



State of Utah
 DEPARTMENT OF NATURAL RESOURCES
 DIVISION OF OIL, GAS AND MINING

Michael O. Leavitt
 Governor
 Ted Stewart
 Executive Director
 James W. Carter
 Division Director

355 West North Temple
 3 Triad Center, Suite 350
 Salt Lake City, Utah 84180-1203
 801-538-5340
 801-359-3940 (Fax)
 801-538-5319 (TDD)

May 11, 1994

TO: File

THROUGH: Daron Haddock

FROM: James D. Smith, Reclamation Specialist *JDS*

RE: Initial Technical Completeness Review
LBA #9 Amendment - Hydrology and Related Issues
Received December 1, 1993
Genwal Coal Company, Crandall Canyon Mine
ACT/015/032, Folder #2, Emery County, Utah

Notable deficiencies that have come out of this review are: 1) Maps in sections throughout the proposed plan show the LBA lease includes portions of Sections 27 and 34, T. 15 S., R. 6 E. and Section 3, T. 16 S., R. 6 E. that are not included in the lease as it was finally issued. 2) Subsidence is projected beyond the permit area around at least 50% of its perimeter. 3) Joes Valley and Horse Canyon have not been included in the determination of the PHC

1.14 **Right of Entry and Operation**

Applicant's Proposal:

Documents are listed upon which the applicant bases its legal right to enter and begin underground mining operations. Copies of leases and/or assignments of leases are in Appendix 1-1. Plate 1-1 shows the leases and adjoining surface and coal ownership.

Analysis:

The LBA #9 Lease, UTU-68082, is not listed in Section 1.14 but is listed on Attachment A of Appendix 1-1. The listing in Appendix 1-1 includes portions of Sections 27 and 34, T. 15 S., R. 6 E. and Section 3, T. 16 S., R. 6 E., acreage that was not included in the LBA lease #9 when it was finally issued to Genwal. Plate 1-1 and other maps in the proposed plan that show the LBA lease show the extraneous acreage.



Deficiencies:

1. The LBA lease is not included in right-of-entry information in Chapter 1 and is not accurately described in Appendix 1-1.
2. The LBA lease is not shown accurately on Plate 1-1 and on other maps throughout the proposed plan.

7.12 Certification

Proposal:

All required maps, plans, and cross sections presented in Chapter Seven that deal with the design of facilities or the determination of watershed characteristics have been certified by a professional engineer.

Analysis:

Plates 7-7 through 7-17 have not been certified by a registered professional engineer. Plate 5-2, which is referenced, has not been certified. Other than Plate 5-2, plates outside of Chapters Six and Seven were not checked.

Deficiency:

3. Not all plans, maps, and cross sections are certified by a qualified, registered, professional engineer or land surveyor.

7.22 Cross Sections, Maps, and Plans

Proposal:

Figures 7-1 through 7-12 and Plates 7-1 through 7-17 depict existing surface and groundwater occurrences within and adjacent to the permit area. These maps also show the topography, streams, wells, water monitoring locations, and other hydrologic design information pertinent to the Crandall Canyon Mine (page 7-2).

Analysis:

Plates 7-12, 7-14, 7-15, and 7-16 show leases SL-062648 and U-54762 incorrectly. Assuming Plate 1-1 is correct, these two leases should be shifted approximately one-quarter mile west on the four specified plates.

The potential impact of the mine operation on Little Bear Spring was incorporated into the PHC (Appendix 7-15) dated June 18, 1993. The PHC has not been updated to include the larger area covered by the LBA lease. The location of Little Bear Spring is described in the PHC but there is no reference to any maps or other illustrations in the plan. The PHC indicates that there is little potential for the Crandall Canyon Mine to cause a negative impact on this spring. However, as this spring is of particular concern to water rights holders and is discussed in the PHC, it should be on a map referred to by the PHC. Plates 7-12, 7-13, and 7-14 would all be appropriate maps on which to show the location of this spring.

Deficiencies:

4. Leases SL-062648 and U-54762 are incorrectly located on Plates 7-12, 7-14, 7-15, and 7-16. (Check Plate 6-1 also.)
5. The locations of Little Bear Spring and of the associated water rights are not on appropriate maps, such as Plates 7-12, 7-13, and 7-14.

