

# TECHNICAL MEMORANDUM

Utah Coal Regulatory Program

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April 18, 2007

TO: Internal File

THRU: Steve Fluke, Team Lead *STF*

FROM: Priscilla Burton, Environmental Scientist, III/Soils *PWB by AN*

RE: Pasture Pond Expansion Cogeneration Assoc., Sunnyside Refuse and Slurry, C/007/0035, Task 2765.

## SUMMARY:

The information provided for the pasture pond amendment (received on March 15, 2007) meets the requirements for Topsoil/Subsoil redistribution. (The initial submittal was reviewed as Task 2644). This proposal would change the final configuration of the slopes of Disposal Area #2 from 5% (20h:1v) to 20% (5h:1v), thereby increasing the capacity of the storage site (Appendix 9-7, Revised Capacity Calculations). Since approximately 20,000 yd<sup>3</sup> are placed in the disposal area each year, this design change will provide an additional five years of capacity for the disposal site.

It is likely that fertilization will be required at this site, based upon the existing information for the nutrient status of the subsoils. As indicated in the MRP the frequency of testing will be decided at the time of reclamation. The Division Guidelines for Topsoil and Overburden Analysis outlines the extent of sampling (for example 500 ft. centers), the total number of samples, and the parameters to be analyzed (i.e. pH, EC, SAR, and macronutrients N, P, K). For the purposes of bonding, the Division should make some assumptions as to the number of total samples and necessary parameters in order to derive a basis for bonding. **The cost for soil sampling and analysis cost should be included as a line item in the bond. The bond was recently recalculated (Task 2389) and approved April 4, 2006 without this line item. Prior to the next permit renewal date (February 2008), the Division should ensure that bonding calculations include a line- item for sampling and analysis costs for the 135 acre site.**

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**TECHNICAL ANALYSIS:**

**OPERATION PLAN**

**HYDROLOGIC INFORMATION**

Regulatory Reference: 30 CFR Sec. 773.17, 774.13, 784.14, 784.16, 784.29, 817.41, 817.42, 817.43, 817.45, 817.49, 817.56, 817.57; R645-300-140, -300-141, -300-142, -300-143, -300-144, -300-145, -300-146, -300-147, -300-148, -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:**

**Acid- and Toxic-Forming Materials and Underground Development Waste**

Appendix 9-7 and Chapter 6 Section state one grab sample will be taken from the surface of Excess Spoil Pile #2 at the completion of each 4 foot lift. Initial borings of the coarse refuse (Appendix 6-7) indicated that at depths of 60 – 130 ft the pile is acid forming. The borings also indicated that the neutralization potential of the underlying native soils (depths of 140 – 195) is between 6 and 17 Tons/1000 Tons of soil.

Annual reports on file with the Division contain the analytical reports for years 1999 through 2002 and 2004. (Spoil analysis was not included in the 2003 annual report.) After reviewing the annual reports, the Division understands that most of the material being placed in Excess Spoil Pile #2 is sand or loamy sand, with a pH between 6.2 and 8.7; an EC between 2 and 3 mmhos/cm; an SAR between 2 and 3; and with adequate buffering capacity [Acid Base Potential (ABP) of 25 to 90 CaCO<sub>3</sub>Tons/1000 Tons spoil]. However, in 2001, spoil with a high SAR of 6 to 16 was placed in the disposal area and in 2004 spoil with acid forming potential was placed in the disposal area (ABP of -2.9). The material placed in Excess Spoil Pile #2 with high SAR (values of 10 and over) and with acid forming probability (ABP values less than zero) must be covered with four feet of cover.

As the mining progresses into the coarse refuse pile, the likelihood of encountering acid-forming material increases. The Permittee will continue to monitor the chemical characteristics of the spoil through grab samples of each four foot lift (Appendix 9-7 and Chapter 6). The Excess Spoil Disposal Area is bonded for four feet of cover (pg 900-11). According to the information in Appendix 9-7, vegetation establishment on the non-toxic, non-acid forming spoil using less than four feet of cover will be demonstrated.

To suppress fires with the coarse refuse pile, part of the third and all of the fourth lift were reclaimed in the spring of 1994 with two feet of borrow material (MRP, Chap 9, pg. 900-

18). The site was fertilized with 16-16-8 (150 lbs/ac) and treated with wood fiber mulch (1 T/acre). The interim seed mix was planted (Fig. 9-1). This mix has no woody species.

