0006

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

November 16, 1998

TO: File

THRU: Daron Haddock, Permit Supervisor DRH

FROM: James D. Smith, Reclamation Specialist JDS

RE: Second Round Technical Analysis of PAP, West Ridge Resources, West Ridge Mine, PRO/007/041, File 2, Carbon County, Utah.

SUMMARY

The applicant submitted an MRP on January 26, 1998 and revisions on May 8 and June 10, 1998. I prepared a TA in July 1998 that covered Chapters 6 - Geology and sections of Chapter 7 - Hydrology of that first MRP. Several deficiencies were identified. The applicant submitted a revised MRP on June 10, 1998. This TA addresses only those sections of the second MRP that were added or modified in response to the deficiencies identified in the July TA. In some sections of this TA the only change from the July TA is the reference to the page in the MRP. Several deficiencies remain to be addressed before the permit can be issued.

TECHNICAL ANALYSIS

ENVIRONMENTAL RESOURCE INFORMATION

Regulatory Reference: Pub. L 95-87 Sections 507(b), 508(a), and 516(b); 30 CFR Sec. 783., et. al.

GEOLOGIC RESOURCE INFORMATION

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

Analysis:

Geologic information in the plan is based on maps and plans required as resource information for the plan, detailed site specific information, and geologic literature and practices. The application includes geologic information in sufficient detail to assist in preparing the subsidence control plan.

Chapter 6 and Appendix 7-1 include descriptions of the stratigraphy of the proposed permit and adjacent areas, starting with the Cretaceous Mancos Shale and the basal sandstone and coal-bearing units of the Blackhawk Formation that intertongue with the Mancos and continuing up through the Eocene Colton Formation. The main sandstone bearing units of the Blackhawk are, starting with the lowest, the Aberdeen, Kenilworth, and Sunnyside Members. The coal seam to be mined at the West Ridge Mine, the Lower

Sunnyside Seam, lies directly above the Sunnyside Sandstone.

Strike of the beds at the West Ridge Mine site is northwest-southeast and generally parallel to the face of the Book Cliffs. Dip is 3 to 8 degrees to the northeast (it is shown as 13%, or 7 degrees, on Map 6-2). No major faults have been mapped by the applicant within the mine permit area, but two small faults have been mapped just to the northeast (Map 6-1). The Sunnyside fault is a major north-northwest striking fault throughout much of the Sunnyside Mining District to the south. The vertical displacement on this fault decreases northward and is not detectable from surface mapping within the lease area. Maps done by the Utah Geological Survey (UGS) indicate at least two other faults in the area of Bear, C, and B Canyons that strike approximately northwest-southeast, but 1997 field work by Agapito Associates, Inc. did not locate faults in this area (p. 6-13).

The Upper Sunnyside Seam lies as little as 5 to 10 feet above the Lower Sunnyside Seam in places. The Upper Sunnyside Seam consists of six lenticular beds that, according to the applicant, cannot be correlated between widely spaced data points(page 6-4). This seam ranges in overall thickness from 2 to 15 feet in the Sunnyside Mine to an average of 7 feet in the Sunnyside No. 1 Mine and 5.7 feet in the workings of the Sunnyside No. 3 Mine. On the West Ridge Mine lease area the average seam height is less than 4 feet. Because of its thinness and close proximity to the Lower Sunnyside Seam, none of the Upper Sunnyside is considered to be mineable using underground mining methods

Strata above the coal seam to be mined will not be removed. Samples for analysis for acid- or toxic-forming materials were collected from a single outcrop exposure in the Left Fork of B Canyon. There were only three samples, one each from the coal seam to be mined and the strata immediately above and below the coal. Results of chemical analyses for acid- or toxic-forming materials, including pyritic sulfur for the coal, are in Appendix 6-1. Because of the lateral uniformity of lithologies in the Book Cliffs Coal Field these three samples may be sufficient to characterize the mine permit area; the roof and floor materials and the coal are known to be consistent throughout the area. To confirm the results of the three outcrop samples from the left fork, the applicant commits to taking additional roof and floor samples when the coal seam is exposed in the right fork (p. 6-16).

Drill-hole logs are in Appendix 6-2. These show the lithologic characteristics, including physical properties and thickness of immediately adjacent stratum that may be impacted. The logs show the strata from immediately below the Lower Sunnyside Seam up to the Upper Sunnyside Seam, and up to 30 feet of strata above the Upper Seam. There are logs for 25 holes. These are drawings, apparently based on the original drillers logs, not copies of the original logs. They are not certified.

The applicant states that the original drill-hole logs contain no information about ground water encountered during drilling (p. 6-15). It is unknown if water was not encountered or if ground water was simply not noted on the logs used to create the drawings in Appendix 6-2. Ground water has been monitored in drill-hole DH 86-1 in the past, is being monitored in drill hole DH 86-2 (Appendix 7-3), and DH 90-1 has been used as a water-supply well, so it is likely that ground water was encountered in other bore holes also. The drill-hole log for DH 86-2 in Appendix 6-2 does not show where water was encountered.

The two methods being proposed for mining the coal are standard room-and-pillar mining to develop the main, headgate and tailgate entries and longwall mining to mine the outlined panels. For standard room-and-pillar mining operations samples are to be collected and analyzed to provide the thickness and

engineering properties of clays or soft rock such as clay shale, if any, in the stratum immediately above and below each coal seam to be mined. Because most mining is to be done by longwall rather than standard room-and-pillar operations, the applicant contends this regulation is not applicable.

Subsidence, including the Subsidence Control Plan, is discussed starting on page 5-15. The surface above mined out longwall panels may be subject to conditions associated with subsidence. Subsidence may occur under the mined out area. Map 5-7 identifies the mining area for which planned subsidence mining methods will be used. Based on experience at other nearby mines located in the Book Cliffs (i.e. Soldier Creek, Sunnyside and Tower), a conservative angle of draw of 20 degrees was used to project the maximum extent of subsidence.

UDOGM has not determined at this time that collection, analysis, and description of additional geologic information is necessary to protect the hydrologic balance, to minimize or prevent subsidence, or to meet the performance standards. The applicant has made no request to the Division to waive in whole or in part the requirements of the borehole information or analysis required of this section.

Geologic information is sufficiently detailed to assist in determining the proposed West Ridge Mine has been designed to prevent material damage to the hydrologic balance outside the permit area; to assist in determining all potentially acid- or toxic-forming strata down to and including the stratum immediately below the coal seam to be mined; 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 to assist in determining if reclamation can be accomplished. Areal and structural geology of the permit and adjacent areas are discussed adequately to show how the areal and structural geology may affect the occurrence, availability, movement, quantity, and quality of potentially impacted surface and ground water. There are no known geologic conditions that could influence the required reclamation in a way so as to require collection of additional information or monitoring of other parameters.

Findings:

Geologic information provided in the PAP 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, -301-724.

Analysis:

Sampling and analysis.

Water quality sampling and analyses have been and will be conducted according to the "Standard Methods for the Examination of Water and Wastewater" or EPA methods listed in 40 CFR Parts 136 and 434. Laboratory reporting sheets in Appendices 7-2 and 7-3 indicate the specific method that have used for each parameter.

Karla Knoop's notes (Appendix 2) indicate that the applicant is using single stage samplers for surface-water sample collection and crest stage gages at ST-6, ST-6a, and ST-7 and perhaps other sites, but this is not clear from the text of the PAP.

Through a misunderstanding, probably the fault of UDOGM, reference is made in the PAP to UDOGM directive Tech-006; this should be Tech-004.

Baseline information.

