EPA Comments on the
Draft Remedial Investigation Report, Red Devil Mine, AK

General Comments:

1. Section Four should contain tables listing summary statistics for the contaminants for each area/media. Such a table should include the number of samples of each contaminant above background vs. the total number of samples collected, the maximum and minimum concentration as well as the mean and standard deviation. Also the background concentration and the appropriate regulatory screening value for the various analytes should be included in such tables.

Response: The existing tables in Chapter 4 will be revised to include the number of samples per analysis, the number of detections per analysis, the number of samples exceeding the background value per analysis, and maximum and minimum concentrations per analysis. Concentration mean and standard deviation will not be added to the tables because, for many analyses, there are insufficient numbers of samples to generate meaningful statistics. The Chapter 4 tables in the draft document present the background values for inorganic analytes and these will be retained. Regulatory screening values are presented in tables in Chapter 7. BLM prefers to keep this organization. Chapter 4 is intended to present the nature and extent of contamination based on background comparisons.

2. The maps of analytical results should be revised. It is recommended that the concentration symbols be changed to indicate those samples below the background concentration and those samples below risk based screening concentration of the various contaminants. The symbols for those analytical results above background concentrations can remain unchanged. Also, the background concentrations on the various maps do not match the background concentrations in the tables, for example the recommended background concentration for arsenic in surface soil (Table 4-2) is 29 mg/kg. Figure 4-2 indicates the background concentration of arsenic is <500 mg/kg.

Response: The maps will be revised. Green symbols will indicate samples below background values. BLM prefers not include risk based screening values on these maps because risk assessment concepts are not presented until later in the report (Chapter 6). The background values used in the figures will be checked against the values presented in the tables.

3. Not to presuppose a remedy, but it is anticipated that monitored natural attenuation (MNA) will be one of the remedies proposed for addressing contamination in the groundwater. Note that the groundwork information for determining if MNA is a viable alternative needs to be collected and analyzed prior to being a selected alterative in a Record of Decision (ROD). The RI should have "site specific data sufficient to estimate with an acceptable level of confidence both the rate of attenuation processes and the anticipated time required to achieve remediation objectives"; from "Use of Monitored Natural Attenuation at Superfund Sites, RCRA Corrective Action and Underground Storage Tank Sites", April, 1999. Also the following documents should be reviewed for additional information on data needs and development of a conceptual hydrologic model; "Monitored Natural Attenuation of Inorganic Contaminants in Ground Water Volume 1 -

Technical Basis for Assessment" October 2007, "Monitored Natural Attenuation of Inorganic Contaminants in Ground Water Volume 2 - Assessment for Non-Radionuclides Including Arsenic, Cadmium, Chromium, Copper, Lead, Nickel, Nitrate, Perchlorate, and Selenium" October 2007, "Groundwater Road Map", July 2011 and "An Approach for Evaluation the Progress of Natural Attenuation in Groundwater", December 2011.

Response: BLM will consider whether monitored natural attenuation may be proposed as a remedy, and will refer to these and other appropriate documents to assess data needs.

4. The RI notes that only one sample had PCB concentrations above detection limits. However, it appears that only surface soils were analyzed for PCBs. In the case of Monofill #1, the potential for PCB contamination would be from subsurface releases. Lack of subsurface sampling in the vicinity of Monofill #1 represents a data gap that should be filled during the upcoming field season.

Response: Groundwater samples to be collected from MW-4 and MW-26 during the September 2012 monitoring event will be analyzed for PCBs.

5. Check the text to ensure that tables cited in the text correspond to tables in the appropriate sections. For example Section 4.3.6, Rice Sluice and Delta, references Table 4-29 which is table with surface mined area subsurface soils data and Section 4.3.3 references Table C-14. There is no Table C-14 in Appendix C.

Response: Citations for all tables will be checked and corrected as appropriate.

6. Throughout Section 4 the phrase, "red porous rock and/or rock with red oxidized rind, vitreous material, and mineralized rock" is continually used. If this phrase used is to represent material from the retort process or something similar, it is recommended that this be stated in the introduction to Section 4 or earlier in the report and then use the phrase "retort waste" throughout the Remedial Investigation (RI) Report.

