April 29, 2002

Bruce K. Means, Chair
National Remedy Review Board
United States Environmental Protection Agency
Office of Solid Waste And Emergency Response
Washington, D.C. 20460

Subject: National Remedy Review Board Recommendations for the Summitville Mine Superfund Site (OU5)

Dear Mr. Means

The letter is prepared by the State of Colorado, Department of Public Health and Environment (the State) in response to the May 4, 2001 National Remedy Review Board (NRRB) evaluation of the Summitville Mine Superfund Site (OU5) final remedy. The U.S. EPA Region 8 has reviewed and concurs with the substance of the State's response.

The NRRB recommendations are presented in bold with the response following.

1. **The board noted that detailed evaluation of alternatives 2, 3, 4 and 5 is difficult without knowing the effectiveness of the OU4 remedy (Site –Wide Reclamation), which is expected to be completed in 2001.**

   The EPA Region 8 mandated that the OU5 ROD be completed by the end of the federal fiscal year 2001. At this same time the OU4 Site-Wide Reclamation was essentially complete. The State of Colorado complied with the schedule and completed the ROD. Not withstanding this schedule, enough is known about the potential effectiveness of OU4 Site-Wide Reclamation to determine a suitable final remedy. Reclamation and revegetation in the Cropsy Valley was completed and fully implemented two years ago. The water quality discharging from this sub-basin of the site has shown significant improvement and these improvements are similarly expected in other areas of the site. For the purpose of the OU5 ROD the water quality was expected to improve by at least 75%. Whether

the water quality improvements are 75% or 90% affects only the size of the impoundment. In the OU5 ROD, the location and size of the impoundment is deferred as a design issue. Equally important is the management of remaining sources and an efficient contamination water routing, storage and treatment system. These are the major components of the final remedy.

The board was also concerned with the high O&M costs (in perpetuity) for alternatives 3, 4 and 5.

The State is likewise concerned about sustaining a high O&M for the site in perpetuity because the State will bear the bulk of these costs. At this time, active treatment is the most reliable option for treating the quantity and to the quality necessary to meet ARARs. The State and EPA has and will continue to investigate ways to lower or eliminate the long-term O&M costs.

The board recommends that the remedy be described in the ROD in more general terms and that details, such as the location and the size of the impoundment and degree of treatment required, be determine during remedial design.

The State felt compelled to balance the agency needs of general statements in the ROD with the desire of specificity demanded by the public. The State believes that enough is known about the site, the remedy and impacts to the downstream watershed to make commitments in the ROD. However, considerations such as the size and location of the Water Treatment Plant and the storage impoundment were left to the design phase.

The board also recommends that minimizing O&M costs be a major consideration in design, and that the Region continue to consider passive technologies. Overall, it is important to retain sufficient flexibility in the ROD to permit full consideration of data on the effectiveness of earlier OUs as these data become available.

Since the State of Colorado assumes responsibility for long-term operation and maintenance of the site, reducing these costs is very important. However, none of the passive treatment options that have been explored to date and prior to the ROD, show promise of treating the quantity of water to the quality required to meet downstream standards. Both the EPA and the State continue to evaluate passive treatment technologies.

2. **The package does not clearly explain how remedial action objectives (RAO) 1 (re-establish fishery) related to protection of human health and the environment. The board recommends that the proposed**

plan either discuss how RAO 1 relates to EPA's mission of protecting heath and the environment (as opposed to natural resources restoration), or eliminate RAO 1 and rely instead on RAO 2 (control surface water, ground water and leachate to meet ARARs) to determine remediation goals and strategy. If RAO 1 is to remain, the board recommends that the Region discuss how achieving RAO1 in the Alamosa River below the Terrace Reservoir may be affected by the periodic irrigation demands that deplete flows in this part of the river.

In the OU5 ROD, the RAO 1 was moved to RAO 2 reflecting its lesser importance. In addition, the RAO text was changed as follows: "Re-establish State aquatic use classifications and attainment of water quality numeric criteria in Segment 3c for the Alamosa River and downstream". The NRRB comment implies that re-establishment of a pre-existing fishery does not constituted protection of the environment. The State disagrees with this assessment. Further, reestablishment of the pre-existing fishery is of tantamount importance to the community and a fact, which the State does not feel comfortable ignoring. However, because a "put, take and grow fishery" has no basis in regulation, the State agrees that this RAO should be changed to reflect that which is actually stated in the WQCD regulation and standard. This ARAR was specifically singled out to reflect the fact that it is a primary driver for the final remedy.

3. **The package is unclear in its description of ARARs. The board recommends that the site decision documents clearly identify which federal and state requirements (e.g. water quality criteria) are applicable, which are relevant and appropriate, and which are "to be considered."**

   As part of the Summitville OU5 Feasibility Study, a detailed ARARs analysis was performed and further refined in the OU5 ROD. This analysis is included in Attachment A and Attachment B, respectively.

4. **The package states that the Summitville remedy will occur in two phases: a 10-year Remedial Action period, followed by long-term O&M. The NCP (40 CFR 300.435(f)(3)) is cited as a basis for this approach. However, this section of the NCP addresses remedies involving the restoration of groundwater and surface water to a level that assures protection of public health and the environment. This remedy might also be considered a source control action, under which surface water will not be restored between the treatment plant and the Fern Creek's confluence with the Alamosa River. Under this definition, long term (O&M begins as soon as the remedy is operational and functional. The Region should clarify how the NCP's**

O&M provisions apply to this action and provide appropriate rationale in the ROD.

According to Attachment C, "Fund-financed remedial actions involving treatment or other measures to restore ground or surface-water quality to a level that assures protection of human health and the environment, the operation of such treatment or other measures for a period of up to 10 years after the remedy becomes operational and functional will be considered part of the remedial action." Both EPA Region 8 and the State of Colorado concur with the interpretation that remedial actions at the Summitville Mine Superfund Site constitute restoration of the environment, that is the treatment of contaminant sources resulting in the attainment of standards at Alamosa River Segment 3c. Based on the Use Attainability Analysis performed by the State of Colorado in 1998, restoration of Segment 3b and 6 is not possible due to an irreversible background condition. These standards were waived in the OU5 ROD. It is the responsibility of the State's Water Quality Control Commission to change the underlying standards to reflect actual conditions in these segments. In recognition that these changes will eventually occur, the unattainable standards were waived due to "Technical Impracticability" CERCLA §121(d)4c.

5. **The board notes that design investigation and data gathering efforts for the preferred alternative could be substantial and that it was unclear whether these costs were considered in the cost estimates. For example, "Design investigations for a new dam foundation" and "Investigation of the subsurface conditions along the Wightman Fork Diversion" are two of these. Costs for these studies should be included in the appropriate alternative cost estimates to the extent they are know as indicated in OSWER Directive 9355.0-75 (A Guide to Developing and Documenting Cost Estimated During the Feasibility Study," July 2000).**

   These indicated costs were incorporated in the Feasibility Study and OU5 ROD. Attachment D shows the detailed costs. Investigation and drilling costs are part of foundation preparation and excavation.

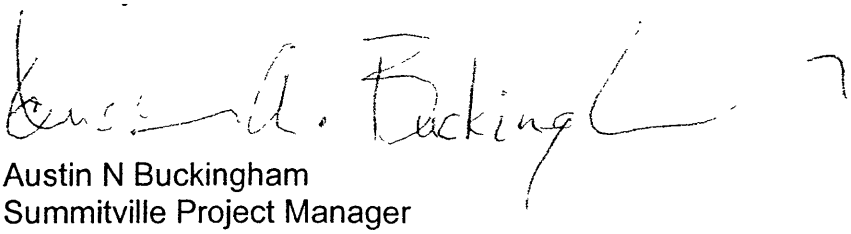
6. **The board notes that sediments in the Alamosa River and the Terrace Reservoir contain elevated metals. During the meeting, the state and region noted that additional data collection and surface water/sediment modeling were underway to evaluate the river and sediments in the reservoir. Pending the results of these efforts, the board recommends that the decision documents clearly address in detail what future action, in any, may be taken in regard to these sediments.**

As part of the Remedial Investigation, Feasibility Study and Record of Decision, the State conducted a detailed water chemistry/sediment sampling and modeling effort. The model evaluated the surface water and sediment in the Alamosa River and the Terrace Reservoir. In addition, the model was used to determine remediation levels at the Summitville Mine downstream point of compliance located at WF 5.5 that would permit attainment of water quality standards in Alamosa River Segment 3c. With these tools, the State determined that if the preferred alternative were implemented, attaining water quality standards would be possible, without the removal of sediments in either the river or the reservoir. Of course remedy performance cannot be fully evaluated until it is implemented and functional. At the five-year review, the State and EPA wi ll again revisit the issue of sediment contamination and if it appears that despite the OU5 remedy, meeting standards will not possible, sediment remove/ would be reconsidered. Thus the door is open to additional remediation in the river and reservoir, but at this point it is considered premature to make such a commitment.

This approach is credible. In the years 2000 and 2001, an acute and chronic fish test was conducted in the Terrace Reservoir. Data shows a healthy population of zooplankton, a sensitive specie. As a result of improved water quality, the presence of zooplankton, and 100% survival during the acute test, 7000 fish were placed in the reservoir for a long-term or chronic test. The fish population will be monitored twice each
year. Fishing and consumption of fish from the Terrace Reservoir and above is discouraged. The agencies are aware that by placing fish, the human health pathway has been opened.

This concludes the responses to the NRRB comments. Please feel free to contact me at the State of Colorado, CDPHE, 303-692-3435 if you have questions.

Sincerely,



Austin N Buckingham
Summitville Project Manager
Hazardous Materials and Waste Management Division

Enclosure NRRB May 4, 2001 Letter

Attachment A: Feasibility ARARs Analysis
B: OU5 ROD ARARs Analysis
C: Transfer of Long-Term Response Action Projects to States
D: Detailed Cost Analysis for Preferred Remedy

Cc: M. Shapiro (OSWER)
S. Luftin (OSWER)
L. Reed (OERR)
B. Breen(OSRE)
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B. Levene (Region 8)
V. Ketellapper (Region 8)
D. Scheppers (CDPHE)
J. Feldman (Colorado AGO)

APPENDIX E

Analysis of Applicable or Relevant and Appropriate Requirements (ARARs)

Remedial actions at CERCLA sites, under most circumstances, must meet established Federal and/or State laws, regulations, standards, etc. Those laws, regulations, standards, etc. that are legally Applicable or Relevant and Appropriate Requirements (ARARs) form the basis for remediation goals. This ARAR evaluation was prepared for the final remedial action at the Summitville Mine Superfund Site (site) and was conducted consistent with the National Contingency Plan (NCP) (see 40 CFR Part 300, Sections 300.400(g) and 300.430(g). In addition, the ARAB evaluation considered the guidance provided in the CERCLA Compliance with Other Laws Manual, Part I and II (U.S. EPA, 1988 and 1989). The scope of this evaluation includes groundwater, surface water, air, and soil contamination at the site as it pertains to the final, site-wide remedial action.

This appendix gives a brief discussion of ARARs including definitions, categories, and circumstance under which waivers of ARARs may apply. A review of the original ARARs identified for the Interim Records of Decision (IRODs) in 1995 is presented, followed by an update of water quality ARARs (numeric standards and use classification) for the Alamosa River since identification of the original ARARs. The last portion, and focus, of this appendix evaluates ARARs for five remedial alternatives proposed for the final action at the site. ARARs that may have significant implications to final remedy selection are identified and remedial alternatives are evaluated for their compliance with ARARs. Compliance with ARARs is a component of the *Comparative Analysis* section of the Feasibility Study which this appendix supplements. The universe of ARARs was originally identified and evaluated in the *Data Evaluation Report* (RMC, 2000) It is the intent of this appendix to further refine the list of possible ARARs for the final remedial action, such that by the time the Record of Decision is issued, only those ARARs applicable to the final remedy will remain.

E.1 ARAR DEFINITION AND CATEGORIES

The NCP (See 40 CFR Section 300.5) defines "applicable" requirements as cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that specifically address a hazardous substance, pollutant, contaminant, remedial action location, or other circumstance found at a CERCLA site. "Relevant and appropriate" requirements address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the environmental or technical factors at a particular site.

ARARs for remedial alternatives are divided into three principal categories:

- Chemical specific,
- Action specific, and
- Location specific.

The NCP also identifies a fourth category of information termed "To Be Considered." While the three principal categories generally deal with Federal and State laws and regulations, the "To Be Considered" category deals with Federal and State advisories, criteria, or guidance. While potential

ARARs in the "To Be Considered" category do not carry the force of a law or regulation, they may be useful in selecting a remedial alternative. A brief description of the three principal ARAR categories follows.

Chemical-Specific ARARs: Chemical-specific ARARs are based on human health or risk based specific chemical concentration limits or discharge limits in environmental- media like air, water, or soil. Examples include, surface water quality standards, groundwater quality standards, and waste water discharge standards.

Action-Specific ARARs: Action-specific ARARs are usually requirements or limitations placed on the operation of a facility. Examples include, operation of water storage reservoirs and work place safety.

Location-Specific ARARs: Location-specific ARARs are restrictions placed on types of activities that may be performed in particular locations. Examples include, landfill siting requirements, wetlands, and floodplain management restrictions.

Remedial action alternatives at Superfund sites are analyzed to see if they meet all regulations, standards, criteria, etc. that are found to be applicable or relevant and appropriate. In general, remedial alternatives that do not meet ARARs are not selected for the final clean-up of a site. The above statement contains the qualifier "in general" because, in special circumstances, one or more ARARs may be waived. Section 121(d)4 of CERCLA identifies six circumstances under which ARARs may be waived:

1. The remedial action selected is only a part of a total remedial action (interim remedy) and the final remedy will attain the ARAR upon its completion;

2. Compliance with the ARAR will result in a greater risk to human health and the environment than alternative operations;

3. Compliance with the ARAR is technically impractical from an engineering perspective;

4. An alternative remedial action will attain an equivalent standard of performance through the use of another method or approach;

5. The ARAR is a State requirement that the State has not consistently applied (or demonstrated the intent to apply consistently) in similar circumstances; or

6. For Super-fund-financed remedial actions, compliance with the ARAR will not provide a balance between protecting human health and the environment and the availability of Superfund money for response at other facilities.

E.2 REVIEW OF ARARs FOR INTERIM REMEDIAL ACTIONS

For the site, the ARAR process began with preparation of a report entitled *"Summitville Mine Site Initial Evaluation of ARARs and TBC"* by Morrison Knudsen in 1994. The 1994 document presented a summary of a large number of potential ARARs, as well as a detailed discussion of the water quality standards for the Alamosa River basin.(at that time). In December 1994, four Interim Records of Decision (IRODs) were published for the Summitville Mine site (EPA Superfund Records of Decision,

R08-95/095 through R08-95-098). The interim remedies were implemented to protect human health and the environment from an imminent threat in the short term, while a final remedial solution was being developed. The interim remedies were intended to control, reduce, or eliminate the major streams of acid mine drainage (AMD) and cyanide at the site. The following briefly discusses each IROD.

Water Treatment (Operable Unit (OU 0): This interim remedy addressed the treatment of AMD from the Summitville site. Water treatment was consolidated into one treatment facility. Water treatment also included destruction of cyanide in the water from the Heap Leach Pad (HLP). Treated water was released into Wightman Fork.

Heap Leach Pad (OU 1): This interim remedy addressed the reduction of AMD and cyanide contaminated waters in the HLP. A rinsing/treatment program was implemented to reduce or detoxify the HLP. The HLP was eventually capped and the cap was vegetated.

Cropsy Waste Pile, Beaver Mud Dump, Summitville Dam Impoundment, and Mine Pits (OU 2): This interim remedy addressed the reduction or elimination of AMD for the referenced areas of the site. These areas were either altered or disturbed during mining activities. Contaminated materials were excavated and placed in the mine pits. The mine pits were subsequently capped.

Reclamation (OU 4): This interim remedy addressed the reduction or elimination of AMD by minimizing infiltration of surface water and oxygen into the sulfide mineral zones and the stabilization of surfaces. Reclamation practices have included construction of ditches for routing of surface water, amendment of soil, and vegetation.

An evaluation of ARARs for each of the interim remedies is presented in its respective 'ROD. The evaluations of ARARs were limited to the scope of the interim action. The four IRODs issued met all ARARs to the extent practicable, but due to their interim nature, ARARs that could not be met by the interim remedial actions were waived until the final ROD was selected and implemented. ARARs for the IRODs are summarized below.

Chemical-specific ARARs for the IRODs included the following:

- Colorado Water Quality Standards - Stream classification and numeric water quality standards,
- Federal Water Quality Criteria,
- Colorado Groundwater Standards, and
- Colorado Discharge Permit System.

Action-specific ARARs for the IRODs included the following:

- RCRA Subtitle C,
- Colorado Mined Land Reclamation Act, and
- Clean Air Act.

Location-specific ARARs for the IRODs included the following:

- National Historical Preservation Act,
- Endangered Species Act,

- Clean Water Act - Dredge and Fill Requirements,
- Fish and Wildlife Coordination Act,
- Colorado Wildlife Act,
- Colorado Wildlife Commission Regulations,
- Floodplain Management, and
- Wetlands Protection.

To evaluate and monitor the interim remedies, EPA established Interim Action Levels (IALs) for surface water exiting the site. The IALs were established for monitoring station WF5.5 at the downstream boundary of the site, which served as the interim monitoring point of compliance for the interim remedies. If met, the IALs were believed to assure that surface water flows from Wightman Fork would meet standards in Segment 3b[1] of the Alamosa River (Figure E.1). The IALs were preliminary benchmarks for measuring the effectiveness of the interim remedial actions, and were developed using a model that utilized high-flow and low-flow average concentrations of contaminants measured at former monitoring station AR45.4 (just below the confluence of Wightman Fork and the Alamosa River) to set threshold loadings allowable at WF5.5 (Morrison Knudsen 1994). The following table lists the IALs for the interim remedies:

Interim Action Levels for WF5.5

Analyte	High Flow (mg/L)	Low Flow (mg/L)
Dissolved Aluminum	2.8	2.6
Dissolved Arsenic	0.80	0.65
Dissolved Cadmium	0.032	0.028
Dissolved Copper	0.44	0.33
Total Iron	110.0	110.0
Dissolved Lead	0.22	0.18
Dissolved Manganese	15.0	10.0
Total Mercury	0.0002	0.0002
Dissolved Silver	0.16	0.13
Dissolved Zinc	3.5	2.5
Total Cyanide	0.8	0.07

Source: Water Treatment Focused Feasibility Study, 1994

The IALs were considered to be preliminary water quality criteria because they were established prior to completion of the Use Attainability Assessment (UAA). Consequently, the IALs were adopted as remedial goals in the IRODs rather than enforceable standards.

1 At the time the IRODs were issued, Segment 3b included current Segments 3b and 3c.

A review of the available water quality data at monitoring station WF5.5 was conducted to evaluate the effectiveness of the interim remedies. Data dating back to December 1994, (i.e., when the IRODs were issued), through the 2000 field season were used in the evaluation. Because the IALs were established for high- and low-flow conditions, data collected in May and June were used to represent high flow and data collected during the remaining months of the year were used to represent low flow. The following table summarizes the results of the evaluation:

Percent of Samples Achieving Interim Action Levels (Based on Samples Collected Since December 1994 at WF5.5)

Analyte	High Flow		Low Flow	
	No. of Samples	Achievement	No. of Samples	Achievement
Dissolved Aluminum	81	10 %	137	12 %
Dissolved Arsenic	69	100 %	97	100 %
Dissolved Cadmium	81	99 %	134	91 %
Dissolved Copper	81	3 %	146	1 %
Total Iron	72	100 %	128	99 %
Dissolved Lead	81	100 %	133	100 %
Dissolved Manganese	81	100 %	146	89 %
Total Mercury	0	–	0	–
Dissolved Silver	71	100 %	114	100 %
Dissolved Zinc	81	100 %	137	74 %
Total Cyanide	12	83 %	64	59 %

The water quality data indicate that the IALs have been achieved, or frequently achieved, for dissolved arsenic, cadmium, lead, manganese, silver, zinc, and total iron since December 1994. Mercury has not been tested. Achievement of 1ALs for aluminum and copper has been infrequent; typically less than 10 percent of the samples have met action levels for the two metals. In the case of aluminum, however, it was noted that the IAL may have been low due to effects of metal loading from sources in the Alamosa River upstream of Wightman Fork. Therefore, reduction of aluminum loading from the site has probably been higher than inferred in the table above. IALs for total cyanide have been achieved over one-half of the time since issuance of the IRODs. Times when IALs for total cyanide were not achieved only occurred during 1995 and 1996; action levels have been achieved since 1997.

