretch, concentrations of contaminants of concern still increase due to contribution from Virginia Canyon and the Big Five Tunnel. Virginia Canyon ground water and surface water is scheduled to be collected and conveyed to the ARGO Water Treatment Facility pursuant to the OU 3 ROD, with construction to begin in July 2005.

As indicated above, recent sampling data show that the Big Five discharge contributes to exceedances of stream standards (i.e., for zinc) in Clear Creek for a good portion of the year. This typically occurs in the winter months during low flow conditions in Clear Creek. Data summaries and analyses showing increases in metals concentrations in Clear Creek resulting from releases from the Big Five Tunnel and other sources are included in the *November 2001 Clear Creek Surface Water Investigation, Analytical Results Report, CDPHE, October 2001*, and *Upper Clear Creek Watershed Trace-Metals Data Assessment, Clear Creek/Central City Superfund Investigative Area, TDS Consulting, Inc., January 2002*. The addendum to the latter report issued by TDS Consulting in June 2003 continues to show the increases in metals concentrations from the Big Five Tunnel discharge, and the resulting exceedances of stream standards for Clear Creek.

The modifications considered by this ESD are warranted by the following conditions:

1. An interim waiver was utilized in the OU 3 ROD for the Big Five Tunnel to allow reevaluation of its designation as a priority discharge under Section 304(l) of the Clean Water Act. The Big Five discharge was not removed from the Section 304(l) list, and final action is required.

2. Acid mine drainage from the Big Five Tunnel continues to exceed stream standards and adversely impact Clear Creek through point-source and diffuse non-point-source discharge.

3. Acid mine drainage from the Big Five Tunnel has continued to sustain a pond that poses a potential public health hazard adjacent to the mine portal in Idaho Springs. Although no action is planned to address the potential for blowouts from the tunnel, action is necessary to remove the pond and thus prevent periodic discharges from pond overflows due to heavy precipitation events or seasonal increases in flow from the tunnel that cause direct discharges of acid mine drainage and sediments with hazardous substances to Clear Creek.

4. At the time of the OU 3 ROD, the determination was made that "*treatment does not attain a level of benefit which is proportional to the cost*" for some discharges.

Construction and operation of the ARGO Tunnel Water Treatment Facility, design and construction of the Virginia Canyon Ground Water Collection and Conveyance system pursuant to the OU 3 ROD, and coordination with other construction projects in the area have provided a cost effective alternative for including the Big Five Tunnel discharge in the individual control strategy for the ARGO Tunnel.

5. The *Five Year Review Report for Clear Creek/Central City Superfund Site, CDPHE September 2004* included a recommendation to make a final decision for the Big Five Tunnel discharge.

DESCRIPTION OF SIGNIFICANT DIFFERENCES

As previously stated, the primary purpose of the remedy selected in the OU 3 ROD was to prevent degradation of downstream surface water quality and aquatic life resources through the treatment of the ARGO Tunnel discharge, the metals contaminated flows exiting Virginia Canyon, and other specific historic mining impacts. Originally, the Big Five Tunnel discharge was not considered for treatment under the OU 3 selected remedy because computer modeling conducted prior to the OU 3 ROD suggested there was minimal impact. Actual sampling data collected since the OU 3 ROD, however, demonstrate that there is a significant impact from the Big Five Tunnel discharge. Based upon this new information and discussions with stakeholders and the local community, the agencies decided that it was warranted to consider the collection and the conveyance of the Big Five discharge as part of the final remedy for the SITE.

The OU 1 ROD specified passive treatment or a combination of active and passive treatment for the Big Five Tunnel discharge. Passive treatment was pilot tested, but was unable to treat the discharge sufficiently to meet regulatory requirements. The OU 3 ROD, which superseded the OU 1 ROD, used an interim waiver of ARARs for the Big Five Tunnel discharge. The OU 3 ROD will be modified with the Big Five Project, the scope of which includes:

- collection of the Big Five Tunnel discharge at the tunnel portal;
- conveyance of the discharge to the ARGO Water Treatment Facility for treatment to the discharge limits specified in the discharge control mechanism for the treatment plant;
- draining the pond outside of the Big Five Mine Tunnel;
- placing waste rock adjacent to the pond back in the pond and additional material to form a stable base;
- capping waste rock and sediments in place in the pond with a suitable cover graded to drain precipitation away from the pond, and maintaining adequate vegetative cover on the cap; and
- operations and maintenance of the collection and conveyance system and pond closure and cap.

