**RESPONSE TO STANDARD MINE TECHNICAL ADVISORY GROUP (SMTAG) COMMENTS**
**STANDARD MINE REMEDIAL INVESTIGATION REPORT**
**April 30, 2010**

This is EPA's response to comments received from the SMTAG on the Standard Mine Remedial Investigation Report expressed in a letter from Anthony Poponi to Christina Progess dated April 19, 2010.

**Comment 1** *The single value of hardness used to calculate the water quality standards for Elk Creek and Coal Creek is too high. These water quality standards appear in Figures 4-10, 4-11, 4-13, and 4-14, which display metal concentrations in Elk Creek and Coal Creek. The water quality standards for the metals were calculated for a hardness of 65 mg L-1 as CaCO3, "the lower 95th confidence limit of the mean hardness in Elk Creek during low flow conditions between 2005 and 2008" (RI, p. 4-13) as specified by CDPHE[1]. Some of the calcium and magnesium in Elk Creek comes from the Standard Mine adits (RI, Table 4-3). Hardness concentrations of about 30 mg L-1 as CaCO3 have been measured in Coal Creek tributaries both upstream (e.g., Splains Gulch) and downstream of Elk Creek in September 2005[2].*

*The hardness used to calculate the water quality standards in ElkCreek should be about 30 mg L-1 as CaCO3, not 65 mg L-1, because we should expect that hardness in Elk Creek should be the same as hardness in nearby tributaries to Coal Creek not affected by mining.*

**Response:** The intent of showing the water quality standards on the graphs presented in the RI was to provide a point of comparison for the water quality measured in Elk Creek and not to indicate that absolute values had been set for long-term compliance monitoring. The water quality standards that are presented in the RI were based on the standards established by the Colorado Water Quality Control Division (WQCD) as established in 5 Code of Colorado Regulations (CCR) 35. For the metals shown on the referenced figures, the standards for Elk Creek are to be calculated from the hardness-based Table Value Standards (5 CCR 31; Table 3). The regulation states that:

> *Hardness values to be used in equations are in mg/L as calcium carbonate and shall be no greater than 400 mg/L. For permit effluent limit calculations, the hardness value 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.*

The 2005 through 2008 hardness data from all of the Elk Creek monitoring locations was used to determine the hardness that was used to calculate the water quality standards shown on the figures in the RI. This approach was considered conservative for two reasons. First, a point of compliance in Elk Creek had not been agreed upon by EPA and state regulators, so the hardness values measured at all Elk Creek monitoring locations, including the low hardness values observed at Elk-29, were included in the calculation. Higher values for the water quality standards would have resulted by using the Elk-08 hardness data alone. Second, the 2009 data showed higher hardness in Elk Creek than was observed in previous years, perhaps due to the 2008 site reclamation efforts. The 2009 data was not included in the hardness calculation because the resulting water quality standards would be higher and not indicate the quality that might be required after all of the site remediation efforts are completed.

The calculations are not intended to be used to identify the water quality standards that would be appropriate if mining had not occurred in the Elk Creek drainage, but rather to calculate the applicable standards given the existing hardness in the creek or the hardness that is present after cleanup activities have been completed. It would be incorrect to use water quality from other drainages to ascertain what the water quality standards should be in Elk Creek.

The numbers shown on the RI figures are indicative of the hardness at the time of the report, and will be updated once cleanup activities are completed at the site and monitoring is being conducted to determine compliance with state water quality regulations. The calculation of the standards will be conducted according to Colorado Water Quality Control Division (WQCD) methods.

> *For determination of standards attainment, where paired metal/hardness data is available, attainment will be determined for individual sampling events. Where paired data is not available, the mean hardness will be used.*

EPA will continue to monitor Elk Creek during and after cleanup activities to determine if the hardness has changed, and if so, what the resulting change in water quality standards should be. EPA anticipates that the hardness in Elk Creek will change once the preferred remedy is installed. EPA will work with CDPHE to ensure the assessment of compliance with water quality standards is conducted appropriately and that water quality standards are calculated using the correct hardness values.

**Comment 2** *Some of the metal concentrations in Figure 4-10 are specified as "dissolved" and some are not. Are all of the metal concentrations dissolved?*

**Response:** All of the metal concentrations are dissolved. The graphs that did not include "dissolved" in the title will be corrected for clarity.

