



State of Utah
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

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September 28, 1998

TO: File

THRU: Joe Helfrich, Permit Supervisor 

FROM: Priscilla Burton, Soils Reclamation Specialist 

RE: Soils Technical Analysis of Hiawatha Response to Division Order 97A, Hiawatha Coal Company, Hiawatha Complex, ACT/007/011-97A. Folder #2, Carbon County, Utah

SUMMARY

The Hiawatha Coal Co. has rewritten portions of Chapter 2, Soils, of their Mining and Reclamation Plan (MRP). The current document clearly identifies borrow areas, all areas to receive borrow soil, and information on the location and handling of all miscellaneous coal and coal waste materials. A timeline for the reclamation of Pond 5 and 5A and soil Borrow Area "A" has been included. This submittal complements information found in the maps and appendices of the current plan, but does not entirely replace that information.

The submittal does not include As-Built of Slurry Pond 4 and the reclaimed preparation plant areas and associated Borrow Areas.

TECHNICAL ANALYSIS:

GENERAL CONTENTS

PERMIT APPLICATION FORMAT AND CONTENTS

Regulatory Reference: R645-301-121.100.

Analysis:

The MRP contains typographical errors which should be corrected. The following errors were noted:

- Exhibit II-5 referred to on page 22 of Chapter 2 could not be found.
- Page 22 states that preparation plant and storage yard sample results are shown in Table II-14. These results were found in Table II-7.
- Page 24, Table II-7 shows results for sample #10 which was not identified in the previous narrative or on Exhibit II-4A. Table II-7 also does not explain the UP abbreviation.
- Table 2 of Appendix II-4, Section 3, discusses coal sample 4 which could not be located on Exhibit II-4. Exhibits 1 and 2 which were described in the cover letter included in this appendix may have shown the location of sample 4, but these exhibits could not be found.
- Page 16 states that the analysis of Slurry Pond No. 1 samples are found in Tables II-2, II-13, II-5. These analyses were found in Tables II-5 and II-6.
- The reclamation plan is inconsistent in the detail of mulch application. Page 16 describes 1T/acre of mulch over the reclaimed slurry ponds; Page 20 calls for 2T/acre; and pages 40 and 55 state 1.5 T/ac of mulch will be applied at the preparation plant. Table II-14 indicates that 2.5T of hay, straw or other acceptable organic additive is needed. The rate of mulch application should be clarified.
- Page 12 describes a six inch layer of substitute topsoil to be replaced over the regraded coal refuse materials. However, sixteen inches of cover is referred to on page 40. According to discussions with Charles Reynolds on September 17, 1998, six inches of cover is an error of fact. Hiawatha Coal Co. plans to apply 16 inches of substitute topsoil to slurry ponds and coal refuse. This has been the approved practice with reclamation of slurry pond 4 and 5. Page twelve must correctly state sixteen inches of substitute topsoil will be replaced over slurry ponds and coal refuse.
- Total available topsoil is recorded in a table on page 10. This table does not reflect the fact that 42,000 CY of soil from Borrow area F has already been applied to slurry pond 4. The table on page 10 should reflect available topsoil.
- Table II-12, page 33 should reflect the current status of the topsoil or topsoil substitute material. i.e. the topsoil west of the equipment yard has been utilized; Borrow area F has been utilized.

findings:

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

R645-301-121.200 correct the text to accurately reflect the location of information within the document and to accurately reflect the permittee's intentions with regard to operations and reclamation plans, see discussion above which itemizes errors of fact in the text.

ENVIRONMENTAL RESOURCE INFORMATION

SOIL RESOURCE INFORMATION

Regulatory Reference: R645-301-411, -301-220.

