4/7/99
Told Jim to forward to
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MEMORANDUM

CH2MHILL

Flood-Stanly Reconnaissance Plan
Bunker Hill Mine Water Management Project

TO: Mary Kay Voytilla/USEPA

COPY: Bob Hopper/Bunker Hill Mine

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Introduction

This memorandum presents the reconnaissance plan for the Flood-Stanly workings of the Bunker Hill Mine in Kellogg, Idaho. Reconnaissance of the Flood-Stanly workings was listed as a high priority action item in the Presumptive Remedy Workshop #2 held on March 2 and 3, 1999 in Spokane, Washington. The purpose, implementation plan, team, coordination and communication issues, deliverables, and health and safety issues associated with the Flood-Stanly reconnaissance are presented below.

Purpose

A substantial amount of past and current investigative work has been conducted to develop a conceptual model of acid and metal load production within the Bunker Hill Mine. Initial data from the current sampling program correlates well with previous work done at the mine, with the majority of acid production attributed to the Flood-Stanly workings. Mass balance calculations suggest that a substantial portion of the hydraulic, acid, and metal load from the Flood-Stanly workings is not being measured. Additional investigative work is necessary to identify these sources. The purpose of the Flood-Stanly reconnaissance is to identify areas that contribute small discharges but high metals load to the mine drainage. This information will be used to evaluate AMD generation mitigation alternatives through a better understanding of surface water inflow, mine water flow, and acid production within the Flood-Stanly workings. Preventing these flows may result in a substantial reduction in long term treatment costs.

Specific objectives of the Flood-Stanly reconnaissance are as follows:

- Identify surface water and groundwater recharge mechanisms to the workings.
- Identify acid producing areas of the workings.
- Understand mine water flow paths within the workings and evaluate the potential for mine water diversions.

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- Identify missing hydraulic, acid, and metal load within the upper country loop (9LA and its tributaries).

Much of the underground reconnaissance will be conducted in areas that have not been maintained, are difficult to reach, or are not easily understood. Therefore, full achievement of the objectives is not likely. However, even partial achievement of the objectives will provide valuable information that will assist in refining the presumptive remedy and allow decision making in the future.

Reconnaissance Plan

The reconnaissance will be conducted by accessing the Flood-Stanly ore body from various levels within the mine. A variety of field parameters will be measured to identify similarities and differences in the quality of water encountered while underground, and to identify flow paths during the reconnaissance. Field parameters will include conductivity, pH, and temperature. Spot samples may be collected and submitted for total metals analysis to provide data on water quality. Flows will be measured with a small cutthroat flume or bucket and stop watch.

A Brunton compass will be used to determine orientation and inclination of raises and transfer chutes that are conduits for flow. This information will be used to establish 3-dimensional orientations of structures and other locations on levels, and connections between levels.

Table 1 provides a summary of the planned access locations for the Flood-Stanly reconnaissance.

Reconnaissance Team and Schedule

Bill Hudson, John Riley, and Nick Zilka will conduct the majority of Flood-Stanly reconnaissance. Alternative team members include Jim Stefanoff and Matt Germon. The reconnaissance is expected to take up to 20 days of underground time. The recon should be conducted during the spring when the mine water flows are higher, and should be started soon because the mine water flows are beginning to increase.

Reconnaissance Coordination and Communication

The majority of reconnaissance activities will require close coordination with Bob Hopper of the Bunker Hill Mine. Entrance dates and times, exit times, and access issues will need to be clarified with Bob prior to conducting any mine reconnaissance.

Mine water sampling will be coordinated with Nahide Gulensoy/CH2M HILL. Samples that are collected underground will be kept cooled until Nahide can prepare samples for shipment to the EPA-CLP laboratory. Holding times will not be exceeded because analysis will be conducted for total metals only, and not ferrous iron.

TABLE 1
Flood-Stanly Recon Locations
Bunker Hill Mine Water Management

Recon Level	Access via	Purpose/Objective
2	Lower Bluebird portal	Identify recharge to uppermost portion of the Flood-Stanly workings.
3	Utz portal	Recon upper workings from above Homestake and from the raise from Homestake.
	Homestake portal	Recon workings and pyritic portions of Cate Fault. Access sublevels above and below main level to determine recharge/discharge mechanisms.
4	Cherry Raise	Quantify known acidic discharges and determine orientation of structures that transmit flow. Determine recharge mechanisms.
	Homestake portal	Compare current conditions with Bretherton's work. Determine possible areas of recharge to lower workings
5	Cherry Raise and Service Raise	Better delineate flow paths.
6	Cherry Raise and Mule Raise	Quantify discharges and water quality and determine orientation of structures that transmit flow.
7	Cherry Raise, Mule Raise, and South Chance Raise	Quantify discharges and water quality and determine orientation of structures that transmit flow.
8	Cherry Raise, Barney Raise, and South Chance Raise	Quantify discharges and water quality and determine orientation of structures that transmit flow.
9	Kellogg Tunnel	Better define flow paths and water quality on entire level. Identify sources that may close the 9LA loop.
10	No. 2 Winze	Quantify discharges and water quality and determine orientation of structures that transmit flow.
11	No. 2 Winze	Quantify discharges and water quality and determine orientation of structures that transmit flow.

Health and Safety Issues

Appropriate safety precautions will be taken while underground in the Bunker Hill Mine. All underground trips will include a check-in and check-out with Bob Hopper. Appropriate restraint techniques will be utilized when using existing raises and ladders for inter-level access. Safety lines may be necessary as a precaution in two to three locations on 3 Level.

Bill Hudson will serve as the Site Safety Coordinator (SSC) under the CH2M HILL Health and Safety Plan (HSP). Appropriate safety briefings will be held at the start of work, and all people entering the mine will be under SSC supervision and will sign the HSP.

Deliverables

Brief one-page write-ups will be forwarded to Bob Hopper and Matt Germon of CH2M HILL at the completion of each recon day, or as necessary. The write-ups will discuss important findings relative to the reconnaissance objectives. A copy of field notes and any available marked-up maps or sketches will be attached to the write-ups.