



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

Michael O. Leavitt
Governor

Kathleen Clarke
Executive Director

Lowell P. Braxton
Division Director

1594 West North Temple, Suite 1210
PO Box 145801
Salt Lake City, Utah 84114-5801
801-538-5340
801-359-3940 (Fax)
801-538-7223 (TDD)

February 15, 2000

TO: Internal File

THRU: Robert Davidson, Project Team Lead

RAO

RE: Soils Technical Analysis of the Link Canyon Substation Relocation, Canyon Fuel Company, LLC, SUFCO Mine, ACT/041/002-AM99G

SUMMARY:

The permitting of a new electrical substation in Link Canyon by the SUFCO Mine of Canyon Fuel Company has a history going back to January of 1998. In anticipation of establishing the necessary electrical specifications to implement longwall mining in the Pines Tract lease, the applicant submitted the initial application (ACT/041/002-98A) on January 22, 1998. This application was withdrawn.

On May 20, 1998, a second submittal was received, and it was determined by the UDNR/OGM to be a significant revision; same was enumerated as ACT/041/002-98-1. After various interagency reviews and deficiency responses, the UDNR/OGM approved revision 98-1 on January 11, 1999.

During the underground drilling activities permitted through 98-1, high temperature and pressure zones were encountered, as well as material voids (all due to coal burn) in the upper Hiawatha coal seam. In an attempt to drill in the interburden between the upper and lower Hiawatha coal seams, similarly difficult geologic conditions were encountered. The permittee decided to reclaim the holes and seek a contingency plan.

On October 12, 1999, representatives from the Manti-LaSal National Forest and the Division visited the area where the planned contingency holes would breakout on the surface (.4 miles up canyon) and agreed to certain stipulations in order to keep the drilling contractor on site and the project progressing.

The contingency plan received joint interagency approval to proceed. In order to comply with the stipulated permitting requirement mandated within the contingency plan's approval, the applicant submitted ACT/041/002-AM99G, Link Canyon Substation #2, to the UDNR/OGM on December 6, 1999.

The Division reviewed the December 6, 1999, submittal and responded to Canyon Fuel on

January 20, 2000. Deficiencies included issues on wildlife, soils and hydrology. Canyon Fuel responded with a second submittal for the Link Canyon Substation #2 relocation pad on February 7, 2000.

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, has been amended to allow construction of a new proposed substation pad in Link Canyon. The original MRP revision contained provisions for a substation pad and borehole breakout to allow power to be taken into the mine. Permission was granted on January 11, 1999 to construct the substation pad. During the 1999 summer, SUFCO constructed the Substation pad as proposed; however, because of an active burn within the coal seam, the borehole breakout was not possible in the area where SUFCO constructed the substation pad.

The current amendment received on December 6, 1999, contains a proposal to construct a new pad 0.4 miles further up the canyon from the present pad in. On October 15, 1999, SUFCO received approval to move the location of the punch out to the new site. The new punch out site is adjacent to the Link Canyon Road and is located at the intersection of the old tramway bench and the Link Canyon Road.. SUFCO proposes to extend the power line the additional 0.4 miles up the canyon and construct a new substation pad adjacent to the current punch out location.

This Analysis section discusses soil resource information as follows:

- Prime Farmland Investigation
- Soil Survey Information
- Soil Characterization

Prime Farmland Investigation

Appendix 2-1 contains a Prime Farmland determinations for the Quitchupah Lease Tract as performed by the Natural Resource Conservation Service. The Quitchupah Lease Tract includes Link Canyon; therefore, no Prime Farmland exists in Link Canyon.

Soil Survey Information

An Order-2 soil survey was completed for the proposed Link Canyon breakout and substation disturbed area and is included in Appendix 2-2. The soils for this area are classified as Strych Pathead Podo families Rockland complex with 30 to 80 percent slopes. The complex contains 30 percent Strych soils, 30 percent Pathead soils, 15 percent Podo soils, 15 percent Rubbleland and 10 percent rock outcrops and finer textured soils. Strych soils are 47 inches deep with rooting depths from 40 to 60 inches. Pathead soils are 60 inches deep with rooting depths 30 to 60 inches. Podo soils are thin at 11 inches deep with rooting depths 20 inches or less. Map unit descriptions are given with an Order-2 soils survey soils map.

