

0024



# State of Utah

DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF OIL, GAS AND MINING

Michael O. Leavitt  
Governor

Ted Stewart  
Executive Director

Lowell P. Braxton  
Division Director

1594 West North Temple, Suite 1210

PO Box 145801

Salt Lake City, Utah 84114-5801

801-538-5340

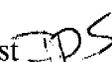
801-359-3940 (Fax)

801-538-7223 (TDD)

December 16, 1997

TO: File

THRU: Joe Helfrich, Permit Supervisor 

FROM: James D. Smith, Reclamation Specialist 

RE: Technical Analysis - Chapter 7 Revision - Amendment ACT/041/002-AM97A,  
Canyon Fuel Company, SUFCO Mine, ACT/041/002, File 2, Sevier County, Utah.

## SUMMARY

The Division received a revised version of Chapter 7 of the SUFCO Mine MRP from Canyon Fuel Company on March 27, 1997. It contained proposed modifications of the water monitoring program, a revised interpretation or model of the hydrogeology and ground-water systems, and a revised PHC determination. The March submittal also included an amended Spill Prevention Control and Countermeasure (SPCC) plan as Appendix 7-6, and the UPDES permit renewal (effective May 1, 1996) as Appendix 7-7.

The revision of Chapter 7 was based largely on a study of the SUFCO mine area by Mayo and Associates. A report on the Mayo study was submitted as Appendix 7-17. The outstanding feature of the Mayo and Associates study is the use of isotopes that are found in ground water to determine mean-residence time ("age") and other characteristics that might be used to differentiate ground-water systems. The report contains an interpretation or model of the hydrogeology that appears to limit or eliminate vertical flow of ground water from the surface down to the coal seam and to isolate ground-water systems in the lower Blackhawk from shallower systems. However, the hydrogeologic model actually discussed within the revised Chapter 7 is not as restrictive and interception of ground and surface water by mining operations and by subsidence-induced fractures are addressed.

Separate TA's were prepared by James D. Smith and Steven M. Johnson that, with additional comments from Peter Hess, were compiled into a final Technical Analysis (TA) dated June 3, 1997. U. S. Forest Service (USFA) comments on the Chapter 7 revision were received on May 5, 1997 and were incorporated into that TA.

Canyon Fuel Company's response to the June 3, 1997 TA was received by the Division on November 5, 1997. A letter, dated 28 October, 1997 accompanied the response

and contained information that is pertinent to several of the deficiencies and that should be included in the MRP. As part of the response to the TA Canyon Fuel Company submitted additional water rights information for Appendix 7-1 and a modified Table 4.7.2-2 for Volume 3.

Several deficiencies remain to be corrected before the Chapter 7 revision is ready to be inserted into the MRP. No TA was done beyond Section 7.3.1.2; Canyon Fuel Company's submittal indicated that, except for pagination, there were no changes from the current Chapter 7 beyond that section. (Pagination will change with the final submittal of the revision because the redline and strikeout markings are to be removed.) This TA does not contain or repeat those sections of previous TA's that found the submitted material to be adequate: these will be included in the final TA. Peter Hess's comments have been addressed in the Storm Water Pollution Prevention Plan, which is not part of the MRP.

### **TECHNICAL ANALYSIS**

## **ENVIRONMENTAL RESOURCE INFORMATION**

### **HYDROLOGIC RESOURCE INFORMATION**

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

#### **Analysis:**

##### **Baseline information.**

##### **Ground-water information.**

No water supply wells exist in the permit or adjacent areas. Water rights and seasonal usage of springs and other ground-water resources for the permit and adjacent areas are listed in Appendix 7-1. Baseline data on seasonal quality and quantity of ground water are in the current MRP, and updated information is included in the Chapter 7 amendment.

Water-quality descriptions generally include total dissolved solids or specific conductance corrected to 25°C, pH, total iron, and total manganese. Ground-water quantity descriptions generally include approximate rates of discharge and depths to water in the coal seam and each water-bearing stratum above and potentially impacted stratum below the coal.

Comments from the USFS point out that two different estimates for recharge are cited: 1.2 percent of total precipitation to the upper Price River Formation and Castlegate Sandstone on page 7-5 (Thiros and Cordy, 1991) and 3 to 8 percent of total precipitation in the region (Danielson and Sylla, 1983) on page 7-10. (See the MRP for complete reference citations.) There is some potential for confusion in citing two different estimates in different parts of the MRP, but the actual effect, for example in conceptualizing the hydrologic balance of the area or determining the PHC, appears to be inconsequential.

