RESPONSIVENESS SUMMARY
STANDARD MINE DRAFT FEASIBILITY STUDY REPORT

Responses to comments provided by the State of Colorado, the U.S. Forest Service (USFS), and the Standard Mine Technical Advisory Group to the Standard Mine Draft Feasibility Study are provided below. The State of Colorado and USFS commented on a draft document dated March 10, 2010. The Technical Advisory Group comment on a draft document dated April 6, 2010 that included changes made in response to the State and USFS comments.

RESPONSES TO STATE COMMENTS REGARDING STANDARD MINE DRAFT FEASIBILITY STUDY.
Comments received March 25, 2010

The following comments were received from the Colorado Department of Public Health and Environment (CDPHE) and the Colorado Attorney General's Office (AGO) on the Standard Mine Superfund Site Draft Feasibility Study (FS) Report. Comments provided in written format are addressed first. Comments that were submitted by the State as tracked changes and comments in the electronic copy of the document are discussed at the end of the written comments.

GENERAL COMMENTS:

Comment: It is fundamental to CDPHE's support of the preferred alternative that: 1) EPA commit in the FS to conduct a detailed evaluation of on-site versus off-site disposal for spent bio-reactor substrate during the Phase 2 design, in the event the agencies proceed with Phase 2; and 2) that the FS include the commitment that EPA will continue to operate the pilot-scale passive treatment system (PTS) (with a reduced monitoring program) to obtain more information about the long-term effectiveness and operation and maintenance of the PTS prior to Phase 2. We agree with EPA's observation in Section 5.2.3 that "There is limited information regarding the long-term operation of a PTS with similar components at similar site conditions." Continued operation of the PTS will assist in addressing the state's concerns about long-term operation and these data may benefit other Superfund mining sites. The continued operation of the PTS was discussed in the Feb. 25th meeting between CDPHE and EPA, as well as an offer to perform an on-site drying test of the BCR residuals.

Constraints in the future may prohibit CDPHE from transporting the substrate to an off-site location; and therefore, the option of on-site disposal must be an element of the remedy. In analyzing FS alternatives for implementability, lead agencies must consider the ease or difficulty of implementation with regard to the "availability of services and materials, including the availability of adequate off-site treatment, storage capacity, and disposal capacity and services..." NCP 300.430(e)(9)(iii)(F)(3). There could be challenges in the future associated with acceptance of the spent substrate at the Gunnison landfill. There are limited landfill options due to the remote location of the site.

Fuel costs may increase dramatically in the future making on-site disposal more attractive from an economic perspective. Therefore a detailed cost comparison of off-site versus on-site disposal is warranted during Phase 2 design. On-site disposal is also consistent with the Superfund Green Remediation Strategy to address the reduction of greenhouse gas and manages the spent media at the site where it was generated rather than consuming local landfill space. See the attached R8 Green Remediation Policy signed by Carol Campbell and http://www.epa.gov/superfund/greenremediation/sf-gr-strategy.pdf. Some of the green remediation concepts have already been applied during the FS (e.g., protecting wetlands) and these concepts should also be considered for spent substrate disposal. Also, the NCP has a bias against off-site disposal of untreated hazardous substances (CERCLA 121(b)(7)).

Language detailing the above general comments should be added to the feasibility study and carried over into the Record of Decision so that EPA Management is aware of these considerations and implementation is followed through. Please see requested edits throughout the Chapters 4, 5 and 7.

***Response**: Language regarding EPA's intent to perform an evaluation of disposal methods during the Phase 2 design for a passive treatment system was added to the FS. The need for a detailed design analysis that would be performed during the Remedial Design phase of the process is mentioned in Section 5.2.3. Other information regarding sludge management was added in Section 4.3.2.4 (see responses to comments in Sections 4 and 5 below).*

The intention to continue operating the pilot scale passive treatment system is now stated in Section 7 of the FS.

RESPONSES TO SPECIFIC COMMENTS
(EPA responses in italics. Changes are shown in red.)

Comment: Section 2.3.7 – Suggest inserting "Colorado Department of Public Health and Environment" before "Proposed Soil Remediation Objectives Policy Document".

***Response**: Done*

Comment: Section 3.3.1, last sentence – Please add to this statement about the success of the PTS with additional context regarding the lack of long-term performance history for similar systems (insert language from Section 5.2.3).

***Response**: Section 3.3.1 doesn't contain a reference to the performance of a PTS; however, the description of a BCR in Section 3.2.4.3 was changed to state the following.*

A BCR can be effective in reducing metals concentrations in adit discharge water. Long-term performance data are not available for systems operated at similar conditions, but the pilot study indicates that a BCR system is implementable and effective at removing cadmium, copper, lead, and zinc from the Level 1 adit discharge water.

The last paragraph of Section 3.4.1 was changed to state the following.