Baseline ground water and surface water data are described in the Mayo and Associates report in Appendix 7-1. Table 1 in Appendix 7-1 summarizes water monitoring periods, locations, geologic units, and who did the monitoring. Baseline geologic information is found in Chapter 6 and Appendix 7-1. Baseline climatological information including seasonal precipitation and the Palmer Hydrologic Drought Index (PHDI), wind direction and velocity, and seasonal temperature ranges is on pages 7-6 and 7-7 and on pages 6 through 9 in Appendix 7-1.

It is unclear from the PAP whether the topsoil borrow area is part of this permit application or not. If it is, baseline surface and ground water quality and quantity information needs to be addressed in the PAP.

Ground-water information.

Locations of wells and springs are shown on Maps 7-5 and 7-6 in the PAP and on Figures 8 and 10 in Appendix 7-1. Ground-water rights in and around the permit and adjacent areas are shown on Map 7-3. A summary of water rights in Appendix 7-5 includes usage, and water right numbers and map numbers from Appendix 7-5 correlate with the numbers on Map 7-3. There are no filings for water rights within the initial permit area, but there are three within the LBA.

Wells

Sunnyside City and East Carbon City have water right 91-4960 for 31.621 ac-ft per year (19.6 gpm) from water-supply well DH 90-1 in the SW1/4 SW1/4 of Section 17, T. 14 S., R. 14 E. DH 90-1 is shown on Map 7-6 but is just off the east edge of most of the other maps in the PAP, including Map 7-3, Water Rights. Information from the state engineers office in Price (Mark Page, Personal Communication to West Ridge Resources) indicates that the well has a total depth of 500 feet. The well has a gravel pack from 207 to 500 feet below ground surface. According to Sunnyside Coal Company records the well is completed in the Price River and North Horn Formations. Because the well is located over a mile from the lease boundary, and is completed in the Price River and North Horn Formations, the applicant feels it is very unlikely that mining in the permit area will affect groundwater systems that contribute water to DH 90-1 (p. 7-4). There is no water-quality or depth information on this well in the PAP.

Only one ground-water monitoring well, DH 86-2 in C Canyon, exists in the permit area. This is open to the entire thickness of the Sunnyside Member of the Blackhawk Formation, which is below the coal seam that will be mined. Well DH 86-1, which has been monitored in the past, is located in Whitmore Canyon approximately one mile below Grassy Creek Reservoir. Locations are shown on Maps 7-6 and 7-7, and data for both wells are in the addendum to Appendix 7-1.

Springs

In the fall of 1985 and spring of 1986, a seep and spring survey was done on West Ridge by Kaiser Coal Corporation to evaluate the density of springs over a mined out area compared to the permit area which had not been mined (p. 5-15). Approximately 150 seeps and springs were identified. Locations are shown on Map 7-5 and Figures 8 and 10 in Appendix 7-1. Sites monitored in fall 1985 are designated with "F" and those monitored in spring 1986 with "S".

The seep and spring density was found to be roughly the same. The mined out area had a density of 21.1 springs and seeps per square mile producing an average of 74.8 gpm/sq mi compared with 22.4 springs and seeps per square mile in the unmined area, producing an average of 79.3 gpm/sq mi. This information indicates that subsidence from mining in the existing Sunnyside Mines has produced no quantifiable difference in flow of seeps and springs on the west side of Whitmore Canyon.

Ground-water quality and quantity data for the 1985 and 1986 seep and spring surveys are in both Appendix 7-6 and Table A-2 of Appendix 7-1. Information includes flow, temperature, pH, and specific conductivity but does not include total iron and total manganese. All the springs on Map 7-5 were in the 1985-1986 survey, but 14 of them are designated by a green triangle as "Spring Monitoring Station (1985-1986)"; it is unclear what this means and how these 14 sites differ from the other springs on the map.

Map 7-6 shows SP-14 to be the same as S-168, and WR-2 to be the same as S-177. The two springs are several thousand feet apart. Table A-1 of the addendum indicates that SP-14, S-177, and W-2 are the same spring, and S-168 is not listed.

Additional data on some of the 1985-86 springs, including a few analyses for total iron and total manganese, were collected by Kaiser Coal Company in 1988 and 1989. From the 1988 and 1989 group of springs, S-30, S-22, S-7, S-16, S-1, S-145, S-144, S-172, S-177, S-190, and S-208 were monitored in 1997 as SP-6 , SP-7 , SP-8 , SP-9 , SP-10, SP-11 , SP-12, SP-13, SP-14 , SP-15, and SP-16, respectively. Data from 1985, 1986, 1988, 1989, and 1997 for these 11 springs are in Table A-1 in the addendum to Appendix 7-1. Five of these springs, SP-8, SP-12, SP-13, SP-15, and SP-16, are proposed to be used for operational monitoring. SP-8 discharges in the upper drainage of C Canyon and the other four discharge from the lower slopes of West Ridge in Whitmore Canyon.

(Although there was nothing found in the PAP to indicate it, it is possible that there is a correlation between the 11 springs monitored in 1985, 1986, 1988, 1989, and 1997 and those designated as "Spring Monitoring Station (1985-1986)" in Map 7-5. However, springs S-57 and S-205 are marked with triangles on the map but were not monitored in 1997 and are not in Table A-1 in the addendum, and data for springs S-39 and S-40 from 1986, 1988, and 1989 are included in Table A-1 but these two springs are not marked as "Spring Monitoring Station (1985-1986)" sites on Map 7-5 and were not monitored in 1997.)

WR-1 and WR-2, also proposed for operational monitoring, discharge from the upper slope of West Ridge in Whitmore Canyon. These two springs were not included in the 1997 survey, but 1986 to 1992 data on seasonal quality and quantity and usage are in Appendix 7-2 and Table A-1 in the addendum to Appendix 7-1: WR-1 is the same as F-2 and S-205, and W-2 the same as F-10 and S-177. There are no total manganese values for WR-1. In addition to this past monitoring, a minimum of two years operational field and laboratory data will be collected at these springs (Table 7-1).

Flow or water level, temperature, pH, both specific conductivity and TDS, and total iron and total manganese were determined for the samples collected in the 1997 ground-water survey (Appendix 7-3). Analyses were also done for the other parameters listed in UDOGM directive Tech 004. Field parameters were measured and samples were collected between May and October, but seasonal variation has not been adequately determined by data from a single year, and the 1998 data are needed for a minimally complete baseline characterization.

Surface-water information.

The locations of streams and reservoirs are shown on Map 4-1. No stock watering ponds are indicated. Surface-water rights in and around the permit and adjacent area are shown on Map 7-3 and summarized in Appendix 7-5.

The applicant anticipates that as mining progresses it may become necessary to discharge water from the proposed mine. Mine water will be discharged to the intermittent drainage in C Canyon. The location of proposed mine discharge point UPDES #1 is shown on Map 7-2.

Locations of stream monitoring sites used in the past are shown on Map 7-6 and Figure 8 of Appendix 7-1. Data for 1987, 1988, and 1989 are in the updated Table A-1 in the addendum to Appendix 7-1 for sites M-1 through M-7, along with data for several other sites. Data generally include flow, pH, TDS or specific conductivity, total iron, and total manganese; however, TSS is not reported. Analyses results are reported for several other water-quality parameters that are listed in UDOGM directive Tech-004.

Water-quality data for additional sites are included in the addendum to Appendix 7-1. Locations are on Figures 8 and 10 of that appendix.

1997 surface-water baseline monitoring data are discussed in Appendix 7-1. Sites identified as M-1, M-4, M-5, and M-6 in the Kaiser Coal Company 1987-1989 data are being monitored as ST-1, ST-6, ST-7, and ST-2, respectively in 1997-1998, and ST-3, ST-4, ST-5, ST-8 are new sites. In 1997 there was no flow at ST-6 and ST-4 and no data were collected at ST-1 (addendum to Appendix 7-1). TSS, flow, temperature, pH, specific conductivity and TDS, total iron, and total manganese were determined for samples collected in 1997 at sites ST-2, ST-3, ST-5, ST-7, and ST-8 (Appendix 7-2), and analyses were also done for the additional parameters listed in UDOGM directive Tech-004, including acidity and alkalinity. Field parameters were measured and samples were collected between May and October, but the dates of monitoring vary from site to site.