### **Surface-water information.**

Plate 2 shows the name and location of all streams. Water rights are listed in Appendix 7-1 and shown on Plate 7-2. There are several stock-watering ponds in and adjacent to the permit area. Names, locations, and ownership of these impoundments are shown on Plate 7-2, which includes a table that cross references water-right numbers with names commonly used by the USFS, cattlemen, and others. The three permitted discharge points for the Convulsion Canyon Mine, UPDES 001, UPDES 002, and UPDES 003 are shown on Plate 7-3. Locations of baseline surface- and ground-water monitoring stations are shown on Plate 7-3.

Baseline information on surface-water quality and quantity sufficient to demonstrate seasonal variation and water usage is in the MRP. Surface water-quality descriptions generally include information on total suspended solids, total dissolved solids or specific conductance corrected to 25°C, pH, total iron, and total manganese. There is little potential for acid drainage from the proposed mining operation. Water-quantity descriptions include seasonal flow rates.

Stipulation 17 of the USFS lease requires that the lessee replace the loss of any surface water identified for protection, not just water covered by water rights. A commitment is made on page 7-38 in the Chapter 7 revision to clarify that SUFCO will replace loss of any surface water identified for protection in the MRP.

### **Probable hydrologic consequences (PHC) determination.**

The Chapter 7 revision contains a determination of the probable hydrologic consequences (PHC) of the proposed operation based upon the quality and quantity of surface and ground water under seasonal flow conditions for the proposed permit and adjacent areas. The PHC determination is based on baseline hydrologic, geologic, and other information collected for the permit application and on operational data. In addition, isotopes that occur in ground water naturally or as a result of human activity (but not deliberately introduced) have been measured at numerous locations in the permit area. Isotope data have been used to determine mean-residence time ("age") of the ground waters and other characteristics that might be used to differentiate between ground-water systems.

The PHC determination includes findings on whether adverse impacts may occur to the hydrologic balance. A potential exists for acid- or toxic-forming materials to be present in areas of the mine, but mine-water discharge data indicate there has been no known impact to surface or ground water in the permit and adjacent areas. Alkalinity of mine discharge water typically exceeds acidity by a factor of twenty. Sediment yield may increase locally because of subsidence, but any such increase will be minor and of short duration. Discharges from sediment ponds have exceeded standards for total suspended solids, but the average total suspended solids concentration has been less than the average daily standard and sediment control measures at the mine appear effective in minimizing impacts of increased sediment yield to the streams. Mine discharges have the potential to increase total dissolved solids, particularly sulfate, in receiving streams; however, discharge standards have not been exceeded and the nature of the receiving waters is such that the impact of the increased dissolved-solids is not significant.

Perennial streams are not to be subsided. Ephemeral stream channels will be subsided but impacts are expected to be minimal. Subsidence may decrease spring flow if fractures intercept ground water.

Fractures caused by subsidence are discussed on page 7-36. The sporadic flow typical of ephemeral streams carries a large sediment load that will contribute to filling or healing of subsidence cracks.

A concept that is frequently proposed for general application throughout the Wasatch Plateau has been cited, that is: when subsidence-induced fractures intercept the abundant mudstone, claystone, and shale strata of the Blackhawk, Price River, and North Horn Formations, plastic flow and swelling clays (such as montmorillonite) quickly seal the fractures and stop any flow of intercepted water through the fractures. Impacts to surface and ground water from subsidence induced fractures are expected to be minimal.

However, the Castlegate Sandstone crops-out extensively in the area and subsidence cracks in this brittle and clay-poor unit often do not seal quickly enough to prevent impacts to water resources, as demonstrated in the draining of Rock Pond in 1995. Canyon Fuel Company proposes that silt and organic material, such as pine needles and other debris, eventually fill and seal subsidence cracks in the Castlegate Sandstone. Under such conditions impacts to the hydrologic resources may last longer but are not permanent.

Declines of flow from several springs and declines in water level in several wells are attributed in part to decreases in precipitation and resultant lower rates of ground-water recharge. Lower precipitation rates are supposed to be indicated by data in Appendix 7-5 and Figure 2 of Appendix 7-17, but the data in these referenced sections do not clearly indicate any periods of decreased precipitation. A plot of Palmer Hydrologic Drought Index (PHDI) data in Figure 2a shows that periods of severe to extreme drought, along with severe to extreme wet

spells, have occurred in the region during the periods discussed, but a correlation between spring flows and well levels and dry and wet spells as indicated by the PHDI has not been made.

