

# TECHNICAL MEMORANDUM

## Utah Coal Regulatory Program

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March 23, 2005

TO: Internal File

THRU: D. Wayne Hedberg, Permit Supervisor

THRU: Joseph C. Helfrich, Environmental Scientist III, Biologist & Team Lead

FROM: Steve Fluke, Reclamation Hydrogeologist

RE: South Crandall Lease Revision, Genwal Resources, Inc., Crandall Canyon Mine, C/015/0032, Task ID #2175

### **SUMMARY:**

Genwal Resources, Inc. (Genwal) has submitted an application to the Division of Oil, Gas and Mining (the Division) requesting a modification of their mining and reclamation plan to include the South Crandall Federal Lease (UTU-78953) and a 40-acre parcel of land that is being subleased from SITLA/PACIFICORP. The Division has reviewed the application and responses to deficiencies six times previously. The latest response, submitted by Genwal on March 8, 2005, was assigned Task #2175

This memo addresses the hydrology section of the response to the deficiencies. Hydrology related deficiencies from the previous Technical Memo (Task ID #2084) that were reviewed for this memo include:

**R645-301-724, R645-301-728.300**, the Permittee needs to further discuss the potential for a northerly recharge component to Little Bear Spring in Chapter 7 and the PHC (Appendix 7-15). References to pre-1998 studies that address this recharge component should include:

- Vaughn Hansen Associates, *Water Quality and Hydrologic Study in Vicinity of Huntington Creek Mine No. 4 and Little Bear Spring*, Prepared for Swisher Coal Company, August 1977.
- Hydro-Sciences, Inc., *Ground Water Hydrology in the Vicinity of the Huntington No. 4 Mine*, Prepared for ARCO Coal Company, December 19, 1980.

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- Beaver Creak Coal Company, *Huntington Canyon No. 4 Mining and Reclamation Plan*, Prepared for UDOGM, 1983.
- Utah Geological and Mineral Survey, *Effects of Coal Mining at Huntington Canyon No. 4 Mine on Little Bear Spring, Emery County*, Prepared for Castle Valley Special Services District, Job No. 84-005, January 21, 1984.
- Vaughn Hansen Associates, *Hydrologic Conditions in Huntington Canyon No. 4 Mine*, 1984.

The Permittee should state that these referenced studies will be available for review at the Division's Public Information Center.

**R645-301-728-300**, the Permittee needs to change text in the PHC stating "Mitigation for potential disruption to Little Bear Spring will be accomplished ... if mining activity in the South Crandall lease tract affect the quality or quantity of the spring" to be consistent with the language of Stipulation #17 as it was in the M&RP text.

**R645-301-723, -731.200**, the Permittee needs to clarify that conducting multiple seam mining beyond spring site LB-7 in Little Bear Canyon is contingent upon a monitoring plan approval by the Division in concurrence with the Forest Service at least two years prior to mining in that area. In addition, Section 7.31.21, Groundwater Monitoring Plan, needs to be updated to include springs LB-7, LB7A, LB-7B, LB-7C, and LB-12, and the removal of spring LB-2.

**R645-301-723**, the Permittee needs to include spring monitoring sites LB-7, LB-7A, LB-7B, LB-7C, LB-5A, and LB-12 to Plates 7-12 and 7-18. Vegetation maps are to be added to the M&RP following surveys to be conducted during the 2005 field season.

All of these deficiencies have been addressed in the latest response (Task #2175). The hydrologic information provided meets the requirements of the Coal Mining Rules. The proposed amendment should be approved.

**TECHNICAL ANALYSIS:**

**ENVIRONMENTAL RESOURCE INFORMATION**

## CLIMATOLOGICAL RESOURCE INFORMATION

Regulatory Reference: 30 CFR 783.18; R645-301-724.

### Analysis:

The existing climatological information presented in the Crandall Canyon Mine M&RP is also representative of the South Crandall lease area and the additional 40-acre sublease area. Average seasonal precipitation, average direction of prevailing winds, and seasonal temperature ranges are all presented in Section 7.24.4 Climatological Information.

### Findings:

The information reported meets the minimum climatological requirements of the Regulations.

## HYDROLOGIC RESOURCE INFORMATION

Regulatory Reference: 30 CFR Sec. 701.5, 784.14; R645-100-200, -301-724.