E.3 UPDATE OF CLASSIFICATION AND NUMERIC STANDARDS FOR THE ALAMOSA RIVER

As part of the CERCLA activities at the site, the Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division (HMWMD) was tasked by U.S. EPA to perform a Use Attainability Assessment (UAA) (Posey and Woodling, 1998) on the Alamosa River system. The HMWMD entered into a contractual arrangement with the Colorado Department of Natural Resources, Division of Minerals and Geology (DMG) and Division of Wildlife (DOW) for services to perform the UAA with the goal to determine the ambient conditions of the river system for two periods: 1) the period preceding open-pit mining activities (approximately pre-1984), and 2) the

pre-mining period (approximately pre-1870). For this assessment, DMG and DOW used the U.S. EPA UAA protocols as guidance. The goal of this work was to determine if pre-mining water quality could attain the assigned water quality standards. Information developed in the UAA provided the primary scientific and technical basis for the revised water quality classifications and standards adopted by the Water Quality Control Commission (WQCC) in its June 10, 1998 rule making.

The notice for the June 10, 1998 rule making included several proposals by the HMWMD and DMG that were later withdrawn from consideration. In particular, proposals for less stringent water quality classifications, standards and temporary modifications for several Alamosa River segments downstream of the Wightman Fork were withdrawn pending further analysis and discussion of the Summitville clean-up options.

The WQCC also noted that, during its proceedings, parties raised potential revisions to water quality classifications and standards for Wightman Fork downstream of the mine and Jasper Creek (Stream Segments 6 and 7, respectively). However, the WQCC determined that revisions to the water quality classifications and standards for these segments were not within the scope of the notice for the rule making, and therefore, were not considered in the rule making. Proposed revisions to these segments may be raised in the next triennial review of Rio Grande River Basin classifications and standards.

To facilitate the following discussion, Table E.1 presents the stream classifications and water quality standards for the Alamosa River, as promulgated in 5CCR 1002-36, as of December 30, 1998. Figure E.1 illustrates the various stream segments recognized in the Alamosa River basin.

E.3.1 Changes to Segment 3a

As a result of the analysis of pre-mining water quality performed for the UAA, it became apparent that water quality classifications and standards for Alamosa River Segment 3a were mis-classified. Segment 3a was first established as the result of a November 1993 rule making hearing. At that time, a Class 1 aquatic life classification was adopted for Segment 3a, along with a combination of table value and ambient quality-based numerical standards. However, it appeared that when the regulation was re-filed in 1997 as part of an overall renumbering of WQCC regulations, an incorrect version of classifications and standards for Segment 3a was included.

As a result of the December 30, 1998 rule making, the WQCC decided to adopt a Class 2 aquatic life classification for Segment 3a. This classification was based on biological and chemical data indicating that Segment 3a was not capable of sustaining a wide variety of cold water biota, including sensitive species, due to uncorrectable water quality conditions. The UAA concluded that prior to any mining in this area, the concentrations of a number of parameters would likely have exceeded the levels needed to fully support an Aquatic Life Class 1 use, due to the erosion of naturally exposed, mineralized rock and. aggregate. There was very limited mining in the Segment 3a watershed, which is upstream of any significant influence of the Summitville Mine. The biological assessment conducted as part of the UAA indicated that the aquatic life present in Segment 3a consists only of limited numbers of macroinvertebrate taxa. Subsequent sampling of macroinvertebrates in 2000 confirmed findings from the earlier assessment.

Data collected for the UAA were used to determine the 85th percentile value of instream water quality levels for each of the four seasons of the year. The chemical analysis indicated that the pre-mining 85th percentile concentration for aluminum was chronically and acutely toxic to trout in each of the

seasons. Therefore, the WQCC retained the acute aluminum standard of 750 µg/L for all seasons. The lower 15th percentile for pH values ranges from 3.52 in the winter to a pH of 4.73 in the summer. The WQCC adopted seasonal pH standards reflecting the UAA data. Finally, revised acute and chronic manganese table value standards were adopted based on revised aquatic life table values for manganese adopted in "The Basic Standards and Methodologies for Surface Water" (5 CCR 1002-31) in a November 1997 rule making hearing.

E.3.2 Changes to New Segments 3b and 3c

Anecdotal data from the 1970's presented in the UAA indicated that a reproducing fish population was present in the portion of the Alamosa River below Fern Creek to the inlet of Terrace Reservoir. Based on this information and the geochemical model predicting pre-mining water chemistry presented in the UAA, the WQCC split Segment 3b into two segments, an upstream Segment 3b and a downstream Segment 3c (Figure E.1). The redefined Segment 3b is now limited to the Alamosa River reach between Wightman Fork and Fern Creek. The new Segment 3c includes the Alamosa River from a point just above the confluence with Fern Creek to the inlet of Terrace Reservoir. Modeling performed during the UAA indicated that it may be possible to re-establish a fishery in Segment 3c. Consequently, re-establishing a fishery in Segment 3c became a goal of the site-wide remediation.

Water quality modeling performed for the UAA demonstrated that Segment 3b should be changed from Aquatic Life Class 1 Cold Water to Aquatic Life Class 2, reflecting pre-mining water quality. However, in view of the HMWMD and DMG withdrawal of their proposal for a revised classification for Segment 3b and considering the input from other parties and interested persons, the WQCC did not make any changes to the water quality classifications for Segment 3b. The numerical water quality standards for Segment 3b were left unchanged with two exceptions. The WQCC adopted acute and chronic manganese table value standards, based on the aquatic life table value criteria for manganese adopted in the Basic Standards (5 CCR 1002-31). In addition, corrections were made to the arsenic standards for Segment 3b to reflect the fact that no water supply classification exists for this segment.

The WQCC retained the existing Aquatic Life Class 1 Cold Water designation for the new Segment 3c. This use classification was supported by the UAA's chemical data and geochemical modeling of pre-mining (pre-1870) conditions. These data and the modeling indicated that, with the exception of iron, the long-term water quality in Segment 3c should be better than the table value standards. Therefore, the WQCC adopted table value standards for this new segment, with the exception of iron, for which the previous 12,000 µg/L standard was retained.

The changes resulted in numeric standards that are the same for Segments 3b and 3c except for two metals, aluminum and copper. The chronic aluminum standard for Segment 3b is applied on a seasonal basis (i.e., May 1 through September 30), whereas the standard in Segment 3c is applied year-round. The chronic copper standard in Segment 3b is fixed at 30 µg/L, whereas the standard in Segment 3c is a table value standard.

E.3.3 Segments 8, 9, and 10

The WQCC retained the existing water quality classifications for Segments 8, 9 and 10 (Figure E.1). The WQCC declined to adopt the Alamosa River joint Objector Group's proposal to upgrade Segment 8 (Terrace Reservoir) to Aquatic Life Class 1. The WQCC based their decision on the. fact that there was insufficient evidence submitted that a Class 1 use is attainable for Terrace Reservoir.

Only limited revisions to the numerical standards for these segments were adopted by the WQCC. Corrections were made to the arsenic standards for Segments 8 and 10 to reflect the fact that no water supply classification existed for these segments. In addition, acute and chronic table value standards for aluminum were adopted for these segments, based on chemical and modeling information indicating that they should be attainable following Summitville clean-up.

E.4 ARARs ANALYSIS FOR FINAL REMEDIAL ACTION

The intent of the final remedial action is to address contaminant sources at the Summitville Mine site and to monitor the downstream effects to water and sediment quality. The primary consideration when identifying and developing ARARs for the final remedy is water quality. Surface water has been identified as the primary pathway for transport of contaminants at the site and downstream areas. Ecological risk assessments have identified contaminants in surface water as posing the highest risk to the environment. Groundwater poses a minimal risk, if any, to the environment downstream of the mine site. Sediments along Wightman Fork and Alamosa River were considered when developing ARARs, but there are no current standards promulgated for sediments. The WQCC has adopted provisional guidance for determining sediment deposition impacts to aquatic life in streams. The sediment guidelines are retained as To Be Considered ARARs for the final remedy.

A list of ARARs that will be used to select the final remedy at the site has been assembled. Tables E.2, E.3, and E.4 identify the chemical-, action-, and location-specific ARARs, respectively. These tables have been developed to demonstrate those requirements that are applicable, relevant and appropriate, or To Be Considered to the Remedial Action Objectives that will be attained in implementing the final remedial action. The ARARs in these tables will form the basis for the evaluation of remedial alternatives that will be presented in the Proposed Plan. The judgement of a particular remedy to meet ARARs is based on on-site and offsite surface water and groundwater monitoring in conjunction with geochemical modeling.

Several of the ARARs for the final remedy are the same as those identified for the IRODs. However, the ARARs for the IRODs were specific to the scope of the interim remedial action, thus, some ARARs are not applicable, relevant and appropriate, or To Be Considered for the final remedy at the site. An example of this is the IALs established for the four interim remedial actions. These preliminary action levels were set knowing that future data collection and geochemical modeling of the Alamosa River basin would be conducted that would provide the basis for revision of action levels or goals for the final remedy. If an ARAR is not applicable, relevant and appropriate or To Be Considered, it is not contained in Tables E.2, E.3, and E.4, and not considered when evaluating remedial alternatives. ARARs that are not appropriate for selection of the final remedial action are listed in Table E.5.

An important change to ARARs for the final remedial action from ARARs identified for the interim remedial actions involves Colorado Water Quality Standards (CWQS). The CWQS were categorized as "To Be Considered" in the IRODs. The basis for this was that a use attainability analysis of the Alamosa River basin was pending, which would likely result in reclassification of use of river segments and updating of numeric standards. The CWQS have been re-categorized as "Applicable" for the final remedial action.

As the site-wide RI/FS has moved forward, it has become apparent that the final remedy may include a water storage impoundment. Because of this possibility, the State of Colorado, Dam Safety and Dam Construction Rules have been added to the universe of ARARs. These rules govern the construction

and operation of dams in Colorado. Given that the impoundment may store water out of priority relative to downstream uses, requires that the Colorado Water Law also be added to the list of ARARs. Collectively, these laws regulate the conveyance, storage, and use of water in the State of Colorado. Also, the potential for use of passive water treatment may exist in the future which would invoke regulations for discharge from the site.

The following sections present an analysis of ARARs for the final remedial action at the Summitville Mine site.

E.4.1 Chemical-Specific ARARs

The chemical specific ARARs presented below are grouped on a media-specific basis. The media considered include:

- Surface Water,
- Groundwater,
- Surface Soils,
- Stream Sediments, and
- Air.

The chemical-specific ARARs used to select the final remedial action are presented in Tables E.2.

E.4.1.1. Surface Water

The applicable or relevant and appropriate chemical-specific requirements identified for surface water for the final remedial action include:

- Site Remedial Action Goals,
- Colorado Water Quality Standards, and
- Federal Water Quality Criteria.

Federal and State Drinking Water Standards are not identified as chemical-specific ARARs because neither water at the site nor in the Alamosa River and Terrace Reservoir is used as a potable drinking water supply. Total Maximum Daily Loads (TMDLs) are not ARARs or To Be Considered for the final remedy, but a discussion of them is presented as they may have some significance in the future.

Site Remedial Action Goals

The development of water quality remediation levels for the final remedy at the site is currently in progress. A modeling approach similar to that used to estimate Interim Action Levels (IALs) for the interim remedial actions is being used. In 1998, the U.S. Geological Survey (USGS) began developing a reactive transport model of Wightman Fork and the Alamosa River to characterize the fate and transport of metal contaminants. A coupled One-dimensional Transport with Inflow and Storage (OTIS)/One-dimensional Transport with Equilibrium Chemistry (OTEQ) is being used for the modeling investigation. The model has also been used to estimate the relative effectiveness of the remedial alternatives at the mine site in terms of reducing the concentrations of contaminants of concern in the Alamosa River. To accomplish this, scenarios for surface water routing at the site were developed for each of the five remedial alternatives carried forward into the Feasibility Study for detailed analysis.

These scenarios represent conditions at some point in the future after OU 4 reclamation and other operable units have become fully mature. Flow and chemistry for point and non-point sources were estimated at the site under both low-flow and high-flow conditions. A discussion of the source flows and chemistries for remedial alternatives is discussed in Appendix A of the Feasibility Study.

The information from site sources was used to estimate post-remediation metal loads for each of the remedial alternatives at the downstream site boundary, surface water monitoring station WF5.5. These loads represent the boundary conditions for the USGS reactive transport model. The model was then run to predict concentrations of metal constituents in the Alamosa River downstream of the site. A goal of the final remedy at the site is to re-establish State aquatic use classification and to attain numeric water quality standards in Segment 3c and downstream. Segment 3c is considered to be the off-site point of compliance for the final remedial action. The predicted concentrations from the model, for each of the remedial alternatives, were compared to Colorado Water Quality Standards (CWQSs) for Segment 3c of the Alamosa River. Predictions from the model were used to semi-quantitatively estimate what metal concentrations should be at the downstream boundary of the site (i.e., at station WF5.5) to achieve CWQSs in Segment 3c.

Modeling is ongoing to estimate site remediation levels for the final remedial action. The remediation levels are intended to be "target" concentrations or values measured at WF5.5, that if achieved, should have a high likelihood of meeting CWQSs in Segment 3c-of the Alamosa River. It is anticipated that remediation levels will be estimated for the primary risk drivers identified in the Ecological Risk Assessments, in addition to other key constituents to monitor the effectiveness of the final remedy.

Remediation levels will be contained in the Record of Decision for the final remedy. Remediation levels for the site will be revised, as necessary, based on continued data collection and monitoring of the final remedial action during the five-year review (CERCLA 40 CFR Part 3000.430 (f)(4)(ii)).

Total Maximum Daily Loads

The Federal Clean Water Act specifies a process to insure that sources of pollutant loading are accounted for when developing strategies to meet Water Quality Standards. This process is called the Total Maximum Daily Load (TMDL). A TMDL is an estimate of the greatest amount of a specific pollutant that a water body or stream segment can receive without violating water quality standards. Under the Act, States must identify lakes, rivers, and streams for which local wastewater discharge limits are not stringent enough to achieve water quality standards. For each of these water bodies, a State is required to set a TMDL for pollutants at a level necessary to ensure that applicable water quality standards can be attained and maintained. This amount accounts for loads from non-point sources and natural background, in addition to point sources loads.

Section 303(d) of the Clean Water Act requires States to identify waters that do not or are not expected to meet applicable water quality standards. To do this, information regarding the physical, chemical, and biological condition of a water body with the associated water quality standards for that water body are compared by the State. If technology-based effluent limits, such as discharge permits, are not stringent enough to assure that water quality standards are met, then the water body is designated as "Water Quality Limited", and added to the 303(d) list.

At present, The State of Colorado has identified four water bodies that are downstream of the Summitville Mine site, each of which are on the 303(d) list. The status of each TMDL is pending with

a completion date for each projected to be June 30, 2004. The four water bodies and TMDL pollutants are listed below.

State Water Body Identification	Description	Pollutants
CORGAL03 B	Alamosa River- Wightman Fork to Terrace Reservoir; Segments 3b and 3c.	pH, aluminum, copper, and iron
CORGAL08	Terrace Reservoir - Segment 8.	pH, copper, manganese, and zinc
CORGAL09	Alamosa River - Terrace Reservoir to Colorado Highway 15; Segment 9.	pH, copper, iron, manganese, and zinc
CORGAL10	Alamosa River - Below Colorado Highway 15; Segment 10.	copper, manganese, and iron

Because TMDLs for the four water bodies listed above have not been promulgated, they are not ARARs for the final remedial action. Furthermore, the TMDLs do not currently provide Federal or State advisories, criteria, or guidance and are not To Be Considered. They may become To Be Considered when they are actually promulgated, which is expected in 2004. The TMDLs would only become ARARs if failure to comply with them is not protective of human health and the environment.

Colorado Water Quality Standards

The Colorado Water Quality Standards (CWQSs) establish a system for classifying State surface waters and procedures and criteria for assigning numeric water quality standards (See 5 CCR 1002-31, Section 31.11). Use classifications and numeric standards specific to waters downstream of the Summitville Mine site are contained in Colorado Classification and Numeric Standards for the Rio Grande Basin (5 CCR 1002-36).

Criteria for Stream Use Classification

The CWQS require that surface water be classified for the present beneficial uses of water, or the beneficial uses that may be reasonably expected in the future for which the water is suitable in its present condition or the beneficial uses for which it is to become suitable as a goal. Where the use classification is based upon a future use for which the waters are to become suitable, the numeric standards assigned to such waters to protect the use classification may require a temporary modification to the underlying numeric standard (See 5 CCR 100208 §3.1.6).

The CWQSs employ four broad types of beneficial use to frame the classification process:

- Recreational,
- Aquatic Life,
- Agriculture, and
- Domestic Water Supply.

The recreational uses are divided into two classifications.

- Recreational Use, Class 1 - Primary Contact, addresses surface water quality concerns where ingestion of small quantities of water during the use is likely to occur, and

- Recreational Use, Class 2 - Secondary Contact, focuses on stream side activities where ingestion of water is unlikely to occur.

The effect of the recreation classification on numeric water quality criteria is limited, the primary consideration being the concentration of fecal coliform bacteria. The site activities are unlikely to contribute bacterial contamination to the watershed. For that reason, the recreational use classifications will not be considered further.

Two aquatic life classifications are currently promulgated for stream segments of interest:

- Class 1 Cold Water Aquatic Life - defined as waters that (1) currently are capable of sustaining a wide variety of cold water biota, including sensitive specifies, or (2) could sustain such biota but for correctable water quality conditions. Waters shall be considered capable of sustaining such biota where physical habitat, water flows or levels, and water quality conditions result in no substantial impairment of the abundance and diversity of species.

- Class 2 Cold and Warm Water Aquatic Life - defined as waters that are not capable of sustaining a wide variety of cold or warm water biota, including sensitive species, due to physical habitat, water flows or levels, or uncorrectable water quality conditions that result in substantial impairment of the abundance and diversity of species.

Both aquatic life classifications are applicable to the final remedy.

Agricultural use is defined as water that is suitable or intended to become suitable for 1) irrigation of crops usually grown in Colorado, and 2) which are not hazardous as drinking water for livestock. Agricultural use classification is applicable to the final remedy.

Domestic water supply is defined as suitable or intended to become suitable for potable water supplies. Surface water and groundwater at the Summitville site are used only as non-potable supply for site operations. Downstream of the site, none of the stream segments (See Segments 6, 3b, 3a, 8, 9, .and 10) are designated for water supply. Therefore, domestic use of water is not considered further.

Numeric Water Quality Standards

The CWQSs provides a three-tiered structure for establishing numeric water quality standards. For unimpacted high quality waters, numeric levels known as the "Table Value Standards" (TVS) are presumed to be protective. For impacted waters where pollutant concentrations exceed TVS values but the beneficial uses are adequately protected, ambient quality-based standards may be adopted. Where classified uses are not being protected and a use attainability analysis has found non-attainability, site-specific-criteria-based standards may be developed. Finally, temporary modifications to numeric standards may also be adopted. TVS, ambient quality-based standards and temporary modifications are relevant to the final remedial action.

Table Value Standards - The TVS are effectively equivalent to, and are based upon the Federal Water Quality Criteria and have been adjusted to protect the beneficial uses of Colorado waters. The TVS for select metals, pH and cyanide are of particular interest for Summitville surface water. It is important to note that many of the TVS for protection of aquatic life from metal pollutants are hardness dependent. The TVS are the basis for many of the promulgated surface water standards at the Summitville Mine site.

Ambient Quality-Based Standards - As the second tier numeric water quality standards, ambient quality-based numeric surface water quality standards are the mechanism where limited water quality impacts may be reflected through less stringent water quality standards. Ambient quality-based standards are specifically intended to address circumstances where natural or irreversible man-induced ambient water quality levels are higher than specific numeric levels, but are determined adequate to protect classified uses.

The CWQS restrict the application of ambient quality-based standards in three ways. First, acute standards may not be based upon ambient water quality, but instead must be based upon either TVS or site-specific-criteria-based standards. Second, ambient quality-based chronic standards must be based upon the 85th percentile of available representative data. Third, the 85th percentile ambient quality-based chronic standards may not be established at a level less stringent than the corresponding acute value established for the same constituent. Typically, where the 85th percentile ambient quality-based chronic standard exceeds the acute TVS, a chronic standard is not adopted and instead the acute TVS is applied. This is logical, as the numerical equivalent of the acute TVS is the least stringent chronic standard the regulations allow.

CWQS for Alamosa River Stream Segments

The following discusses the use classifications and water quality standards for Alamosa River Segments that are applicable to the final remedy a the Summitville Mine site. In addition to the classifications discussed, it is important to note that all segments downstream of the Summitville Mine are listed as Recreation 2 use (i.e., minimal direct contact) and none are classified for water supply use.

Segment 6 - The Alamosa River Segment 6 is defined as the mainstem of Wightman Fork from the west line of Section 30, Township 37 North, Range 4 East to the confluence with the Alamosa River (Figure E.1). The upstream point of Segment 6 is essentially where the Summitville Mine begins to impact Wightman Fork. Segment 6 is only classified for agricultural use; no numeric standards have been established for this segment. In performing the use attainability analysis, the WQCC determined that because of the highly contaminated condition of this segment, the aquatic life and domestic water supply beneficial uses will not be attained in the next 20 years. Although Segment 6 is classified for agricultural, no numeric standards have been promulgated for inorganic constituents. There is no indication that Segment 6 surface waters are being beneficially used for agricultural purposes. The only numeric water quality standard promulgated for Segment 6 is for fecal coliform, which is not a mine-related contaminant of concern.