From 1988 through 1995 the rate at which water was discharged from the mine went from approximately 450 gpm to 1,000 gpm. By 1996 the rate was up to over 1,600 gpm (Figure 12, Appendix 7-17). Water being pumped from the mine is bypassing the normal flow path through the subsurface to the streams, but the overall hydrologic balance of the Quitchipah drainage is maintained. After cessation of mining, discharge from the mine will also cease and reclamation will return disturbed stream channels to a stable state. When mine discharge stops, Quitchipah Creek can be expected go dry in the summer.

The potential for hydrocarbon contamination is small. The mine road is not salted within the permit area so contamination from road salt is not a concern. Coal-hauling trucks are covered so fugitive dust is considered insignificant. Also, probable impacts from a spill of an entire truckload of coal are considered small.

The PHC previously contained an estimate of ground water lost from the Quitchipah basin based on moisture in the produced coal. This estimate has been revised to include only the as-shipped moisture (p. 7-36). This changes the estimate of loss from 180 acre-feet per year to 80 acre-feet per year.

#### **Ground-water monitoring plan.**

The Chapter 7 revision includes information on the baseline ground-water monitoring. The original PHC determination was based on analysis of all baseline hydrologic, geologic, and other information. The MRP provides for the monitoring of parameters that relate to the suitability of the ground water for current and approved postmining land uses and to the objectives for protection of the hydrologic balance. It identifies the quantity and quality parameters to be monitored, sampling frequency, and site locations in Tables 7-2, 7-3, 7-4, and 7-5. The MRP describes how the data may be used to determine the impacts of the operation upon the hydrologic balance. Monitoring data are submitted to the Division at least every 3 months and in an annual summary.

#### **Findings:**

Information provided in the proposed amendment is considered adequate to meet the requirements of the hydrologic resource information section.

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

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

### **Analysis:**

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

A new version of Plate 7-3 has been submitted as part of the proposed amendment to show locations and approximate elevations for monitoring stations used to gather baseline and operational data on surface and ground water and UPDES discharge locations.

The proposed amendment does not require any changes to maps that show elevations and locations of sites for monitoring fish and wildlife and air quality.

#### **Surface Water Resource Maps**

There are no water-supply intakes for current users of surface waters flowing into, out of, and within a hydrologic area. The three permitted discharge points for the Convulsion Canyon Mine, UPDES 001, UPDES 002, and UPDES 003 and the are shown on Plate 7-3. Surface waters that will receive discharges from affected areas in the proposed permit area are shown on Plates 7-2 and 7-3. Location of surface water bodies such as streams and springs within the proposed permit and adjacent areas are shown on Plates 7-2 and 7-3. There are no known lakes, constructed or natural drains, and irrigation ditches within the proposed permit and adjacent areas. There are several stock-watering ponds in and adjacent to the permit area. Names, locations, and ownership of these impoundments are shown on Plate 7-2, which includes a table that cross references water-right numbers with names commonly used by the USFS, cattlemen, and others.

#### **Certification**

Plates 7-2, 7-3, and 7-15-1, the only cross sections, maps, and plans included in the Chapter 7 revision to satisfy the requirements of the Coal Mining Rules, were prepared by and certified by a registered, professional engineer.

### **Findings:**

Information provided in the proposed Chapter 7 revision is considered adequate to meet the requirements for the maps, plans, and cross sections of the hydrologic resource

information section.

## **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, -300-148, -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:**

##### **Ground-water monitoring.**

Canyon Fuel Company needs to demonstrate that monitoring locations and parameters are no longer necessary before the Division can approve modification of the operational monitoring plan. For clarity, flow measurement should be included in Tables 7-4 and 7-5. Total hardness, total alkalinity, dissolved iron, and dissolved manganese are currently included in the operational ground- and surface-water monitoring plans but have been omitted, without discussion in either Appendix 7-17 or the Chapter 7 revision, from Tables 7-4 and 7-5.

