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July 16, 2008

By Federal Express Priority Overnight Service and by Email

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Re: Request for Reconsideration of Denial of Petition to Correct Information (BLM File Code: 3500, I-27512, I-01441, FS File Code: 1300-1/2800-1/2820-5)

Dear Mr. Vargas and Assistant Director of Information Resources:

Enclosed please find a Request for Reconsideration of the denial of our Petition to Correct Information submitted pursuant to Public Law 106-554 § 515. This Request for Reconsideration is filed on behalf of the Greater Yellowstone Coalition (GYC) and Natural Resources Defense Council (NRDC).

Our detailed rationale for the Request for Reconsideration is set out in the attached memorandum by Tom Myers, Ph.D. (Attachment 1). Also attached is GYC and NRDC's Petition to Correct Information dated April 4, 2008 (Attachment 2), the Forest Service's denial of this Petition dated June 3, 2008 (Attachment 3), and the Bureau of Land Management's (BLM) denial and memorandum in support of its denial dated June 3, 2008 ("Staff Memo") (Attachment 4).

On April 4, 2008, GYC and NRDC filed a Petition pursuant to the Data Quality Act to correct information disseminated by the Forest Service and BLM. The Petition to Correct Information pertained to information contained in the Final Environmental Impact Statement (FEIS) for the Smoky Canyon Mine Panels F and G Expansion Project published on October 26, 2007. The Petition also pertained to the Final Modeling Report, Groundwater Flow and Solute Transport, Smoky Canyon Mine Panels F and G Extension Area, prepared for the Forest Service

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and BLM by JBR Environmental Consultants ("JBR 2007"). JBR 2007 is the groundwater flow and transport model used by the Forest Service and BLM as a basis for water quality impact analysis in the FEIS. The information disseminated by the Forest Service and BLM in the FEIS provided justification for the agencies' decision to approve the Smoky Canyon Mine Panels F and G Proposed Mine Expansion, as evidenced in their June 6, 2008 Records of Decision.

The GYC/NRDC Petition requested the correction of information in the FEIS based on information presented in a 2005 technical memorandum written by Simplot's consultants, Brian Buck and Alan Mayo of JBR Associates ("Buck/Mayo memo," attached hereto as Attachment 5). The Buck/Mayo memo presented data and rationale that contradicted the critical assumption in the FEIS and groundwater model that chemical attenuation of selenium will occur in the upper Wells Formation aquifer at the Smoky Canyon Mine. Because neither the FEIS nor JBR 2007 provided any data or explanation to refute the Buck/Mayo memo, GYC and NRDC filed the April 4, 2008 Petition to Correct Information.

On June 3, 2008, the Forest Service and BLM denied the GYC/NRDC Petition and determined that neither the FEIS nor the groundwater model "requires correction with respect to the inclusion of selenium attenuation." (June 3, 2008 letter from BLM to Earthjustice) The agencies also determined that the FEIS "will not be changed or withdrawn in response to this petition." Id. The agencies' response principally alleged that: (1) additional memos by Simplot's consultants provided rationale for the chemical attenuation relied upon in the FEIS and JBR 2007; (2) the Buck/Mayo memo did not strictly preclude attenuation; and (2) the FEIS did, in fact, already consider a "no attenuation" option, and thus no further agency action was required.

We respond to these assertions in detail in the attached technical memorandum. In sum, we find that the agencies' response still betrays a failure to satisfy agency guidelines for dissemination of information. First, while the agencies claim that the FEIS, JBR 2007 and two 2006 JBR memos contain analyses and data that refute the concerns clearly set forth in the 2005 Buck/Mayo memo, there is nothing in the Staff Memo that demonstrates this. The citations to the FEIS and JBR 2007 provided in the Staff Memo do not stand for this proposition, as detailed in the attached technical memorandum. Furthermore, the agencies did not provide copies of the 2006 memoranda, nor did they cite excerpts from those documents in their denial of the GYC/NRDC Petition. Thus there is no evidence that these memoranda effectively refute the conclusions of the Buck/Mayo memo.

Second, the BLM Staff Memo also argues that the Buck/Mayo memo did not conclusively rule out chemical attenuation. But in pursuing this argument, the agencies misconstrue the GYC/NRDC Petition. The Petition alleged that, as of the date of the Buck/Mayo memo in January 2005, Simplot's consultants concluded that there were no data to support chemical attenuation of selenium in the Wells Formation aquifer. In fact, the Buck/Mayo memo cited data that indicated that selenium attention was not occurring and could not occur. The GYC/NRDC Petition quoted the memo as follows:

> Empirical data obtained to date from GW-11, GW-IW, GW-CW, GW-16, GW-18, DC-MW-5, MC-MW-1, the major springs down gradient of Panels F and G and the theoretical information discussed in this memo indicate that chemical attenuation of Se has not been demonstrated for flow pathways through the upper Wells Formation aquifer

at the Smoky Canyon Mine. After review of the information presented in this memo, **at this time, we have not been able to identify quantifiable chemical attenuation mechanisms for Se that can be used in the Panels F and G groundwater impact analysis and recommend modeling Se attenuation due only to dilution and dispersion.**" (Emphasis in original.)

The GYC/NRDC Petition stated that, subsequent to the Buck/Mayo memo, neither Simplot's consultants nor the agencies identified quantifiable chemical attenuation mechanisms for selenium applicable to the Panels F and G groundwater impact analysis. The Petition pointed out that no demonstration was made in any subsequent memos in the record, in the groundwater model or in the FEIS. Nothing in the agencies' June 3, 2008 response to the GYC/NRDC Petition indicates that the empirical data cited in the 2005 Buck/Mayo memo has been refuted. Consequently, GYC and NRDC maintain that the FEIS and JBR 2007 still require correction.

Third, the agencies' posit that it is not necessary to correct information in the FEIS because the FEIS already included a prediction of impacts to water quality for "no attenuation" scenarios for Simplot's proposed action and all mining alternatives. As evidence of the agencies' evaluation of "no attenuation," the agencies cited several tables contained in the FEIS. Again, the agencies have misconstrued the GYC/NRDC Petition. The FEIS and JBR 2007 explicitly embraced Simplot's chemical attenuation premise. There is no question that the agencies explicitly rely upon an estimate of "15 to 25 percent" selenium attenuation. The fact that scenarios were calculated without attenuation is not dispositive. The agencies' decision specifically relied on attenuation mechanisms, although the existence of those mechanisms was explicitly refuted in the Buck/Mayo memo. We maintain that those mechanisms were never established in the record and that no document demonstrates the base geochemical conditions that would allow attenuation. The agencies' response to the GYC/NRDC Petition provides no evidence to the contrary.

Whether one applies OMB's general Information Quality Guidelines, the more specific USDA guidelines applying to environmental impact statements, or the more stringent USDA guidelines applying to "influential regulatory information," the basis for appeal remains the same. OMB's Information Quality Guidelines set forth general criteria requiring that the dissemination of material by federal agencies meet minimum standards of objectivity, utility and integrity. The agencies' failure to provide the rationale behind a fundamental shift in analysis, where that analysis provides the very basis for the agencies' Record of Decision, is most certainly a violation of the Information Quality Guidelines of both the United States Department of Agriculture and the Department of the Interior. As currently written, the FEIS fails basic standards of objectivity, transparency, and integrity. Specifically, as explained fully in the GYC/NRDC Petition and the attached technical memorandum, the FEIS fails to:

- Use sound analytical methods in carrying out scientific analyses.

- Use reasonably reliable and reasonably timely data and information.

- When using data obtained from or provided by third parties, ensure transparency in its dissemination by identifying known sources of error and

limitations in the data.

• Ensure transparency of the analysis by (1) Presenting a clear explanation of the analysis to the intended audience; (2) Providing transparent documentation of data sources, methodology, assumptions, limitations, uncertainty, computations, and constraints; (3) Explaining the rationale for using certain data over other data in the analysis; and (4) Presenting the model or analysis logically so that the conclusions and recommendations are well supported.

• Clearly identify sources of uncertainty affecting data quality.

• For quantitative assessments, clearly state the uncertainty of final estimates to the extent practicable. Data and data collection systems should, as far as possible, be of sufficient quality and precision that uncertainty in the final estimates is appropriately characterized.

• For qualitative assessments, provide an explanation of the nature of the uncertainty in the analysis.

(Citing USDA Guidelines for Objectivity of Regulatory Information. See http://www.ocio.usda.gov/qi_guide/regulatory.html.)

GYC and NRDC are non-profit membership organizations. Their members currently use and plan to continue to use the lands on the Caribou-Targhee National Forest that will be affected by the expansion of the Smoky Canyon Mine. The pollution of groundwater and surface water from selenium, resulting from the mining activities, will adversely affect members' recreational, financial, and personal interests. The failure of the agencies to follow the applicable information quality guidelines and to correct information disseminated in the FEIS has resulted in a Record of Decision that permits the expansion of the Smoky Canyon Mine to the detriment of GYC and NRDC's members' interests.

Thank you in advance for your attention to this matter. If you have any questions about this Request for Reconsideration, please do not hesitate to contact me at 781-631-4119.

Submitted respectfully by,

Lisa Evans

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Attorney

On behalf of:

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Attachment 1

Technical Memorandum

Review of BLM Staff Memorandum From Bill Stout to Karen Port, Mike Candelaria, Stephanie Balzarini, Jeff Jones, Ken Paur, and Chris Carlson, Dated April 16, 2008 Earthjustice Petition to Correct Information in the Smoky Canyon Mine Final EIS and Final Modeling Report

July 10, 2008

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This technical memorandum reviews the staff memorandum prepared by BLM in response to the Earthjustice Petition to Correct Information Disseminated by the USDA Forest Service (FS) and US DOI Bureau of Land Management (BLM) filed on behalf of the Greater Yellowstone Coalition (GYC) and Natural Resources Defense Council (NRDC).[1] The FS and BLM rejected the petition based on the Staff Memo. The GYC/NRDC Petition focused on the agencies' failure to consider in the FEIS the conclusions of a memorandum written by Buck and Mayo in 2005 that attenuation should not be considered when analyzing groundwater quality resulting from the expansion of the Smoky Canyon Mine into Panels F and G[2].

The Staff Memo primarily relies on three arguments that wind through and are repeated in its responses. First, it argues that the Buck/Mayo memo does not actually preclude the consideration of chemical attenuation. Second, it argues that the FEIS and supporting documents refute the conclusions of the Buck/Mayo memo. And third, it argues that the FEIS does not actually rely on attenuation because the modeling included "no-attenuation" runs.

This technical memorandum responds to the three arguments. In doing so, it responds to all five overlapping responses (Staff Memo, p. 2, 6, 9, 10, and 11). While the Buck/Mayo memo may not prove that attenuation does not occur, it does demonstrate that the conditions at Smoky Canyon do not facilitate and may actually prevent significant chemical attenuation. Secondly, nothing in the groundwater modeling report or the FEIS refutes the facts presented in the Buck/Mayo memo. Finally, while the FEIS

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[1] Staff Memorandum. From Bill Stout, To: Karen Porter, Mike Candelaria, Stephanie Balzarini, Jeff Jones, Chris Carlson, copied to Larry Timchak and Joe Kraayenbrink. RE: Earthjustice Petition to Correct Information in the Smoky Canyon Mine Final EIS and Final Modeling Report. April 16, 2008. Hereinafter "Staff Memo."

[2] Memorandum. From: Brian Buck, Alan Mayo, To: James Blair, Scott Gerwe, Lori Hamann, copied to Bill Stout, Jeff Jones, Greg Brown. Re: Evaluation of the Potential for Cadmium and Selenium Attenuation – F and G Panels, Smoky Canyon Mine. January 20, 2005. Hereinafter "Buck/Mayo memo."

may have included no-attenuation model runs, the FEIS' focus is on explaining why attenuation will occur, why it is conservative that the agencies only used 15 to 25 percent attenuation, and how attenuation will minimize the extent of selenium contamination in the groundwater. Additionally, for all alternatives in the FEIS except alternative D, the "no-attenuation" results would have resulted in an illegal project because they would have caused standards to be exceeded in the groundwater where it discharges to the streams.

The Staff Memo quotes from the Buck/Mayo memo, and from two other memos written by the same authors in 2006, taking various sentences and assertions out of context, and without citing page numbers. This makes following the arguments within the Staff Memo difficult.

This technical memorandum describes in detail why the Staff Memo fails to answer satisfactorily the GYC/NRDC "Petition for Correction of Information." This technical memorandum also clarifies and provides additional rationale for the need to correct information, as requested in the original Petition.

1. The Staff Memo is incorrect because the FEIS and groundwater model report do not refute the underlying argument in the Buck/Mayo memo that chemical attenuation will not occur.

The Staff Memo first claims that the GYC/NRDC Petition's assertion that there should not be chemical attenuation included in the FEIS is "a misrepresentation of the facts" (Staff Memo, p. 2). The Staff Memo quotes the Petition's quotation of the last sentence of the Buck/Mayo memo:

> After review of the information presented in this memo, at this time, we have not been able to identify quantifiable chemical attenuation mechanisms for Se that can be used in the Panels F and G groundwater impact analysis and **recommend modeling Se attenuation due only to dilution and dispersion**. (Buck/Mayo Memo, p. 10, emphasis added).

Obviously, this statement claims the information just presented in the memo leads to the conclusion that the modeling should not include chemical attenuation. In fact the memo's concluding sentence downplays the facts in the Buck/Mayo memo, primarily including a listing of the chemical characteristics at the mine site that preclude chemical attenuation.

Neither the FEIS nor JBR (2007) refutes these points by specifying how the chemical conditions actually are appropriate to attenuation. Neither document presents field evidence of attenuation in the unsaturated Wells formation. Their discussion of it occurring in the Wells aquifer has been refuted (Myers, 2007). Significantly, the method used in the modeling to simulate attenuation would only apply to attenuation in the unsaturated zone. This will be considered in more detail below in the following sections.

It is important to consider this point up front: did the FEIS and groundwater model report (JBR, 2007) utilize the Buck/Mayo report or refute it? JBR (2007) makes three references to the Buck/Mayo Memo.

a. The first reference is on page 3, but it is incorrect. The reference is for a general description of the hydrogeology of the area, but the Buck/Mayo memo does not contain a general hydrological description of the area.

b. JBR (2007) references the Buck/Mayo memo within its discussion of selenium attenuation only at the beginning of the literature review. JBR (2007) states:

> A review was made of literature and empirical data collected from the Smoky Canyon Mine related to potential chemical attenuation of selenium and cadmium in the flow paths modeled from the Panels F and G overburden sources to the points of groundwater discharge to the surface environment (Buck and Mayo 1/20/05). As described by Buck and Mayo (2005), there is abundant information in the literature supporting chemical attenuation of selenium in specific chemical and biological environments." (JBR, 2007; p. 34).

The remaining discussion in JBR concerning the literature review of selenium attenuation does not mention the Buck/Mayo memorandum.

c. The third reference is to the fact that cadmium has very low concentrations in water issuing from seeps and springs on the overburden fills. This does not concern selenium attenuation.

None of these references to the Buck/Mayo memo in JBR (2007) refutes the arguments against using attenuation or discusses why the conditions at Smoky Canyon are conducive to attenuation. Other reports considered in the FEIS do not consider the memo, including Maxim (2004), the primary geochemical analysis for the proposed mine, the DEIS, and the FEIS chapters 3 and 4.

The Staff Memo (p. 6) claims that the DEIS summarized the Buck/Mayo memo on page 4-36 of the DEIS. The DEIS does not reference the Buck/Mayo memo at this point, but merely cites the JBR groundwater model report and summarizes the literature review in the Buck/Mayo memo. The DEIS correctly included the fact that attenuation should not be considered at that time (Staff Memo, p. 4). If the DEIS relied on the Buck/Mayo memo, the references do not prove it.

The Staff Memo mentions that new site-specific data were received from the CERCLA investigation at the Smoky Canyon Mine (Staff memo, p. 4, also p. 7) and that Buck and Mayo prepared another memo, dated March 12, 2006 entitled "Initial Thoughts on Simplot Preliminary Hydrology Comments." The Staff Memo mentions an additional 2006 Buck/Mayo memo entitled "Simplot Hydrology Comment on Panels F&G DEIS" (Staff Memo, p. 8). Neither JBR (2007) nor the FEIS reference these two memos,

although they were written a year earlier. The Staff Memo refers to the 2006 Buck and Mayo memos as being in the EIS Project Record, but they were not cited in any of the public reports.