The updated Table A-1 in the addendum to Appendix 7-1 includes data showing no-flow at ST-4, ST-5, ST-6, and ST-7 during April, May, and June 1998. There are no 1998 data in the PAP for ST-1, ST-2, ST-3, and ST-8.

On page 7-18 the applicant commits to three years of baseline data, to consist of the 1997 and 1998 data plus at least one year additional data from earlier monitoring, which includes Kaiser Coal Company 1987-1989 data for sites M-1 through M-7. The PHC will be updated, if needed, following the collection and analyses of information gathered during the 1998 field season (p. 7-9).

Baseline monitoring will be performed until construction of the mine and mine facilities begins.

Once construction is initiated, the operational monitoring schedule will be utilized. The protocols and locations for operational monitoring are in Table 7-1. Monitoring will continue through reclamation until bond release.

No acid drainage is expected from the proposed mining operation. Acid-forming materials in western coals generally consist of sulfate minerals such as pyrite and marcasite that oxidize when exposed to air and water and produce acid. Oxidation of pyrite can be expected in the West Ridge Mine. However the amount of acid produced will be small because of the small amount of pyrite present; analysis results from a single sample (Appendix 6-1) indicate 0.08% pyrite in the coal. Furthermore it is anticipated that any acid will quickly be neutralized by abundant, naturally occurring carbonate minerals; the acid-base potential of the roof and floor samples are 162 and 1.35 t/1000tons, respectively (Appendix 6-1). Iron is readily precipitated as iron-hydroxide and it is not expected that excess iron will be observed in mine discharge water. No other acid-forming materials or any toxic-forming materials have been identified or are suspected to exist in materials to be disturbed by mining. The applicant intends to produce a run-of-mine product without any coal-processing waste for disposal or on-site storage (p. 6-16).

Climatological information including seasonal precipitation and the Palmer Hydrologic Drought Index (PHDI), wind direction and velocity, and seasonal temperature ranges is on pages 7-6 and 7-7 and on pages 6 through 9 in Appendix 7-1.

The determination of the PHC has not indicated that adverse impacts may occur to the hydrologic balance on or off the proposed permit area, or that acid-forming or toxic-forming material is present that may result in the contamination of ground-water or surface-water supplies. As a result there is no requirement for supplemental information.

Baseline cumulative impact area information.

Mayo and Associates (Appendix 7-1) have analyzed geologic and hydrologic information and prepared a report describing the surface-water and ground-water systems of the permit and adjacent areas. UDOGM will use this information along with information from federal and state agencies to assess the probable cumulative hydrologic impacts of coal mining and reclamation operations at the West Ridge Mine and prepare the Cumulative Hydrologic Impact Assessment (CHIA).

Probable hydrologic consequences determination.

The Probable Hydrologic Consequences (PHC) determination is on pages 7-9 through 7-15. This PHC determination is based on one-year of baseline hydrologic data, plus geologic and other information collected for the permit application. Most of this information is in Chapter 7 and the report by Mayo and Associates in Appendix 7-1 of the PAP. The PHC determination is not based on data statistically representative of the site. The PHC will be updated, if needed, following the collection and analyses of information gathered during the 1998 field season (p. 7-9).

The PHC determination includes findings on: whether adverse impacts may occur to the hydrologic balance; whether acid-forming or toxic-forming materials are present that could result in the contamination of surface or ground-water supplies; what impact the proposed operation will have on sediment yield from the disturbed area; acidity, total suspended and dissolved solids, and other important water quality parameters of

local impact; flooding or streamflow alteration; ground-water and surface-water availability. No other characteristics were identified as necessary for the PHC determination.

Adverse impacts to the hydrologic balance

Identified potential adverse impacts to the hydrologic balance are land subsidence and bedrock fracturing, which have the potential to impact the hydrologic balance if fracturing increases the vertical hydraulic conductivity of overburden rock. Such vertical fracturing has the possibility of decreasing discharge rates of near-surface ground water while increasing the recharge rates of deeper ground-water systems.

Based on their analysis of the probable hydrologic consequences (PHC), the applicant has concluded that it is highly unlikely that mining in the West Ridge area will result in the decrease of near-surface ground-water discharge rates:

1) Thick interburden between the mined horizon and the near-surface ground-water systems and the presence of swelling clays in the North Horn Formation will prevent fracturing and subsidence from increasing vertical hydraulic conductivities and decreasing spring discharge rates.
2) Ground water that is encountered by mining operations will likely be old, meaning that recharge occurred thousands of years in the past. Water in the Sunnyside Sandstone in well DH 86-2 has a radiocarbon age in excess of 11,000 years.
3) Ground water systems encountered in the Blackhawk Formation occur in isolated sandstone paleochannels, fractures, and faults. These ground-water systems are not in active hydraulic communication with the subsurface and have limited areal and vertical extent. Mining could dewater some of these systems if they are intercepted during mining operations, but because of the limited spatial extent of these systems, discharge from these isolated ground-water systems will cease soon after interception by mine workings.

The thickness and low permeability of the interburden between the mined horizon and the near-surface ground-water systems, the presence of swelling clays, and the lack of interconnectivity between elements of the hydrologic system and between those elements and the surface all diminish the probability that fracturing and subsidence will adversely affect the ground-water resources. The long residence time ("age") of the water supports the concepts of slow movement and poor interconnectivity.

Acid-forming or toxic-forming materials

Acid-forming materials in western coal mines generally consist of sulfide minerals, namely pyrite and marcasite, which, when exposed to air and water, are oxidized and produce acid. Oxidation of pyrite will occur in the West Ridge Mine; however, the it is anticipated that any acid will quickly be neutralized by abundant, naturally occurring carbonate minerals. Iron is readily precipitated, as iron-hydroxide, and it is not expected that excess iron will be observed in mine discharge water.

Coal will be stockpiled in a relatively contained area of the mineyard and all runoff from the site will flow to the sediment pond for containment. At the time of reclamation, the coal will be removed from the site

prior to the commencement of any regrading activities. The applicant intends to produce a run-of-mine product without any coal-processing waste for disposal or on-site storage (p. 6-16). Also, any waste rock generated through underground activities, such as construction of overcasts, will be permanently stored underground and therefore should not be a factor in surface reclamation activities.

No other acid-forming materials or any toxic-forming materials have been identified or are suspected to exist in materials to be disturbed by mining.

Sediment yield from the disturbed area

The probable hydrologic consequences of sediment yield from the disturbed area are discussed on pages 7-10 and 7-11. The drainage control system for the mine site is shown on Map 7-2. Culverts and ditches are designed to handle drainage from a 10 year, 24 hour event. Most undisturbed drainage from C Canyon upstream from the mine yard facility area will be culverted underneath the mine site through a 5-foot diameter corrugated metal pipe, which meets or exceeds the design storm for this drainage area. Runoff from the disturbed area and natural runoff that flows onto the disturbed area will be channeled to the sediment pond, which is designed to completely contain the 10 year, 24 hour event. The sediment pond has been designed to handle the sediment yield from the disturbed area, calculated to be 0.3600 acre-feet per year, and retain it in the pond. This will effectively reduce the sediment yield from the disturbed area during the operational phase to an insignificant amount.

The sediment pond will be constructed as soon as practical. During reclamation the sediment pond will be removed during removal of the bypass culvert and restoration of the channel. Sediment traps at regular intervals along the drainage bottom will collect and contain sediment from the regraded site. The surface of the regraded area will be gouged with a backhoe bucket to create large depressions, which will act as sediment traps. Anticipated sediment yield from the reclaimed area will be similar to adjacent undisturbed areas.

