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DIVISION OF OIL, GAS AND MINING

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October 4, 1995

TO: Daron Haddock, Permit Supervisor

FROM: *JB* Priscilla Burton, Soils Reclamation Specialist

RE: Technical Analysis of Mining and Reclamation Plan. Willow Creek Mine. Cypress Plateau Mining Company. PRO/007/038. Folder #2. Carbon Co., Utah.

Summary:

Cypress Plateau Mining Co. has submitted a proposal to develop a mine portal at the Willow Creek Mine site. This site was previously disturbed by Blackhawk Coal Co. and recently reclaimed (1991) by the Abandoned Mine Reclamation Program (AMR).

AMR buried approximately 400,000 yd³ of coal refuse from the Price River Coal Pile (Panther Mine) in a pit against the old highwall at the Willow Creek site.¹ The buried refuse is 110 feet deep in the highwall location. AMR covered the refuse with approximately 36" of soil. The cover material was obtained from the excavation of the burial pit for the refuse. Prior to burial, AMR took samples of the refuse to determine its quality; ash, btu's, sulfur etc., were sampled. (Approval to remove this refuse and place it on the Castle Gate Mine refuse pile was given September 15, 1995 under Major Revision 95-B to the Castle Gate Mine plan.)

This permit application package encompasses the Willow Creek Mine site as well as Crandall Canyon, and the Castle Gate Preparation Plant areas. Cypress Plateau Mining Co. (CPMC) has presented a lengthy discussion of the soils, refuse, and coal sampled by previous mining operations over the last two decades in the Castle Gate mining area.

Current resource information presented in the plan includes the sampling of the riparian areas where Willow Creek will be diverted and drilling cores of roof, floor and coal seams.

This review summarizes the environmental, operational and reclamation information presented for the proposed Willow Creek Mine site. Where changes to the present Castle Gate Mine plan are proposed, these changes are also discussed.

¹The information in this paragraph was reported to me in a telephone conversation with Mark Mesch and Chris Rohrer, September 28, 1994.



SOILS RESOURCE INFORMATION

Regulatory Reference: 30 CFR Sec. 783.21, 817.200(c); R645-301-411, -301-222.

Analysis:

Volume 2: Section 3.1 Soils Information
Section 3.2 Vegetation Information
Table 3.2-2 Previous and Proposed New Disturbance by
Vegetation Type
Section 3.6 Geological Information
Section 3.6.3 Coal and Overburden/Interburden Characteristics

Volume 9: Exhibit 5:
Profile Descriptions of Soils Encountered at the Willow
Creek Mine Facilities Area
Soil Mapping Unit Descriptions of Soils in the Willow
Creek Mine Permit Area
Prime Farmlands
Soil Sample Analysis Data
Roof and Floor Analyses

Volume 9: Exhibit 7 Documentation of Existing Site Conditions

Volume 10: Exhibit 11 Geotechnical Investigations

Map 4 Facilities Area Soils Map
Map 3 Regional Soils Map

Exhibit 8.3 Made Land (Volume 13A)

This site is at an elevation of 6200' and on a southeastern facing slope. Fourteen to 18 inches of water falls annually. Vegetation is noted on Map #4 (but no key is provided in the legend). Most of the disturbance is in *Artemesia tridentata* spp *tridentata* (big sagebrush) and *Elymus salinus* (saline wildrye) vegetation. The site has been a repository for coal refuse from 1938 - 1972 and in 1990 was the burial site of approximately 400,000 yd³ of refuse in an AMR reclamation project (AMR\007\907 to 912). (CPMC has incorrectly listed the AMR reclamation project date as Fall of 1989 in section 3.2.) The site is not Prime Farmland as shown in Ex 5, Volume 9.

Section 3.1 of the text is largely devoted to discussion of soil, refuse and roof and floor samples taken by various mine operations in the Castle Gate Mine area over the last two decades. Unfortunately, the laboratory analyses are not all included with the discussion in Ex 5. Those that are included are poorly organized. It is difficult for the reader to follow the discussion without the laboratory analyses.

Map 4, Facilities Area Soils Map, does not have all of the samples referred to in the text (see page 3.1-5 and 3.1-6) in its legend or designated on the map. Some soil samples are partially identified on the map (i.e. samples WC 2, 8, 9,

11, 12 and 2 refuse samples from 1994 could not be located.) There are no recent (post-reclamation) disturbed pad area sampling sites noted on this map and there is no evidence of the recent site specific soil survey (referred to at the top of page 3.1-7) on the map. Geotechnical survey information found in Exhibit 11 of Volume 10 is not referred to, but does provide the best information regarding the present conditions at the Willow Creek Mine site.