Despite a lack of long-term performance history for similar systems, the pilot-scale passive treatment system (PTS) performance has demonstrated that a PTS is feasible at cold, remote sites. Despite the high removal rate, however, the BCR effluent exceeds the stringent water quality standards for cadmium, lead, and zinc (Golder 2009a).

Comment: Section 3.4.4, last sentence – This statement regarding study recommendations is a little unclear when reviewing the previous paragraphs which describe the addition of lime. Please confirm the study recommendations did not include lime application.

***Response**: The following sentence was added to the last paragraph of Section 3.4.4.*

A specific lime amendment rate was not recommended because varying rates were not studied.

Comment: Table 3-2, Surface Water Monitoring and Ground water monitoring – Suggest the "Implementability" statements be changed to address implementability per the NCP criteria, rather than community acceptance. For example, "easily implemented during season when the site is accessible."

***Response**: Table 3-2 was changed to state the following in the Implementability column.*

Easily implemented when site is accessible.

Comment: Figure 4-9 Alternative 3E: please reconfigure, or move the location of, the mixing pond before the implementation of the second phase of the remedy to allow for access directly to the Standard Mine adit and bio-reactor opposed to the construction of the proposed access road. CDPHE does not want to maintain and additional road at the site.

***Response**: This comment will be addressed during remedial design.*

Comment: Figure 4-12 Bulkhead in Level 1: the flow-through bulkhead will be utilized to control flow to either a bio-reactor or Elk Creek. Please add a flow meter to the design for the upper pipe conveyance system so that the flow can be accurately set and monitored. The meter would be installed downstream of the control valve for the conveyance pipeline to the portal.

***Response**: This comment will be addressed during remedial design. The cost was not considered significant for the FS cost estimate, so the costing was not changed in the FS.*

Comment: Section 6.1.1.4, Page 3 of 18, Bullet Item number 8, Alternative 5B: change the word "us" to "is"in the sentence "water treatment system that "is" used opposed to "us".

***Response**: Done*

Comment: Section 6.1.3.1, System Reliability, page 7 of 18, second bullet statement, second sentence: change the word "An" to just "A".

***Response**: Done*

Comment: Section 6.1.3.1, System Reliability, page 7 of 18, sixth bullet statement, first sentence: add the word "to" after the word expected.

***Response**: Done*

Comment: Section 6.1.3.4, Item #3 – Shouldn't this alternative's long-term effectiveness be evaluated only on its ability to be reliable with minimal O&M (similar to Item #1).

***Response**: Alternative 5B consists of installing a bulkhead and allowing water to flow through the bulkhead (controlled releases). The bulkhead itself would be reliable, but it would only be effective if the timing of releases is effective in reducing downstream risks or if a downstream water treatment system is effective.*

Comment: Section 7.0 PREFERRED ALTERNATIVE, page 2 of 3, Phase 1 Monitoring: Phase 1 monitoring should include a surface water sampling event from station Elk-29 to location ELK-08 immediately prior to implementation of Phase 1 of the remedy in order to establish a pre-remedial baseline condition for this reach of Elk Creek. Additionally, after completion of Phase 1, and the installation of the flow-through bulkhead, the valve should be closed for a week for a "water-tight" test and before opening the valve a second sampling event should be implemented to evaluate surface water quality with no discharge to Elk Creek. A comparison of the pre-remedial results and the results after valve closure should be made with respect to the stream standards. This information will provide "background" water quality with respect to standards. The information would also be utilized to compare with performance monitoring data after remedy completion and to present to the water quality control division staff and subsequently the commission.

Monitoring of Elk Creek should also include limited sampling events above and below the Standard Mine portal at different discharge rates from the bulkhead to establish a discharge rate that would not exceed standards should water be stored behind the bulkhead and released later during low flow events. This information would be recorded and provided in an operations and maintenance report in case the bio-reactor ever had to be by-passed.

***Response**: This comment will be addressed more fully in the Compliance Monitoring Plan that will be developed by EPA and the State during the remedial design/remedial action phase of the project.*

RESPONSES TO COLORADO ATTORNEY GENERAL COMMENTS

Comment: § 2, pg 2. Remedial actions must meet ARARs unless grounds for waiver exist. Please remove the "greatest extent practicable…" language in the 1st ¶ under § 2.3. This only applies to removal actions under the NCP.

***Response**: Done*

Comment: § 2, pg 3. The first ¶ reference to the ARARs table should be "Table 2-1." Also, please add the following language at the end of this ¶ acknowledging TBCs: "In addition to ARARs, EPA and the State also identified other advisories, criteria and guidance "to be considered" (TBC) in selecting and implementing the remedy."

***Response**: Done*

Comment: § 2, pg 3. Second ¶ under 2.3.1 discusses the INS. Please change the 4th sentence to read, " A classification has not been assigned to groundwater in the vicinity of the Standard Mine site, therefore the Interim Narrative Standard applies in accordance with 5 CCR 1002-41.5(C)(6)." Also, please add the following at the end of the 5th sentence describing the INS: "(Tables 1-4 provide standards for domestic and agricultural use classifications as well as standards for total dissolved solids)."