The Staff Memo states that "the **project record** clearly demonstrates that the information contained in and the conclusions drawn in the 2005 Buck/Mayo (sic) were considered in the analysis contained in the Final EIS" (Staff Memo, p. 9, emphasis added). The fact remains that most of the information in the Buck/Mayo memo was never considered or refuted in JBR (2007). The agencies rely on two unreferenced 2006 memos for their claim that the Buck/Mayo memo was refuted. As will be discussed below, nothing in the FEIS or JBR (2007) actually refutes the Buck/Mayo memo.

2. The Buck/Mayo memo provides data and analysis that indicate that conditions at Smoky Canyon do not facilitate and may actually prevent significant chemical attenuation. No agency documents, including the Staff Memo, provide an adequate counter to the observed conditions.

The Staff Memo very selectively quotes from the Buck/Mayo memo to suggest that chemical attenuation is not precluded by the analysis contained in that memo (Staff Memo, p. 3). The following quotes are from the Staff Memo, but originate in the Buck/Mayo memo. The following responds to these selective quotes and explains how they are pulled out of context and do not show that the Buck/Mayo memo supports modeling chemical attenuation.

"*Theoretical and empirical evidence for Se attenuation is documented in the literature* ..."

This is true, but irrelevant for this situation because the remainder of the Buck/Mayo memo shows that the conditions in the literature are not met at this proposed mine site.

"*Theoretical calculations and data, laboratory experiments, and empirical observation of specific environments demonstrate that both Cd and Se attenuation are possible under certain conditions. The crux of the matter is to determine if these conditions exist at the Smoky Canyon Mine and if attenuation will likely occur in the seepage and groundwater pathway under and down gradient of Panels F and G.*"

The Buck/Mayo memo discusses what those conditions are and presents data, discussed below, demonstrating that the required conditions do not exist at the Smoky Canyon Mine.

"*It is not known if the drop in Se concentrations between GW-16 and HS (Hoopes Springs) is due solely to mixing and dilution with other groundwater in the Wells Formation aquifer, or if some chemical attenuation also reduces Se concentrations in groundwater along that flow path.... If a large proportion of that groundwater is of background quality, then mixing with groundwater from the Pole Canyon area would have a* ***significant dilution effect*** *on the Se concentrations observed at HS. The*

magnitude of the dilution in this flow path is unknown so it is not possible to estimate the possible involvement of other attenuation mechanisms in this flow path. We attempted an estimated of the potential dilution occurring between GW-16 and HS with the conservative solutes: nitrate, sulfate and chloride with no success." (Emphasis added).

The Staff Memo left out the remainder of the paragraph, which emphasizes dilution rather than attenuation:

> Regardless, **it is noteworthy** that the Se concentration in the groundwater plume, which begins at about 0.46 mg/l at GW-16, remains above the surface water standard at a concentration of 0.01 mg/l at Hoopes Spring after a total flow path of about 2.3 miles and significant dilution." (Buck/Mayo memo, p. 7, emphasis added)."

It is "noteworthy" that the concentration is still so high, even after the substantial dilution that would be caused by regional groundwater from the Wells Formation. The most important reason that data from Pole Canyon and Hoopes Spring cannot be used to insinuate attenuation is that the flow between the two locations has not reached steady state (Myers, 2007; p. 23). It also assumes that all of the discharge is at Hoopes Spring and that the background concentration (especially of sulfate) is zero.

"*It is possible that there is attenuation of Se transport from the E-panel; however there is no information to confirm that the attenuation takes place along flow paths within the upper portion of the Wells Formation aquifer. These issues are being further investigated in the AOC site investigation.*"

The relevance of including this quote in the Staff Memo is not clear. The entire paragraph presents no information that could be construed to indicate attenuation of Se in seepage from the E-panel.

"*With all the above-described sites, it is not possible to determine the effects of the different lithologies within the seepage flow paths internal to the overburden fills (sic) on the resulting seepage chemistries. Because of this, the seepage chemistries of these sites are only generally comparable to each other, and the future Panels F and G overburden fill conditions. However, this does not detract from the usefulness of these data for indicating potential chemical attenuation mechanisms that might occur outside of these overburden fills.*"

This summarizes the lack of information in a section entitled "Comparison of Panels F and G Predictions to Panels A and E Conditions" in the Buck/Mayo memo. The section describes the differences in seepage chemistries discharging from different overburden piles. The differential seepage chemistry may "not detract from the usefulness of these data," but is irrelevant because the section did not present data demonstrating those "chemical attenuation mechanisms."

"*Empirical data obtained to date from GW-11, GW-IW, GW-CW, GW-16, GW-18, DC-MW-5, MC-MW-1, the major springs down gradient of Panels F and G and the theoretical information discussed in this memo indicate that chemical attenuation of Se has not been demonstrated for flow pathways through the upper Wells Formation aquifer at the Smoky Canyon Mine. After review of the information presented in this memo,* ***at this time, we have not been able to identify quantifiable chemical attenuation mechanisms for Se that can be used in the Panels F and G groundwater impact analysis and recommend modeling Se attenuation due only to dilution and dispersion.***" (Emphasis in original.)

This is exactly the point: chemical Se attenuation should not be considered in the modeling because Buck and Mayo did not identify quantifiable chemical attenuation mechanisms, yet most of JBR's (2007) analysis (and as reported in the FEIS) relies on chemical attenuation.

The Staff Memo (p. 3 and 4) indicates that the Buck/Mayo memo "indicated a number of times the possibility that chemical attenuation ... could potentially occur but that there was insufficient data at that time to confirm the existence of attenuation or quantify it to the degree that it could be used in the groundwater impact analysis". The reality is that the Buck/Mayo memo identified conditions that would prevent attenuation, not just fail to identify its occurrence. This is the empirical data mentioned in the above quote.

Additional considerations show that the attenuation claims made by the agencies are incorrect or do not refute the arguments in the Buck/Mayo memo against attenuation. For example, most of the discussion in the FEIS concerns perceived attenuation within saturated Wells Formation. From page 4-44 through 4-46, the FEIS discusses attenuation along the Pole Canyon to Hoopes Spring pathway. On page 4-47, the FEIS discusses attenuation from Panel A to the Culinary Well. On page 4-48, the FEIS briefly discusses some lab tests which purportedly show attenuation. The FEIS relies on these laboratory tests to indicate the 200 to 1200 feet of unsaturated Wells Formation may attenuate Se. This vadose zone attenuation is an additional argument in the FEIS, not considered in the Buck/Mayo memo, allegedly supporting the use of attenuation in the model. However, it ignores the fact that in the field, under Pole Canyon, there is no attenuation in 200 feet of unsaturated Wells Formation (Myers, 2007; p. 27). Infiltrating stream water had Se concentrations similar to those observed in the monitoring well 200 feet below the surface.

Myers (2007) refuted the arguments for attenuation in the Wells aquifer and presented data showing that it does not occur in the vadose zone, but the Staff Memo claims that this information was the basis of the agency adoption of 15 to 25 percent attenuation for flow in the Wells Formation. There is no information that the conditions observed at the mine site, which would preclude attenuation, had changed or that new data have shown these data to be incorrect. This is the subject of the next section.

3. Nothing in the groundwater modeling report or the FEIS refutes the facts presented in the Buck/Mayo memo.

The Staff Memo (p. 9 and 10) essentially repeats some of its previous analysis to claim that it is "incorrect to state that the findings of the 2005 Buck/Mayo analysis do not support the analysis." The problem is that the Buck/Mayo memo makes several points as to why attenuation will not occur. It is unknown whether the 2006 Buck/Mayo memos refute them, but presumably the Staff Memo would include specific statements from those memos if they did. The Buck/Mayo memo makes the following points that have not been refuted.

> Evidence for Se attenuation is less clear. Some chemical attenuation may take place along the groundwater flow paths from overburden areas. However, the low pH, high organic and low Redox **conditions needed to promote Se chemical attenuation do not appear to occur along the groundwater flow paths in the upper Wells Formation aquifer** from overburden areas at the Smoky Canyon Mine or from the planned overburden areas at Panels F and G. (Buck/Mayo memo, p. 9, emphasis added)

Here, Buck and Mayo indicate that the conditions that would allow attenuation to occur have not been observed on the site. Their statement that it "may take place" is mere speculation not supported by the data. The observed lack of attenuation beneath Pole Canyon (Myers, 2007), discussed above, makes this clear. The next paragraph in the memo makes clear the conditions do not occur.

> The rock matrix in the Wells Formation is typically sandstone or carbonates with minor shale. June 2004 groundwater monitoring data from DC-MW-5 and MC-MW-1 (monitoring wells near Panels G and F respectively) indicate pHs of 7.4 and ORPs of 59.6 and 116 mv respectively (Maxim, 2004c). Water chemistry at the large springs of interest, Books spring, south Fork Sage Creek Spring, and base flow for lower Deer Creek all have pHs ranging from 7.4 to above 8. The springs also have ORPs typically greater than 100 mv. Therefore, **there is no field evidence** that the requisite pH and Redox conditions for significant Se attenuation in the Wells Formation aquifer between Panels F and G and these springs are present. (Buck/Mayo Memo, p. 9-10, emphasis added).

This paragraph describes the geochemistry of the groundwater flowing beneath the proposed panels F and G. It shows the conditions are not conducive for Se attenuation. The water is not acidic nor are conditions reducing; both are needed for significant attenuation. The Buck/Mayo memo continues to show that the conditions needed for reduction are not likely under panels F and G. The memo stated:

> Research has been done by Maxim and others suggesting potential, microbiological hosted attenuation of Se might occur in fine-grained materials within pit backfills under anaerobic (partially saturated to saturated) conditions. One of these investigators has indicated that the relatively fine-grained, organic-rich shales within backfilled overburden offer the most likely opportunity for selenium reduction and attenuation within the overall flow path. However, **none**

> **of the backfilled Panels F and G pits have been proven to be able to reach the necessary material, chemical, and biological characteristics**, which would reliably promote such reducing conditions and possible chemical-biological attenuation. (Buck/Mayo memo, p. 10, emphasis added).

If these conditions occurred, the attenuation would be within the backfilled pit. Buck and Mayo suggest the conditions could occur, but admit they do not expect them in the proposed pit backfill. Observed conditions at the existing Smoky Canyon Mine in the seeps and monitoring wells beneath the pits, such as GW-11, show that in this mine these conditions are not likely to manifest. Buck and Mayo discuss that conditions in well GW-11 show that water seeping through Panel A will be oxidized and mobile.

> Seepage water collected from the only backfill monitoring well at Smoky Canyon Mine (GW-11), installed at the base of unsaturated backfill, contains about 5 mg/l of O_2, is only slightly acidic (pH=6.5), has a positive ORP (157 – 199 mv), and has a very positive eH (357 mv). The 2003 and 2004 samples from GW-11 had Se concentrations of 2.44 and 4.7 mg/l, respectively, with selenate measured as the dominant form of Se present. Collectively, these results suggest the **Se should be oxidized and mobile** in the overburden matrix at the bottom of the A-Panel backfill. (Buck/Mayo memo, p. 10, emphasis added)

None of the data collected at the Smoky Canyon Mine and proposed expansion demonstrates "chemical attenuation of Se" (Buck/Mayo memo, p. 10). They could not identify "quantifiable chemical attenuation mechanisms for Se that can be used in the Panels F and G groundwater impact analysis" (*Id.*).

However, the FEIS and JBR (2007) claim that attenuation may occur – **without showing that the conditions just cited are different**. Contrary to the claims in the Staff Memo (p. 10), the Buck/Mayo memo and the FEIS **are** contradictory. The FEIS has not presented evidence that the conditions required for chemical attenuation are present at Smoky Canyon.

4. The FEIS may have included no-attenuation model runs, but its focus is on explaining why attenuation will occur. The clear emphasis of the FEIS is on attenuation.

The FEIS devotes six pages to how attenuation will occur, from 4-43 through 4-49. The arguments primarily focus on flow through the saturated Wells Formation, which Myers (2007) correctly refuted. The FEIS' conclusion clearly demonstrates it believes attenuation occurs, but in the vadose zone, which is not where it spent most of the six pages arguing it would occur.

> Taking all the available evidence of selenium attenuation under consideration the Agencies have determined that attenuation of selenium is likely to **occur in the vadose zone under the proposed pit backfills** and that it would reduce concentrations of selenium at the water table. For decision-making purposes, the

> Agencies have adopted an attenuation range of 15 to 25 percent to be used in the groundwater impact modeling. The range of selenium attenuation selected by the Agencies is **less than what is indicated from literature and empirical data** and is therefore considered to be conservative. The groundwater quality impact analysis also reviewed the effect (sic) 0 and 30 percent selenium attenuation to evaluate a wider range of input values. (FEIS, p. 4-49, emphasis added)

The description of how fate and transport was modeled also focused on attenuation. The model report (JBR, 2007; Section 4.6) listed ten assumptions that were used for the fate and transport model. The FEIS restated these assumptions on pages 4-49 through 4-51.

Point number 6 and point number 10 dealt with attenuation. In JBR (2007):

> 6. Dispersion and dilution in a homogeneous and isotropic aquifer were the only processes that reduced concentrations; effects of bedding and any chemical or sorption attenuation were not modeled. (JBR, 2007; p. 47)

> 10. With the exception of cadmium and selenium, concentrations of COPCs were conservative and were considered to be unaffected by chemical retardation or attenuation. Cadmium was considered to be fully chemically attenuated due to precipitation reactions with carbonate minerals in the vadose zone under the overburden fills. Model runs included 15, 25, and 30 percent selenium attenuation in the Wells Formation. Model runs were also performed with the combination of the 2-inch particle size cutoff and 30 percent selenium attenuation. Selenium attenuation was accomplished by reducing the selenium load from the overburden waste dumps by 15, 25, and 30 percent. This approach is appropriate because selenium concentrations at modeled discharge locations are the result of mixing and dispersion. COPC concentrations were estimated by the model for specific locations. (JBR, 2007; p. 47)

In the FEIS, point number 6 was expressed exactly the same. Point number 10, however, was different:

> 10. Selenium input concentrations shown in **Table 4.3-5** were reduced by a range of 0, 15, 25, and 30 percent to account for geochemical attenuation. Cadmium was considered to be fully chemically attenuated due to precipitation reactions with carbonate minerals in the vadose zone under the overburden fills. The groundwater flow and fate and transport modeling description is provided in the Groundwater Flow and Solute Transport Modeling Report (JBR 2007). Solute concentrations in groundwater at specific locations within the model domain were calculated. These specific locations are listed below and shown on **Figure 4.3-2**. (FEIS, p. 4-51, emphasis in original)

The description in JBR (2007), point number 10, refers to "15, 25, and 30 percent selenium in the Wells formation". Then it states "attenuation was accomplished by reducing the selenium load from the overburden waste dumps by 15, 25, and 30 percent."

The description of the model setup does not specify that the model was run with no attenuation (for FEIS alternative D). Its two descriptions of selenium attenuation describe different things. Point 6 specifically refers to dispersion within the Wells Formation, because that is the only place that dispersion and dilution can occur. The FEIS states it differently in that input concentrations were reduced by certain percentages, and it refers to the model report alluding to a more complete description of the modeling effort.

JBR (2007) mentions 0% attenuation in its discussion of the results of its modeling. For the proposed action, alternatives A through C, and DEIS alternative D, the results are strictly for no-attenuation, although other runs with attenuation were considered. Of course, presenting results for the "no-attenuation" model run showed higher concentrations in the groundwater and discharge to the streams.

In a change of emphasis, JBR's (2007) discussion of FEIS alternative D focuses on attenuation, although the runs do include "no-attenuation." The focus is on the agency preferred 15 to 25 percent attenuation. In fact, the FEIS alternative D was designed and analyzed by different consultants, directly controlled by Simplot. JBR noted here that Simplot had convinced the agencies of the merit of including attenuation, stating

> Because the agencies recognized that the Simplot comments regarding 30 percent attenuation and minus 2-inch particle size adjustment have technical merit, the effect of these adjustment (sic) are shown in the tables below. However, the agencies also decided that result for the more conservative 15 to 25 percent attenuation and the minus ½-inch particle size adjustment results better match the batch test results and the known selenium concentrations at the Smoky Canyon Mine. (JBR, 2007; p. 70-71).

There is no mention of "no-attenuation" being more conservative.