Exhibit 8-3 from the Castle Gate Mine plan is referred to on page 3.1-9 (second to the last line). This exhibit and its corresponding soil samples could not be found in exhibit 13A of the plan or in any other location. Made Land #2 and Pits #6 - 10 are also referred to and discussed. Since the Castle Gate Mine plan will be replaced by the Willow Creek Mine, and since these and other soil samples from the Castle Gate Mine plan are critical to the discussion in section 3.1; it is recommended that soils analyses (from Crandall Canyon, the Schoolhouse refuse pile and the preparation plant) and the accompanying soils map be placed in an exhibit of the Willow Creek Mine Plan for present and future reference.

Exhibit 5 is titled "Profile Descriptions of Soils encountered at the Willow Creek Mine Facilities Area." Actually, the profile descriptions found within this exhibit are excerpted from the Soil Conservation Service soil survey of Carbon County and are located at great distances from the mine site. For example the Winetti Series soil typical pedon (pg. Ex 5-12) is located 2.5 miles north of the Sunnyside Mine in Sec 20, T14S, R14E. These pedon locations are not located on any mine plan map (of course). In some instances information is included in this exhibit that is applicable in even a general sense, i.e. the Winetti Variant.

One site specific pedon discussed in the text was sampled in 1979 by Price River Coal Co. (PRCC) in the vicinity of the Willow Creek mine (location not shown on Map 4). Page 3.1-9 and 3.1-10 describe these pits, although the labeling of Pit #4 has been omitted from the text. Pit #4 represents the cut side of the fill bench. Pit #4 has an A1, B2t, and B2ca horizon. These soil horizons have textures from loamy very fine sand (0 - 2") , gravelly very fine sandy loam (2 - 5") , and gravelly very fine sandy loam (5 - 10") over bedrock at ten inches. The consistency of the soil was nonsticky and nonplastic in all cases and the pH was very neutral in all horizons 7.6, 7.5, and 7.6 respectively.

Pit #5 describes the fill soil (disturbed soil) which was on the pad prior to reclamation of the site by AMR. Pit #5 was dug in an area barren of vegetation. Horizons were determined based on coarse fragment content and color. The upper twenty four inches has 60 percent gravels and stones. Coarse fragment size and amount increases with depth to 70% cobbles at 35 inches and 60% boulders at 96 inches. Clay content also increases with depth, from 35 to 96 inches being described as a very bouldery clay soil.

Three samples from 0 - 6 and 6 - 18 inch depth were taken of this disturbed soil in 1988 by Kent Crofts (Intermountain Environmental, IME). Field notes were recorded, but not included in Exhibit 5. Soil samples were analyzed by the Book Cliffs laboratories, but no samples were found in Ex. 5 from Book Cliffs lab. Sample reports which correspond to this date and which were analyzed by ACZ were found. (In a discussion with Jerry Nettleton of Terra Matrix, I discovered that the BookCliffs Lab became ACZ.) This source of confusion could be eliminated from the text.

The Pit #5 disturbed soil sample analyses convey that the soil has a neutral pH of 7.2 to 7.5; the EC ranged from 0.5 to 3.6 mmhos/cm, saturation percentage ranged from 26 to 33%; the SAR was calculated to be from 0.4 to 1.2; Boron was 2.2 ppm or less; Se was 0.03 ppm or less; all forms of sulfur were extremely low and neutralization potential was less than 10% or less than 10 T of CaCO₃ per 1000 Tons of overburden. The texture of this disturbed soil was sandy loam or loam. The particle size of the material ranged from gravelly to very gravelly with one report of 15% cobbles at the 6 - 18" increment. The "pedon" description (discussed above) confirms that coarse fragments larger than stones did not exist in the top 24" of disturbed soil.

Although the soils described were removed from the site during burial of the Panther Mine coal refuse; similar soils were likely replaced upon the graded refuse in the 1991 AMR reclamation of the site. Exhibit 7, Documentation of Existing Site Conditions was searched for further information, but this exhibit was missing from the mine plan. No photographs documenting conditions at the site could be found in the mine plan. No field sampling has been conducted to determine the optimum soil salvage depth, although a plan to sample these soils in the future is discussed in Section 4.2. (And should be underway, as the soils are being removed from the refuse at this writing.)

