

# TECHNICAL MEMORANDUM

## Utah Coal Regulatory Program

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March 9, 2005

TO: Internal File

THRU: Pamela Grubaugh-Littig, Permit Supervisor

THRU: Wayne Western, Team Lead

FROM: David Darby, Environmental Specialist

RE: Incidental Boundary Change, Penta Creek Fee Lease, West Ridge Resources, Inc., West Ridge Mine, C/007/0041, Task ID #2172

### **SUMMARY:**

West Ridge Resources, Inc. submitted a proposal March 8, 2005 for an incidental boundary change (IBC) adjacent to Grassy Trail Reservoir. This application presents a major concern if there is any potential for a connection between the water in the reservoir and mine. The IBC is only for the extension (development) of the tailgate (northeast side) entries, an additional 1300 feet through the Penta Creek fee property to the bleeder entries in the approved Federal Lease UTU 78562. Map 5-7 shows the proposed entries.

In a meeting on March 8, 2005, Mr. Dave Shaver stated that West Ridge Mine is taking a risk in developing the entries in Panel 7 any further, because they are waiting for a seismic study to be completed. The seismic study will identify potential impacts to Grassy Trail Reservoir from mining the panel. The Permittee is speculating that seismic data mining Panel 6 will show that full development of Panel 7 can be accomplished in the future without harm to Grassy Trail Reservoir. The tailgate entry is currently under construction for Panel 7. As the Permittee develops the gaterow to Panel 7 the, already approved, mine workings will be closer (approximately 875 feet) to Grassy Trail Reservoir, than they will be when they reach the IBC (approximately 1400 feet).

There are three geological related concerns in mining areas adjacent to reservoirs. 1). What is the relative distance, both vertical and lateral, between the water level in the reservoir and the area to be mined? 2). What is the amount of faulting or fracturing of the strata between the dam and the mine, that may provide an avenue for interception? 3). What will be the effects of seismic activity to the dam and underlying strata from mining?

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**TECHNICAL ANALYSIS:**

## **ENVIRONMENTAL RESOURCE INFORMATION**

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

## **GEOLOGIC RESOURCE INFORMATION**

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

The West Ridge IBC is located in the Book Cliffs, in Whitmore Canyon north of Sunnyside, Utah. (Map 1-1). The dip of the formations is approximately 13 degrees, northeast. Andalex is mining in the Lower Sunnyside Coal seam. The coal thickness is about 8 feet thick in the vicinity of the IBC (Plate 6-3). Map 5-7 identifies at least 2000 feet of cover between the coal seam and surface of the IBC. All mining activities in the Penta Creek IBC will be underground, no mining activities on the surface.

### **Analysis:**

The permittee complies with this section, because they have supplied sufficient Geologic information 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. Geologic structure and stratigraphy of the permit and adjacent areas are discussed adequately to show how it may influence the occurrence, availability, quantity, and quality of 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.

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.

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 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 determined that collection, analysis, and description of additional geologic information is not 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.

#### Acid- and Toxic-forming Materials

The permittee has supplied the chemical analyses of the strata and coal seam for acid- or toxic-forming materials, including the total sulfur and pyretic. There are no acid or toxic forming materials to cause adverse impacts. There are no new changes with regard to geology. 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).

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### Drill Holes

No drill holes exist on the IBC.

### Stratigraphy

The applicant supplied Map 6-1 showing the geology and stratigraphic setting on and adjacent to the permit, including the IBC. 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.

### Star Point Sandstone

The Star Point Sandstone is the oldest stratigraphic unit exposed in the lease areas. It is the basal unit of the Mesaverde Group and is approximately 440 feet thick. The formation contains the Panther, Storrs, and Spring Canyon Sandstone Members which consist of coarsening upward littoral sequences of white to light gray, fine to medium grained, tight, quartzose sandstone (Blanchard 1981). The Star Point Formation overlies and intertongues with the marine

Mancos Shale. The Star Point is the lowest cliff-forming unit over most of the east side of the Wasatch Plateau.

#### Blackhawk Formation

The Blackhawk Formation measures approximately 900 feet thick and consists of interbedded fluvial and marine sandstone, siltstone, and shale. The Blackhawk Formation conformably overlies the Star Point Sandstone and the boundary between the two formations is sharp; the massive Spring Canyon Sandstone member of the Star Point Sandstone is overlain by easily erodible, shaley sandstone.

In the lease area, the Blackhawk Formation is the principal surficial bedrock unit in the area. The Blackhawk Formation underlies the massive coarse-grained fluvial Castlegate Sandstone.

#### Castlegate Sandstone

The Castlegate Sandstone is exposed in the central and northeastern portion of the lease block (Plate 6-1). The formations consist of a white to gray, coarse grained to conglomeratic fluvial sandstone. Exposures of the Castlegate Sandstone typically form cliffs to steep slopes. The Castlegate Sandstone is approximately 300 feet thick in the Gordon Creek area.

#### Price River Formation

The Price River Formation occurs in the northeastern portion of the lease block (Plate 6-1). The Price River is also a fluvial deposit and contains gray to white silty sandstones with interbedded subordinate shale and conglomerate. The formation typically forms ledges and slopes. The Price River formation ranges from 600 to 1,000 feet in thickness.

#### Unconsolidated Deposits

Unconsolidated deposits composed of silt and fine-grained sand, alluvial sediments and talus debris occur along valley floors and at the base of steep slopes. The thickness of these sediments is variable. In the Horizon No. 1 Mine area, the thickest alluvial deposits occur along Beaver Creek. Based on field observations, the alluvial sediments appear to exceed 10 feet in thickness.

#### Structure

The permittee did not provide structural information in the amendment, however the Permittee did identify there is geological information in the MRP and referenced some of the major geological studies conducted in the vicinity of the IBC.

#### *Faults*

A review of the geological studies conducted by Clark (1928) and Osterwald et al (1981) show no mapped faults in the vicinity of Grassy Trail Reservoir. The Osterwald study does

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mention that most faults and fault zones in the Sunnyside district are obscure at the surface. The permittee has been issued a permit to mine the federal lease and is currently driving the gaterows for Panel 7. Any faults encountered during the mining process should be reported, and especially if groundwater is associated with them.

**Findings:**

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

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

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

**Analysis:**

Coal Resource and Geologic Information maps have been submitted by the Permittee.

**Findings:**

The applicant has submitted sufficient information in Chapter 6 of the MRP to meet the minimum Maps, Plans and Cross-section requirements if the regulations.

**OPERATION PLAN**

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.

## COAL RECOVERY

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

### Analysis:

The permittee has met the requirements of the Coal Recovery section, addressed within the approved mining and reclamation plan, Chapter 5, page 5-22.

### Type and Method of Mining Operations

The permittee will drive the gaterow using the standard room and pillar method.

### Findings:

The applicant has submitted sufficient Coal Recovery information to meet the minimum requirements if the regulations.

## 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.

### Analysis:

The applicant has provided information in the MRP to show they will conduct reclamation activities on the minesite. Reclamation of the mine site will follow completion of the mining operations as required by state regulations R645-301 and R645-302 will be accomplished. The reclamation plan is discussed in detail in Section 3.5 of this permit application.

No oil and gas exploration or production wells are located in the permit area.

Subsidence of the sediments overlying the mining area will be monitored. A detailed description of the subsidence monitoring plan, including a map illustrating the location of monitoring stations, is presented in Chapter 5 of the MRP.

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**Findings:**

The applicant has submitted sufficient Reclamation Plan information to meet the minimum requirements of the regulations.

**RECOMMENDATIONS:**

It is recommended that the geological section of the application be approved.