JBR (2007) reports concentrations at the monitoring point and discharge point to the streams that are less than the surface water standard for all attenuation assumptions. But they clearly focus on the agency-preferred range:

> For the agency preferred range of selenium attenuation (15 to 25 percent), selenium concentrations in groundwater from the model domain discharged at South Fork Sage Creek Spring ranged from 0.0021 to 0.0024 mg/l, which is less than half the surface water standard of 0.005 mg/l. For the same range of selenium attenuation, the groundwater concentrations at lower Deer Creek ranged from 0.0028 to 0.0031 mg/l. (JBR, 2007; p. 72).

It is impossible to read JBR (2007) and the FEIS without getting the message that the agencies expect attenuation to occur and that they rely on it for limiting Se concentrations in groundwater and discharge to surface water.

Conclusion

The Buck/Mayo memo demonstrates that the conditions at Smoky Canyon do not facilitate and may actually prevent significant chemical attenuation. These conditions are the basic geochemistry of the Wells Formation through which seepage must flow and in which the attenuation would occur.

Neither the groundwater modeling report nor the FEIS refutes the facts presented in the Buck/Mayo memo. Both documents provided arguments, easily refuted, that attenuation has occurred at the site, but they do not show the base geochemical conditions that would allow attenuation. In fact, the Buck/Mayo memo demonstrated that such conditions did not exist. The Staff Memo claims that two additional memos written in 2006 by Buck and Mayo refute the conclusions of the 2005 Buck/Mayo memo, but the Staff Memo did not provide any statements from those memos to demonstrate this.

Finally, it is misleading for BLM and FS to posit, as they did in their Staff Memo, that the FEIS adequately considered "no-attenuation." The FEIS' focus is on explaining why attenuation will occur, why it is conservative that the agencies only used 15 to 25 percent attenuation, and how attenuation will minimize the extent of selenium contamination in the groundwater. Additionally, for all alternatives except alternative D of the FEIS, the "no-attenuation" results would result in an illegal project, because the mine would cause standards to be exceeded in the groundwater where it discharges to the streams. The model run for FEIS alternative D did not need attenuation to simulate concentrations within standards because many other problems with the model caused the under-prediction of Se concentrations (Myers, 2007).

References

JBR, 2007. Final Modeling Report, Groundwater Flow and Solute Transport, Smoky Canyon Mine Panels F and G Extension Area. Prepared for Bureau of Land Management and U.S. Forest Service. JBR Environmental Consultants, Sandy, Utah.

Maxim Technologies (Maxim), 2004. Baseline Technical Report, Water Resources, Manning Creek and Deer Creek, Phosphate Lease Areas (Panels F&G), Smoky Canyon Mine, Caribou County, Idaho. Helena MT, June 2004.

Myers, T., 2007. Review of Hydrogeology and Water Resources for the Final Environmental Impact Statement, Smoky Canyon Mine, Panels F and G and Supporting Documents. Prepared for Natural Resources Defense Council and Greater Yellowstone Coalition.

Attachment 2

Petition to Correct Information Disseminated by the US Department of Agriculture Forest Service and US Department of the Interior Bureau of Land Management

April 4, 2008

Petition Elements

This Petition (Request for Correction of Information) is a formal request for the correction of information disseminated by the US Department of Agriculture Forest Service and US Department of Interior Bureau of Land Management. This petition is submitted pursuant to:

1. Public Law 106-554 § 515
2. Office of Management and Budget (OMB) Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility and Integrity of Information Disseminated by Federal Agencies
3. US Department of Agriculture's Information Quality Guidelines
4. Bureau of Land Management's Information Quality Guidelines

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REQUEST FOR CORRECTION OF INFORMATION CONTAINED IN THE FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE SMOKY CANYON MINE PANELS F AND G EXPANSION PROJECT

1. Request and Petitioners

This Petition (Request for Correction) is a formal request for the correction of information disseminated by the United States Department of Agriculture (USDA) Forest Service and Department of the Interior Bureau of Land Management (BLM). This Request for Correction is made on behalf of petitioners **Greater Yellowstone Coalition** and **Natural Resource Defense Council**, and it is submitted under Public Law 106-554 § 515, Office of Management and Budget (OMB) Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility and Integrity of Information Disseminated by Federal Agencies, USDA's Information Quality Guidelines and BLM's Information Quality Guidelines.

2. **Requestor(s) Contact Information**

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3. Description of Information to Correct

This request pertains to certain information contained in the Final Environmental Impact Statement (FEIS) for the Smoky Canyon Mine Panels F and G Expansion Project published on October 26, 2007. See 72 Fed. Reg. 60881. The request also pertains to the Final Modeling Report, Groundwater Flow and Solute Transport, Smoky Canyon Mine Panels F and G Extension Area, prepared for the Bureau of Land Management and U.S. Forest Service by JBR Environmental Consultants, Sandy, Utah. (JBR 2007), which is part of the FEIS. JBR 2007 is the groundwater flow and transport model used by the U.S. Forest Service and the Bureau of Land Management as a basis for water quality impact analysis in the FEIS. The information disseminated by the US Forest Service and the Bureau of Land Management in the FEIS, including in the JBR 2007, supported and provided justification for the Agencies' recommendation to permit the expansion of the Smoky Canyon Mine.

4. Explanation of Noncompliance with OMB, Forest Service and BLM Information Quality Guidelines

The USDA and BLM have adopted the OMB's general Information Quality Guidelines, as well as more specific guidelines applying to environmental impact statements. OMB's Information Quality Guidelines set forth general criteria requiring that the dissemination of material by federal agencies meet minimum standards of objectivity, utility and integrity. More specifically, the USDA's Information Quality Guidelines, under "Regulatory Guidelines," set forth quality standards that must be met by the USDA's "environmental assessments, environmental impact statements and associated documents prepared under the National Environmental Policy Act (NEPA)." See http://www.ocio.usda.gov/qi_guide/regulatory.html, last checked March 8, 2008.

The following information quality criteria comprise the quality standards that USDA agencies and offices must follow in developing and reviewing regulatory information and disseminating it to the public. The guidelines provide standards for objectivity concerning both "regulatory information" and "influential regulatory information." These guidelines are set forth below.

Guidelines for Objectivity of Regulatory information

To ensure the objectivity of information disseminated by USDA agencies and offices in conjunction with their rulemaking activities, the agencies and offices will:

• Use sound analytical methods in carrying out scientific and economic analyses and in preparing risk assessments.

• Use reasonably reliable and reasonably timely data and information (e.g., collected data such as from surveys, compiled information, and/or expert opinion).

• When using the best available data obtained from or provided by third parties, ensure transparency in its dissemination by identifying known sources of error and limitations in the data.

• Evaluate data quality and, where practicable, validate the data against other information when using or combining data from different sources.

• Ensure transparency of the analysis, to the extent possible, consistent with confidentiality protections, by:

° Presenting a clear explanation of the analysis to the intended audience.

° Providing transparent documentation of data sources, methodology, assumptions, limitations, uncertainty, computations, and constraints.

° Explaining the rationale for using certain data over other data in the analysis.

° Presenting the model or analysis logically so that the conclusions and recommendations are well supported.

• Clearly identify sources of uncertainty affecting data quality.

• For quantitative assessments, clearly state the uncertainty of final estimates to the extent practicable. Data and data collection systems should, as far as possible, be of sufficient quality and precision that uncertainty in the final estimates is appropriately characterized.

• For qualitative assessments, provide an explanation of the nature of the uncertainty in the analysis.

• Where appropriate, subject the analysis to formal, independent, external peer review to ensure its objectivity. If analytic results have been subjected to such a review, the information may generally be presumed to be of acceptable objectivity. However, in accordance with the OMB standard, this presumption is rebuttable based on a persuasive showing by a petitioner in a particular instance, although

the burden of proof is on the complainant.

• If agency-sponsored peer review of the analysis is employed to help satisfy the objectivity standard, the review process should, where appropriate, meet the general criteria for competent and credible peer review recommended by OMB. OMB recommends that (a) peer reviewers be selected primarily on the basis of necessary technical expertise, (b) peer reviewers be expected to disclose to agencies prior technical/policy positions they may have take on issues at hand, (c) peer reviewers be expected to disclose to agencies their sources of personal and institutional funding (private or public sector), and (d) peer reviews be conducted in an open and rigorous manner.

With respect to "influential scientific information" disseminated by USDA regarding analysis of risks to human health, safety, and the environment, USDA has provided an additional set of guidelines that its agencies must follow. See http://www.ocio.usda.gov/qi_guide/regulatory.html. According to USDA guidelines, when "influential scientific information" is disseminated, agencies and offices will ensure, to the extent practicable, the objectivity of this information by adapting the quality principles found in the Safe Drinking Water Act Amendments of 1996 and the following "Guidelines for Objectivity of Influential Regulatory Information:"

Guidelines for Objectivity of *Influential* Regulatory Information

The agencies and offices will:

• Use the best science and supporting studies conducted in accordance with sound and objective scientific practices, including peer-reviewed science and studies where available.

• Use data collected by accepted methods or best available methods (if the reliability of the method and the nature of the decision justifies the use of the data).

• In the dissemination of *influential* scientific information about risks, ensure that the presentation of information is comprehensive, informative, and understandable. In a document made available to the public, specify, to the extent practicable:

° Each population addressed by any estimate of applicable effects.
° The expected risk or central estimate of risk for the specific populations affected
° Each appropriate upper bound or lower-bound estimate of risk.
° Each significant uncertainty identified in the

process of the risk assessment and studies that would assist in reducing the uncertainty.
°Any additional studies, including peer-reviewed studies, known to the agency that support, are directly relevant to, or fail to support the findings of the assessment and the methodology used to reconcile inconsistencies in the scientific data.

According to the USDA's definition of "influential scientific information," the Smoky Canyon FEIS would be subject to the heightened standards set forth in the above Guidelines for Objectivity of Influential Regulatory Information. The definition of influential scientific information is found in the USDA Peer Review Guidelines at www.ocio.usda.gov. The definition states in part:

> **Influential scientific information** means scientific information the agency reasonably can determine will have or does have a clear and substantial impact on important public policies or private sector decisions. Executive Order 12866 defines an economically significant rulemaking as one that is likely to result in a rule that may have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities.

See http://www.ars.usda.gov/Main/docs.htm?docid=8041&pf=1&cg_id=0 (last checked March 8, 2008). Because the FEIS is likely to adversely affect the environment in a material way, the agencies should be held to the information quality standards applicable to influential scientific information.

5. Specific Noncompliance with the Information Quality Guidelines

This section demonstrates how the information disseminated by the Forest Service and BLM in the FEIS fails to comply with specific OSM, USDA Forest Service and BLM Information Quality Guidelines. The specific agency guideline is reiterated below, followed by an explanation of the failure of the FEIS to comply with the guideline.

(a) The Guidelines require use of sound analytical methods in carrying out scientific and economic analyses and in preparing risk assessments.

The FEIS fails to "use sound analytical methods in carrying out scientific ... analyses" by not incorporating the findings of a memorandum that presents information on an issue fundamental to the scientific underpinnings of the document. Specifically, the FEIS fails to include key findings contained in the memorandum from Brian Buck and Alan Mayo, PhD of JBR Environmental Consultants, Inc. to James Blair (BLM), Scott Gerwe (USFS) and Lori Hamann (J.R. Simplot) entitled "Evaluation of the

Potential for Cadmium and Selenium Attenuation – F and G Panels, Smoky Canyon Mine," dated January 20, 2005 (hereinafter Buck/Mayo memorandum).

Petitioners received the Buck/Mayo memorandum from the BLM on February 14, 2008. This 11-page document was among hundreds of other documents, totaling more than 3,100 pages, that GYC received in response to a Freedom of Information Act request submitted to the BLM on November 19, 2007. The document concerns a critical issue posed by the proposed expansion of the Smoky Canyon Mine into Panels F and G – specifically whether selenium contamination caused by mining chemically attenuates in groundwater at the mine. While the FEIS concludes that chemical attenuation plays a substantial role in lowering concentrations of selenium in groundwater at the Smoky Canyon Mine, the Buck/Mayo memorandum directly contradicts that proposition. The FEIS' finding that chemical attenuation of selenium will occur is absolutely essential to the proposed expansion. Only through chemical attenuation can the proposed mining expansion avoid violating Idaho water quality standards. Without chemical attenuation of selenium in groundwater, all action alternatives in the FEIS would be illegal.

The Buck/Mayo memorandum asserts that the preliminary modeling for Panels F and G showed that surface and groundwater quality could indeed exceed water quality standards (Buck/Mayo memorandum, page 1). Because this finding would likely prevent the expansion of the mine into Panels F and G, Buck and Mayo considered the evidence for chemical attenuation of selenium. At the request of GYC and NRDC, expert hydrologist Dr. Tom Myers assessed the Buck/Mayo memorandum, as well as the FEIS, and describes the Buck/Mayo findings as follows:

> The Buck/Mayo memo discussed several analyses and concluded that chemical attenuation should not be considered in the modeling for the FEIS (Buck/Mayo memorandum, page 10). However, the FEIS and JBR (2007), which were completed after the Buck/Mayo memorandum was written, justified and included attenuation. In fact, the FEIS and JBR (2007) used the same data and either ignored or misinterpreted it by concluding that chemical attenuation should be included in the model. Neither the FEIS nor JBR (2007) attempted to reconcile the conclusions set forth in this memorandum with the methods used for the model or reported in the FEIS. In fact, neither JBR (2007) nor the FEIS even mention the existence of this memorandum, which presents results that prove the modeling completed by JBR (2007) for the FEIS relies on a faulty conceptual model. It follows then that any decision based on the transport analysis in JBR (2007) and the FEIS are not completely informed and are also flawed.

Excerpted from the Supplemental Comments on Smoky Canyon Mine Panels F&G Proposed Mine Expansion/Final Environmental Impact Statement, March 6, 2008, Technical Memorandum from Dr. Tom Myers, submitted by GYC and NRDC (hereinafter, "Myers 2008 Technical Memorandum"). (Emphasis added.)

In his Technical Memorandum, Myers notes that, in particular, the following three points from the Buck/Mayo memorandum were not included in the FEIS modeling. First,

the Buck/Mayo memorandum points out that the fact that the selenium load decreases between Pole Canyon and Hoopes Spring does not prove or even suggest chemical attenuation. In fact, the Buck/Mayo memorandum concluded that it is impossible to distinguish between dilution due to groundwater inflow to the pathway and any chemical attenuation, but noted that it "is noteworthy that the Se concentration in the groundwater plume, which begins at about 0.46 mg/l at GW-16, remains above the surface water standard at a concentration of 0.01 mg/l at Hoopes Spring after a total flow path of about 2.3 miles and significant dilution." (Buck/Mayo memorandum, page 7). The memorandum also opined that the selenium concentrations at GW-18 are much lower than at Hoopes Spring, not due to chemical attenuation, but because GW-18 is likely not on the same pathway as flow from Pole Canyon to Hoopes Spring (*Id.*). Nevertheless, JBR (2007) concluded that the decrease in Se load from Pole Canyon to Hoopes Spring is evidence of chemical attenuation and that dubious sulfate loading and flow path analysis shows that attenuation is about 50%.

Second, Myers observes that

> the Buck/Mayo memorandum questions the concentration data used for seepage in the transport model. Noting the pore volume calculations for input concentrations (Maxim 2004, JBR 2007); the Buck/Mayo memorandum implies the initial concentration is too low by referencing data collected from monitoring well GW-11. Observed Se concentrations in October 2003 and May 2004 were 2.44 and 4.7 mg/l, respectively (Buck/Mayo memorandum, page 8), which are much higher than the initial values used by JBR (2007) (0.52, 0.64, and 0.73 mg/l for Panel F, Panel G and Panel G East Dump, respectively (JBR 2007, Input Table in Appendix)). Further support for using the higher value observed in GW-11 is that the amount of oxygen in the seepage water and the positive eH value indicates the Se species is likely to be selenate, which should be mobile in the "overburden matrix" (Buck/Mayo memorandum, page 10).

Myers 2008 Technical Memorandum.

Third, Myers observes that

> the Buck/Mayo memorandum notes that earlier transport modeling of Se transport near the culinary well had been calibrated successfully with just dilution and dispersion. As pointed out by Myers (2007a) the new JBR (2007) model for Panels F and G did not use any existing data for calibration.

Myers 2008 Technical Memorandum.

In sum, Myers stated

> The Buck/Mayo memorandum demonstrates that the agencies chose to

> ignore sound analytical methods in carrying out scientific analyses and in preparing risk assessments and ignored the conclusions of their own experts. The surface and groundwater quality estimates in the FEIS, because they are based on chemical attenuation of Se, are incorrect.

