



# State of Utah

DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF OIL, GAS AND MINING

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October 23, 1997

TO: File

THRU: Daron Haddock, Permit Supervisor

FROM: Robert Davidson, Soils Reclamation Specialist

RE: Response to Deficiencies - Technical Analysis of the Mining and Reclamation, Dugout Canyon Mine, Canyon Fuel Company, PRO/007/039-PM97A, Folder #2, Carbon County, Utah

## SUMMARY:

The Mining and Reclamation Permit Application Package (M&RP) was received from Canyon Fuel Company on March 15, 1996 for the proposed Dugout Canyon Mine. This Technical Analysis (TA) review is the third round and includes culverting the creek.

## TECHNICAL ANALYSIS:

# ENVIRONMENTAL RESOURCE INFORMATION

## SOILS RESOURCE INFORMATION

Regulatory Reference: 30 CFR Sec. 783.21, 817.200(c); R645-301-220, -301-411.

### Analysis:

Chapter 2, Soils, Sections 220 through 224, discusses the soil resources within the proposed Dugout Canyon Mine disturbances. Relevant soils information includes current and published soil surveys, characterizations, and substitute topsoil identification. The Analysis section discusses resource information as follows:

- Prime Farmland Investigation
- Soil Survey Information - Two remaining deficiencies are listed.
- Substitute Topsoil

### **Prime Farmland Investigation**

No prime farmland has been identified within the presently proposed Dugout Canyon Mine permit area. A negative prime farmland determination was concluded by reviewing the 1980 Prime Farmland reconnaissance performed for the Sage Point-Dugout Mine permit (ACT/007/009). During a recent site investigation of the Dugout Canyon mining area, no evidence of past cultivation of the soils could be found. Furthermore, within the immediate mine facilities area, the Soil Conservation Service (SCS) surveyed soil units are listed as non-irrigated sites for both the Comodore-Datino Variant complex and the Rock outcrop-Rubbleland-Travessilla complex. As reported by the SCS, these soils are not considered grazeable by livestock and the soil-unit areas are limited for harvesting wood products because of slope steepness, surface stones and boulders, and abundant rock outcrops.

### **Soil Survey Information**

Two deficiencies remain for this section as follows:

- Since EarthFax Engineering, Inc., gathered the soil resource information it can only be presumed that a qualified person conducted the soil survey and performed the necessary technical analysis. Consistent with R645-301-130, Reporting of Technical Data, credentials of the person and/or persons performing this work need to be provided (e.g., APPENDIX 2-3, Soil Test Pit Logs, does not have the organization and persons listed who performed the work, or their credentials identified).
- Provide sample, laboratory data, and analytical summary (Table 2-1) for soil pit TP-11 according to DOGM's Guidelines for Topsoil and Overburden<sup>1</sup>. Since TP-11 represents disturbed soils, it is imperative that a complete characterization be provided to ensure that the soil is acceptable as a substitute soil.

Soil survey information is provided by both a general-area Order-III and a site-specific Order-II soil surveys. The Order-III survey is reproduced from the SCS "Soil Survey of the Carbon County Area<sup>2</sup>" and is delineated on a general area soils map (Plate 2-1). According to the SCS soil survey, soils present on the east facing slopes of Dugout Canyon are part of the Rock outcrop-Rubbleland-Travessilla complex while those on the west facing slopes are part of the Comodore-Datino Variant complex. Generally, soils have formed from sandstone and shale

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<sup>1</sup>Leatherwood, J., and Duce, D., 1988. Guidelines for Management of Topsoil and Overburden for Underground and Surface Coal Mining. State of Utah Department of Natural Resources, Division of Oil, Gas and Mining.

<sup>2</sup>Jensen, E. H., and Borchert, J. W., 1988. Soil Survey of Carbon Area, Utah. Soil Conservation Service, U. S. Department of Agriculture, Washington D. C.

colluvium and are predominantly stoney to gravelly sandy loams. The soils are typically well drained with moderate permeability, are highly susceptible to water erosion and range from shallow soils on the east facing side slopes to very deep soils on the west facing toe slopes.