Segment 3b - The Alamosa River Segment 3b is defined as the mainstem of Alamosa River from the confluence of Wightman Fork to Fern Creek (Figure E.1). Segment 3b is classified as Cold Water Aquatic Life, Class 1, and Agriculture. The numeric water quality standards and TVS assigned to Segment 3b are presented in Table E.1.

Segment 3b is the reach of the Alamosa River most impacted by the Summitville Mine site. Already degraded by upstream tributaries (i.e., Iron, Alum, and Bitter Creeks), Wightman Fork, Jasper Creek, and other downstream tributaries contribute additional metals contamination to this segment. Segment 3b has depressed pH, and aluminum, copper, and zinc in excess of the calculated TVS as measured most recently in 2000. In addition, were it not for the hardness attributable to the chemicals added for water treatment at the Summitville site, the TVS for some additional metals might also be exceeded. For that reason, the WQCC adopted the chronic aquatic life standard for aluminum on a seasonal basis from October through April, but declined to adopt a chronic aquatic life standard for aluminum for

May through September (where instead the acute = TVS for aluminum acts as a chronic maximum). Furthermore, the WQCC based the chronic copper standard upon the 85th percentile ambient data from Segment 3a. The WQCC's decision to base the chronic copper standard upon the 85th percentile ambient data from Segment 3a was based on the assumption that the elevated hardness in Segment 3b would raise the maximum ambient concentration to a value allowed by the regulations. It should be noted, however, that copper concentrations in Segment 3b have exceeded the acute standard (which is hardness-based) as recently as 2000.

Segment 3c - The Alamosa River Segment 3c is defined as the mainstem of the Alamosa River from immediately below the confluence with Fern Creek to the inlet of Terrace Reservoir (Figure E.1). This Segment 3c has the same classifications as Segment 3b: Cold Water Aquatic Life, Class 1, and Agriculture. The numeric water quality standards and TVS assigned to Segment 3c are presented in Table E.1. Segment 3c has depressed pH, and aluminum and copper in excess of the fixed and calculated TVS as measured most recently in 2000. Water in this segment is, in part, impacted from water upstream of Wightman Fork. Modeling performed during the UAA indicated that it may be possible to re-establish a fishery in Segment 3c. Consequently, Segment 3c serves as the offsite point of compliance for final remedial action.

Segment 8 - The Alamosa River Segment 8 is defined as Terrace Reservoir. Segment 8 carries the following classifications: Cold Water Aquatic Life, Class 2, and Agriculture. The numeric-water quality standards assigned to Segment 8 are presented in Table E.1. Terrace Reservoir is influenced by both naturally and historically impacted tributaries to the Alamosa River, as well as the Summitville Mine site. Terrace Reservoir is also affected by fluctuating water levels related to irrigation practices. In 2000, Terrace Reservoir had copper, iron, and manganese concentrations in excess of the calculated TVS on at least one occasion.

Segment 9 - Segment 9 of the Alamosa River is defined as the portion of the river from the outlet of Terrace Reservoir to Highway 15 (Gunbarrel Road). Segment 9 maintains a Cold Water Aquatic Life, Class 1, and Agriculture use classification. In 2000, Segment 9 had iron and manganese in excess of the fixed standards or calculated TVS on at least one occasion.

Segment 10 - The Alamosa River Segment 10 is defined as the portion of the river from Colorado Highway 15 (Gunbarrel Road) to its point of final diversion. The use classification for Segment 10 is Cold Water Aquatic Life, Class 2, and Agriculture. Recent sampling in Segment 10 during 2000 found that all water quality standards were met.

Federal Water Quality Criteria

State numerical water quality standards are essentially a site-specific adaptation of a Federal Water Quality Criteria, subject to EPA approval. When available, State standards are generally the appropriate standard for the specific body of water. Federal Water Quality Criteria (40 CFR part 131) are only relevant and appropriate in the absence of current, segment-specific CWQSs. In the circumstance of Summitville, current, segment-specific CWQSs are available and will be applied as the surface water quality ARARs for the site.

E.4.1.2 Groundwater

Colorado Groundwater Standards

The Colorado Ground Water Standards (CGWS) provide for classification of groundwaters and the adoption of water quality standards to protect existing and potential beneficial uses of groundwaters (5 CCR 1002-41, Sections 41.4 and 41.5). Five classes of groundwaters are identified in the CGWS:

- Domestic Use - Quality,
- Agricultural Use - Quality,
- Surface Water Quality Protection,
- Potentially Usable Quality, and
- Limited Use and Quality.

The shallow contaminated groundwater beneath the site is of limited areal extent, is not currently being put to beneficial use, and is unlikely to be beneficially used in the future. Domestic and agricultural uses do not apply to the site. However, contaminated groundwater has the potential to impact surface water quality of Wightman Fork. The CGWS acknowledge the potential for interconnection between groundwater and surface water and provide the option to classify groundwater for Surface Water Quality Protection. The-Surface Water Quality Protection classification is defined as: "A proposed or existing activity does or will impact groundwaters such that the water quality standards of classified surface water bodies within the specified area will be exceeded" (See §3.11.4(B)(3)).

The affected surface water body within the specified area, i.e., the mine site, is Wightman Fork (Segment 6). Segment 6 is classified for agriculture, but there is no evidence of agricultural use. No numeric standards for metal contaminants have been promulgated for Segment 6. Because of these reasons, and the fact that site groundwater has been historically impacted from highly altered and mineralized rock, the Surface Water Quality Protection classification for site groundwater was retained as a To Be Considered ARAR.

Protection of groundwater is cited in RCRA Subtitle C regulations. The site is not a Subtitle C facility and the RCRA groundwater protection standards do not apply and they are not applicable ARARs for the final remedial action.

E.4.1.3 Soil

Federal and State chemical-specific ARARs for soil contamination have been identified for contaminants of concern at the site. Table value standards for soil cleanup have been proposed by the State Hazardous Material and Waste Management Division. The standards are cited in the "Proposed Soil Remediation Objectives Policy. Document," December 31, 1997. Standards are proposed for certain metals, of these, arsenic, cadmium, copper, and lead have been detected in site soils. The soil standards do not form applicable ARARs for the final remedy at the site because of their proposed status. Instead, the soil standards are To Be Considered, as they may have some bearing on the final. remedy. The lead standard is based on U.S. EPA's "Revised Interim Guidance on Establishing Soil Lead Cleanup Levels at Superfund Sites," July 1994 (Directive #9355.4-12). Review of soil data from OU 4 sampling of disturbed areas, roads ditches, and topsoil stockpiles (U.S. BOR, 1998) found no exceedances of the lead soil standard proposed in the U.S. EPA Directive #9355.4-12, therefore, the Directive for lead will not be considered further.

E.4.1.4 Stream Sediments

Currently, there are no numeric standards promulgated for stream sediments in the Alamosa River and its tributaries. Consequently, sediment ARARs do not exist. However, the WQCC has implemented a policy for assessing impacts to aquatic systems from sediment deposition. The guidance is cited in Policy 98-1 "Provisional Implementation Guidance for Determining Sediment Deposition Impacts to Aquatic Life in Stream and Rivers," June 1988. The guidance policy is directly patterned after U.S. . EPA's guidance for a number of programs including water quality standards, assessment and reporting, biocriteria development, rapid bioassessment protocols, and use attainability analysis. The rapid bioassessment protocols have been used in the past to assess aquatic life in the Alamosa River downstream of the Summitville Mine site. Monitoring of sediment and aquatic life is expected to be a component of the final remedy, as such, Policy 98-1 is retained as To Be Considered ARAB.

E.4.1.5 Air

Federal and State ARARs have been identified for construction and generation of particulate matter (PM10) at the site (See 5 CCR 1001, § 3(1)(B)(3)(e)). An emission permit would not be required for on-site activities, although the construction will have to comply with the substantive requirements of the emission permit. Control measures to minimize dust and air monitoring will be implemented if necessary during remedial construction activities.

Regulations for emission of hazardous air pollutants have been established at both the Federal and State levels. These regulations, however are not applicable to the site because hazardous emissions are not expected to be associated with the final remedial action.

E.4.2 Action-Specific ARARS

Action-specific ARARs are triggered by specified activities or the application of specific technologies to site conditions. The action-specific ARARs to be used in selecting the final remedial action are presented in Table E.3. The potentially applicable or relevant and appropriate action-specific requirements identified for the final remedial action include:

- RCRA Subtitle C, Hazardous Waste Treatment, Storage and Disposal,
- Colorado Regulations Pertaining to Solid Waste Disposal Sites and Facilities,
- Colorado Discharge Permit System Regulations,
- Clean Water Act Storm Water Permitting Requirements,
- Clean Water Act Section 404 Dredge and Fill Requirements,
- Colorado Mined Land Reclamation Act,
- Dam Safety and Dam Construction,
- Appropriation and Use of Water,
- Water Rights Determination and Administration, and
- Passive Treatment of Mine Drainage Control Regulation.

The action-specific ARARs applicable to the final remedial action are outlined below for information purposes.

RCRA Subtitle C

40 CFR 261.4(b)(7) specifically excludes "solid waste from the extraction, benefication and processing of ores and minerals..." from the rules governing management of hazardous waste in RCRA Subtitle C. Mine wastes present at the site, including waste rock, processed ore in the HLP and wet waste rock, were generated as a result of the extraction, processing or benefication of ores and minerals. Accordingly, RCRA Subtitle C is not legally applicable to the final remedy because it addresses mine wastes. EPA Region VIII, however, as a matter of policy considers RCRA Subtitle C "relevant and appropriate" if the mining waste remaining on the site fails Toxicity Characteristics Leachibility Procedure (TCLP). Site wastes have been tested and they have not failed this toxicity test. Therefore, RCRA Subtitle C is not "relevant and appropriate" to the final remedial action.

It is likely that the final remedial action at the site will include some form of conventional water treatment. Conventional water treatment generates end-product waste (sludge) that will require disposal. RCRA Subtitle C may be relevant and appropriate to actions at the site if the sludge material is sufficiently similar to RCRA hazardous waste, particularly if the subject wastes fail the TCLP. Further, if the disposal activity involves the use of a waste management unit sufficiently similar to a RCRA regulated unit, and the unit is to receive waste sufficiently similar to RCRA hazardous wastes, then RCRA Subtitle C requirements pertaining to that type of waste management unit would be relevant and appropriate.

Sludge from the existing water treatment facility at the mine site has been tested using TCLP methods to determines its potential to be a hazardous waste. Test results indicate that the sludge material is non-hazardous; TCLP limits were not exceeded for metal constituents. Because future water treatment facilities will employ similar technologies as the existing facility, the chemical composition of the produced sludge is likely to remain unchanged. Therefore, RCRA Subtitle C regulations for hazardous waste generators, transporters, and disposal facilities owners and operators are not applicable to the final remedial action.

Colorado Regulations Pertaining to Solid Waste Disposal Sites and Facilities

The Colorado Regulations Pertaining to Solid Waste Disposal Sites and Facilities (Colorado Solid Waste Disposal Regulations (CSWDR)) govern the siting, operation, and closure of solid waste management activities and facilities (6 CCR 1007-2). The CSWDR also provide that all activities subject to the jurisdiction of the Colorado Mined Land Reclamation Act are exempt (See §1.4.2). This exemption is intended to recognize the substantial overlap between the CSWDR and the regulations promulgated pursuant to the Mined Land Reclamation Act. Further, the exemption serves to vest authority for the development of regulations related to mine development, operations, and closure exclusively with the Mined Land Reclamation Program. For that reason, CSWDR may not be "applicable" or "relevant and appropriate" to solid waste disposal activities that may occur during the final remedial action, by virtue of the existence of the Mined Land Reclamation requirements. The CSWDR will be applicable to sludge disposal from the water treatment plant, however, if solid waste is taken from the site and disposed at offsite locations within Colorado.

Colorado Discharge Permit System Regulations

When evaluating the applicability or relevance and appropriateness of the Colorado Discharge Permit System Regulations (CDPSR) to activities at the site, the Colorado Water Quality Control Division permit issued to Galactic Resources, Inc., the last mine operator, for the treatment plant at the site

(Colorado Discharge Permit Number CO-0041947, dated November 12, 1991) provides a reference and support document. The November 12, 1991 CDPSR permit is useful to understand how the variety of CDPSR requirements are integrated and applied on a site-specific basis. However, it is important to understand that the ambient water quality standards against which the 1991 CDPSR permit calculations were performed have changed substantially and must be re-evaluated.

In the 1991 CDPSR permit, it was determined that the mining and cyanide heap leach processes at the site were subject to the Copper, Lead, Zinc, Gold, Silver, and Molybdenum Ores Subcategory of the Ore Mining and Dressing Point Source Category found at 40 CFR Part 440 (Permit CO-0041947, Rationale, page 21). The scope of the Ore Mining and Dressing Point Source Category is very broad, and covers all of the point source discharges and any discernable conveyances which may collect storm water runoff from waste rock piles, storage piles, tailings and other mine activities defined at 40 CFR 440.132(g). While any selected remedial action must meet the substantive requirements of these effluent limitations, it should be noted that a permit to discharge treated water is not required pursuant to CERCLA.

The Best Available Technology Economically Achievable (BAT)-based effluent limitations promulgated for Ore Mining and Dressing are not applicable because the mine is no longer active. Regardless, the BAT-based effluent limits were considered in preparing the permit and are relevant and appropriate to future point source discharges from the Summitville Mine site. In addition, the CDPSRs allow imposition of Best Management Practices (BMPs) as part of storm water pollution plans where special conditions justify the added protection.

When collecting and storing storm water, the Ore Mining and Dressing regulations provide an exemption for excess storm water flows created from greater than 10-year 24-hour precipitation events. In effect, the regulations provide, as a substantive criteria, the requirement to design and implement a storm water control and treatment program capable of handling a 10-year 24-hour storm event. The 10-year 24-hour criteria will be relevant and appropriate to sizing of storm water management systems during design of the final remedy. It is noteworthy to point out that designs of storm water control structures contained in the Feasibility Study are based on the 500-year 24-hour storm event, which considerably greater than required in the regulations.

A formal CDPSR permit is not required for the final remedy, pursuant to CERCLA Section 121(e). However, the new Water Treatment Plant will be required to meet all of the substantive requirements of a permit, and a permit-like document will be prepared and reviewed by the WQCC.

Clean Water Act Storm Water Permitting Requirements

Storm water is defined in NPDES Program as "storm water runoff, surface runoff, snow melt runoff, and surface runoff and drainage" (See 40 CFR 122.26(b)(13)). A permit application is required for active and inactive mining sites where an owner can be identified and when discharge of storm water runoff from mining operations come into contact with any overburden, raw material, intermediate product, finished product, by-product, waste product, or areas where tailings have been removed (See 122.26(b)(14)(iii)). As such, the NPDES Storm Water Permit requirements are applicable to discernable surface flows of storm water that contacts waste rock at the Summitville Mine site.

The Storm Water Permit regulations require compliance with Sections 301 and 402 of the Clean Water Act. Sections 301 and 402 require use of Best Available Technology to control toxic pollutants, and where necessary, further control to achieve ambient water quality criteria. In addition, the storm water

regulations contemplate implementation of storm water Best Management Practices (BMPs) as part of the comprehensive program. BMPs have been designed to minimize or control contact between precipitation and potential sources of pollutants. The BMPs developed at the Summitville Mine site have included housekeeping, employee training, inspections, and preventative maintenance. In addition, reclamation activities such as grading, stabilization, revegetation, erosion control, and sediment control were included as part of the BMPs.

At present, a NPDES Storm Water Permit is not anticipated for the final remedy. Instead, a document similar in content to a NPDES permit, will be drafted and issued to regulate future storm water control at the Summitville Mine site.

Clean Water Act Section 404 Dredge and Fill Requirements

Section 404 of the Clean Water Act regulates the discharge of dredged or fill material to the waters of the United States. It states that no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge that does not have other significant adverse environmental effects. "Practicable" is defined by the regulation to mean available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes. Any remedial alternative at the site that involves the placement of materials into "waters of the United States" will be evaluated to determine if practicable non-fill alternatives exist.

Colorado Mined Land Reclamation

The Colorado Mined Land Reclamation (MLR) regulations at 2 CCR 407-1 require the reclamation of mined areas. The regulations provide specific reclamation criteria which are. applicable to the Summitville Mine site as the result of an MLR permit. An MLR permit is required prior to development of a mine site. The regulations require that the permitted provide detailed operations information, reclamation measures to be applied to the areas disturbed by mining activities, and a bond.

The conditions imposed by the Colorado MLR Permit #M-84-157 for the Summitville Mine stipulate a phased approach to and reclamation which minimizes the total disturbed area at any point in time. Reclamation activities at the mine site will emphasize surface soil stabilization (to include grading, topsoil management, and revegetation), preservation of water quantity and quality, and concern for the safety and protection of wildlife. The reclamation requirements of the MLR are ARARs applicable to the final remedial action at the site.

Dam Safety and Dam Construction

Rules and regulations for dam safety and dam construction have been promulgated pursuant to the authority granted the State Engineer in CRS 37-80-101 to 37-80-123 and 24-4-103. These rules and regulations apply to any dam constructed or used to store water in Colorado. Because the final remedy will incorporate a water storage component, these dam safety and dam construction rules and regulations are applicable to the final remedy.

The State Engineer classifies dams based upon an evaluation of the consequences of failure of the dam absent flooding conditions, assuming the reservoir level is at the high-water line. The following dam classifications have been established:

- Class I - a dam for which loss of human life is expected in the event of failure of the dam,
- Class II - a dam for which significant damage is expected to occur, but no loss of human life is expected in the event of failure of the dam,
- Class Ill - a dam for which loss of human life is not expected and damage to structures is not expected, and
- Class IV - a dam for which loss of human life is not expected, and which damage. will occur only to the dam owner's property in the event of failure.

In their October 2000 inspection report, the State Engineer classified the existing SDI embankment as a Class III dam.

The State Engineer has established Rules 5, 6, and 7 that relate to construction or modification of darns as described below. To the extent the final remedial action includes construction or modification of a dam, each rule is applicable to the final remedial action at the site.

Rule 5 sets forth requirements for construction or enlargement of dams or reservoirs. Enlargement of a darn is defined as any alteration modification, or repair that increases the vertical height of the dam. Rule 6 cites requirements for alteration, modification, or repair of an existing dam which will affect the safety of the structure. Alteration or modification is defined as a change from the originally approved construction plans, except for ordinary repairs and general maintenance. Rule 7 establishes requirements for breach of an existing dam. A dam breach is defined as the removal of all or part of the darn to the level of the natural ground, so it is incapable of impounding water and creating a hazard. For each Rule, the owner is required to submit an application package to the State Engineer and receive approval of construction plans and specifications prior to commencing construction (See 2 CCR 402-1 Section 5A, 6A, and 7A).

Appropriation and Use of Water

CRS 37-82-101 regulates water of natural surface streams subject to appropriation for beneficial use. The water of every natural stream includes all water within the State of Colorado which is tributary to a natural surface stream but does not include non-tributary groundwater. The Constitution of the State of Colorado provides that water of every natural stream within the State of Colorado, not already appropriated, is the property of the public, and subject to appropriation. The basic tenant of the Colorado appropriation system is that the "first in time, is the first in right." An appropriation is made when an individual physically takes the water from a stream and transports it to another location for beneficial use. The first person to appropriate water and apply that water to beneficial use has the first right to use that water within a particular stream system. The senior, or first appropriator, must then be satisfied before any other junior rights are fulfilled. The right to divert unappropriated waters of any natural stream to beneficial uses shall never be denied.

In the event the final remedial action at the site has water diversion and impoundment as remedial components, the final remedy will be subjected to the Colorado appropriation system.

Water Rights Determination and Administration

Article 92 of the Colorado Constitution pertains to water right determination and administration. (See CRS 37-92-101 to 37-92-602). Water judges, or referees, within each of the State Water Divisions have the authority and duty to rule upon determinations of water rights and conditional water rights,

and their amount and priority. The State Engineer has the responsibility for the administration and distribution of water, which is accomplished by divisional engineers.

Because the final remedial action at the Summitville Mine site will include some component of water storage, determination and administration of water rights will be applicable. Water stored or consumed out of priority will be subjected to the Colorado appropriation system to prevent injury to holders of senior water rights downstream of the site.

Passive Treatment of Mine Drainage Control Regulation

The Colorado Water Quality Control Commission (WQCC) has adopted water quality regulations pertaining to passive treatment of mine drainage (5 CCR 1002-83). The regulations are intended to provide a basis for approval of Passive Treatment of Mine Drainage (PTMD) systems which are proposed to address mine drainage problems not subject to the Colorado permit system for discharge of pollutants. This control regulation does not take precedence over the conditions of any permit required for the discharge of pollutants.