***Response**: Done*

Comment: § 2, pg 4. Please change the 1st sentence to read: "Colorado Water Quality Regulations, 5 CCR 1002, are promulgated by Colorado's Water Quality Control Commission (WQCC) and guide water quality regulation within the State."

***Response**: Done*

Comment: § 2, pg 4. Please change the first three sentences of the second ¶ to read: "Regulation 31 establishes basic water quality standards that apply to all surface waters of the state as well as numeric standards for protection of waters with specific use designations. Table Value Standards (TVS) are a subset of numeric standards and are based on federal water quality criteria adjusted to protect the beneficial uses of Colorado waters. The TVS are the default criteria for numeric standards, but different standards may be applied to specific stream segments if adopted by the WQCC through an administrative rulemaking proceeding."

***Response**: Done*

Comment: § 2, pg 5. Please break the 1st sentence of § 2.3.5 into 2 sentences separating the state and federal RCRA regulations. The second sentence and third sentences should read: "The State RCRA solid and hazardous waste regulations are codified at 6 CCR 1007-2 and 1007-3, respectively. State and federal hazardous waste regulation
numeric citations – i.e. CFR and CCR "Parts" - are identical."

***Response**: Done*

Comment: § 2, pg 5-6. The last sentence on pg 5 carrying over to pg 6 indicates that haz waste regulations may be relevant and appropriate if treatment sludge fails TCLP. If this is the case, we need to change state and federal HW ARARs to "relevant and appropriate" in the ARARs Table.

***Response**: The following sentence was deleted from the FS.*

> *If sludge or other treatment byproducts are tested and determined to be hazardous and require disposal at a RCRA-permitted facility, Parts 264, 265, and 268 of RCRA regulations may also be applicable*

Comment: § 2, pg 6. The first full ¶ states "[m]aterial disposed of on site would more likely be regulated by the Colorado Mined land Reclamation Act." It is unclear why that would be the case rather than the state solid waste regulations. Please add further explanation.

***Response**: The following sentence was deleted from the FS.*

> *Material disposed of on site would more likely be regulated by the Colorado Mined Land Reclamation Act.*

Comment: § 2, pg 6. Section 2.3.7 discusses guidance documents pertinent to soil remediation. Please insert the "TBC" acronym somewhere in these two ¶s.

***Response**: Done*

Comment: § 2, pg 6. Section 2.3.9 mentions "exemptions" in § 320 of Colorado's Environmental Covenants Law. Please strike the second sentence. While there are circumstances under which CDPHE may waive the requirement for an EC, this waiver has never been discussed in relation to the Standard Mine remedy. Moreover, CDPHE has run into significant problems when seeking cooperation from local governments to impose land use restrictions with state oversight and enforcement authority as required by the waiver provision.

***Response**: The following sentence was deleted from the FS.*

> *Exemptions are stated in Section 25-15-320.*

Comment: § 2, pg 8. Please strike the second sentence under the Surface Water heading. Basic standards and numeric standards (of which TVS is a subset) are not the same as evidenced by the separate tables setting forth different standards for each. Also, please add the following to the end of the 3rd sentence: "if adopted by the WQCC."

***Response**: Done*

Comments shown as redline/strike out provided within the narrative for FS Sections 4, 5 and 7 are addressed below. Changes to text are shown in red.

RESPONSES TO STATE COMMENTS PROVIDED AS TRACKED CHANGES IN THE ELECTRONIC VERSION OF SECTION 4

Section 4.2 The 3rd paragraph was changed to read as follows.

> *Deed restrictions convey a restriction from a property owner to subsequent owners.*

Section 4.3.2.4 Due to state questions regarding draining BCR substrate and the manner in which maintenance costs were calculated, Paragraph 2 was changed to read as follows.

> *BCR Media Replacement*
> *The longevity of BCR media can be estimated based on limestone and carbon longevity. Theoretical limestone and carbon longevity estimates for the pilot system are 6 and 21 years,*

