

TECHNICAL MEMORANDUM

Utah Coal Regulatory Program

December 4, 2003

TO: Internal File

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

FROM: James D. Smith, Environmental Scientist III/Hydrology

RE: Abandoned Equipment, Co-Op Mining Company, Bear Canyon Mine, C/015/025, Task ID #1696

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.

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Appendix 7-P contains copies of the Material Safety Data Sheet (MSDS) for the hydraulic fluid, gear oil, lead, and battery acid remaining in the abandoned equipment. Potential hydrologic impacts are discussed on pages 7-25 through 7-27 in the MRP, which have been updated to include the potential impacts from the abandoned equipment. The Probable Hydrologic Consequences (PHC) determination done for the Bear Canyon Mine by Mayo and Associates in 2001 (App 7-J of the MRP) discusses potential impacts from spillage of fuels, greases, and oils during normal operation and maintenance of vehicles and equipment, but does not include consequences from abandoned mining equipment.

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 Wastes

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. Appendix 7-P contains MSDSs for materials that were left in the abandoned equipment. Potential contaminants from the abandoned equipment are:

- 15 gallons of R&O 150 in the gear boxes;
- 50 to 55 gallons of hydraulic fluid
- 20 to 28 gallons of battery acid in the batteries; and
- lead in the batteries.

Water from this section of the mine provides the mine's culinary water supply and will be monitored for the life of the mine.

Findings:

Information on disposal of noncoal mine waste is adequate to meet the requirements of the Coal Mining Rules.

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:

General

The section of the mine 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 area where the roof-fall occurred is elevated enough so that seepage can drain around the abandoned equipment by way of surrounding entries and cross-cuts.

Groundwater Monitoring

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 will 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.

The roof-fall 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 Waste

Potential hydrologic impacts are discussed on pages 7-25 through 7-27 in the MRP. These pages have been updated to include the potential impacts from the abandoned equipment. A separate PHC determination for the Bear Canyon Mine, prepared by Mayo and Associates in

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2001 (App 7-J of the MRP), discusses potential impacts from spillage of fuels, greases, and oils during normal operation and maintenance of vehicles and equipment, but does not include consequences from abandoned mining equipment. UDOGM updated the Gentry Mountain CHIA in 2003, but underground abandonment of equipment was not covered in that CHIA.

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.

Steel is the main material in the abandoned equipment, and there are probably small amounts of other common metals. The amount of steel in the mining equipment abandoned at the roof-fall in the #1 Mine is on the order of several tons, but this is not significant considering the amount of steel that is routinely abandoned during underground mining operations over the life of a mine. A considerable tonnage of ferrous materials - such as steel roof bolts, wire mesh, and cans used in support pillars - is left in underground coal mines because these materials cannot be removed without endangering the lives of miners. 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. At the Bear Canyon Mine, coal production has been over 500,000 tons per year since 1996 and was a little over 1 million tons/year in 2000 and 2001: thousands of tons of steel have been left underground since mining began in 1983.

Figure 7P-1 on page 7P-3 shows locations of the abandoned 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.

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

- C Based on isotopic analyses, water encountered in the mine has had little or no recent communication with the surface and is not subject to annual recharge events.
- 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.

If 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 oxidize, it would be at a slow rate and the amount of iron and other metals added to the ground water at any one time would be 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 pHs and 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 increasingly dilute with increasing distance from the abandoned equipment;
- C Because of dilution, dispersion, and natural seasonal fluctuations, changes in ground-water quality would probably not be detectable in springs or ground-water baseflow to streams. However, because of the relatively short and direct flowpath from the equipment to the point of mine discharge, contaminants from the equipment might be detectable in the mine discharge, which is used as a culinary water supply.

If the abandoned equipment is not covered with water as the mine floods, which is the expected scenario at Mine #1, components might break down and metals oxidize at a faster rate, but probable impacts would be small because of the isolation and relative immobility of most potential 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. Appendix 7-P contains MSDSs for materials that were left in the abandoned equipment. Potential contaminants from the abandoned equipment are:

- 15 gallons of R&O 150 in the gear boxes;
- 50 to 55 gallons of hydraulic fluid
- 20 to 28 gallons of sulfuric acid in the batteries; and
- lead in the batteries.

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Water-Quality Standards And Effluent Limitations

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. Monitoring of the mine discharge will continue for the life of the mine. Potential contaminants from the abandoned equipment are identified in the MRP, and MSDSs are in Appendix 7-P. Water not consumed in culinary and mine operations is discharged to the stream in Bear Canyon under a UPDES permit.

The water-monitoring plan in the MRP calls for quarterly water-quality monitoring at SBC-9A. This should be sufficient to detect a prolonged or significant increase in sulfate concentration caused by acid leaking from the batteries. Water samples collected at site SBC-9A are analyzed for oil and grease, and the UPDES permit requires a determination of oil and grease for water discharged to Bear Creek. Under the water-monitoring plan, analysis is done for lead only once every five years, in the year prior to permit renewal.

Because the mine discharge provides the culinary water supply for the mine, it is also subject to periodic sampling to meet the requirements of the Clean Drinking Water Act. Water analyses required for the Bear Canyon Water System by the Division of Drinking Water are:

Bacteriological	- quarterly
Lead and Copper	- 5 samples every 3 years (samples must be first draw)
Asbestos	- 1 sample every 9 years
Inorganics and Metals	- 1 sample every 3 years
Nitrate	- 1 sample every year
Nitrite	- 1 sample every year
VOC	- 1 sample every 6 years
Radionuclides	- 1 sample every 4 years.

The Coal Mining Rules require that discharges of water from areas disturbed by coal mining and reclamation operations be made in compliance with all Utah and federal water quality laws and regulations, and monitoring submittals to the Division are to include analytical results from each sample taken during the reporting period. There is special concern on the part of Division of Oil, Gas and Mining, the Division of Drinking Water, and the Permittee that contaminants from the abandoned equipment be detected should they enter the mine's water system. The results of analyses done to comply with Division of Drinking Water requirements should be reported also to the Division of Oil, Gas and Mining as part of the mine water-monitoring plan.

Findings:

R645-301-728.320, -728.332, -728.350, -731.212, The Permittee needs to describe the water-quality analyses done for the Division of Drinking Water, and report to the Division of Oil, Gas and Mining all water-quality analyses results for the mine-discharge water, including analyses done in compliance with the requirements of the Division of Drinking Water.

MAPS, PLANS, AND CROSS SECTIONS OF MINING OPERATIONS

Regulatory Reference: 30 CFR Sec. 784.23; R645-301-512, -301-521, -301-542, -301-632, -301-731, -302-323.

Analysis:

Mine Workings Maps

Figure 7P-1 (page 7P-3) shows floor 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 shows the location of the roof-fall and abandoned equipment but does not show the mine floor elevations and anticipated water level.

Findings:

Maps, plans, and cross sections of mining operations are adequate to meet the requirements of the Coal Mining Rules.

RECOMMENDATIONS:

Approval of this amendment is not recommended until the deficiency identified in this Technical Memorandum is adequately addressed.