Link Canyon Substation-1

A soil survey was conducted specifically for substation pad number 1 and is included in Appendix 2-6. This soil survey was completed on April 8, 1998 and includes two soil pits with profile descriptions. The investigation was completed by Chris Hansen and Mike Davis of Canyon Fuel Company, LLC and Robert Davidson of the Utah Division of Oil, Gas and Mining. Figure 1 illustrates the Link Canyon soil pit locations (LC-1 and LC-2) for the substation pad area. Both soil pits were hand excavated to 20 inches using a pick and shovel. For this soil survey, the soils were not classified and no soils map for the substation area was generated. From the soils descriptions, the soils from LC-1 and LC-2 appear to be either from the Pathead or Podo family inclusions. However, the pit descriptions supply adequate information for determining the quality and quantity of soil available for salvage.

Link Canyon Substation-2

An Order-1 soil survey was conducted in November 1999 for the Link Canyon Substation number 2 and is included in Appendix 2-6. The survey describes three soil types as follows:

Soil Family	Soil Taxonomic Class	Map Unit
Pathead	Loamy-skeletal, mixed (calcareous), frigid Typic Ustorthents	A, E
Podo	Loamy, mixed (calcareous), frigid Lithic Ustorthents	B
Cabba	Loamy, mixed (calcareous), frigid, shallow Typic Ustorthents	B, C, E

The Order-1 soils map, Soils Map A, is included at the end of the soil survey in Appendix 2-6. Map A shows five different mapping units, A through F, overlain with the proposed substation pad area. The mapping units are described as follows:

Mapping Unit	Map Unit Description
A	Moderately deep, 20" to 40" of soil over shale bedrock. Colluvial and alluvial material derived from sandstone and shale. Thin, dark brown topsoil layer over brown colored subsoils. Pathead Family. 35% to 45% slopes
B	Shallow and very shallow soils over shale, sandstone and some coal. Gravelly to stony loam derived from colluvial and residual materials. Cabba and Podo Families. 40% to 45% slopes.
C	Very shallow soils over shale. Red in color and less stones. Weakly developed and calcareous. Cabba Family. 40% slopes.
D	Disturbed area. Steep, rocky, shallow to moderately deep loamy soils up to 20" thick over sandstone and shale bedrock. Soils are composed of road cut and rocky side cast materials from old tramway. Bedrock exposed in places. 70% to 90% slopes.
E	Surface boulders, 8" to 20" of soil over shale. Pathead and Cabba Families.
F	Disturbed area. Includes old tramway and recent punch out activities. Very shallow to shallow soils composed of mixed sandstone and shale materials.

Soil Characterization

The Mine Reclamation Plan Order-2, Appendix 2-2, soil survey provides map unit descriptors for soil map unit 20, Strych-Pathead-Podo families-Rubbleland complex. Soil family descriptions identify taxonomic classifications, parent material, landscape position, slope, vegetation community, profile descriptions, rooting depths, hydrologic information, plus soil erodibility and hazard.

Link Canyon Substation-1

For the Substation number 1 soil survey, Appendix 2-6, the soil horizons at each sampling location were sampled and characterized according to the State of Utah Division of Oil, Gas and Mining (DOGM) guidelines for topsoil and overburden¹. Sampled parameters included: soil texture; pH; organic matter percent; saturation percent; electrical conductivity; CaCO₃; soluble potassium, magnesium, calcium and sodium; sodium absorption ratio, and extractable selenium and boron. Soils in both pits (LC-1 and LC-2) have very similar characteristics, with all parameters in the DOGM acceptable range. Soil profile descriptions are provided and identify the volume and type of rock on the surface and within the soil profile. The A horizon contains 10% rock, principally pebbles. The C1 horizons contain 40 to 45% rock, principally pebbles and cobbles. The C2 horizon for LC-1 contains 50% rock fragments, predominantly cobbles. The surface has occasional boulders with a veneer of pebbles and cobbles. Approximately 20 inches of soil from the A and C horizons

¹Leatherwood, 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.

is available for salvage.

