



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

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)

Michael O. Leavitt
Governor
Lowell P. Braxton
Division Director

October 22, 1998

TO: File

THRU: Daron Haddock, Permit Supervisor

FROM: James D. Smith, Reclamation Specialist

RE: Round Two - Technical Analysis of Permit Application, Canyon Fuel Company, Dugout Canyon Mine - Phase II, ACT/007/039-98-1, File 2, Carbon County, Utah

DRH
JDS

SUMMARY

The Permit Application Package (PAP) for the Dugout Canyon Mine was approved by UDOGM and the permit was issued March 16, 1998. Construction at the mine site began in May 1998. One purpose of this Phase II submittal is to incorporate a parcel of BLM land located at the downstream end of the disturbed area to better accommodate a sedimentation pond for the mine pad. Other changes are also being made to the mine plan, such as water storage tanks up the canyon from the main pad area, expanded coal storage, and relocation of the electric-power sub-station, to better facilitate mining operations.

A Technical Analysis (TA), dated August 25, 1998, of the Phase Two application was sent to Canyon Fuel Company. The response from Canyon Fuel Company was received by UDOGM on September 11, 1998. The sections in this TA are intended to replace the corresponding sections in the August 25 TA, additions or changes having been made due to the permittee's responses to deficiencies and the resulting changes in pagination in the MRP.

TECHNICAL ANALYSIS

ENVIRONMENTAL RESOURCE INFORMATION

GEOLOGIC RESOURCE INFORMATION

Regulatory Reference: 30 CFR Sec. 784.22; R645-301-623, -301-724.

Analysis:

Geologic information includes a description of the geology of the proposed permit and adjacent areas down to and including the stratum immediately below the lowest coal seam to be mined and the aquifer below the lowest coal seam to be mined that may be adversely impacted by mining. This description includes the areal and structural geology of the permit and adjacent areas, and other

parameters that influence the required reclamation. It also shows how areal and structural geology may affect the occurrence, availability, movement, quantity, and quality of potentially impacted surface and ground water. The description is based on maps and plans required as resource information for the plan, detailed site specific information, and, geologic literature and practices.

Descriptions of the stratigraphy and lithology of strata from the Mancos Shale up to the Colton Formation and of Quaternary pediment gravels and alluvium are in Section 624.100. That section also contains a discussion of geologic structure and a very brief description of the nature, depth, and thickness of the coal seams and the interburden between the Sunnyside, Rock Canyon, and Gilson seams. Plate 6-4 is an isopach map of the Rock Canyon seam overburden thickness and Plate 6-5 is an isopach map of the Rock Canyon to Gilson seam interburden thickness. Plates 6-6 and 6-7 in the Confidential binder are, respectively, isopach thickness maps of the Rock Canyon and Gilson seams.

The Gilson and Rock Canyon seams are both sufficiently developed to allow for economic mining in the proposed permit area but only the Rock Canyon seam is to be mined under the proposed MRP. Movable coal in the Rock Canyon seam ranges from 5 to 8 feet in thickness (p. 6-15). Although the current permit application does not include federal acreage, an R2P2 for the logical mining unit that includes Soldier Canyon and Dugout Canyon Mines and federal lease U-07064-027821 is included in the Confidential binder.

Appendix 6-1 (Confidential binder) contains cutting and core logs for drill holes 3-1, 9-1, 9-2, 10-1, 11-1, 13-1, 13-2, 14-1, 15-1, 15-2, 15-3, 19-2, HCC-4 (H-4), KCC-A and KCC-E. Collar or ground elevations are included in Appendix 6-1. Drill hole locations and elevations are shown on Plate 6-1.

Some bore holes have been logged from the surface to total depth, for others only the coal seams and adjacent strata have been logged. Together, the logs describe lithologic characteristics and thickness of each stratum from the surface to below the coal seams. Ground water occurrence was not marked on these logs at the time the holes were bored (p. 6-17). Bore hole logs were used to construct the cross sections on Plate 6-3, which show the interval from the Sunnyside coal zone to below the Gilson coal zone. Figure 6-1 is a more general cross section from the surface to the Mancos Shale.