Myers 2008 Technical Memorandum.

(b) The Guidelines require use of reasonably reliable and reasonably timely data and information (e.g., collected data such as from surveys, compiled information, and/or expert opinion).

The FEIS and JBR (2007) failed to "use reasonably reliable and reasonably timely data and information" by justifying and including attenuation, in direct contradiction of the data and information in the Buck/Mayo memorandum. As described in the previous section (see (a), above), the Buck/Mayo memorandum presents results that prove the modeling completed by JBR (2007) for the FEIS includes unreliable data. In particular, the Buck/Mayo memorandum discussed several analyses and concluded that chemical attenuation should not be considered in the modeling for the FEIS (Buck/Mayo memorandum, page 10).

In addition, the following points from the Buck/Mayo memorandum prove that some crucial and "reasonably reliable data and information" were not included in the FEIS modeling. First, the Buck/Mayo memorandum reviews the data regarding transport between the Pole Canyon waste rock dump and wells GW-15 and GW-16 and concludes that they provide evidence of little or no attenuation. Neither JBR (2007) nor the FEIS disclosed or discussed this information. Myers notes:

> In contrast, dissolved Se concentrations in the Pole Canyon monitoring wells greatly exceed groundwater and surface water standards. Dissolved Se concentrations in the deep monitoring well, GW-16 ... remained relatively constant for 2003-2004 with an average of 0.49 mg/l, whereas Se in the shallow alluvial well GW-15, varied greatly. The average total Se concentration in LP samples since May 1986 is 0.389 mg/l and the average Se concentration in alluvial groundwater at this site in 2003 and 2004 ... was 0.463 mg/l. the Se values are comparable to the average concentration in GW-16, suggesting there is minimal Se chemical attenuation occurring along this relatively short and shallow groundwater flow path in the upper Wells Formation at this location. (Buck/Mayo Memorandum, page 6)

Myers 2008 Technical Memorandum. Myers (2007a and 2007b) used the same data that were contained in the Buck/Mayo memorandum as evidence that attenuation should not be considered in the groundwater modeling for the FEIS. However, the FEIS failed to consider these data and its own experts' opinions about selenium attenuation.

Second, Myers notes that the fact that the Se load decreases, between Pole Canyon and Hoopes Spring, does not prove or even suggest chemical attenuation. The

Buck/Mayo memorandum concluded that it is impossible to distinguish between dilution due to groundwater inflow to the pathway and any chemical attenuation. They also opined that the Se concentrations at GW-18 are much less than at Hoopes Spring because GW-18 is likely not on the same pathway as flow from Pole Canyon to Hoopes Spring (*Id.*). Nevertheless JBR (2007) concluded that the decrease in Se load from Pole Canyon to Hoopes Spring is evidence of chemical attenuation and that dubious sulfate loading and flow path analysis shows that attenuation is about 50%. Again, the FEIS failed to consider these data and its own experts' opinions about selenium attenuation.

Myers also notes in his 2008 Technical Memorandum that

> Data from seven monitoring wells, all of the springs, and theoretical geochemical considerations all lead to the conclusion that chemical attenuation of Se at the Smoky Canyon mine has not been demonstrated and attenuation should not have been included in the transport model (Buck/Mayo memorandum, page 10). JBR (2007) modeled attenuation and ignored this empirical data. Clearly JBR utilized a faulty and incorrect conceptual model for transport, which as noted above, lead to flawed analysis and unreliable predictions of impacts. The Buck/Mayo memorandum demonstrates that the agencies chose to ignore "reasonably reliable and reasonably timely data and information (e.g., collected data such as from surveys, compiled information, and/or expert opinion)."

Myers 2008 Technical Memorandum. Thus the surface and groundwater quality estimates in the FEIS, because they are based on chemical attenuation of Se that is not supported by "reasonably reliable data," are inaccurate and must be corrected.

(c) Use the best science and supporting studies conducted in accordance with sound and objective scientific practices, including peer-reviewed science and studies where available.

Failure to include the Buck/Mayo memorandum's analyses and its conclusion that chemical attenuation should not be considered in the modeling for the FEIS is a blatant failure to use the best science and supporting studies conducted in accordance with sound and objective scientific practices. The FEIS and JBR (2007) justified and included attenuation, in direct contradiction of the data and analysis in the Buck/Mayo memorandum. No attempt was made to reconcile the conclusions in this memo with the conclusions reached in the FEIS. Neither JBR (2007) nor the FEIS mention the existence of this memo. Yet the Buck/Mayo memorandum presents results that prove the modeling completed by JBR (2007) for the FEIS includes faulty conceptualization and is flawed. It follows then that all decisions based on JBR (2007) and the FEIS are not completely informed and are also flawed.

All information presented in this Request for Correction is relevant to this section of the applicable guidelines and represents a failure to ensure the objectivity of information disseminated by USDA and BLM agencies and offices in conjunction with

their rulemaking activities. The information drawn from the Buck/Mayo memorandum, described above in sections (a) and (b), indicates a failure of the FEIS to use "the best science and supporting studies conducted in accordance with sound and objective scientific practices, including peer-reviewed science and studies where available."

(d) Use data collected by accepted methods or best available methods (if the reliability of the method and the nature of the decision justifies the use of the data).

Again, the Myers 2008 Technical memorandum points out that

> the Buck/Mayo memo discussed several analyses and concluded that chemical attenuation should not be considered in the modeling for the FEIS (Buck/Mayo memorandum, page 10). It can be assumed that the memo was prepared by the agencies own experts based on the best available information using the best available methods. However, the FEIS and JBR (2007), which were completed after the Buck/Mayo memorandum, justified and included attenuation. In fact, the FEIS and JBR (2007) used the same data and either ignored or misinterpreted it by concluding that chemical attenuation should be included in the model. They did not attempt to reconcile the conclusions in this memorandum with the methods used for their model or reported in the FEIS. In fact, neither JBR (2007) nor the FEIS even mention the existence of this memorandum, which presents results that prove the modeling completed by JBR (2007) for the FEIS relies on a faulty conceptual model.

Myers 2008 Technical Memorandum. It follows then that any decision based on the transport analysis in JBR (2007) and the FEIS are not completely informed and are also flawed.

e. In the dissemination of *influential* scientific information about risks, ensure that the presentation of information is comprehensive, informative, and understandable. In a document made available to the public, specify, to the extent practicable, Any additional studies, including peer-reviewed studies, known to the agency that support, are directly relevant to, or fail to support the findings of the assessment and the methodology used to reconcile inconsistencies in the scientific data.

As explained above, the Buck/Mayo memorandum discussed several analyses and concluded that chemical attenuation should not be considered in the modeling for the FEIS (Buck/Mayo memorandum, page 10). It can be assumed that the memorandum was prepared by the agencies' own experts, based on the best available information using the best available methods. However, the FEIS and JBR (2007), which were completed after the Buck/Mayo memorandum, justified and included chemical attenuation. In fact, the FEIS and JBR (2007) used the same data and either ignored or misinterpreted them by concluding that chemical attenuation should be included in the model. Although directed by OMB's Guidelines to use "any additional studies, including peer-reviewed studies,

known to the agency that support, are directly relevant to, or fail to support the findings of the assessment and the methodology used to reconcile inconsistencies in the scientific data," the agencies did not attempt to reconcile the conclusions in this memorandum with the methods used for their model or reported in the FEIS. (Emphasis added.) In fact, neither JBR (2007) nor the FEIS even mention the existence of this memorandum, which contains results that prove the modeling completed by JBR (2007) for the FEIS relies on a faulty conceptual model. It follows then that any decision based on the transport analysis in JBR (2007) and the FEIS are not completely informed and are also flawed.

6. Explanation of the Effect of the Alleged Error

The effect of the failure to include the Buck/Mayo memorandum into the development of the recent Smoky Canyon Panels F and G FEIS and JBR's groundwater model (JBR 2007), upon which the FEIS depends, is that all action alternatives in the FEIS would be illegal and therefore any decision to permit the mine expansion would be in violation of federal statute.

The agencies added an updated groundwater modeling and transport report (JBR 2007) to the FEIS in an effort to shore up their argument that the proposed expansion will not lead to violations of both groundwater and surface water standards. Petitioners provided detailed comments on the FEIS that included an exhaustive analysis by Dr. Tom Myers that demonstrated that the agencies' groundwater modeling report is fatally flawed.[1] Subsequently, we learned, from information in the Buck Mayo that the principle that underpins the agencies' groundwater model, chemical attenuation of selenium in groundwater at the Smoky Canyon Mine, is not based on fact or science. To be precise, the Forest Service and BLM "hung their hats" on chemical attenuation of selenium in groundwater in order to be in a position to approve the proposed mine expansion. The truth is that the agencies were aware as early as January 2005 "that chemical attenuation of Se has not been demonstrated for flow pathways through the upper Wells Formation aquifer at the Smoky Canyon Mine." (Buck Mayo memorandum)

Chemical attenuation of selenium in groundwater at the Smoky Canyon Mine became one of the three lynchpins for the expansion of the mine. The other two underpinnings of mine expansion approval are the new and untested "store and release" cover design and the assumption that the future clean up of existing selenium contamination at the Smoky Canyon Mine under CERCLA will take place and work as predicted. Without chemical attenuation, all of the predictions for selenium contamination of groundwater, hence surface water from the mine expansion, fly out the window. As we noted in our comments on the FEIS, "The transport modeling used by JBR assumed there would be Se attenuation, but none of the bases for assuming attenuation were correct."[2]

In fact, as stated above, Dr. Myers developed a groundwater and transport model for the Smoky Canyon Mine. He then demonstrated with his model and documented in his

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[1] Myers, T., December 11, 2007. Groundwater model and transport at the Smoky Canyon Mine Proposed Panels F and G, pg. 39. This report was included in Appendix E to the comments of GYC, NRDC and other groups on the Smoky Canyon Mine FEIS.

[2] Greater Yellowstone Coalition, Natural Resources Defense Council, December 21, 2007, pg. 32.

groundwater modeling report for the FEIS (using the same data that JBR 2007 used as evidence) that attenuation should not be considered in the groundwater modeling for the FEIS. Myers details this in his review of the Buck/Mayo Memorandum. We reiterate below the principal points of the Myers 2008 Technical Memorandum:

> The following discussion presents four results from the Buck/Mayo memorandum that they used to conclude that chemical attenuation should not be included. This discussion also explains how the Buck/Mayo memorandum supports previous analyses and reviews of the FEIS and JBR (2007) by Myers (2007a and 2007b).
>
> First, the Buck/Mayo memorandum reviews the transport between the Pole Canyon waste rock dump and wells GW-15 and GW-16 as evidence of little or no attenuation. Neither JBR (2007) nor the FEIS disclosed or discussed this information.
>
> > In contrast, dissolved Se concentrations in the Pole Canyon monitoring wells greatly exceed groundwater and surface water standards. Dissolved Se concentrations in the deep monitoring well, GW-16 ... remained relatively constant for 2003-2004 with an average of 0.49 mg/l,, whereas Se in the shallow alluvial well GW-15, varied greatly. The average total Se concentration in LP samples since May 1986 is 0.389 mg/l and the average Se concentration in alluvial groundwater at this site in 2003 and 2004 ... was 0.463 mg/l. the Se values are comparable to the average concentration in GW-16, suggesting <u>there is minimal Se chemical attenuation occurring along this relatively short and shallow groundwater flow path in the upper Wells Formation</u> at this location. (Buck/Mayo Memorandum, page 6, emphasis added)
>
> Also, Myers (2007a and 2007b) used the same data from GW-15 and GW-16 as evidence that attenuation should not be considered in the groundwater modeling for the FEIS.
>
> Second, the fact that the Se load decreases, between Pole Canyon and Hoopes Spring, does not prove or even suggest chemical attenuation. In fact the Buck/Mayo memorandum concluded that it is impossible to distinguish between dilution due to groundwater inflow to the pathway and any chemical attenuation, but noted that it "is noteworthy that the Se concentration in the groundwater plume, which begins at about 0.46 mg/l at GW-16, remains above the surface water standard at a concentration of 0.01 mg/l at Hoopes spring after a total flow path of about 2.3 miles and significant dilution." (Buck/Mayo memorandum, page 7). They also opined that the Se concentrations at GW-18 are much less than at Hoopes Spring because GW-18 is likely not on the same pathway as flow from Pole Canyon to Hoopes Spring (*Id.*). Myers (2007b) also discussed that the change in load and concentration is mostly due to dilution from other water sources, the fact that transport from Pole Canyon to Hoopes Spring has not reached steady state, and that not all of the Pole Canyon Se actually discharges at

Hoopes Spring. Nevertheless JBR (2007) concluded that the decrease in Se load from Pole Canyon to Hoopes Spring is evidence of chemical attenuation and that dubious sulfate loading and flow path analysis shows that attenuation is about 50%.

Third, the Buck/Mayo memorandum questions the Se concentration data used for seepage in the transport model. Noting the pore volume calculations for input concentrations (Maxim 2004, JBR 2007), the Buck/Mayo memorandum implies the initial concentration is too low by referencing data collected from monitoring well GW-11. Observed Se concentrations in October 2003 and May 2004 were 2.44 and 4.7 mg/l, respectively (Buck/Mayo memorandum, page 8), which are much higher than the initial values used by JBR (2007) (0.52, 0.64, and 0.73 mg/l for Panel F, Panel G and Panel G East Dump, respectively (JBR 2007, Input Table in Appendix)). Myers (2007a) used observations from GW-11 and the E panel seep to support his use of higher initial Se concentrations in the modeled seepage from the proposed panels. Further support for using the higher value observed in GW-11 is that the amount of oxygen in the seepage water and the positive eH value indicates the Se species is likely to be selenate which should be mobile in the "overburden matrix" (Buck/Mayo memorandum, page 10).

Fourth, the Buck/Mayo memorandum notes that earlier transport modeling of Se transport near the culinary well had been calibrated successfully with just dilution and dispersion. Myers (2007a) used data at this well also, with just dilution and dispersion, for calibration. As pointed out by Myers (2007a) the new JBR (2007) model for Panels F and G did not use any existing data for calibration.

Data from seven monitoring wells, all of the springs, and theoretical geochemical considerations all lead to the conclusion that chemical attenuation of Se at the Smoky Canyon mine has not been demonstrated and attenuation should not have been included in the transport model (Buck/Mayo memorandum, page 10). JBR (2007) modeled attenuation and ignored this empirical data. Clearly JBR utilized a faulty and incorrect conceptual model for transport, which as noted above, lead to flawed analysis and unreliable predictions of impacts. The Buck/Mayo memorandum demonstrates that the agencies chose to ignore the plethora of evidence that attenuation will not occur, and, indeed, ignored the conclusions of their own experts. The surface and groundwater quality estimates in the FEIS, because they are based on chemical attenuation of Se are simply wrong.[3]

In sum, the memorandum's conclusions about attenuation are in direct conflict with the conclusions represented in the FEIS. And as noted above, the last paragraph of the memorandum states that no mechanism to support chemical attenuation has been found. The effect of this error is that all action alternatives in the FEIS would be illegal and therefore any decision to permit the mine expansion would be in violation of federal statute.

[3] Myers 2008 Technical Memorandum.

7. Recommendation and Justification for How the Information Should Be Corrected

The Smoky Canyon Mine Panels F and G Expansion FEIS should be withdrawn, and the inputs to the groundwater model should be changed to reflect that no chemical attenuation occurs at the Smoky Canyon Mine. The groundwater and transport model should then be rerun to provide more accurate predictions of selenium contamination of both groundwater and surface water. The results of this improved groundwater modeling should then be used to portray accurately the effects on water quality should the Smoky Canyon Mine Expansion go forward as described in the Agency Preferred Alternative.

Respectfully submitted for Petitioners,

/s/ Lisa Evans

Lisa Evans
Attorney
Earthjustice

References

JBR, 2007. Final Modeling Report, Groundwater Flow and Solute Transport, Smoky Canyon Mine Panels F and G Extension Area. Prepared for Bureau of Land Management and U.S. Forest Service. JBR Environmental Consultants, Sandy, Utah.

Maxim Technologies, 2004. Baseline Technical Report, Water Resources, Manning Creek and Deer Creek, Phosphate Lease Areas (Panels F & G), Smoky Canyon Mine, Caribou County, Idaho. Prepared for J.R. Simplot, Pocatello ID. Maxim Technologies, Inc., Helena, MT., June 2004.

Myers, T., 2007a. Groundwater Flow and Contaminant Transport at the Smoky Canyon Mine, Proposed Panels F and G. Prepared for Natural Resources Defense Council and Greater Yellowstone Coalition.