respectively (Golder 2009a). In order to increase the longevity, the full-scale bioreactor media should contain a higher proportion of limestone than the pilot system. Longevity estimates for other BCR systems are typically between 10 and 20 years (Gusek and Schuek 2004). At the end of its lifespan, the media would likely consist of non-degradable organic matter (i.e., lignin), metal sulfides, and residual limestone. Media disposal options include disposal in an on-site repository, disposal in an off-site landfill, or drying and burning of media on site for volume reduction and subsequent disposal in a repository or landfill. Spent BCR media is different from typical metal hydroxide water treatment sludge which requires mechanical dewatering with filter presses. In a BCR, metal sulfides accumulate within the organic media during treatment of mine waters and are removed along with media during replacement events. During a media replacement event, the BCR would be drained prior to excavation and disposal. BCR media has been to shown to drain readily in place without any specific dewatering processes. The pilot BCR at the Golinsky site drained in about 20 hours (Golder 2007). The drainage rate is a function of permeability, field capacity, and residual moisture content, factors that are not very sensitive to changes in temperature. Substrate age may also affect the drainage rate, as degradation of substrate with time may lead to a higher degree of fine particles which will drain more slowly. Regardless, the substrate drainage rate at the Standard mine is expected to be similar to the Golinsky site pilot BCR and the total drain time is expected to be from several days to one week assuming similar substrate composition and ages. Water drained from the BCR would be recycled for treatment by the other BCR(s) on site. It is anticipated that draining of the BCR and allowing the BCR media to dewater within the BCR cell itself will be sufficient to adequately prepare the BCR media for either on-site or off-site disposal. However, future pilot testing of dewatering and disposal options at the Standard Mine site will be conducted if necessary to finalize a site-specific media disposal strategy. The media replacement would likely occur over two construction seasons to allow continual treatment in one BCR cell while the other is being refurbished. The cost estimates for replacing the BCR media include the costs for construction over a two year period and the associated mobilization charges, but for clarity and simplicity the costs are totaled and shown in one year (Appendix A).

Section 4.3.2.4 Paragraph 4 was changed as follows due to wording changes suggested by the State.

Cost estimates for Alternative 3 considered off-site disposal of spent BCR media for the reasons discussed below, though on-site disposal is not precluded. Design and construction of the existing site repository was a significant effort due to lack of available space on site, multiple stakeholder input, and site construction challenges. The existing repository is closed and it would be expensive to periodically re-open the repository, distribute materials such that site drainage is maintained, and re-cover the affected area. On the other hand, fuel costs could increase significantly in the future which could make on-site disposal cost effective. Also, on-site disposal is consistent with EPA "green" initiatives to reduce greenhouse gas emissions and manages the spent media at the site where it was generated rather than consuming local landfill space. The feasibility and cost of on-site disposal is highly dependent on the size of the BCR. If burning of the spent media is allowed prior to placement in a repository, that will reduce the volume of spent media, but the remaining ash will still contain metals with the same concern for release. At two other pilot sites, the ash was mixed with Portland cement to form a concrete-like waste in preparation for disposal (Knight Piesold 2001). Pending detailed design analysis of on-site versus off-site disposal, the PTS alternatives presented herein assumed off-site disposal of the spent BCR media as a dependable and proven management approach.

Section 4 3.2.4, Solids/Sludge Removal. The State requested that a bullet be added regarding sludge removal in pipes. This effort is minor and would be included as part of removing the settling basin solids, BCR media, and mixing basin sludge, so an additional bullet and cost analysis was considered unnecessary.

Section 4 3.2.4, Last Paragraph. Due to wording changes requested by the state, the paragraph was changed to read as follows.

Long-Term Monitoring

Long-term monitoring would be required to verify compliance with site discharge requirements. Over the course of the first year, monthly monitoring would be recommended to verify proper startup and operation. After the first year, the monitoring frequency would be reduced to bi-monthly (i.e., every other month). A sampling and analysis program would be necessary for all of alternatives that include a PTS and would likely include the following influent and effluent parameters: cadmium, copper, iron, lead, manganese, zinc, BOD, total dissolved solids (TDS), TSS, nitrate, ammonia, and total phosphorus. In addition, influent and effluent flow rate, pH, temperature, specific conductance, dissolved oxygen (DO), and oxidation-reduction potential would be measured in the field. Sampling during winter and spring months is difficult given the heavy snowfall and lack of road access to the site. During treatability testing, site access during winter and spring was achieved with a snowmobile or on skis. This is not anticipated to be continued during full-scale operation. An automated monitoring system, including influent and effluent Teledyne ISCO™ autosamplers and flumes, may be used to allow year-round monitoring. Sample collection and download of flow data would be conducted in June or July when the site becomes accessible.

Section 4.7.2 Flowable Fill Installation. The flowable fill is shown on the figure. No changes were made to this section.

Section 4.7.2 Last paragraph. Due to a request regarding O&M, a paragraph describing the O&M was added to the description of each alternative.

Section 4.11.2. Monitoring. Due to wording request from the State, the text was changed to read as follows.

Monitoring

A monitoring program would be developed to determine if an adequate vegetative cover has developed and continues successfully.

RESPONSES TO STATE COMMENTS PROVIDED AS TRACKED CHANGES IN THE ELECTRONIC VERSION OF SECTION 5

Section 5.2.1, Overall Protection of Human Health and Environment. The wording change requested by the State was incorporated as shown below.

Protection of on-site or off-site ecological receptors would not be accomplished. Conditions in Elk Creek may gradually improve in response to the Removal Actions conducted at the site from 2005 through 2008; however, due to continued releases of contaminated waters to Elk Creek, it is expected that WQS would not be met in Elk Creek. There would be no reduction in the production of acid rock drainage and subsequent transport of contaminants to off-site surface water and groundwater. The RAOs would not be met.