Treatment of the Big Five discharge at the ARGO Plant is protective of human health and the environment and will neutralize acidity and remove 99 percent of the metals from the discharge. The treated discharge will meet the Clear Creek aquatic life standards and satisfy the ARARs related to the discharge by incorporating it into the individual control strategy for the ARGO Tunnel. Since this final action for the Big Five Tunnel discharge will meet ARARs, the interim waiver invoked in

the OU 3 ROD is withdrawn. Implementation of the Big Five Project will expedite OU 3 remedial action objectives with respect to water quality goals.

SUPPORT AGENCY COMMENTS

CDPHE is the lead agency for the SITE. EPA has reviewed the revised remedy and supports the implementation of the remedy as presented in this ESD.

STATUTORY DETERMINATIONS

The changes to the remedy selected in the 1991 OU 3 ROD, as presented in this ESD, were made in accordance with all applicable regulatory and statutory requirements as required by Section 121 of CERCLA. A comprehensive evaluation of ARARs was conducted as part of the OU 3 remedy selection, which as noted above, included remedies such as those now being selected for the Big Five Tunnel discharge. ARARs were recently reviewed in the September 2004 *Five Year Review Report.* Treatment of the Big Five discharge will meet all ARARs. Closure of the pond will be performed through a work plan approved by the agencies. That approval will include a condition that the plan meet all applicable and relevant and appropriate state and federal standards.

Considering the new information that has developed and the changes that have been made to the selected remedy, CDPHE and EPA believe that the revised remedy is protective of human health and the environment, complies with federal and state requirements, and is cost effective. In addition, the revised remedy utilizes permanent solutions to the maximum extent practicable for the SITE.

PUBLIC PARTICIPATION ACTIVITIES

For the last two years, CDPHE and EPA have discussed addressing the Big Five Tunnel discharge and the sediment with key stakeholders involved in the Clear Creek community, including the City of Idaho Springs, Clear Creek County, the Clear Creek Watershed Advisory Group, the Upper Clear Creek Watershed Association, the Colorado Department of Transportation, and various landowners. Minutes for the January 8 and February 12, 2004 Upper Clear Creek Watershed Association meetings include a motion passed and other general support for the project to pipe the Big Five Tunnel discharge to the ARGO Water Treatment Facility for treatment. The Responsiveness Summary for the OU 3 ROD includes numerous comments requesting treatment of more acid mine discharges. The Responsiveness Summary for the OU 3 ROD states that "*[S]everal downstream water users voiced support for treatment of the Big Five tunnel by constructing a pipeline which would carry the tunnel discharge to the treatment unit which will be constructed for the Argo tunnel.*" CDPHE and EPA will continue to meet with stakeholders as the remedy moves forward.

SIGNATURES

Signed by:

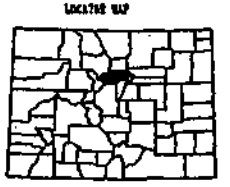
Max H. Dodson
Assistant Regional Administrator
Ecosystems Protection and Remediation
EPA Region 8