Important water quality parameters

Because it is anticipated that only a small volume of mine discharge water will flow into Grassy Trail Creek; because of the anticipated chemical similarities of the mine discharge water to the water in the Grassy Trail Creek; and because of the poor quality of the water naturally flowing in Grassy Trail Creek, overall water quality in Grassy Trail Creek will likely not be significantly impacted and specific water quality parameters such as sodium, sulfate, and bicarbonate will not be significantly increased as a result of discharging water from the mine.

It is unlikely that the water discharged from the mine into the C Canyon drainage will flow all the way to Grassy Trail Creek. Except during large storms or heavy snowmelt, water in similar intermittent drainages nearby is entirely lost to infiltration or evapotranspiration before reaching Grassy Trail Creek.

The TDS concentration of discharge water from the proposed mine will probably be similar to the discharge from the Sunnyside Mines, which had TDS concentrations of about 1,600 mg/l, with the dominant ions being sodium, sulfate, and bicarbonate. This chemical composition is similar to that of waters that have been in contact with the Mancos Shale (p. 7-12). Sunnyside Coal Company had a UPDES permit with a TDS concentration limit of 1,650 mg/l for the mine water discharge. Water discharged from the mine workings

was put to beneficial uses such as growing alfalfa crops and irrigating the municipal golf course and city park. Excess water was discharged into Grassy Trail Creek where it was utilized by cattle and wildlife (p. 7-13).

Water discharged from the proposed West Ridge mine (most of such water, according to the PAP) will infiltrate into the alluvial sediments near the Book Cliffs escarpment, which will raise the local water table or create a perched water table above the Mancos Shale. Raising of the local water table may result in increased vegetation, which in turn will could have a positive impact on wildlife and the local ecosystem. Quality of ground waters in the Mancos Shale is naturally poor, with TDS significantly greater than 1,600 mg/l, so addition of mine discharge water will not have detrimental effects on water quality.

The applicant asserts that the chemical quality of ground water discharging from springs above the proposed coal mine will not be adversely affected by underground mining operations. According to the permittee, Mayo and Associates (Appendix 7-1) have demonstrated that deep ground waters adjacent to the coal seams throughout the Book Cliffs and Wasatch Plateau coal fields are hydraulically isolated from shallow overlying ground-water systems that support springs and provide baseflow to streams at the surface. No mechanism has been identified by which important water quality parameters in shallow ground-water systems above the proposed coal mine may be adversely impacted by mining operations. Furthermore, there are no known springs of significance in the lease and adjacent area that discharge from locations that are stratigraphically or topographically below the coal seam to be mined. The thick Mancos Shale will prevent the migration of any mine discharge water downward to formations underlying the Mancos Shale.

Flooding or streamflow alteration

The applicant anticipates that at some time it may be necessary to discharge water from its proposed mine into the C Canyon drainage. The discharge point will be about one mile above the confluence with B Canyon. Both C and B Canyons are intermittent drainages that rarely have flow. The stream channel in this drainage is large enough to contain torrential thunderstorm events that commonly exceed several CFS in this region.

The anticipated discharge rate from the mine is unknown at this time; however, discharges from the nearby Soldier Canyon and Sunnyside mines have averaged about 300 to 400 gpm. It is possible that over the life of the proposed West Ridge mine the discharge rate could be in this same range. Discharge rates from other mines in the Book Cliffs have been quite variable over time due to the nature of the ground-water systems encountered in the mines. Ground water flows encountered in coal mines in the Book Cliffs and Wasatch Plateau coal fields are contained mostly in sandstone channels and in fractures and faults. It is not unusual for large portions of mines to be mostly dry; at the Soldier Canyon Mine, mining proceeded for several years before water was encountered in quantities sufficient to require discharge from the mine. Similar experiences are reported at Andalex's Tower (Centennial) Mine. As new mine workings are developed in "wet" areas, the discharge rate may temporarily exceed 300 to 400 gpm. The mine discharge rate appears to be more a function of the amount of new mine area recently opened than the total size of the mine.

A discharge of 300 to 400 gpm will not cause flooding or significant alteration of the streambed in the C Canyon drainage. The channel geometry in C Canyon is primarily the result of erosion that occurs during torrential thunderstorm events when the flow in the drainage is several times that anticipated from the

proposed West Ridge Mine. The mine discharge will easily be contained within the inner stream channel, which should be stable. Additionally, if a constant discharge is achieved in C Canyon as a result of mine discharge, increased vegetation densities along the stream bank will increase bank stability and decrease erosion. Wildlife habitat will also be improved with the available water and the vegetation growing on the stream bank.

Ground water and surface-water availability

Mining in the permit area will not significantly affect the availability of ground water. Ground waters in the Blackhawk Formation exist in highly compartmentalized partitions, both vertically and horizontally, and the formation does not act as a hydraulically continuous aquifer. Ground-water systems in the Blackhawk Formation are hydraulically isolated from overlying, modern ground waters. The effects of locally dewatering the Blackhawk Formation adjacent to mine openings will not have any significant impact on ground-water availability in the region surrounding the mine.

The applicant indicates there are no ground-water supply wells in the mine lease area or adjacent to it and that the removal of water from horizons immediately above and below the mined horizon will not impact any water supplies. Rather, the applicant contends that underground mining makes available water from the Blackhawk Formation that was previously inaccessible.

Sunnyside City and East Carbon City have a water right for 31.621 ac-ft per year from water-supply well DH 90-1 in the SW1/4 SW1/4 of Section 17, T. 14 S., R. 14 E. (Map 7-6). According to Sunnyside Coal Company records the well is completed in the Price River and North Horn Formations and has a gravel pack from 207 to 500 feet below ground surface. Because the well is located over a mile from the lease boundary and is completed in the Price River and North Horn Formations, the applicant feels it is very unlikely that mining in the permit area will affect groundwater systems that contribute water to DH 90-1 (p. 7-4). There is no water-quality or depth information on this well in the PAP.

Ground-water monitoring plan.

Locations for baseline ground-water monitoring are on Map 7-6 and Figures 8 and 10 in Appendix 7-1. The PAP does not contain an explicit baseline ground-water monitoring plan, and parameters to be monitored are not listed in the PAP, but data analysis reports in Appendices 7-2 and 7-3 indicate that water-quality samples for 1997 were analyzed for all baseline parameters listed in UDOGM directive Tech-004. Tech-004 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. 1997 sampling was done when the sites were accessible in May, July, August, and October, so monitoring has not been monthly but has been frequent enough that it should detect seasonal changes if continued as planned.

No ground-water monitoring results from 1998 are reported in the PAP. Planned baseline ground-water monitoring should be completed in the fall of 1998, but baseline monitoring will be performed until construction of the mine and mine facilities begins. Once construction is initiated, the operational monitoring schedule will be utilized (Table 7-1).

Table 7-1 indicates data will be collected quarterly, and there is a commitment on page 7-18 that

operational water monitoring reports will be submitted on a quarterly basis to UDOGM.

On page 7-18 the applicant commits to three years of baseline data, to consist of the 1997 and 1998 data plus at least one year additional data from earlier monitoring, which includes Kaiser Coal Company data from 1985 to 1989 and Sunnyside Coal Company data from 1986 to 1993. The PHC will be updated, if needed, following the collection and analyses of information gathered during the 1998 field season (p. 7-9).

Baseline monitoring will be performed until construction of the mine and mine facilities begins. Once construction is initiated, the operational monitoring schedule will be utilized. Monitoring will continue through reclamation until bond release.

The applicant is of the opinion that physical parameters and chemical composition of springs and streams in and around the permit area will be adequately characterized following the collection of three years of baseline data, to consist of the 1997 and 1998 data plus at least one year additional data from earlier monitoring (Kaiser Coal Company data from 1985 to 1989 and Sunnyside Coal Company data from 1986 to 1993), and two years of operational data (p. 7-18).