Link Canyon Substation-2

Substation number 2 Order-1 soil survey, Appendix 2-6, includes three soil pits, LCS2-1, LCS2-2 and LCS2-3. Field profile descriptions sheets are provided for each of the pits, including a hand drawn field map showing the location of each soil pit. Pit LCS2-1 is identified as Pathead Family and pit LCS2-3 is identified as Cabba Family. Field profile descriptions include horizon identification, depth, color, texture, structure, consistence, soil reaction to acid, boundary description, % rock fragments, root distribution and pores. In addition, each description sheet includes location, vegetation, parent material, physiography, elevation, slope, aspect, drainage, and surface rock description. Sampled soil horizons were sent to a soils laboratory for analyses.

Laboratory results are discussed in Appendix 2-6, which also includes copies of the lab data sheets. Seven soil samples were obtained from three soil pits as discussed in the EIS report. Analyses indicate that the majority of the can be used as substitute topsoil and growth media. Exceptions include a portion of the LCS2-1 soil profile from 27 to 39 inches which contains elevated levels of selenium (1.4 mg/kg). However, soils will not be salvaged from this depth since salvage calculations are based on an average depth of 24 inches from Soil Unit A.

Analysis of soils from soil pit LCS2-1 indicate that soils within the upper 11-inches of the soil profile have an average water holding capacity of 4.1 % to 4.4 %, less than the 5 % recommended as suitable substitute soil by the Division guidelines. However, this average will be improved as soils are mixed with other soils salvaged at the site that have higher water holding capacity (6 to 10).

Substitute Topsoil

Link Canyon Substation-2

The area where Link Canyon Substation pad #2 will be located was disturbed prior to implementation of SMCRA. As a result, no soil salvage was performed during construction of the old trolley road. According to the Order-1 soil survey, Soil Unit D is composed of road cut and rocky side cast material from the old trolley road, with mixed rock and loamy soil materials up to about 20 inches thick and bedrock exposed in places. Since native topsoil is scarce and salvage of native soils provides very limited topsoil resources available for soil redistribution, these side cast soil materials need to be sampled and characterized for suitability as substitute topsoil.

A soil pit (LCS2-4) was excavated in Soil Unit D on January 28, 2000. The soil pit was logged by Chris Hansen, Environmental Coordinator for Canyon Fuel Company, and Robert Davidson, Reclamation Specialist with the Utah Division of Oil, Gas, and Mining. Two soils were identified, sampled and shipped to IML in Sheridan Wyoming for laboratory analysis. Soil Unit D is described as side cast and cut material from Soil Unit B. A small volume of additional soil has been cast off the side of the trolley road as the result of recent drilling pad construction activities.

Since the trolley road side cast material primarily originates from Soil Unit B, SUFCO assumes that these soil materials will be suitable for reclamation. SUFCO commits that for any reason, the analysis results of the soils indicate they are not suitable for reclamation, they will take steps to remedy the situation.

Two horizons of disturbed soils were identified - overcast soils from the original trolley road construction and overcast soils from recent construction activities. The trolley road overcast rests directly on weathered shale as identified in the soils pit. The soil appears to be four feet deep as measured perpendicularly to the slope. Soils thin to the north toward the intersection of the trolley road and the current Manti-LaSal National Forest road, and to the east toward the Forest road. Soil pit log LCS2-4 is included at the back of Appendix 2-6.

Findings:

The information provided in the amendment meets the regulatory requirements of this section.