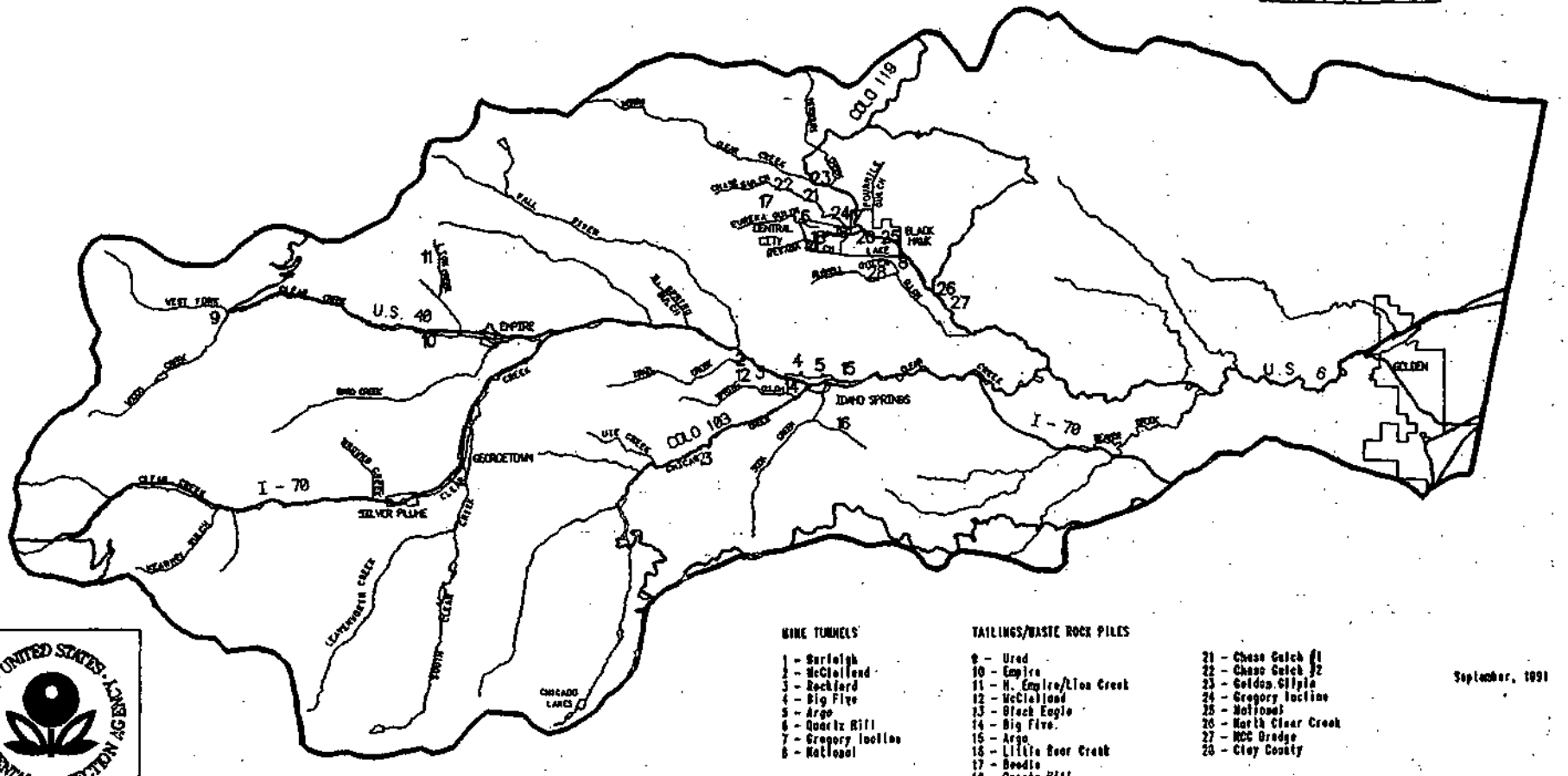
Date

Gary W. Baughman
Division Director
Hazardous Materials and Waste Management Division
Colorado Department of Public Health and Environment

5/19/05
Date

CLEAR CREEK BASIN, COLORADO
Site Map





MINE TUNNELS

1 - Burleigh
2 - McClelland
3 - Rockford
4 - Big Five
5 - Argo
6 - Quartz Hill
7 - Gregory Incline
8 - National

TAILINGS/WASTE ROCK PILES

9 - Urad
10 - Empire
11 - N. Empire/Lion Creek
12 - McClelland
13 - Black Eagle
14 - Big Five
15 - Argo
16 - Little Door Creek
17 - Doodle
18 - Quartz Hill
19 - Gregory Gulch #2
20 - Gregory Gulch #1
21 - Chase Gulch #1
22 - Chase Gulch #2
23 - Golden Gilpin
24 - Gregory Incline
25 - National
26 - North Clear Creek
27 - NCC Dredge
28 - Clay County

September, 1991

TABLE 1.0 ANALYTICAL SUMMARY TABLE BIG FIVE DISCHARGE SAMPLES

Metals concentrations expressed in micrograms/Liter

Sampling Event	As	Cd	Cu	Hg	Mn	Pb	Zn
1985 Phase I RI	10	48	1710	NAF	19,700	91	9770
1989 Phase II RI	10	27	690	NAF	18,800	5	9100
2001 CDPHE	NAF	24	1500	NAF	32,200	NAF	9160
2005 UOS (1)	2	20	2960	0.1	19,500	16	7610
State Drinking Water MCL	10	5	-	2	-	-	-
State Drinking Water MCLG	-	-	1300	-	-	15	-
State Secondary MCL	-	-	100	-	50	-	500
Aquatic Life NEC/WQCD (2)	5 (2)	0.4/3	5/7	0.01 (2)	1000/1493	4/2	47/200

NAF = Not Analyzed For
MCL – Maximum Contaminant Level
MCLG – Maximum Contaminant Level Goal
NEC – No Effect Concentrations are metal concentrations at which aquatic life does not suffer any toxic effects
(1) UOS – START contractor for EPA's Emergency Response Team
(2) WQCD – aquatic standards for Clear Creek Segment 2