Analysis reports on coal, floor, and roof samples from the Rock Canyon and Gilson seams are found in Appendix 6-2 (Confidential binder). Floor and roof samples of the Rock Canyon seam were collected from one of the portals of the abandoned Rock Canyon seam mine in Dugout Canyon (portals shown on Plate 5-1) and a sample of coal was taken from a fresh coal outcrop located a few-hundred feet inside. The location where the coal, roof, and floor samples were collected for the Gilson seam is shown on Figure A1 in Appendix 6-2 in the Confidential binder.

Samples were analyzed for acid- or toxic-forming and alkalinity-producing materials, including total sulfur but not pyritic or other specific forms of sulfur. BTU, ash, and sulfur content of the Rock Canyon coal are briefly summarized at the end of Section 624.100. No unacceptable values were reported for the parameters listed in Table 2 of UDOGM's "Guidelines for Management of Topsoil and Overburden for Underground and Surface Coal Mining."

Data from one location are probably insufficient to determine the potential for acid- and toxic-forming materials for the entire proposed mine. However, waste material from the mine is not to be

used in reclamation. (Although not part of this permit submittal, future development of a waste-rock disposal site has been contemplated.) Limited topsoil will be available for reclamation, so selected overburden materials from the facilities area and B and C horizon soils from the sediment pond area will be used as substitute topsoil and growth media during reclamation. Current information indicates these materials are within acceptable acid- and toxic-forming parameters (Table 2-1). Data from the adjacent Soldier Creek Mine and other operations in the Book Cliffs support the determination of low potential for acid- and toxic-forming or alkalinity-producing material. The MRP contains a commitment (p. 2-33) that where overburden materials are used to supplement topsoil, they will be used only after it has been demonstrated that the resultant soil is suitable for supporting revegetation.

Clay content was determined for the roof and floor rock samples. The sample from the roof of the Gilson seam contained 20 % clay, but clay content of the other roof and 2 floor samples was less than 10 %. Drill-hole logs indicate lithology of strata immediately above and below the minable coal varies within the permit and adjacent areas. Several factors, such as thickness of overburden, use of a 35^o angle of draw in formulating the subsidence control plan, anticipation that most of the land within the permit area will eventually be affected by subsidence, and the low potential for material damage from subsidence indicate additional determination of engineering properties of roof and floor rock would be of little value. No additional determinations of thickness and engineering properties of clays or soft rock are needed prior to approval of the proposed MRP.

Rock Canyon coal thickness in the proposed permit area ranges from 5 to 8 feet, except for a want in the north-central part of the proposed permit area, where coal thins to under 3 feet (Plate 6-6). Maximum subsidence can be projected as 3.5 to 5.6 feet, based on the assumption that the surface will subside up to 70% of the thickness of the extracted coal. Overburden thickness ranges from 600 feet in the south part of the proposed permit area to over 2,400 feet in the north. Overburden consists of the upper Blackhawk Formation, the Castlegate Sandstone, and the Price River, North Horn, and Flagstaff Formations, which are described in Section 624.100. Gilson to Rock Canyon interburden thickness is 30 to 80 feet over most of the proposed permit area, and up to 100 feet at the west edge (Plate 6-5), and Rock Canyon to Sunnyside thickness is 140 to 180 feet.

The application includes geologic information in sufficient detail to assist in determining the probable hydrologic consequences of the operation upon the quality and quantity of surface and ground water in the permit and adjacent areas, including the extent to which surface and ground water monitoring is necessary; and determining whether reclamation as required by the R645 Rules can be accomplished and whether the proposed operation has been designed to prevent material damage to the hydrologic balance outside the permit area.

At this time the Division does not require the collection, analysis, and description of additional geologic information to protect the hydrologic balance, to minimize or prevent subsidence, or to meet the performance standards.

The applicant has made no request the Division to waive in whole or in part the requirements of the bore hole information or analysis required of this section. However, the applicant has requested, within the text of the PAP, that the information in Appendices 6-1 and 6-2 be kept confidential. The Applicant should provide this information in a folder or binder separate from the rest of the PAP and marked "Confidential".

Findings:

Information in the geologic resource section is considered adequate to meet the requirements of this section.

HYDROLOGIC RESOURCE INFORMATION

Regulatory Reference: 30 CFR Sec. 701.5, 784.14; R645-100-200, -301-720.