Myers, T. 2007b. Review of Hydrogeology and Water Resources for the Final Environmental Impact Statement, Smoky Canyon Mine, Panels F and G. Prepared for Natural Resource Defense Council, San Francisco, CA.

USDA United States Department of Agriculture | Forest Service | Washington Office | 1400 Independence Avenue, SW Washington, DC 20250

File Code: 1300-1/2800-1/2820-5
Date:

JUN 0 3 2008

Lisa Evans, Attorney
Earthjustice
21 Ocean Avenue
Marblehead, MA 01945

Dear Ms. Evans:

The purpose of this letter is to respond to the Earthjustice April 3, 2008, Petition for Correction of Information to the USDA Forest Service under the Information Quality Act (IQA; Public Law 106-554 §515) and the U.S. Department of Agriculture (USDA) Information Quality (IQ) Guidelines. Earthjustice requested that the Final Environmental Impact Statement (FEIS) for the proposed Smoky Canyon Mine Panels F and G expansion be withdrawn for correction. The petition asserts that a key model simulation presented in the FEIS is not consistent with the earlier recommendations of consultants working on the Draft Environmental Impact Statement, and therefore, that the predicted water quality effects in the FEIS are incorrect. The Bureau of Land Management (BLM) also received a similar petition from Earthjustice. In consultation with the BLM, the Forest Service has given the Earthjustice request for correction careful consideration and the identified concerns have been thoroughly reviewed.

The modeled prediction of effects to water quality from on-lease waste rock disposal facilities do not directly pertain to the Forest Service's decision to authorize off-lease access and utilities; rather, they are more pertinent to BLM's decision to authorize on-lease mining activities. Consequently, BLM has compiled a detailed explanation of why the prediction of water quality effects in the FEIS is not incorrect, and they will provide that in their response to the similar IQA petition served to them. The Forest Service concurs with the response provided by BLM.

If you are dissatisfied with this response, you may submit a Request for Reconsideration (RFR). An RFR filed after the 45-day deadline may be denied as untimely. The RFR should reference this letter. Additional requirements and information for an RFR are listed on the USDA Correction of Information website: http://www.ocio.usda.gov/qi_guide/corrections.html. An RFR can be submitted to the Reconsideration Official by mail, fax, or email:

USDA Forest Service
ATTN: Data Quality Office
Mail Stop 1113, 1SW Yates Building
1400 Independence Avenue, SW
Washington, DC 20250-1143
FAX : (202) 260-3245
EMAIL: gvargas@fs.fed.us

If you should have additional questions, please contact George Vargas, Forest Service Quality of Information Officer, at (202) 205-0444, or e-mail gvargas@fs.fed.us.

Sincerely,

Thelma J. Strong

THELMA J. STRONG
Director, Office of Regulatory and Management Services

cc: Larry Timchak, Jeff Jones, Barry Burkhardt, Tony L Ferguson, George Vargas, Christopher Carlson, Kenneth Paur, Joshua Stout, Joseph Kraayenbrink

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*	To:	Name: Lisa Evans, Attorney Title: Organization: Earthjustice Street: 21 Ocean Avenue Line 2: City, State, Zip: Marblehead, Massachusetts 01945
	cc:	Larry Timchak/R4/USDAFS, Jeff Jones/R4/USDAFS, Barry Burkhardt/R4/USDAFS, Tony L Ferguson/WO/USDAFS, George Vargas/WO/USDAFS, Christopher Carlson/WO/USDAFS, KENNETH PAUR/Unspecified/USDA, Joshua Stout/IFD/ID/BLM/DOI, Joseph Kraayenbrink/IFD/ID/BLM/DOI
	Email To:	
*	Subject:	Data Quality Act Petition Regarding the Final Environmental Impact Statement for the Smoky Canyon Mine Panels F & G
*	Categories:	WO-MGM, WO-ORMS
*	Finalized Signatures:	THELMA J. STRONG

* These fields must be entered before the letter can be finalized

Co-authors: Kimbra Gillis/WO/USDAFS, George Vargas/WO/USDAFS, Glenn M Lewis/WO/USDAFS

WO Formal One Signature

Review Information

Simultaneous Review
Reviewers' instructions:

Sequential Review

Current Reviewer	Still To Review	Reviewers Concurring	Reviewers Not Concurring
		Glenn M Lewis/WO/USDAFS Thelma Strong/WO/USDAFS	None

Review Comments

Glenn M Lewis/WO/USDAFS concurs, 04/29/2008 01:28:00 PM EDT

Thelma Strong/WO/USDAFS concurs, 06/03/2008 02:51:12 PM EDT

All reviews completed

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TAKE PRIDE IN AMERICA

In Reply Refer To:
3500
I-27512; I-01441

June 3, 2008

Earthjustice
Lisa Evans
21 Ocean Avenue
Marblehead, MA 01945

Dear Ms. Evans:

On April 7, 2008, BLM received your Petition to Correct Information submitted pursuant to Public Law 106-554 part 515. The petition pertains specifically to the Smoky Canyon Mine Panels F and G Final Environmental Impact Statement (FEIS) and the Final Groundwater Flow and Solute Transport Modeling Report. It was requested in the petition that the BLM withdraw the FEIS and change the inputs to the groundwater model to reflect that no chemical attenuation of selenium occurs at the Smoky Canyon Mine.

Under BLM's Information Quality Guidelines, the BLM has carefully considered the petition, including the rationale provided, the explanation of the effect of the alleged error, and the recommendation for how the information in the FEIS should be corrected (see the enclosed staff memo, dated April 16, 2008). It has been determined that neither of the two documents requires correction with respect to the inclusion of selenium attenuation. Therefore, it was also determined that the FEIS will not be withdrawn or changed in response to this petition.

In regard to the inclusion of selenium attenuation in groundwater analysis, there is not a conflict between the analysis disclosed in the FEIS and the memorandum (JBR memorandum January 20, 2005) in the project record that was prepared for the Draft EIS. The conclusions regarding selenium attenuation from the Draft EIS, which were based on the same JBR memorandum dated January 20, 2005, are discussed in the FEIS and were considered in the analysis. The recommendation of the petition is to withdraw the FEIS so that it can be corrected to reflect no selenium attenuation in the analysis. The FEIS **already** discloses predicted impacts with no selenium attenuation, for Simplot's Proposed Action and all Mining Alternatives with a direct effect on water quality.

To allow the public and decision makers to make comparisons, pages 4-52, 4-65, 4-76, 4-90, 4-96, and 4-97 of the FEIS all clearly display predicted water quality impacts which do not include any attenuation of selenium. All of those pages except page 4-65 include a range of selenium attenuation from No

Attenuation to the agency adopted range of selenium attenuation to greater selenium attenuation. Therefore the FEIS will not be withdrawn or changed in response to this petition.

In accordance with BLM's Information Quality Guidelines, if you are dissatisfied with this response, you may appeal to:

Assistant Director, Information Resources Management, BLM
1849 C Street, NW
Washington, DC 20240

The following four elements should be included in a challenge to information:

1. Specific reference to the information being challenged.
2. Statement specifying why you believe the information fails to satisfy the standards in the BLM, DOI or OMB guidance.
3. How you are affected by the challenged information.
4. The name and address of the person filing the complaint.

Sincerely,

Joe Kraayenbrink
District Manager

Enclosure:
Staff memo, dated April 16, 2008 (13 pp.)

Cc:
BLM, Candelaria
USFS, Timchak
USFS, Jones

DATE: April 16, 2008

TO: Karen Porter, Mike Candelaria, Stephanie Balzarini, Jeff Jones, Ken Paur, Chris Carlson

CC: Larry Timchak, Joe Kraayenbrink

FROM: Bill Stout

RE: Earthjustice Petition to Correct Information in the Smoky Canyon Mine Final EIS and Final Modeling Report.

Introduction

BLM and the FS received a Petition to Correct Information Disseminated by the USDA FS and USDOI BLM pursuant to Public Law 106-554 part 515. This petition was received by both agencies on April 7, 2008. The petition was submitted by Earthjustice on behalf of Greater Yellowstone Coalition and the Natural Resources Defense Council.

The two documents that the petition to correct pertains to are:

1) The Smoky Canyon Mine, Panels F & G Final EIS released in October 2007
2) Final Modeling Report, Groundwater Flow and Solute Transport, Smoky Canyon Mine Panels F & G Extension Area, April 2007

The GYC received a **2005** memorandum from JBR (Brian Buck and Alan Mayo) to BLM and FS technical staff, dated January 20, 2005, regarding selenium attenuation and its use in the water quality model for the Smoky Canyon Mine **DRAFT** EIS. This document was obtained through a FOIA regarding the Dry Valley Mine. To the best of my knowledge, the GYC has not submitted a FOIA request for information pertaining to attenuation of selenium and its use in the Final EIS.

For clarification, Brian Buck is the project manager and a geologic engineer for JBR Environmental (JBR), the BLM and Forest Service's 3rd party contractor for the preparation of the EIS. Dr. Alan Mayo is the geohydrologist subcontracted to JBR to conduct groundwater analysis and modeling. They have prepared numerous memorandums and reports in the project record. They were the primary authors of all three JBR memos discussed in this memo.

The memo in question, called the Buck/Mayo 2005 memo by the petitioner, was fully considered and is part of the project record for the Smoky Canyon Mine Panels F and G EIS.

Earthjustice asserts 5 reasons [labeled a. through e. in the petition] as to why the Final EIS and the Final Modeling Report should be withdrawn and corrected under the Data Quality Act. In addition, there are numerous other assertions within the text of the petition, most of which are very similar. Assertions are combined below and each assertion is labeled with the corresponding page number and letter from the petition.

While correctly interpreting the conclusions of the 2005 Buck/Mayo memo is key to understanding the issues presented by the petitioner, the bulk of the issues relate to how the information in the memo was used [or was not used] rather than a disagreement with the technical content of the 2005 memo.

Petitioner's Rationale for Correction

ASSERTION: The Buck/Mayo 2005 memo concluded that chemical attenuation should not be included in the Final EIS. (a, page 7)

RESPONSE: This summary, provided by the petitioner, of the Buck/Mayo 2005 memo is incorrect. The Buck/Mayo 2005 memo concluded three things and none of them imply that chemical attenuation of selenium should not be included in the Final EIS. The conclusions of the Buck/Mayo 2005 memo are quoted as follows:

1) "*Evidence for Se attenuation is less clear. Some chemical attenuation may take place along the groundwater flow paths from overburden areas. However, the low pH, high organic and low Redox conditions needed to promote Se chemical attenuation do not appear to occur along the groundwater flow paths in the upper Wells Formation aquifer from overburden areas at the Smoky Canyon Mine or from the planned overburden areas at Panels F and G.*" [Emphasis added]

2) "*One investigator has indicated that the relatively fine-grained, organic-rich shale within backfilled overburden offer the most likely opportunity for selenium reduction and attenuation within the overall flow path (L. Kirk, 2005). However, none of the backfilled Panels F and G pits have been proven to be able to reach the necessary material, chemical, and biological characteristics, which would reliably promote such reducing conditions and possible chemical-biological attenuation.*"

3) "*After review of the information presented in this memo, at this time, we have not been able to identify* ***quantifiable*** *chemical attenuation mechanisms for Se that can be used in the Panels F and G groundwater impact analysis and recommend modeling Se attenuation due only to dilution and dispersion.*" [Emphasis added]

To assert that the memo says there should not be chemical attenuation included in the Final EIS is a misrepresentation of the facts. The exact language of the 2005 memo is provided below:

Theoretical and empirical evidence for Se attenuation is documented in the literature (Herring, and others, 2001, Weres and others, 1990, and others).

Theoretical calculations and data, laboratory experiments, and empirical observation of specific environments demonstrate that both Cd and Se attenuation are possible under certain conditions. The crux of the matter is to determine if these conditions exist at the Smoky Canyon Mine and if attenuation will likely occur in the seepage and groundwater pathway under and down gradient of Panels F and G.

It is not known if the drop in Se concentrations between GW-16 and HS [Hoopes Springs] is due solely to mixing and dilution with other groundwater in the Wells Formation aquifer, or if some chemical attenuation also reduces Se concentrations in groundwater along that flow path.

If a large proportion of that groundwater is of background quality, then mixing with groundwater from the Pole Canyon area would have a significant dilution effect on the Se concentrations observed at HS. The magnitude of the dilution in this flow path is unknown so it is not possible to estimate the possible involvement of other attenuation mechanisms in this flow path. We attempted an estimate of the potential dilution occurring between GW-16 and HS with the conservative solutes: nitrate, sulfate and chloride with no success.

It is possible that there is attenuation of Se transport from the E-Panel; however, there is no information to confirm that the attenuation takes place along flow paths within the upper portion of the Wells Formation aquifer. These issues are being further investigated in the AOC site investigation.

With all the above-described sites, it is not possible to determine the effects of the different lithologies within the seepage flow paths internal to the overburden fills on the resulting seepage chemistries. Because of this, the seepage chemistries of these sites are only generally comparable to each other, and the future Panels F and G overburden fill conditions. However, this does not detract from the usefulness of these data for indicating potential chemical attenuation mechanisms that might occur outside of these overburden fills.

Empirical data obtained to date from GW-11, GW-IW, GW-CW, GW-16, GW-18, DC-MW-5, MC-MW-1, the major springs down gradient of Panels F and G and the theoretical information discussed in this memo indicate that chemical attenuation of Se has not been demonstrated for flow pathways through the upper Wells Formation aquifer at the Smoky Canyon Mine. After review of the information presented in this memo, ***at this time, we have not been able to identify quantifiable chemical attenuation mechanisms for Se that can be used in the Panels F and G groundwater impact analysis and recommend modeling Se attenuation due only to dilution and dispersion.***

As the above quoted text from the Buck/Mayo 2005 memo indicates, the authors clearly indicated a number of times the possibility that chemical attenuation of selenium in the groundwater flow paths under the Smoky Canyon Mine could potentially occur but that there was insufficient data at that time to confirm the existence of attenuation or quantify it to the

degree that it could be used in the groundwater impact analysis then being planned [for the Draft EIS]. The memo was written before the Draft EIS was completed in support of that document, not the Final EIS.

The petitioner's incorrect restatement of the conclusions contained in the Buck/Mayo 2005 is needed to maintain that the analysis in the Final EIS, which included selenium attenuation, is in contradiction to the Buck/Mayo 2005 memo. The agencies and the authors of the memo summarized the selenium attenuation aspect of the 11-page Buck/Mayo memo in the Draft EIS in the following way on page 4-36:

> *"A review was made of literature and empirical data collected from the Smoky Canyon Mine related to the potential chemical attenuation of selenium and cadmium in the flow paths being modeled from the Panels F and G overburden sources to the points of groundwater discharge to the surface environment (JBR 2005a). There is abundant information in the literature supporting chemical attenuation of selenium in specific chemical and biological environments.* ***However, at the present time, it was concluded that there is insufficient evidence that these specific chemical environments exist to the degree necessary within the modeled flow paths for Panels F and G to allow estimation of significant chemical attenuation of selenium.*** *Although there may be some attenuation of selenium in these flow paths, none has been used in the fate and transport modeling for the groundwater impact assessment."* [Emphasis added]

The language of the Draft EIS indicates that attenuation of selenium was being considered by the agencies but at that time, there was insufficient information to include attenuation in the groundwater impact analysis. This is consistent with the conclusions of Buck/Mayo 2005. At the time of the Draft EIS, Buck, Mayo, and the agencies did not reject the potential for selenium attenuation in the subject flow paths; rather they made it clear that more information would be needed to quantify attenuation before it could be considered in the impact analysis.

As part of the public input process comments were provided on the Draft EIS. At that time, the agencies received additional literature, new site-specific data from the CERCLA investigation at Smoky Canyon Mine, new site-specific laboratory testing from the Smoky Canyon Mine, and new laboratory data from the Dry Valley Mine. The new information was fully considered as documented in another memo from Buck and Mayo dated March 12, 2006 titled, "Initial thoughts on Simplot Preliminary Hydrology Comments". This 2006 memo starts by summarizing the conclusions of the 2005 memo in this manner:

> *"Our previous recommendations to the agencies are contained in our January 20, 2005 memo on: EVALUATION OF THE POTENTIAL FOR CADMIUM AND SELENIUM ATTENUATION - F AND G PANELS, SMOKY CANYON MINE. In that memo we concluded that literature supported chemical attenuation of selenium in certain physical environments but that literature did not specifically support significant attenuation of selenate in the expected chemical conditions and lithologies of the subsurface flow path at Panels F and G. Our conclusions included the following statements:*

"Some chemical attenuation may take place along the groundwater flow paths from overburden areas. However, the low pH, high organic and low Redox conditions needed to promote Se chemical attenuation do not appear to occur along the groundwater flow paths in the upper Wells Formation aquifer from overburden areas at the Smoky Canyon Mine or from the planned overburden areas at Panels F and G. . . . . After review of the information presented in this memo, at this time, we have not been able to identify quantifiable chemical attenuation mechanisms for Se that can be used in the Panels F and G groundwater impact analysis and recommend modeling Se attenuation due only to dilution and dispersion."