PTMD refers to biological, geochemical, and physical-chemical systems designed to remove metals and/or dissolved solids from mine water and to neutralize mineral acidity using low-cost material and construction techniques which do not require frequent maintenance operations. Systems may include, but are not limited to: microbiological reactors; limestone mills, barriers, cascades, and settling ponds; and constructed wetlands. PTMD may also include portal bulkheads or other mine sealing techniques. PTMD does not refer to standard mined land reclamation measures.

Applicants shall secure the required application from the WQCC with appropriate construction plans, operation, and monitoring plans (See Section 83.4 (2)). Applications are submitted to the WQCC and Mine Land Reclamation Division of the Colorado Department of Natural Resources. The WQCC approves or denies the application and advises the applicant of that determination. If approved, the application is issued for public comment before final approval.

The PTMD regulations are applicable to the final remedial action at the Summitville Mine site. Portal bulkheads exist at the site that will likely require permitting during the final remedy. Use of passive water treatment technologies has been recognized in the Feasibility Study as a possible future treatment consideration, should passive technologies prove capable of treating the large volume of acid mine drainage at the site. Future use of passive water treatment would likely require compliance with PTMD regulations.

E.4.3 Location-Specific ARARS

Location-specific ARARs are restrictions placed on the conduct of activities solely because they occur in specific locations. The "applicable" or "relevant and appropriate" location-specific requirements identified at the site are listed in Table E.4 and include:

- Fish and Wildlife Coordination Act,
- Historic and Cultural Preservation,
- Endangered Species, and
- Protection of Floodplains and Wetlands.

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act serves to protect fish and wildlife when Federal actions result in the control or structural modification to natural streams or water bodies. Federal agencies must develop measures to prevent, mitigate, or compensate for project related losses of fish and wildlife. Specifically included are projects involving stream relocation and water diversion structures. If appropriate, prior to modification of water bodies, the appropriate agencies will be consulted.

Historic and Cultural Preservation

The National Historic Preservation Act (NHPA) requires Federal agencies to account for the effects on districts, sites, buildings, structures, or objects that are included on the National Register of Historic Places (Executive Order 11593). The Act also requires consideration of the cultural environment. Similarly, the Colorado Register of Historic Places establishes requirements for protection of properties of State historical interest. Structures and artifacts which are 50 years old are considered to be historic. In addition, the Historic and Archeological Data Preservation Act of 1974 establishes procedures to preserve historical and archeological data which might be destroyed through alteration of terrain as a result of Federal construction projects.

A Cultural Resource. Survey has been performed for the site (Clark, 1997).. In addition, the U.S. Bureau of Reclamation has identified several historic artifacts not mentioned in the Cultural Resource Survey (U.S. BOR, 1998a). Most of the historic and cultural resources associated with the historic Summitville Mine site have been previously destroyed. Remaining historic artifacts will not be disturbed by reclamation activities and they will be avoided during implementation of the final remedy.

Endangered Species

The Endangered Species Act requires that Federal agencies ensure that Federal actions will not jeopardize the continued existence of any threatened or endangered species or impact critical habitat. The lands surrounding the Summitville Mine site are habitat to a number of animals including deer, elk, pica, marmot, cottontail, song birds, raptors, and occasionally bighorn sheep, mountain goat, black bear, and mountain lion. Wildlife is minimal, or absent, from the disturbed areas of the site. Threatened and Endangered Species are not known to be present in the vicinity of the mine site (U.S. BOR, 1998a).

The Wilderness Act, however, is not an ARAR because implementation of the final remedial action will not occur in a designated wilderness area.

Protection of Floodplains and Wetlands

Executive Order No. 11988 and Executive Order No. 11990 requires Federal agencies to evaluate the potential adverse effects of proposed actions on Floodplains and Wetlands, respectively. Floodplains and wetlands potentially subjected to adverse impacts from site remedial actions will be inventoried and considered during the analysis, selection, and implementation of the final remedy.

E.5 COMPLIANCE OF REMEDIAL ALTERNATIVES WITH ARARs

According to the National Contingency Plan, 40 CFR § 300.430 (e)(9), remedial alternatives are evaluated in the Feasibility Study using nine criteria. Among the evaluation criteria is "Compliance

with ARARs." As a threshold matter, alternatives are evaluated to determine whether they attain ARARs under Federal environmental laws and State environmental or facility siting laws, or provide grounds for invoking one of the waivers.

ARARs that may significantly affect the final remedy at the site include chemical- and action-specific ARARs; no location-specific ARARs have been identified that would significantly affect the final remedy. An evaluation of the remedial alternative compliance with chemical-specific ARARs was performed using the Colorado Water Quality Standards (CWQSs), as applied to Alamosa River Stream Segment 3c. Segment 3c of the Alamosa River is the offsite point of the compliance for the final remedial action (Figure E.1). The evaluation focused on predicted copper concentrations from the reactive transport modeling, as copper is the primary environmental risk driver in the Alamosa River system downstream of the site. Compliance with water quality standards for most of the other contaminants of concern derived from the site is expected to be similar, or better, than copper. The copper standard has historically been the most difficult standard to meet; therefore, its is reasonable to expect that if copper standards are met then standards for the other metal contaminants would also be met. The evaluation also included compliance with action-specific ARARs, which pertain to activities and operations at the site. Results of the ARAR compliance evaluation of remedial alternatives is summarized in Table E.6.

Colorado Water Quality Standards in Segment 3c of the Alamosa River will not be met under Alternative 1A (No Action), Alternative 1B (No Further Action/SDI breach), or Alternative 3 (*status quo*). Use of a large impoundment to passively treat acid mine drainage from the site, as proposed in Alternative 2, is unproven and unlikely to meet CWQSs in Segment 3c. Results of reactive transport modeling suggest that Alternatives 4 and 5, which include impoundment and treatment of contaminated water, could meet copper standards in Segment 3c under certain flow conditions. Achieving standards in Segment 3c for other contaminants under the same flow conditions is likely under these two alternatives.

Colorado Solid Waste Disposal Regulations may be applicable to Alternatives 3, 4 and 5 because of the sludge (solid waste) generated from water treatment that is proposed in all of these alternatives. Solid waste generation, transportation, and disposal for each of these remedial alternatives may be conducted pursuant to the regulations. These regulations, however, are not applicable to Alternatives 1A, 1B, and 2 because sludge will not be produced.

Storm water discharge is an ARAR applicable to all alternatives. Each alternative will comply with storm water discharge regulations. If required, a document similar in content to a Colorado Discharge Permit System Regulations (CDPSR) permit will be drafted to regulate storm water discharges from the site.

Minimizing or eliminating pollutant discharge is an ARAR that is applicable to alternatives that incorporate water treatment. Alternative 2 uses passive treatment, and Alternatives 3, 4, and 5 use active water treatment. Each of these alternatives will comply with pollutant discharge ARARs by meeting the substantive requirements for discharging treated effluent. If necessary, a document similar in content to a NPDES permit will be drafted to regulate pollutant discharges.

Rules and regulations for either dam modification, breaching, or new construction are applicable to each of the remedial alternatives that include a dam as a component. Each of these remedial alternatives will comply with ARARs related to dam safety and construction.

Water rights appropriation, determination, and administration requirements are applicable to remedial alternatives that impound water (Alternatives 1A, 2, 3, 4, and 5). These remedial alternatives will comply with the Colorado appropriation system. Water rights ARARs are not applicable to Alternative 1B.

The ARAR for passive treatment of mine drainage control is applicable to all remedial alternatives, because all alternatives maintain bulkheads in the Reynolds and Chandler Adits which is included in the definition of passive treatment. Each of the remedial alternatives would comply with the substantive regulations for passive treatment.

E.6 WAIVER OF ARARs

As explained more fully in Section E.1, CERCLA provides that under certain circumstances, ARARs may be waived. In this case, it is proposed that certain State of Colorado surface water standards be waived based on technical impracticability. Specifically, it is proposed that certain numeric standards and the use classifications for Alamosa River Segment 3b (mouth of Wightman Fork to Town of Jasper) and Segment 6 (Wightman Fork) be waived (Figure E.1). The specific requirements are contained in Classifications and Numeric Standards for Rio Grande Basin, CCR 1002-36. The current use classifications for Segment 3b and 6 are Class 1 - Cold Water Aquatic Life and agriculture, respectively.

E.6.1 Segment 3b

The justification for invoking a use classification waiver for Segment 3b is the analysis performed in the UAA. The UAA demonstrated that the currently assigned aquatic life use classification of Class. 1 - Cold Water for Segment 3b is unattainable due to the presence of naturally occurring mineralized terrains upstream of Wightman Fork that contribute metals and acidity to the Alamosa River. Waiver of certain numeric water quality standards for Segment 3b, cited in Classifications and Numeric Standards for Rio Grande Basin, CCR 1002-36, is also proposed. The UAA demonstrated that considerable acidity, and aluminum and iron loading originates in the Alamosa River basin upstream of Wightman Fork. The source of the acidity and metals is drainage from naturally-occurring, mineralized terrains in the Iron, Alum, and Bitter Creek drainages. The naturally-occurring sources pre-date mining in the area and have resulted in impaired background conditions. Furthermore, several abandoned mines are located in this upper region of the Alamosa River that have been reported to discharge acid mine drainage. These sources result in a, degradation of Alamosa River water quality that ultimately affects the Alamosa River downstream of Wightman Fork. Recent sampling of the Alamosa River has confirmed that sources upstream of Wightman Fork are the primary contributors of aluminum and iron to the mainstem of the Alamosa River (RMC, 2001b). Therefore, its is proposed that the numeric standards for aluminum, iron, and pH be waived for Segment 3b. It is the intent that copper and other metal standards that are not waived at this time will be met.

CERCLA Circumstance No. 3 "technically impracticable" is the statutory basis for waiver of use classification of Class 1 - Cold Water Aquatic Life and the aluminum, iron, and pH numeric standards for Segment 3b. Technical impracticability is defined in CERCLA 121(d)(4)(C) when "compliance is not feasible from an engineering standpoint or because of excessive costs, particularly in relation to performance." Remediation or engineering controls at the Summitville Mine site will be incapable of achieving the aquatic life use classification and water quality standards for aluminum, iron, and pH in Segment 3b. Therefore, a technical impracticability waiver is justified.

E.6.2 Segment 6

Waiver of the agricultural use classification for Segment 6 is proposed primarily because of the inability of the final remedy to meet the agricultural manganese standard. The agricultural use classification for Segment 6 (Figure 1-1) would be waived pursuant to CERCLA § 121(d)(4)(C), technical impracticability. The basis for this waiver is that naturally occurring drainage upstream of the site contains manganese concentrations that would prevent meeting the current agricultural manganese standard in Segment 6. The manganese agricultural standard for the Rio Grande Basin is currently 200 µg/L (5 CCR 1002-36). Review of water quality data from upper Cropsy Creek and upper Wightman Fork, areas that are upstream of the site and not impacted by mining activities, shows that these areas contribute sufficient manganese to exceed the agricultural standard for manganese. The manganese from these areas would have caused the agricultural standard to be exceeded in one-half of the monitoring events during 2000. The source of the manganese is acid rock drainage from mineralized terrains in upper Cropsy-Creek and Wightman Fork that ultimately flows into Segment 6. Remediation or engineering controls at the site will be incapable overcoming this condition. Therefore, a technical impracticability waiver of the agricultural use classification for Segment 6 is justified

E.6.3 Other Segments

Waiver of use classification and numeric standards for other segments of the Alamosa River is not proposed at this time. Segment 3c of the Alamosa River is the offsite point of compliance for the final remedial action and no waivers are proposed for this segment. No waivers are proposed for the remaining mainstem Alamosa River Segments 8, 9, and 10 (Figure E.1). Although waivers are not proposed for these segments at this time, it is possible that future waivers may be requested. The basis for requesting future waivers will be from continued data collection at the mine site and in the Alamosa River basin. Should conditions change that would require waiver of additional use classifications or numeric standards, waivers would be requested at that time. Additionally, as the final remedy at the site is implemented and its effectiveness is monitored, future waivers may be appropriate. CERCLA (40 CFR Part 3000.430 (f)(4)(ii)) requires five-year reviews of remedial actions at Superfund sites, and future waivers may be requested based on the outcome of the reviews.

Waiver of additional standards are under consideration, but not proposed at this time. These include: 1) numeric standards for copper and zinc in Segment 3b; and 2) the numeric standard for manganese in Segments 8, 9, and 10. The right to invoke waivers for these, or possible other standards, is reserved pending future data collection and monitoring of the final remedial action at the site. The appropriate time when possible waiver of additional use classifications or numeric standards would be at the time of the CERCLA five-year review.

TABLE E.1

STREAM CLASSIFICATION AND WATER QUALITY STANDARDS FOR THE ALAMOSA RIVER BASIN (5 CCR 1002-36)

Stream Segment Description	Desig.	Classifications	Numeric Standards						Temporary Modifications and Qualifiers
			Physical and Biological	Inorganic (mg/l)		Metals (ug/l)			
1. All tributaries to the Rio Grande, including all wetlands, lakes and reservoirs which are within the South San Juan Wilderness Area		Aq Life Cold 1 Recreation 2 Water Supply Agricultural	D.O.=6.0 mg/l D.O.(sp)=7.0 mg/l pH=6.5-9.0 F.Coli=200/100ml	NH_3(ac)=TVS NH_3(ch)=0.02 Cl_2(ac)=0.019 Cl_2(ch)=0.011 CN=0.005	S=0.002 B-0.75 NO_2=0.05 NO_3=10 CI=250 SO_4=250	As(ac)=50(TR) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(TR) CrVI(ac)/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=300(dis) Fe(ch)=1000(TR) Pb(ac/ch)=TVS Mn(ch)=50 Hg(ch)=.01(TR) Ni(ac/ch)=TVS	Se(ac)=10(TR) Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	
2. Mainstem of the Alamosa River including all tributaries, wetlands, lakes, and reservoirs from the source to immediately above confluence with Alum Creek, except for the specific listings in Segment 1		Aq Life Cold 1 Recreation 2 Water Supply Agricultural	D.O.=6.0 mg/l D.O.(sp)=7.0 mg/l pH=6.5-9.0 F.Coli=200/100ml	NH_3(ac)=TVS NH_3(ch)=0.02 Cl_2(ac)=0.019 Cl_2(ch)=0.011 CN=0.005	S=0.002 B-0.75 NO_2=0.05 NO_3=10 CI=250 SO_4=250	As(ac)=50(TR) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(TR) CrVI(ac)/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=300(dis) Fe(ch)=1000(TR) Pb(ac/ch)=TVS Mn(ch)=50 Hg(ch)=.01(TR) Ni(ac/ch)=TVS	Se(ac)=10(TR) Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	
3a. Mainstrem of Alamosa River from immediatly above the confluence with Alum Creek to immediately above the confluence with Wightman Fork	UP	Aq Life Cold 2 Recreation 2 Agricultural	D.O.=6.0 mg/l D.O.(sp)=7.0 mg/l F.Coli=200/100ml **Seasonal Stds.** **12/1-2/28** pH=3.52-9.0 **3/1-5/31** pH=4.0-9.0 **6/1-8/31** pH=4.73-9.0 **9/1-11/31** pH=3.94-9.0	NH_3(ac)=TVS NH_3(ch)=0.02 Cl_2(ac)=0.019 Cl_2(ch)=0.011 CN=0.005	S=0.002 B–0.75 NO_2=0.05	Al(ac)=750 As(ch)=100(TR) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(TR) CrVI(ac)/ch)=TVS	Cu(ac)=TVS Fe(ch)=12000(TR) Pb(ac/ch)=TVS Mn(ac/ch)=TVS Hg(ch)=0.1(TR) Ni(ac/ch)=TVS	Se(ac/ch)=TVS Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	
3b. Mainstrem of Alamosa River from immediatly above the confluence with the Wightman fork to immediately above the confluence with Fern Creek	UP	Aq Life Cold 1 Recreation 2 Agricultural	D.O.=6.0 mg/l D.O.(sp)=7.0 mg/l pH=6.5-9.0 F.Coli=200/100ml	NH_3(ac)=TVS NH_3(ch)=0.02 Cl_2(ac)=0.019 Cl_2(ch)=0.011 CN=0.005	S=0.002 B-0.75 NO_2=0.05	Al(ac)=750 As(ah)=100(TR) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(TR CrVI(ac)/ch)=TVS	Cu(ac)=TVS Cu(ch)=30 Fe(ch)=12000(TR) Pb(ac/ch)=TVS Mn(ac/ch)=TVS Hg(ch)=.01(TR)	Ni(ac/ch)=TVS Se(ac/ch)=TVS Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS **Seasonal Stds.** **6/1-9/30** Al(ch)=87	

TABLE E.1 (cont.)

STREAM CLASSIFICATION AND WATER QUALITY STANDARDS FOR THE ALAMOSA RIVER (5 CCR 1002-36)

Stream Segment Description	Desig.	Classifications	Numeric Standards						Temporary Modifications and Qualifiers
			Physical and Biological	Inorganic (mg/l)		Metals (ug/l)			
3c. Mainstrem of the Alamosa River from immediately below the confluence with the Fern Creek to the inlet of Terrace Reservoir	UP	Aq Life Cold 1 Recreation 2 Agricultural	D.O.=6.0 mg/l D.O.(sp)=7.0 mg/l pH=6.5-9.0 F.Coli=200/100ml	NH_3(ac)=TVS NH_3(ch)=0.02 Cl_2(ac)=0.019 Cl_2(ch)=0.011 CN=0.005	S=0.002 B-0.75 NO_2=0.05	Al(ac)=750 Al(ch)=87 As(ch)=100(TR) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(TR)	CrVI(ac)/ch)=TVS Cu(ac/ch)=TVS Fe(ch)=12000(TR) Pb(ac/ch)=TVS Mn(ac/ch)=TVS Hg(ch)=.01(TR)	Ni(ac/ch)=TVS Se(ac/ch)=TVS Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	
4a. Mainstrem of Alum Creek, Bitter Creek, Burnt Creek and Iron Creek from their sources to their confluences with the Alamosa River whit the exception of 4b	UP	Recreation 2 Agricultural	pH=2.5-9.0 F.Coli=200/100ml						
4b. Mainstrem of Iron Creek from its source to immediately above the confluence with Tributary G.		Aq Life Cold 1 Recreation 2 Agricultural	D.O.=6.0 mg/l D.O.(sp)=7.0 mg/l pH=6.5-9.0 F.Coli=200/100ml	NH_3(ac)=TVS NH_3(ch)=0.02 CL_2(ac)=0.019 Cl_2(ch)=0.011 CN=0.005	S=0.002 B-0.75 NO_2=0.05	As(ch)=100(TR) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(TR) CrVI(ac)/ch)=TVS	Cu(ac/ch)=TVS Fe(ch)=1000(TR) Pb(ac/ch)=TVS Mn(ac/ch)=TVS Hg(ch)=.01(TR)	Ni(ac/ch)=TVS Se(ac/ch)=TVS Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	
5. Mainstrem of Winghtman Fork from source to west line of S30, T37N, R4E, including all tributaries and wetlands		Aq Life Cold 2 Recreation 2 Agricultural	pH=6.0-9.0 F.Coli=200/100ml	NH_3(ac)=TVS NH_3(ch)=0.02 Cl_2(ac)=0.019 Cl_2(ch)=0.011 CN=0.005	S=0.002 B-0.75 NO_2=0.05	As(ac)=50(TR) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(TR) CrVI(ac)/ch)=TVS	Cu(ac/ch)=TVS Fe(ch)=1000(TR) Pb(ac/ch)=TVS Mn(ac/ch)=TVS Hg(ch)=.01(TR) Ni(ac/ch)=TVS	Se(ac/ch)=TVS Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	
6. Mainstrem of Winghtman Fork from the west line of S30, T37N, R4E to the confluence with the Alamosa River	UP	Recreation 2 Agricultural	F.Coli=200/100ml						
7. Jasper Creek, including all tributaries and wetlands, from the source to the confluence with the Alamosa River	UP	Aq Life Cold 2 Recreation 2 Agricultural	D.O.=6.0 mg/l D.O.(sp)=7.0 mg/l pH=5.5-9.0 F.Coli=200/100ml	NH_3(ac)=TVS NH_3(ch)=0.02 Cl_2(ac)=0.019 Cl_2(ch)=0.011 CN=0.005	S=0.002 B-0.75 NO_2=0.05	As(ch)=50 Cd(ch)=1 CrIII(ch)=100 CrVI(ch)=25 Cu(ch)=90 Cu(ac/ch)=TVS	Fe(ch)=3400 Pb(ch)=4 Mn(ch)=1000 Hg(ch)=0.05 Ni(ch)=5	Se(ch)=20 Ag(ch)=0.1 Zn(ch)=170	All metals are Total Recoverable (TR) unless otherwise noted
8. Terrace Reservoir	UP	Aq Life Cold 2 Recreation 2 Agricultural	D.O.=6.0 mg/l D.O.(sp)=7.0 mg/l pH=6.5-9.0 F.Coli=200/100ml	NH_3(ac)=TVS NH_3(ch)=0.02 Cl_2(ac)=0.019 Cl_2(ch)=0.011 CN=0.005	S=0.002 B-0.75 NO_2=0.05 NO_3=10 Cl=250 SO_4=250	Al(ac)=750 Al(ch)=87 As(ch)=100(TR) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(TR)	CrVI(ac)/ch)=TVS Cu(ac/ch)=TVS Fe(ch)=300(dis) Fe(ch)=1000(TR) Pb(ac/ch)=TVS Mn(ac/ch)=TVS	Hg(ch)=.01(TR) Ni(ac/ch)=TVS Se(ac/ch)=TVS Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	

TABLE E.1 (cont.)