OPERATION PLAN

TOPSOIL AND SUBSOIL

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

Analysis:

The Analysis section discusses operation information for the proposed, substation and power line borehole in Link Canyon as follows:

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

Topsoil and Subsoil Removal

Link Canyon Substation-1

For the Link Canyon Substation 1 disturbed area, the A and C horizons will be removed together and stored on the pad out slope. The A horizon is between 6 to 8 inches deep with the C horizons extending down to 20 inches. Therefore, topsoil and subsoil will be salvaged together to an average depth of at least 19 inches across the site during construction of the Substation pad and access road. In-situ rock, cobbles and boulders, will be left in and on the surface of the side cast

soils as resource protection.

Although the projected disturbed area is 0.28 acres, the actual projected area of soil disturbance is 0.08 acres. Based on a 20 inch topsoil salvage depth, 224 cubic yards of topsoil will be salvaged from the 0.08 acres. As shown on Plate 5-2D, the entire disturbed area is 0.28 acres, and the actual surface disturbance area for cut and fill (ASCAs 1,2, & 3) is 0.18 acres. The 0.08 acres is based on actual cut-slope area with the remainder 0.10 acres as pad and out slope fill. The cut and fill boundary is shown on Plate 5-2D; everything above the line is cut and below the line is fill.

Since the side-cast topsoil will cover the original topsoil surface on a portion of the slope below the pad, the un-salvaged topsoil will be preserved in-place by using a marker layer, or marker flagging, to mark the proximity of the original, undisturbed topsoil surface. During excavation of the stockpiled side-cast topsoil during reclamation, the flagging will help prevent damage of the original topsoil by marking the undisturbed surface. To insure that the original soil surface will be located during reclamation excavation of the side-cast stockpiled topsoil, a 3-inch wide polyethylene underground warning tape marker will be used as flagging and will be placed on eight foot centerline grid pattern.

Link Canyon Substation-2

Soil salvage depth at Substation number 2 pad is based on Division guidelines and by field observation of root distribution. The Order-1 soil survey in Appendix 2-6 states that suitable soil for plant growth of native species basically exists above weathered and hard bedrock. Topsoil is not well-defined and soil materials are mixed without distinct layers. The presence of roots in the soil above the underlying bedrock indicates no significant restricting zones. As discussed in the amendment, the A and portions of the C horizons will be removed together from the salvage area without segregation. Canyon Fuel commits to salvage and stockpile all available suitable soils encountered during site construction. The amendment states that all actual soil salvage volumes may differ from the total and are dependant upon field conditions found during construction. A person qualified to make soil salvaging determinations will be on site during construction.

As discussed in the Order-1 soil survey and based on root distribution, 51 cubic yards of undisturbed soil are available for salvage from the undisturbed soils. Map Unit D soils, the overcast located on the east side of the old trolley road, will be salvaged prior to construction of the substation pad and will account for 67 cubic yards of soil. As shown in table below, a total of 118 cubic yards of soil is estimated for salvage.

Soil Map Unit	Suitable Soil Thickness (inches)	Average Salvage (inches)	Soil Map Area sq. ft.	Soil Salvage Volume (CY)
A	18 to 30	24	612	24
B	2 to 12	8	579	14
C	4 to 8	6	473	9
D	24 to 48	36	600	67
E	6 to 12	8	28	1
F	0 to 10	5	198	3
Total				118

Topsoil Substitutes and Supplements

Link Canyon Substation-1

Since the topsoil is thin (6 to 8 inches), the C horizon subsoil will be salvaged with the A-horizon topsoil. Based on analysis results for the C horizon subsoils as shown in Table 1 of Appendix 2-6, there are no problems associated with the C horizon subsoils being used as substitute topsoil.

Link Canyon Substation 2

Soil Unit-D is composed of road cut and rocky side cast material from the old trolley road. According to the Order-1 soil survey, mixed rock and loamy soil materials range up to about 20 inches thick with bedrock exposed in places. Based on limited amounts of native, undisturbed topsoil resources, Unit-D side cast soil materials provide additional substitute topsoil resource material. The salvage area within Unit D is calculated at 600 square feet with an average salvage depth of 36 inches. Therefore, the total volume of soil salvage from Unit D is estimated at 67 CY. This assumption is based on estimated areas and volumes and not on soil suitability since laboratory analysis have not been received from Inter-Mountain Laboratories.