### Analysis:

#### Sampling and Analysis

The permittee has added eight spring and six stream monitoring locations to their existing water monitoring program. As stated in Section 7.2, Sampling and Analysis, of the mine's M&RP, "all water samples are collected and analyzed according to methods in either the "Standard Methods for the Examination of Water and Waste Water" or the 40 CFR parts 136 and 434".

#### Baseline Information

A description of the hydrologic and geologic characteristics of the South Crandall lease area and the additional 40-acre sublease area has been added to Section 7.24.1 Groundwater Information and Section 7.24.2, Surface Water Information. Geologic characteristics of the lease area have also been included in Chapter 6. Baseline information of the premining groundwater and surface water features within and adjacent to the lease area is included as Appendix 7-58 Summary of Hydrologic Baseline Information, South Crandall Lease Area.

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Appendix 7-58 identifies and shows the locations of seeps, springs, surface water, and drainages that have been monitored within and adjacent to the lease area since 1980. Little Bear Spring and Little Bear Canyon Creek have been monitored since 1957 and 1970, respectively. The tabulated baseline data presents discharge, flow, and field parameter data (including temperature, pH, and conductivity) available for each monitoring site. Major ion, trace metal, and nutrient water quality data collected by Genwal in June and August, 2003, are also presented for the eight springs and five surface water monitoring sites to be included in the Genwal water monitoring program for the South Crandall lease area and the additional 40-acre sublease area.

Supplemental hydrologic information has been added as Appendices 7-52 through 7-57, and 7-59 through 7-62 to address the complex hydrogeology of Little Bear Spring. Little Bear Spring is an important municipal water source and is located approximately 600 feet south of the South Crandall Lease Area in Little Bear Canyon. These appendices are scientific studies that describe, among other things, the groundwater systems encountered in the Crandall Canyon mine, their relation to Little Bear Spring, and the potential source of water for the spring. The Division agrees with the Permittee's assessment that the studies indicate that Little Bear Spring is recharged primarily through surface water and alluvial groundwater losses in Mill Fork Canyon. To clarify that it is generally believed that adverse impacts to the spring due to mining in the South Crandall lease area are unlikely, the Permittee has added verbiage from the Forest Service, BLM Joint Decision Notice/Finding of No Significant Impact, Coal Lease Application UTU-78953 to Section 7.24.1, Groundwater Information, Mine Plan Area Aquifers.

However, the Forest Service has commented that the hydrologic studies have not conclusively determined that Little Bear Spring is recharged primarily from water losses in Mill Fork Canyon and that there is also a component of flow reaching the spring from the north and west. The Forest Service bases their comment on earlier studies of the spring (pre-1998) suggesting a north and west source area that was not eliminated as a possibility in later studies. The Division and Forest Service believed the Permittee had inadequately addressed the Forest Service comment by stating in Section 7.24.1, Groundwater Information, Mine Plan Area Aquifers, "Despite the conclusions of these studies the Forest Service still believes there may be a northerly component of flow recharging Little Bear Spring". The Division had requested (Task ID # 2023) the Permittee rephrase this statement to more adequately address the Forest Service comment and acknowledge a difference of interpretation of the studies. The statement has been removed from the MR&P (Task ID #2084) and replaced with a statement saying, "at least one earlier study suggested that there may be a northerly component of recharge to Little Bear Spring". While this statement is true, it does not adequately address past Forest Service comments. At the request of the Division (Task ID #2084), the potential for a northerly recharge component to Little Bear Spring has been further discussed and references to the following pre-1998 studies that address this component have been included in the M&RP:

- 1) Vaughn Hansen Associates, *Water Quality and Hydrologic Study in Vicinity of Huntington Creek Mine No. 4 and Little Bear Spring*, Prepared for Swisher Coal Company, August 1977.
- 2) Hydro-Sciences, Inc., *Ground Water Hydrology in the Vicinity of the Huntington No. 4 Mine*, Prepared for ARCO Coal Company, December 19, 1980.
- 3) Beaver Creek Coal Company, *Huntington Canyon No. 4 Mining and Reclamation Plan*, Prepared for UDOGM, 1983.
- 4) Utah Geological and Mineral Survey, *Effects of Coal Mining at Huntington Canyon No. 4 Mine on Little Bear Spring, Emery County*, Prepared for Castle Valley Special Services District, Job No. 84-005, January 21, 1984.
- 5) Vaughn Hansen Associates, *Hydrologic Conditions in Huntington Canyon No. 4 Mine*, 1984.