7.24 Baseline Information
7.24.1 Groundwater Information

Proposal:

A few of the seeps and springs have been developed for beneficial use. No water wells used for consumption by animals or humans other than MW-1 are known to exist within the study area of the spring inventory. Hence, only minor groundwater development has occurred in the past within the mine plan or adjacent areas. Appendix 7-1 lists groundwater rights in and adjacent to the permit area and locations are on Plate 7-14.

Specific conductance, pH, temperature, use, and flow data for seeps and springs are given in Appendices 7-16 through 7-19 and discussed on pages 7-12 through 7-13.

SP-30 and SP-36 will be monitored to determine potential impacts in the immediate vicinity of the mine (page 7-36).

Analysis:

Little Bear Spring in Little Bear Canyon is located roughly two miles southeast of the mine portal. This spring is an important source of water for the Castle Valley Special Services District and that organization has expressed concerns in the past about potential impacts of mining on the spring. These concerns are discussed briefly in the

PHC (Appendix 7-15) but this spring is not mentioned in Section 7.24.1. Little Bear Spring is downgradient of the underground workings, based on the potentiometric surface on Plate 7-13, but will probably be unaffected by mine operations. The spring is not within areas covered by Genwal's previous seep and spring surveys and is not on any of the maps in the proposed permit.

Along with TDS (or specific conductance corrected to 25° C) and pH, analysis of groundwater for total iron and total manganese is required by R645-301-724.100 and 731.211. Tables 7-4 and 7-5 include dissolved iron but not total iron and include manganese without indicating whether it is total or dissolved. Laboratory reports in Appendix 7-20 show analysis has been done for dissolved iron part of the time, for total iron part of the time, and for both total and dissolved iron part of the time: whether analysis was for total or dissolved iron is not indicated on many reports. The laboratory reports rarely identify analysis for manganese as being for total or dissolved forms.

Use, flow, temperature, pH, and specific conductance (at 25° C) are included in Appendices 7-16 through 7-20 and in the summaries on pages 7-12 and 7-13. Iron and manganese, either total or dissolved, are not summarized in the appendices or on pages 7-12 and 7-13.

According to Appendix 7-17 and Annual Reports for 1990, 1991, 1992, and 1993, spring SP-30 has not had measurable flow since 1985. SP-30 is being monitored to determine impacts in the immediate vicinity of the mine, yet there is no analysis of the loss of flow at SP-30 as it might relate to mining in lease SL-062648, even if that mining occurred prior to Genwal's operation of the mine.

Deficiency:

6. Little Bear Spring, an important water supply source discussed in the PHC, is not mentioned in the groundwater development section of 7.24.1.
7. Little Bear Spring and associated water rights are not shown on appropriate maps.
8. Total iron and total manganese are not included in the groundwater analysis lists in Tables 7-4 and 7-5.
9. Information on total iron and total manganese, required by R645-301-724.100 and 731.211, is not included in the groundwater quality information in Appendices 7-16 through 7-20 and on pages 7-12 and 7-13.
10. The possible relationship between the cessation of flow from SP-30 and mining in lease SL-062648 has not been investigated.

7.24.2 Surface Water Information

Proposal:

Flow measurements collected at the USGS gauging station at the mouth of Crandall Canyon, from a flume in Blind Creek, and estimated in Horse Creek are contained in Appendix 7-2. Instantaneous flow data for Blind, Horse, and the north end of Crandall Canyons were collected in 1991 at locations shown on Plate 7-7. During seep and spring surveys in 1989, the south fork of Horse Canyon was dry above station HS-0 (Plate 7-7) and Blind Canyon was dry above the midpoint between stations B-2 and B-3 (Plate 7-7).

USFS water quality data for Indian Creek are summarized in Appendix 7-45. Surface water quality data collected from Crandall Creek by Genwal are in Appendix 7-3. Appendix 7-42 contains laboratory analytical results of water samples taken at the flumes in Crandall and Blind Canyons. Field water quality measurements from 1989 to the present for Crandall and Blind Canyons are in Appendix 7-43.

Blind Canyon is the location of a study, to be done by the USFS and partially financed by Genwal, of effects of retreat-mining induced subsidence on watershed erosion and stream flow (page 7-24). A timetable for the research and mining is in Appendix 7-26 and related information is in Appendices 7-27 through 7-39. Because subsidence induced increases of sediment load could impact USFS lands and waters outside the permit boundary, Genwal has committed to provide off-site erosion control measures for USFS lands to offset potential damage. An agreement whereby Genwal donates \$15,000 to the Manti-La Sal National Forest to fund graveling of a road in Nuck Woodward Canyon is in Appendix 7-44. In addition Genwal commits to remediating any adverse effects of retreat-mining.