Springs

Eleven springs (SP-6, SP-7, SP-8, SP-9 , SP-10, SP-11 , SP-12, SP-13, SP-14 , SP-15, and SP-16) in the permit and adjacent areas are being monitored for baseline data (Map 7-6). Five of these springs, SP-8, SP-12, SP-13, SP-15, and SP-16, are proposed to be used for operational monitoring. Most of the stations in the proposed operational ground-water monitoring program are located on the east slope of West Ridge. This is because, according to the applicant, there are no springs that are suitable for monitoring on the west side of West Ridge except for SP-8.

Springs SP-12, SP-13, SP-15, and SP-16 discharge from the lower slopes of West Ridge in Whitmore Canyon. Spring SP-8 discharges in the upper drainage of C Canyon. Water-quality data for these five springs, from 1986 to 1989, are in the addendum to Appendix 7-1. Flow, pH, conductivity, and TDS were determined for these springs, along with several other parameters. However total iron and total manganese are not reported for SP-8 and SP-15, and only the September 1989 samples from the three other springs show analysis results for these two constituents. Baseline water-quality samples for 1997 for all five springs (plus SP-14 and SP-62) were analyzed for all baseline parameters listed in UDOGM directive Tech-004 (Appendix 7-3).

Springs WR-1 and WR-2 discharge from the upper slope of West Ridge in Whitmore Canyon. Minimal baseline data for springs WR-1 and WR-2 from 1986 to 1992 are in the addendum to Appendix 7-1, except there are no total manganese values for WR-1. There are no reported flow or water-quality data for 1997.

Wells

Only one ground-water monitoring well, DH 86-2 in C Canyon, exists in the permit area. It is open to the entire thickness of the Sunnyside Member of the Blackhawk Formation, which is below the coal seam that will be mined. Water-quality data for DH 86-2 from 1987 to 1989 are in the addendum to Appendix 7-1. Water depth, pH, conductivity, TDS, total iron, and total manganese were determined for these samples,

along with several other parameters. Baseline water-quality samples for 1997 (Appendix 7-3) were analyzed for all baseline parameters listed in UDOGM directive Tech-004. The applicant proposes that after three years of baseline and two years of operational monitoring, water level only will be measured in this well.

Water-quality and water level data from 1987 to 1993 for well DH 86-1, located in Whitmore Canyon approximately one mile below Grassy Creek Reservoir, are also in the addendum.

Sunnyside City and East Carbon City have a water right from water-supply well DH 90-1 in the SW1/4 SW1/4 of Section 17, T. 14 S., R. 14 E. (Map 7-6). The well has a gravel pack from 207 to 500 feet below ground surface, bring completed in the Price River and North Horn Formations. Because the well is located over a mile from the lease boundary, and is completed in the Price River and North Horn Formations, the applicant feels it is very unlikely that mining in the permit area will affect groundwater systems that contribute water to DH 90-1 (p. 7-4).

Surface-water monitoring plan.

Locations for baseline surface-water monitoring are on Map 7-6 and Figures 8 and 10 in Appendix 7-1. The PAP does not contain an explicit baseline surface-water monitoring plan and parameters to be monitored for baseline water-quality are not listed in the PAP, but data analysis reports in Appendices 7-2 and 7-3 indicate that water-quality samples for 1997 (Appendix 7-3) were analyzed for all baseline parameters listed in UDOGM directive Tech-004. Tech-004 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. In 1997 sampling was done when the sites were accessible in May, July, August, and October, so monitoring has not been monthly but has been frequent enough that it should detect seasonal changes if continued as planned.

Planned baseline surface-water monitoring should be completed in the fall of 1998, but baseline monitoring will be performed until construction of the mine and mine facilities begins. Once construction is initiated, the operational monitoring schedule will be utilized. Monitoring will continue through reclamation until bond release (Table 7-1).

The applicant is of the opinion that physical parameters and chemical composition of springs and streams in and around the permit area will be adequately characterized following the collection of three years of baseline data, to consist of the 1997 and 1998 data plus at least one year additional data from earlier monitoring (Kaiser Coal Company data from 1985 to 1989 and Sunnyside Coal Company data from 1986 to 1993, and two years of operational data (p. 7-18).

Streams

Except for ST-1 and ST-6a, baseline stream monitoring sites are shown on Map 7-6. Sites currently being monitored are ST-1, ST-2, ST-3, ST-4, ST-5, ST-6, ST-7, and ST-8: sites ST-1, ST-6, ST-7, and ST-2 are the same as M-1, M-4, M-5, and M-6 in the Kaiser Coal Company 1987-1989 data. ST-6a, above the proposed mine site, was monitored in 1997 and 1998 but there was no flow recorded. Samples collected at sites ST-2, ST-3, and ST-8 in 1997 were analyzed for the parameters listed in UDOGM directive Tech-004, including acidity and alkalinity. ST-5 and ST-7 had some flow in 1997 and water samples collected by an automatic sampler were analyzed for TDS, TSS, total iron, total and manganese; at ST-5 pH was measured in

the field. ST-4 and ST-6 were dry and ST-1 was not monitored. Field parameters were measured and samples were collected between May and October 1997, but the dates of monitoring vary from site to site (Appendix 7-2).

Monitoring in May, June, and July 1998 at ST-4, ST-5, ST-6, ST-6a, and ST-7 showed no flow (addendum to Appendix 7-1). 1998 monitoring results at ST-1, ST-2, ST-3, and ST-8 are not reported in the PAP.

Grassy Trail Creek is the only perennial stream in the permit and adjacent areas. The permit area does not include any portion of the upper Grassy Trail Creek watershed; nevertheless, two sites on Grassy Trail Creek are being monitored for baseline data (Map 7-6). Stream site ST-3 is located below the confluence with Hanging Rock Canyon and is upstream of the permit area. Stream site ST-8 is located just above the confluence with Water Canyon, downstream of the permit area.

If it becomes necessary to discharge water from the proposed mine, the water will discharge into the C Canyon drainage. Baseline data are being collected at ST-5 and ST-6 on this intermittent stream. ST-5 had some flow in 1997 and water samples collected by an ISCO automatic sampler were analyzed for TDS, TSS, total iron, and total manganese in the laboratory, and pH in the field (Appendix 7-2). Monitoring in May, June, and July 1998 showed no flow. Karla Knoop's notes (Appendix 2) indicate that the applicant is using single stage samplers for surface-water sample collection and crest stage gages at ST-6, ST-6a, and ST-7 and perhaps other sites, but this is not clear from the text of the PAP. Additional data show that, except for one minor flow, ST-6 was dry when monitored in 1988 and 1989. ST-6a, above the proposed mine site, was monitored in 1997 and 1998 but there was no flow recorded (addendum to Appendix 7-1). There was one sample collected in A Canyon at ST-7 in 1997 that was analyzed for TDS, TSS, total iron, and total manganese but not pH. Because flow in C Canyon is intermittent, the applicant does not propose any operational surface-water monitoring locations in this drainage. Discharge water will be subject to monthly monitoring stipulated by a UPDES permit. Because the monitoring required under the UPDES permit is more stringent and more frequent than that proposed in this permit application, no operational monitoring in the C Canyon drainage below the mine discharge is proposed.

Findings:

Hydrologic resource information provided in the PAP is not considered adequate to meet the requirements of this section. Prior to approval the applicant must provide the following information:

R645-301-723 - through a misunderstanding, probably the fault of UDOGM, reference is made in the PAP to UDOGM directive Tech-006; this should be Tech-004.