The Chapter 7 revision includes an operational ground-water monitoring plan beginning on page 7-39 and in Tables 7-2, 7-3, and 7-5 (Section 7.3.1.2). The plan is based upon the PHC determination and the analysis of all baseline hydrologic, geologic, and other information. Except as noted above, the plan provides for the monitoring of parameters that relate to the suitability of the ground water for current and approved postmining land uses and to the objectives for protection of the hydrologic balance. Except as noted above, the plan identifies operational monitoring sites, quantity and quality parameters to be monitored, and sampling frequency in Tables 7-2, 7-3, and 7-4 and shows baseline and operational monitoring locations on Plate 7-3. The plan describes how the data may be used to determine the impacts of the operation upon the hydrologic balance. Ground-water monitoring data are to be submitted to the Division at least every 3 months and in an annual summary. Ground-water monitoring will continue through the mining and post-mining periods until bond release.

Both water-quality and water-level monitoring are to be continued at the waste-rock-disposal site (p. 7-39). Information on parameters to be measured and frequency of measurements is currently in Volume 3 of the MRP. In a letter to DOGM (received May 5, 1997) the US Forest Service requested that determination of boron and selenium be continued; boron and selenium have been added to the operational monitoring parameter list in Table 4.7.2-2 of Volume 3.

The proposed ground-water monitoring plan eliminates eleven wells from water depth measurement. No new wells are proposed. Varied reasons are given for abandoning measurements at US-77-8, US-77-9, US-79-9, US-79-10, US-81-1, US-81-2, US-81-3, 89-20-2, and 89-21-1. (p. 66, Appendix 7-17) including: the wells have been destroyed by mining; water is no longer accessible due to casing failure; or cement filling the bore hole below the well screen has failed and opened the bottom of the well to new, indeterminable sources of ground water. Canyon Fuel Company recommends abandonment of monitoring at US-77-7 and US-79-12 because they are located in areas that were mined before 1991 and far from current or projected mining.

Quarterly monitoring reports on file with DOGM show US-77-8, US-81-1, US-81-2, 89-20-2, and 89-21-1 as failed wells, 89-21-1 apparently having been intercepted by mine operations in 1996. Records show US-77-7, US-79-9, and US-79-12 have always been dry. Dropping these eight wells from the monitoring plan is reasonable and should cause no problem or loss of useful information related to protection of the hydrologic balance.

US-77-9 is open to the lower Castlegate Sandstone and upper Blackhawk Formation, and US-79-10 is open to the upper Hiawatha Coal Seam. These two wells were dry up to 1994 and 1995, respectively, through both wet and dry periods as indicated by the PHDI data in Figure 2a of Appendix 7-17. Since 1994-1995 water levels have been measured consistently (up to October 1996), but at levels deeper than where the bottom of the casing should be, indicating a failure of the cement sealing the bottom of these bore holes. The recent appearance of water in US-77-9 and US-79-10 most likely does not represent saturation of a zone that was previously unsaturated, and the origin of this water is unknown. Because of the apparent failure of the cement, and also possibly of the casing, and the uncertainty of the origin of the water that is being measured, continued monitoring of these two wells would be of questionable value. The data that indicate failure of US-77-9 and US-79-10 are in Table 7-1 of Chapter 7 and in Appendix 7-3 and are discussed on pages 42 and 49 in Appendix 7-17. Continued monitoring of these two wells was not recommended by Mayo and Associates in their report in Appendix 7-17.

US-81-3 was marked "inaccessible" in the fourth quarter 1996 and has apparently been inaccessible several times in the past, but otherwise it provides a good long-term record of water levels in the upper Hiawatha Coal Seam. US-81-3 is located in an area that has never been mined and the probability of casing failure due to subsidence is minimal or non-existent.

US-81-3 monitors an area that has been a concern to water users in the past due to loss of flow at several nearby springs. Quarterly measurement of ground-water levels at US-81-3 should continue, if possible. Canyon Fuel Company indicated in the 28 October, 1997 letter that water level measurements are frequently not possible due to collapse or blockage of the casing. However, this information is not in the Chapter 7 revision in support of the proposal to drop this well from the monitoring plan.

The water level in well US-80-4, open to the Castlegate Sandstone, rose six feet following first and second mining below the well in 1983. In August 1985 there was a twenty foot decline, following which water levels declined slowly through 1992. Data collected since 1993 appear to show that the water level has stabilized and may even be increasing. The period from 1993 to 1996 was a dominantly wet period according to the PHDI data shown in Figure 2b of Appendix 7-17. US-80-4 is near US-77-9, which is proposed to be removed from the operational monitoring plan because of possible cement or casing failure. In order to provide information on adjustments of the hydrologic systems to the effects of mining, responses of the hydrologic systems to changes in recharge and climatic conditions, or other factors important to understanding the hydrology and hydrogeology of the permit and adjacent areas and protection of the hydrologic balance, monitoring of water levels in US-80-4 will continue, but yearly rather than quarterly.