Topsoil Storage

Link Canyon Substation-1

Soils salvaged from the Link Canyon Substation-1 area will be stored on the pad out slope. The out slope stockpiled soil will be protected by placing berms and/or silt fences at the base of the slope. Additionally, the soil will be seeded with the seed mix specified in Section 3.30 of the MRP.

Topsoil signs will be placed on the Link Canyon Substation-1 pad out slopes identifying the out slopes as "TOPSOIL." Since the Link Canyon Substation-1 disturbed area is located within cattle grazing areas of the U.S. Forest Service, the amendment states that pad out slopes will be fenced to prevent damage from cattle grazing to the stockpiled topsoil. Plate 5-2D, Detail of Link Canyon Surface Facilities, shows the link fence enclosing the topsoil stockpile out slope. An additional link fence shown is placed to protect the substation pad area.

Since the soil survey only describes soils down to 20 inches, the type and quality of residuum or colluvium material in deeper cuts is unknown. Since the topsoil cannot be contaminated from other less desirable cut or fill materials, segregation and placement of the salvaged topsoil will help preserve the topsoil without contamination from the other cut material. The salvaged topsoil will be removed first and placed on the south end of the pad out slope. The remaining excavated materials from the deeper cuts will be used as fill material for the access road and northern end of the substation pad.

Link Canyon Substation-2

The Substation No. 2 stockpile will be placed at the southern end of the pad as shown on Plate 5-2E. The stockpile will be protected with berms and/or silt fences, a three strand barbwire fence, and vegetation to control erosion. The stockpile will not be moved or disturbed until final reclamation.

Findings:

The information provided in the amendment meets the regulatory requirements of this section.

RECLAMATION PLAN

TOPSOIL AND SUBSOIL

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

Analysis:

The Analysis section discusses reclamation information as follows:

- Soil Redistribution
- Soil Stabilization

Soil Redistribution

Link Canyon Substation-1

The un-salvaged topsoil buried beneath the side-cast topsoil will be preserved for later reclamation efforts by placement of marker flagging. The flagging will mark the proximity of the original, undisturbed topsoil surface to help prevent surface damage during reclamation and excavation of the side-cast topsoil and other fill materials. The original soil surface will be located during reclamation excavation of the side-cast stockpiled topsoil and fills. Flags are placed on a 8 foot centerline grid pattern.

Final reclamation of the pad will include the removal of the substation equipment and replacement of the fills and soils stored in the pad area. The plan states that pre-existing slopes will be restored to AOC using the side-cast fill materials stored in the pad and road out slopes (pp 5-58 and 5-67). Topsoil from the pad out slope topsoil storage area will be redistributed over the newly restored slope. The reclaimed pad, access road, and affected slopes will be fenced with a three strand barbed wire fence to prevent damage from cattle grazing during reclamation.

Link Canyon Substation-2

The area within the disturbed area boundary is 0.21 acres. However, the plan shows that only 0.12 acres will actually be disturbed. Therefore, based on the 118 cubic yards of salvaged topsoil over 0.12 acres, 7.3 inches of redistributed soil cover is available to cover shale and weathered bedrock material. The plan states that the 118 cubic yards is a conservative estimate and additional soils are anticipated to be available.

Soil Stabilization

Link Canyon is a steep canyon area with an average rainfall of only 11 inches. Therefore, the applicant plans to provide additional measures and other soil stabilization techniques (e.g., deep gouging) to help assure reclamation success. As explained in the revision, deep gouging or pocking provides alleviates soil compaction, increases soil stability, and increases water harvesting

Since the reclaimed area is within a USFS grazing unit, the reclaimed slope will be protected from grazing by fencing.

Findings:

The information provided in the amendment meets the regulatory requirements of this section.

Link Canyon Substation

ACT/041/002-AM99G

February 15, 2000

Page 11

RECOMMENDATIONS:

The application should be approved as discussed in this memorandum.

sm

O:\041002.CON\FINAL\STA#2LINK.AM99G.wpd