Final (contemporaneous) reclamation of 5.5 acres on the Old Coarse Refuse Road was completed in 1994 with four feet of borrow material over acid forming material and six to 18 inches on the road outlopes where no toxicity was noted.

Evaluation of the Sacco Flats site (MRP, Appendix 3-6 and Appendix 3-5) concluded that the depth of cover enhanced woody plant establishment with the optimum cover being 48 inches of borrow or 12 inches of topsoil.

The Permittee has not suggested that the above reclamation supports lesser cover. The bond held for the site must include four feet of cover over the entire site until such time as demonstrations of vegetation establishment with lesser cover can be documented.

#### **Findings:**

The information provided meets the requirements of the Regulations. The bond held for the site must include four feet of cover over the entire site until such time as demonstrations of vegetation establishment with lesser cover can be documented for the non-acid/non-toxic spoil.

## **SPOIL AND WASTE MATERIALS**

Regulatory Reference: 30 CFR Sec. 701.5, 784.19, 784.25, 817.71, 817.72, 817.73, 817.74, 817.81, 817.83, 817.84, 817.87, 817.89; R645-100-200, -301-210, -301-211, -301-212, -301-412, -301-512, -301-513, -301-514, -301-521, -301-526, -301-528, -301-535, -301-536, -301-542, -301-553, -301-745, -301-746, -301-747.

#### **Analysis:**

##### **Excess Spoil:**

Excess Spoil Pile #2 is described in Chapter 9 and Appendix 9-7. Plates 9-8A through 9-8D illustrate plans for Spoil Disposal Area #2. The 1999 through 2004 annual reports, indicate that approximately 103,000 Tons of material has been placed in Excess Spoil Pile #2.

Annual reports from 1999 through 2004 indicate that over 1 million Tons of refuse have been removed from the coarse refuse pile.

#### **Findings:**

Information provided meets the requirements of the Regulations.

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**RECLAMATION PLAN**

**TOPSOIL AND SUBSOIL**

Regulatory Reference: 30 CFR Sec. 817.22; R645-301-240.

**Analysis:**

**Redistribution**

The worst cast scenario would require four feet of cover to be placed over coal mining waste (Section 10.1, page 800-3, and Section 9.8.1). This worst cast scenario would require 644,656 yd<sup>3</sup> of borrow soil as illustrated on Plate 8-4. However, the operation of the cogeneration plant will likely reduce the coal waste on the surface and result in lesser amounts of borrow (approximately 373,000 yd<sup>3</sup>) as illustrated in Plate 10-6.

Comparison Plate 8-4 and Plate 10-6

Requirements	Plate 8-4 Worst Case Scenario for Bonding	Plate 10-6 More Probable Scenario described in MRP
4 ft. Borrow Material	75.9 acres	9.3 acres
2 ft. Borrow Material	14.06 acres	4.0 acres
1.5 ft. Borrow Mat.	124.7 acres	45.24 acres
Total Borrow Required	644,656 yd <sup>3</sup>	372,679 yd <sup>3</sup>

Three borrow areas are shown on Plate 5-1 Surface Facilities Map and Plate 2-1. Two of these borrow areas were previously disturbed, industrial sites. The borrow soils are classified as Strych very stony or gravelly loam (Sec. 224 and Plate 2-1, App.2-8 Order One Soil Survey of Proposed Disturbed Sites and Borrow Areas). The plan indicates that borrow materials will be retrieved from depths of 22 – 24 ft (App. 2-9 and Sec. 224).

The borrow soils were sampled and analyzed (Sec. 231). Analytical results are in Appendices 2-4 Reclamation Soil Borrow Area 1; 2-5 Borrow Area Sampling Results; and 2-9 Soil Borrow Material Report. App. 2-9 provides an indication of concentration of plant macro-nutrients (nitrogen, phosphorus, and potassium) that are likely to be found in the borrow soil. The surface layer of most cultivated soils has between 0.06 and 0.5% Total N (J.M. Bremner, "Total Nitrogen," Chap. 37. In. Soil Science Society of America. 1996. Series No. 5. Methods of

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Soil Analysis: Part 3 - Chemical Methods. (SSSA: Madison, Wisconsin). The average %Total N and P in mg/kg for the surface six inches and the 15 – 20 ft. deep subsoil is shown in the table below (derived from the information in App. 2-9).