R645-301-723 - clarify the methodology used in sampling and analyzing water samples. Karla Knoop's notes (Appendix 2) indicate that the applicant is using single stage samplers for surface-water sample collection and crest stage gauges at ST-6, ST-6a, and ST-7 and perhaps other sites, but this is not clear from the text of the PAP.

R645-301-724 - It is unclear from the PAP whether the topsoil borrow area is part of this permit application or not. Baseline surface and ground water quality and quantity information for the topsoil borrow area need to be addressed in the PAP, and especially the PHC

determination needs to include this area.

R645-301-724, -121.100 - clarify the conflicting information on Map 7-6 and in Table A-1 concerning springs SP-14, WR-2, S-168, and S-177. Map 7-6 shows SP-14 to be the same as S-168, and WR-2 to be the same as S-177, at locations several thousand feet apart. Table A-1 of the addendum indicates that SP-14 and S-177 are the same site, and S-168 is not listed in the table.

R645-301-724, -121.100 - clarify why 14 of the springs on Map 7-5 are designated as "Spring Monitoring Station (1985-1986)" and how these 14 sites differ from the others.

R645-301-724 - 1998 baseline data to sufficiently demonstrate seasonal variation and water usage.

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

Except for ST-1 (M-1) and ST-6a, elevations and locations of monitoring stations used to gather data on water quality and quantity are shown on Map 7-6. Locations of test holes bored from the surface and in-mine from Kaiser's exploratory entries are shown on Map 6-2. Drill hole locations are shown on Map 6-2. Drill-hole collar elevations, intervals cored, and depths drilled are tabulated in Appendix 6-2.

Subsurface-water Resource Maps

As described by Mayo and Associates (Appendix 7-1), ground-water systems in the permit and adjacent area have limited areal and vertical extent due to the heterogeneous lithology of the rock units containing and overlying the coal-bearing strata. It is asserted that no aquifers exist in the permit and adjacent areas and therefore no map has been prepared to show the location and extent of subsurface water.

Sunnyside City and East Carbon City have water right 91-4960 for 31.621 ac-ft per year from water-supply well DH 90-1 in the SW1/4 SW1/4 of Section 17, T. 14 S., R. 14 E. Ground water has been encountered in bore holes DH 86-1 and DH 86-2. These are shown on Map 7-6. It is likely that ground water was encountered in other bore holes, but the occurrence of ground water was not marked on drillers logs. The number of springs and seeps, and the water rights on those springs and seeps and on the streams fed by ground-water baseflow, indicates that there are valuable ground-water resources, especially in the North Horn and Colton Formations on West Ridge and in Whitmore Canyon.

Thick overburden between the coal seam and the North Horn and Colton will possibly preclude or minimize impacts from mining on the ground water, but this is not discussed in the PAP. Maps and cross sections are not used to show the location and extent of ground water and to clarify the relationship between the ground-water resources and the proposed mining operation. Instead the ground-water resources are dismissed as inconsequential because there is no mappable aquifer, and potential impacts from mining treated as non-existent; such dismissal is questionable.

Surface-water Resource Maps

The location of surface-water bodies can be found on Map 7-3, which shows Grassy Trail Reservoir and its location with respect to the permit area. Grassy Trail Reservoir stores culinary water for East Carbon City and the town of Sunnyside, and for other uses such as irrigation. The water supply intake for the culinary water, located at the reservoir, is marked on Map 7-3. In addition the towns have a water-supply well in the SW¼ SW¼ of Section 17, T. 14 S., R. 14 E., which is just off the east edge of the PAP maps.

The applicant anticipates that as mining progresses it may become necessary to discharge water from the proposed mine. Mine water will be discharged to the intermittent drainage in C Canyon. The location of

mine discharge point UPDES #1 is shown on Map 7-2. Surface drainage from the disturbed area will pass through a sediment pond into the B Canyon drainage. The sediment pond is shown on Map 5-5 and in detail on Map 7-4. There are irrigation ditches that divert flow from Grassy Trail Creek but none of them are within the proposed permit and adjacent areas.

Well Maps

No oil and gas wells exist within the proposed permit area.

Sunnyside City and East Carbon City have water right 91-4960 for 31.621 ac-ft per year from water-supply well DH 90-1 in the sw1/4 sw1/4 of Section 17, T. 14 S., R. 14 E. (Map 7-6).

The locations of water monitoring wells DH 86-1, which was monitored from 1987 to 1993 , and DH 86-2, which was monitored during 1986, 1987 and 1997, are on Map 7-6.

Findings:

Maps, plans, and cross sections of resource information provided in the PAP are not considered adequate to meet the requirements of this section. Prior to approval the applicant must provide the following information:

R645-301-722.300 - locations of monitoring sites ST-1 (M-1) and ST-6a are not shown on a map.

OPERATION PLAN

MINING OPERATIONS AND FACILITIES

Regulatory Reference: 30 CFR Sec. 784.2, 784.11; R645-301-231, -301-526, -301-528.

COAL RECOVERY

Regulatory Reference: 30 CFR Sec. 817.59; R645-301-522.

Analysis:

The Lower Sunnyside Seam is the most important coal seam in the area. According to information on page 6-3, it exceeds 6 feet throughout most of lease SL-068754, the West Ridge Mine area.

Thickness and nature of the Upper Sunnyside Seam is indicated on the logs in Appendix 6-2, but there is no analysis of this coal and no isopach map. From the bore-hole logs in Appendix 6-2, the Upper Seam appears thick enough to be mined; however, the applicant states that the average seam height is less than 4 feet, that it consists of six lenticular beds, and that it cannot be correlated between widely spaced data points (page 6-4). The Upper Sunnyside Seam lies as little as 5 to 10 feet above the lower seam in places and because of this thin interburden both seams cannot be recovered using current underground mining methods.

In leases SL-068754 and UTU-76577 the BLM has apparently determined the Upper Sunnyside Seam to be non-economic. Sterilization of this seam by mining of the Lower Seam will eliminate any need to reaffect these leases in the future through coal mining and reclamation operations.

Findings:

Operation information on coal recovery provided in the PAP is considered adequate to meet the requirements of this section.

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:

Operational Water Monitoring Plan

The PAP includes ground-water and surface-water monitoring plans based upon the PHC determination and the analysis of all baseline hydrologic, geologic, and other information in the permit application. These plans provide for the monitoring of parameters that relate to the suitability of surface and ground water for current and approved postmining land uses and to the objectives for protection of the hydrologic balance, as well as the effluent limitations found at 40 CFR Part 434. They identify the quantity and quality parameters to be monitored, sampling frequency, and site locations. Locations of water monitoring stations are shown on Map 7-6.

Baseline monitoring will be performed until construction of the mine and mine facilities begins. Once construction is initiated, the operational monitoring schedule will be utilized. Monitoring will continue through reclamation until bond release.

Locations of operational monitoring stations are depicted on Map 7-7. Operational monitoring locations, hydrologic monitoring protocols, sampling frequencies, and sampling sites are listed in Table 7-1. Operational field and laboratory hydrologic monitoring parameters for surface water are listed in 7-2. Operational field and laboratory hydrologic monitoring parameters for ground water are listed in Table 7-3. The hydrologic monitoring parameters have been selected in consultation with UDOGM directive Tech-004.

The applicant proposes that operational field and laboratory parameters will be measured for the first two years of mine operation, after which only field parameters will be measured. The applicant is of the opinion that the physical parameters and chemical composition of springs and streams in and around the permit area will be adequately characterized following the collection of three years of baseline laboratory data (in progress) and two years of operational laboratory data. Continued monitoring for laboratory parameters will not enhance the scientific understanding of hydrologic systems in the mine permit area. However,

monitoring of field parameters - pH, specific conductance, and temperature - will continue during mine operation in order to identify mining-related impacts to the discharge and chemical characteristics of streams and springs in the permit and adjacent area. If the field parameters at any sampling site deviate significantly from historical values, monitoring of operational laboratory water quality will resume at that site.