Thus we did not close the door on use of geochemical attenuation along the Wells Formation flow path but did not have sufficient evidence that such occurred to quantify it enough for the purposes of our groundwater impact analyses.

Based on the new information obtained in comments to the Draft EIS, the Final EIS discusses the inclusion of selenium attenuation in several locations. On page 4-43, the Final EIS again summarizes the conclusions of [and correctly cites to] the Draft EIS which represents the conclusions of the 2005 Buck/Mayo memo.

A review was made of literature and empirical data collected from the Smoky Canyon Mine related to potential chemical attenuation of selenium and cadmium in the flow paths being modeled from the Panels F and G overburden sources to the points of groundwater discharge to the surface environment (JBR 2007). There is abundant information in the literature supporting chemical attenuation of selenium in specific chemical and biological environments. However, at the time the DEIS was prepared, it was concluded that there was insufficient evidence that these specific chemical environments exist to the degree necessary within the modeled flow paths for Panels F and G to allow estimation of significant chemical attenuation of selenium. The DEIS indicated, "Although there may be some chemical attenuation of selenium in these flow paths, none has been used in the fate and transport modeling for the groundwater impact assessment." Since the DEIS was completed, additional information has been obtained on selenium attenuation in the Wells formation that can be used in this impact analysis and is described in the following section.

Neither the memo prepared by Buck and Mayo in 2005 to discuss possible use of selenium attenuation in the groundwater quality analysis, the Draft EIS, the Final EIS, or the 2006 memo in the record support the petitioner's assertion that the 2005 Buck/Mayo memo concluded that chemical attenuation should not be included in the Final EIS.

ASSERTIONS: Neither the 2007 Final Modeling Report or the 2007 Final EIS mention the existence of the Buck/Mayo memo, which presents results that prove the Final EIS relies on a faulty conceptual model. (a, page 7)

The Final EIS fails to "use sound analytical methods in carrying out scientific....analysis" by not incorporating the findings of the Buck/Mayo memo of 2005. (a, page 6)

The Final EIS and Final Modeling Report fail to "use reasonably reliable and reasonably timely data and information" by justifying and including attenuation in direct contradiction of the data in the Buck/Mayo memo. (b, page 9)

Points from the Buck/Mayo memo prove that some crucial and "reasonably reliable data and information" were not included in the Final EIS modeling. (b, page9)

Failure to use the Buck/Mayo memo and its conclusion that attenuation should not be considered in the modeling for the Final EIS is a blatant failure to use best science and supporting studies. (c, page 10)

The Final EIS ignored or misinterpreted the memo created by the agencies own experts, and therefore any decisions made are not completely informed and are flawed. (d, page 11)

RESPONSE:

Collectively these statements in the petition assert that the 2005 Buck/Mayo memo regarding selenium attenuation or the information contained within the memo was omitted from the Final EIS and therefore the analysis in the Final EIS is flawed. This assertion is incorrect. The information contained in the 2005 Buck/Mayo is fully considered in the analysis of the Final EIS.

The 2005 Buck/Mayo memo was prepared to inform the agencies regarding theoretical selenium attenuation and site-specific considerations. At that time, this memo and its conclusions were considered and adopted by the agencies. This is indicated by references to the conclusions in the 2005 Modeling Report and the 2005 Draft EIS. The memo was summarized and **cited** (page 31) in the 2005 Modeling Report that was prepared for the Draft EIS. The Draft EIS cites (page 4-36) to the 2005 Modeling Report and summarizes the conclusions this way:

> *"A review was made of literature and empirical data collected from the Smoky Canyon Mine related to the potential chemical attenuation of selenium and cadmium in the flow paths being modeled from the Panels F and G overburden sources to the points of groundwater discharge to the surface environment (JBR 2005a). There is abundant information in the literature supporting chemical attenuation of selenium in specific chemical and biological environments.* ***However, at the present time, it was concluded that there is insufficient evidence that these specific chemical environments exist to the degree necessary within the modeled flow paths for Panels F and G to allow estimation of significant chemical attenuation of selenium.*** *Although there may be some attenuation of selenium in these flow paths, none has been used in the fate and transport modeling for the groundwater impact assessment."*

As the 2005 Buck/Mayo memo suggests, the DEIS does not include selenium attenuation in the analysis. As part of the public involvement process comments were provided on the Draft EIS. At that time, Simplot provided additional literature, site-specific data from the CERCLA

investigation at Smoky Canyon Mine, site-specific laboratory testing from the Smoky Canyon Mine, and laboratory data from the Dry Valley Mine. The agencies looked critically at this new information which was documented in a 2006 Buck/Mayo memo titled "Initial Thoughts on Simplot Preliminary Hydrology Comments". In addressing the new information, the 2006 memo first addresses the previous conclusions drawn in the 2005 memo.

> "Our previous recommendations to the agencies are contained in our January 20, 2005 memo on: *EVALUATION OF THE POTENTIAL FOR CADMIUM AND SELENIUM ATTENUATION - F AND G PANELS, SMOKY CANYON MINE. In that memo we concluded that literature supported chemical attenuation of selenium in certain physical environmental but that literature did not specifically support significant attenuation of selenate in the expected chemical conditions and lithologies of the subsurface flow path at Panels F and G. Our conclusions included the following statements:*
>
> *"Some chemical attenuation may take place along the groundwater flow paths from overburden areas. However, the low pH, high organic and low Redox conditions needed to promote Se chemical attenuation do not appear to occur along the groundwater flow paths in the upper Wells Formation aquifer from overburden areas at the Smoky Canyon Mine or from the planned overburden areas at Panels F and G. . . . . After review of the information presented in this memo, at this time, we have not been able to identify quantifiable chemical attenuation mechanisms for Se that can be used in the Panels F and G groundwater impact analysis and recommend modeling Se attenuation due only to dilution and dispersion."*
>
> *Thus we did not close the door on use of geochemical attenuation along the Wells Formation flow path but did not have sufficient evidence that such occurred to quantify it enough for the purposes of our groundwater impact analyses."*

The 2006 memo, which was prepared to evaluate the new data, proceeds to make the following statements in regard to the new selenium attenuation information:

> *"We think Simplot's (Newfields) preliminary hydrology comments on comparing the ROM Control and Fate and Transport column leach test, performed by Maxim Technologies, sheds new light on the potential for selenium attenuation in the Well Formation below ROM overburden waste material. Newfields compared the mass loading from pore volume 1 (i.e., PV1) from ROM unsaturated, ROM fate and transport unsaturated, and ROM fate and transport partially saturated column tests. In their analysis they compared the mass of Se leached from the ROM control column in PV 1 with the mass of Se collected from similar PV 1 concentrations collected after the pore volume of water passed through Wells Formation material in the fate and transport columns.*
>
> *At face value, we think these calculations provide new evidence for Se attenuation after contact with saturated and unsaturated Wells Formation materials. There are several issues regarding the design and implementation of the column tests which tend to complicate and possibly mask the effect of this attenuation measurement.*

Despite the above complications, we think the column test data do suggest some Se attenuation by flow through the Wells Formation materials. We would appreciate the agencies' approval of our use of data from the ROM control columns and fate and transport columns as we continue to review Simplot's preliminary comments. We are asking for this approval because the agencies have previously decided not to use data from the subject test columns in the EIS.

It is our understanding that Newfields may be conducting further tests (roll testing) to validate Well Formation attenuation, and that these data may be available within the near future. If these new data substantiate attenuation, we believe we could accommodate some attenuation in the groundwater fate and transport model with the numerical value for the partitioning coefficient being based on a combination of information from the column tests and the bottle roll tests."

Based on this information, and further investigation as documented in a May 4, 2006 memo from Buck and Mayo entitled "Simplot Hydrology Comments on Panels F&G DEIS", the agencies adopted a conservative selenium attenuation factor for use in the Final EIS. [All three of the Buck/Mayo memos described above are in the EIS Project Record.]

Section 1.7 (page 1-26) of the Final EIS clearly points out this change and briefly discusses the consistency with conclusion in the Draft EIS [which are based on the 2005 Buck/Mayo memo]. Section 4.3 of the Final EIS fully describes the inclusion of selenium attenuation in the vadose zone. It starts by restating the conclusions contained in the Draft EIS on page 4-43. This paragraph indicates that the Draft EIS acknowledged the presence of selenium attenuation, but there was insufficient data to quantify it for use in modeling. This paragraph is as follows:

"A review was made of literature and empirical data collected from the Smoky Canyon Mine related to potential chemical attenuation of selenium and cadmium in the flow paths being modeled from the Panels F and G overburden sources to the points of groundwater discharge to the surface environment (JBR 2007). There is abundant information in the literature supporting chemical attenuation of selenium in specific chemical and biological environments. However, at the time the DEIS was prepared, it was concluded that there was insufficient evidence that these specific chemical environments exist to the degree necessary within the modeled flow paths for Panels F and G to allow estimation of significant chemical attenuation of selenium. The DEIS indicated, "Although there may be some chemical attenuation of selenium in these flow paths, none has been used in the fate and transport modeling for the groundwater impact assessment." Since the DEIS was completed, additional information has been obtained on selenium attenuation in the Wells formation that can be used in this impact analysis and is described in the following section".

Pages 4-43 through page 4-49 of the Final EIS describe the new information received and considered since the Draft EIS and the agency adoption of 15-25% attenuation when the evidence indicates a possible range of selenium attenuation between 30% and 64%. All the information on the selenium attenuation information from the Buck/Mayo 2005 memo and the new data received since the Draft EIS is also described on pages 34 through 43 of the 2007

Groundwater Modeling Report. The text in the groundwater modeling report specifically cites the Buck/Mayo 2005 memo and includes information from it within the report.

Page 4-48 of the Final EIS describes that the attenuation would take place in the unsaturated zone between the backfilled pits and the aquifer. The text is shown below:

> *"Selenium contained in overburden leachate at Panels F and G would need to pass through a significant thickness of unsaturated Wells formation before entering the Wells formation aquifer. Estimated thickness of the Wells formation vadose zone under Panels F and G range from 200 to 1,200 feet. This unit includes the upper Grandeur Limestone member of the Park City formation, fine-grained sandstone with interbeds of limestone and dolomite and cherty limestone with sandstone interbeds. There is abundant calcareous rock in this flow path, which could provide attenuation reaction media as described in the literature. Iron and minor clay content of the unit could also contribute to the selenium attenuation."*

In summary, the project record clearly demonstrates that the information contained in and the conclusions drawn in the 2005 Buck/Mayo were considered in the analysis contained in the Final EIS. They also show that including selenium attenuation is not contradictory of the 2005 Buck/Mayo. The Buck/Mayo 2005 memo clearly indicates that selenium attenuation could possibly take place in the groundwater flow paths but that insufficient information was available at that time to quantify this attenuation. The information included in the two Buck/Mayo memos of 2006 indicates consideration and a critical review of new information in the impact analysis. The 2007 groundwater modeling report also discusses the Buck/Mayo 2005 memo and provides an explanation of how selenium attenuation was quantified for the groundwater impact analysis that was eventually included in the Final EIS.

ASSERTION: In the Final EIS, the agencies failed to include the findings that do not support the analysis.(e, page 11)

RESPONSE: It is incorrect to state that the findings of the 2005 Buck/Mayo do not support the analysis.

The first conclusion in the 2005 Buck/Mayo memo is that some chemical attenuation may take place along groundwater flow paths, but there is no field evidence that the requisite pH and Redox conditions for significant Se attenuation in the Wells Formation aquifer between Panels F and G and these springs are present. The Final EIS includes an attenuation factor based on new empirical and laboratory data that were not available when the Buck/Mayo 2005 memo or the Draft EIS were written. The Final EIS clearly indicates why the agencies revised their approach

of including an attenuation factor, based on these new data. The 2005 memo, the Draft EIS, and the Final EIS are all consistent in this respect.

The second conclusion in the 2005 Buck/Mayo memo is that none of the backfilled Panels F and G pits have been proven to be able to reach the necessary material, chemical, and biological characteristics, which would reliably promote such reducing conditions and possible chemical-biological attenuation. For the reasons described in the 2005 Buck/Mayo memo no reduction of selenium in the backfill was included in the Final EIS analysis. Again, the 2005 memo, the Draft EIS, and the Final EIS are all consistent in this respect.

The third conclusion in the 2005 Buck/Mayo memo is that "After review of the information presented in this [2005] memo, ***at this time***, we have not been able to identify ***quantifiable*** chemical attenuation mechanisms for Se that can be used in the Panels F and G groundwater impact analysis and recommend modeling Se attenuation due only to dilution and dispersion. In comments on the Draft EIS the agencies received sufficient information to conclude that selenium attenuation was quantifiable. This information is considered in the 2006 Buck/Mayo titled "Initial Thoughts on Simplot Preliminary Hydrology Comments", the 2006 memo from Buck and Mayo titled "Simplot Hydrology Comments on Panels F&G DEIS", and the 2007 Modeling Report and the Final EIS. In restating the conclusions of the Draft EIS in the Final EIS, the Final EIS clearly considers the relationship between the information in the 2005 Buck/Mayo memo and the new information.

The analysis contained in the Final EIS and the content of the 2005 Buck/Mayo memo are consistent.

ASSERTION: No attempt was made to reconcile the conclusions in the Buck/Mayo memo with those in the Final EIS. (c, page 10)

RESPONSE: The 2005 Buck/Mayo memo and the use of selenium attenuation in the Final EIS are not contradictory. None of the conclusions in the 2005 Buck/Mayo memo permanently exclude use of a selenium attenuation factor as was used in the Final EIS analysis. Rather, Buck/Mayo 2005 indicates that selenium attenuation was possible but there was insufficient data available, in 2005 to quantify attenuation. Data provided by Simplot and their environmental consultants during the public comment period on the Draft EIS was objectively considered by the agencies and their consultants before any of the findings were included in the Final EIS.

Page 4-43 of the Final EIS discusses the relationship between the conclusions of the Draft EIS and the new information.

ASSERTION: Without chemical attenuation of selenium in groundwater, all action alternatives would be illegal. (a, page 7)

RESPONSE: This assertion is incorrect. The Final EIS fully discloses in several locations that the Preferred Alternative, Alternative D, would comply with applicable groundwater and surface water quality standards with or without selenium attenuation in the vadose zone.

The Draft EIS and the Final EIS disclose to the public and decision makers that Simplot's Proposed Action, and mining alternatives A, B, and C would not be in compliance without further mitigation. As such, the Draft EIS and the Final EIS both reflect that Alternative D, construction of a cover to limit leaching of selenium and release to the groundwater , as part of the Agency Preferred Alternative.

The Final EIS describes the impacts to groundwater and surface water in Section 4.3. Tables of the predicted impacts are included in the text. These tables not only include the impacts with the agency adopted range of selenium attenuation (15 – 25%), but they also include predicted impacts with a wider range including no attenuation and two levels of even more attenuation than adopted by the agencies. This was done to comparatively represent and disclose the range of attenuation suggested by commenters on the Draft EIS. Tables 4.3-15 and 4.3-16 from the Final EIS disclosing predicted groundwater impacts from the Agency Preferred Alternative are provided below. They clearly show analysis with no attenuation is contained in the Final EIS. Table 4.3-15 (page 4-76) shows selenium concentrations with no attenuation are below the groundwater standard of 0.050 mg/l selenium. Table 4.3-16 (page 4-76) shows selenium concentrations for down gradient springs with no attenuation are below the surface water standard of 0.005 mg/l selenium.