	Ave. Total N %	Ave. P mg/kg
Surface 0 – 6 inch	0.2	10.1
Subsoil 15 – 20 ft.	0.01	4.3
East Slurry interim	0.07	NA
Coarse Ref. lifts 3 & 4	0.05	NA

By comparing these numbers in the first two rows of the table, one sees that the average measurement of % total N in the surface six inches falls within the norm for surface soils. Also note that surface six inches has 15 times the nitrogen and 4 times the phosphorus content of the 15 – 20 ft. subsoil strata.

The requirement for testing the regraded mine site and borrow area soils is found in Section 9.8.5 of the MRP. It is likely that fertilization will be required at this site, based upon the existing information for the nutrient status of the subsoils. As indicated in the MRP the frequency of testing will be decided at the time of reclamation. The Division Guidelines for Topsoil and Overburden Analysis outlines the extent of sampling (for example 500 ft. centers), the total number of samples, and the parameters to be analyzed (i.e. pH, EC, SAR, and macronutrients N, P, K). For the purposes of bonding, the Division should make some assumptions as to the number of total samples and necessary parameters in order to derive a basis for bonding. **The cost for soil sampling and analysis cost should be included as a line item in the bond. The bond was recently recalculated (Task 2389) and approved April 4, 2006 without this line item. Prior to the next permit renewal date (February 2008), the Division should ensure that bonding calculations include a line- item for sampling and analysis costs for the 135 acre site.**

In addition to fertilization, the most likely amendment to be required at reclamation will be lime (or possibly fly-ash), especially if lesser cover is approved over the coarse refuse, which may be acid forming (see Operations Hydrology Acid-Toxic Forming Materials discussion above). In fact, revegetation test plots were designed to confirm the suitability of borrow areas employed lime. These plots were monitored and a report is in App. 2-6. **This information should be reviewed during the next mid-term review.**

Currently the **interim** reclamation plan calls for 150 lbs/ac of 16-16-8 fertilizer (Sec. 9.9.2) The requirement for fertilization during interim reclamation with 150 lbs/ac of 16-16-8 is found on page 900-17 of the MRP. However, no fertilizer use was recorded in the interim reclamation that occurred in 1995, when cover soil used for interim reclamation on the East Slurry Cell embankment was tested and found to be on average 0.07% Total Nitrogen (App. 2-11). The interim seed mix was planted (Fig 9-1). But, to suppress fires with the coarse refuse

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pile, part of the third and all of the fourth lift were reclaimed in the spring of 1994 with two feet of borrow material (MRP, Chap 9, pg. 900-18). The excess spoil material that was used as cover was analyzed for %Total Nitrogen and found to be on average 0.07 %. The site was fertilized with 16-16-8 (150 lbs/ac) and treated with wood fiber mulch (1 T/acre). The interim seed mix was planted (Fig. 9-1). [This mix had no woody species.] **These two sites are not part of the annual reporting vegetation information, but would make for an interesting qualitative comparison of fertilizer vs. no fertilizer on cover material that had similar nitrogen content.**

**Findings:**

The information provided meets the requirements for Topsoil/Subsoil redistribution.

**STABILIZATION OF SURFACE AREAS**

Regulatory Reference: 30 CFR Sec. 817.95; R645-301-244.

**Analysis:**

Plate 9-9D of Appendix 9-7 illustrates the west and east facing 15% slopes of Excess Disposal Area #2. These slopes run for a length of approximately 150 ft. The spoil is predominantly sand and has little water holding capacity. Stabilization will be accomplished through the use of gouging, wood fiber mulch, and hay. The seed mix to be applied over the Spoil Disposal Site #2 is the Pinyon/Juniper/Sagebrush mix given in Figure 10-3, which includes the small trees: serviceberry and mountain mahogany.

Final reclamation treatments will include 2Tons/ac mulch and wood fiber mulch as described in Section 9.9.4.

**Findings:**

The information provided meets the requirements of the Regulations.

**RECOMMENDATIONS:**

The information provided for the pasture pond amendment meets the requirements for Topsoil/Subsoil redistribution.

The Division Guidelines for Topsoil and Overburden Analysis outlines the extent of sampling (for example 500 ft. centers), the total number of samples, and the parameters to be

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analyzed (i.e. pH, EC, SAR, and macronutrients N, P, K). **Prior to the next permit renewal date (February 2008), the Division should ensure that bonding calculations include a line-item for sampling and analysis costs for the 135 acre site.**

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