MEETING SUMMARY
Hydrogeology Group Technical Meeting
New World Mining District Response And Restoration Project
Gallatin National Forest Office
January 22, 2002

The Hydrogeology Group met in Bozeman on January 22, 2002 to discuss the McLaren Pit status, to listen to a proposal from Joe Gurrieri and George Furniss on adding to our knowledge on ferricrete, and to discuss any additional data gaps that may still exist in Fisher Creek. An agenda of the meeting is attached at this end of this summary. Meeting attendants included Mary Beth Marks, Frank Ehernberger, Mike Wireman, David Nimick, Mike Cannon, Mark Story, Joe Gurrieri, George Furniss, Peter Werner, John Koerth, Dan Stanley, Allan Kirk, Pat Dunlavy, and Michael Cormier. A summary of the meeting discussion follows.

McLaren Pit Hydrogeology

Allan Kirk summarized our current knowledge of the hydrogeologic relationships in the McLaren Pit and Daisy Creek. His summary included a discussion of metals loading to Daisy Creek, groundwater occurrence in the McLaren Pit and underlying bedrock, and the status of the monitoring well drilling program. Allan also described his and Henry Bogert's exploration of the Winter Tunnel adjacent to the McLaren Pit. Following the presentation, the group discussed several issues, which follow:

- There was some discussion on the potential for groundwater to rise from bedrock into the waste. The group acknowledged that the potential was there, but that infiltration of precipitation was a larger component of the seasonal saturation of waste. Mike Wireman said there is an upward pressure gradient in bedrock, as evidenced by artesian conditions, but not necessarily a pathway from bedrock to waste rock.

- There were numerous questions on the groundwater drilling program. Dan Stanley briefly outlined the lithology noted in the wells that were drilled downgradient of the pit and stated that, in general, water quality in the three wells that were sampled was relatively good. There was some concern by David Nimick that we had missed the plume in the drilled wells, and that it would be important to find the plume below the pit, if it exists. It was suggested that the 10 shallow piezometers that will be installed this field season be placed to intercept the plume.

- Two other suggestions were made on the well installation program: that the new wells be sampled in April and that the piezometers be driven rather than installed with a backhoe.

- The group was told that all the wells located within the capped area of the pit will be plugged and abandoned except for the two waste rock wells that were installed in October to replace EPA wells 3 and 4. Mike Wireman suggested that one Wolsey well should be salvaged or redrilled in the capped area. Due to the placement of the well in an area of the pit that will require a considerable cut of waste during reshaping and preparing the waste, salvage of the well is not practical.

- A suggestion was made that available O_{18} data be reviewed to see if there is a difference between bedrock and waste. Without the deuterium data, it is hard to interpret the O_{18} data. Mike Wireman indicated that the analysis for deuterium in samples collected in 1999 has been promised by the lab to be completed in the near future.

- David Nimick reminded the group that the USGS study in Daisy Creek showed almost all metal loading during low flow is from groundwater, and probably originates in shallow colluvium.

❖ ***Action Items***: The action items to come out of this discussion are: 1) Consider sampling the new wells in April; 2) Send an interim data package to the group that includes well logs and sampling data for the new wells; 3) Install the piezometers below the pit using drive methods with the intent of finding the McLaren Pit plume. Keep the Hydrogeology Working Group informed of progress and results during field activities.

Ferricrete Study Proposal

Joe Gurrieri with the Beaverhead-Deerlodge National Forest gave a brief introduction to the work that George Furniss had published on his ferricrete studies. Joe said he asked George some time ago if there were any further conclusions that could be made from George's data using the chemistry of ferricrete (iron deposits) to estimate pre-mining water quality. George said he thought that, with a little bit of additional ferricrete data from select locations in Fisher Creek, he would be able to answer that question. This Joe said was the basis for the proposal that he and George were presenting to the group at today's meeting. George then gave a summary of his work at Paymaster Gulch, which is an unmined tributary in the Blackfoot River drainage, and his work in the Fisher Creek drainage. About an hour of discussion followed the presentation on the origin and character of ferricrete. The following summary statements were made by individuals on the merits of the study. The ferricrete proposal is attached to these meeting notes.

- David Nimick supports the study. For the little bit of effort and money, he thought the data gathered would lead to important clues on what pre-mining conditions may have been. This information would then give us a better idea on how much impact any cleanup actions may have on water quality in Fisher Creek.