TABLE 4.3-15 MODELED PEAK SELENIUM CONCENTRATIONS AT OBSERVATION POINTS FOR ALTERNATIVE D STORE AND RELEASE COVER

INPUTS	POINT A		POINT B		POINT C		POINT D	
	TIME (YR)	CONC (MG/L)	TIME (YR)	CONC (MG/L)	TIME (YR)	CONC (MG/L)	TIME (YR)	CONC (MG/L)
No Atten.	64	0.0186	25	0.0057	25	0.00496	27	0.0178
15% Atten.	64	0.0158	25	0.0032	25	0.0042	27	0.0152
25% Atten.	64	0.0140	25	0.0028	25	0.0037	27	0.0134
30% Atten.	64	0.0130	25	0.0026	25	0.0035	27	0.0125
2" + 30% Atten.	64	0.0071	25	0.0014	25	0.0019	27	0.0067

TABLE 4.3-16 MODELED PEAK SELENIUM CONCENTRATIONS AT DISCHARGE POINTS FOR ALTERNATIVE D STORE AND RELEASE COVER

INPUTS	SF SAGE SPRING		BOOKS		DEER CREEK		CROW CREEK	
	TIME (YR)	CONC (MG/L)	TIME (YR)	CONC (MG/L)	TIME (YR)	CONC (MG/L)	TIME (YR)	CONC (MG/L)
No Atten.	118	0.0028	379	0.0022	60	0.0037*	420	0.0018
15% Atten.	118	0.0024	379	0.0019	60	0.0031*	420	0.0015
25% Atten.	118	0.0021	379	0.0017	60	0.0028*	420	0.0013
30% Atten.	118	0.0020	379	0.0015	60	0.0026*	420	0.0012
2" + 30% Atten.	118	0.0011	379	0.0008	60	0.0014*	420	0.0007

* Concentration in groundwater discharged to creek before mixing groundwater discharge with stream water

In addition to the groundwater impact analysis the Final EIS also provided impact analysis regarding surface water. Table 4.3-22 describes direct and indirect impacts to surface water for Alternative D using current baseline conditions (including existing surface water contamination from the Smoky Canyon Mine). This table also shows the predicted impacts with no attenuation, as well as the agency adopted range (15 – 25%) and more attenuation. Note that the analysis indicates that the Agency Preferred Alternative would not be in full compliance in Sage Creek regardless of selenium attenuation. However, the following table, Table 4.3-23 includes the predicted effects of the Agency Preferred Alternative along with the currently constructed mitigation measures at Smoky Canyon Mine and indicates that the project would comply with the surface water standard of .005 mg/l selenium either with the agency adopted attenuation range or with no attenuation.

TABLE 4.3-22 ESTIMATED SELENIUM CONCENTRATIONS (MG/L) IN AREA STREAMS FOR ALTERNATIVE D STORE AND RELEASE COVER (0.6 IN/YR)

LOCATION	NO ATTEN.	15% ATTEN.	25% ATTEN.	30% ATTEN.	2" + 30% ATTEN.
SUMMER/FALL DURING IRRIGATION SEASON					
Mouth of Deer Creek	0.0032	0.0028	0.0025	0.0023	0.0014
Crow Downstream of Deer Creek	0.0017	0.0015	0.0014	0.0013	0.0008
Mouth of S.F. Sage Creek	0.0051	0.0048	0.0046	0.0045	0.0039
Mouth of Sage Creek	0.0072	0.0070	0.0069	0.0069	0.0066
Crow Downstream of Sage Creek	0.0051	0.0049	0.0048	0.0048	0.0044
LATE FALL/WINTER BASEFLOWS WITHOUT IRRIGATION DIVERSIONS					
Mouth of Deer Creek	0.0032	0.0028	0.0025	0.0023	0.0014
Crow Downstream of Deer Creek	0.0013	0.0012	0.0011	0.0011	0.0008
Mouth of S.F. Sage Creek	0.0051	0.0048	0.0046	0.0045	0.0039
Mouth of Sage Creek	0.0072	0.0070	0.0069	0.0069	0.0066
Crow Downstream of Sage Creek	0.0041	0.0040	0.0039	0.0039	0.0036

TABLE 4.3-23 ESTIMATED SELENIUM CONCENTRATIONS (MG/L) IN SAGE CREEK AND CROW CREEK FOR ALTERNATIVE D STORE AND RELEASE COVER (0.6 IN/YR), ASSUMING SUCCESSFUL RECLAMATION AT E PANEL AND WITH HOOPES SPRINGS SELENIUM REMOVAL ACTION

LOCATION	NO ATTEN.	15% ATTEN.	25% ATTEN.	30% ATTEN.	2" + 30% ATTEN.
SUMMER/FALL DURING IRRIGATION SEASON					
Mouth of South Fork Sage Creek	0.0037	0.0034	0.0032	0.0031	0.0025
Mouth of Sage Creek	0.0036	0.0034	0.0034	0.0033	0.0030
Crow Downstream of Sage Creek	0.0029	0.0027	0.0026	0.0025	0.0022
LATE FALL/WINTER BASEFLOWS WITHOUT IRRIGATION DIVERSIONS					
Mouth of South Fork Sage Creek	0.0037	0.0034	0.0032	0.0031	0.0025
Mouth of Sage Creek	0.0036	0.0034	0.0034	0.0033	0.0030
Crow Downstream of Sage Creek	0.0024	0.0023	0.0022	0.0022	0.0019

Summary

In the petitioner's Explanation of the Alleged Error, they make two points 1) The effect of the failure to not include the 2005 Buck/Mayo memo in the development of the recent Smoky Canyon Mine Panels F and G Final EIS and JBR's groundwater model is that all action alternatives would be illegal, and 2) the conclusions in the 2005 Buck/Mayo memo are in direct conflict with the conclusions in the Final EIS.

Both assertions are shown to be incorrect. The Final EIS **does** include a summary of the conclusions from the 2005 Buck/Mayo memo. It also references the 2007 Groundwater Modeling Report which cites to the 2005 Buck/Mayo memo. The Final EIS clearly shows that the Preferred Alternative would be in compliance with applicable water quality standards even without consideration of selenium attenuation. The conclusions of the 2005 Buck/Mayo memo are **not** in conflict with the conclusions in the Final EIS.

In their recommendation for how the information should be corrected, the petitioner states that the Final EIS should be withdrawn and the inputs to the groundwater analysis should be changed to reflect that no chemical attenuation takes place at Smoky Canyon Mine. As shown above, the impact analysis contained in the Final Modeling Report and the Final EIS already reflect this condition. The Final EIS discloses for the public and decision makers the predicted impacts for the range of selenium attenuation accepted by the agency **and** with no selenium attenuation.

January 20, 2005

MEMORANDUM

TO: JAMES BLAIR, SCOTT GERWE, LORI HAMANN
CC: BILL STOUT, JEFF JONES, GREG BROWN
FROM: BRIAN BUCK, ALAN MAYO
RE: EVALUATION OF THE POTENTIAL FOR CADMIUM AND SELENIUM ATTENUATION - F AND G PANELS, SMOKY CANYON MINE

The purpose of this memo is to review the applicability of theoretical considerations and empirical data that may support incorporating chemical attenuation in the fate and transport modeling for the F and G Panels. The investigation included a preliminary literature review of attenuation mechanisms and an analysis of Cd and Se data collected at the Smoky Canyon Mine that may substantiate local attenuation.

Maxim Technologies (2004a) performed column leach testing of overburden materials to be disposed on site during development of the Panels F and G. Laboratory testing results indicate that cadmium, selenium, nickel, zinc, manganese, and sulfate are contaminants of potential concern (COPC). Sulfate and manganese are regulated under secondary water quality standards, thus they are not being considered in the fate and transport modeling. Preliminary groundwater fate and transport modeling has indicated that nickel and zinc concentrations at the points of compliance are not problematic (greater than applicable groundwater or surface water standards at potential compliance points). Only cadmium (Cd) and selenium (Se) concentrations are estimated to be problematic, based on preliminary modeling that did not incorporate any attenuation mechanisms other than dispersion and dilution.

The groundwater flow model predicts that groundwater from under the Panel F pit will discharge at South Fork Sage Creek Spring and the damage zone of the West Sage Valley branch of the Meade thrust fault, and groundwater from under the Panel G pit appears to discharge to Books Spring, Deer Creek and Crow Creek. Groundwater and surface water standards for Cd are 0.005 and 0.001 mg/L respectively, and groundwater and surface water standards for Se are 0.05 and 0.005 mg/L respectively.

Fate and transport modeling for the Panels B and C SEIS (JBR, 2001) and the preliminary fate and transport modeling results for Panels F and G assumed dilution and dispersion were the only attenuation mechanisms. Because the preliminary fate and transport modeling for Panels F and G indicated that both Cd and Se surface water quality standards might be exceeded, potential chemical attenuation of these contaminants warrants further examination. Maxim Technologies (2004b) reviewed potential chemical and biological attenuation processes for Cd and Se and described empirical data obtained from the Dry Valley mine. The theoretical discussion by Maxim regarding Cd chemical attenuation mechanisms is sound, as are the physical chemical attenuation mechanisms cited from the literature for Se. Various theories for biologically hosted chemical attenuation in pit backfills have also been described by Maxim but these results have not yet been proven to the degree they are reliable at his time for the Panels F and G project and the agencies (BLM, USFS, and IDEQ) have decided not to use these theories at this time for the Panels F and G groundwater impact analyses.

THEORETICAL CONSIDERATIONS

Mineral precipitation and sorption to mineral and organic surfaces are two potential chemical attenuation mechanisms for Cd and Se. Biologic mediation is an important factor in some processes.

Cadmium

In solution, cadmium occurs as the divalent cation Cd^{2+}. As such, much of its chemical behavior is similar to other divalent cations such as Ca^{2+}, and Mg^{2+}, and trace metals such as $Ba^{2+}$and Sr^{2+}. Ample theoretical evidence for Cd attenuation was found during a literature search (Allen and others, 1993; Fuller and Davis 1987; Hinz and Slim, 1964; Papadopoulos and Rowell; 1988, Zachara and others, 1991). Processes include Cd precipitation and Cd sorption to clays, carbonate and other minerals. Cd attenuation is not redox dependent, but is responsive to pH conditions and its chemical attenuation is enhanced in neutral to alkaline systems.

Groundwater in contact with calcite may contain appreciable concentrations of HCO_3^- and CO_3^{2-} ions. Concentrations of metal ions (i.e., Ba^{2+}, Cd^{2+}, etc.) may be controlled by solubility equilibrium with metal carbonate, hydroxy-carbonate, and hydroxide solid phases, because these solid phases have low solubility and rapid precipitation-dissolution kinetics. Of particular interest to this investigation is the solid phase Otavite, a Cd carbonate mineral. Otavite has a low solubility, log K = -13.7, compared to the relatively higher solubility of calcite, log K= -8.35, (Morel and Hering, 1993). What this means is that groundwater, that has had ample contact with soil and unsaturated zone gases, may readily dissolve calcite in the unsaturated zone and aquifer matrix. If Cd^{2+}, encounters groundwater with HCO_3^-, Otavite precipitation will likely occur.

In alkaline solutions, a wide range of metallic cations readily sorb onto calcite by exchange with surface associated Ca^{2+}. Of the metallic cations Cd^{2+} is strongly sorbed and is followed by Zn, Mn, Co, and Ni.

Selenium

Inorganic selenium occurs in four oxidation states including the oxidized forms Se^{+6}, and Se^{+4}, the neutral or elemental form Se, and the reduced form Se^{2-}. The form and mobility of selenium in natural waters are dependent on the solution pH and redox conditions (Figure 1). The oxidized forms, Se^{+6} and Se^{+4}, which typically occur in oxidized, neutral to alkaline waters as the oxyanions SeO_4^{2-} (selenate) and SeO_3^{-2} (selenite), respectively, are very mobile. The neutral Se^0 and reduced form Se^{2-}, which typically occur in reduced water, tend to be immobile.

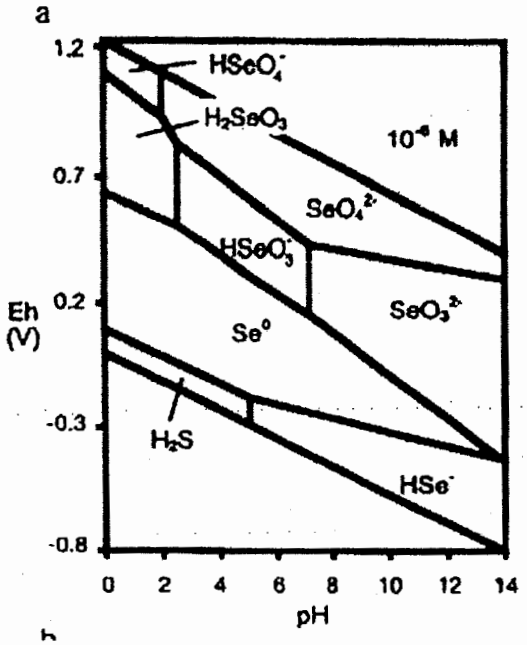


Figure 1 Eh-Ph diagram for Se at 25 °C (after Johnson, 2004).

Theoretical and empirical evidence for Se attenuation is documented in the literature (Herring, and others, 2001, Weres and others, 1990, and others). The chemical kinetics of conversion between selenate, selenite, and elemental selenium are slow, but can be accelerated by microbiological activity (Herbel, and others, 2000).

In oxidizing conditions, Se attenuation occurs by adsorption to metal oxides such as iron, aluminum and manganese, calcite, and clay minerals. However, in oxidizing, alkaline solutions with high concentrations of other strongly sorbed anions, Se is mobile and does not tend to be sorbed (Balistrieri and Chao, 1987).

In reducing conditions, Se has been shown to be effectively attenuated in organic-rich sediments. At Kesterson Reservoir in Merced County, California, such processes completely removed Se from surface water within the first decimeter of the organic rich soil column (Weres and others, 1990). Se attenuation in a wetland was described at seleniferous phosphate overburden seeps at the Wooley Valley Mine where dissolved Se concentrations decreased from up to 0.52 mg/L to less than 0.005 mg/L within 50 meters of the seeps (Stillings and Amacher, 2004). Maxim Technologies (2004b) has suggested that Se attenuation was occurring at the Dry Valley mine in saturated backfill where microbial reduction of Se appeared to occur under anaerobic conditions.

EMPIRICAL DATA

Theoretical calculations and data, laboratory experiments, and empirical observation of specific environments demonstrate that both Cd and Se attenuation are possible under certain conditions. The crux of the matter is to determine if these conditions exist at the Smoky Canyon Mine and if attenuation will likely occur in the seepage and groundwater pathway under and down gradient of Panels F and G.

In this investigation, empirical data from the Smoky Canyon mine area have been used to evaluate the potential for Cd and Se attenuation. Data (Tables 1 and 2) include:

1. Pole Canyon Creek flow below the external dump (LP - Pole Canyon Creek about 0.1 mile down gradient of external dump, and LP1 - Pole Canyon Creek at discharge from dump).

2. Monitoring wells GW-15 and GW-16 located down gradient of the Pole Canyon dump in Pole Canyon. GW-15 monitors water in the Pole Canyon Creek alluvium and GW-16 monitors water in the upper 50 feet of the Wells Formation aquifer.

3. Seeps discharging from the E-Panel overburden area on the east side of E-Panel. Seeps ES-4 and ES-5 discharge approximately 1 and 8 gpm, respectively.

4. Monitoring well GW-18 located down gradient of the E-Panel dump. The well is constructed in the damage zone of the West Sage Valley Branch – Meade Thrust Fault and monitors water in the upper 50 feet of the Wells Formation aquifer.

5. Hoopes Spring, which discharges from the Wells Formation aquifer along the West Sage Valley Branch – Meade Thrust Fault.