STREAM CLASSIFICATION AND WATER QUALITY STANDARDS FOR THE ALAMOSA RIVER (5 CCR 1002-36)

Stream Segment Description	Desig.	Classifications	Numeric Standards						Temporary Modifications and Qualifiers
			Physical and Biological	Inorganic (mg/l)		Metals (ug/l)			
9. Mainstrem of the Alamosa River from the outlet of Terrance Reservoir to Colorado Highway 15 (Gunbarrel Road)	UP	Aq Life Cold 1 Recreation 2 Agricultural	D.O.=6.0 mg/l D.O.(sp)=7.0 mg/l pH=6.5-9.0 F.Coli=200/100ml	NH_3(ac)=TVS NH_3(ch)=0.02 Cl_2(ac)=0.019 Cl_2(ch)=0.011 CN=0.005	S=0.002 B-0.75 NO_2=0.05	Al(ac)=750 Al(ch)=87 As(ch)=100(TR) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(TR)	CrVI(ac)/ch)=TVS Cu(ac/ch)=TVS Fe(ch)=1000(TR) Pb(ac/ch)=TVS Mn(ch)=200 Hg(ch)=.01(TR)	Ni(ac/ch)=TVS Se(ac/ch)=TVS Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	
10. Mainstrem of Alamosa River from Colorado Highway 15 (Gunbarrel Road) to its point of final diversion.	UP	Aq Life Cold 2 Recreation 2 Agricultural	D.O.=6.0 mg/l D.O.(sp)=7.0 mg/l pH=6.5-9.0 F.Coli=200/100ml	NH_3(ac)=TVS NH_3(ch)=0.02 Cl_2(ac)=0.019 Cl_2(ch)=0.011 CN=0.005	S=0.002 B-0.75 NO_2=0.05	Al(ac)=750 Al(Ph)=87 As(ch)=100(TR) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(TR)	CrVI(ac)/ch)=TVS Cu(ac/ch)=TVS Fe(ch)=1000(TR) Pb(ac/ch)=TVS Mn(ch)=200 Hg(ch)=.01(TR)	Ni(ac/ch)=TVS Se(ac/ch)=TVS Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	

TABLE VALUE STANDARDS[1]

Parameter[2]	***Table Value Standards***[3,4]
Ammonia	Cold Water Acute = 0.43/FT/FPH/2[5] in mg/L
Cadmium	Acute = $e^{(1.128[\ln(\text{hardness})]-2.905)}$ (Trout) = $e^{(1.128[\ln(\text{hardness})]-3.828)}$ Chronic = $e^{(0.7852[\ln(\text{hardness})]-3.490)}$
Chromium III	Acute = $e^{(0.819[\ln(\text{hardness})]+3.688)}$ Chronic = $e^{(0.819[\text{in}(\text{hardness})]+1.561)}$
Chromium VI	Acute = 16 Chronic = 11
Copper	Acute = $e^{(0.9422[\ln(\text{hardness})]-1.4634)}$ Chronic = $e^{(0,8545[\text{in}(\text{hardness})]-1.465)}$
Lead	Acute = $e^{(1.6148[\ln(\text{hardness})]-2.8736)}$ Chronic = $e^{(1.417[\ln(\text{hardness})]-5.167)}$

Parameter[2]	***Table Value Standards***[3,4]
Manganese	Acute = $e^{(0.7693[\ln(\text{hardness})]+4.4995)}$ Chronic = $e^{(0.5434[\ln(\text{hardness})]+4.785)}$
Nickel	Acute = $e^{(0.76[\ln(\text{hardness})]+3.33)}$ Chronic = $e^{(0.16[\ln(\text{hardness})]+1.06)}$
Selenium	Acute = 135 Chronic = 17
Silver	Acute = $e^{(1,72(\ln(\text{hardness})]-721)}$ Chronic = $e^{(1.72[\ln(\text{hardness})]-9.06)}$ (Trout) = $e^{(1.72[\ln(\text{hardness})]-10.51)}$
Uranium	Acute = $e^{(1.102[\ln(\text{hardness})]+2.7088)}$ Chronic = $e^{(1.102\ [\ln(\text{hardness})]+2.2382)}$
Zinc	Acute = $e^{(0.8473[\ln(\text{hardness})]+0.8604)}$ Chronic = $e^{(0.8473[\ln(\text{hardness})]+0.7614)}$

TABLE E.1 (cont.)

STREAM CLASSIFICATION AND WATER QUALITY STANDARDS FOR THE ALAMOSA RIVER (5 CCR 1002-36)

1 In certain instances the designation "TVS" is used to indicate that for a particular parameter a "table value standard" has been adopted. This designation refers to numerical criteria set forth in the Basic Standards and Methodologies for Surface Water (5 CCR 1002-31). Note"TVS(tr)" refers to trout TVS.

2 Metals are stated as dissolved unless otherwise specified (i.e., TR = total recoverable).

3 Hardness values to be used in equations are in mg/I as calcium carbonate. The hardness values used in calculating the appropriate metal standard should be based on the lower 95 percent confidence limit of the mean hardness value at the periodic low flow criteria as determined from a regression analysis of site-specific data. Where insufficient site-specific data exists. to define the mean hardness value at the periodic low flow criteria, representative regional data shall be used to perform the regression analysis. Where a regression analysis is not appropriate, a site-specific method should be used. In calculating a hardness value, regression analyses should not be extrapolated past the point that data exist.

4 Both acute and chronic numbers adopted as stream standards are levels not to be exceeded more than once every three years on the average.

5 $FT = 10^{.03(20-TCAP)}$; TCAP less than or equal to T less than or equal to 30
$FT = 10^{.03(20-T)}$; 0 less or equal to T less than or equal to TCAP
TCAP = 20° C cold water aquatic life species present
TCAP = 25° C cold water aquatic life species absent
FPH = 1; 8 less than pH less than or equal to 9
$FPH = \frac{1 + 10^{(7.4-PH)}}{1.25}$; 6.5 less than or equal to pH less than or equal to 8

FPH means the acute pH adjustment factor, defined by the above formulas
FT means the acute temperature adjustment factor, defined by the above formulas
T means temperature measured in degrees celsius
TCAP means temperature CAP; the maximum temperature which affects the toxicity of ammonia to salmonid and non-salmonid fish groups.

NOTE: If the calculated acute value is less than the calculated chronic value, then the calculated chronic value shall be used as the acute standard.

TABLE E.2

SUMMARY OF CHEMICAL-SPECIFIC ARARs SELECTED FOR THE FINAL REMEDIAL ACTION

Standard, Requirement, Criteria, or Limitation	Citation	Applicable or Relevant and Appropriate	Description/Comments
Federal Water Quality Criteria	40 CFR Part 131 Quality Criteria for Water, 1986, pursuant to 33 USC § 1314	Relevant and Appropriate	Sets standards for surface water to protect aquatic life and human health. See Section E.4.1.1.
Colorado Water Quality Standards	5 CCR 1002-31, §§ 31.11	Applicable	Sets standards and classifications for surface water. Primary ARAR for final remedy. See Section E.4.1.1.
Colorado Classification and Numeric Standards for Rio Grande Basin	5 CCR 1002-36	Applicable	Classification and numeric standards for the San Juan and Rio Grande Rivers, including tributaries and standing bodies of water. Classification identifies actual beneficial uses of water and allowable concentrations of various parameters. See Section E.4.1.1.
Basic Standards and Methodology for Surface Water	5 CCR 1002-31	Applicable	Provides basic standards, antidegradation rule, implementation process, and system for classifying surface water, assigning water quality standards and review of classifications and standards.
Colorado Groundwater Standards	5 CCR 1002-41 §§ 41.4 and 41.5	To Be Considered	Sets standards for contaminants in groundwater. Applicable only to protect surface water. See Section E.4.1.2.
Clean Air Act, National Primary and Secondary Ambient Air Quality Standards	40 CFR Part 50, pursuant to 42 USC § 7409 State: CRS § 25-7-108, 5. CRR 1001-14	Applicable	Sets standards for air emissions.
Colorado Air Pollution Prevention and Control Act	5 CCR 1001-10 Part CO) and (II), Reg. 8	Applicable	Same as above.
Proposed Soil Remediation Objectives Policy Document	CDPHE HMWMD, December 31, 1997	To Be Considered	Proposes guidance in establishing soil cleanup standards.
Provisional Implementation Guidance for Determining Sediment Deposition Impacts to Aquatic Life in Streams and Rivers	Colorado Water Quality Control Commission Policy 98-1, June 1998	To Be Considered	Guidance for assessing impacts to aquatic life and habitat conditions caused by human induced erosion and deposition of materials in aquatic systems.

TABLE E.3

SUMMARY OF ACTION-SPECIFIC ARARs SELECTED FOR THE FINAL REMEDIAL ACTION

Standard, Requirement, Criteria, or Limitation	Citation	Applicable or Relevant and Appropriate	Description/Comments
Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act of 1976 (RCRA)	40 CFR Part 257, Subpart A: § 257.1-1 Floodplains, paragraph (a); § 257.3-7 Air, paragraph (b)	Applicable	Regulates the storage and handling of solid waste.
Colorado Solid Waste Disposal Sites and Facilities Act	6 CCR 1007-2, pursuant to CRS § 30-20-101, et.seq.	Applicable	Establishes standards for the licensing, locating, constructing, and operating solid waste facilities. Water treatment sludge is a solid waste. See Section E.4.2.
Guidelines for the Land Disposa of Solid Wastes	40 CFR Part 241, pursuant to 42 USC § 6901, et.seq.	To Be Considered	Regulates the land disposal of solid waste.
Guidelines for the Storage and Collection of Residential, Commercial, and Institutional Solid Waste	40 CFR Part 243, pursuant to 42 USC § 6901, et.seq.	To Be Considered	Establishes guidelines for the collection of residential, commercial, and institutional solid waste.
Guidelines for Development and Implementation of State Solid Waste Management Plans	40 CFR Part 256, pursuant to 42 USC § 6901, et.seq.	To Be Considered	Establishes guidelines for Federal approval of State solid waste management programs.
Criteria for Classification of Solid Waste Disposal Facilities and Practices	40 CFR Part 257, pursuant to 42 USC § 6901, et.seq.	Applicable	Establishes criteria for solid waste disposal facilities and solid waste management. See Section E.4.2.
Identification and Listing of Hazardous Waste	40 CFR Part 261, pursuant to 42 USC § 6921 State: 6 CCR 1007-3 Part 261, pursuant to CRS § 25-15-302	Applicable	Establishes the procedures and process for listing and determining hazardous waste.
National Pollutant Discharge Elimination System	40 CFR Parts 122, 125, pursuant to 33 USC § 1342	Relevant and Appropriate	Regulates the discharge of treated effluent and storm water runoff to waters of the U.S. See Section E.4.2.
Effluent Limitations	40 CFR Part 440, pursuant to 33 USC § 1311; State: 5 CCR 1002-3, §§ 10.1 to 10.1.7, pursuant to CRS § 25-8-503	Relevant and Appropriate	Sets standards for discharge of treated effluent to waters of the U.S. and State of Colorado.

TABLE E.3 (cont.)

SUMMARY OF ACTION-SPECIFIC ARARs SELECTED FOR THE FINAL REMEDIAL ACTION

Standard, Requirement, Criteria, or Limitation	Citation	Applicable or Relevant and Appropriate	Description/Comments
Colorado Mined Land Reclamation Act	CRS 34-32-101 to 125 Rule 3 of Mineral Rules and Regulations	Applicable	Regulates all aspects of mining, including reclamation plans and socioeconomic impacts. See Section E.4.2.
Colorado Discharge Permit System	CCR 1002-61	Applicable	Implementation of the Colorado Water Quality Control Act, and applies to operations discharging to waters of the state from a point source. See Section E.4.2.
Colorado Water Quality Control Act. Storm Water Discharge Regulations	5 CCR 1002-61	Applicable	Regulates discharge of storm water during construction activities. See Section E.4.2.
Regulations on the Collection of Aquatic Life	2 CCR 406-8. Ch. 13, Article Ill, Section 1316	Applicable	Establishes requirements for collection of biological samples.
Protection of Fishing Streams	CRS 33-5-101 - 107	Applicable	Establishes notification requirements for modifications to streams.
Appropriation and Use of Water	CRS 37-82-101 - 106	Applicable	Establishes rights to water in the State of Colorado. See Section E.4.2.
Occupational Safety and Health Act	29 USC §§ 651-678	Applicable	Regulates worker health and safety.
Reservoirs and Rules and Regulations for Dam Safety and Dam Construction	CRS 37-87-101 - 125, 37-80-(11k), and 24-4-103	Applicable	Establishes rules and regulations for the design, construction, and operation of dams and reservoirs. See Section E.4.2.
Water Rights Determination and Administration	CRS 37-92-101 - 602	Applicable	Administers Colorado water rights. See Section E.4.2.
Colorado Air Pollution Prevention and Control Act	5 CCR 1001-3; Section III.D.1.b.c.d; Sections II.D. 2.b.c.e.f.g.; Reg. 1	Applicable	Regulates fugitive emissions during construction.
Colorado Air Pollution Prevention and Control Act	5 CCR 1001-5, Regulation 3 APENs	Applicable	Establishes requirements for obtaining permits.
Colorado Air Pollution Prevention and Control Act	5 CCR 1001-4, Regulation 2 Odors	Applicable	Regulates generation of odors.

TABLE E.3 (cont.)

SUMMARY OF ACTION-SPECIFIC ARARs SELECTED FOR THE FINAL REMEDIAL ACTION

Standard, Requirement, Criteria, or Limitation	Citation	Applicable or Relevant and Appropriate	Description/Comments
Colorado Passive Treatment of Mine Drainage Control Regulation	5 CCR 1002-83, Regulation No. 83	Applicable	Regulates passive mine drainage treatment systems. See Section E.4.2.

TABLE E.4

SUMMARY OF LOCATION-SPECIFIC ARARs SELECTED FOR THE FINAL REMEDIAL ACTION

Standard, Requirement, Criteria, or Limitation	Citation	Applicable or Relevant and Appropriate	Description/Comments
National Historic Preservation Act (NHPA)	16 USC § 470 et seq. A portion of 40 CFR § 6.301 (b), 30 CFR Part 63, Part 65, Part 800	Applicable	Regulates impacts to historic places and structures. Summitville Town site protection will be required.
Colorado Register of Historic Places	CRS §§ 24-80.1-101 to 108	Applicable	The State historic preservation officer reviews potential impacts to historic places and structures.
The Historic and Archaeological Data Preservation Act of 1974	16 USC 469 40 CFR § 6.301(c)	Applicable	Protects sites with archeological significance.
Historic Sites Act of 1935, Executive Order 11593	16 USC §§ 461 et.seq. 40 CFR § 6.301(a)	Applicable	Regulates designation and, protection of historic places.
The Archaeological Resources Protection Act of 1979	16 USC §§ 470aa-47011	Applicable	Regulates removal of archeological resources from public or tribal lands.
Colorado Historical, Prehistorical, and Archaeological Resources Act	CRS §§ 24-80-401 to 410 1301 to 1305	Applicable	Regulates prehistoric and archeological resources on State lands.
Executive Order No. 11990 Protection of Wetlands	40 CFR § 6.302(a) and Appendix A	Applicable	Minimizes impacts to wetlands.
Executive Order No. 11988 Floodplain Management	40 CFR § 6.302 and Appendix A	Applicable	Regulates construction in floodplains.
Section 404, Clean Water Act (CWA)	33 USC 1251 et seq. 33 CFR Part 330	Applicable	Regulates discharge of dredge or fill materials into waters of the U.S.
Fish and Wildlife Coordination Act	16 USC § 661 et seq. 40 CFR § 6.302(g)	Applicable	Requires coordination with Federal and State agencies to provide protection of fish and wildlife.
Endangered Species Act	16 USC §§ 1531-1543 50 CFR Parts 17, 402 40 CFR § 6.302(b)	Applicable	Regulates the protection of threatened or endangered species.
Non-game, Endangered, or Threatened Species Act	CRS §§ 33-2-101 to 108	Applicable	Standards for regulation of non-game wildlife and threatened and endangered species.

TABLE E.4 (cont.)

SUMMARY OF LOCATION-SPECIFIC ARARs SELECTED FOR THE FINAL REMEDIAL ACTION

Standard, Requirement, Criteria, or Limitation	Citation	Applicable or Relevant and Appropriate	Description/Comments
Colorado Natural Areas	Colorado Revised Statutes, Title 33 Article 33, Section 104	Applicable	Maintains a list of plant species of "special concern". Recommends coordination among Division of Parks and Outdoor Recreation.
Colorado Species of Special Concern and Species of Undetermined Status	Colorado Division of Wildlife Administrative Directive E-1, 1985, modified	Applicable	Protects species listed on the Colorado Division of Wildlife generated list.
Colorado Wildlife Enforcement and Penalties	CRS §§ 33-1-101, et.seq.	Applicable	Prohibits actions detrimental to wildlife.
Wildlife Commission Regulations	2 CCR 405-0	Applicable	Establishes specific requirements for protection of wildlife.
Wild and Scenic Rivers Act	16 USC §§ 1271-1287 40 CFR § 6.302(e) 36 CFR Part 297	Applicable	Establishes requirements to protect wild, scenic, or recreational rivers.

TABLE E.5

SUMMARY OF ARARs THAT HAVE BEEN EVALUATED
BUT ARE *NOT* APPLICABLE TO THE FINAL REMEDIAL ACTION

Standard, Requirement, Criteria, or Limitation	Citation	Description/Rationale
Chemical-Specific ARARs		
National Drinking Water Standards	40 CFR Part 141, Subpart B pursuant to 42 USC §§ 300g-1. and 300j-9	Regulates drinking water quality. No public drinking water supplies are present.
Maximum Contaminant Level Goals	40 CFR Part 141, Subpart F, pursuant to 42 USC § 300g-1	Sets goals for drinking water contaminants. No public drinking water supplies are present.
National Secondary Drinking Water Standards	40 CFR Part 143, purs uant to 42 USC §§ 300g-1(c) and 300j-9	Sets non-enforceable standards for drinking water. No public drinking water supplies are present.
Colorado Primary Drinking Water Standards	5 CCR 1003-1 pursuant to CRS § 25-1-101(1)(x)	Sets non-enforceable standards for drinking water. No public drinking water supplies are present.
Colorado Secondary Drinking Water Standards		Sets non-enforceable standards for drinking water. No public drinking water supplies are present.
Federal Total Maximum Daily Loads	Clean Water Act 33 USC 1313; 40 CFR Part 130.7	Requires states to identify impaired waters and to establish total maximum daily loads to ensure that water quality standards can be attained. At present, TMDLs have not been promulgated; therefore, they are not ARARs.
RCRA Subtitle C Groundwater Protection Standards	40 CFR 264.92-264.101	Sets standards for groundwater at RCRA facilities. The site is not a RCRA Subtitle C facility and the standards do not apply.
National Emission Standards for Hazardous Air Pollutants	40 CFR Part 61, Subparts N, 0, P, pursuant to 42 USC § 7412	Regulates emission of hazardous chemicals to the atmosphere. No hazardous emissions are present.
Colorado Emission Standards for Hazardous Air Pollutants	CRS § 25-7-108, 5 CCR 1001-10	Regulates emission of hazardous chemicals to the atmosphere. No hazardous emissions are present.
Toxic Substances Control Act, PCB Spill Cleanup Policy	52 FR 10688 April 2, 1987	Regulates hazardous materials from manufacture to disposal. PCBs are not present.
Interim Guidance on Establishing Soil Lead Cleanup Levels at Superfund Sites	EPA Directive #9355.4-12, July 1994	Suggests levels for lead in soil. This factor would be considered if lead is found in elevated levels in soil, but lead has not been found at elevated levels.

TABLE E.5 (cont.)