Analysis:

Chapter 2, Soils, Sections 220 through 233, discusses the soil resources within the Hiawatha Mine boundaries. Relevant soils information includes published soil surveys, characterizations, and substitute topsoil identification. This Analysis discusses resource information as follows:

- Soil Survey
- Substitute Topsoil

Soil Survey Information

Soil survey information is provided in Appendix II-1 and II-2. Order-III soil surveys were conducted by the Soil Conservation Service in 1981 and by the Forest Service in 1990. Soil Types of the Hiawatha Area are shown on Drawing II-1; Soil types of the South Fork area are shown on Drawing II-2; Soil Types of the Middle Fork area are shown on Drawing II-3.. Many of the SCS soil symbols used on Drawing II-1 do not correlate with those of the Order-III soil survey provided in the Appendix II-1. The soil symbols on Drawing II-I are those of the Carbon County Soil Survey published in 1988. Using the published soil survey in addition to the survey included in Appendix II-1, it is possible to relate the markings on Drawing II-1 to soil types.

In the Hiawatha Area, adjacent to Miller Creek are SCS Map numbers 50 and 53. These are the prime farmland soils of the Haverdad loam and Hernandez family. Typically in these

soils, the loam extends to a depth of five feet. These soils have been identified in the plan as borrow soils. Map unit 113, Strych very stony loam, also figures prominently in the Hiawatha area. This soil is loam to a depth of five feet with increasing stoniness (at five inches) and increasing cobbles (at 42 inches). This soil has also been identified as a source of borrow material for the preparation plant area. The third SCS designation in the Hiawatha area is Map Unit 29, mine dumps. There are 101.66 acres of slurry ponds and refuse piles in the Hiawatha area. Of these, Pond 4 (26.37 acres) was reclaimed in 1996 with Hernandez family soil from Borrow Area F). Pond 5A is presently being reclaimed with Hernandez family soil from Borrow Area A. The top and south slope of Pond 5A were topsoiled and seeded in 1997. The remainder of Pond 5A (grading and topsoiling) will be completed in 1998.

Soils of the South Fork area (King VI Mine) are generally identified as Soil Unit 33, Gerst-Badland-Rubbleland complex. An Order One survey was mapped by Jim Borchert and Earl Jensen of the SCS in 1981. This is the information provided in Appendix II-1. The King VI mine was constructed on Typic Ustorthent soils (T3). These soils are further identified as the Brycan Loam (B2D, B2C, B4E) soils which occur in stream bottoms. Brycan soils are fine sandy loam to 28 inches and gravelly sandy clay loam to a depth of sixty inches. The soils on the south facing slope of South Fork are the Norte Variant (N3G). Typically bouldery on the surface with cobbles and stones increasing in the profile reaching 52% with the layers 10 to 40 inches below the surface. The depth of the soil extends to five feet. The soils of the north facing slope were identified as Beardall Variant (X2G), a fine-loamy, mixed Typic Cryoboralf. The Beardall Variant is a stony, cobbly loam to a depth of approximately three feet at which point sandstone bedrock is encountered.

Soils of the King VI disturbed area were further sampled and described by William R. Glenn, a Certified Professional Soil Scientist. Information gathered by Mr. Glenn is included in Appendix II-3 and will be further discussed under the Substitute Topsoil section below.

Soils of Middle Fork (King IV and King V Mines) are shown on Drawing II-3. As with South Fork, the soils in the drainage are Typic Ustorthents. They were not further identified on the drawing, one might assume that they are also Brycan loam. Soils of the south facing slope were identified as Guben extremely bouldery loam (G4G). These soils are bouldery on the surface. The subsoil is a stony loam and the substratum is a calcareous very stony, very bouldery loam. The north facing slopes are Beardall Variant, similar to those described for the north slope of South Fork.

Substitute Topsoil

The disturbed soils within the mine area have been significantly altered by previous mining activities and have lost their native identities. In the Hiawatha area, a soil survey of disturbed soil was conducted by Earthfax Engineering, Inc in 1997. This information is found in

Section 3 of Appendix II-4 and test pits are located on Drawing II-1. In the Preparation Plant area, surface disturbance of the soil occurs to approximately three feet, below which, soils are suitable for use as substitute topsoil (Strych very stony loam). The UpperRail Yard soil surface has coal fines layered from a few inches to 7.5 feet deep on the surface. Sampling revealed that under the coal fines was suitable material for substitute topsoil (Haverdad loam). A Ridge Borrow Area was identified adjacent to Slurry Pond No. 1. This soil contains numerous stones and boulders in the surface and is identified as a last resort material for cover of the Hiawatha site.