Section 5.2.3. The fifth bullet in the list of potential issues associated with Alternative 3 was changed to read as follows.

- *The system requires long-term operation and maintenance, which can be costly and difficult at a remote, high-elevation site.*

Section 5.2.3 The seventh and eighth bullets in this section were changed to read as follows.

- *All five PTS systems require road realignment across private property. Use of a PTS system will require obtaining perpetual easements for access from the landowners,*

coordination with natural resource trustees to minimize ecological disturbance, and a road design that minimizes O&M requirements.

- *A detailed design analysis of the methods for drying and disposal of spent BCR media may be necessary to determine the best spent substrate handling and disposal methods.*

Section 5.2.3 The shading in the tables were changed to allow the shaded cells to be distinguished if the document is printed in black and white.

Section 5.2.3 Compliance with ARARs, Fish and Wildlife, was changed to read as follows.

> *Fish and Wildlife – Site activities would be coordinated with natural resource trustees to ensure the treatment system, new road, and construction activities pose no threats to protected species.*

Section 5.2.3 Compliance with ARARs, Long-term Effectiveness and Permanence, the last three paragraphs were changed to read as follows.

> *Treatment of adit discharge would reduce the loading of contaminants to Elk Creek for as long as the system operates. As with any water treatment system, long-term operation and maintenance and monitoring would be required. The PTS would function for long periods of time (i.e., winter and spring months) without regular supervision. Annual operation and maintenance tasks and monitoring would be completed in summer and fall months when the site is accessible by vehicle.*
>
> *The proper handling and disposal of treatment residuals (i.e., settling pond sludge, spent BCR media, and mixing basin sludge) would be required in order to minimize residual risk. The BCR media, for instance, would be contained within a concrete basin and covered with a geomembrane liner; the media would not be accessible during system operation. During BCR media replacement events, the spent media would be handled and transported appropriately in order to avoid exposure to, or release of, the spent media. The other residuals, namely the settling pond and mixing basin solids, would be removed, tested to determine disposal requirements, and disposed on a more regular basis as necessary (e.g., every five years). A larger system would generate more residuals than the smaller systems, and a system that does not include a mixing basin would only generate settling basin solids and spent BCR media. The effectiveness of managing the treatment residuals is similar for the five PTS alternatives; however, there would be a higher volume of residuals for the higher capacity options.*
>
> *A larger system would reduce the risk from untreated adit discharge but would increase the volume of residuals. A smaller system would have a higher risk if it is not sufficient to treat all adit discharge during peak runoff, but would produce less residual material.*

Section 5.2.3 Reduction of Toxicity, Mobility, or Volume through Treatment, 4th paragraph was changed to read as follows.

> *The metals would precipitate primarily in the BCR media and mixing basin. With proper operation and maintenance of the system, including replacement of the BCR media, the metal removal would be irreversible. The PTS would generate settling basin solids, BCR media, and mixing basin sludge (for designs that include a mixing basin). The residuals would require periodic removal and disposal. There is uncertainty over the characteristics of the treatment residuals and whether they would constitute hazardous waste. Fixation of the residuals may be necessary in order to render the residuals non-hazardous and allow disposal in a non-hazardous landfill or on-site repository.*

Section 5.2.3 Implementability. The second paragraph was changed to read as follows.

> *The remote site location and harsh climate would restrict monitoring; an automated monitoring system that permits winter and spring monitoring should be considered.*

Section 5.2.3 Cost. The State requested clarification of the cost calculations regarding calculation of mobilization costs. Section 4 was changed to clarify the calculations and no changes to this section were deemed necessary.

Section 5.2.5 The second bullet listing issues with Alternatives 5A and 5B was changed to read as follows.

- *Alternative seepage pathways out of the mine could develop due to increased head pressures within the workings. This would apply to Alternative 5A; if water is released regularly, less pressure would build up behind a permeable bulkhead (Alternative 5B). Monitoring may be needed to identify and control new flow paths that result in contaminated seeps or increased metals concentrations in Elk Creek or groundwater.*

Section 5.2.5, Overall Protection of Human Health and Environment. The last paragraph was changed to read as follows.

> *This alternative addresses the surface water RAOs, but does not address the groundwater and soil RAOs. Localized groundwater located in the vicinity of the Standard Mine fault, as well as the mine workings contains elevated concentrations of site contaminants, though the extent or the seasonality of the contamination has not been well quantified. The groundwater may be further impaired if alternative flow paths out of the mine workings develop due to water build-up in the mine workings.*

Section 5.2.5 Long-Term Effectiveness and Permanence. The first three bullets now read as follows.