The Order-II survey was conducted for the Dugout Canyon Mine surface facilities area and is illustrated on a site specific soils map (Plate 2-2). A total of 6 pits (TP-1 thru TP-5 and TP-11) were delineated and described in accordance with the standards of the National Cooperative Soil Survey. Pits TP-1 through TP-5 were sampled and characterized according to the DOGM's guidelines for topsoil and overburden. *However, no analytical data was provided for test pit TP-11. Since test pit TP-11 represents disturbed soils, it is imperative that a complete characterization be provided to ensure that the soil is acceptable as a substitute soil.*

*In addition, since no information was provided for the names of persons and organizations that conducted the Order-II survey, it can only be presumed that a qualified Soil Scientist conducted the soil survey and performed the necessary technical analysis. Consistent with R645-301-130, Reporting of Technical Data, credentials of the person and/or persons performing this work need to be provided (e.g., APPENDIX 2-3, Soil Test Pit Logs, does not have the organization and persons listed who performed the work, or their credentials identified).*

A large portion of the mine facilities area is covered by overburden and disturbed soils consisting of soil mixed with coal waste and/or waste rock from previous mining operations and are described by soil test pits TP-2, TP-3, and TP-11. The overburden is a mixture of rock and/or coal waste with Travessilla soils. The Travessilla soils are classified by the SCS soil survey as loamy, mixed (calcareous) mesic, Lithic Ustic Torriorthents. Generally, the overburden is termed as a "gravelly loam" with rock concentrations between 10 and 40 percent and rock size that varies from gravel to boulder. Rock fragments are composed of sandstone with some siltstone blocks. The overburden is found in the flat areas and on most of the steep slopes; is moderately well drained, and supports sage brush, juniper, rabbit brush, and a variety of grasses. Thickness varies from a few feet to more than eight feet.

The remainder of the facilities area has soils that appear to be undisturbed or have been only slightly disturbed. Soils present in the canyon bottom lie within the disturbed and undisturbed areas of the mine. The undisturbed soils were identified by the Order-II survey as part of the SCS listed soil unit Datino Variant complex, and were given the distinction "Soil Type TS." According to the SCS Carbon County soils survey, the Datino Variant soil complex is characterized as very deep, well drained, moderate permeable soils on mountain slopes being formed in colluvium derived dominantly from sandstone and shale. The SCS survey defines Datino Variant soils as loamy-skeletal, mixed Typic Haploborolls. The typic subgroup of Haploborolls<sup>3</sup> is defined as freely drained soils with a moderately thick brownish mollic

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<sup>3</sup>Soil Conservation Service, U.S. Department of Agriculture, Agriculture Handbook No.436, pp 288-289.

epipedon. Typic Haploborolls were formed in alluvium during the late-Pleistocene or Holocene ages, do not have a shallow lithic (stone) contact, and do not have deep wide cracks in most years. The USDA handbook further states that where slopes are suitable, Haploborolls are mostly under cultivation.

Undisturbed TS soils (soil test pits TP-1, 4, & 5) are found on both sides of Dugout Creek in the northeastern portion and in the southwestern portion of the facilities area. The TS soils are found in flat lying areas and on slopes with grades up to 40 percent or more. The soil supports vegetation consisting of sage, cottonwood, gambel oak, grass, pinyon, and fir. Information condensed from soil test pit TP-4 and lower sections of pit TP-1 show soil horizons O1 (1 inch), A1 (1 to 5 inches), B2 (5 to 14 inches), B3 (14 to 28 inches), and C (28 inches to 9 feet). Portions of TP-5 soil profiles and the upper four feet of TP-1 soil profile appeared disturbed. All horizons were sampled and analyzed according to DOGM soil and overburden guidelines; field and laboratory results were within specifications.

Current soil productivity for the undisturbed and/or slightly disturbed soils is reported by the 1996 survey for living cover percentages as recorded in Section 321.100. Undisturbed soils have acceptable physical and chemical characteristic results consistent with requirements outlined by DOGM's soil and overburden guidelines as recorded in Table 2-1 for test pits TP-2 and TP-3.

### **Substitute Topsoil**

As discussed by the Order-II survey, the disturbed soils within the mine area have been significantly altered by previous mining activities and have lost their native identities. These disturbed soils, or overburden materials, typically contain waste rock and/or coal waste. With the exception of the percentage of rock fragments, these overburden materials have physical and chemical properties that are within DOGM's acceptable range for soil and overburden guidelines and could therefore be considered a substitute topsoil. 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 premining 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.

Canyon Fuel Company proposes using the overburden material (represented by TP-2, TP-3 & TP-11) and the B and C horizon soils (represented by TP-1, TP-4 & TP-5) as substitute topsoil during reclamation. Waste and coal waste will be segregated from the soils and disposed of properly. Overburden material will primarily come from the proposed coal pile and water tank/pump house areas. The B and C horizon soils will be excavated from the sediment pond area.

### **Findings:**

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

**R645-301-130**, Since EarthFax Engineering, Inc., gathered the soil resource information it can only be presumed that a qualified person conducted the soil survey and performed the necessary technical analysis. Consistent with R645-301-130, Reporting of Technical Data, credentials of the person and/or persons performing this work need to be provided (e.g., APPENDIX 2-3, Soil Test Pit Logs, does not have the organization and persons listed who performed the work, or their credentials identified).