SUMMARY OF ARARs THAT HAVE BEEN EVALUATED
BUT ARE *NOT* APPLICABLE TO THE FINAL REMEDIAL ACTION

Standard, Requirement, Criteria, or Limitation	Citation	Description/Rationale
Action-Specific ARARs		
RCRA Subtitle C	40 CFR Part 261.4(b)(7) and RCRA Section 3001(b) (Beville Amendment)	Regulates disposal of hazardous materials. Applicable for disposal of listed wastes and sludges. Relevant and appropriate for disposal of hazardous mine waste, but site wastes have been tested and are not hazardous.
Colorado Hazardous Waste Regulations	6 CCR 1007-3, Part 264	Regulates the siting, construction, operation, and maintenance of hazardous waste disposal facilities. Site wastes have been tested and found to be no-hazardous.
Source Separation for Materials Recovery Guidelines	40 CFR Part 246, pursuant to 42 USC § 6901, et.seq.	Outlines requirements and recommended procedures for source separation of solid waste Separation of solid waste is not proposed for the final remedy.
Standards Applicable to Generation of Hazardous Waste	40 CFR Part 262, pursuant to 42 USC § 6922 State: 6 CCR 1007-3 Part 262, pursuant to CRS § 25-15-302	Establishes standards for the generation of hazardous waste. Hazardous waste is not expected to be produced.
Standards Applicable to Transporters of Hazardous Waste	40 CFR Part 263, pursuant to 42 USC § 6823 State: 6 CCR 1007-3 Part 263, pursuant to CRS § 25-15-302, 4 CCR 723-18	Regulates the transportation of hazardous waste. Hazardous waste is not expected to be produced and transported.
Hazardous Materials Transportation Act, D.O.T. Hazardous Materials Transportation , Regulations	49 USC §§ 1801-1813 49 CFR Parts 107, 171-177	Regulates the transportation of hazardous materials. Hazardous waste is not expected to be produced and transported.
Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities	40 CFR Part 264, pursuant to 42 USC § 6924, 6925 State: 6 CCR 1007-3 Part 264, Subparts B, C, D, E, F, G, K, L, and N, pursuant to CRS § 25-15-302	General regulations for the design, operation, and maintenance of hazardous waste treatment, storage and disposal facilities. Hazardous waste is not expected to be produced and disposed.
Interim Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities	40 CFR Part 265 State: 6 CCR 1007-3 Part 265	Establishes standard for TSD facilities during interim status. Hazardous waste is not expected to be produced and disposed.
Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities	40 CFR Part 266 State: 6 CCR 1007-3 Part 267	Establishes requirements for the recovery of precious metals from a waste stream. Hazardous waste is not expected to be produced.

TABLE E.5 (cont.).

SUMMARY OF ARARs THAT HAVE BEEN EVALUATED BUT ARE *NOT* APPLICABLE TO THE FINAL REMEDIAL ACTION

Standard, Requirement, Criteria, or Limitation	Citation	Description/Rationale
Interim Standards for Owners and Operators of New Hazardous Waste Land Disposal Facilities	40 CFR Part 267 State: 6 CCR 1007-3 Part 267	Establishes requirements for new hazardous waste land disposal facilities. Hazardous waste is not expected to be produced and disposed.
Hazardous Waste Permit Program	40 CFR Part 270 State: 6 CCR 1007-3 Part 100	Establishes procedures for obtaining U.S. EPA permit for hazardous waste management program. Hazardous waste is not expected to be produced and disposed.
Underground Storage Tanks	40 CFR Part 280	Establishes regulations for the monitoring, design, and construction of underground storage tanks. Underground tanks are not present nor proposed for the final remedy.
Underground Injection Control Regulations	40 CFR §§ 144.12, 144.24, and 144.25, pursuant to 42 USC § 123(e)(1)	Establishes requirements for injection of waste water into wells and aquifers. Underground injection is not proposed for the final remedy.
National Pretreatment Standards	40 CFR Part 403, pursuant to 33 USC § 1317	Sets standards for the discharge of effluent to publically owned treatment works. No publically owned treatment works are proposed.
Toxic Pollutant Effluent Standards	40 CFR Part 129, pursuant to 33 USC § 1317	Establishes standards or sets prohibitions for certain hazardous constituents. Toxic effluent will not occur from the final remedy.
Federal Mine Safety and Health Act	30 USC §§ 801-962	Regulates worker safety at active mine sites. The site is not an active mine.
Colorado Noise Abatement Statute	CRS §§ 25-12-101, eq.seq.	Establishes standards for controlling noise. Excessive noise in the remote setting of the site is not expected.
Location-Specific ARARs		
Wilderness Act	16 USC 1311, 16 USC 668 50 CFR 53, 50 CFR 27	Limits activities within areas designated as wilderness or National Wildlife Refuge. The site is not in a wilderness or wildlife refuge.

TABLE E.6

EVALUATION OF ARAR COMPLIANCE FOR REMEDIAL ALTERNATIVES

	Alternative 1A - No Action and Alternative 1B - No Further Action/SDI Breach	***Alternative 2 - Clean Water Diversion/New Dam Below WF-CC Confluence/Passive Water Treatment***	***Alternative 3 - Upgrade SDI/Existing WTP/Seasonal Treatment***	***Alternative 4 - Upgrade SDI/New WTP/Flexible Treatment Season***	***Alternative 5 - New Dam Above WF-CC Confluence/New WTP/Flexible Treatment Season***
Chemical-Specific ARARs					
Colorado Water Quality Standards; 5 CCR 1002-31, Section 31.11; Colorado Classification and Numeric Standards for Rio Grande Basin; CCR 1002-36	Will not meet copper standard in Alamosa River stream Segment 3c	Unknown if copper standard will be met in Alamosa River stream Segment 3c	Will not meet copper standard in Alamosa River stream Segment 3c	Modeling shows that copper standard could be met in Segment 3c under certain flow conditions	Modeling shows that copper standard could be met in Segment 3c under certain flow conditions
Federal Water Quality Criteria; 40 CFR Part 131 Quality Criteria for Water, 1986, persuant to 33 USC § 1314	Will not meet copper standard in Alamosa River stream Segment 3c	Unknown if copper standard will be met in Alamosa River stream Segment 3c	Will not meet copper standard in Alamosa River stream Segment 3c	Modeling shows that copper standard could be met in Segment 3c under certain flow conditions	Modeling shows that copper standard could be met in Segment 3c under certain flow conditions
Action-Specific ARARs					
Colorado Solid Waste Disposal Sites and Facilities Act 6 CCR 1007-2, persuant to CSR § 30-20-101, et.seq.	NA	NA	Solid waste (sludge) will be disposed at an on-site facility persuant regulations	Solid waste (sludge) will be disposed at an on-site facility persuant regulations	Solid waste (sludge) will be disposed at an on-site facility persuant regulations
Criteria for Classification of Solid Waste Disposal Facilities and practices 40 CFR Part 257, persuant to 42 USC § 6901, et.seq.	NA	NA	Solid waste (sludge) will be disposed at an on-site facility persuant regulations	Solid waste (sludge) will be disposed at an on-site facility persuant regulations	Solid waste (sludge) will be disposed at an on-site facility persuant regulations

TABLE E.6 (continued)

EVALUATION OF ARAR COMPLIANCE FOR REMEDIAL ALTERNATIVES

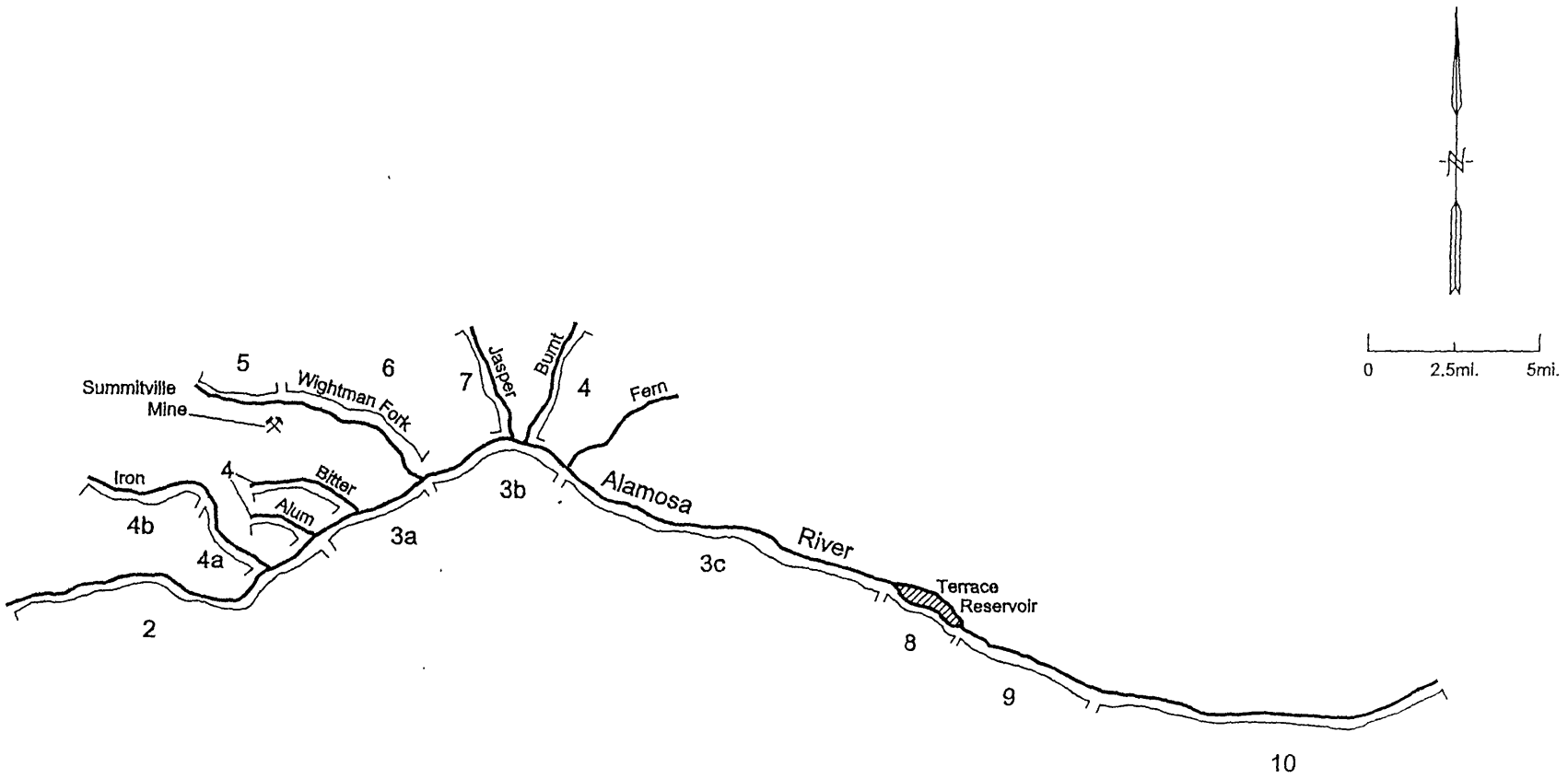
	Alternative 1A - No Action and Alternative 1B - No Further Action/SDI Breach	***Alternative 2 - Clean Water Diversion/New Dam Below WF-CC Confluence/Passive Water Treatment***	***Alternative 3 - Upgrade SDI/Existing WTP/Seasonal Treatment***	***Alternative 4 - Upgrade SDI/New WTP/Flexible Treatment Season***	***Alternative 5 - New Dam Above WF-CC Confluence/New WTP/Flexible Treatment Season***
National Pollutant Discharge Elimination System 40 CFR Parts 122, 125, pursuant to 33 USC § 1342	NA	A permit, similar in content to a NPDES permit, for offsite discharge will be obtained, if required	A permit, similar in content to a NPDES permit, for offsite discharge will be obtained, if required	A permit, similar in content to a NPDES permit, for offsite discharge will be obtained, if required	A permit, similar in content to a NPDES permit, for offsite discharge will be obtained, if required
Colorado Water Quality Control Act. Storm Water Discharge Regulations 5 CCR 1002-61	Will comply with regulations, at a minimum	Will comply with regulations	A permit, similar in content to a Colorado Storm Water Discharge Permit, will be obtained, if required	A permit, similar in content to a Colorado Storm Water Discharge Permit, will be obtained, if required	A permit, similar in content to a Colorado Storm Water Discharge Permit, will be obtained, if required
Colorado Mined Land Reclamation Act CRS 34-32-101 to 125 Rule 3 of Mineral Rules and Regulations	Will comply with regulations, at a minimum	Will comply with regulations	Will comply with regulations	Will comply with regulations	Will comply with regulations
Colorado Discharge Permit System CCR 1002-61	NA	Will comply with substantive requirements for point source discharge	Will comply with substantive requirements for point source discharge	Will comply with substantive requirements for point source discharge	Will comply with substantive requirements for point source discharge
Appropriation and Use of Water CRS 37-82-101 - 106	Required water rights will be purchased for Alternative 1A only	Required water rights will be purchased	Required water rights will be purchased	Required water rights will be purchased	Required water rights will be purchased
Water Rights Determination and Administration CRS 37-92-101- 602	Required water rights will be purchased for Alternative 1A only	Required water rights will be purchased	Required water rights will be purchased	Required water rights will be purchased	Required water rights will be purchased

TABLE E.6 (continued)

EVALUATION OF ARAR COMPLIANCE FOR REMEDIAL ALTERNATIVES

	Alternative 1A - No Action and Alternative 1B - No Further Action/SDI Breach	***Alternative 2 - Clean Water Diversion/New Dam Below WF-CC Confluence/Passive Water Treatment***	***Alternative 3 - Upgrade SDI/Existing WTP/Seasonal Treatment***	***Alternative 4 - Upgrade SDI/New WTP/Flexible Treatment Season***	***Alternative 5 - New Dam Above WF-CC Confluence/New WTP/Flexible Treatment Season***
Reservoirs and Rules and Regulations for Dam Safety and Dam Construction CRS 37-87-101 - 125, 37-80-(11k), and 24-4-103	1A - SDI will not comply with regulations 1B-SDI will be breached in accordance with regulations	SDI will be breached in accordance with regulations; new dam will be constructed in accordance with regulations.	SDI will be upgraded in accordance with regulations	SDI will be upgraded in accordance with regulations	SDI will be breached in accordance with regulations; new dam will be constructed in accordance with regulations.
Colorado Passive Treatment of Mine Drainage Control Regulation 5 CCR 1002-83, Regulation No. 83	Will comply with regulations, at a minimum	Will comply with regulations	Will comply with regulations should passive treatment be used in the future	Will comply with regulations should passive treatment be used in the future	Will comply with regulations should passive treatment be used in the future

Notes: NA means ARAR is not applicable to a particular remedial alternative.



Legend

3b Stream Segments

SUMMITVILLE MINE SITE-WIDE RI/FS	
Alamosa River Stream Segments As of December 30, 1998	FIGURE: E.1
Date: 04/18/01 By: DJH	
File: O:\1149_027.BTM\RIVRSEGS.DWG	

TABLE 4-1

SUMMARY OF CHEMICAL-SPECIFIC ARARs SELECTED FOR THE FINAL REMEDIAL ACTION

Standard, Requirement, Criteria, or Limitation	Citation	Applicable or Relevant and Appropriate	Description/Comments
Federal Water Quality Criteria	40 CFR Part 131 Quality Criteria for Water, 1986, pursuant to 33 USC § 1314	Relevant and Appropriate	Sets standards for surface water to protect aquatic life and human health. See Section E.4.1.1.
Colorado Water Quality Standards	5 CCR 1002-31, §§ 31.11	Applicable	Sets standards and classifications for surface water. Primary ARAR for final remedy. See Section E.4.1.1.
Colorado Classification and Numeric Standards for Rio Grande Basin	5 CCR 1002-36	Applicable	Classification and numeric standards for the San Juan and Rio Grande Rivers, including tributaries and standing bodies of water. Classification identifies actual beneficial uses of water and allowable concentrations of various parameters. See Section E.4.1.1.
Basic Standards and Methodologies for Surface Water	5 CCR 1002-31	Applicable	Provides basic standards, antidegradation rule, implementation process, and system for classifying surface water, assigning water quality standards and review of classifications and standards.
Colorado Groundwater Standards	5 CCR 1002-41 §§ 41.4 and 41.5	To Be Considered	Sets standards for contaminants in groundwater. Applicable only to protect surface water. See Section E.4.1.2.
Clean Air Act, National Primary and Secondary Ambient Air Quality Standards	40 CFR Part 50, pursuant to 42 USC § 7409. State: CRS § 25-7-108, 5. CRR 1001-14	Applicable	Sets standards for air emissions.
Colorado Air Pollution Preventio and Control Act	5 CCR 1001-10 Part C(I) and (II), Reg. 8	Applicable	Same as above.
Proposed Soil Remediation Objectives Policy Document	CDPHE HMWMD, December 31, 1997	To Be Considered	Proposes guidance in establishing soil cleanup standards.
Provisional Implementation Guidance for Determining Sediment Deposition Impacts to Aquatic Life in Streams and Rivers	Colorado Water Quality Control Commission Policy 98-1, June 1998	To Be Considered	Guidance for assessing impacts to aquatic life and habitat conditions caused by human induced erosion and deposition of materials in aquatic systems.

TABLE 4-2

SUMMARY OF ACTION-SPECIFIC ARARs SELECTED FOR THE FINAL REMEDIAL ACTION

Standard, Requirement, Criteria, or Limitation	Citation	Applicable or Relevant and Appropriate	Description/Comments
Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act of 1976 (RCRA)	40 CFR Part 257, Subpart A: § 257.1-1 Floodplains, paragraph (a); § 257.3-7 Air, paragraph (b)	Applicable	Regulates the storage and handling of solid waste.
Colorado Solid Waste Disposal Sites and Facilities Act	6 CCR 1007-2, pursuant to CRS § 30-20-101, et.seq.	Applicable	Establishes standards for the licensing, locating, constructing, and operating solid waste facilities. Water treatment sludge is a solid waste. See Section E.4.2.
Guidelines for the Land Disposal of Solid Wastes	40 CFR Part 241, pursuant to 42 USC § 6901, et.seq	To Be Considered	Regulates the land disposal of solid waste.
Guidelines for the Storage and Collection of Residential, Commercial, and Institutional Solid Waste	40 CFR Part 243, pursuant to 42 USC § 6901, et.seq.	To Be Considered	Establishes guidelines for the collection of residential, commercial, and institutional solid waste.
Guidelines for Development and Implementation of State Solid Waste Management Plans	40 CFR Part 256, pursuant to 42 USC § 6901, et.seq.	To Be Considered	Establishes guidelines for Federal approval of State solid waste management programs.
Criteria for Classification of Solid Waste Disposal Facilities and Practices	40 CFR Part 257, pursuant to 42 USC §6901, et.seq.	Applicable	Establishes criteria for solid waste disposal facilities and solid waste management. See Section E.4.2.
Identification and Listing of Hazardous Waste	40 CFR Part 261, pursuant to 42 USC § 6921 State: 6 CCR 1007-3 Part 261, pursuant to CRS § 25-15-302	Applicable	Establishes the procedures and process for listing and determining hazardous waste.
National Pollutant Discharge Elimination System	40 CFR Parts 122, 125, pursuant to 33 USC § 1342	Relevant and Appropriate	Regulates the discharge of treated effluent and storm water runoff to waters of the U.S. See Section E.4.2.
Effluent Limitations	40 CFR Part 440, pursuant to 33 USC § 1311; State : 5 CCR 1002-3, §§ 10.1 to 10.1.7, pursuant to CRS § 25-8-503	Relevant and Appropriate	Sets standards for discharge of treated effluent to waters of the U.S. and State of Colorado.
Colorado Mined Land Reclamation Act	CRS 34-32-101 to 125 Rule 3 of Mineral Rules and Regulations	Applicable	Regulates all aspects of mining, including reclamation plans and socioeconomic impacts. See Section E.4.2.
Colorado Discharge Permit System	CCR 1002-61	Applicable	Implementation of the Colorado Water Quality Control Act, and applies to operations discharging to waters of the state from a point source. See Section E.4.2.
Colorado Water Quality Control Act. Storm Water Discharge Regulations	5 CCR 1002-61	Applicable	Regulates discharge of storm water during construction activities. See Section E.4.2.
Regulations on the Collection of Aquatic Life	2 CCR 406-8. Ch. 13, Article III, Section 1316	Applicable	Establishes requirements for collection of biological samples.

TABLE 4-2 (cont.)

SUMMARY OF ACTION-SPECIFIC ARARs SELECTED FOR THE FINAL REMEDIAL ACTION

Standard, Requirement, Criteria, or Limitation	Citation	Applicable or Relevant and Appropriate	Description/Comments
Protection of Fishing Streams	CRS 33-5-101 - 107	Applicable	Establishes notification requirements for modifications to streams.
Appropriation and Use of Water	CRS 37-82-101 - 106	Applicable	Establishes rights to water in the State of Colorado. See Section E.4.2.
Occupational Safety and Health Act	29 USC §§ 651-678	Applicable	Regulates worker health and safety.
Reservoirs and Rules and Regulations for Dam Safety and Dam Construction	CRS 37-87-101 - 125, 37-80-(11k), and 24-4-103	Applicable	Establishes rules and regulations for the design, construction, and operation of dams and reservoirs. See Section E.4.2.
Water Rights Determination and Administration	CRS 37-92-101 - 602	Applicable	Administers Colorado water rights. See Section E.4.2.
Colorado Air Pollution Prevention and Control Act	5 CCR 1001-3; Section III.D.1.b.c.d; Sections II.D. 2.b.c.e.f.g.; Reg. 1	Applicable	Regulates fugitive emissions during construction.
Colorado Air Pollution Prevention and Control Act	5 CCR 1001-5, Regulation 3 APENs	Applicable	Establishes requirements for obtaining permits.
Colorado Air Pollution Prevention and Control Act	5 CCR 1001-4, Regulation 2 Odors	Applicable	Regulates generation of odors.
Colorado Passive Treatment of Mine Drainage Control Regulation	5 CCR 1002-83, Regulation No. 83	Applicable	Regulates passive mine drainage treatment systems. See Section E.4.2.

