Johnson, Bill H (DNR)

From: Fred Marinelli <[redacted]
Sent: Thursday, September 06, 2012 8:35 AM
To: Al Trippel; Deb McGovern
Cc: Melinda Todorov; David Blaha; Houston Kempton; Paul Haby; Fred Marinelli; Carlson, Erik (DNR); John L. Adams
Subject: Task 2 - Phase 1 QA Update

All,

First, I request upfront that we be allowed to complete our work on Monday Sept 10 to allow additional time over the weekend to finalize some of the calculation checks currently in progress.

It should be understood that there is really no endpoint to this type of QA work, especially with models that continue to evolve. Given the dual constraints of project scheduling and available resources, we can only check a small percentage of the overall model and there is no guarantee that an unchecked model component is free of calculation problems. To hedge our bets, we have focused the Phase 1 QA review on the model components thought to generate the greatest amounts of chemical mass. At the plant site, the major components are the eleven subareas of the FTB. At the Mine Site, the significant components are believed to be the Cat 1 stockpile, WWTP return flow to the West Pit, Plant Site water pumped to the West Pit, and ore wall rock in the West Pit.

We have focused our QA efforts on site conditions during longer-term closure. This is because the WWTP will be in operation during mining and for at least several decades after mining. If unanticipated site conditions occur during the operational period (e.g., chemical concentrations higher than expected), the mine permit will assuredly require that the site operator upgrade the WWTP as necessary to mitigate the situation. However, it is during long-term closure (when the WWTP may no longer be available) that unanticipated conditions may be more difficult to mitigate.

We have not focused on pathways that connect the chemical generating components to the groundwater and river compliance points. It is our understanding that the Project will no longer consider PRBs and engineered wetlands, but the models have not been re-run to reflect these changes. We recommend deferring pathway analysis to the Phase 2 QA work; that is, after the AWMP is final and the models have been revised accordingly.

We identified a number of calculation issues early in the QA process and these have been resolved with Barr to our satisfaction. With one exception, we have not identified any new issues that would require model modification and new model output.

The excepted issue is the method by which the model computes sulfur generation below bentonite-amended areas of the FTB. We have questioned the method used in the model and discussed the issue with Barr. We proposed a different mathematical approach to computing sulfate production when availability of oxygen is limited by diffusion through the bentonite-amended layer. In comparing the two methods, it was found that our alternate approach would reduce the oxygen availability and lead to lower sulfur production rates than those currently predicted by the model. We conclude that the current model likely overestimates the rate of sulfur generation below bentonite-amended areas compared to our alternate mathematical approach. Because the current model approach predicts higher chemical concentrations in FTB seepage, this discrepancy can be construed as conservative with regard to evaluation of regulatory compliance. It has no practical effect on the time for source depletion because the predicted depletion times are greater than 200 years by either

method. Given that sulfur generation from bentonite-amended areas is significantly less than from other areas, we do not recommend modifying the current model for this Phase1review. The issue may be revisited at a later time if and when the model is modified for other reasons.

With regard to the model components we have checked, we have not identified any components that appear to be producing sulfur or other chemical constituents at rates significantly different than what we have computed independently (using equations and inputs mutually agreed upon by Barr and the Agencies) or in conflict with our professional judgment.

Regards,

Fred Marinelli

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