Analysis:

Baseline information.

Ground-water information.

For the initial PAP, water monitoring data that potentially met the minimum requirements of SMCRA and the Utah Coal Mining Rules was done at only 13 (6 springs and 7 in-mine locations) of the 97 sites listed in the initial PAP. On average only 3 samples were analyzed for those thirteen sites, so determination of baseline seasonal quality was minimal for specific sites; however, overall baseline ground-water quality and quantity information was considered sufficient to characterize baseline ground-water conditions for the permit area.

Four springs are to be monitored for operational water quality and quantity: SC-65, SP-20 (same as S-30), SC-14, and SC-100. Water rights have not been filed on these springs. The permittee selected these springs because "These springs are reasonably accessible and, based on the historical data, are representative of conditions within their respective formations." (Page 7-54). However, there is actually little historic data for these springs, and it is necessary to rely on data from the Soldier Canyon Mine and surrounding springs to extrapolate baseline information. These springs will be monitored quarterly, when accessible, for at least 2 years, and water samples will be analyzed for the parameters listed in Table 7-4 (page 7-54).

Water-quality samples were to have been collected during 1997. October 1997 data at SC-65, SC-100, and SP-20 were mistakenly collected as field parameters only rather than water-quality parameters, and no data at all were collected at SC-14 that month. The permittee collected no water samples nor made any determinations of field parameters during the first quarter of 1998, but by agreement with UDOGM monitoring was done early in the third quarter as representative of the second quarter. Unfortunately field parameters only, rather than water-quality parameters, were determined for these samples.

There are flow data for SC-65 from July 1976, September and October 1995, August and October 1997, and June 1998. Water-quality data were determined for August 1997, and a few water-quality parameters were determined for July 1976. Flows were measured in 1995 at other Colton Formation springs: in September and October at SC-45, SC-46, SC-50, and SC-99, and in October 1995 only at SC-110 and SC-111, but water-quality parameters were not measured. Additional water-quality data for SC-65 are needed before mining disturbs this area, which will not be at least until such time as federal lease U-07064-027821 to the east is added to the permit area. This spring will be

monitored quarterly, when accessible, for at least 2 years, and water samples will be analyzed for the parameters listed in Table 7-4 (page 7-54).

SP-20 has data from 1976 to 1981 that includes both flow and quality determinations, but total iron and manganese are notably absent; total iron and manganese were included in water-quality data from September and October 1995 and August 1997 (S-30) and operational parameters were monitored in October 1997 (S-30) and June 1998. Nearby springs that also flow from the Flagstaff Formation, SP-15, SP-17, and SP-18, have data back to June 1976 that include some total iron and total manganese concentrations. Data are available to deduce water-quality conditions for the area around SP-20, but water-quality conditions specific to SP-20 need to be determined. This spring will be monitored quarterly, when accessible, for at least 2 years, and water samples will be analyzed for the parameters listed in Table 7-4 (page 7-54).

For spring SC-14 there are flow data from September and October 1995 and June 1998, but there are no water-quality data. SC-14's flow is small but appears to be the largest from the North Horn Formation in the area. Nearby springs SC-15, SC-16, SC-16, and SC-17 that also issue from the North Horn Formation were dry when visited in 1995. SP-13, SP-16, SP-19, SC-87, and SC-102, other North Horn springs located within a few miles, were dry or had low flows or just seepage in 1995. There is basically no water-quality information for SC-14 or related springs. Additional water-quality data are needed before mining disturbs this area, which will not be until after the year 2001 according to the proposed mining sequence shown on Plate 5-7 of the MRP. This spring will be monitored quarterly, when accessible, for at least 2 years, and water samples will be analyzed for the parameters listed in Table 7-4 (page 7-54).

Spring SC-100 has flow data from September and October 1995, August and October 1997, and June 1998 but water-quality data for August 1997 only. Nearby springs SC-59, SC-82, SC-83, SC-84, SC-85, SC-104, SC-105, SC-114, and SC-115 (Flagstaff) and SC-101 (North Horn) have had low flows and no analyses for water quality. The USGS measured some water-quality parameters in nearby springs G-95, G-96, and G-97 in July 1980. Additional water-quality data are needed for SC-100 before mining disturbs this area, which will not be at least until such time as federal lease U-07064-027821 to the east is added to the permit area. This spring will be monitored quarterly, when accessible, for at least 2 years, and water samples will be analyzed for the parameters listed in Table 7-4 (page 7-54).