South Fork disturbed soils were investigated in July of 1982 (see Appendix II--3) and again in December of 1983 (Appendix II-4, Section 2). Soil samples were collected (locations shown on Exhibit II-4B) from the upper and lower pad (areas A and B, respectively). Soils are suitable for use as substitute topsoil and will be salvaged to a depth of 1.5 feet prior regrading of the site.

Middle Fork soils were likewise sampled in December of 1983 (Appendix II-4, Section 2). Soil samples were collected from the upper and lower pads (see Exhibit II-4C). Based on this soil sampling, 1.5 acres of soil will be segregated from the site as substitute topsoil after regrading. The plan indicated on page 28 of Appendix II-4, Section 2, that gravels and cobbles will be separated out from the salvaged substitute topsoil. This will not be necessary and should be struck from the plan. The Division recognizes that native soils contain high percentages of rock fragments, is inevitable and does not present a reclamation hazard. Indeed, to reclaim and restore the land to pre-mining conditions will require soils with indigenous rock fragment volumes and content. Therefore, it is not only acceptable, but desirable to salvage soils containing intrinsic rock. Waste and coal waste will be segregated from the soils and disposed of in the fill or in Pond 1 or Pond 5A.

Findings:

The information provided exceeds the regulatory requirements of this section. It is not necessary to separate out coarse fragments from the substitute topsoil prior to its use. In fact this may be detrimental to the establishment of a natural looking reclaimed surface.

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

R645-301-233.200 reference to separating out coarse materials from the substitute topsoil by using a mechanical rock picker should be removed from Appendix II, Section 2 of the MRP.

ALLUVIAL VALLEY FLOORS

Regulatory Reference: R645-302-320.

Analysis:

The Hiawatha Mine MRP presents several factors that preclude the mine site from being classified as an alluvial valley floor. Based on information presented, the following findings can be made:

- No irrigated agriculture has or does occur within the permit and adjacent areas.
- No flood irrigation or subirrigation of stream-laid deposits have historically occurred within the proposed disturbed area.
- Soil and topographic conditions within the proposed disturbed area preclude future flood irrigation of the site.

Findings:

The information provided meets the regulatory requirements of this section.

PRIME FARMLAND

Regulatory Reference: R645-301-221, -302-270.

Analysis:

No prime farmland has been identified within the Hiwatha Mine permit area. A negative prime farmland determination was concluded in 1983 for the site due to lack of irrigation water. Within the immediate mine facilities area, the Soil Conservation Service's (SCS) "Soil Survey of the Carbon County Area"¹ identifies the Hernandez Family soils (soil type 50) and the Haverdad Loam (soil type 53) as potential prime farmland soils when irrigation is available.

Findings:

¹Jensen, E. H., and Borchert, J. W., 1988. Soil Survey of Carbon Area, Utah. Soil Conservation Service, U. S. Department of Agriculture, Washington D. C.

The information provided meets the regulatory requirements of this section.

OPERATION PLAN

TOPSOIL AND SUBSOIL

Regulatory Reference: 30 CFR Sec. 817.22; R645-301-230.

Analysis:

Chapter 2, Soils, Sections 230 through 234, discusses the soil's operation plan for the Hiawatha Mine. Relevant information includes soil salvage, stockpiling, and topsoil substitutes and supplements. The Analysis section discusses operational information as follows:

- Topsoil and Subsoil Removal
- Topsoil Storage
- Topsoil Substitutes and Supplements

Topsoil and Subsoil Removal

The MRP describes the salvage and handling of undisturbed soils in section 231.100. It is unlikely that any undisturbed soils will be encountered during the life of the mine, unless an expansion is planned. Should an expansion be considered, a soil survey of the site must be undertaken prior to any disturbance. An Order-I soil survey would be required to ascertain the topsoil salvage depth. The MRP should further state that a non-biased, third party, professional soil scientist will be on-site during soil salvage to monitor and supervise soil salvage operations for the purpose of maximizing soil salvage volumes and quantities. Surface disturbance activities will only take place after topsoil removal.