Analysis:

Flow measurements from Crandall Canyon from October 1979 to September 1984 are in Appendix 7-2; however, flow measurements from the flume in Blind Canyon and estimated flows from Horse Canyon are not in Appendix 7-2 as stated on page 7-19. Instantaneous flow measurements for the three canyons for the year 1991 are in Appendix 7-23, along with flume measurements for Crandall and Blind Canyons and results of an instantaneous flow survey by IES of Horse, No Name, Blind, and Crandall Canyons for 1992. Instantaneous flow data for Horse Canyon for 1991 recorded no flow at least once during the year at four of the stations. Instantaneous flow data for Horse Canyon for 1992 in Appendix 7-23 indicate the south fork to be dry and the main channel to be dry approximately 340 feet upstream of the fork. This is sketchy information, but not even all of this has been included in the characterization of flow in Section 7.24.2. Locations

of the stations used for these instantaneous flow measurements are not on Plate 7-7, contrary to the statement on page 7-23.

USFS water quality data for Indian Creek are summarized in Appendix 7-45. No reference is made in the text in Section 7.24.2. to the Indian Creek flow data in Appendix 7-44. The supplemental information on drainages from the west face of East Mountain in Appendix 7-48 is not included in the surface water characterization in Section 7.24.2. Although the BLM has removed the acreage west of the Joes Valley fault from the LBA #9 lease, these drainages are adjacent to the permit area and need to be included in the description of the surface water quality and quantity. Because the information is not in this section it has not been used in the determination of the PHC and therefore the need for operational monitoring has not been determined.

Appendices 7-3 and 7-42 appear to contain the same water quality data from Crandall and Blind Creeks. If they are different, this needs to be clarified. Otherwise one of these appendices should be removed from the proposed plan. Field water quality measurements for Crandall and Blind Canyons in Appendix 7-43 are for 1989 to 1991, not up to the present as stated on page 7-23.

There are no water quality data for Horse Canyon in the proposed plan. Additional data are needed to adequately characterize baseline water quality and quantity. Because the needed information is not in this section, determination of the PHC is incomplete and the need for operational monitoring in Horse Canyon has not been evaluated. Mining has already been done under the south fork of Horse Canyon, retreat-mining under the uppermost reaches. Further retreat-mining under this drainage is not proposed until 1996, according to Plate 5-2. This will provide time to obtain data to characterize more adequately baseline conditions in this drainage.

The Blind Canyon study has the objectives of quantifying changes in stream channel profiles and changes in channel features, such as erosion caused by subsidence from retreat-mining. Methods outlined in the proposal in Appendix 7-25 involve establishing cross sections and stream profiles, surveying morphometric features, and assessing streambank stability and landslides. Appendix 7-44 contains USFS flow data for Indian Creek and not the erosion control enhancement agreement with the Manti-La Sal National Forest. A copy of that agreement is not found in the proposed plan.

Deficiency:

11. Flow measurements from the flume in Blind Canyon and estimated flows from Horse Canyon are not in Appendix 7-2, contrary to the statement on page 7-19.

12. Data on flow in Horse Creek are very meager, but meager as they are, not all available flow data, i.e., instantaneous flows observed in 1992, have been utilized in Section 7.24.2 to characterize baseline water quantity for Horse Canyon.
13. References to Plate 7-7 for locations of instantaneous stream flow measurement points are not correct.
14. The Indian Creek flow data in Appendix 7-44 and water quality data in 7-45 are not included in the surface water information in Section 7.24.2.
15. Information in Appendix 7-48 for Joes Valley and East Mountain has not been incorporated in the surface water information in Section 7.24.2.
16. Appendices 7-3 and 7-42 appear to be redundant, containing the same water quality data from Crandall and Blind Creeks.
17. Field water quality measurements from Blind and Crandall Canyons in Appendix 7-43 are for 1989 to 1991 only, not up to the present as stated on page 7-23.
18. Additional data are needed to adequately characterize baseline water quality and quantity for Horse Canyon before retreat-mining beneath it resumes.
19. Appendix 7-44 does not contain the erosion control enhancement agreement with the Manti-La Sal National Forest, contrary to the statement on page 7-25.