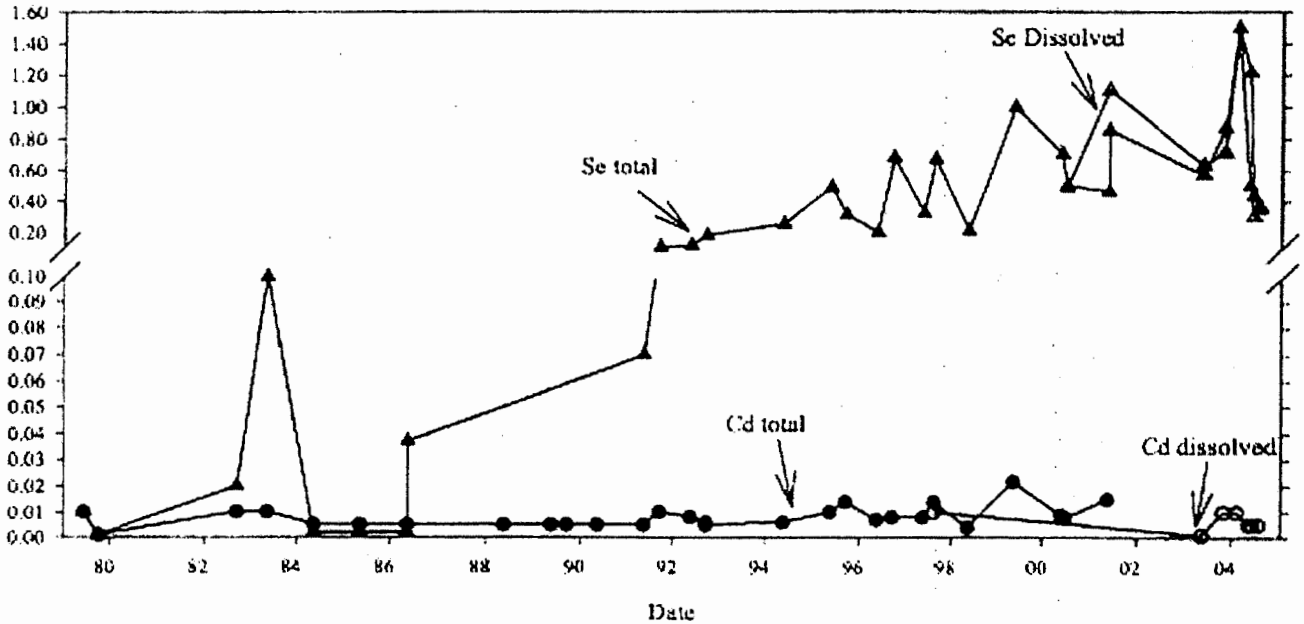
Most of these sample locations are at the ground surface or in shallow, actively recharged aquifer conditions, which favor oxidizing conditions. Water discharged from Hoopes Spring is likely a mixture of groundwater from shallow and deeper flow paths (JBR 2001).

Pole Canyon Dump

The Pole Canyon external dump was built in the 1980s near the mouth of Pole Canyon. A drain was constructed of coarse overburden materials at the bottom of the dump in Pole Canyon Creek and covered with run of mine (ROM) overburden. The drain collects seepage water from the dump and also carries Pole Canyon Creek flow along the bottom of the dump. Water samples have been routinely collected from Pole Canyon Creek, both upstream and downstream of the dump, since 1979 and a few samples have also been collected where the creek discharges from the drain since 1997 (Table 1). Samples have not been taken from the core or the bottom of the dump matrix itself. Down gradient monitoring wells, GW-15 and GW-16, were constructed in Pole Canyon in 2003. GW-15 is completed in the alluvium of Pole Canyon Creek and GW-16 is completed in the upper 50 feet of the Wells Formation aquifer. Both wells are located just up gradient of the West Sage Valley Branch of the Meade Thrust Fault.

In 2003-2004 dissolved Cd at both LP and LP-1 typically varied between about 0.006 and 0.009 mg/L (Table 1 and Figure 2). The groundwater standard does not apply, but the samples exceeded the surface water standard of 0.001 mg/L. Se concentrations have exceeded the surface water standard in all samples since 1986 and have been as great as 1.5 mg/L (Table 1, Figure 2). From Figure 2 it is apparent that Se concentrations increased to 0.5 mg/L in response to seepage from the Pole Canyon

Figure 2 Cd and Se concentrations in Pole Canyon Creek at LP and LP-1.



dump directly into the drain (and creek waters). Although Pole Canyon Creek Cd concentrations appear to have also increased due to drainage from Pole Canyon dump, the increase was minor relative to the Se response, and the Cd concentrations in the down gradient Pole Canyon sampling locations are orders of magnitude less than the Se concentrations. The geometric mean of Cd values for site LP since 1986 is only about 0.002 mg/L greater than the mean pre-1986 concentrations of 0.0054 mg/L.

Dissolved concentrations were only determined for samples collected after 1997, however, dissolved and total concentrations for each solute are similar. Thus, it is reasonable to consider total concentrations as approximate surrogates for dissolved concentrations.

Table 2 shows Cd and Se concentrations in monitoring wells GW-15 and GW-16 collected since 2003. In both monitoring wells the dissolved Cd concentrations are less than 0.001 mg/L in all samples. The low concentration in both monitoring wells demonstrates that Cd contamination of groundwater is not a concern at these sampling locations even though they are immediately downgradient of the Pole Canyon dump, which is a known source of COPCs, and located along the losing reach of Pole Canyon Creek, which carries Cd and Se from the dump at concentrations greater than their respective surface water standards. These results suggest that Cd is attenuated in the subsurface between Pole Canyon dump and Pole Canyon Creek and groundwater monitoring locations GW-15 and GW-16 (a short and shallow groundwater flow path).

In contrast, dissolved Se concentrations in the Pole Canyon monitoring wells greatly exceed groundwater and surface water standards (Table 2). Dissolved Se concentrations in the deep monitoring well, GW-16 (e.g., upper Wells Formation), remained relatively constant for 2003-2004 with an average of 0.49 mg/l, whereas Se in the shallow alluvial well GW-15, varied greatly. The average total Se concentration in LP samples since May 1986 is 0.389 mg/L and the average Se concentration in alluvial groundwater at this site in 2003 and 2004 (same timeframe as the GW-16 samples) was 0.463 mg/L. These Se values are comparable to the average concentration in GW-16, suggesting there is minimal Se chemical attenuation occurring along this relatively short and shallow groundwater flow path in the upper Wells Formation at this location.

E-Panel Seeps

Two seeps, ES-4 and ES-5, have been monitored on the east side of the E-Panel dump since 2002 (Table 2). Dissolved Cd in these seeps ranges from 0.0003 to 0.0015 mg/L with averages that are approximately 0.001 mg/L. Dissolved Se from these seeps ranges from about 1 to 13 mg/L, exceeding both groundwater and surface water standards by a wide margin.

The E-Panel is up gradient of both GW-18 and Hoopes Spring. The low discharge rate from the seeps, less than 10 gpm total, suggests that leakage from the E-Panel may not be a significant factor in the Se concentrations in GW-18 and Hoopes Spring at this time. Chemistry of these seeps is further discussed later in this document.

Hoopes Spring and GW-18

Hoopes Spring and monitoring well GW-18 are located along the West Sage Valley Branch Fault. The spring discharges from the fault damage zone. The well is located northwest of the spring possibly along the western edge of the fault damage zone.

Cd and Se concentrations in Hoopes Spring (HS) are listed in Table 2. All dissolved Cd concentrations for HS taken since 2000 are less than 0.001 mg/L. In 1999 Se concentrations began to increase and have exceeded the Se surface water standard of 0.005 mg/L since then (Table 2). This increase in Se concentration is likely related to groundwater transport from the Pole Canyon dump to the Wells Formation aquifer discharge at Hoopes Spring. Wells Formation groundwater from the Pole Canyon dump area (e.g., groundwater monitored at GW-16) is thought to flow to the damage zone of the West Sage Valley Branch Fault and then southward along the high hydraulic conductivity damage zone to ultimately discharge at Hoopes Spring. The geometric mean dissolved Se concentration at HS since 2000 is 0.010 mg/L, which is about 2 orders of magnitude less than at GW-16. It is not known if the drop in Se concentrations between GW-16 and HS is due solely to mixing and dilution with other groundwater in the Wells Formation aquifer, or if some chemical attenuation also reduces Se concentrations in groundwater along that flow path. Given the average flow condition at Hoopes Spring (6 cfs total from all discharges in the immediate area), it is clear that a significant amount of groundwater is collected along the damage zone of the fault and discharged at Hoopes Spring. If a large proportion of that groundwater is of background quality, then mixing with groundwater from the Pole Canyon area would have a significant dilution effect on the Se concentrations observed at HS. The magnitude of the dilution in this flow path is unknown so it is not possible to estimate the possible involvement of other attenuation mechanisms in this flow path. We attempted an estimate of the potential dilution occurring between GW-16 and HS with the conservative solutes: nitrate, sulfate and chloride with no success. Regardless, it is noteworthy that the Se concentration in the groundwater plume, which begins at about 0.46 mg/L at GW-16, remains above the surface water standard at a concentration of 0.01 mg/L at Hoopes Spring after a total flow path of about 2.3 miles and significant dilution.

At GW-18, dissolved Cd concentrations are less than 0.001 mg/L (Table 2), and dissolved Se concentrations average 0.0039 mg/L. At this location (GW-18) the Se concentrations in the Wells Formation aquifer m are about an order of magnitude less than Hoopes Spring. Data collected by Simplot for the Smoky Canyon Mine site investigation (K. Tegtmeyer, personal communication, January 2005) indicates that GW-18 is probably not located directly within the flow path from Pole Canyon to Hoopes Spring (i.e., along the high conductivity damage zone of West Sage Valley Branch Fault). At present, the E Panel area appears to have little effect on down gradient groundwater quality within the Wells Formation. It is possible that there is attenuation of Se transport from the E-Panel; however, there is no information to confirm that the attenuation takes place along flow paths within the upper portion of the Wells Formation aquifer. These issues are being further investigated in the AOC site investigation.

Comparison of Panels F and G Predictions to Panels A and E Conditions

Maxim Technologies (2004a) conducted leach column tests on representative, mono-lithologic samples collected from Panels F and G overburden rocks. The weighted average concentration for Pore Volume 1 was approximately 0.09 and 0.8 mg/l for Cd

and Se, respectively. Because several hundred years would have to pass before the first pore volume of water would pass through the Panels F and G backfills, JBR extrapolated with trend lines the weighted average Cd and Se concentrations for Panels F and G to estimate the concentrations at the initial (PV0) time frame as follows:

Panel F

Cd	0.24 mg/L
Se	1.76 mg/L

Panel G

Cd	0.22 mg/L
Se	1.74 mg/L

The above concentrations estimate average seepage water chemistry at the bottom of the overburden fills, before seepage leaves the overburden matrix and enters the underlying carbonate and calcareous sandstones of the Wells Formation.

Monitoring well GW-11 was constructed at the bottom of the Panel A backfill. The well is completed in the vadose zone at the base of the overburden backfill. However, the measured water level at this location has never been above the base of the backfill. Therefore, the water collected from the well is water that accumulates in a sump at the bottom of the well which most likely drains from the backfill. Dissolved Cd and Se concentrations in this well are:

October 2003 (Maxim Technologies, 2004b)

Cd	0.259 mg/L
Se	2.44 mg/L

May 2004 (K. Tegtmeyer, 2004 personal communication)

Cd	0.661 mg/L
Se^{+6}	4.7 mg/L

The extent to which these concentrations represent average concentrations in the pit-backfill pore water is not known because the water in the well sump may have been subject to evaporative concentration prior to sampling (K. Tegtmeyer, 2005 personal communication).

In the past, significant quantities of surface runoff water accumulated in the northern portion of Panel A, which was open. Concentrations of Se in this pit pond water were not routinely monitored but two samples obtained from the pit pond water had Se concentrations of 0.064 and 0.097 mg/L. The pit pond was assumed to be the most likely source of potential contamination of the Industrial and Culinary Wells (GW-IW and GW-CW) because the open pit pond was immediately east of these wells, whereas the backfilled (southern) portion of the pit was located about 4,000 feet south (cross-gradient) of the wells. In these wells the Cd concentrations are essentially at background levels, but Se is present at concentrations of about 0.01 to 0.014 mg/L. Using the groundwater transport model developed for the Panels B and C SEIS, the estimated (modeled) Se concentrations in GW-IW and GW-CW calibrated well to the observed Se concentrations in GW-IW and GW-CW (JBR, 2001). This calibration was achieved with no attenuation other than dilution and dispersion. No similar calibration was attempted using the Cd concentrations. However, there is no evidence for Cd

transport from Panel A to GW-CW and GW-IW because Cd concentrations have remained very low at these locations. Therefore, we conclude that Cd transport was attenuated between the Panel A open pit and GW-CW and GW-IW, a lateral distance of less than 0.1 mile.

The E-Panel seeps (Table 2) have been sampled for both Cd and Se. Average concentrations of Cd in ES-4 and ES-5 are 0.0009 and 0.0011 mg/L respectively, and average Se concentrations for ES-4 and ES-5 are 8.82 and 1.67 mg/L respectively. Therefore, if significant concentrations of Cd and Se are released from overburden within the E-Panel overburden fills, Cd is apparently not transported to the seep discharges as efficiently as Se.

With all the above-described sites, it is not possible to determine the effects of the different lithologies within the seepage flow paths internal to the overburden fills on the resulting seepage chemistries. Because of this, the seepage chemistries of these sites are only generally comparable to each other, and the future Panels F and G overburden fill conditions. However, this does not detract from the usefulness of these data for indicating potential chemical attenuation mechanisms that might occur outside of these overburden fills.

Discussion and Conclusions

In summary, there is no evidence for Cd transport from the overburden disposal areas at the Smoky Canyon Mine to shallow or deep groundwater flow systems despite the presence of Cd at elevated concentrations in water from the Panel A backfill area, Pole Canyon Creek and two seeps from the E-Panel. Cd attenuation is attributed to dilution, Otavite precipitation, and calcite absorption mechanisms. Discharge concentrations from the Pole Canyon dump, Panel A backfill, and the E-Panel seeps suggest that the Cd attenuation is due to mineral precipitation once the leachate leaves the overburden matrix and encounters flow paths outside the overburden. The abundance of carbonate minerals and the slightly acidic character of the leachate will readily release the needed bicarbonate ions (HCO_3^-) needed to promote Otavite precipitation in the flow path immediately beneath the overburden fills and before the seepage enters the deeper, Wells Formation water table. For this reason, we recommend that Cd be dropped from the fate and transport modeling.

Evidence for Se attenuation is less clear. Some chemical attenuation may take place along the groundwater flow paths from overburden areas. However, the low pH, high organic and low Redox conditions needed to promote Se chemical attenuation do not appear to occur along the groundwater flow paths in the upper Wells Formation aquifer from overburden areas at the Smoky Canyon Mine or from the planned overburden areas at Panels F and G.

The rock matrix in the Wells Formation is typically sandstone or carbonates with minor shale. June 2004 groundwater monitoring data from DC-MW-5 and MC-MW-1 (monitoring wells near Panels G and F respectively) indicate pHs of 7.4 and ORPs of 59.6 and 116 mv respectively (Maxim, 2004c). Water chemistry at the large springs of interest, Books Spring, South Fork Sage Creek Spring, and base flow for lower Deer Creek all have pHs ranging from 7.4 to above 8. The springs also have ORPs typically greater than 100 mv. Therefore, there is no field evidence that the requisite pH and

Redox conditions for significant Se attenuation in the Wells Formation aquifer between Panels F and G and these springs are present.

Research has been done by Maxim and others suggesting potential, microbiological hosted attenuation of Se might occur in fine-grained materials within pit backfills under anaerobic (partially saturated to saturated) conditions. One of these investigators has indicated that the relatively fine-grained, organic-rich shales within backfilled overburden offer the most likely opportunity for selenium reduction and attenuation within the overall flow path (L. Kirk, 2005). However, none of the backfilled Panels F and G pits have been proven to be able to reach the necessary material, chemical, and biological characteristics, which would reliably promote such reducing conditions and possible chemical-biological attenuation. Future research and design work might be able to predict Se attenuation in pit backfills with the degree of certainty suitable for groundwater environmental impact analyses but this type of information is not available at this time.

Seepage water collected from the only backfill monitoring well at Smoky Canyon Mine (GW-11), installed at the base of unsaturated backfill, contains about 5 mg/L of O_2, is only slightly acidic (pH = 6.5), has a positive ORP (157 – 199 mv), and has a very positive eH (357 mv). The 2003 and 2004 samples from GW-11 had Se concentrations of 2.44 and 4.7 mg/L, respectively, with selenate measured as the dominant form of Se present. Collectively, these results suggest the Se should be oxidized and mobile in the overburden matrix at the bottom of the A-Panel backfill (Figure 1).

Empirical data obtained to date from GW-11, GW-IW, GW-CW, GW-16, GW-18, DC-MW-5, MC-MW-1, the major springs down gradient of Panels F and G and the theoretical information discussed in this memo indicate that chemical attenuation of Se has not been demonstrated for flow pathways through the upper Wells Formation aquifer at the Smoky Canyon Mine. After review of the information presented in this memo, at this time, we have not been able to identify quantifiable chemical attenuation mechanisms for Se that can be used in the Panels F and G groundwater impact analysis and recommend modeling Se attenuation due only to dilution and dispersion.

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