Surface-water information.

For the initial PAP, water monitoring data that potentially met the minimum requirements of SMCRA and the Utah Coal Mining Rules was minimal at most specific sites; however, overall surface-water quality and quantity information was considered sufficient to characterize surface-water baseline conditions for the permit area.

For DC-1, DC-2, and DC-3 surface-water quality and quantity data from August and October 1997 and April and June 1998 have been included with the proposed amendment. There are also data for DC-1 from March 1998, and additional data for DC-1 extend back to July 1976. August 1997 flows and March 1998 water-quality data for DC-4 and DC-5 have also been included; these data were collected because of a misunderstanding by the operator and these 2 sites are not scheduled for quarterly monitoring of either field or operational water-quality parameters.

Probable hydrologic consequences determination.

A PHC determination prepared by Mayo and Associates in 1996 is in Appendix 7-2. Previous studies in the vicinity of the Soldier Canyon Mine were reviewed for information on geology, hydrology, and hydrogeology and for data on discharge, sediment, and other surface and ground water parameters. Seventeen additional ground and surface water samples were collected in 1995 for chemical and isotopic analyses. In spite of a large data base, most of the analyses lack information on the basic parameters required by the Coal Mining Rules and SMCRA, and on seasonal variation. The PHC determination for the MRP begins on page 7-41. It is based on the data collected by Mayo and Associates and additional data collected in 1996 and 1997. Collection of operational data began in 1998.

Ground water and surface-water availability

Potential adverse effects to the hydrologic balance from the proposed mining operations are: both decreased and increased stream flows and spring discharges due to capture of surface or ground water by mine-related subsidence, bedrock fracturing, and aquifer dewatering; increased stream flows due to increased discharge of ground water from the Blackhawk Formation through the mine workings; and increased ground-water recharge to overlying ground water systems. It appears that the Soldier Canyon Mine has not decreased groundwater discharge in overlying or underlying groundwater systems. It is unlikely that coal mining will effect the discharges of any spring as a result of mining in the Dugout Canyon permit and adjacent areas (Appendix 7-3 and MRP - pp. 7-45 through 7-47).

Considerable seasonal and climatic variability are noted in the hydrographs of springs in the permit and adjacent areas, but data for both Soldier Creek and springs that overly the Soldier Canyon Mine workings do not show discharge declines which may be attributed to either subsidence or bedrock fracturing. The Blackhawk groundwater system in the vicinity of mined coal seams is compartmentalized both vertically and horizontally. Coal mining locally dewateres overlying rock layers in the Blackhawk Formation but does not appear to draw additional recharge from overlying or underlying groundwater systems (p. 7-46).

Steady-state inflow to the Dugout Canyon mine is expected to be approximately 220 gpm (p. 7-49). Mine consumption is estimated to be 30 gpm, leaving 190 gpm (306 acre-feet/yr) discharge to Dugout Creek, which would represent an increase of approximately 6% over average annual flow of 5,100 acre-feet/yr (p. 7-50). Estimated maximum discharge from the Dugout Canyon Mine will be approximately 400 gpm. If this maximum rate were sustained for a full year it would be a 13% increase in the estimated average annual flow of Dugout Creek (p. 7-50).

The potential for mine water discharge and increased flow rates in Dugout Creek are based on the studies of Lines (1985 - see MRP for reference). Actual data that could be used to correlate coal production rates to mine water discharge rates at the Soldier Canyon Mine and to predict mine water discharge rates for the Dugout Canyon Mine are not in the PAP. Annual reports provide some information.