Because these studies are not the property of Genwal, the Division will keep these studies available for review in the Division's Public Information Center.

Language indicating that studies have conclusively determined that Little Bear Spring is recharged primarily from water losses in Mill Fork Canyon has been removed from the M&RP. In addition, the Division has requested (Task ID # 2023) the Permittee address the possibility of intercepting part of the fracture system that is believed to be the primary means of conveyance of groundwater to Little Bear Spring in Section 7.24.1, Groundwater Information, Effects of Mining Operation on Groundwater. Instead, the Permittee has adequately addressed this issue in Section 7.24.1, Groundwater Information, Mine Plan Area Aquifers.

The listing of water rights in and adjacent to the permit boundary, as obtained from the Utah Division of Water Rights, has been updated on the groundwater and surface water rights maps (Plates 7-14 and 7-15, respectively), the tabulated listing of surface water rights (Table 7-6), and the supporting water rights information (Appendix 7-1).

### **Baseline Cumulative Impact Area Information**

The Division has updated the East Mountain CHIA (March 23, 2005) to incorporate the expansion of the Crandall Canyon Mine into the South Crandall Canyon lease tract and the SITLA/Pacificorp sublease tract. Hydrogeologic information provided by the amendment was adequate for the Division to complete this update.

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## **Modeling**

A conceptual recharge model of Little Bear Spring is presented as Appendix 7-55 Investigation of the Potential for Little Bear Spring Recharge in Mill Fork Canyon, Emery County, Utah. The model uses information obtained from studies presented in other appendices including two isotopic studies, an in-mine slug tests, a resistivity study, hydrogeologic information, and historical flow data. In addition, a dye tracing study and three electromagnetic (AquaTrack) studies of the Little Bear Spring recharge system are presented in the appendices. Combined, these studies make a compelling argument that the primary source of recharge to Little Bear Spring is through surface water and alluvial groundwater losses in Mill Fork Canyon.

## **Probable Hydrologic Consequences Determination**

The Probable Hydrologic Consequences Determination (PHC) (Appendix 7-15) has been updated to include the hydrologic, geologic, baseline, and supplemental information provided for the South Crandall lease area and the additional 40-acre sublease area. Updates in the PHC center around the recharge source to Little Bear Spring and the potential impacts of the proposed mine workings on the spring. Studies indicate that fractures in the Star Point Sandstone act as a conduit to provide surface and alluvial water from Mill Fork Canyon to Little Bear Spring. Because this fracture system lies outside of the South Crandall Lease permit boundary, and a regional Star Point aquifer does not likely contribute to the fracture system, then it is considered extremely unlikely that the proposed mining activities will impact the spring. In addition, the Star Point Formation will not be undermined by the proposed mining in the South Crandall Lease Area because the coal seams proposed for mining are stratigraphically above the Star Point Formation.

As stated above (Baseline Information) the Forest Service has commented that the hydrologic studies have not conclusively determined that Little Bear Spring is recharged primarily from water losses in Mill Fork Canyon and that there is also a component of flow reaching the spring from the north and west. The Division has requested (Task ID # 2023) the Permittee adequately address the Forest Service comment and acknowledge a difference of interpretation of the studies, and address the possibility of intercepting part of the fracture system that is believed to be the primary means of conveyance of groundwater to Little Bear Spring.

Language indicating that studies have conclusively determined that Little Bear Spring is recharged primarily from water losses in Mill Fork Canyon has been removed from the PHC and the possibility of intercepting recharge groundwater to Little Bear Spring has been adequately addressed. At the request of the Division (Task ID #2084), the potential for a northerly recharge component to Little Bear Spring has been further discussed and references to the following pre-1998 studies that address this component have been included in the M&RP:

- 1) Vaughn Hansen Associates, *Water Quality and Hydrologic Study in Vicinity of Huntington Creek Mine No. 4 and Little Bear Spring*, Prepared for Swisher Coal Company, August 1977.
- 2) Hydro-Sciences, Inc., *Ground Water Hydrology in the Vicinity of the Huntington No. 4 Mine*, Prepared for ARCO Coal Company, December 19, 1980.
- 3) Beaver Creek Coal Company, *Huntington Canyon No. 4 Mining and Reclamation Plan*, Prepared for UDOGM, 1983.
- 4) Utah Geological and Mineral Survey, *Effects of Coal Mining at Huntington Canyon No. 4 Mine on Little Bear Spring, Emery County*, Prepared for Castle Valley Special Services District, Job No. 84-005, January 21, 1984.
- 5) Vaughn Hansen Associates, *Hydrologic Conditions in Huntington Canyon No. 4 Mine*, 1984.