- Mike Wireman echoed Nimick's support. He said that such information would give us a better idea of how far upstream we can provide acceptable water quality for fish as a result of cleanup actions. He said that moving the water quality barrier to fish up stream is a more viable measurement of how much a cleanup improves the quality of water in the stream than water quality standards, because standards are unobtainable at this site. He also brought up the idea of zonations in water quality and how the zones will change over time in response to cleanup.

- John Koerth said that pursuing the ferricrete study is not the way to go. He feels that collecting this type of data focuses the cleanup on what can't be accomplished in terms of water quality rather than what can be accomplished. In terms of DEQ's position, the ferricrete work will have little to do with how the state views the results of the cleanup since, at the end of the project, the project will have to meet CECRA requirements, which are WQB-7 standards. He also said that until the most rigorous cleanup is achieved, the focus of the project should be solely on the cleanup and meeting B-1 standards. Only until after all cleanup activities are completed should this type of study be considered.

❖ ***Action Items***: One action item came out of this discussion: 1) The Forest Service will consider whether the Gurrieri/Furniss proposal will be accepted.

Glengarry/Como Hydrogeology

Allan Kirk summarized our current knowledge of the hydrogeologic relationships in the Glengarry/Como/Upper Fisher Creek area. His summary included a discussion of the Glengarry rehabilitation work, the Como raise rehabilitation work, and water quality results from monitoring water quality in the Glengarry tunnel. The main purpose of reviewing this work, and in revisiting the Hydrogeology Group's discussion held on September 6, 2002, was to determine if further monitoring or dye tracer studies needed to be completed before a removal action could be implemented on the Glengarry/Como. Following Allan's presentation, the group discussed several issues, which follow:

- At the September meeting, there was a general consensus by the group that there currently is enough data to support closure of the Glengarry. The one remaining data gap to be discussed is a potential dye tracer study that Mike Wireman had originally thought was necessary to determine if the Spalding Tunnels were in direct communication with the Glengarry Tunnel. Dan Stanley said that the EPA had originally planned to complete a dye tracer above the Spalding to trace the connection from the Spalding as well as the Crown Butte fault. The test wasn't carried out due to weather conditions.

- With the underground mapping data and the surface geology work done by Allan Kirk, the major fracture in the Glengarry Tunnel at 1050 feet from the portal trends in a direction that cuts across Scotch Bonnet Mountain and does not intersect with the Spalding. Having this information, and the information gathered from the Como raise that shows a considerable copper source originating in the Como Basin and flowing down the raise, Mike Wireman and the rest of the group agreed that a dye tracer study was no longer needed to answer the Spalding connection question.

- Mike Wireman supports closure of the Glengarry. The thing you do not want is to create new seeps from the closure. He said that eliminating point sources is a great thing to do.

- Mike Wireman said that post-closure monitoring of the Glengarry/Como removal action would take some thinking in deciding where to monitor. The ferricrete seeps southwest of the Glengarry may be a good place to look for water diverted from the Glengarry. We may want to put a monitoring well in the fracture that cuts the Glengarry. The Hydrogeology group should be involved in the development of a post-closure monitoring plan.

- John Koerth said that the lawsuit against Crown Butte Mines, Inc., was all about discharges. If you eliminate the discharge, than that is your best hope. Return to pre-mining condition.

❖ ***Action Items***: No action items came out of this discussion.

Meeting Agenda
Hydrogeology Group
New World Mining District

January 22, 2002
1:00 PM to 5:00 PM
Gallatin National Forest Supervisor's Office
10 East Babcock Avenue, Room
Bozeman, MT

Meeting Objectives, Mary Beth Marks 1:00

Hydrogeology of McLaren Pit area, Allan Kirk 1:15

Estimation of Pre-Mining Water Quality in Fisher Creek using Ferricrete Zonation Patterns, George Furniss and Joe Gurrieri 1:45

Hydrogeology of the Como Basin, Glengarry Mine, and Upper Fisher Creek Drainage – Need for additional Tracer Studies?, Allan Kirk 2:15

Group Discussion

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BY M. Cormier DATE 1/22/02

JOB TITLE New World Response & Restoration JOB NUMBER

SUBJECT Geohydrology Group SHEET

Sign In Sheet

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