

TECHNICAL MEMORANDUM

Utah Coal Regulatory Program

September 2, 2004

TO: Internal File

THRU: James D. Smith, Environmental Specialist and Team Lead

FROM: David Darby, Environmental Specialist.

RE: Permit Boundary Expansion, Hidden Splendor Resources, Horizon Mine, C/007/0020, Task ID #1933

SUMMARY:

Hidden Splendor Resources (HSR) submitted an amendment to the Horizon Mine MRP on May 21, 2004. This amendment will increase the permitted acreage from 711 acres to 1,577 acres. The additional acreage is the part of federal lease UTU-74804 that lies north of Beaver Creek. There are also some minor changes to the surface facilities.

The Horizon Mine permit area includes federal coal lease UTU-74804 (1,272 acres) and fee coal owned by Hidden Splendor Resources (305 acres). Hidden Splendor Resources has been the owner and operator of the Horizon Mine since March 2003, when it acquired the rights to the Horizon Mine from Lodestar Energy, Inc. through the US Bankruptcy Court for the Eastern District of Kentucky.

The previous operators, Lodestar Energy, Inc. received a permit to expand mine operations into the 406 acres of Federal Lease UTU-74804 located south of Beaver Creek in 2001. Knowledge of the surface/groundwater relationship and depth of groundwater north of Beaver Creek was not sufficient to allow permitting of the entire federal lease at that time.

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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 Horizon No. 1 Mine is located in the northern portion of the Wasatch Plateau (Figure 6-1)

Analysis:

Chapter 6 includes the geologic information for the Horizon Mine area in accordance with the requirements set forth in R645-301-600. The permittee has submitted a stratigraphic column in Table 6-1.

Previously assembled geologic data obtained from Beaver Creek Coal Co. has been used as a basis for this chapter. The data from Beaver Creek Coal Co. included drill logs generated during their mining efforts. Information from recent geologic publications and in-house reports is also included to supplement the information obtained from Beaver Creek Coal Co.

The minable seams for the area are found in the lower 350 feet of the Blackhawk Formation. Plates 6-2 and 6-3 are geologic cross sections that illustrate the stratigraphic relationships of the Blackhawk and Star Point Formations and the mappable coal beds present in the Horizon No. 1 Mine area.

A total of eight coal seams can be identified in the Gordon Creek region, however, Hidden Splendor has plans to mine only the Hiawatha seam. Four of the eight seams are present in the mine area and outcrop on the walls of the North Fork of Gordon Creek Canyon, Coal Canyon, and Bryner Canyon. Weathering, burning and vegetation obscures the majority of coal outcrops of the Hiawatha, Gordon, Castlegate "A", and Bob Wright seams. Only the Hiawatha and Castlegate "A" seams have been economically mined in the area. The Hiawatha seam marks the base of the Blackhawk Formation. The Castlegate "A" seam overlies the Aberdeen Sandstone. The Aberdeen is a marine sandstone sequence that coarsens upward, and is similar in character to the Star Point Sandstone. The Aberdeen measures over 120 feet at Price Canyon (Sec. 12, T13S, R9E) and thins to the west. In the vicinity of the Horizon No. 1 Mine and the National Mine (Sec. 17, T13S, R8E), the Aberdeen Sandstone is apparently discontinuous and not easily recognizable on outcrop. The westward pinch-out of the Aberdeen Sandstone is illustrated on the west-east stratigraphic section between drill hole LMC-4 and the Arco measured section near the National Mine as illustrated on Plate 6-3.

Acid- and Toxic-forming Materials

Table 6-5 summarizes the quality of the Hiawatha coal seam. The analyses were performed on core samples from drill hole LMC-4 as well as the HZ drill holes. Supporting laboratory data sheets are provided in Appendix 6-2.

According to data provided in Table 6-5, the average moisture content of the Hiawatha coal seam is 7.99 percent. The pyritic sulfur content of the coal is low, with a maximum of 0.07 percent and an average of 0.05 percent.

Data presented in Appendix 6-2 and summarized in Table 6-6 indicate that the Hiawatha coal seam does not possess toxic-forming characteristics. Boron and selenium concentrations, as well as sodium adsorption ratios, are all within a range classified as "good" by Leatherwood and Duce (1988). However, the acid-base potential of each of the three coal samples which were collected from the HZ-series holes suggests that the coal has a potential to be acid-forming.