Because these studies are not the property of Genwal, the Division will keep these studies available for review in the Division's Public Information Center.

In order to clarify that the intent of Stipulation #17 is met, the text in the PHC has been changed to reflect that an uninterrupted supply of culinary water will be assured irrespective of whether mining can be conclusively shown to have affected Little Bear Spring. Text stating "Mitigation for potential disruption to Little Bear Spring will be accomplished ... if mining activity in the South Crandall lease tract affect the quality or quantity of the spring" has been changed to be consistent with the language of Stipulation #17.

### **Groundwater Monitoring Plan**

The existing groundwater monitoring plan was originally amended to include the monitoring of four springs located within and adjacent to the South Crandall lease area. These sites included: Little Bear Spring, a municipal water source, that discharges water from fractures within the Star Point Sandstone and is located approximately 600 feet outside of the lease area; site LB-2 that discharges from the Castlegate Sandstone at the south end of the lease area; site LB-5A that discharges from a sandstone channel in the Blackhawk Formation overlying mining operations at the south end of the lease area; and site SP-79 that discharges from the Star Point Sandstone at the northeast portion of the lease area.

In order to address Special Coal Lease Stipulation #9 and conduct mining in Little Bear Canyon beyond Spring LB-7, the Forest Service and the Division have agreed that monitoring

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programs should be developed by the Permittee and in place at least two years prior to mining in that area. The monitoring programs should be approved by the Division in concurrence with the Forest Service prior to implementation.

In the event of multiple seam mining beyond spring site LB-7 in Little Bear Canyon, a monitoring program should be developed that, at a minimum, consists of the following:

- Additional monitoring of spring sites LB-7, LB-7A, LB-7B, LB-7C, LB-5A, and LB-12;
- A map identifying and showing the general location of vegetation in the area that could potentially be affected by mining in Little Bear Canyon; and
- A detailed map of riparian and wetland vegetation associated with spring sites LB-7, LB-7A, LB-7B, LB-7C, LB-5A, and LB-12.

In the event of single seam mining beyond spring site LB-7 in Little Bear Canyon, the Permittee will need to include spring sites LB-7, LB-7A, LB-7B, and LB-7C into their quarterly monitoring plan. The springs will be monitored for flow and field parameters.

The Permittee has committed to the minimum required monitoring for multiple seam mining as outlined above starting in 2005. This additional monitoring satisfies the requirement for single seam mining beyond spring site LB-7. In order to conduct multiple seam mining beyond spring site LB-7, a monitoring plan must be submitted and approved by the Division in concurrence with the Forest Service at least two years prior to mining in that area. Multiple seam mining will therefore be contingent upon meeting this requirement. Section 7.31.21, Groundwater Monitoring Plan, has been updated to include springs LB-7, LB7A, LB-7B, LB-7C, and LB-12, and the removal of spring LB-2. All of the spring sites will be monitored for the field and laboratory water quality parameters as listed in Table 7-4. Protocols for monitoring are listed in Table 7-10 of the M&RP.

### **Surface-Water Monitoring Plan**

The existing surface water monitoring plan has been updated to include the monitoring of four creeks with six monitoring sites located within and adjacent to the South Crandall lease area as shown on Plate 7-18. The creeks to be monitored include: the intermittent Little Bear Canyon Creek, the ephemeral drainage in SW  $\frac{1}{4}$  of Section 4 T16S R7E (Section 4 Creek), the ephemeral drainage located along the west permit boundary along the border of Sections 5 and 6 T16S R7E, and the intermittent creek in Section 5 T16S R7E that drains into Crandall Creek downstream of the Genwal surface facilities (Section 5 Creek). Little Bear Canyon Creek and Section 4 Creeks will be monitored approximately 100 feet above their confluence with Huntington Creek, the drainage along the west permit boundary will be monitored at station IBC-1 above the confluence with Crandall Creek, and Section 5 Creek will be monitored above the confluence

with Crandall Creek and at two stations located at the confluence of the drainages upper left and right forks. All of the creek sites will be monitored for the field and laboratory water quality parameters listed in Table 7-8. Protocols for monitoring are listed in Table 7-10 of the M&RP.