- *Pressures that develop behind the Alternative 5A bulkhead could result in creation of seepage flow pathways. Seepage that may develop is expected to be lower in metal concentrations due to the decreased oxidation in the mine workings and natural filtration along the newly developed flow pathways.*
- *Maintenance would be required to make certain the system continues to function properly. Potential maintenance items include valve repairs, pipe segment replacements, pipe cleanout, and cleanout of sediment buildup behind the bulkhead.*
- *Monitoring of bulkhead integrity would be required to protect against unintended discharges of water. Pressure or water level monitoring may be performed to monitor the buildup of water behind the bulkhead.*

The following State comment on Bullet 3 was noted but the text was not changed because this is a topic that would be addressed during remedial design. *"This is a suggestion: DRMS work at the site will include drilling into the Level 1 adit to see how deep water is behind the collapse. This bore, if properly cased, can be utilized to measure the height of water behind the bulkhead opposed to installing a pressure transducer and downloading the data in to a computer. Given the height of the water above the floor of the tunnel will provide the information to calculate the pressure at the base of the bulkhead."*

Section 5.2.5, Reduction of Toxicity, Mobility, and Volume through Treatment

> *Water that develops an alternative pathway out of the Level 1 workings as a result of the impermeable bulkhead (Alternative 5A) would likely be treated through natural attenuation as it passes through subsurface rock formations prior to discharging to Elk Creek. If water finds a direct flow path to Elk Creek that surfaces not far from the workings, natural attenuation may not occur.*

Section 5.2.5 Short-Term Effectiveness

The last bullet in the section describes the potential for increased discharge from other levels of the mine. The State recommended that the bullet be eliminated, but EPA believes that discharge from upper levels of the mine is a possibility if the bulkhead remains closed and water builds up to the elevation of the Level 2 mine workings. Therefore the last bullet was retained in the final document.

RESPONSES TO COMMENTS PROVIDED BY THE STATE AS TRACKED CHANGES IN THE ELECTRONIC VERSION OF SECTION 7

Section 7.0 second paragraph. "Community groups…" was changed to "The local community…"

Discussion of revegetation monitoring and ongoing maintenance, operation, and monitoring of the pilot passive treatment system was added.

The State commented that the data from the Level 1 and Level 3 discharge monitoring will be used to evaluate on-site versus off-site disposal of spent BCR media. EPA believes that the Level 1 and Level 3 discharge monitoring would not be particularly useful in comparing various methods of disposal. It is more likely that tests specifically designed to evaluate disposal parameters would be conducted using the pilot system. If the Phase 2 Remedial Action is deemed necessary, the disposal testing would be performed as part of the Remedial Design process.

Please note that other changes were made to Section 7 after EPA received State comments but prior to submitting the document for public review. These changes were not substantive, but were added to make the process used to select the preferred remedy more transparent and easier to understand. The revised version of Section 7 is provided at the end of this responsiveness summary for convenience.

RESPONSE TO USFS COMMENTS SENT VIA E-MAIL FROM LINDA LANHAM TO CHRISTINA PROGESS ON 03/25/2010

Comment: I did review the Draft Feasibility Study Report. I verified the land status layout depicted on Figure 4-1 and this figure looks correct from my survey drawings.

From our conference phone call on 02/24/10, I thought there would be a three (3) phase approach listed in Section 7. Question: Why was the three phase approach consolidated to a two phase approach? I like the following phased approach for Standard Mine I thought was discussed during the conference phone call on 02/24/10:

- As listed on page 1 of Section 7, Phase I would be source water control, Alternative 6, along with soil amendment and revegetation, Alternative 11. Implement this work and monitor the site for a number of years.

- Phase II would be flow-through bulkhead, Alternative 5, with flowable fill and foam level 3, Alternative 7. Implement this work and monitor the site for a number of years.

- Phase III would be water treatment, Alternative 3.

> ***Response:*** *This issue was resolved during a phone conversation between Linda Lanham/USFS and Christina Progess/EPA. The USFS concurs with the proposed remedy.*

Comment: Section 7 seems to be written in a condensed fashion. The second paragraph could be expanded to provide more rationale. I know you don't want to layout a schedule for monitoring the site between phase implementations, but I don't think the narrative in this section really mentions the needed monitoring period which is years between implementing the next phase.

> ***Response****: Text was added to Section 7 to make the rationale for selecting the preferred remedy more transparent and easier to understand, and the need to monitor for a period of years was*

added. The revised version of Section 7 is provided at the end of this responsiveness summary for convenience.

RESPONSES TO COMMUNITY COMMENTS TO DRAFT FEASIBILITY STUDY DATED APRIL 6, 2010
Comments received May 3, 2010

Comment: This letter conveys the SMTAG's and Frontier Environmental Services review of the Feasibility Study (FS) for the Standard Mine Site, Gunnison County, Colorado. In this letter, the SMTAG provides a critique of the FS.

