

TECHNICAL MEMORANDUM

Utah Coal Regulatory Program

OK

August 13, 2004

TO: Internal File

THRU: Wayne Hedberg, Permit Supervisor *DWH*

FROM: Steve Fluke, Reclamation Hydrogeologist
SWF

RE: Little Bear Canyon Field Visit, Crandall Canyon Mine, C/015/0032

Wayne Hedberg, Jim Smith, and Steve Fluke conducted a site visit to Little Bear Canyon on August 5, 2004. The purpose of the visit was to observe the springs in the canyon that could potentially be impacted by the proposed undermining of the canyon area. In particular, we wanted to document the spring elevations in relation to the 600-foot cover of the Blind Canyon seam. We used a Trimble GeoExplorer 3 GPS unit to establish coordinates. Spring or stream flows given are estimates as no flows were measured during the field visit. Pictures of the field visit along with descriptions can be found on the Division's database.

OBSERVATIONS:

Little Bear Spring and Little Bear Canyon Stream

We hiked into Little Bear Canyon from Huntington Creek. Some water flowed in the Little Bear Canyon streambed (less than 20 gpm) downstream of Little Bear Spring that was not diverted into the pipeline. No standing or flowing water was observed in the streambed upstream of Little Bear Spring area. However, while hiking down the upper reach of the stream channel at the end of the day, we observed some flow (~ 1-2 gpm) in the streambed for a section where the streambed intersects a coal seam marked by a stake as SCC Outcrop #11 (estimated elevation of approximately 8,000 feet). The streambed drops about 10-15 feet over a sandstone ledge at this location creating a small splash pool below. No flow or standing water was observed in the streambed downstream from this point until we reached Little Bear Spring.

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Spring LB-5a

We hiked up the north slope of Little Bear Canyon to Spring LB-5a. This spring appears to be the easternmost spring along the north slope of Little Bear Canyon and issues from the Castlegate/Blackhawk contact. (After talking with Erik Petersen, hydrologic consultant for Genwal, on August 6, 2004, it appears that this is not the spring he has been monitoring as LB-5a since baseline monitoring began in 1997. This spring is identified as LB-5a by Jim Kohler in his email to Aaron Howe dated June 30, 2004, and as reported by Katherine Foster and Karl Boyer from their field visit on July 13, 2004.) The soil was damp at the contact and flow picked up to a trickle in a grass-covered rill that ran down the Blackhawk formation for approximately 100 feet before infiltrating into the colluvium. Maximum flow in the rill was estimated at less than one-half gpm. Due to the cliff above, adequate satellites could not be received by the GPS unit at the contact. The GPS unit was moved 40 to 50 vertical feet below the cliff where it recorded its position using 5 to 6 satellites for 20 minutes. The corrected UTM coordinates at this position are N 4366399.766m, E 487000.858m, at an elevation of 8633.405 feet. After correction, the horizontal precision is 1.1 meters. This places the top of Spring LB-5a at approximately 8673 to 8683 feet.

Unknown Springs at Alcove

Another spring area was observed approximately 100 feet west of Spring LB-5a in an alcove along the Castlegate/Blackhawk contact. We did not know which spring or springs this area is presented as on the Crandall Canyon Mine's spring and seep survey map. The spring area is characterized as a seep at the contact and a drip from an overhang issuing approximately 40 feet above from the Castlegate sandstone. Flow trickles for approximately 20 feet below the contact area where it infiltrates into the colluvium. No coordinates were obtained with the GPS unit due to poor satellite coverage.

Spring LB-7

Approximately 1,000 feet west of the alcove spring, a spring was observed in a small drainage issuing from a sandstone outcrop within the Blackhawk Formation approximately 75 feet below the Blackhawk/Castlegate contact. Based on comparisons with photographs from Katherine Foster's report, this is the spring identified by Katherine as LB-5 and by Karl Boyer as LB-7. Erik Petersen stated that he believes this is Spring LB-7. Erik also stated that the spring originates from the contact, but likely infiltrates and reappears at the sandstone outcrop where we observed it. We did not hike up to the contact above the spring we observed and did not see any flow from above. Flow was estimated at approximately 1 to 2 gpm. The corrected UTM coordinates for this spring where it issues from the Blackhawk Formation are N 4366376.674m, E 487020.241m, at an elevation of 8629.657 feet. After correction, the horizontal precision is 2.9 meters. Due to impending thunderstorms, we decided to end our survey and hike down the drainage to the upper reaches of the Little Bear Canyon stream. We observed flow from the

spring for approximately 300 to 400 feet down the drainage before it infiltrated into the colluvium.

Other Springs and Seeps

No other notable springs or seeps were observed during our site visit. We did observe signs of many former springs in the form of tufa and/or mineral deposits mostly located at the base of the Castlegate sandstone and some of the larger sandstone outcrops within the Blackhawk Formation. Wayne traversed approximately 1,000 feet west/southwest of LB-7, but did not go far enough to see signs of the spring that Erik Petersen monitors as LB-5a. At the time of the site visit we were not aware of the location of the spring that was being monitored and believed that the monitored spring was LB-5a as described above.

SUMMARY:

We observed three springs (LB-5a, LB-7, and an unknown spring) located along the north slope of Little Bear Canyon that issue from within or just below the Blackhawk/Castlegate contact. The springs' elevations are above 8630 feet, which is well above the 600-foot cover of the Blind Canyon seam. However, flow from Spring LB-7 was observed to flow down slope and infiltrate into the colluvium within the 600-foot cover. No other notable seeps or springs were observed during the site visit.

We did not see the spring that is being monitored by the mine as LB-5a which reportedly has greater flow than those observed during this visit. The spring issues from the Blackhawk formation, but its elevation is unknown. A survey should be conducted on this spring and, to eliminate future confusion, the spring should be renamed or correlated to the original spring and seep survey conducted in 1995.

We observed flows within the Little Bear Canyon stream to be consistent with the Crandall Canyon M&RP classification as intermittent above and perennial below the Little Bear Spring.