### **Findings:**

- Hydrologic Resource Information is sufficient to meet the requirements of the Coal Mining Rules.

## **MAPS, PLANS, AND CROSS SECTIONS OF RESOURCE INFORMATION**

Regulatory Reference: 30 CFR 783.24, 783.25; R645-301-323, -301-411, -301-521, -301-622, -301-722, -301-731.

### **Analysis:**

#### **Monitoring and Sampling Location Maps**

Plate 7-12 shows the seep and spring locations for the Crandall Canyon mine and surrounding area. The baseline seep and spring locations for the South Crandall lease area and the additional 40-acre sublease area are shown on this plate as well as in Appendix 7-58. In addition, Plate 7-12 shows the locations of the spring monitoring sites as identified in Section 7.31.21, Groundwater Monitoring Plan, and Table 7-10. Little Bear Spring (LB-11) has been identified as a monitoring site on Plate 7-12. Surface and groundwater monitoring locations for the South Crandall lease area and the additional 40-acre sublease area are shown on an updated map in Plate 7-18.

In order to clarify the locations of significant springs in relation to the geology and longwall mining projections in Little Bear Canyon watershed, topographic maps of the watershed have been provided (Appendix 7-63) that show the following:

- Surveyed locations and identity of all significant springs;
- The Hiawatha and Blind Canyon seam outcrop contours;
- The Blind Canyon seam 600-foot overburden contour;
- The Hiawatha and Blind Canyon seam mining projections; and
- Surface geology.

In order to address Special Coal Lease Stipulation #9 and conduct mining in Little Bear Canyon beyond Spring LB-7, the Permittee has committed to monitoring programs that include: 1) additional monitoring of spring sites LB-7, LB-7A, LB-7B, LB-7C, LB-5A, and LB-12; 2) a map identifying and showing the general location of vegetation in the area that could potentially

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be affected by mining in Little Bear Canyon; and 3) a detailed map of riparian and wetland vegetation associated with spring sites LB-7, LB-7A, LB-7B, LB-7C, LB-5A, and LB-12. The spring monitoring locations have been added to Plates 7-12 and 7-18. Vegetation maps will be added following surveys to be conducted during the 2005 field season.

### **Subsurface Water Resource Maps**

Plate 7-13, Potentiometric Surface of Spring Canyon Member, Star Point Sandstone, is referenced in Section 7.24.1, Groundwater Information, Effects of Mining Operation on Groundwater, of the existing and revised M&RP. The plate should not be removed from the M&RP, nor does it need to be updated to include the South Crandall lease area, as stated in the Division's first Technical Analysis, dated December 2, 2003 (Task ID #1698). No subsurface water resource map is included for the South Crandall lease area or the additional 40-acre sublease area.

Plate 7-14, Groundwater Rights, has been updated to include the South Crandall lease area and the additional 40-acre sublease area.

### **Surface Water Resource Maps**

Plate 7-15, Surface Water Rights, has been updated to include the South Crandall lease area and the additional 40-acre sublease area.

Plate 7-16, Stream and Monitoring Stations, is referenced in Section 7.24.1, Groundwater Information, Mine Plan Area Surface Hydrology, of the existing and revised M&RP. The plate should not be removed from the M&RP, nor does it need to be updated to include the South Crandall lease area, as stated in the Division's first Technical Analysis, dated December 2, 2003 (Task ID #1698).

### **Well Maps**

No water monitoring wells are proposed for the South Crandall lease area or the additional 40-acre sublease area.

### **Findings:**

Maps, Plans, and Cross Sections of Resource Information is sufficient to meet the requirements of the Coal Mining Rules.

## OPERATION PLAN

### 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:

##### **Groundwater Monitoring**

The existing groundwater monitoring plan was originally amended to include the monitoring of four springs located within and adjacent to the South Crandall lease area. These sites included: Little Bear Spring, a municipal water source, that discharges water from fractures within the Star Point Sandstone and is located approximately 600 feet outside of the lease area; site LB-2 that discharges from the Castlegate Sandstone at the south end of the lease area; site LB-5A that discharges from a sandstone channel in the Blackhawk Formation overlying mining operations at the south end of the lease area; and site SP-79 that discharges from the Star Point Sandstone at the northeast portion of the lease area.

