

June 23, 2003

TO: Internal File

THRU: Peter H. Hess, Environmental Scientist/Engineering, Team Lead

FROM: James D. Smith, Environmental Scientist/Hydrology

RE: Abandoned Equipment, Co-Op Mining Company, Bear Canyon Mine, C/015/025-03C

SUMMARY:

Mining of the Hiawatha Seam in the 1st North section of the Bear Canyon #1 Mine was abandoned due to a roof fall that occurred on January 14, 2003. The roof fall buried a coal hauler, a distribution box, and a shop trailer, and the buried equipment had to be abandoned in-place. Other equipment was removed and the area sealed. Co-Op Mining Company utilizes the water from the mine for both culinary and mining purposes, so they are concerned about potential contamination.

The section that was sealed-off included water-monitoring site SBC-11, which monitored floor seeps in the northeast corner of Mine #1. Drainpipes were installed through the seals near SBC-11, and also through the seals near the roof-fall - at elevations sufficiently low that water should not back-up behind the seals and flood the abandoned equipment. The entry where the roof-fall occurred is elevated enough so that seepage can drain through surrounding entries and around the abandoned equipment.

SBC-9A now monitors flow from the drainpipes through the seals plus water that comes down from the Blind Canyon Seam through a nearby drill-hole. Co-Op Mining anticipates abandoning SBC-9A and the surrounding entries in 2003 or 2004. Pumping will cease and water will rise until it can drain by gravity into the West Mains, but the abandoned equipment will be above this water level. Water is piped from the West Mains to the Co-Op water-supply system, and water quality will be monitored for the life of the mine.

Other than a general description of the abandoned equipment, there is no information on what fluids or other potential pollutants have been left underground. The Permittee has not determined the probable hydrologic consequences of abandoning this equipment - the potential and probable impacts on the mine discharge in particular, and that the water-monitoring plan is adequate to detect materials that may adversely affect water quality or be detrimental to public health and safety.

TECHNICAL MEMO

TECHNICAL ANALYSIS:

OPERATION PLAN

SPOIL AND WASTE MATERIALS

Regulatory Reference: 30 CFR Sec. 701.5, 784.19, 784.25, 817.71, 817.72, 817.73, 817.74, 817.81, 817.83, 817.84, 817.87, 817.89; R645-100-200, -301-210, -301-211, -301-212, -301-412, -301-512, -301-513, -301-514, -301-521, -301-526, -301-528, -301-535, -301-536, -301-542, -301-553, -301-745, -301-746, -301-747.

Analysis:

Disposal Of Noncoal Mine stes

Mining of the Hiawatha Seam in the 1st North section of the Bear Canyon #1 Mine was abandoned due to a roof fall that occurred on January 14, 2003. The roof fall buried a coal hauler, a distribution box, and a shop trailer, and the buried equipment had to be abandoned in-place. Other equipment was removed and the area sealed. Other than a general description of the abandoned equipment, there is no information on what fluids or other potential pollutants have been left underground.

Findings:

R645-301-528.330, The Permittee must provide information, such as type and volume, on fluids and other potential pollutants associated with the abandoned equipment.

HYDROLOGIC INFORMATION

Regulatory Reference: 30 CFR Sec. 773.17, 774.13, 784.14, 784.16, 784.29, 817.41, 817.42, 817.43, 817.45, 817.49, 817.56, 817.57; R645-300-140, -300-141, -300-142, -300-143, -300-144, -300-145, -300-146, -300-147, -300-147, -300-148, -301-512, -301-514, -301-521, -301-531, -301-532, -301-533, -301-536, -301-542, -301-720, -301-731, -301-732, -301-733, -301-742, -301-743, -301-750, -301-761, -301-764.

Analysis:

neral

The section that was sealed-off included water-monitoring site SBC-11, which monitored floor seeps in the northeast corner of Mine #1. Drainpipes were placed through seals near SBC-11, and also near the roof fall - at elevations sufficiently low that water should not back-up

behind the seals and flood the abandoned equipment. The entry where the roof-fall occurred is elevated enough so that seepage can drain through surrounding entries and around the abandoned equipment.

Groundwater nitoring

SBC-9A now monitors flow from the drainpipes that were installed in the seals plus water that comes down from the Blind Canyon Seam through a nearby drill-hole. Co-Op Mining anticipates abandoning SBC-9A and the surrounding entries in 2003 or 2004. Pumping will cease and water will rise until it can drain by gravity into the West Mains, but the abandoned equipment should be above this water level. Water is and will continue to be piped from the West Mains to the Co-Op water-supply system, and water quality will be monitored for the life of the mine.

A roof fall in the Hiawatha level of #1 Mine has left SBC-11 inaccessible; therefore, SBC-11 has been removed from the Water Monitoring Matrix in Table 7.1-8. Table 7.1-9 (Past and Existing Monitoring Sites) has also been updated to include this information.

Acid- and Toxic-Forming Materials and Underground Development ste

The roof fall in the 1st North section of the Bear Canyon #1 Mine (January 14, 2003) buried a coal hauler, a distribution box, and a shop trailer, and the buried equipment had to be abandoned in-place. Other equipment was removed and the area sealed. Except for a general description of the abandoned equipment, there is no information on lubricants, hydraulic fluids, and other potential pollutants that have been left underground.