The estimated volumes of stockpiled soils are presented in Table II-12 and discussed in the narrative under 231.400 (page 31). Five topsoil stockpiles were identified: Middle Fork, containing 354 CY; South Fork, containing 1,206 CY; Hiawatha area east of Pond 4, containing 1,488 CY; Hiawatha area east of Pond 5, containing 1,028 CY; and Hiawatha area west of the equipment storage yard, containing 4,480 CY. In total, 8,556 CY of topsoil has been salvaged and stockpiled over the years. The total listed in Table II-12 of the plan should clearly show that of the 8,556 CY salvaged, 4,480 CY were utilized in the reclamation of Pond 5 reclamation and

1,488 CY will be used for the Pond 4 outslope reclamation. Thus, the available topsoil material stored in piles on site is 3,048 CY.

Topsoil Storage

Topsoil stockpiles have been seeded and protected with berms. Their locations are identified by a sign. Dimensions and descriptions of each pile are provided in section 231.400 of the MRP. Page 32 of section 231.400 states that the stockpile west of the equipment storage yard in the Hiawatha area has been used for the reclamation of Pond 5 in 1997. As additional topsoil stockpiles are used, the MRP section 231.400 should be updated.

Topsoil Substitutes and Supplements

The Hiawatha mine site pre-dates SMCRA, as a result, there was no topsoil removal for the majority of the mine site. Some disturbed areas have substitute topsoil stockpiled in the form of mine pads, berms, or embankments which have been tested and determined suitable for use in reclamation. These areas are discussed in the MRP, summarized in Table II-13 and identified on Reclamation Soils Information Exhibits II-4 A-D. Table II-12 provides a summary of substitute topsoil volumes. Appendix II-4 describes in detail the suitability of substitute topsoil material for the Hiawatha area, South Fork, and Middle Fork.

In the Hiawatha Area, substitute topsoil materials have been identified in the Lower Preparation Plant and Upper Rail Storage Yard and Borrow area A (locations are noted on Exhibit II-4A). These materials will be used to reclaim the preparation plant, slurry ponds and coal refuse embankments. Five additional Borrow sites have been designated to be utilized only in the event that the existing proposed borrow sites do not provide adequate material. These potential borrow areas are designated B, C, D, E and the Ridge Area. The amount of substitute topsoil identified for use in the Hiawatha area is stated in Table II-12 of the MRP and re-iterated below:

<u>Borrow Location</u>	<u>Depth of Removal</u>	<u>Potential Volume Available</u>
Lower Preparation Plant	3.33 ft	24,300 CY
Upper Rail Storage Yard	varies	75,543 CY
Borrow Area A	7.0 ft	<u>190,291 CY</u>
TOTAL		290,134 CY

Areas yet to be reclaimed at the Hiawatha site are shown on Exhibit II-4A. Table II-13, Reclamation Area Topsoil Volumes (page 42 of the MRP) provides a summary of the acreage

within each reclamation area. Listed below is a summation of the areas to receive the 290,134 CY of substitute topsoil. Areas not listed below will be reclaimed with insitu soils after removal of surface waste.

<u>Reclamation Area</u>	<u>Description</u>	<u>Acres</u>
RA-2	Slurry pond 5	40.39
RA-3	Slurry pond 5A	15.51
RA-10	Slurry pond 1 and	19.39
RA-9	Refuse Pile 1	17.51
RA-11	Preparation plant	1.9
RA-12	Upper rail yard	<u>6.38</u>
TOTAL		101.08

These numbers would suggest that a topsoil redistribution depth of 21 inches can be achieved over the specified ares: 290,134 CY over 101.08 acres.

At the Middle Fork location, three areas of in situ materials have been identified for substitute topsoil. These areas are estimated to produce 10,620 CY of substitute topsoil for 9.4 acres, which will result in a cover of 8.4 inches (see Table II-13 and Table II-8 and Appendix II-4). The remaining 5.4 acres will be reclaimed using in situ materials.