In order to address Special Coal Lease Stipulation #9 and conduct mining in Little Bear Canyon beyond Spring LB-7, the Forest Service and the Division have agreed that monitoring programs should be developed by the Permittee and in place at least two years prior to mining in that area. The monitoring programs should be approved by the Division in concurrence with the Forest Service prior to implementation.

In the event of multiple seam mining beyond spring site LB-7 in Little Bear Canyon, a monitoring program should be developed that, at a minimum, consists of the following:

- Additional monitoring of spring sites LB-7, LB-7A, LB-7B, LB-7C, LB-5A, and LB-12;
- A map identifying and showing the general location of vegetation in the area that could potentially be affected by mining in Little Bear Canyon; and
- A detailed map of riparian and wetland vegetation associated with spring sites LB-7, LB-7A, LB-7B, LB-7C, LB-5A, and LB-12.

In the event of single seam mining beyond spring site LB-7 in Little Bear Canyon, the Permittee will need to include spring sites LB-7, LB-7A, LB-7B, and LB-7C into their quarterly monitoring plan. The springs will be monitored for flow and field parameters.

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The Permittee has committed to the minimum required monitoring for multiple seam mining as outlined above starting in 2005. This additional monitoring satisfies the requirement for single seam mining beyond spring site LB-7. In order to conduct multiple seam mining beyond spring site LB-7, a monitoring plan must be submitted and approved by the Division in concurrence with the Forest Service at least two years prior to mining in that area. Multiple seam mining will therefore be contingent upon meeting this requirement. Section 7.31.21, Groundwater Monitoring Plan, has been updated to include springs LB-7, LB7A, LB-7B, LB-7C, and LB-12, and the removal of spring LB-2. All of the spring sites will be monitored for the field and laboratory water quality parameters listed in Table 7-4. Protocols for monitoring are listed in Table 7-10 of the M&RP.

As a stipulation of the lease agreement (Special Coal Lease Stipulation #17), the Permittee has committed to mitigate for potential disruption to Little Bear Spring. Stipulation #17 states “In order to adequately protect flow from Little Bear Spring, the Lessee must enter into a written agreement with Castle Valley Special Services District (CVSSD) to assure an uninterrupted supply of culinary water equivalent to historical flows from the spring. The agreement must be in place prior to mining.” A water treatment plant is to be constructed under the provisions of an agreement between Genwal, Pacificorp, and the Castle Valley Special Service District. A copy of the agreement that meets the requirements of Special Coal Lease Stipulation #17 is included as Appendix 7-51. In order to clarify that the intent of Stipulation #17 is met, the Division has requested (Task ID #2023) that text in the MRP should reflect that an uninterrupted supply of culinary water will be assured irrespective of whether mining can be conclusively shown to have affected Little Bear Spring. Specifically, text in Section 7.24.1, Mitigation and Control Plan, stating “Should it be necessary to develop alternate water supplies due to unexpected diminution or interruption of flows as a direct result of mining activities...” should also reference the additional protection placed on Little Bear Spring. Text in Section 7.27, Alternative Water Source Information, stating “Mitigation for potential disruption to Little Bear Spring will be accomplished ... if mining activity in the South Crandall lease tract affect the quality or quantity of the spring” should be changed to be consistent with the language of Stipulation #17. These changes have been made to the M&RP text.

### **Surface Water Monitoring**

The existing surface water monitoring plan has been updated to include the monitoring of four creeks with six monitoring sites located within and adjacent to the South Crandall lease area and the additional 40-acre sublease area as shown on Plate 7-18. The creeks to be monitored include: the intermittent Little Bear Canyon Creek, the ephemeral drainage in SW ¼ of Section 4 T16S R7E (Section 4 Creek), the ephemeral drainage located along the west permit boundary along the border of Sections 5 and 6 T16S R7E, and the intermittent creek in Section 5 T16S R7E that drains into Crandall Creek downstream of the Genwal surface facilities (Section 5

Creek). Little Bear Canyon Creek and Section 4 Creeks will be monitored approximately 100 feet above their confluence with Huntington Creek, the drainage along the west permit boundary will be monitored at station IBC-1 above the confluence with Crandall Creek, and Section 5 Creek will be monitored above the confluence with Crandall Creek and at two stations located at the confluence of the drainages upper left and right forks. All of the creek sites will be monitored for the field and laboratory water quality parameters listed in Table 7-8. Protocols for monitoring are listed in Table 7-10 of the M&RP.