7.28 Probable Hydrologic Consequences Determination

Proposal:

The PHC is in Appendix 7-15. An updated version was submitted June 18, 1993 in response to the part of Division Order #93A concerning Little Bear Spring.

No water inflow is occurring in the Crandall Canyon mine. Consequently, water is being pumped into the mine (page 1 Appendix 7-15). Surface water availability could be impacted by excessive pumping of water from Crandall Creek. Genwal has committed not to pump at a rate that will cause the flow of the creek to fall below the minimum required rate.

There is some potential for impact to seeps and springs through subsidence. Seeps and springs and water rights have been identified. Genwal is monitoring flow rates and quality for the water rights within and adjacent to the current mine permit area.

An alternate water source plan has been developed in the event any water rights or springs/seeps are adversely affected by the mining operation or reclamation activities.

Analysis:

Water inflow totals no more than 100 gpm, mostly from the old workings, as described on page 7-14 of the proposed plan. This water flow was also described and discussed at the June 10, 1993 meeting of Genwal, DOGM, Castle Valley Special Services District, and Huntington Cleveland Irrigation Company. The mine inflow is pumped to State Lease ML-21569 for use in the mining operations. All inflow is used in underground mining operations (page 7-14). Use is approximately 7.6 gpm and projected use is 7.9 gpm (page 7-13).

Well MW-1 currently serves as a water supply well for the mine, minimizing the need for surface pumping (page 7-29). In Appendix 7-15 it is stated that all water for in-mine consumption is being pumped into the mine with no contribution from mine inflow. On page 7-27 it is stated that no water has been pumped from Crandall Creek for the previous two year period. (On the other hand water has been discharged from the mine only three times in the past five years (page 7-16). Because the Mining and Reclamation Plan has undergone numerous updates, it is not clear when the two and five year periods referred to begin or end. Statements such as "the last five years" or "the previous two years" become confusing or meaningless as the plan is amended and updated.)

Little Bear Spring is not currently being monitored by Genwal, but the Castle Valley Special Services District is almost certainly monitoring water quality and quantity. As mentioned above, because this spring is discussed in the PHC (Appendix 7-15) and because of the concerns of the water right holders, the location of this spring and the associated water rights should be on the appropriate plans and maps in the proposed plan.

Information on surface and groundwater in Joes Valley and the west flank of East Mountain is found in various sections of the proposed plan, including Appendices 7-44, 7-45, and 7-48. The data have not been described, summarized, or analyzed in Sections 7.24.1 and 7.24.2 and have not been used in the determination of the PHC. Water monitoring is supposed to be planned based on the findings of the PHC. The proposed plan does not include monitoring of surface or groundwater in Joes Valley, but there is no determination in the PHC to justify the decision not to monitor.

Flow data indicate that Horse Canyon does not have perennial flow within the permit area, but these data have not been used in the proposed plan to arrive at such a determination. There is intermittent flow in the south fork within the permit area, and intermittent or perennial flow in the main fork in the area adjacent to the permit area. These drainages are not evaluated in the PHC. Three springs in the upper reaches of

Horse Canyon tributaries are included in the operational monitoring plan but there is no surface water monitoring. The basis for not having surface water monitoring in Horse Canyon is not found in the PHC.

Deficiency:

20. There are confusing and what appear to be contradictory statements concerning groundwater inflow to the mine, surface water pumped into the mine, and the sources of water used in mine operations in the PHC (Appendix 7-15) and pages 7-14 through 7-29.

21. Joes Valley and the west flank of East Mountain have not been included in the determination of the PHC.

22. Horse Canyon has not been included in the determination of the PHC.

7.30 Operations Plan
7.31.21 Ground Water Monitoring Plan

Proposal:

Construction and completion of wells MW-1 and MW-2 are described on pages 7-37 and 7-41.

Groundwater monitoring will include collection of water quality and quantity data from eleven springs (page 7-36). SP2-24, SP2-9, SP-47a, SP2-14, SP2-23, and SP1-3 were chosen because of the water rights filed on them by the USFS. SP-30 and SP-36 will be monitored to determine potential impacts in the immediate vicinity of the mine. SP-58 will be monitored as an indicator of long term changes in groundwater issuing from the Blackhawk Formation in an area that will not be affected by mining operations. SP-19 and SP-22 will be monitored as indications of the water supply in the upper reaches of Blind Canyon.