TABLE 4-3

SUMMARY OF LOCATION-SPECIFIC ARARs SELECTED FOR THE FINAL REMEDIAL ACTION

Standard, Requirement, Criteria, or Limitation	Citation	Applicable or Relevant and Appropriate	Description/Comments
National Historic Preservation Act (NHPA)	16 USC § 470 et seq. A portion of 40 CFR § 6.301 (b), 30 CFR Part 63, Part 65, Part 800	Applicable	Regulates impacts to historic places and structures. Summitville Town site protection will be required.
Colorado Register of Historic Places	CRS §§ 24-80.1-101 to 108	Applicable	The State historic preservation officer reviews potential impacts to historic places and structures.
The Historic and Archaeological Data Preservation Act of 1974	16 USC 469 40 CFR § 6.301(c)	Applicable	Protects sites with archeological significance.
Historic Sites Act of 1935, Executive Order 11593	16 USC §§ 461 et.seq. 40 CFR § 6.301(a)	Applicable	Regulates designation and protection of historic places.
The Archaeological Resources Protection Act of 1979	16 USC §§ 470aa-47011	Applicable	Regulates removal of archeological resources from public or tribal lands.
Colorado Historical, Prehistorical, and Archaeological Resources Act	CRS §§ 24-80-401 to 410 1301 to 1305	Applicable	Regulates prehistoric and archeological resources on State lands.
Executive Order No. 11990 Protection of Wetlands	40 CFR § 6.302(a) and Appendix A	Applicable	Minimizes impacts to wetlands.
Executive Order No. 11988 Floodplain Management	40 CFR § 6.302 and Appendix A	Applicable	Regulates construction in floodplains.
Section 404, Clean Water Act (CWA)	33 USC 1251 et seq. 33 CFR Part 330	Applicable	Regulates discharge of dredge or fill materials into waters of the U.S.
Fish and Wildlife Coordination Act	16 USC § 661 et seq. 40 CFR § 6.302(g)	Applicable	Requires coordination with Federal and State agencies to provide protection of fish and wildlife.
Endangered Species Act	16 USC §§ 1531-1543 50 CFR Parts 17, 402 40 CFR § 6.302(b)	Applicable	Regulates the protection of threatened or endangered species.
Non-game, Endangered, or Threatened Species Act	CRS §§ 33-2-101 to 108	Applicable	Standards for regulation of non-game wildlife and threatened and endangered species.
Colorado Natural Areas	Colorado Revised Statutes Title 33 Article 33, Section 104	Applicable	Maintains a list of plant species of "special concern". Recommends coordination among Division of Parks and Outdoor Recreation.
Colorado Species of Special Concern and Species of Undetermined Status	Colorado Division of Wildlife Administrative Directive E-1, 1985, modified	Applicable	Protects species listed on the Colorado Division of Wildlife generated list.
Colorado Wildlife Enforcement and Penalties	CRS §§ 33-1-101, et.seq.	Applicable	Prohibits actions detrimental to wildlife.
Wildlife Commission Regulations	2 CCR 405-0	Applicable	Establishes specific requirements for protection of wildlife.
Wild and Scenic Rivers Act	16 USC §§ 1271-1287 40 CFR § 6.302(e) 36 CFR Part 297	Applicable	Establishes requirements to protect wild, scenic, or recreational rivers.

TABLE 6-1
COMPARISON OF REMEDIAL ALTERNATIVES FOR SUMMITVILLE MINE SUPERFUND SITE

Comparison Criteria	*Alternatives*				
	1A- No Action and 1B - No Further Action/ Breach Summitville Dam Impoundment	**2 - Clean Water Diversion/New Dam Below Confluence/Passive Water Treatment**	**3 - Upgrade Summitville Dam Impoundment/Existing Water Treatment Facility with Seasonal Treatment**	**4 - Upgrade Summitville Dam Impoundment/New On-Site Water Treatment Plant with Flexible Treatment Season**	**5 - New Dam Upstream of Confluence/New Gravity-Fed Water Treatment Plant with Flexible Treatment Season**
Protection of Human Health and the Environment	Not protective of human health and the environment because significant AMD would continue.	Possibly protective of human health, but not protective of the environment because passive treatment has not proven to be effective.	Protective of human health, but not protective of the environment because significant AMD would continue	Protective of human health and the environment because most all AMD would be contained and treated.	Highest protection of human health and the environment because most all AMD would be contained and treated.
Compliance with Chemical Specific ARARs	Will not comply with water quality ARARs; waiver of water quality standards would be required.	Compliance with water quality ARARs is unproven; waiver of water quality standards would be required.	Does not comply with water quality ARARs; waiver of water quality standards would be required.	High probability of complying with water quality ARARs; waiver of water quality standards would be required.	Highest probability of complying with ARARs; waiver of water quality standards would be required.
Compliance with Action Specific ARARs	Will comply with minimum requirements; or requirements do not apply; Alternative 1A will not comply with SEO dam regulations.	Will comply with ARARs; some ARARs do not apply.	Will comply with ARARs	Will comply with ARARs	Will comply with ARARs
Compliance with Location Specific ARARs	Will comply with minimum requirements.	Will comply with ARARs	Will comply with ARARs	Will comply with ARARs	Will comply with ARARs
Long-Term Effectiveness and Permanence	Minimal long-term effectiveness; point and non-point sources would continue to discharge AMD.	Unproven due to undemonstrated reliability of passive water treatment.	Low effectiveness due to frequent releases of untreated water during years of normal to above normal precipitation; problematic water treatment.	Moderate to high effectiveness, but unable to store and treat additional AMD.	Highest because it is able to store and treat additional AMD; gravity-fed delivery system has high reliability.
Reduction of Toxicity, Mobility or Volume	Minimal reduction in mobility and volume, no reduction in toxicity.	Moderate to low reduction; 32 to 34 percent reduction in copper compared to Alternative 1A/1B.	Moderate reductions, but frequent releases of untreated water could occur; 60 to 90 percent reduction in copper compared to Alternative 1A/1B.	High because new Water Treatment Plant reduces volume of sludge produced, but unable to store and treat additional drainage; 86 to 97 percent reduction in copper compared to Alternative 1A/1B.	Highest because new Water Treatment Plant reduces volume of sludge produced; able to store and treat additional drainage; 88 to 97 percent reduction in copper compared to Alternative 1A/1B.
Short-Term Effectiveness	Least effective because contaminated sediments and AMD would immediately impact Wightman Fork.	Low effectiveness due to considerable disturbance within Wightman Fork during construction of new dam.	Moderate to high effectiveness because disturbances in Wightman Fork minimal, but releases of untreated water would significantly lower the effectiveness.	Moderate to high effectiveness because remedial action would cause minimal disturbances. Disturbances would be less than Alternative 5.	Moderate effectiveness because some disturbances within Wightman Fork would occur during construction of new dam.
Implementability	Could be readily implemented.	Least implementable due to construction of large dam and purchase of substantial water rights.	Easiest to implement because current site operations are continued with little additional work.	Moderately implementable.	Moderately implementable, requiring a greater level of effort due to the new dam.
Cost ***Total Present Value:***	Lowest total present value. ***1A -$9,696,000*** ***1B -$16,637,000***	Lowest O&M costs ***$35,534,000***	Highest total present value and highest O&M costs ***$85,423,000***	Second highest O&M costs ***$72,939,000***	Highest Capital Costs ***$75,409,000***

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Transfer of Long-Term Response Action (LTRA) Projects to States

Over the next 10 to 15 years approximately 100 Fund-financed ground water and surface water restoration projects are scheduled to be transferred to States for Operation and Maintenance (O&M). The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Section 104(c)(6), provides the statutory basis for the transfer of these ground water and surface water restoration projects from the Environmental Protection Agency (EPA) remedial action (RA) to State O&M. The National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR§300.435(f)(3), states that "for fund-financed remedial actions involving treatment or other measures to restore ground water or surface water quality to a level that assures protection of human health and the environment, the operation of such treatment or other measures for a period up to ten years after the remedy becomes operational and functional (O&F) will be considered part of the remedial action. Activities required to maintain the effectiveness of such treatment or measures following the 10-year period, or after the remedial action is complete, whichever is earlier, shall be considered O&M." EPA defines the ten-year period between the O&F determination and the start of O&M as a long-term response action (LTRA) and federal funding is still provided as it was for the remedial action. If cleanup goals have not been achieved upon completion of the ten years, the remedy transitions into O&M to be conducted by the State. Federal funds are not used to conduct O&M.

This fact sheet identifies key elements of the LTRA transfer process and provides guidance for Remedial Project Managers (RPMs) related to the transfer of responsibilities from EPA to the State for O&M. Users of the *Remedial Design/Remedial Action (RD/RA) Handbook* are encouraged to place this fact sheet in the Appendix labeled O&M.

TABLE OF CONTENTS

A. Overview

This fact sheet provides guidance to RPMs and others who have responsibilities for transferring LTRA projects from EPA to States. It provides practical information on planning for the transfer of a remedy from LTRA to the O&M stage, including roles and responsibilities, documentation, and record keeping. This fact sheet complements the fact sheet, *Operation & Maintenance in the Superfund Program,* dated May 2001, OSWER 9200.1-37FS.

B. Key Definitions and Milestones

The concepts defined in this section are shown graphically in **Exhibit 1.**

What is a long-term response action (LTRA)?

The NCP, 40 CFR§300.435(f)(3), states: "For fund-financed remedial actions involving treatment or other measures to restore ground- or surface-water quality to a level that assures protection of human health and the environment, the operation of such treatment or other measures for a period of up to 10 years after the remedy becomes operational and functional will be considered part of the remedial action". The 10-year period between the O&F determination and the start of O&M is defined for the purposes of this guidance as a long-term response action, LTRA, and federal funding is still provided as it was for the remedial action. Ground water pump and treat and Monitored Natural Attenuation (MNA) are considered remedies for aquifer restoration and are the most common remedies for LTRAs.

The LTRA provision is limited to actions involving ground water and surface water **restoration**. The NCP, 40 CFR§300.435(f)(4), identifies two activities that are not considered restoration measures: 1) source control maintenance measures; and, 2) ground- or surface-water measures initiated for the primary purpose of providing a drinking water supply (i.e., not for the purpose of restoring ground water). In addition, the following measures normally are not intended for ground water restoration and therefore would ***NOT*** be considered LTRAs:

- Ground water pump and treat remedies for containment only, and
- Ground water monitoring only (i.e., with no restoration objective).

Special consideration may be needed for response actions where the specific remedial action objective is the removal of non-aqueous phase liquid (NAPL) as a source material through direct extraction [e.g., pumping or collection trenches for light non-aqueous phase liquid (LNAPL)] or enhanced recovery techniques [e.g., in-situ thermal treatment for dense non-aqueous phase liquid (DNAPL)]. The remedial action objective for these actions is generally source removal or recovery. As such, these actions generally do not trigger the LTRA phase. However, DNAPL or LNAPL recovery frequently will be done concurrently with response actions to remediate a ground water plume containing dissolved contaminants (using technologies such as pump and treat or MNA). In these cases, the operable unit addressing restoration of the ground water plume generally will transition to LTRA following the O&F determination.

If cleanup goals have not been achieved upon completion of the 10-year LTRA period, the remedy transitions from remedial action (RA) into O&M. Once the cleanup goals have been met, regardless of whether this occurs before or after the 10-year period, a follow-on monitoring component may be required as a part of O&M.

What is the operational and functional (O&F) determination?

The NCP, 40 CFR§300.435(f)(2) states, "A remedy becomes operational and functional either one year after construction is complete, or when the remedy is determined concurrently by EPA and the State to be functioning properly and is performing as designed, whichever is earlier. EPA may grant extensions to the one-year period, as appropriate." This reference to 'construction is complete' means the date when physical construction activities have been completed for the operable unit being considered and is not the same as the 'construction completion' milestone for the site.

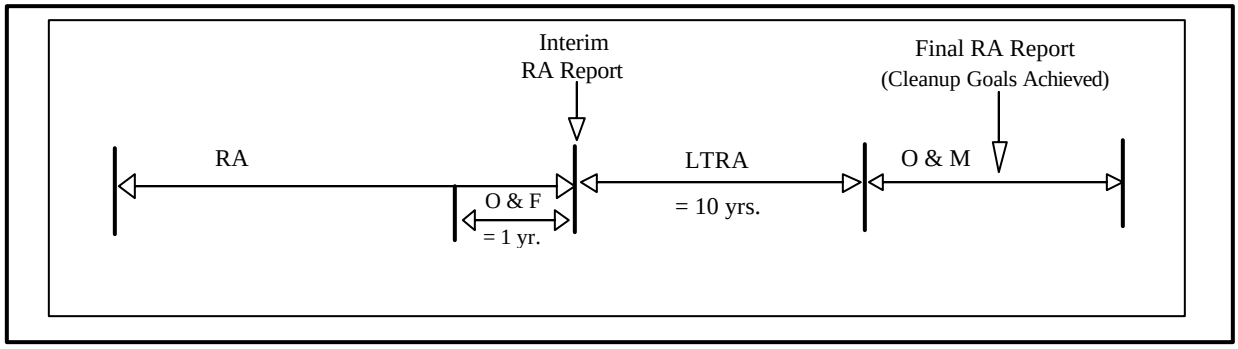

Exhibit 1- Fund-lead Ground Water and Surface Water Restoration Pipeline

The O&F milestone begins the 10-year LTRA period. In cases where LTRA is not applicable, the O&F milestone governs when theRegions turn these projects over to the States for O&M. See the *Operation & Maintenance in the Superfund Program* fact sheet for more information on O&F documentation.

Does the 10-year LTRA period ever restart?

The 10-year LTRA period would not change or restart following the initial O&F determination. Adjustments to ground water remediation remedies are routine (e.g., following an optimization review) to ensure effective and efficient operations. These adjustments would not impact or change the LTRA period.

C. Preparing for LTRA Transfer

State involvement in fund-financed ground water and surface water restoration projects can begin at different stages. For remedies where the State has assumed the lead role for project implementation under a cooperative agreement, the State may design and build the remedy, and then operate the system throughout the 10-year LTRA period. Where EPA maintains the lead for remedy implementation, EPA will likely operate the system throughout the LTRA period.

In both cases, the State assumes 10% of the cost during the LTRA period. States can assume the lead at any time during the LTRA period, but no later than the 10-year point. This guidance is written assuming a transition following 10 years of EPA operations. However, the general principles would apply regardless of the lead agency during the LTRA period.

Preparation for transfer from LTRA to O&M should start in an early stage (i.e., Remedial Design) of the Superfund remedial pipeline. Early preparation helps to:

- Clarify State financial and performance commitments;
- Ensure that adequate language is incorporated into Superfund State Contracts (SSC) and Cooperative Agreements (CA); and,
- Provide an opportunity for State input to system design and O&M Plan development.

As discussed in the *Operation & Maintenance in the Superfund Program* fact sheet, the O&M Plan developed during remedial design (RD) stage is a critical component of the transfer

process, and helps to ensure the proper transition of responsibility for O&M of fund-lead projects from EPA to the State. The O&M Plan should define the administrative, financial, and technical details and requirements for inspecting, operating, and maintaining the various components of a remedy. An O&M Plan for an LTRA project should generally contain many of the elements identified in **Exhibit 2**. During the RA phase, the O&M Plan should be updated to reflect actual remedial activities. For LTRA projects, as well as all other projects, the State and EPA should have frequent discussions about the O&M Plan, the determination of O&F, the joint EPA/State inspection, the O&M Manual, and any facility, cost, or schedule changes. Additional considerations are discussed in the *Operation & Maintenance in the Superfund Program* fact sheet.

D. Transition from LTRA to O&M

Many issues need to be addressed before an LTRA project can be successfully transferred to the State for O&M. **Exhibit 3** is a checklist of considerations that an RPM can use to prepare for the transfer. The exhibit and the following sections suggest a three-year timeframe for conducting the transfer. However, it may be feasible to complete the suggested actions in a shorter time period. Regions are encouraged to review and discuss LTRA transfer schedules with the States on a routine basis (e.g., during annual work planning meetings).

The following time frames assume a 10-year LTRA period. However, as stated in the NCP, 40 CFR§300.435(f)(3), a remedy may be considered administratively complete before the 10-year period if: 1) water has been restored to a level considered protective of human health and the environment, or 2) water has been restored to a point where reductions in contaminant concentrations are no longer significant.

O&F through Year 7 of the LTRA Period

For the first 7 years of the LTRA period, major activities are those associated with routine system operations (e.g., operating the pump and treat system, performing required maintenance, and conducting an appropriate level of monitoring to ensure system effectiveness). In addition, the RPM should review remedy performance, assess progress toward achieving goals, and conduct a five-year review consistent with the schedule for the site.

Year 8 of the LTRA Period

During year 8 of the LTRA period, detailed planning for the transfer of the ground water restoration system should begin. EPA intends to transfer a ground water restoration system that is operating effectively and efficiently. To accomplish this, specific actions should be taken prior to the transfer of an LTRA project to the State. First, the Region should meet with the State to define the process, clarify roles and responsibilities, and establish a schedule and milestones.

Second, EPA and the State should conduct a joint inspection of the treatment system and, where appropriate, an optimization review that would evaluate the effectiveness and efficiency of the remedy. The major questions that should be addressed during an optimization review include:

- Is the system operating efficiently?
- Can adjustments be made to the extraction or treatment systems to reduce costs?
- Has an evaluation been conducted on the efficiency of extraction, treatment, and overall performance?
- Is the system making progress toward

achieving cleanup goals?

Exhibit 2 – Typical O&M Plan Elements to Consider for LTRA Transfer

- Designation of the organizational unit of the government responsible for O&M
- Identification of the availability of State funding mechanisms for O&M activities
- Milestone dates for State assumption of O&M responsibilities
- Criteria for determination of O&F
- Description and duration of O&M activities
- Summary of O&M staffing needs (including training and certification requirements)
- Summary of O&M performance standards
- Contingency plan for handling abnormal occurrences
- Safety requirements for O&M activities
- Equipment and material requirements
- Estimates of annual O&M costs
- Reporting requirements
- Conditions for O&M termination
- Description of site use and disposition of facilities following completion of O&M
- Strategy for modifying existing site health and safety plan (HASP) and quality assurance project plan (QAPP)
- Access and property issues

- Is the plume contained and contaminant migration under control?

- What exit strategy will be used to guide decisions on when to shut down the ground water restoration system?

- Were any performance issues identified during the previous five-year review and have they been addressed?

The joint inspection should result in a list of repairs or adjustments that might be necessary. For example, EPA may need to replace remedy components nearing the end of their useful life before transfer to the State.

For the remainder of the 10-year LTRA period, capital expenditures for the optimization review, the design/construction of an optimized system, and any other funding required to update the remedy are a remedial action expense. RPMs need to ensure that funding is available during the LTRA period and to coordinate with the State to ensure the State's ten percent cost share.

A second five-year review likely will be conducted during the later stages of the LTRA period. Where feasible, Regions are encouraged to coordinate the timing of this review with the actions noted above. Follow-up actions should be completed to the extent possible prior to completing transfer to the State.

Year 9 of the LTRA period

During year 9, any changes required from the optimization review should be designed and constructed, and any required changes to the O&M Plan should be made. The State should also receive official notification of the transfer date so there will be sufficient time for their required budgeting and contracting activities.

Year 10 of the LTRA period

During year 10, EPA should operate the optimized system and review the system's operation and performance. EPA should make revisions to any manuals or plans as necessary

and review and transfer warranties over to the State. EPA also should send another letter to the State confirming the date of transfer and providing a schedule for any remaining actions.

At this point, the State should complete its contracting activities and have a contractor in place to receive training on the system. To facilitate transition of the system from EPA to the State, the State may have its contractor observe and receive EPA training to operate the remedy following the LTRA period.

What document should be used for transfer?

It is recommended that all agreements associated with the transfer of the ground water restoration system be presented in an appendix to the State Superfund Contract signed by EPA and the State. Suggested components of this appendix are:

- Roles and Responsibilities
- Transfer Date
- Transfer of remedial design documents, Remedial Action Reports, etc.
- Site Inspections
- Training Requirements
- O&M Cost Estimates
- Information Required for Contractor Bid Package
- State Access to Publically-Owned Treatment Works
- Access Agreements
- Identify Equipment not Owned by the Federal Government
- Provide As-Built Drawings
- Health and Safety Issues for Contractors
- Real Property Transfer
- Waste Characterization, Waste Manifest Data; and
- Certificate of Occupancy/Approval

E. EPA Oversight During O&M

As discussed in the *Operation & Maintenance in the Superfund Program* fact sheet, the RPM is responsible for assuring that O&M is performed by the State and that required progress reports are submitted to EPA.