#### **Acid- and Toxic-Forming Materials and Underground Development Waste**

The existing M&RP has not been updated for the South Crandall lease area or the additional 40-acre sublease area. If waste rock is generated, the mine has committed to a program of testing the waste rock for acid- or toxic-forming materials. If such materials are identified, then the waste rock will be contained prior to proper disposal.

#### **Transfer of Wells**

Transfer of wells is not currently considered. Any future transfers will be in accordance with DOGM approval.

#### **Discharges Into An Underground Mine**

There are no planned discharges into underground mines for the South Crandall lease area or the additional 40-acre sublease area.

#### **Gravity Discharges From Underground Mines**

There are no gravity discharges currently planned from the South Crandall lease area or the additional 40-acre sublease area. No mention specifically regarding discharge from the lease areas are made. The mine must obtain a NPDES permit for any water discharge from the lease areas.

#### **Water-Quality Standards And Effluent Limitations**

No new disturbed surface areas are proposed for the South Crandall lease area or the additional 40-acre sublease area.

#### **Diversions: General**

No new disturbed surface areas are proposed for the South Crandall lease area or the additional 40-acre sublease area.

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**Diversions: Perennial and Intermittent Streams**

No new disturbed surface areas are proposed for the South Crandall lease area or the additional 40-acre sublease area.

**Diversions: Miscellaneous Flows**

No new disturbed surface areas are proposed for the South Crandall lease area or the additional 40-acre sublease area.

**Stream Buffer Zones**

No underground mining within 100 feet of a perennial stream is proposed for the South Crandall lease area or the additional 40-acre sublease area.

**Sediment Control Measures**

No new disturbed surface areas are proposed for the South Crandall lease area or the additional 40-acre sublease area.

**Siltation Structures: General**

No new disturbed surface areas are proposed for the South Crandall lease area or the additional 40-acre sublease area.

**Siltation Structures: Sedimentation Ponds**

No new disturbed surface areas are proposed for the South Crandall lease area or the additional 40-acre sublease area.

**Siltation Structures: Other Treatment Facilities**

No new disturbed surface areas are proposed for the South Crandall lease area or the additional 40-acre sublease area.

**Siltation Structures: Exemptions**

No new disturbed surface areas are proposed for the South Crandall lease area or the additional 40-acre sublease area.

### **Discharge Structures**

No new disturbed surface areas are proposed for the South Crandall lease area or the additional 40-acre sublease area.

### **Impoundments**

No new disturbed surface areas are proposed for the South Crandall lease area or the additional 40-acre sublease area.

### **Ponds, Impoundments, Banks, Dams, and Embankments**

No new disturbed surface areas are proposed for the South Crandall lease area or the additional 40-acre sublease area.

### **Findings:**

Hydrologic Resource Information is sufficient to meet the requirements of the Coal Mining Rules.

## **RECLAMATION PLAN**

### **HYDROLOGIC INFORMATION**

Regulatory Reference: 30 CFR Sec. 784.14, 784.29, 817.41, 817.42, 817.43, 817.45, 817.49, 817.56, 817.57; R645-301-512, -301-513, -301-514, -301-515, -301-532, -301-533, -301-542, -301-723, -301-724, -301-725, -301-726, -301-728, -301-729, -301-731, -301-733, -301-742, -301-743, -301-750, -301-751, -301-760, -301-761.

### **Analysis:**

#### **Hydrologic Reclamation Plan**

No update to the existing hydrologic reclamation plan was submitted because no new surface disturbance is planned for the South Crandall lease area or the additional 40-acre sublease area.

### **Findings:**

The permittee has submitted sufficient information to address this section.

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## CUMULATIVE HYDROLOGIC IMPACT ASSESSMENT

Regulatory Reference: 30 CFR Sec. 784.14; R645-301-730.

### **Analysis:**

The Division has updated the East Mountain Cumulative Hydrologic Impact Assessment (CHIA) (March 23, 2005) to incorporate the expansion of the Crandall Canyon Mine into the South Crandall Canyon lease tract and the SITLA/Pacificorp sublease tract. Hydrogeologic information provided by the amendment was adequate for the Division to complete this update.

### **Findings:**

The information reported meets the minimum CHIA requirements of the Regulations.

### **RECOMMENDATIONS:**

The hydrologic information provided meets requirements of the Coal Mining Rules. The proposed amendment should be approved.