A longwall entry was driven near the location of well US-79-13 in 1981 and a longwall panel passed nearby in 1988. The well is open to a sandstone unit that lies approximately two-hundred feet above the upper Hiawatha Coal Seam. Water levels have been measured in this well since 1982 and have shown no long-term change. Information from this well appears to support the concept of little to no hydrologic communication between the coal seam and overlying, saturated strata. The planned yearly monitoring of this well should be sufficient as long as water levels remain consistent with past measurements.

The proposed amendment includes monitoring of seven springs: SUFCO 001, SUFCO 0047, SUFCO 057A, SUFCO 0089, GW-13, GW-20, and GW-21. With the exception of GW-20, these springs are monitored under the current MRP.

Spring 057A has usually been dry during the period it has been monitored, but it had measurable flow in 1987 (the first year of monitoring), 1993, and 1995. Flow appears perhaps to be sensitive to the amount of precipitation. Spring 057A is the only spring that has been monitored in the Duncan Draw - Mud Spring Hollow area, which has been an area of concern to water users in the past due to loss of flow from several springs, including 057A. Quarterly measurement of flow at 057A is to be continued.

Under the water monitoring plan in the proposed amendment, monitoring of in-mine roof drip 062 is to be discontinued. Chemical characteristics of water from this roof drip are well established; water-quality analyses from 1983 to 1996 show little variation. This site is

located in the main entry of the mine, and active mining in the vicinity has ceased. The volume of water flowing from this drip has been 0.4 gpm or less since 1986. Continued monitoring will probably yield no significant information.

Equipment, structures, and other devices used in conjunction with monitoring the quality and quantity of ground water onsite and offsite have been properly installed, maintained, and operated. The proposed amendment states that where feasible, this equipment will be removed by the operator when no longer needed. USFS comments point out that Stipulation 15 of the USFS lease unconditionally requires removal of this equipment and the phrase "where feasible" in the proposed permit should be removed as it does not excuse the permittee from this lease obligation.

### **Surface-water Monitoring**

Canyon Fuel Company needs to demonstrate that monitoring locations and parameters are no longer necessary before the Division can approve modification of the operational monitoring plan. Flow measurement is discussed in the text, but for clarity flow measurement should be included with the parameters listed in Tables 7-4 and 7-5. Total hardness, total alkalinity, dissolved iron, and dissolved manganese are currently included in the operational ground- and surface-water monitoring plans but have been omitted from Tables 7-4 and 7-5 without discussion in either Appendix 7-17 or the Chapter 7 revision.

Canyon Fuel Company proposes to continue to monitor six surface water sites, two less than in the currently approved MRP. Plate 7-3 shows four baseline or "historic" stream monitoring sites that include 022 and 030, two sites that are currently monitored but that Canyon Fuel Company apparently intends to stop monitoring upon approval of this revision of Chapter 7.

The Chapter 7 revision includes an operational surface-water monitoring plan beginning on page 7-48 and in Tables 7-2, 7-3, and 7-5 (Section 7.3.1.2). The plan is based upon the PHC determination and the analysis of all baseline hydrologic, geologic, and other information. Except as noted above, the plan provides for the monitoring of parameters that relate to the suitability of the surface water for current and approved postmining land uses and to the objectives for protection of the hydrologic balance. Except as noted above, the plan identifies operational monitoring sites, quantity and quality parameters to be monitored, and sampling frequency in Tables 7-2, 7-3, and 7-5 and shows baseline and operational monitoring locations on Plate 7-3. The plan describes how the data may be used to determine the impacts of the operation upon the hydrologic balance. Surface-water monitoring data are to be submitted to the Division at least every 3 months and in an annual summary. Surface-water monitoring will continue through the mining and post-mining periods until bond release.

Flows have been measured only occasionally at sites 022 in Mud Spring Canyon and

030 in East Spring Canyon, both just above the mine. These two surface-water monitoring stations have not been included in the operational monitoring plan in the revised Chapter 7. There is no discussion of reasons for discontinuing monitoring of 022 and 030 in the Chapter 7 revision or Appendix 7-17.