The acid-forming potential of the coal will be tempered by its slightly alkaline nature (with a pH that varies from 7.3 to 7.8, according to Appendix 6-2). Furthermore, impacts to the environment of the permit and adjacent areas resulting from this acid-forming potential will be minimized by two factors. First, coal will be stored on the surface for only short periods of time before being shipped off site, thus reducing the potential for weathering, oxidation, and generation of acid drainage. Second, runoff from the coal stockpile will be routed through the facility sedimentation pond, where it will mix with more-alkaline runoff from additional areas, thus neutralizing any acidic drainage which might form.

Table 6-6 lists the analytical results of tests performed to determine the acid- and toxic-forming potential of floor and roof samples collected adjacent to the Hiawatha coal seam from LMC-4 and from the HZ holes. Comparing the data in Table 6-6 with the guidelines presented by Leatherwood and Duce (1988) indicate that the roof and floor materials should be neither acid-generating nor toxic-forming. One sample (LMC-4 roof material) did contain an anomalously-high pyritic sulfur content of 0.24 percent. However, comparison with other samples collected in the area indicates that this high pyritic sulfur content is likely of limited areal extent. This is further verified by the high neutralization potential of the remaining roof and floor materials (with acid/base potentials varying from 20.3 to 64.0 tons of CaCO₃ per 1000 tons of material).

To monitor conditions of the overburden and underburden, samples will be taken at 2,000 ft intervals throughout the mine and will be tested according to the Divisions requirements.

Roof and Floor Properties

As discussed in Section 6.5.2, the roof and floor rock of the Castlegate "A" and Hiawatha seams varies from shale to competent sandstone. Information obtained from the LMC drill holes and selected drill holes from the Beaver Creek Coal Company permit application for their mines in the area have been utilized to determine roof and floor conditions that can be anticipated while mining the Hiawatha seam. The location of the of the Beaver Creek drill holes are included on Plate 3-3. Logs of the wells used to determine the properties of the roof and floor rock are included in Appendix 6-1.

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The logs of drill hole LMC-3 and LMC-4 indicate the floor rock of the Hiawatha consists of five feet of carbonaceous silty shale and silty sandstone overlying the massive sandstone of the Spring Canyon Member of the Star Point Formation. No cores were obtained from LMC-3 and LMC-4 to determine the geotechnical properties of roof or floor rock. However, uniaxial strength tests were performed by Beaver Creek Coal Company on samples of shales and sandstones obtained from drill holes GCD-4, 7, and 10. These drill holes are located approximately one mile west-southwest of the Horizon Mine portals. The results of the tests are provided in Table 6-7.

The logs from drill hole LMC 1 indicate the roof of the uppermost split of the Castlegate "A" seam is approximately 35 feet of sandstone. The floor of the seam consists of four feet of shale overlying approximately 30 feet of sandstone. In LMC-2, the upper split roof rock consists of 42 feet of carbonaceous shale and the floor consists of 38 feet of shaley silty sandstone. In LMC-3, the upper split roof rock consists of 4.5 feet of shale overlain by 19 feet of silty sandstone and the floor rock consists of four feet of shale overlying 8.5 feet of sandstone. In LMC-4, the roof rock consists of 15 feet of sandstone and the floor rock is five feet of siltstone overlying 26 feet of sandstone. Information from Beaver Creek Coal Company GCD-4 indicates that the roof rock of the Castlegate "A" seam in the area of the drill hole consists of sandstones interbedded with shales and the floor consists of shale. The results of uniaxial strength tests for samples obtained from the roof and floor rock of the Castlegate "A" seam in drill hole GCD-4 is provided in Table 6-7.r

Drill Holes

The applicant has provided information from several boreholes on and adjacent to the permit area. Drill holes were drilled by Beaver Creek Coal Company to garner data for coal reserves. Drill Hole logs are provided in Appendix 6-1.

Stratigraphy

The applicant has described the stratigraphy in Section 6.4 of the MRP. The description includes the area on and adjacent to the mine. The stratigraphy consists of:

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 in the Gordon Creek area 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 an easily erodible, shaley sandstone.

In the lease area, the Blackhawk Formation is the principal surficial bedrock unit. The Blackhawk is disconformably overlain by the massive coarse grained, fluvial Castlegate Sandstone. A total of eight coal seams can be identified in the Gordon Creek region. Four of the eight seams are present in the mine area and outcrop on the walls of the North Fork of Gordon Creek Canyon, Coal Canyon, and Bryner Canyon.