Of the 6.8 additional acres to be disturbed at the Willow Creek Mine site, most of the acreage to be impacted is in the Shupert-Winetti complex with lesser disturbance to the Travessilla - Rock Outcrop - Gerst Complex and the Midford Family - Pod Association. The mine plan places most of new disturbance in areas of Winetti series soils based upon a comparison between profile descriptions conducted by PRCC in 1979 for the Castle Gate Mine and the SCS description of the Winetti Series (see page 3.1-14). However, the representative profile of Pit #4 for the Willow Creek mine site does not fit the description of the Winetti Series. The soils in the Pit profile are more developed. They have a zone of clay accumulation in the B horizon and no mention is made of cobbles or boulders in the A, or B horizons. The pH throughout the profile is much less alkaline than that in the Winetti series. Other soils indicated in the vicinity of the Willow Creek Mine site (as shown on Map 4) are the Pathead - Curecanti Family Association. The Curecanti soils are very deep and have pH values around 6.5. The Pathead soils are stony and cobbly with an alkaline pH. Neither description fits the profile of Pit #4.

For the above reasons, the disposition of the disturbed soils within the various series as stated on page 3.1-13 seems to be in error. This supposition should be further supported with field studies or deleted from the plan. A determination of the most likely Willow Creek disturbed area soils classification is critical to the mine operators contention that waste rock and other materials with high coarse fragments are suitable substitute topsoil material. This contention is not supported by either the Pit #4 or Pit #5 profile. The representative soil does, however, contain large amounts of gravels in the upper 24 inches.

Forage production values are reported for SCS mapping units 63, 72, 107 and 121 (see pg 3.1-14). Map 4 shows the Willow Creek Mine site to be in the area of Soil types 107 and 72 which have productivity rates of 1000 - 2000 lbs/cr/yr and 1000 - 1400 ls/ac/yr, respectively.

The mine water tank disturbance will be in SCS mapping unit 121 (mostly the

Travesilla series) and mapping unit 63 (mostly the Podo soils). Typical pedons for these series are found in Ex. 5 (not site specific). No field sampling has been conducted to confirm the soil type or to determine the potential for soil salvage.

Streambank samples were analyzed in 1989 by ACZ laboratories for Blackhawk Coal Co. (BCC). These stream locations had 25 to 53% coarse fragments and textures ranging from clay loam to sandy loam. These soil samples are identified on the map as Physical Soil Sample Locations, June 1989. In 1994, the stream was revisited by Cypress Plateau to delineate wetlands. The stream soils were classified as Typic Fluvaquents (sic). This classification was not shown on Map 4. Some, but not all of the sampling sites from this effort are shown on Map 4. Field notes were not found in Ex 5.

Also in 1989, three sediment pond samples were taken and describe the nature of the run-off from the mine pad. Of note were elevated nitrate nitrogen levels which probably account for the higher than normal EC values and which would be harmful to plant growth.

The buried refuse was sampled in 1994. Locations of the samples (94-12-1R and 94-12-2R) are not indicated on Map 4 and sample analyses could not be found in Ex. 5. The location of these analyses may be in Ex. 11, Geotechnical Investigations. If this is the case, that fact should be included in the discussion of the samples.

Findings:

The plan can not be considered technically adequate with regard to a description of the existing soils resource. The mining and reclamation application is not in compliance with the requirements of 30 CFR 783.21 and 30 CFR 817.200.

The permittee must provide the following, prior to approval, in accordance with the requirements of:

R645-301-222 Soil Survey. The application must include an organized, clear and concise description of the premining soils resource, including a map delineating the different soils, soil identification and description.

The text implies greater understanding of the Willow Creek Mine site soils resource than the provided documentation can confirm. A site specific investigation of the soils prior to disturbance is warranted to establish present conditions of the soils in the 6.8 acres of new disturbance. This information and the results of the proposed sampling (pg 4.2-5) prior to removal of the refuse cover material should be disclosed within section 3.1. An isopach map of the removal depth for the undisturbed sites and the disturbed regolith should be sketched to identify those areas where soil will not be salvaged and to ensure that all suitable cover material is identified for salvage. This is very important considering that 6.8 acres of disturbance will be added to the site, but not all of those acres will contribute additional topsoil for reclamation.

The information presented in the plan is taken from many different sources and could be presented in a more orderly fashion. For example, all soil sampling

locations discussed in the text should be included in the map legend and located on the map. All notations on the map should be in the legend. All soil analyses discussed in section 3.1 should be included in Ex. 5. Exhibit 5 could be prefaced by a table of contents for easy reference. Exhibit 7, Documentation of Existing Site Conditions, should be completed.

Castle Gate Mine Plan soils information (found in chapter 8 of the Castle Gate Mine Plan and its appendix) should be included as an exhibit, since this chapter provides a complete description of the Crandall Canyon, Preparation Plant and Refuse soils and analyses.