The applicant believes that discontinuance of laboratory parameters after two years of operation is acceptable for two reasons. According to the applicant mechanisms whereby the chemical composition of springs and streams that are above the mine workings can be adversely impacted by mining activities are absent. The applicant also states that this type of ground-water monitoring program has been approved for the Soldier and Dugout Canyon Mines, 10 miles north of the West Ridge area. By following the procedure in directive Tech 004, UDOGM concluded that the requested modification of the Soldier Canyon Mine monitoring plan was justified at the time the Alkali lease addition was approved. Furthermore, the monitoring programs at Soldier and Dugout Canyon Mines are subject to ongoing evaluation by UDOGM to assure that the monitoring is meeting the objective of protection of the hydrologic balance and that the monitoring includes parameters that relate to the suitability of the ground water for current and approved postmining land uses.

The monitoring programs at both Soldier Canyon and Dugout include semi-annual (high-flow and low-flow) water-quality analysis and weekly base-flow hydrograph measurements during "wet" and "dry" years that are not included in the proposed West Ridge monitoring plan. Failure to establish the distinction between baseline and operational monitoring produced problems at the Dugout Mine, and the Dugout ground-water monitoring plan now includes, in addition to the "wet" and "dry" year monitoring, quarterly laboratory analysis for operational parameters for at least two years, and analysis for baseline parameters every five years.

The Division may modify the monitoring requirements including the parameters covered and the sampling frequency if the operator demonstrates, using the monitoring data obtained, that the operation has minimized disturbance to the prevailing hydrologic balance in the permit and adjacent areas and prevented material damage to the hydrologic balance outside the permit area; that water quantity and quality are suitable to support approved postmining land uses; or that monitoring is no longer necessary to achieve the purposes set forth in the monitoring plan.

A procedure for modifying the monitoring plan is outlined in UDOGM directive Tech 004, Part 5E. Amendments to monitoring programs will be approved on a site specific basis. Generally, quarterly sampling will still be required at each surface and ground water monitoring location. Required monitoring may be reduced to field parameters and the parameters identified in R645-301-731.200 on a quarterly basis plus one complete operational sample collected during the low flow (August or September) season if certain criteria are met. Inaccessibility will not be considered an excuse to forego the annual operational sample. The West Ridge Mine applicant has not yet met the criteria.

Table 7-1 indicates data will be collected quarterly, and there is a commitment that water monitoring reports will be submitted on a quarterly basis to UDOGM on page 7-18. When the analysis of any ground-water sample indicates noncompliance with the permit conditions, the operator will promptly notify the Division and immediately provide for any accelerated or additional monitoring necessary to determine the nature and extent of noncompliance and the results of the noncompliance (p. 7-18).

It is unclear from the PAP whether the topsoil borrow area is part of this permit application or not. If

it is, operational surface and ground water monitoring for the topsoil borrow area needs to be addressed in the PAP.

Ground-water monitoring.

Operational hydrologic monitoring protocols, sampling frequencies, and sampling sites are described in Table 7-1. Operational field and laboratory hydrologic monitoring parameters for surface water are listed in 7-2. The hydrologic monitoring parameters have been selected in consultation with UDOGM directive Tech-004. Operational field and laboratory parameters will be measured for the first two years of mine operation, after which the applicant proposes that only field parameters will be measured. The applicant feels physical parameters and chemical composition of springs and streams in and around the permit area will be adequately characterized following the collection of three years of baseline laboratory data (in progress) and two years of operational laboratory data.

In order to comply with UDOGM directive Tech-004, baseline samples will be collected from each spring in the monitoring program during the low flow (fall) sampling beginning with the first mid-term review. This will be repeated every five years until reclamation is complete (p. 7-19).

Springs

Seven springs in the permit and adjacent areas will be monitored (Map 7-6). Four of these springs (SP-12, SP-13, SP-15, and SP-16) discharge from the lower slopes of West Ridge in Whitmore Canyon. Two springs, WR-1 and WR-2, discharge from the upper slope of West Ridge in Whitmore Canyon. One spring (SP-8) discharges in the upper drainage of C Canyon. Baseline data for springs WR-1 and WR-2 are in the addendum to Appendix 7-1, except there are no total manganese values for WR-1.

Most of the monitoring stations in this monitoring program are located on the east slope of West Ridge. This is because, with the exception of SP-8, there are no springs that are suitable for monitoring on the west side of West Ridge.

Wells

Only one ground-water monitoring well, DH 86-2, exists in the permit area. This well monitors the Sunnyside Member of the Blackhawk Formation, which is below the coal seam that will be mined. The applicant proposes that after three years of baseline and two years of operational monitoring, water level only will be measured in this well.

Sealing of the ground-water monitoring well and any future wells will comply with R645-301-748 (page 7-27).

Sunnyside City and East Carbon City have a water right for 31.621 ac-ft per year from water-supply well DH 90-1 in the sw1/4 sw1/4 of Section 17, T. 14 S., R. 14 E. (Map 7-6). The well has a total depth of 500 feet, with a gravel pack from 207 to 500 feet below ground surface. According to Sunnyside Coal Company records the well is completed in the Price River and North Horn Formations. Because the well is located over a mile from the lease boundary, and is completed in the Price River and North Horn Formations, the applicant feels it is very unlikely that mining in the permit area will affect groundwater systems that

contribute water to DH 90-1 (p. 7-4), and it is not included in the monitoring plan in Table 7-1.

Surface-water monitoring plan.

Operational hydrologic monitoring protocols, sampling frequencies, and sampling sites are described in Table 7-1. Operational field and laboratory hydrologic monitoring parameters for surface water are listed in 7-2. The hydrologic monitoring parameters have been selected in consultation with UDOGM directive Tech-004.

In order to comply with UDOGM directive Tech-004, baseline samples will be collected from each stream monitoring site in the monitoring program during the low flow (fall) sampling beginning with the first mid-term review. This will be repeated every five years until reclamation is complete (p. 7-19).

The applicant will obtain a UPDES discharge permit to cover any possible discharge from the sediment pond (page 7-34).

Streams

Grassy Trail Creek is the only perennial stream in the permit and adjacent areas. However, the permit area does not include any significant portion of the upper Grassy Trail Creek watershed. Nevertheless, two sites on Grassy Trail Creek will be monitored. Stream site ST-3 is located below the confluence with Hanging Rock Canyon and is upstream of the permit area and Grassy Trail Reservoir. Stream site ST-8 is located just above the confluence with Water Canyon, downstream of the permit area and Grassy Trail Reservoir.

If it becomes necessary to discharge water from the proposed mine, this water will discharge into the C Canyon drainage. Discharge water will be subject to monthly monitoring stipulated by a UPDES permit. Because flow in C Canyon is intermittent and because the monitoring required under the UPDES permit is more stringent and more frequent than that proposed in this permit application, the applicant does not propose any surface-water monitoring locations in this drainage other than the UPDES discharge point.

Acid and toxic-forming materials and underground development waste.

Data in Appendix 6-1 indicate that the potential for acid and/or toxic-forming material is minimal. No acid-forming materials or any toxic-forming materials have been identified or are suspected to exist in materials to be disturbed by mining (p. 7-10).

The applicant intends to produce a run-of-mine product without any coal-processing waste for disposal or on-site storage (p. 6-16). It is not likely that any significant amount of the roof, floor or coal material would be incorporated in the regraded fill material at the time of final reclamation. Coal will be stockpiled in a relatively contained area of the mineyard and all runoff from the site will flow to the sediment pond for containment (p. 6-8). Any waste rock generated through underground activities, such as construction of overcasts, will be permanently stored underground and therefore should not be a factor in surface reclamation activities (p. 6-7). Roof and floor materials will be permanently stored underground and will not brought to the surface for disposal. There will be no coal processing or coal preparation at the minesite. Prior to reclamation of the minesite all coal will be removed from the minesite and sold (p. 7-25).