UDOGM prepared a CHIA for Gentry Mountain in 2001 (which is currently being updated). Underground abandonment of equipment was not covered in that CHIA. Consequences from abandoned mining equipment were not included in the Probable Hydrologic Consequences (PHC) determination in the Bear Canyon Mine MRP.

The main materials in the abandoned equipment are metals, mainly steel. A considerable tonnage of ferrous materials - such as steel roof bolts, wire mesh, and cans used in support pillars - is routinely abandoned in underground coal mines because the materials cannot be removed without endangering the lives of miners. The amount of steel in the abandoned equipment is probably on the order of several tons, but this additional steel is not significant considering the amount routinely abandoned during underground mining operations during the life of a mine: based on information from the Genwal Crandall Canyon Mine, room-and-pillar mining requires that approximately 400 tons of steel be placed and abandoned underground for each million tons of coal produced, and in 2000 and 2001, production at the Bear Canyon Mine was a little over 1 million tons/year.

TECHNICAL MEMO

Water encountered in the mine has had little or no recent communication with the surface and is not subject to annual recharge events.

Conditions in the abandoned areas of the mine are not conducive to oxidation or other chemical reactions:

- C Recorded pH values for ground waters entering the Bear Canyon Mine range from 6.6 to 8.3, but are typically neutral to slightly alkaline;
- C Oxygen will typically be absent or at low concentration both in the air and waters of the abandoned mine. Other oxidizing agents will typically not be found in an abandoned mine.
- C Cool temperatures in the abandoned mine will tend to retard rather than accelerate most chemical reactions.

Figure 7P-1 on page 7P-3 shows locations of the equipment, the main inflows to the mine, the seals and drains, and the anticipated water level when drainage to the West Mains begins. Based on information in the amendment, it is not likely that the areas where the equipment is to be abandoned will be flooded.

Assuming the mine were to flood and the abandoned equipment were to be covered with water, several probable results and impacts can be evaluated:

- C Flooding of the abandoned mine might be relatively rapid, but once flooded, flow of ground water into, through, and out-of the void spaces of the mine should be slow;
- C If steel or other metals to oxidize, it would be at a very slow rate and the amount of iron and other metals added to the ground water at any one time would be very small;
- C Oxides of most metals are insoluble or slightly soluble in water (anions in solution in the water could increase solubility, but this is not anticipated based on typical ground-water chemistries of the region), especially at temperatures expected in the mine, so once formed, metal oxides would tend to precipitate as solids within the mine rather than flow in solution in the ground water. If any metal were to go into solution, concentrations would be highest near the abandoned equipment, but the volume of water in the flooded mine would dilute concentrations outside the immediate vicinity of the abandoned equipment;

- C Because of dilution and dispersion, natural seasonal fluctuations, and the limits of accuracy of analytical methods, changes in water quality would not be expected to be large enough to be detected at the surface at springs or in ground-water baseflow to streams. However, because of the relatively short and direct flowpath from the equipment to the point of mine discharge, materials from the equipment might be detectable in the mine discharge.

If the abandoned equipment is not covered with water as the mine floods, which is the expected scenario at Bear canyon, the metals might oxidize at a faster rate. The probable impacts would be small because of the relative immobility of metals and similar contaminants.

Whether the equipment were flooded or not, more mobile materials such as acids, lubricants, and hydraulic fluids could escape from the equipment and contaminate the hydrologic system. The Permittee does not identify these other potential contaminants in the abandoned equipment.

Water-Quality Standards And Effluent nitations

The potential of contamination in water discharging from the mine is a special concern at the Bear Canyon Mine because Co-Op Mining Company utilizes the water from the mine for both culinary and mining purposes. Water not consumed in culinary and mine operations is discharged to the stream in Bear Canyon under a UPDES permit.

Monitoring of the mine discharge will continue for the life of the mine, but as there is no further information on this monitoring it is assumed to be the operational monitoring described in the MRP. Because the potential contaminants from the abandoned equipment are not identified, the Division cannot determine that the routine monitoring described in the MRP is sufficient. The Permittee needs to identify the potential contaminants and establish that the proposed monitoring is adequate to detect materials that may adversely affect water quality or be detrimental to public health and safety.

Findings:

R645-301-731.311, The Permittee needs to identify the potential contaminants from the abandoned equipment and establish that the proposed monitoring is adequate to detect materials that may adversely affect water quality or be detrimental to public health and safety.

MAPS, PLANS, AND CROSS SECTIONS OF MINING ERATIONS

TECHNICAL MEMO

Analysis:

Mine Workings  ps

The updated Plate 7-10B is not listed on the C2 form.

Figure 7P-1 on page 7P-3, which is similar to Plate 7-10B, shows elevations for the #1 Mine, the water level anticipated when drainage to the West Mains begins, and locations of the roof-fall, abandoned equipment, the main inflows to the mine, and the seals and drains. Updated Plate 7-10B is similar except it does not show the mine elevations and anticipated water level. The text of Appendix 7-P refers to Plate 7-10B, so this map should show all pertinent information.

Findings:

R645-301-121.300, Include updated Plate 7-10B on the C1/C2.

R645-301-731.700, The Permittee needs to include all necessary information on a single map and use that map as the reference for Appendix 7-P.

RECOMMENDATIONS:

The proposed amendment should not be approved until the Permittee adequately addresses the deficiencies identified in this technical memo.