**R645-301-224 and R645-302-233**, Provide sample, laboratory data, and analytical summary (Table 2-1) for soil pit TP-11 according to DOGM's Guidelines for Topsoil and Overburden. Since TP-11 represents disturbed soils, it is imperative that a complete characterization be provided to ensure that the soil is acceptable as a substitute soil.

## **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 proposed Dugout Canyon Mine. Relevant information includes soil salvage, stockpiling, and topsoil substitutes and supplements. The Analysis section discusses operational information as follows:

- Topsoil and Subsoil Removal - Two deficiencies
- Culvert Expansion Soil Removal - One deficiency
- Topsoil Substitutes and Supplements - One deficiency
- Topsoil Storage - One deficiency

#### **Topsoil and Subsoil Removal**

Two deficiencies remain for this section as follows:

- Since topsoil resources are limited, all appropriate topsoils (A horizon) and subsoils (B and C horizons) need to be removed, segregated and stockpiled.

- Since topsoil resources are limited, the MRP must identify soil borrow for making up any soil deficit. Soil borrow will require locating a soil borrow area and supplying all the regulatory information necessary for permitting a soil borrow site.

*Since topsoil resources are limited, the MRP must designate that all topsoils and subsoils within the surface disturbance area will be salvaged, and identify soil borrow for making up any soil deficit.* The average soil replacement thickness of 5.96 inches will result in minimal reclamation success which will limit the effective plant rooting depth and heighten plant failure during stress. Under these conditions, erosion protection will be limited and will likely result in exposure of backfill and mine waste materials when rills and gullies form with minimal erosion. For successful reclamation to occur, topsoil and subsoil replacement volumes should approach an average 16 to 18 inches of soil depth. In addition to more effective plant establishment and deep seated rooting depths, these deeper soil depths allow for the implementation of surface roughening reclamation techniques, such as deep pocking, or gouging of the soil surface without penetrating the subsurface fills.

*In order to preserve and protect the natural soil resources, soil salvage plans need to maximize soil recovery volumes for both topsoils and subsoils. Therefore, all B and C horizon soils need to be salvaged in addition to salvaging topsoils from the undisturbed soils.* The plan shows that the only subsoils to be salvaged includes the B and C horizons during the excavation of the sediment pond. The undisturbed TS soils are deep rich mollisols, with deep subsoils (B and C horizons) of excellent quality material available for salvage. A non-biased, third part, 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.

Undisturbed soils marked #96 will not be disturbed although they are within the disturbed boundary. These southwest facing, undisturbed soils are therefore considered a buffer zone.

The plan explains that all topsoil thicker than 6 inches will be removed as a separate layer from the subsoil, segregated, and stockpiled separately. The B and C horizons removed will be segregated and stockpiled. Furthermore, topsoil less than 6 inches thick will be removed with the immediately underlying unconsolidated materials and treated as topsoil.

Appendix 2-5 includes soil recovery calculations.

### **Culvert Expansion Soil Removal**

One deficiency is included as follows:

- Update the October 15, 1997, "Soil Removal from Within the Culvert Expansion Area" submittal to reflect surface disturbance boundary corrections. This submittal needs to be included as an appendix. Chapter 2, Soils, and Appendix 2-5, Topsoil Storage Pile Calculations, need to be updated to reflect any corrections for soil salvage and should include the culvert installation topsoil salvage volumes.

On October 15, 1997, EarthFax submitted a report for salvaging topsoil from within the Culvert Expansion Area. The report includes Plate 1, Soil Removal Culvert Expansion Project. This report identifies 7 areas for soil salvage along the stream embankments during culvert installation. The A, B, and C horizons will be removed and stored together. Except for the large woody vegetation, all vegetation will be incorporated in the stockpiled soils. The approximate volume of soil to be removed is calculated at 1,568 CY. The soil removal volumes are based on the assumption and calculations provided in Attachment B of this report. Soil will be temporarily stored on-site and could eventually be permanently stored at the Soldier Canyon topsoil storage area.

Soils left in-place on steep hillsides that cannot be salvaged, will be preserved by covering them with a geotextile fabric. The fabric could then be covered with backfill. During final reclamation, the geotextile fabric will act as a marker layer indicating the maximum extent of backfill removal.

### **Topsoil Substitutes and Supplements**

One deficiency remains for this section as follows:

- Since the 7,304 CY of overburden materials identified as "substitute soils" will not be salvaged and will remain within the surface disturbance as construction fill and pad material, they may not be considered for reclamation as substitute soils. Therefore, all calculations and references of these overburden materials as reclamation soils must be corrected in the MRP.