Transfer of wells.

All water wells utilized during the operating phase will be abandoned in accordance with the rules outlined in "Administrative Rules For Water Well Drillers, State of Utah, Division of Water Rights, 1987". Closure of the wells will be conducted by a licensed well driller. The procedure is outlined on page 7-26.

Discharges into an underground mine.

No discharge into the underground mine is anticipated (page 7-27).

Gravity discharges from underground mines.

Surface entries and accesses to underground workings will be located and managed to prevent or control gravity discharge from the mine. All workings will dip away (downdip) from the portals. It is anticipated that the mine will be relatively dry but in the event that discharge becomes necessary, discharge will comply with the performance standards of the regulations and requirements of the UPDES permit before being discharged off the permit area (page 7-27).

Water quality standards and effluent limitations.

Sediment control measures have been designed to prevent, to the extent possible, additional contributions of sediment to stream flow or runoff outside the permit area, to meet effluent limitations and to minimize erosion (page 7-35).

The applicant will obtain a UPDES discharge permit to cover any possible discharge from the sediment pond (page 7-40).

Casing and sealing of wells.

Sealing of the ground-water monitoring well and any future wells will comply with R645-301-748 (page 7-34). Upon completion of activities, the wells will be permanently sealed to prevent acid or toxic drainage from entering ground or surface water, to minimize disturbance to the hydrologic balance and to ensure safety when no longer utilized. Permanent closure of monitoring well DH 86-2 will be in accordance with the requirements of "Administrative Rules for Water Well Drillers", July 15, 1987, State of Utah, Division of Water Rights. The well abandonment plan is on page 7-43. Any future water or monitoring wells will be abandoned in a similar manner (page 7-40).

Findings:

Hydrologic operation information provided in the PAP is not considered adequate to meet the requirements of this section. Prior to approval the applicant must provide the following information:

R645-301-121.100 - The statement "Should any ground water sample indicate noncompliance with the permit conditions, the operator will promptly notify the Division and immediately provide for any accelerated or additional monitoring necessary to determine the nature and

extent of noncompliance and will provide the results of the sampling to the Division.", on page 7-18 should include surface water.

R645-301-731.200 - If the criteria in UDOGM directive Tech 004, Part 5E are met and with UDOGM's approval, required quarterly monitoring may be reduced to field parameters and the parameters identified in R645-301-731.200, plus one complete operational sample collected during the low flow (August or September) season. The applicant has not demonstrated that the criteria have been met and is presupposing that they will be met after operational data are collected for two years.

R645-301-731.200 - The proposed reduction in monitoring after two years does not include one complete operational sample collected annually during the low flow (August or September) season, as discussed in UDOGM directive Tech 004, Part 5E.

R645-301-731.200, -751 - It is unclear from the PAP whether the topsoil borrow area is part of this permit application or not. Sediment control and surface and ground water monitoring, if the determination of the PHC indicates a need fro monitoring, for the topsoil borrow area need to be addressed in the PAP.

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.

Analysis:

Monitoring and Sampling Location Maps.

Except for ST-1 (M-1) and ST-6a, elevations and locations of monitoring stations to be used to gather operational data on water quality and quantity are shown on Map 7-7.

Findings:

Maps, plans, and cross sections of operations information provided in the PAP are not considered adequate to meet the requirements of this section. Prior to approval the applicant must provide the following information:

R645-301-722.300 - (repeat) locations of monitoring sites ST-1 (M-1) and ST-6a are not shown on a map

RECLAMATION PLAN

GENERAL REQUIREMENTS

Regulatory Reference: PL 95-87 Sec. 515 and 516; 30 CFR Sec. 784.13, 784.14, 784.15, 784.16, 784.17, 784.18, 784.19, 784.20, 784.21, 784.22, 784.23, 784.24, 784.25, 784.26; R645-301-231, -301-233, -301-322, -301-323, -301-331, -301-333, -301-341, -301-342, -301-411, -301-412, -301-422, -301-512, -301-513, -301-521, -301-522, -301-525, -301-526, -301-527, -301-528, -301-529, -301-531, -301-533, -301-534, -301-536, -301-537, -301-542, -301-623, -301-624, -301-625, -301-626, -301-631, -301-632, -301-731, -301-723, -301-724, -301-725, -301-726, -301-728, -301-729, -301-731, -301-732, -301-733, -301-746, -301-764, -301-830.

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:

It is unclear from the PAP whether the topsoil borrow area is part of this permit application or not. If

it is, reclamation surface and ground water monitoring for the topsoil borrow area needs to be addressed in the PAP.

Ground-water monitoring.

The operational monitoring program will continue through reclamation until bond release (Table 7-1). In order to comply with UDOGM directive Tech-004, baseline samples will be collected from each spring in the monitoring program during the low flow (fall) sampling beginning with the first mid-term review. This will be repeated every five years until reclamation is complete (p. 7-19).

Final abandonment of water monitoring well DH 86-2 (at the mine site) will be conducted prior to completion of final reclamation (page 7-26).

Surface-water monitoring.

The operational monitoring schedule will continue through reclamation until bond release (Table 7-1). In order to comply with UDOGM directive Tech-004, baseline samples will be collected from each stream monitoring site during low flow beginning with the first mid-term review. This will be repeated every five years until reclamation is complete (p. 7-19).

Transfer of wells.

All water wells utilized during the operating phase will be abandoned in accordance with the rules outlined in "Administrative Rules For Water Well Drillers, State of Utah, Division of Water Rights, 1987". Closure of the wells will be conducted by a licensed well driller. The procedure is outlined on page 7-26. Any future water or monitoring wells will be abandoned in a similar manner (page 7-40).

Discharges into an underground mine.

No discharge into the underground mine is anticipated (page 7-27).

Gravity discharges from underground mines.

Surface entries and accesses to underground workings will be located and managed to prevent or control gravity discharge from the mine. All workings will dip away (downdip) from the portals. It is anticipated that the mine will be relatively dry but in the event that discharge becomes necessary, discharge will comply with the performance standards of the regulations and requirements of the UPDES permit before being discharged off the permit area (page 7-27).

Casing and sealing of wells.

Upon completion of activities, wells will be permanently sealed to prevent acid or toxic drainage from entering ground or surface water, to minimize disturbance to the hydrologic balance and to ensure safety when no longer utilized (p. 7-40). Permanent closure of monitoring well DH 86-2 will be in accordance with the requirements of "Administrative Rules for Water Well Drillers", July 15, 1987, State of Utah, Division of Water Rights (p. 7-43). Well abandonment plans are on pages 7-26 and 7-43. Any future water or

monitoring wells will be abandoned in a similar manner (page 7-40).

Findings:

Hydrologic reclamation information provided in the PAP is considered adequate to meet the requirements of this section.

R645-301-731.200, -751 - It is unclear from the PAP whether the topsoil borrow area is part of this permit application or not. Sediment control and any proposed related surface and ground water monitoring for the topsoil borrow area need to be addressed in the PAP.

MAPS, PLANS, AND CROSS SECTIONS OF RECLAMATION OPERATIONS

Regulatory Reference: 30 CFR Sec. 784.23; R645-301-323, -301-512, -301-521, -301-542, -301-632, -301-731.

Analysis:

Reclamation monitoring and sampling location maps.

Baseline monitoring will be performed until construction of the mine and mine facilities begins. Once construction is initiated, the operational monitoring schedule will be utilized. Monitoring will continue through reclamation until bond release (Table 7-1). Locations are shown on Map 7-7.

Findings:

Maps, plans, and cross sections of reclamation information provided in the PAP is considered adequate to meet the requirements of this section.