Potential Hydrocarbon Contamination

Diesel fuel, oils, greases, and other hydrocarbon products will be stored and used at the site for

a variety of purposes. Diesel and oil stored in above-ground tanks at the mine surface facilities may spill onto the ground during filling of the storage tank, leakage of the storage tank, or filling of vehicle tanks. Similarly, greases and other oils may be spilled during use in surface and underground operations. The probable future extent of the contamination caused by diesel and oil spillage is expected to be small because the tanks will be located above ground and spillage during filling of the storage or vehicle tanks will be minimized to avoid loss of an economically valuable product. A Spill Prevention Control and Countermeasure Plan (SPCC) to be developed for the site upon completion of Phase II construction will provide inspection, training, and operation measures to minimize the extent of contamination resulting from the use of hydrocarbons at the site. This plan is not required to be submitted as part of the MRP; however, a copy will be maintained at the mine site as required by the Utah Division of Water Quality (p. 7-50). Phase I is currently proceeding under a construction SPCC.

Findings:

Hydrologic resource information provided in the PAP is considered adequate to meet the requirements of this 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, -300-147, -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.

Underground mining and reclamation activities are planned to be conducted to minimize disturbance of the hydrologic balance within the permit and adjacent areas, to prevent material damage to the hydrologic balance outside the permit area, and to support approved postmining land uses in accordance with the terms and conditions of the approved permit and the performance standards of this part. The Division has not required additional preventive, remedial, or monitoring measures to assure that material damage to the hydrologic balance outside the permit area is prevented.

Analysis:

By defining terms, stating objectives, and identifying responsibilities, UDOGM Coal Regulatory Program Directive Tech-004 (Tech-004) is meant to clarify the Division's position on what constitutes an appropriate monitoring program and provides methodology for consistently amending these monitoring programs. Under Tech-004, amendments to monitoring programs will be approved on a site specific basis.

The monitoring plan at Dugout Canyon Mine conforms to the amended monitoring plan approved for the Soldier Canyon Mine, which is based on Tech-004. The amended Soldier Canyon

Mine monitoring plan was approved in accordance with the procedure in section 5E of Tech-004:

- a. Canyon Fuel Company appears to be the owner of the surface in all areas where monitoring was stopped. Canyon Fuel Company also owns the water rights for the springs that have been removed from the monitoring plan. The only surface-water right involved that is not owned by the mine is upstream of the mine, beyond the area affected by subsidence, and the monitoring point on that reach of stream is to be replaced by one downstream, closer to the mine.
- b. Historical quality data show that, except for some problem samples, a good cation/anion balance exists with these data.
- c. Data can be used in a regression analysis to demonstrate that conductivity correlates to the specific water quality of that site, as measured by TDS.
- d. The site is not critical to the ongoing PHC determination.
- e. Monitoring is no longer necessary to achieve the purposes set forth in the approved monitoring plan.
- f. Subsidence monitoring information indicates that further subsidence is not likely and that future mining will not occur in adjacent areas that could affect these water sources.

Sites above and below the disturbed areas and discharge points of both the Soldier Canyon (G-5, G-6, and G-10) and Dugout Canyon Mine (DC-1, DC-2, and DC-3) are monitored quarterly for flow and operational field and laboratory parameters.

Ground-water monitoring.

Operational ground-water monitoring protocols are given on pages 7-52 through 7-56. Locations of wells and springs to be monitored are on Plate 7-1. Quarterly operational monitoring of springs at Dugout Canyon Mine, as at the adjacent Soldier Canyon Mine, has been reduced to field parameters only: flow, pH, specific conductance, and temperature. Four springs are to be monitored for operational water quality and quantity: SC-14, SC-65, SC-100, and SP-20 (same as S-30). Water rights have not been filed on these springs.

During the first "wet" year and first "dry" year following permit issuance, spring flows will be measured weekly between April 1 and August 31 as conditions permit, with the intent of preparing baseflow hydrographs from the data. Wet and dry years will be defined based on snow-pack measurements as of March 1 for the Price-San Rafael area, with a wet year being the first year after permit issuance when the snow pack water content is greater than 110% of normal and a dry year being the first year following permit issuance when the snow pack is less than 70% of normal.

SC-14, SC-65, SC-100, and SP-20 will be monitored quarterly, when accessible, for at least 2 years, and water samples will be analyzed for the parameters listed in Table 7-4. Following these 2 years, operational water-quality parameters for the springs will be determined semi-annually during the "wet" and "dry" years only, if the first 2 years of quarterly monitoring have not already included these "wet" and "dry" years; this is one notable variation from the recommended schedule in Tech-004. Operational ground-water quality parameters to be monitored at the Dugout Canyon Mine are listed in Table 7-4 of the MRP. They correspond with the operational parameters in Table 4 of Tech-004 except that total alkalinity and hardness are not included.