At the South Fork location, Table II-11 outlines two areas which will yield 6,339 CY of substitute topsoil for 8.33 acres (Table II-13). This will cover the affected area with approximately 5 inches of substitute topsoil. The remaining 2.44 acres will be reclaimed using the underlying materials.

The North Fork location was reclaimed in 1980 immediately after construction using salvaged topsoil materials.

Findings:

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

R645-301-231.400, The total listed in Table II-12 of the plan should clearly show that of the 8,556 CY salvaged, 4,480 CY were utilized in the reclamation of Pond 5 reclamation and that 1,488 CY will be utilized for the Pond 4 reclamation. Thus, the available topsoil material stored in piles on site is 3,048 CY.

R645-301-222, The MRP should state that, an Order-I soil survey is required to ascertain

topsoil salvage depth, in the event of any additional new disturbance at the mine site. The MRP should further state that a non-biased, third party, professional soil scientist will be on-site during soil salvage to monitor and supervise soil salvage operations for the purpose of maximizing soil salvage volumes and quantities and that surface disturbance activities will only take place after topsoil removal.

RECLAMATION PLAN

TOPSOIL AND SUBSOIL

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

Analysis:

Chapter 2, Soils, Sections 240 through 250, discusses the soil's reclamation plan for the Hiawatha Mine. Table II-13 provides information on substitute topsoil volumes required for each reclamation location. Reclamation locations can be found on Exhibits II-4 A - D. Chapter 5, section 540, and Chapter 3, section 341.230, address slope stability and erosion control, respectively. Reclamation Topography and Cross-Sections are shown on Exhibits V-4, V-10, V-11, V-12, V-13 and V-13 A, B, C. This Analysis section discusses reclamation information as follows:

- Contemporaneous Reclamation
- Coal Waste
- Soil Redistribution
- Soil Nutrients and Amendments
- Soil Stabilization

Contemporaneous Reclamation

Total reclaimed acreages have been summarized in a Table on page 37 of Chapter 2. A total of 25.41 acres in Slurry Pond 4/Refuse Pile 2 were reclaimed in 1996 using 42,000 CY of substitute topsoil from Borrow Area F (9.8 acres, also reclaimed in 1996). There are 0.96 acres remaining to be reclaimed in 1998, as well as 7.64 acres on the northeast edge of Slurry pond 4 to be regraded and topsoiled in 1998.

Slurry Pond 5, main cell reclamation was begun in 1997. Of the 40.39 total acres, 22.73 acres were topsoiled and seeded. The remaining 17.66 acres of the main cell are presently being regraded and topsoiled in 1998. Topsoil for Slurry Pond 5 has come from Borrow Area A

(16.87 acres).

Borrow Area A is still in use. After the 1998 season, Borrow Area A will be re-surveyed for remaining volumes (refer to page 37) and areas which have provided the maximum depth of substitute topsoil will be ripped and seeded with a final seed mix. Remaining areas will be seeded with an interim seed mix.

The majority of the preparation plant area has been reclaimed.

Coal Waste

Exhibit V-9A, Hiawatha Processing Plant and Waste Disposal Sites Post and Pre-Law, illustrates the extent of disturbance in the Hiawatha area. Hiawatha Coal Company does not accept responsibility for areas designated as pre-law which have not been redisturbed by the post-law operations. Exhibit V-9C illustrates three locations where coal waste will be vacuumed or scraped from the soil surface and permanently placed in Slurry Pond 5, cell 5A. Any additional areas identified by the Division or the Permittee will be treated in the same manner (see Chapter 5, page 56). Exhibit V-9C could not be found in the existing MRP or with the recent submittal.