**Comment 3** *In Figure 4-17, which presents the metal loading data for Coal Creek, a black box appears adjacent to a dotted line. Should this be a location label (the iron fen)? Should a similar label show the location of the Mount Emmons treatment plant input as well?*

**Response:** Figure 4-17 will be corrected to show the locations of the iron fen and the Mount Emmons WTP.

**Comment 4** *In Chapter 6 of the RI, the conclusions of the human health and ecological risk assessments are presented. For the human health risk assessment, the initial conclusion was that only the "child ATV rider" is at risk, and that risk comes primarily from the inhalation of manganese in airborne soils generated by all-terrain vehicle recreation at the site. The Addendum to the human health risk assessment showed that remedial actions completed over the past three years (removal of waste rock to the repository) have resulted in reduced risk to the child ATV rider – the current assessment is there is no longer any human health risk at the site. Given that these assessments are done for both a "central tendency exposure" and a "reasonable maximum exposure" and that no ATV recreation has ever been observed at the site, we agree with the conclusion that human health is no longer at risk at the Standard Mine site.*

**Response:** Agreed.

**Comment 5** *An outstanding issue related to the Human Health Risk Assessment involving the additional risk posed by cadmium in Crested Butte's drinking water has been addressed, but not in the RI. The Standard Mine Technical Advisory Group (SMTAG) has been requesting since the release of the draft Baseline Human Health Risk Assessment in 2007 that the EPA assess the increased risk to Standard Mine site visitors if they also ingest cadmium in Crested Butte drinking water. In a March 1, 2010,*

*memorandum from the EPA's senior toxicologist Susan Griffin to remedial project manager Christina Progess, and at the April 13, 2010, meeting of the SMTAG, the EPA presented the assessment of this increased risk to an adult hiker who visits the Standard Mine site (the "adult hiker" was one of the receptors considered in the Baseline Human Health Risk Assessment).*

*Exposures by incidental ingestion and inhalation of soil at the site, by drinking Crested Butte water, and by diet were considered in this assessment. The concentration of cadmium in the drinking water was set at 25 µg L-1, or one-half the detection limit for cadmium analysis, based on a result of "not detected" in an April 8, 2009, report from the Town of Crested Butte's water treatment plant. Relative to the exposure received by hiking at the site (expressed as a hazard quotient of 0.0055, drinking Crested Butte water increased the risk of non-cancer cadmium exposure by about 1¼ times (a hazard quotient of 0.007 for the drinking water). Taken together, the hazard quotient for the adult hiker was 0.0125. A hazard quotient of less than 1 is considered to represent an acceptable risk by the EPA.*

*The EPA risk estimate would have been higher if they used the maximum cadmium concentration measured in Crested Butte drinking water during the year of 2008[3], which was 69 µg L-1. The date of this maximum value was April 9, 2008. For this higher concentration, the cadmium hazard quotient would be 0.019 (the increase in the hazard quotient is proportional to the increase in cadmium concentration). For the higher cadmium concentration, the total hazard quotient for the adult hiker would have been 0.025, still well below a hazard quotient of 1, which represents acceptable risk.*

*In the memorandum, the EPA compared the adult hiker's exposure to cadmium from the site to exposure to cadmium in a typical diet using a dietary cadmium intake rate of 0.24 µg kg-1 d-1, which was based on a "Market Basket Survey." The source of this dietary cadmium intake rate could not be located based using the information provided by the EPA, but other sources suggest that this rate may be slightly high (e.g., 0.14-0.20 µg kg-1 d-1 for German adults[4]). The dietary intake of cadmium was about 34 times greater than the drinking water ingestion for 25 µg L-1 drinking water and about 13 times greater than the drinking water ingestion for 69 µg L-1 drinking water. The EPA presented this comparison to demonstrate that the risk of cadmium exposure by both hiking at the site and drinking the water was much less than the risk of eating a typical diet, but this comparison is irrelevant because the purposed of the risk assessment for the Standard Mine site is to determine the additional risk presented by the Standard Mine site, not to compare the risk to existing risks experienced by humans exposed to the site and its downstream effects.*

**Response:** To address community concerns, EPA provided the assessment of increased risks from cadmium exposure to community members that both visit the site and regularly ingest Crested Butte drinking water. This evaluation is outside of the scope of the Baseline Human Health Risk Assessment, and was therefore not included in the Risk Assessment portion of the RI. The March 1, 2010, memorandum from Susan Griffin to Christina Progess will be referenced in the Baseline Risk Assessment section of the RI for the convenience of interested parties.

**Comment 6** *Chapter 7 summarizes the results of the RI and presents the preliminary remedial action objectives (RAOs). The RAOs address the following points:*

*• reduce metal concentrations in Elk Creek water and sediments "to the extent practicable…to lessen water quality impacts and maximize reasonably attainable water uses,"*
*• reduce metal concentrations in Coal Creek water and sediments to the same extent as Elk Creek,*
*• ensure that metals from Elk Creek do not exceed drinking water standards at Crested Butte's drinking water intake on Coal Creek,*
*• reduce runoff from waste rock,*

*• reduce human exposure to manganese by ingestion and inhalation of site soils, and*
*• reduce ground water flow through mine workings to reduce metal loading to Elk Creek.*

*These RAOs represent an appropriate set of responses to the current conditions at the Standard Mine site and in Elk Creek and Coal Creek. The RAOs do not specify a location on Elk Creek by which water quality standards will be met. This RAO should be clarified to reflect the discussion of fish habitat and Elk-08 as the point of compliance.*

**Response:** The RAOs are not specific regarding a point of compliance. The proposed point of compliance was identified during development of Preliminary Remediation Goals (PRG) during the Feasibility Study process and is documented in the Feasibility Study Report.