Four springs are to be monitored for operational water quality and quantity: SC-65, SP-20

(same as S-30), SC-14, and SC-100. Water rights have not been filed on these springs. The permittee selected these springs because "These springs are reasonably accessible and, based on the historical data, are representative of conditions within their respective formations." (Page 7-54). However, there is actually little historic data for these springs, and it is necessary to rely on data from the Soldier Canyon Mine and surrounding springs to extrapolate baseline information. Springs SC-65, SP-20, SC-14, and SC-100 will be monitored quarterly, when accessible, for at least 2 years, and water samples will be analyzed for the parameters listed in Table 7-4 (page 7-54).

There are flow data for SC-65 from July 1976, September and October 1995, August and October 1997, and June 1998. Water-quality data were determined for August 1997, and a few water-quality parameters were determined for July 1976. Flows were measured in 1995 at other Colton Formation springs: in September and October at SC-45, SC-46, SC-50, and SC-99, and in October 1995 only at SC-110 and SC-111, but water-quality parameters were not measured. Additional water-quality data for SC-65 are needed before mining disturbs this area, which will not be at least until such time as federal lease U-07064-027821 to the east is added to the permit area. This spring will be monitored quarterly, when accessible, for at least 2 years, and water samples will be analyzed for the parameters listed in Table 7-4 (page 7-54).

SP-20 has data from 1976 to 1981 that includes both flow and quality determinations, but total iron and manganese are notably absent; total iron and manganese were included in water-quality data from September and October 1995 and August 1997 (S-30) and operational parameters were monitored in October 1997 (S-30) and June 1998. Nearby springs that also flow from the Flagstaff Formation, SP-15, SP-17, and SP-18, have data back to June 1976 that include some total iron and total manganese concentrations. Data are available to deduce water-quality conditions for the area around SP-20, but water-quality conditions specific to SP-20 need to be determined. This spring will be monitored quarterly, when accessible, for at least 2 years, and water samples will be analyzed for the parameters listed in Table 7-4 (page 7-54).

For spring SC-14 there are flow data from September and October 1995 and June 1998, but there are no water-quality data. SC-14's flow is small but appears to be the largest from the North Horn Formation in the area. Nearby springs SC-15, SC-16, SC-16, and SC-17 that also issue from the North Horn Formation were dry when visited in 1995. SP-13, SP-16, SP-19, SC-87, and SC-102, other North Horn springs located within a few miles, were dry or had low flows or just seepage in 1995. There is basically no water-quality information for SC-14 or related springs. Additional water-quality data are needed before mining disturbs this area, which will not be until after the year 2001 according to the proposed mining sequence shown on Plate 5-7 of the MRP. This spring will be monitored quarterly, when accessible, for at least 2 years, and water samples will be analyzed for the parameters listed in Table 7-4 (page 7-54).

Spring SC-100 has flow data from September and October 1995, August and October 1997, and June 1998 but water-quality data for August 1997 only. Nearby springs SC-59, SC-82, SC-83, SC-84, SC-85, SC-104, SC-105, SC-114, and SC-115 (Flagstaff) and SC-101 (North Horn) have had low flows and no analyses for water quality. The USGS measured some water-quality parameters in nearby springs G-95, G-96, and G-97 in July 1980. Additional water-quality data are needed for SC-100 before mining disturbs this area, which will not be at least until such time as federal lease U-07064-027821 to the east is added to the permit area. This spring will be monitored quarterly, when accessible, for at least 2 years, and water samples will be analyzed for the parameters listed in Table 7-

4 (page 7-54).

Tech-004 recommends that for springs, water-quality samples be analyzed for baseline parameters every fifth year. Page 7-56 includes a commitment to collect one water sample at each spring sampling point during low flow period every fifth year, during the year preceding re-permitting, to be analyzed for baseline parameters.

Water depth in wells will be monitored quarterly. Wells GW-10-2, GW-11-2, and GW-24-1 (all completed in the Castlegate Sandstone) and springs SC-65 (Colton Formation), SP-20 (Flagstaff Formation), SC-14 (North Horn Formation), and SC-100 (Flagstaff Formation at contact with North Horn Formation) will be used to monitor ground water conditions in the proposed Dugout Canyon Mine permit area.