Groundwater rights are listed in Appendix 7-1 and shown on Plate 7-14. Seep and spring locations are on Plate 7-12. Tables 7-4 and 7-5 list the parameters for which baseline and operational monitoring are done. Groundwater quality and quantity information is in Appendices 7-16 through 7-20.

Analysis:

Construction and completion of wells MW-3, MW-4, and MW-5 are not mentioned on pages 7-31 and 7-34. Drillers logs and well construction information for

MW-4 and MW-5 are in Appendix 7-46. Either information on construction and completion of these three wells should be added to pages 7-37 and 7-41 or a reference be given to where information can be found. If no log is available on MW-3, whatever information is available should be mentioned.

According to Appendix 7-17 and Annual Reports for 1990, 1991, 1992, and 1993, spring SP-30 has had no measurable flow since October 1985. SP-30 is being monitored to determine impacts in the immediate vicinity of the mine, yet there is no analysis of the loss of flow at SP-30 as it might relate to mining, even if that mining occurred prior to Genwal's operation of the mine. Continued monitoring of an apparently dry spring is of little value; consideration should be given to other springs in lease SL-062648 to be monitored in addition to or as replacements of SP-30.

Water rights have been claimed by the USFS on lands within and adjacent to the permit area, with numerous claims on springs in Upper Joes Valley immediately west of the permit area. At least part of the water discharged by the Joes Valley springs has been characterized as coming from East Mountain (page 7-6). The USFS has in the past expressed concern that the monitoring plan is not adequate to characterize the groundwater system or to monitor effects of mining on water resources contributing to surface and groundwater flow on Forest Service lands. Ground water information for these areas has not been covered in Section 7.24.1 so these areas were not included in the determination of the PHC. Springs are to be monitored in Joes Valley, but because this area is not included in the PHC, the monitoring plan may not be sufficient.

There is no proposed operational monitoring of any springs within lease ML-21568. The only spring selected for operational monitoring in the state leases is SP 1-19, an intermittent spring at the edge of the area of potential subsidence for lease ML-21569 (Sec 36). Lease ML-21569 is identified as high priority area for deer in the summer (Plate 3-1A). SP 1-9 in lease ML-21568 and SP 1-24 in lease ML-21569 are perennial springs that would be good candidates for monitoring as they are in areas most likely to experience maximum subsidence. There are no water rights filed on any seeps and springs within the state leases, but impacts to these springs could indicate impacts to surface and groundwater in the Crandall and Blind Canyon drainages. In addition, use of these seeps and springs by wildlife could be greatly affected.

A commitment is made in Section 7.27 that when flows are interrupted or reduced (by 50% or more) as a result of mining activities, alternate water supplies will be developed. While monitoring of every spring and seep is not practical, there must be enough monitoring to detect impacts from mining, otherwise the commitment to mitigate is meaningless.

Deficiency:

23. Construction and completion of wells MW-1 and MW-2 are described on pages 7-37 and 7-41, but there is no information on wells MW-3, MW-4 and MW-5, even by reference to the information in Appendix 7-46.
24. Monitoring a flowing spring in addition to or in place of SP-30 should be considered.
25. The monitoring plan (or lack of monitoring) for Joes Valley and Horse Canyon is not based on the PHC.
26. Areas likely to be affected by subsidence, such as the State leases, need additional monitoring of springs to determine impacts from subsidence.

7.31.22 Surface Water Monitoring Plan

Proposal:

Two flumes have been installed on Crandall Creek and one in Blind Canyon to monitor possible effects of mining in State Lease ML-21569. Water quality samples will be collected from the flume locations quarterly and analyzed according to Tables 7-8 and 7-9. In anticipation of acquiring adjacent leases, a flume has been installed in Indian Creek (page 7-43). The flume locations are shown on Plate 7-7.

Stream channel monitoring stations have been established along both the north and south forks of Crandall Creek, Blind Creek, and the south fork of Horse Creek to determine which stream reaches exhibit perennial flow. Stream flow and water temperature were measured regularly during several months in 1991 and once in September 1992. Stream monitoring results are in Table 7-6a, but a determination of what stream reaches exhibit perennial flow has yet to be made (page 7-43).