Although much of the mine area is considered disturbed, the three test pits (TP2, TP3 & TP-11) show that much of the overburden material is an acceptable substitute topsoil and suitable growth medium for reclamation. According to the MRP these disturbed overburden materials will not be salvaged. The proposed MRP submittal identifies an average replacement thickness of 13.4 inches which is based 13,129 CY of topsoil/substitute topsoil being available during reclamation. However, only 5,825 CY of topsoil and subsoils will be salvaged and stockpiled which calculates to an average soil replacement depth of 5.96 inches. *Since the remaining 7,304 CY of overburden materials identified as "substitute soils" will not be salvaged and will remain within the surface disturbance area as construction fill and pad material, they may not be considered for reclamation as substitute soils. Therefore, all calculations and references of these overburden materials as reclamation soils must be corrected in the MRP.*

### **Topsoil Storage**

One deficiency remains for this section as follows:

- Section 234.300 states that stockpiled soil may be temporarily redistributed if the soil is in jeopardy of being detrimentally affected in terms of soil quantity and quality by mine operations. Such action may only take place by prior approval of DOGM with appropriate amendment changes to the MRP.

As stated in the plan, the topsoil stockpile will be located at the Dugout Mine (Plate 2-2). Substitute topsoil will be stored at the Soldier Canyon Mine topsoil storage area (Plate 2-3) with the Dugout stockpiles marked, labeled and kept separate from the Soldier Canyon Mine stored soils. Section 231.400 gives the construction, modification, use, and maintenance of the storage piles.

*Section 234.300 states that stockpiled soil may be temporarily redistributed if the soil is in jeopardy of being detrimentally affected in terms of soil quantity and quality by mine operations. Such action may only take place by prior approval of DOGM with appropriate amendment changes to the MRP.*

### **Findings:**

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

**R645-301-232**, Since topsoil resources are limited, all appropriate topsoils (a horizon) and subsoils (B and C horizons) need to be removed, segregated and stockpiled.

**R645-301-232.720**, Since topsoil resources are limited, the MRP must identify soil borrow for making up any soil deficit. Soil borrow will require locating a soil borrow area and supplying all the regulatory information necessary for permitting a soil borrow site.

**R645-301-120**, Update the October 15, 1997, "Soil Removal from Within the Culvert Expansion Area" submittal to reflect surface disturbance boundary corrections. This submittal needs to be included as an appendix. Chapter 2, Soils, and Appendix 2-5, Topsoil Storage Pile Calculations, need to be updated to reflect any corrections for soil salvage and should include the culvert installation topsoil salvage volumes.

**R645-301-232.200**, Since the 7,304 CY of overburden materials identified as "substitute soils" will not be salvaged and will remain within the surface disturbance as

construction fill and pad material, they may not be considered for reclamation as substitute soils. Therefore, all calculations and references of these overburden materials as reclamation soils must be corrected in the MRP.

**R645-301-234.240 and R645-301-234.300**, Section 234.300 states that stockpiled soil may be temporarily redistributed if the soil is in jeopardy of being detrimentally affected in terms of soil quantity and quality by mine operations. Such action may only take place by prior approval of DOGM with appropriate amendment changes to the MRP.

## **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 proposed Dugout Canyon Mine. The Analysis section discusses reclamation information as follows:

- Deficiency
- Soil Redistribution
- Soil Nutrients and Amendments
- Soil Stabilization

#### **Deficiency**

This reclamation section contains one general deficiency as follows:

- The reclamation plan needs to specify and delineate soil handling, redistribution techniques, nutrients and amendments, and soil stabilization for the following three scenarios: (1) steep side-slopes along the stream corridor containing in-place soils that were buried and covered with geotextile fabric, (2) stream channel riparian zones, and (3) all other general areas.

#### **Soil Redistribution**

The plan explains that any contaminated surface soil within the disturbed area will be removed and stored during final reclamation. Furthermore, the plan says that if the contaminated

soils can not be rehabilitated, the contaminated material will be buried along with excess gravels, crushed stone, or other contaminants.

Soil redistribution thickness will be based on topsoil stockpile and borrow-soil volumes. Currently, topsoil redistribution is calculated at 5.96 inches and is based on 7.3 acres of surface disturbance with 5,825 CY of soil.

### **Soil Nutrients and Amendments**

Soil nutrients and amendments will be applied to the redistributed soils based on analyses of samples collected from the stockpiled topsoils. The plan needs to specify soil nutrients and amendments for the steep side-slopes along the stream corridor containing the in-place soils that were buried under the geotextile fabric.

### **Soil Stabilization**

Standard soil stabilization practices include surface roughening techniques such as gouging and/or deep pocking, to help minimize compaction and reduce erosion.

### **Findings:**

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

**R645-301-240 and R645-301-250**, The reclamation plan needs to specify and delineate soil handling, redistribution techniques and soil stabilization for the following three scenarios: (1) steep side-slopes along the stream corridor containing in-place soils that were buried and covered with geotextile fabric, (2) stream channel riparian zones, and (3) all other general areas.