During Phase I construction in September 1998 ground water was discovered discharging from the old Gilson coal-seam workings on the east side of Dugout Canyon. This water had been seeping undetected through the alluvium and into the stream channel. Beginning in the fourth quarter of 1998, this water will be monitored at point MD-1, shown on Plate 7-1 (page 7-56).

Surface-water monitoring.

Operational surface-water monitoring protocols are given on pages 7-57 through 7-59. Sites DC-1, DC-2, and DC-3, located above and below the disturbed areas and UPDES discharge points, are to be monitored quarterly for flow and operational field and laboratory parameters. Operational surface-water quality parameters to be monitored at the Dugout Canyon Mine are listed in Table 7-5 of the MRP. They correspond with the operational parameters in Table 3 of Tech-004 except that total alkalinity and hardness are not included.

In addition DC-2, DC-3, DC-4, and DC-5 are to be monitored weekly between April 1 and August 31 during the first "wet" year and first "dry" year following permit issuance. Flows will be measured with the intent of preparing baseflow hydrographs from the data, and samples will be collected during the high-flow and low-flow seasons at DC-4 and DC-5 to be analyzed for tritium and operational water-quality parameters.

For surface water, Tech-004 recommends one water-quality sample at low flow every fifth year, either during the year preceding re-permitting or at midterm review, to be analyzed for baseline parameters. In addition to the regular monitoring, the MRP contains a commitment to collect one water sample at each sampling point during low flow period every fifth year, during the year preceding re-permitting, to be analyzed for baseline parameters (p. 7-59).

Transfer of wells.

Before final release of bond, exploration or monitoring wells will be sealed in a safe and environmentally sound manner. Ownership of wells will be transferred only with prior approval of the Division, and conditions of such a transfer will comply with State and local laws. Canyon Fuel Company will remain responsible for the management of transferred wells until bond release (p. 7-60).

Findings:

Operations hydrologic information provided in the PAP is considered adequate to meet the requirements of this section.

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:

Ground-water monitoring.

Reclamation ground-water monitoring protocols are given along with the operational monitoring protocols on pages 7-52 through 7-56. Locations of wells and springs to be monitored are on Plate 7-1. Groundwater monitoring during the post-mining period will continue until bond release (p. 7-56). See the discussion of Ground Water Information under Baseline Information in the Environmental Resource Information section.

During the post-mining period field data and water samples will be collected from springs SC-65 (Colton Formation), SP-20 (Flagstaff Formation), and SC-14 and SC-100 (Flagstaff Formation at contact with North Horn Formation) once each year during September or October (low-flow season while the sites are still accessible).

Water levels will be measured in wells GW-10-2, GW-11-2, and GW-24-1 (all completed in the Price River Formation or the underlying Castlegate Sandstone) once each year. Exploration or monitoring wells are planned to be sealed before final bond release, but if ownership of the wells is transferred the permittee will remain responsible for the management of the wells until bond release (p. 7-60).

Transfer of wells.

Before final release of bond, exploration or monitoring wells will be sealed in a safe and environmentally sound manner. Ownership of wells will be transferred only with prior approval of the Division, and conditions of such a transfer will comply with State and local laws. Canyon Fuel Company will remain responsible for the management of transferred wells until bond release (p. 7-60).

Water-quality standards and effluent limitations.

Discharges of water from disturbed areas will be in compliance with all Utah and federal water-quality laws and regulations and with effluent limitations for coal mining contained in 40 CFR Part 434 (p. 7-86).

Casing and sealing of wells.

When no longer needed for monitoring or other use approved by the Division and upon a finding of no adverse environmental or health and safety effects, or unless approved for transfer as a water well, each well will be capped, sealed, backfilled, or otherwise properly managed as required by the Division. Permanent closure measures will be designed to prevent access to the mine workings by people, livestock, fish and wildlife, machinery and to keep acid or other toxic drainage from entering ground or surface waters (p. 7-97).

Findings:

Reclamation hydrologic information provided in the PAP is considered adequate to meet the requirements of this section.