Response: Use of the phrase "red porous rock and/or rock with red oxidized rind, vitreous material, and mineralized rock" in the RI report is intended to denote the observation of these physical characteristics in the field. Combined with other data including elevated metals concentrations and physical location of the materials, such observations form the basis for the identification of materials that likely contain thermally-processed ore (tailings, or calcines). However, the presence of these physical characteristics alone, particularly red oxidized rind which may be difficult to distinguish from a natural weathering rind on rock fragments containing iron, does not conclusively indicative the presence of tailings. As stated in Section 3.1.3 of the Draft RI Report, the identification of tailings and other mine waste at the RDM site is complicated by several factors, including similarities in physical characteristics of some tailings/waste rock materials and native soils and sediments that are also derived from Kuskokwim group bedrock. Therefore, BLM prefers to use descriptive rather than interpretive terminology to indicate the presence of materials with these characteristics. The use of the phrase "red porous rock and/or rock with red oxidized rind, vitreous material, and mineralized

rock" in the Draft RI Report will be reviewed, and the RI Report will be revised as appropriate to assure that the phrase is used correctly.

7. The following technical edit is recommended for Section 4. A new header should be provided prior to the bullets noting that this information is a summary of all data for the section. For example, at the end of Section 4.2.2.1, prior to Section 4.2.2.2 is a series of four bullets that follow the discussion of labeled Bedrock/Weathered Bedrock. On first read it appears that these bullets are a summary of the Bedrock/Weathered Bedrock. But they actually summarize the entire section. This occurs throughout Section 4. It is recommended that a heading titled Summary of (appropriate media) Data be inserted prior to the bullets.

Response: The suggested headers will be added to Chapter 4 where applicable.

Specific Comments:

1. P. 4-3, Section 4.1, 1st parg. This paragraph discusses how non-detects were incorporated into the calculation of background concentrations for COPCs. This is one example where the tables mentioned in General Comment 1 would be useful since it would allow one to quickly determine how many background samples were non-detects. As long as the frequency of the non-detects does not exceed 50% in either the background samples or contaminated samples, there should be no issue with this approach. Such tables should be included in the next version of the RI.

Response: The Background Statistics tables for each type of media in Chapter 4 present the number of samples and the number of detections for each analyte. As noted in the response to General Comment 1, the number of detections per analysis will be added to the other tables in Chapter 4.

2. P. 4-5, Section 4.1.5. This section notes that 18 background sample and four duplicates were collected from the Kuskokwim River (Kusko R.). In earlier discussions regarding sampling of the Kusko R. the agencies and BLM agreed upon two transects of five samples each (i.e. 10 samples total) upstream of the Red Devil Creek delta. There is now double the number of background samples. This increased number of background samples should be discussed with the Agencies and it may be necessary to insert some explanatory text into the report regarding this deviation from the workplan.

Response: The samples collected from the Kuskokwim River near the mouth of the Holitna River will be eliminated from the background data set.

3. P. 4-7, Section 4.2.1.2. It is doubtful there are naturally occurring petroleum products, VOCs or PCBs, etc. However, we agree this is a mineralized area. It is recommended that only inorganic analytes be retained as background values. Also, the second bullet of this section needs to be rewritten to more clearly state what the main concept is.

Response: All references to background concentrations of organic analytes will be removed from the report. The second bullet in Section 4.2.1.2 will be re-written more clearly.

4. P. 4-9, Section 4.2.2.1. The bullets under the Bedrock/Weathered Bedrock subsection are not clear and should be reviewed and rewritten. For example the second bullet states that mercury, etc. in tailings, etc. was more elevated above background than bedrock implying concentrations in bedrock above background. However, the last bullet states bedrock/weathered bedrock inorganics were below background values.

Response: The bullets will be re-written more clearly.

5. P. 4-21, Section 4.3.3, Kuskokwim River Alluvium subsection. The first sentence needs be reviewed and probably rewritten. It states that the alluvium occurs 8-10 ft below ground surface. If this is true then what is the material covering the alluvium? Check the text for similar issues throughout the alluvium discussion in Section 4.3.5.1 and elsewhere in the report.

Response: The text will be revised to more clearly state the point being made. Text throughout this Chapter will be similarly checked and revised for clarity, as necessary.

6. P. 4-23, Section 4.2.5.1, 1st parg. The last sentence in this paragraph notes that thallium concentrations are above background concentrations. Where else was thallium detected above background?

Response: BLM assumes the commenter is referring to Section 4.3.6.1. Thallium was detected above background values in most of the subsurface soil samples. See Tables 4-24 and 4-25.

7. P. 4-26, Section 4.4.4. This section states that most of the wells sampled had petroleum organic concentrations present. Stating whether the concentrations are above background and/or ADEC screening values would be more useful.

Response: As noted in Specific Comment 3, references to background concentrations of organic analytes (including petroleum hydrocarbons) will not be included in the report. Comparison to ADEC values will be retained in Chapter 7.