Through our review we found only the items listed below as issues for further explanation, correction, or improvement:

Since none of the alternatives would address all of the RAOs, it was determined that a phased approach of multiple alternatives would be the most effective remedy for the Standard Mine site. The EPA's preferred alternative includes a combination of the following:

Alternative 7 – Flowable Fill and Foam in Level 3
Alternative 5B – A flow-through bulkhead
Alternative 11 – Soil Amendment and Revegetation
Alternative 2 – Institutional Controls, and if necessary
Alternative 3 – PTS

It is our opinion that this is a technically feasible alternative that has a high probability of being effective at meeting the RAOs. We do believe that passive treatment will ultimately be required. We agree that Alternative 7 needs to be implemented and monitored prior to the design of the PTS, but we would like to see the EPA commit to a time-frame by which it plans to meet the water quality standards at Elk-08. Currently the language in the preferred alternative is vague at best.

***Response**: EPA appreciates the community review of the FS and understands the sense of urgency to complete the cleanup. The information will be conveyed to site decisionmakers and considered in the timing of the Remedial Action.*

For convenience, the revised version of Section 7 is provided below. Red text has been added to address State and USFS comments.

7.0 PREFERRED ALTERNATIVE

Based on the evaluation provided above, EPA, CDPHE, and the USFS have proposed a preferred alternative. This section presents the rationale used in selecting the preferred remedy and a description of the phased approach that would be used to implement the remedy. The ranking of alternatives identified in Section 6 (Table 6-1) is a useful tool in selecting applicable remedial alternatives; however, the overall ranking for each alternative assumes that all criteria are equally important, which is not the case. Therefore, the agencies considered not only the ranking from Section 6, but also the overall likelihood of success in meeting the RAOs when selecting the components of the preferred alternative. The preferred alternative includes a phased approach to remediation as described below. The preferred alternative may be revised after consideration of community comments and concerns.

The highest ranking alternatives identified in Section 6 involve either water treatment or an impermeable bulkhead. The state is concerned about long-term O&M of a PTS and prefers that this remedy be used only as needed if WQS cannot be met using alternatives with less O&M obligations. Water treatment at the Mt. Emmons Project WTP is expected to encounter insurmountable administrative hurdles so was eliminated from further consideration. The local community has expressed concern about the use of an impermeable bulkhead. Therefore, these alternatives were not included as the initial step in managing site contamination.

Alternative 7, flowable fill and foam in Level 3, is the next most highly ranked alternative and is agreeable to all three agencies. Alternative 7 involves sealing the raises between Levels 2, 3, and 4 to prevent water flow to lower levels of the mine where it would contact the most highly contaminating materials before discharge at Level 1. Fractures and mineralized zones would be sealed to reduce the flow of water into the mine and to prevent contact with contaminant sources. Alternative 7 captures all of the water that enters the mine at and above Level 3, providing a greater degree of certainty of effectiveness relative to the other source water control alternatives (Alternatives 6, 8, 9A, and 9B).

A flow-through bulkhead (Alternative 5B) was added to the remedy to prevent the potential for uncontrolled releases of mine water from within Level 1. The flow-through bulkhead, while not effective in meeting the RAOs in and of itself, would allow for control of the Level 1 adit discharges in a manner that results in the least impact to aquatic receptors in Elk Creek. If water treatment is needed to meet WQS at Elk-08, the flow-through bulkhead could be used to regulate flow to the PTS thus reducing the design flow and the footprint and cost of the PTS.

Alternatives 1 through 10 do not address the Level 5 and Level 98 waste rock and adit discharges; therefore, Alternative 11 will be included to address these sources of contamination.

Finally, if several years of monitoring indicated that the alternatives identified above are not adequate to allow WQS to be met at Elk-08, a PTS (Alternative 3) would be installed. Because Alternatives 7 and 5B may change the flow and quality of water from the Standard Mine adits, the size and design of the PTS would be dependent on current adit discharge flow rate and water quality data at the time that a full design for the PTS is being completed as part of the Phase 2 remedy.

Alternative 2, Institutional Controls, will be included as required by law.

PHASE 1 – SOURCE WATER CONTROL

Alternative 7 – Flowable Fill and Foam in Level 3

The portal and adit of Level 3 would be rehabilitated to allow construction within the workings. The raises would be re-collared and backfilled with polyurethane foam to prevent inflow from the Level 4

shaft and outflow to lower levels of the mine. Fracture zones along the fault or in bedrock in Level 3 would be sealed to reduce the inflow of water from the surrounding aquifer. The floor would be sealed to prevent interactions between the water and any contaminants located in the adit and to prevent flow to lower levels of the mine. Water would be directed out of the Level 3 portal and flow through a channel to Level 1 where it would be discharged to Elk Creek or treated.