Estimates of the yardage of coal waste located in the Upper Rail Storage Yard and the Rail Tracks are provided on page 57. In the Upper Rail Storage Yard, the waste will be placed against the toe of the cut slope and covered with a minimum of 24 inches of in situ soil. Waste coal found along the rail tracks (approximately 2,500 CY) will be hauled to Slurry Pond 1. As will several miscellaneous piles which will be moved prior to regrading. In general, where greater than 50% coal or other contaminants are present on the surface, this material will be removed and taken to a Slurry Pond for final burial (Chapter 2, page 37).

Slurry Pond 5A and Slurry Pond 1/Refuse Pile 1 will be graded to final reclamation contour, topsoiled with 16 inches of substitute topsoil, surface gouged or otherwise roughened and seeded. The plan indicates on page 40 of Chapter 2 that Slurry Pond 1/Refuse Pile 1 will be resampled and analyzed for pH, EC, SAR, Na, Mg, Ca, Se, B, and acid/base potential. The Division requests that Al, Fe, Mn and Zn are added to the list of analytes, due to high levels of these metals and low pH values being previously recorded in some samples from Pond 1 and Pond 4 (see Tables II-2, II-5).

Soil Redistribution

In the preparation plant and upper storage yard, where cut and fill operations will occur, approximately 1.5 feet of the topsoil and subsoil materials will be removed from the selected areas and temporarily stockpiled and protected. The area southeast of the prep. plant and

the area between the railroad spur and the Middle Fork haul road can achieve the final grade without significant regrading and without temporarily stockpiling the topsoil. Preparation for seeding will include ripping to a depth of 18 to 24 inches; redistribution of topsoil (where called for); discing along the contour; fertilization; seeding; mulching.

Cut and fill calculations for Middle and South Fork are found in Chapter 5, pages 51 and 54 and in Appendix V-15. In Middle Fork, approximately 74,000 CY of material will be cut. In South Fork, approximately 42,000 CY will be cut. The fill balances the cut in both instances. All coal and coal waste will be pushed against the toe of the cut slope and buried. Fills will be constructed at a slope of 2h:1v. During regrading, substitute topsoil will be salvaged from the mine pad (as designated on Exhibit II-4 B and C) for placement at the surface. Fill will be ripped to a depth of 18-24 inches prior to placement of approximately six inches of substitute topsoil. Seeding, fertilizing and mulching (1.5 T/ac) will follow.

Substitute topsoil will be used in Middle Fork for the mine pad, coal stockpile and truck loadout areas (Chapter 5, page 52). Substitute topsoil will be replaced on the South Fork mine pad site.

In South Fork, salvaged topsoil will be replaced on the overland conveyor and loadout facilities and the loadout and coal stockpile area (Chapter 5, page 53).

Reclamation of Borrow Areas is described on pages 41 and 43 of Chapter 2, and pages 58 - 60 of Chapter 3. In general, the sites will be graded (Exhibit V-13), ripped, disked, raked, seeded, fertilized and mulched. Page 43 of Chapter 2 clearly indicates that the top 12 inches of soil from a borrow site will be returned to that site to expedite reclamation of the borrow area. This information should be repeated on page 41 of Chapter 2 as well within the text of Chapter 3, to ensure that the permittee understands this procedure and to ensure that the DOGM inspector has the correct information at hand.

Soil Nutrients and Amendments

Soil nutrients and amendments will be applied to the redistributed soils based on analyses of samples collected from the stockpiled topsoil and the substitute topsoils.

Soil Stabilization

Soil stabilization practices include surface roughening techniques such as gouging and/or deep pocking, and use of mulch.

Findings:

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

requirements of:

R645-301-240, Exhibit V-9C could not be found in the existing MRP or with the recent submittal. Exhibit V-9C should be added to the submittal.

R645-301-731.311, Al, Fe, Mn and Zn should be added to the list of analytes on page 40 of Chapter 2, due to high levels of these metals and low pH values being previously recorded in some samples from Pond 1 and Pond 4.

R645-301-242, The MRP should clearly indicate that the top 12 inches of soil from a borrow site will be returned to that site to expedite reclamation of the borrow area. This information should be repeated in the MRP wherever the reclamation of substitute topsoil is addressed. i.e. pages 41, 43 and 58-60.