8. P. 4-28, Section 4.5.2. The analytical results for inorganics should be compared to ambient water quality standards as well as background concentrations, see General Comment 1.

Response: The inorganic results are compared to ambient water quality criteria in Chapter 7.

9. P. 5-3, Section 5.1.2.1. The second bullet under the subheading Arsenic states arsenic contamination ranges up to 6,000 ug/L. The next sentence states one sample was 4,430 ug/L. Since this is not the maximum value detected is not clear why this sample is highlighted. The text should state why this sample is of more importance than the other samples.

Response: The one sample with a SPLP concentration of 4,430 ug/kg consisted only of tailings (calcines), rather than a mixture of tailings/waste rock as appears to be the case for most other samples discussed in this section. The purpose of highlighting this information is that the results for this sample are likely more representative of the thermally processed ore than samples of mixed tailings/waste rock. The text will be revised to make this distinction more clear.

10. P. 5-5, Section 5.1.2.2. In the first paragraph include text that states the RCRA toxicity value for arsenic is 5 mg/L.

Response: The text will be revised to include information regarding the RCRA regulatory value for arsenic.

11. P. 5-6, Section 5.1.4. This section indicates that erosion of surface soil in the main processing area continues to serve as a source for the migration of contaminants. A non time critical removal action should be designed to address this situation by next summer. Among other alternatives, a sedimentation basin or removing contaminated material from the banks of Red Devil Creek and then stabilization of the stream banks should be investigated.

Response: BLM is constructing a new gate on the road to the mine in an effort to deter local people from entering the site as an interim action in 2012. BLM will continue to consider interim action in the future, based on project objectives, site conditions and funding.

12. P. 5-12, Section 5.2.2.1. It is not clear what the intent of the third paragraph is. Please review it and consider rewriting the paragraph.

Response: The intent of this paragraph is to show that more soluble fractions of mercury were detected in high proportions relative to total mercury only in those samples that had low total mercury concentrations. The text will be revised to improve clarity.

13. P. 7-2, Section 7.1.2. The tables in this section should have another column added under the "Comparison Values" that includes the appropriate EPA risk based screening values or other appropriate EPA screening values.

Response: EPA risk based screening values will be added to the tables in Chapter 7.

14. P. 7-15, Section 7.1.2, Subsection - Kuskokwim River Sediment. The text in the second paragraph indicates there is concentration gradient in the sediment samples. A figure that displays that information should be cited in the text.

Response: A reference to Figure 4-29 will be added to the text here.

15. P. 7-17, Section 7.1.3. The last sentence of the last paragraph should be rewritten to clarify the intent of the sentence. What percentage of arsenate is in the groundwater samples that are less than or equal to 37 ug/L total arsenic? Why the 37 ug/L divide?

Response: The intent of this paragraph is to show that arsenate is the dominant arsenic species in most groundwater samples, particularly those with comparatively higher total arsenic concentrations. The text will be revised to improve clarity.

16. P. 7-21 Study Question 15. Information on how to determine if groundwater is impacting the sediment in the Kusko R should be included in the response to Question 15.

Response: Based on information presented in the Draft RI Report, the bulk of impacted groundwater at the site appears to daylight into Red Devil Creek and is subsequently discharged into the Kuskokwim River as surface water rather than groundwater. However, it is possible that some impacted groundwater (e.g., groundwater impacted by waste materials in the Red Devil Creek delta) discharge directly into the Kuskokwim River. BLM will evaluate the need to determine if such discharge is occurring, and if so, whether such discharges could be impacting Kuskokwim River sediments. This information will be added to the text for Study Question 15.

Typographic Errors and Editorial Comments.

1. P. 4-12, Section 4.2.5.1. Add the word "Dolly" to the subtitle; "Sluiced Overburden".

Response: The change will be made as requested.

2. Section 4 Tables. The units for the data associated with SPLP Inorganic Elements are labeled ug/L. However, the column in the same tables has the units as mg/L. This inconsistency should be resolved.

Response: The tables will be checked and corrected as necessary.

3. P. 7-10, Table 7-3. The table should be consistent in the way that "concentrations exceeding comparison criteria" are highlighted. This reviewer recommends that the values in the "Range of Detected Concentrations" be highlighted.

Response: The change will be made as requested.

4. P. 7-16, Section 7.1.3, 2nd parg. The third sentence should be rewritten to read "Sluicing of overburden from the surface mined area created the Dolly and Rice sluice deltas . . ."

Response: The change will be made as requested.