Five-year reviews continue throughout the O&M period as long as waste is left on-site above levels that allow for unlimited use and unrestricted exposure. EPA will either conduct the five-year review or be in a concurrence role if the State conducts the five-year review.

Exhibit 3 – Checklist of LTRA Considerations During a Superfund Project	
Project Phase	**LTRA Considerations**
Remedial Design	• Ensure that the RD statement of work addresses O&M; • Consult with the State to develop an O&M Plan for the selected remedy; and • Ensure signed SSC/CA includes language on the process for determining O&F date, EPA and State obligations, and disposition of real property.
Remedial Action	• Ensure that the RD statement of work and design specifications require training of O&M staff before the remedy is turned over: • Update O&M plan; • Coordinate review and finalization of the O&M manual with the State; • Draft the RA Report at the completion of construction, including section on required O&M activities; • Encourage State officials to visit site during construction; • Conduct joint EPA/State inspection; • EPA documents date of inspection and beginning of O&F period in a letter sent to the State; • Notify State by letter of impending O&F period deadline; and • Make an O&F determination and document it in the RA Report as well as in a letter to the State.
O&F to Year 7 of LTRA Period	• EPA (or State) operate system; • Conduct a five-year review, consistent with the schedule for the site; and, • Strengthen communication with State (e.g., share performance and monitoring data, results of performance reviews, etc.).
Year 8 of LTRA (PLANNING AND PERFORMANCE REVIEWS)	• Provide notice to State of date of anticipated transfer from LTRA to O&M so State can have ample time for budgeting O&M costs, agree on schedule and milestones; • Conduct review of system performance to ensure effective and efficientoperation (e.g., optimization study); • Revise O&M Plan as appropriate; • Review property transfer and site access requirements; • State should begin staffing activities for O&M (e.g., hiring initiatives, procurement strategy and timeline for contract support); • Identify equipment for repair/replacement; and, • EPA should initiate request for RA funding to implement appropriate findings from the optimization review and repair/replace equipment as necessary.
Year 9 of LTRA (IMPLEMENT SYSTEM CHANGES)	• Design/construct revisions to system, as required; • EPA (or State) operates optimized system; • Revise all manuals, sampling plans, and monitoring plans; • Conduct second five-year review, consistent with the schedule for the site; and, • Prepare to transfer all warranties.
Year 10 of LTRA (COMPLETE TRANSFER)	• State should complete arrangements for O&M services, State personnel or contractor should observe operations and receive training on the treatment system; and • Property transfer and access arrangements should be completed.
O&M Period	• State should assume O&M responsibility; • State should provide progress reports to EPA as agreed; and, • State (or EPA) should conduct subsequent five-year reviews.

TABLE A. 10: REMEDIAL ACTION COST ESTIMATE (FEASIBILITY STUDY REPORT)
Alternative 5: Capital Cost

Site: Summitville Mine Superfund Site
Location: Rio Grande County, Colorado
Phase: Remedial Action/Feasibility Study (-30% to +50%)
Base Year: 2001
Date: 4/23/2002

Description: Alternative 5 (WF-Up RCC Gravity Dam)
Project Years: 0 - 10

CAPITAL COST: DESCRIPTION	QTY	UNIT	UNIT COST		TOTAL	SOURCE*
Mobilization/Demobilization	5%			$718,000		2
				SUBTOTAL:	$718,000	
SDI Breach	1	LS		$229,000		2
				SUBTOTAL:	$229,000	
Reynolds Adit Rehabilitation	1	LS		$1,333,000		3
				SUBTOTAL:	$1,333,000	
Source Mitigation						
Interceptor Drain	4120	LF	$124	$511,000		2
GC L Ditch - Highwall	1	LS	$51,000	$51,000		4
Contaminated Water Pipeline	4500	LF	$72	$324,000		2
Concrete Impact Basin	1	LS	$43,000	$43,000		4
				SUBTOTAL:	$929,000	
Clean Water Diversions						
Ditch P	1	LS	$165,000	$165,000		
Upgrade. L Ditches	1	LS	$146,000	$146,000		
Wightman Fork	1	LS	$766,000	$766,000		
				SUBTOTAL:	$1,077,000	
Relocate Forest Service Road						
Road Construction	2500	LF	$92	$230,000		
Seeding and Reveg	2	Acre	$10,500	$21,000		
Culverts	4	Each	$5,000	$20,000		
				SUBTOTAL:	$271,000	
WFUp:. 80 ft. Dam, 405 ac-ft	1	LS		$4,551,000		2
				SUBTOTAL:	$4,551,000	
Construct Water Treatment Plant						
Building & Equipment	1	LS		$5,063,000		
Infrastructure/Foundation	1	LS	$750,000	$750,000		
				SUBTOTAL:	$5,813,000	
Water Rights						
Purchase for Initial Fill	405	Ac-Ft	$400	$162,000		
				SUBTOTAL:	$162,000	
SUBTOTAL					$15,083,000	
Contingency (scope+bid)	30%				$4,524,900	5
				SUBTOTAL	$19,608,000	
Project Management	5%				$980,400	5
Remedial Design	6%				$1,176,480	5
Construction Management	6%				$1,176,480	5
				SUBTOTAL	$3,333,000	
TOTAL CAPITAL COST					**22,941,000**	

(All subtotal and total costs rounded to nearest $1000)
* See Page 4-5 for a legend to the sources for element costing.

SUMMITVILLE MINE SUPERFUND SITE

Engineering Alternatives Cost Summary

SDI Breach

Summer 2000

ITEM #	DESCRIPTION	UNIT	QUANTITY	UNIT COST	EXTENSION	SOURCE*
1	Dam & SDI Excavation	CY	23,610	$7.50	$177,000	
2	Pump House Demolition	LS	1	$10,000.00	$10,000	
3	Site Grading	AC	4	$5,000.00	$20,000	
4	Amending and Seeding (revegetation)	AC	4	$5,500.00	$22,000	
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10						
					$229,000	

SUMMITVILLE MINE SUPERFUND SITE

Engineering Alternatives Cost Summary
Reynolds Adit Rehabilitation
Summer 2000

ITEM #	DESCRIPTION	UNIT	QUANTITY	UNIT COST	EXTENSION	SOURCE*
1	Reynolds Tunnel Rehabilitation	LF	1,260	$1,000.00	$1,260,000	
2	Install Valve	LS	1	$10,000.00	$10,000	
3	6" HDPE Pipe	LF	1,260	$50.00	$63,000	
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					$1,333,000	

SUMMITVILLE MINE SUPERFUND SITE

Engineering Alternatives Cost Summary
Chandler Adit Rehabilitation
Summer 2000

ITEM #	DESCRIPTION	UNIT	QUANTITY	UNIT COST	EXTENSION	SOURCE*
1	Chandler Tunnel Rehabilitation	LF	280	$1,000.00	$280,000	
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10						
					$280,000	

SUMMITVILLE MINE SUPERFUND SITE

Engineering Alternatives Cost Summary
Building Demolition
Summer 2000

ITEM #	DESCRIPTION	UNIT	QUANTITY	UNIT COST	EXTENSION	SOURCE*
1	Water Treatment Plant	LS	1	$97,000.00	$97,000	3
	a. Concrete Demo	CY	370	$35.75	$13,000	
	b. Steel Demo	LF	1,600	$10.80	$17,000	
	c. Wall Demo	SF	23,000	$1.00	$23,000	
	d. Onsite Disposal	SF	10,000	$1.25	$13,000	
	e. Site Grading and Revegetation	Acre	1	$10,500.00	$11,000	
	f. Decontamination	LS	1	$20,000.00	$20,000	
2	CDP	LS	1	$97,000.00	$97,000	3
	a. Concrete Demo (foundation)	CY	370	$35.75	$13,000	
	b. Steel Demo	LF	1,600	$10.80	$17,000	
	c. Wall Demo	SF	23,000	$1.00	$23,000	
	d. Onsite Disposal	SF	10,000	$1.25	$13,000	
	e. Site Grading and Revegetation	Acre	1	$10,500.00	$11,000	
	f. Decontamination	LS	1	$20,000.00	$20,000	
3	Maintenance Shop	LS	1	$71,000.00	$71,000	3
	a. Concrete Demo (foundation)	CY	210	$35.75	$8,000	
	b. Steel Demo	LF	1,080	$10.80	$12,000	
	c. Wall Demo	SF	15,200	$1.00	$15,000	
	d. Onsite Disposal	SF	10,000	$1.25	$13,000	
	e. Site Grading and Revegetation	Acre	1	$10,500.00	$8,000	
	f. Decontamination	LS	1	$15,000.00	$15,000	
4	Upper Storage Building	LS	1	$71,000.00	$71,000	3
	a. Concrete Demo (foundation)	CY	210	$35.75	$8,000	
	b. Steel Demo	LF	1,080	$10.80	$12,000	
	c. Wall Demo	SF	15,200	$1.00	$15,000	
	d. Onsite Disposal	SF	10,000	$1.25	$13,000	
	e. Site Grading and Revegetation	Acre	1	$10,500.00	$8,000	
	f. Decontamination	LS	1	$15,000.00	$15,000	
5	<Enter Building Title here>			$0.00	$0	

SUMMITVILLE MINE SUPERFUND SITE

Engineering Alternatives Cost Summary

Source Mitigation

Summer 2000

ITEM #	DESCRIPTION	UNIT	QUANTITY	UNIT COST	EXTENSION	SOURCE*
1	Interceptor Drain	LF	4,120	$124.00	$511,000	2
	a. Drain Pipe w/Gravel	per/ft	4,120	$100.00	$412,000	
	b. Clean Outs	per/ft	4,120	$16.67	$69,000	
	c. Seed and Reveg	per/ft	4,120	$7.23	$30,000	
2	GCL Ditch - Highwall	LS	1	$51,000.00	$51,000	4
	a. Excavate Channel	CY	1,600	$8.00	$13,000	
	b. Channel Bedding	CY	700	$10.00	$7,000	
	c. GCL	SF	4,600	$0.75	$3,000	
	d. Access road	LF	3,040	$5.60	$17,000	
	e. Seed and Reveg	Acre	1	$10,500.00	$11,000	
3	Rockfall Fence	LS	1	$141,000.00	$141,000	5
	a. Rockfall Fence	LF	2,000	$60.00	$120,000	
	b. Seed and Reveg	Acre	2	$10,500.00	$21,000	
4	Alamosa River - Pull and Cap	LS	1	$910,000.00	$910,000	
	a.Excavate and Shape Sediment	CY	19,000	$15.00	$285,000	
	b. Backfill and restore contours	CY	19,000	$25.00	$475,000	
	c. Seed and Reveg	Acre	6	$25,000.00	$150,000	
5	Contaminated Water Pipeline	LF	4500	$72.00	$324,000	2
	Pipeline	LF	4500	$72.00	$324,000	

SUMMITVILLE MINE SUPERFUND SITE

Engineering Alternatives Cost Summary

Relocate Forest Service Road

Summer 2000

ITEM #	DESCRIPTION	UNIT	QUANTITY	UNIT COST	EXTENSION	SOURCE*
1	Road Construction	LF	5,800	$92.00	$533,600	
2	Seeding and Reveg	Acre	4	$10,500.00	$42,000	
3	Culverts	Each	8	$5,000.00	$40,000	
4						
5	Road Construction	LF	2,500	$92.00	$230,000	
6	Seeding and Reveg	Acre	2	$10,500.00	$21,000	
7	Culverts	Each	4	$5,000.00	$20,000	
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9						
10						
					$886,600	

SUMMITVILLE MINE SUPERFUND SITE

Engineering Alternatives Cost Summary
Clean Water Diversion and Dam
Summer 2000

ITEM #	DESCRIPTION	UNIT	QUANTITY	UNIT COST	EXTENSION	SOURCE*
1	Clean Water Diversion Channel	LF	5,760	$140.00	$806,000	
2	Clearing and Grubbing	ACRE	2	$7,500.00	$15,000	
3	Stripping/Foundation Excavation	CY	3,000	$4.00	$12,000	
4	Dam Embankment	CY	24,000	$5.00	$120,000	
5	Rip Rap	CY	450	$35.00	$16,000	
6	Rip Rap	CY	200	$15.00	$3,000	
7	Outlet Works	LS	1	$120,000.00	$120,000	
8	Spillway	LS	1	$40,000.00	$40,000	
9	Instrumentation	LS	1	$5,000.00	$5,000	
10	Seeding and Reveg	Acre	2	$10,500.00	$21,000	
					$1,158,000	

SUMMITVILLE MINE SUPERFUND SITE

Engineering Alternatives Cost Summary

WFDown: 145ft. Dam, 2503 ac-ft

Summer 2000

ITEM #	DESCRIPTION	UNIT	QUANTITY	UNIT COST	EXTENSION	SOURCE*
1	Clearing and Grubbing	ACRE	6	$7,500	$45,000	
2	Stripping	CY	8,800	$4	$35,000	
3	Foundation Excavation	CY	30,000	$8	$240,000	
4	Foundation Preparation	LS	1	$150,000	$150,000	
5	Grouting	LS	1	$400,000	$400,000	
6	Roller Compacted Concrete	CY	95000	$55	$5,225,000	
7	Facing Concrete	CY	3000	$600	$1,800,000	
8	Gravity Outlet Works	LS	1	$600,000	$600,000	
9	Spillway	LS	1	$250,000	$250,000	
10	Instrumentation	LS	1	$75,000	$75,000	
11	Seeding and Reveg	ACRE	6	$10,500	$63,000	
					$8,883,000	

SUMMITVILLE MINE SUPERFUND SITE

Engineering Alternatives Cost Summary

Water Rights

Summer 2000

ITEM #	DESCRIPTION	UNIT	QUANTITY	UNIT COST	EXTENSION	SOURCE*
1	Purchase for Initial Fill	Ac-Ft	2,503	$400.00	$1,001,000	
2	Purchase for Initial Fill	Ac-Ft	298	$400.00	$119,000	
3	Purchase for Initial Fill	Ac-Ft	275	$400.00	$110,000	
4	Purchase for Initial Fill	Ac-Ft	405	$400.00	$162,000	
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10						
					$1,392,000	

SUMMITVILLE MINE SUPERFUND SITE
Engineering Alternatives Cost Summary
Clean Water Diversions
Summer 2000

ITEM #	DESCRIPTION	UNIT	QUANTITY	UNIT COST	EXTENSION	SOURCE*
1	Ditch P	LS	1	$165,000.00	$165,000	
	a. Soil Excavation	CY	10,000	$5.00	$50,000	
	b. Rip Rap	CY	4,150	$25.00	$104,000	
	c. Site Grading and Revegetation	Acre	1	$10,500.00	$11,000	
2	Upgrade L Ditches	LS	1	$146,000.00	$146,000	
	a. Excavation	CY	10,000	$5.00	$50,000	
	b. Rip Rap	SF	1,000	$25.00	$25,000	
	c. Site Grading and Revegetation	Acre	1	$10,500.00	$11,000	
	d. Access Road	LF	2,000	$30.00	$60,000	
3	Upgrade Ditch R	LS	1	$25,000.00	$25,000.00	
	a. Rip Rap Excavation	CY	500	$5.00	$3,000	
	b. Freeboard Rip Rap	CY	450	$25.00	$11,000	
	d. Site Grading and Revegetation	Acre	1	$10,500.00	$11,000	
4	Wightman Fork	LS	1	$937,000.00	$937,000	
	Clearing & Grubbing	Acre	6	$3,500.00	$19,000	
	Excavate Channel	CY	60,000	$5.00	$300,000	
	Drop Structures	Each	5	$85,000.00	$425,000	
	Rip Rap	CY	1,000	$25.00	$25,000	
	Box Culverts	LS	1	$45,000.00	$45,000	
	Service Road	LF	2,000	$30.00	$60,000	
	c. Site Grading and Revegetation	Acre	6	$10,500.00	$63,000	
5	Wightman Fork	LS	1	$766,000.00	$766,000	
	Clearing & Grubbing	Acre	4	$3,500.00	$14,000	
	Excavate Channel	CY	45,000	$5.00	$225,000	
	Drop Structures	Each	3	$85,000.00	$255,000	
	Rip Rap	CY	5,000	$25.00	$125,000	
	Box Culverts	LS	1	$45,000.00	$45,000	
	Service Road	LF	2,000	$30.00	$60,000	
	c. Site Grading and Revegetation	Acre	4	$10,500.00	$42,000	
6	Cropsy Creek			$885,000.00	$885,000.00	
	Clearing & Grubbing	Acre	6	$3,500.00	$19,000	
	Excavate Channel	CY	60,000	$5.00	$300,000	
	Drop Structures	Each	5	$85,000.00	$425,000	
	Rip Rap	CY	1,000	$25.00	$25,000	
	Box Culverts	LS	1	$45,000.00	$45,000	
	Service Road	LF	2,000	$30.00	$60,000	
	c. Site Grading and Revegetation	Acre	1	$10,500.00	$11,000	
7						
8	Wightman Fork	LS	1	$448,000.00	$448,000	
	Clearing & Grubbing	Acre	3	$3,500.00	$11,000	
	Excavate Channel	CY	30,000	$5.00	$150,000	
	Drop Structures	Each	1	$85,000.00	$85,000	
	Rip Rap	CY	5,000	$25.00	$125,000	
	Box Culverts	LS	1	$45,000.00	$45,000	
	c. Site Grading and Revegetation	Acre	3	$10,500.00	$32,000	
9				$0.00	$0.00	
10				$0.00	$0.00	

SUMMITVILLE MINE SUPERFUND SITE

Engineering Alternatives Cost Summary
Reynolds Adit Control Valve
Summer 2000

ITEM #	DESCRIPTION	UNIT	QUANTITY	UNIT COST	EXTENSION	SOURCE*
1	Install Valve	LS	1	$10,000.00	$10,000	
2	6" HDPE Pipe	LF	1,300	$50.00	$65,000	
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7						
8						
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10						
					$75,000	

SUMMITVILLE MINE SUPERFUND SITE

Engineering Alternatives Cost Summary

WFUp: 80 ft. Dam, 405 ac-ft

Summer 2000

ITEM #	DESCRIPTION	UNIT	QUANTITY	UNIT COST	EXTENSION	SOURCE*
1	Clearing and Grubbing	ACRE	3	$7,500.00	$22,500	
2	Stripping	CY	4,400	$4.00	$17,600	
3	Foundation Excavation	CY	13,000	$8.00	$104,000	
4	Foundation Preparation	LS	1	$75,000.00	$75,000	
5	Grouting	LS	1	$250,000.00	$250,000	
6	Roller Compacted Concrete	CY	50000	$53.00	$2,650,000	
7	Facing Concrete	CY	1500	$600.00	$900,000	
8	Gravity Outlet Works	LS	1	$350,000.00	$350,000	
9	Spillway	LS	1	$100,000.00	$100,000	
10	Instrumentation	LS	1	$50,000.00	$50,000	
11	Seeding and Reveg	Acre	3	$10,500.00	$31,500	
					$4,551,000	

SUMMITVILLE MINE SUPERFUND SITE

Engineering Alternatives Cost Summary

SDI Upgrade

Summer 2000

ITEM #	DESCRIPTION	UNIT	QUANTITY	UNIT COST	EXTENSION	SOURCE*
1	Clearing & Grubbing	Acre	3.5	$3,500.00	$12,000	
2	Upgrade Spillway	LS	1	$430,000.00	$430,000	
3	Instrumentation	LS	1	$30,000.00	$30,000	
4	Fertilize, Seed, and Mulch	AC	2	$5,500.00	$11,000	
5	Seep Collection/Pumpback	LS	1	$40,000.00	$40,000	
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8						
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10						
					$523,000	

SUMMITVILLE MINE SUPERFUND SITE

Engineering Alternatives Cost Summary
Construct Water Treatment Plant
Summer 2000

ITEM #	DESCRIPTION	UNIT	QUANTITY	UNIT COST	EXTENSION	SOURCE*
	Building & Equipment (Micro-Filtration)	LS	1	3234000	$3,234,000	
1	Building & Equipment	LS	1	$5,063,000	$5,063,000	
2	Construct Wet Well	LS	1	$250,000.00	$250,000	
3	Electrical to Pump Station	LS	1	$80,000.00	$80,000	
4	Infrastructure/Foundation	LS	1	$750,000.00	$750,000	
					$9,377,000	
	Building &Equipment are below					
5	Building/Foundation	LS	1	$750,000.00	$750,000	
6	Equipment	LS	1	$4,000,000.00	$4,000,000	
7	Remote Control/Radio	LS	1	$100,000.00	$100,000	
8	Influent Pipeline & Associated Valves	LF	1,000	$180.00	$180,000	
9	Revegetate	Acre	2	$10,500.00	$21,000	
10	Access Road	LF	300	$40.00	$12,000	