Stations USFS-109 and USFS-110 have not been monitored since 1991 and they were not included in the operational monitoring plan in the current MRP. No documentation could be found in the Division's files for approval to remove these two stations from the monitoring plan, but the removal appears to have taken place at the time of the 1992 permit renewal.

In the Chapter 7 revision, 047A is listed with the stream-monitoring sites in Table 7-2, discussed on page 7-24 under surface-water quality, and shown as a stream monitoring site on Plate 7-3. However, in Appendix 7-17 this site is identified as a spring in Table A-1, in Figure 17, and in the text on pages 41, 57, and 68; on page 57 it is described as discharging as a series of small springs in the bottom of a normally dry wash. According to the October 28, 1997 letter from Canyon Fuel Company, monitoring station 047A is in the stream bed and is a surface-water monitoring site, but it is spring fed except during spring runoff or a storm event. This explanation or description of 047A, which helps clarify the apparent discrepancies between Chapter 7 and Appendix 7-17, is not found in the Chapter 7 revision.

### **Findings:**

Information provided in the proposed Chapter 7 revision not is considered adequate to meet the requirements of the hydrology operation plan. Prior to approval Canyon Fuel Company needs to provide the following in accordance with:

**R645-301-731.210, -731.220, -731.214, -731.224,** Canyon Fuel Company needs to demonstrate that monitoring locations and parameters are no longer necessary before the Division will approve modification of the operational monitoring plan. There is no discussion of reasons for discontinuing operational monitoring at surface-water monitoring sites 022 and 030. Total hardness, total alkalinity, dissolved iron, and dissolved manganese are currently included in the operational ground- and surface-water monitoring plans but have been omitted from Tables 7-4 and 7-5 without discussion in either the Chapter 7 revision or Appendix 7-17. Flow measurement is discussed in the text, but for clarity flow measurement should be listed with the parameters in Tables 7-4 and 7-5.

**R645-301-722.100, -731.210,** Quarterly measurement of ground-water levels at US-81-3 should continue, if possible. Canyon Fuel Company indicated in the October 28, 1997 letter that water level measurements are frequently not possible due to collapse or blockage of the casing. However, this information is

not in the Chapter 7 revision or Appendix 7-17 in support of the proposal to drop this well from the monitoring plan.

**R645-301-731.210, -731.220,** In the Chapter 7 revision 047A is listed with the stream-monitoring sites in Table 7-2 and shown as a stream monitoring site on Plate 7-3. However, in Appendix 7-17 this site is identified as a spring in Table A-1, in Figure 17, and in the text on page 68. According to the October 28, 1997 letter from Canyon Fuel Company, monitoring station 047A is in the stream bed and is a surface-water monitoring site. But it is spring fed except during spring runoff or a storm event. This explanation or description of 047A, which helps clarify the apparent discrepancies between Chapter 7 and Appendix 7-17, is not in the Chapter 7 revision.

## **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.

### **Monitoring Sampling Location Maps**

A new version of Plate 7-3 has been submitted as part of the proposed amendment to show locations and approximate elevations for monitoring stations used to gather data on water quality and quantity. Plate 7-3 shows both "historic" and operational well and stream monitoring sites.

### **Certification Requirements.**

Plates 7-2, 7-3, and 7-15-1, the only cross sections, maps, and plans included in the proposed Chapter 7 revision to satisfy the requirements of the Rules, were prepared by and certified by a registered, professional engineer.

### **Findings:**

Information provided in the proposed Chapter 7 revision is considered adequate to meet the requirements for maps, plans, and cross sections of the hydrologic section of the operation plan.

Chapter 7 Revision- Amendment to MRP  
ACT/041/002-97A  
June 3, 1997  
Page 13

## **CUMULATIVE HYDROLOGIC IMPACT ASSESSMENT**

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

In 1989 the Division prepared an assessment of the probable cumulative hydrologic impacts (CHIA) of the proposed operation and all anticipated mining upon surface- and ground-water systems in the cumulative impact area, covering Muddy and Quitchipah drainages. The CHIA determined that the proposed operation has been designed to prevent material damage to the hydrologic balance outside the permit area. The proposed amendment does not provide any information that indicate a need to change that determination. However, the CHIA needs to be updated to include recent information.

### **RECOMMENDATION**

Prior to approval of the revised Chapter 7 of the Convulsion Canyon Mine MRP, the requirements of the Coal Mining Rules must be met as outlined above.