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# TECHNICAL MEMORANDUM

## Utah Coal Regulatory Program

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November 10, 2010

TO: Internal File

THRU: Steve Christensen, Team Lead *SKC*

FROM: Priscilla W. Burton, CPSSc, Environmental Scientist III *DS 15 Nov 2010*

RE: Waste Analysis Lab Data, Canyon Fuel Company, Dugout Canyon Mine, C/007/0039, Task ID #3650

### SUMMARY:

Supplemental information for Attachment 5-4 of the Dugout Mine MRP was received on October 11, 2010. The information in this application includes the analyses of 26 waste rock samples pulled from February 2009 to December 2009, and 16 samples pulled from January through March 2010. There have been a total of 27 samples grabbed in 2009. (One additional sample, with Lab ID S0903055-011, was taken in January 2009 and provided in May 2009, making a total of 27 samples grabbed in 2009.) The information should be approved and incorporated into the MRP.

Only 27 sample analyses were provided to the Division from the 274,000 tons of waste taken to the waste rock site and reported in the 2009 Annual Report. That corresponds to one grab sample for every 10,000 cu yds, not every 5,000 cu yds as stated in the permit. Therefore, the Permittee was not in compliance with the sampling and analysis requirements of Chap. 5, Sec. 513.400., Sec. 528.300, Sec. 536 and Refuse Pile Amendment Volume Section 536.200 for 2009. It is recommended that the Permittee monitor more closely the volumes taken to the waste rock site in 2010.

All 14 samples taken in the 1st quarter of 2010 have acid forming potential based upon their pyritic sulfur content. Samples taken in August and November 2009 also had a likelihood of acid formation based upon the pyritic sulfur content. At present, the waste has an alkaline pH, but overtime, if the material is exposed to water and oxygen, oxidation may occur. Therefore, at final reclamation, this material should be compacted and placed out of the rooting zone (below four feet).

## **TECHNICAL ANALYSIS:**

# **OPERATION PLAN**

## **HYDROLOGIC INFORMATION**

### **Acid- and Toxic-Forming Materials and Underground Development Waste Refuse Site [05112010]**

The plan indicates that for one grab sample will be taken for every 5,000 yd<sup>3</sup> hauled to the waste rock site (Chap. 5, Sec. 513.400, Sec. 528.300, Sec. 536 and Refuse Pile Amendment Volume Section 536.200). The analytical parameters are described in section 536.200 of the Waste Rock Amendment Volume. These samples were analyzed by Inter-Mountain Laboratories in Sheridan, WY.

The Permittee states in the cover letter to this amendment that 118,738 tons were delivered to the Dugout Canyon Mine waste rock site in 2009. However, the certification report dated February 2010 (December 2009 inspection date) indicates that 274,000 tons of refuse were hauled to the Dugout Waste Rock site from the Savage Coal Terminal preparation plant in 2009.

Collection and sample analysis is based upon volume rather than tonnage. The 2009 analyses were previously reviewed under Task 3542, with a request for bulk density. The bulk density of the waste is estimated by the Permittee as 1 Ton/cu yd (cover letter dated October 6, 2010), The Permittee estimates the bulk density of the material to be 1 T/yd<sup>3</sup>. This estimate is reasonable and comparable to the loose density of ripped shale reported in textbooks (i.e. Pfleider, Eugene P. 1968. Surface Mining. NY: American Institute of Mining Metallurgical, and Petroleum Entineers, Inc.)

There were 27 samples analyzed and reported to the Division for the year 2009. The October 6, 2010 cover letter concludes that 26 samples taken in 2009 were adequate for the 118,000 tons hauled in 2009. If, however, there were 274,000 tons of refuse hauled to the site in 2009, then 54 samples should have been provided to the Division. According to the information in the annual report, the Permittee was not in compliance with the sampling and analysis requirements of Chap. 5, Sec. 513.400., Sec. 528.300, Sec. 536 and Refuse Pile Amendment Volume Section 536.200 for 2009.

Four of the 27 samples analyzed in 2009 indicate potentially acid-forming waste (samples taken August through November 2009, representing 20,000 cubic yards). In addition, five

samples taken Februray through March ( representing 25,000 cu yds ) indicate the waste is sodic, that is having both high pH and high SAR values, and an Electrical Conductivity reading below 4 mmhos). Similar data was noted in approximately one third of the samples taken from December 2004 through March 2005 (Task 2156).

All 14 samples taken in the 1st quarter of 2010, representing 70,000 tons of waste are potentially acid-forming based upon their pyritic sulfur content. At present, the waste has an alkaline pH, but overtime, if the material is exposed to water and oxygen, oxidation may occur. Therefore, at final reclamation, this material should be compacted and placed out of the rooting zone (below four feet).

Samples taken in Feb and March of 2009 were alkaline (pH average 8.9) and sodic (SAR average= 17) with approximately 10 times more neutralizing capacity than the waste sampled in the 1st quarter of 2010.

Appendix A of the 2009 Annual Report contains refuse pile certifications. The February 2010 certification (December 2009 inspection) indicates that the remaining capacity of the waste rock site is 724,222 tons.

### **Findings:**

Only 27 sample analyses were provided to the Division from the 274,000 tons of waste taken to the waste rock site and reported in the 2009 Annual Report. That corresponds to one grab sample for every 10,000 cu yds, not every 5,000 cu yds as stated in the permit. Therefore, the Permittee was not in compliance with the sampling and analysis requirements of Chap. 5, Sec. 513.400., Sec. 528.300, Sec. 536 and Refuse Pile Amendment Volume Section 536.200 for 2009. It is recommended that the Permittee monitor more closely the volumes taken to the waste rock site in 2010.

### **RECOMMENDATIONS:**

All 14 samples taken in the 1st quarter of 2010 have acid forming potential based upon their pyritic sulfur content. Samples taken in August and November 2009 also had a likelihood of acid formation based upon the pyritic sulfur content. At present, the waste has an alkaline pH, but overtime, if the material is exposed to water and oxygen, oxidation may occur. Therefore, at final reclamation, this material should be compacted and placed out of the rooting zone (below four feet).