Red Devil Mine Draft Final RI Report
Additional Comments from EPA's Lon Kissinger received April 19, 2013

NEW P.4-1, Background Value Estimation: Figures should be provided giving locations of all background samples for all media and these figures should be appropriately referenced within the text.

Response: Sampling location figures in Chapter 2 will be updated to more clearly identify which samples represent background. These revised figures will be referenced in Chapter 4.

NEW P. 4-3, Section 4.1.1 Surface Soil: More information needs to be provided on outlier tests. ProUCL guidance notes that identification of outliers should involve all concerned parties. Normal distribution based outlier tests require that the residual distribution following outlier removal be normally distributed. QQ plots should be included.

Response: Q-Q Plots and classical outlier tests (Dixon Test and Rosner Test), as available through ProUCL, were used to identify potential outliers. For all compounds, Q-Q plots were used to identify potential outliers. The Dixon test was used to confirm the potential outliers. The Dixon test, and all outlier tests available through ProUCL, assumes normal distribution of the data set. Many of the compounds in the background data set for which statistics were used to determine a background threshold value did show normal distribution. In some instances, this assumption was not met. Although using the Dixon test to confirm the presence of outliers when the data set is not normally distributed adds a level of uncertainty, this most often occurred for compounds that are naturally occurring or not a risk-driver at the site. Further information on the use of Q-Q plots and the limitations of the outlier tests available in ProUCL will be provided in this section.

NEW P.4-4, Section 4.1.1 Surface Soil: Procedure for comparison and pooling of background samples should reviewed by a statistician.

Response: Noted.

Additional EPA Comments received May 13, 2013

NEW: I would request that the 95th percentile harvest rates derived by Koster be added as an appendix to the HHRA.

Response: This data was provided as an Excel spreadsheet to BLM's contractors through EPA. The data are summarized in Table 6-22 of the HHRA. The ADF&G spreadsheet does not include any introductory information that would explain the contents or is in a format that would be easily understandable as a standalone appendix. No change to the document will be made.

NEW: In section 6.2.3.7.1, the applicability of the FCM modeling approach should be clarified for arsenic and antimony.

Response: The FCM for arsenic and antimony is 1. This is described and supported in this section:

"BLM sculpin whole-fish tissue data from Red Devil Creek is used to estimate concentrations of chemicals in game fish using a food chain multiplier (FCM) approach. The concentration of COPCs in game fish is estimated from the slimy sculpin concentration from Red Devil Creek multiplied by an FCM. For methylmercury, an FCM of three is assumed to account for biomagnification (i.e., the game fish concentration of methylmercury is set equal to three times the concentration in sculpin). This approach is supported by the fact that the biomagnification of methylmercury typically is three-fold with each trophic transfer (McGeer et al. 2004). For inorganic mercury and other metals, an FCM of one is assumed. This approach is defensible because biomagnification of metals (other than methylmercury) in aquatic organisms is rare. In fact, an inverse relationship has been shown for the trophic transfer of metals (except methylmercury) via the diet—that is, concentrations decrease from one trophic level to the next (McGeer et al. 2004). Hence, use of an FCM of one for inorganic mercury and other metals is health-protective."

NEW: I reviewed "Mercury, Arsenic, and Antimony in Aquatic Biota from the Middle Kuskokwim River Region, Alaska, 2010-2011." Unfortunately, the report does not contain sampling data at individual sampling locations, but rather only tabulates results by reach. It would be desirable to look at results immediately upstream and downstream of Red Devil. Even though telemetry results indicate that some of these species are highly mobile (e.g. species such as grayling, pike, burbot and sheefish), earlier work (Gray et al. 2000) indicated that mercury concentrations in grayling collected downstream of the confluence of Red Devil and the Kuskokwim were greater than those collected upstream. Modeled game fish mercury concentrations should be compared with sample results closest to the confluence of Red Devil and the Kuskokwim, not Reach C overall. This impacts the final paragraph of section 6.2.3.7.1 on page 32.

Response: Most of the fish collected by Gray et al. (2000) were collected downstream from the Cinnabar Creek mine because it was one of the few localities where they observed fish relatively near a mercury mine. The way that the fish data are presented in Gray et al. (2000) does not permit one to evaluate mercury levels in fish upstream and downstream from Red Devil Creek. The comparison made in the HHRA is trying to show the fish concentration used in the risk assessment (sculpin from Red Devil Creek) versus the fish concentration of fish that would be caught in the Kuskokwim River near Red Devil for consumption, in areas people have indicated they fish (Brown et al 2012). Reach C is the sampling location on the Kuskokwim River closest to Red Devil Mine, as shown on the attached map. The interim draft fish tissue report, which summarized 2010 and 2011 sampling results, found the greatest concentrations of mercury in pike from the George and Holitna Rivers and lower concentrations in Reach C. Both the George and Holitna are well outside the influence of Red Devil Mine and have numerous known cinnabar deposits, many of which have been mined in the past. Preliminary fish tracking data indicates that adult pike within these two rivers seldom move into the Kuskokwim River, therefore their mercury levels appear to be a direct result of mercury exposure in those watersheds and not from other sources in the Kuskokwim Basin. The preliminary tracking data also indicate that in general pike utilize the middle Kuskokwim River as a dispersal corridor rather than 'core' habitat, which is defined as habitat that provides the conditions necessary for pike to rest, hide, feed, and spawn. Some pike appear to utilize the Kuskokwim upstream of the Holitna seasonally, but year-round use appears limited. The paucity of pike in the mainstem Kuskokwim near Red Devil Mine coupled with the seasonal movement patterns of the species, makes correlations to inputs from Red Devil Mine difficult if not impossible.