Weathering, burning and vegetation obscures the majority of coal outcrops of the Hiawatha, Gordon, Castlegate "A", and Bob Wright seams. Only the Hiawatha and Castlegate "A" seams have been economically mined in the area. The Hiawatha seam marks the base of the Blackhawk Formation. The Castlegate "A" seam overlies the Aberdeen Sandstone. The Aberdeen is a marine sandstone sequence that coarsens upward, and is similar in character to the Star Point Sandstone. The Aberdeen measures over 120 feet at Price Canyon (Sec. 12, T13S, R9E) and thins to the west. In the vicinity of the Horizon No. 1 Mine and the National Mine (Sec. 17, T13S, R8E), the Aberdeen Sandstone is apparently discontinuous and not easily recognizable on outcrop. The westward pinch-out of the Aberdeen Sandstone is illustrated on the west-east stratigraphic section between drill hole LMC-4 and the Arco measured section near the National Mine as illustrated on Plate 6-3.

Castlegate Sandstone

The Castlegate Sandstone is exposed in the central and northeastern portion of the lease block (Plate 6-1). The formation consists 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.

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Structure

Figure 6-3 shows data of a dip slope from the top of the Spring Canyon Member of the Star Point Sandstone to the north-northeast. The area around the minesite is dissected by several faults. There are two graben zones, the Gordon Creek Graben and the Fish Creek Graben. These grabens run parallel and converge into N-S trending faults of the North Gordon Fault zone. The proposed mine expansion will take place in the Fish Creek Graben Zone. According to Figure 6-3 any buildup of mine water may flow out the portal.

Several igneous dikes have been reported in area mines including the Beaver Creek Coal Mines #2 and #3. The dikes are reported to be Miocene age and are a mica peridotite (Tingey, 1986). The dikes are typically associated with faults that bisect the area and trend east-west to northwest-southeast.

Faults

The area of the permit is heavily faulted (Plate 6-1). Two major fault zones affect the lease block: the North Gordon and Fish Creek fault zones (Figure 6-2). The North Gordon fault zone measures three miles wide and five miles in length and is located east of the lease. The Fish Creek fault zone averages two miles wide and enters the lease from the northwest.

The permit area contains essentially two major fault trends. They are the N60 degree west trending faults (Range N50-75W) associated with the Fish Creek fault zone, and the N-S trending faults associated with the North Gordon fault zone. Sympathetic faulting also occurs within the mine area. Displacements of the faults in the mine area are variable ranging from a few feet to as much as 200 feet.

Findings:

The applicant has submitted sufficient Geologic Resource Information to meet the minimum requirements if the regulations.

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

Figure 6-2 in the text section identifies the general regional geology. There are no coordinates or boundary lines to provide specific reference on the map, however it does give an

idea of the relationship between surface stratigraphy and faulted areas. Plate 6-1 provides more detail of the geology and permit area. The map shows a layout for the geologic cross-sections, shown in Plate 6-2 (N-S cross-section) and 6-3 (E-W cross-section). The streams are not shown on Plate 6-1. Figure 6-3 provides information of the regional structure. Generally the structure is to the north north-east, however do to the multitude of fault in the area the slope could change in any fault block..

Well Maps

Plate 6-1 identifies the wells and drill holes on and adjacent to the permit area.

Findings:

The applicant has submitted sufficient Maps, Plans and Cross-section information to meet the minimum requirements if the regulations

OPERATION PLAN

COAL RECOVERY

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

Analysis:

The permittee requirements of this section have been addressed within the approved mining and reclamation plan, Chapter 5, page 5-22.

Type and Method of Mining Operations

Findings:

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

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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 at completion of mining. Drill holes LMC 1, 2, 3, and 4 will be plugged and abandoned following State approved methods. ThreeFour new holes have been (HZ-1, HZ-2, HZ-3, and HZ-3HZ01-6-1) drilled and completed as monitoring wells within the uppermost saturated zone beneath the Hiawatha seam to better predict the potential of inflow into the mine.

Reclamation of the mine site following 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.

When no longer needed for monitoring or other use approved by the UDOGM and upon a finding of no adverse environmental or health and safety effects, or unless approved for transfer as a water well, each well or boring will be capped, sealed, backfilled, or otherwise properly managed, as required by UDOGM. Permanent closure measures will be designed to prevent access to the borings or monitoring wells by people, livestock, fish and wildlife, machinery and to keep acid or other toxic drainage from entering the groundwater system.

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 Section 3.4.8.

Findings:

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

RECOMMENDATIONS:

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

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