Please read the analysis section for further information on deficiencies in the text and map presentation.

ALLUVIAL VALLEY FLOORS

Regulatory Reference: 30 CFR Sec. 785.19; R645-302-320.

Analysis:

Volume 3 Section 3.7.6 Evaluation of Potential Impacts on Alluvial Valley Floors
Section 7.11 Operations on Alluvial Valley Floors

The permit application refers to a decision document by the Division of Oil Gas and Mining (DOGM) in 1982. At that time, a multi-disciplinary team studied the vicinity of the Castle Gate Preparation Plant. The team determined that the site was in an alluvial valley, but that there were no effects on the soils or water quality by the adjacent mining activity. This document is reprinted in Exhibit 10.

The Price River is impacted by the power plant; the Dept of Transportation road salt storage facility; highway activity and abandoned coal refuse piles along the river banks. Both the Willow Creek Mine site and the Castle Gate Preparation Plant have remained idle for most of the last decade.

Findings:

The plan is considered technically adequate with regard to the Alluvial Valley discussion.

OPERATION PLAN TOPSOIL AND SUBSOIL

Regulatory Reference: 30 CFR Sec.817.22; R645-301-232, -301-233, -301-234, -301-242, -301-243.

Analysis:

Volume 3: Section 4.2 Soil Handling Plans
Section 4.5 Engineering Design and Operating Plans
Table 4.5-1 Summary of Mining Related Disturbance (acreages)
Table 5.3-1 Temporary Seed Mixture

Map 18	Mine Surface Facilities
Map 22	Mine Surface Facilities Area Premining/Postmining Cross-Sections
Exhibit 11	Geotechnical Investigations

The Willow Creek Mine site will cover 55.8 acres (see Table 4.5-1) and 6.8 acres of that will be new disturbance to the area (see Table 3.2-2). Disturbed soils which are presently covering the site will be salvaged and stored for final cover over the site. The pad is formed by waste rock, refuse, and coal as well as disturbed soils and regolith. In Section 3.1 a comparison of the materials likely to be encountered in the removal of soils from the pad is presented. The Division recognizes that some contamination of the soil stockpile by coally materials is inevitable and will not present a reclamation hazard. **However, it must be made clear that the Division does not approve of the use of waste rock, refuse or coal as a substitute soil material.** Waste rock and refuse must be sampled for acid and toxic forming materials and covered as required.

The comparisons presented in Table 3.1-2 illustrate that coal refuse lacks adequate pH and texture (50% of the time). That, combined with a high percentage of coarse fragments, massive structure, lower available water holding capacity, some increased salts (EC) and dark color (increasing the temperature in the germinating and rooting zone) make it a hostile environment for reclamation. Coal mine refuse is prone to acidification as it oxidizes. Waste piles in the area have become quite acidic (pH 3.0) with time (see the Trash Canyon site in the AMR Monument Project file AMR\007\927 Fall 1995 for further information. Trash canyon is across Highway 6 from the power generating plant.)

Recent reclamation efforts to direct seed and transplant into refuse, and coal have failed miserably and success has come only by covering the waste.² Should CPMC being willing to undertake greenhouse and field trials to determine adequate revegetation techniques and plant materials for roof and floor, interburden and coal refuse, then the Division would be supportive of such an effort. However, the information presented thus far in the plan is a haphazard statistical comparison that can not be considered valid, i.e. the number of samples in the populations being compared by the "t" test of the means was widely varying from 2 to 40 samples in some cases. It was not convincing to the Division.

²Conversation with Chris Rohrer 9/28/95, concerning Abandoned Mine Reclamation Program attempts at direct seeding and transplanting into abandoned coal mine waste piles in Huntington Canyon, Sego Canyon, and the Byron Howard Mine.

Prior to removal of disturbed soils from the site, a composite samples will be taken from 0 - 18' at 500 foot intervals along the length of the site (pg 4.2-5). The Division calculates that there will be a minimum of 8 samples taken. The samples will be analyzed according to the Division guidelines for Topsoil/Overburden. (Please follow Table #6 for the substitute topsoil evaluation.)

Topsoil salvage volumes are recorded in Table 4.2-1. Soil will be salvage from 12 to 18 inches in depth from the disturbed site at the Willow Creek mine site. Undisturbed areas will have 6-8 inches of soil salvaged. (The text indicates up to 18 inches from disturbed areas and up to three feet of soil may be salvaged from undisturbed areas.) It is not clear how the salvage depths presented in the table were determined, since no site specific survey information has been presented. It is assumed, however, that the Geotechnical investigations (Ex 11) were critical to development of the soil salvage plan. Drilling locations TH3 and TH5 in the location of the AMR reclamation clearly show that 24 inches of cover overlies the refuse. The approval for removal of the refuse to the Schoolhouse refuse pile clearly requires recovery of all 24 inches. Therefore, the yardage estimated in Table 4.2-1 will likely be revised after removal of the refuse.