The purpose of this alternative is to reduce the amount of water that enters the mine at Level 3 and direct the water that does enter Level 3 away from the most contaminated portions of the mine workings (between Levels 3 and 1) where contaminants are entrained in the water. This is expected to reduce the overall flow of water out of the mine workings. Metal concentrations in the Level 1 adit discharge should decrease by reducing rock-water interactions between Levels 1 and 3. Because data show that the water flowing into Level 3 has relatively low metal content compared to the Level 1 adit discharge and Alternative 7 prevents contact between the mine water and the contaminated materials within Level 3, the metal concentrations in the Level 3 adit discharge should be relatively low. Discharge from the Level 3 adit would be conveyed to Level 1 for one of two possible scenarios: discharge to Elk Creek or treatment in a PTS installed at Level 1.

The estimated cost of Alternative 7 is $2,185,100.

Alternative 5B – Flow-Through Bulkhead

The blockage in Level 1 would be removed and the adit would be rehabilitated to allow construction of a flow-through bulkhead. The bulkhead would be constructed within competent bedrock and include piping and valves for water discharge and sediment removal.

Rehabilitation of the Level 1 adit and installation of a flow through bulkhead would reduce the potential for an uncontrolled release of contaminated mine water and the resulting environmental impacts. Water could be released during periods of high runoff or when least likely to affect aquatic receptors in Elk Creek. Alternately, the valve may be used to attenuate flow to a water treatment system so the system could be designed to operate at a low to moderate flow rate throughout the year rather than be designed to accommodate high flows that occur during spring runoff and then operate at a fraction of capacity during low flow months.

The estimated cost of Alternative 5B is $2,213,000.

Alternative 11 – Soil Amendment and Revegetation

The waste rock at Levels 5 and 98 would be amended with lime, organic matter (compost), and fertilizer and seeded. Surface water and adit discharges would be routed around the treated soils.

The alternative would decrease the amount of water that flows through contaminated soils and transports contaminants to downstream waters and reduce interactions between human and ecological receptors and contaminated soils. The soil amendments would decrease the mobility of contaminants present in the soil and reduce the toxicity of contaminants to environmental receptors.

The estimated cost of Alternative 11 is $418,100.

Alternative 2 – Institutional Controls

Environmental covenants would be established with site property holders in order to minimize exposure to mine waste and other contaminated media. Fencing or signage will be installed as necessary to protect the remedy and limit visitor contact with site contaminants.

Phase 1 Monitoring

The impacts of the Phase 1 Remedial Action would be measured over a period of years to determine if an additional phase of treatment is needed and, if so, guide design of a Phase 2 system. The following monitoring would be performed as detailed in a site monitoring and maintenance plan.

Elk Creek Water Quality
Surface water quality in Elk Creek would be sampled regularly to determine progress toward meeting WQS at Elk-08. Samples will be collected at Elk-08 and at other current Elk Creek monitoring stations, as appropriate.

Adit Discharge
Phase 1 is expected to alter the flow rate and chemistry of the Level 1 adit discharge. The flume at Level 1 would be maintained and monitored on a regular basis to identify changes in flow rate from Level 1. The Level 1 adit discharge water would be sampled at the same time as Elk Creek monitoring stations to characterize changes in adit discharge chemistry. A flume would be installed at Level 3 and the flow and chemistry of the Level 3 adit discharge would monitored to determine if the water requires treatment. If so, the flow and water chemistry data from Levels 1 and 3 would be combined to identify the design flow and chemistry for the PTS.

Vegetation
After implementation of Alternative 11, progress toward meeting vegetative success criteria will be monitored.

BCR Pilot System
The BCR pilot system will be operated, maintained, and monitored until a determination of whether Phase 2 is necessary. This operation will provide valuable data about the long-term effectiveness of the system in reducing contaminant concentrations and help address state concerns about BCR operation and maintenance. The analytical monitoring program will be reduced from the level conducted during the pilot study.

PHASE 2 – WATER TREATMENT

Alternative 3 – Passive Treatment System

After monitoring the effects of Phase 1 on water quality in Elk Creek, it may be determined that the remedy does not adequately improve water quality at Elk-08. In that case, a PTS would be installed to treat water at Level 1. The water requiring treatment may originate from Level 1 alone, or may be a combination of Level 3 and Level 1 discharges depending on how the Phase 1 work has affected the hydrology within the mine and geochemistry of the mine discharge(s).

A specific design flow rate for the proposed PTS (which varies between Alternatives 3A, 3B, 3C, 3D, and 3E) is not presented here because the post-Phase 1 adit discharge flow and chemistry is unknown. Post-Phase 1 monitoring, as discussed above, will be used to determine if a PTS is necessary in order to meet PRGs, and if so, what size and configuration of a PTS is needed. Data gathered from Level 1 and Level 3 adit discharge monitoring would be used to determine the water treatment strategy (e.g., Level 1 only or both the Level 1 and Level 3 adit discharges) and the influent parameters for the PTS. The PTS would be designed to reduce loading to Elk Creek to the degree necessary to meet WQS at Elk-08.