Stream flow observations made during drilling operations and seep and spring surveys suggest that large portions of the south fork of Horse Creek, Blind Creek, and both the north and south forks of Crandall Creek have only ephemeral or intermittent flows within the state leases. Plates 5-2A and 5-2B show the points of transition between perennial and intermittent flow.

No retreat-mining will be conducted beneath the buffer zones along these streams until it has been determined what reaches are perennial and that these reaches will not be adversely affected by mining (page 7-43).

Analysis:

Locations of the three flumes installed by Genwal are shown on Plate 7-7. Although most of the permit area drains to Huntington Creek through Crandall, Blind, and Horse Canyons, the westernmost portion of permit area drains from East Mountain into Joes Valley. USFS data on flow and water quality for Indian Creek are in Appendices 7-44 and 7-45. Genwal has installed a flume in Indian Creek but no data from that flume are presented in the proposed plan. There is no stated intent to monitor surface water quality or quantity anywhere in Joes Valley as part of the operational monitoring plan.

Drainages on the west side of East Mountain are not included in the description of surface water quality and quantity in Section 7.24.2. Joes Valley and the East Mountain drainages have not been included in the determination of the PHC. The probable hydrologic consequences of mining are not determined for Joes Valley, so the operational monitoring plan in these areas may not be sufficient and operational surface water monitoring may be needed in these drainages.

Table 7-6a is identified on page 7-43 as the location of the information on perennial flow for Crandall, Blind, and Horse Canyons. This table is not in the proposed plan.

Stream flow observations made during drilling operations and seep and spring surveys suggest that large portions of the south fork of Horse Creek, Blind Creek, and both the north and south forks of Crandall Creek have only ephemeral or intermittent flows within state leases ML-21568 and ML-21569. According to the statement in the first paragraph on page 7-43, a determination of what reaches of those three drainages exhibit perennial flow has yet to be made. However Plates 5-2A and 5-2B, which are not in the proposed plan, are referenced as showing the points of transition between perennial and intermittent flow.

Reaches of streams that were flowing during surveys in 1991 and 1992 may be dry in the future, but the permit applicant should have an idea of where intermittent and perennial reaches of the drainages are based on the available data. The data should be evaluated in the PHC and the operational monitoring program planned accordingly.

Under the currently approved plan, mining has already been done under the south fork of Horse Canyon and Blind Canyon. Retreat-mining has been done beneath the uppermost reaches of Horse Canyon, which were identified as not having perennial flow, and under Blind Canyon. The USFS is currently investigating the effects of subsidence from retreat-mining on the Blind Creek drainage. An interim report is due from the USFS by September 1994 and a final report by September 1995. The remainder of the south fork of Horse Canyon and several smaller tributaries to the main fork are in the zone of possible subsidence in the proposed mining plan. Genwal has established monitoring stations along Blind and Horse Canyons, but the future use of these stations

and the surface water monitoring plans for Horse Canyon are not described in the proposed plan.

The need of an operational monitoring for Horse Canyon cannot be evaluated because of the lack of water quality data and the fragmentary water quantity data in the proposed plan. Monitoring of Horse Creek was stipulated as part of the current coal mining permit, but the nature of the monitoring was not specified. Additional data are needed to adequately characterize baseline water quality and quantity. Under the proposed plan, further retreat-mining beneath this drainage is not anticipated until 1996 (Plate 5-2). This will provide time to obtain data to characterize more adequately baseline conditions in this drainage.

Deficiency:

27. Although a flume has been installed, there is no stated intent to monitor water quality or quantity on Indian Creek in the proposed plan.

28. There is no Table 7-6a, containing results of stream monitoring for perennial and intermittent flow, in the proposed plan (page 7-43).

29. The proposed operational monitoring plan is not based on a determination of what stream reaches exhibit perennial flow according to the statement in the first paragraph on page 7-43.

30. Plates 5-2A and 5-2B are not in the proposed plan (page 7-43), therefore the reaches of streams where flow is perennial and the points of transition between perennial and intermittent flow are not identified in the proposed plan.

31. Monitoring surface water quality and quantity in Horse Canyon needs to be planned and implemented as soon as possible in order to characterize baseline conditions and determine the PHC before retreat-mining resumes beneath that drainage.

32. Until it is demonstrated through determination of the PHC that surface water monitoring is not needed for Joes Valley, including the west flank of East Mountain, surface water monitoring needs to be planned and implemented in those areas.