Some locations will not have soil salvaged. These locations are identified in Table 4.2-1 as the Water Tank Area (1.0 acre), and the Office Trailer area (3.1 acres) other areas with limited depth or high rock content will also be avoided. No site specific study or information has been presented to identify the extent of these areas. The Division is unclear as to why the water tank area will be exempt from topsoil salvage.

Soil from all horizons will go into a common stockpile. Stockpile sideslopes will be 3h:1v or less. The soil will be protected from erosion by grading and upgradient berms. Stockpiles will be seeded with a temporary vegetation mix as described in Table 5.3-1. Seeding may not occur for 6 months.

One stockpile is shown on Map 4 for the Willow Creek site. It will hold 75,700 yd³ of soil.

Riparian areas will have soil salvaged to a depth of 24 inches this material will not be placed in the stockpile. It will be directly placed on the stream re-alignment site.

Findings:

The plan can not be considered technically adequate with regard to a description of soil handling plans. The mining and reclamation application is not in compliance with the requirements of 30 CFR 817.22.

The permittee must provide the following, prior to approval, in accordance with the requirements of:

R645-301-232.200, -233.100, -233.200 and R645-301-234.100 and R645-301-234.230.

Results of the sampling program (proposed in section 4.2) should be reported in section 3.1 prior to approval of the permit. The results of such a study will enable CPMC to present exact information on the quantity, quality and availability of soil substitute material.

Table 4.2-1 should be revised to reflect the actual volume of soil recovered from the refuse removal project and to reflect the results of the site specific field study requested in the deficiencies listed under Soils Resource.

Soil Stockpiles must be seeded promptly, allowing 6 months to pass between stockpiling and seeding is too long. Six months will allow the weather to erode the pile and the soil will be hardened and crusted which is not a good environment for germinating seeds. A shorter time period should be specified.

RECLAMATION PLAN

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.

Analysis:

Volume 3: Section 5.2 Soil Replacement Plans
Section 5.3 Habitat Restoration Plans
Volumes 13/13A: Exhibit 19 Castle Gate Information
Volume 14/14A/14B: Exhibit 20 Crandall Canyon Information
Map 18 Mine Surface Facilities
Map 22 Mine Surface Facilities Area Premining/Postmining Cross-Sections
Exhibit 19 Castle Gate Reclamation Plan
Exhibit 20 Crandall Canyon Reclamation Plan

The plan describes replacement of soil and soil testing for fertility and other amendments. Some confusion exists between reclamation practices as described in Section 3.1 (page 3.1-30) and that in Section 5.2.2.3. In the first instance CPMC indicates that no mulch will be applied. Instead, the gravels in the soils will serve as mulch. In the second instance, CPMC indicates that the ground will be deep ripped and mulch incorporated into the soil prior to seeding and applied after seeding as well. And earlier in section 5.2.2.2 the plan says deep ripping will occur only when necessary.

Soil Replacement thickness will be 10 inches in the Castle Gate Preparation Plant and the Willow Creek Mine site and 5 inches in the Crandall Site. This is a reduction in depth at the preparation plant where 12 inches had previously been approved. It is unclear where the 10 inch cover for the preparation plant is presently being stored, as all the Gravel Canyon storage and Crandall Canyon storage will be used to cover the refuse pile and Crandall Canyon (see Table 4.2-1). Crandall Canyon cover was previously approved at 6 inches.

Cover depth over the Schoolhouse canyon refuse has been omitted from the discussion in the text. A cover depth of 24 inches over the refuse was previously approved and is discussed in Exhibit 19.

Findings:

The reclamation plan can not be considered technically adequate.

The permittee must provide the following, prior to approval, in accordance with the requirements of:

R645-301-242 Soil Redistribution and R645-301-244 Soil Stabilization.

More detail in the plan regarding the soil salvage (as requested in deficiencies listed under Operations Topsoil and Subsoil) is required before the Division can approve the 10" cover over the Willow Creek Mine site and the preparation plant as well as the reduction in cover at the Crandall Canyon site.

Information in the plan should include a statement concerning the location for information on the planned cover over the Schoolhouse canyon refuse pile.

The soil stabilization practices described in each section should not be conflicting.