T E C H N I C A L M E M O R A N D U M

Utah Coal Regulatory Program

June 8, 2004

TO: Internal File

THRU: Wayne Western, Team Co-Lead
Dana Dean, Team Co-Lead

FROM: Priscilla Burton, Environmental Scientist III, Soils.

RE: Lila Canyon Extension, UtahAmerican Energy Inc., Horse Canyon Mine, C/007/0013, Task #1859.

SUMMARY:

Information received on February 24, 2004 is being reviewed under Task #1859. The information was prepared in response to TA_PM02B dated April 8, 2003.

This review is of information provided to comply with soils, air quality and post mining land use requirements of the regulations. Approval is not recommended at this time. The PAP must include a plan to visually monitor the 17 acres of undisturbed soils within the disturbed area for accumulations of coal fines. Should coal fines begin to accumulate on the undisturbed areas, watering of the the ROM coal stockpile will be warranted as per the August 27, 1999 Approval Order (DAQE-702-99) Condition #16.

The Permittee has included a commitment to have a qualified soils specialist on site during topsoil salvage and redistribution (Section 232.100). The Division soil scientist should also be present during cryptogam harvest and soil salvage, since these tasks are paramount to reclamation success.

TECHNICAL ANALYSIS:

GENERAL CONTENTS

REPORTING OF TECHNICAL DATA

Regulatory Reference: 30 CFR 777.13; R645-301-130.

Analysis:

An Order I Soil Survey was conducted of the proposed Lila Canyon extension disturbed area was conducted in August 1998 by Dan Larsen, Soil Scientist, Environmental Industrial Services, Inc., Helper,Utah. The extensive experience and qualifications of Mr. Larsen to perform this survey are detailed in Appendix 1-5.

Findings:

The information provided meets the requirements of the Regulations.

ENVIRONMENTAL RESOURCE INFORMATION

Regulatory Reference: Pub. L 95-87 Sections 507(b), 508(a), and 516(b); 30 CFR 783., et. al.

SOILS RESOURCE INFORMATION

Regulatory Reference: 30 CFR 783.21; 30 CFR 817.22; 30 CFR 817.200(c); 30 CFR 823; R645-301-220; R645-301-411.

Analysis:

Elevation of the proposed mine facility is from 5,800 to 6,500 feet. The Soil Survey (Section 3.2 of Appendix 2-3) indicates an average annual precipitation of 8-14 inches with the majority of the precipitation coming in Fall, Winter and early Spring. The soil resources within the Lila Canyon Extension are discussed in Chapter 2, Sections 210 through 224 of the PAP.

Mr. Daniel Larsen, Professional Soil Scientist with Environmental Industrial Services conducted an Order I soil survey of the disturbed area in August of 1998. His report is located in Appendix 2-3. (An addendum attached to Appendix 2-3 is for the proposed fan portal site soils.)

The survey contains soil descriptions, soil pedon descriptions, soil salvage suitability analysis, laboratory soil testing data, field soil profile descriptions, soil and landscape photographs, a soils map, and a salvageable-soils map. All mapping and soil survey work were performed according to the standards of the NRCS's National Cooperative Soil Survey.

Soil Identification and Description and Productivity

The predominant soil classification was Strych fine sandy loam, loamy-skeletal, mixed mesic Ustic Haplocalcid (formerly classified as Ustollic Calciorthids in the 1988 Carbon County Soil Survey).

Order: Aridisol (formed in desert climate)
Suborder: Calcid (accumulation of calcium carbonate)
Great Group: Haplocalcid (other calcids)
Subgroup: Ustic Haplocalcid
(moisture control section is dry less than ¾ of the time when the temperature is above 5 C and aridic soil moisture regime bordering on ustic)
Family: loamy-skeletal, mixed mesic (soil temperature)
Series: Strych fine-sandy loam
Phases: bouldery, very bouldery, extremely bouldery

Also found at the site were two soils with little pedogenesis and little horizonization, classified as Gerst silt loam, loamy, mixed (calcareous), mesic, shallow Ustic Torriorthents

Order: Entisol (young soil, little pedogenesis)
Suborder: Orthent (lack of clay accumulation)
Great Group: Torriorthent (aridic moisture regime)
Subgroup: Ustic Torriorthent
(moisture control section is dry less than ¾ of the time when the temperature is above 5 C and aridic soil moisture regime bordering on ustic)
Family: loamy, mixed (calcareous), mesic
Series: Gerst silt loam
Phase: shallow

and Travessilla fine sandy loam, loamy, mixed (calcareous), mesic Lithic Ustic Torriorthents.

Order: Entisol
Suborder: Orthent
Great Group: Torriorthent
Subgroup: Lithic Ustic Torriorthent (lithic contact within 50 cm)
Family: loamy, mixed (calcareous), mesic
Series: Atchee Series (formerly Travessilla series)

Phase: none given

The soils were mapped using the following designations:

DSH = Strych fine sandy loam variant, 3 to 8% slopes
SBG = Strych bouldery fine sandy loam, 5 to 15% slopes
VBJ = Strych very bouldery fine sandy loam, 5 to 15% slopes
XBS = Strych extremely bouldery sandy loam, 10 – 45% slopes
RBL = Rubbleland- Strych-Gerst complex, 20 – 70% slopes
RBT = Rock outcrop – Travessilla family complex, Atchee Series

From the soil description sheets in Appendix 2-3 and Plate 2-2 Detailed Soils Map of the Mine Facilities Site, the Division notes that the canyon bench holds deep soils, stabilized from wind erosion by a surface layer of biological soil crusts, dried plant litter, boulders and live plant cover. The A horizon layer varies due to position on the slope from three inches (at sample site LC 1 through 3) to 26 inches deep (at sample site LC 4). The B horizon stretches from 31 – 60 inches in the profile and is the zone of accumulation of carbonates. The deepest soils are pockets of colluvium from the cliffs above. The soils are underlain by sandstone bedrock, except at the location of the fan portal where shale and burned coal cover the sandstone rock layer. Shale was also encountered at LC 3 and LC 5 (see discussion of SAR and EC below).

Soils are subject to extremes of temperature. On August 6, 1998 at 11:30 a.m., the temperature of the bare soil at location LC4 was 130 F. At a depth of 20 inches, the temperature was 65 F. These soils are in a mesic soil temperature regime. That means that the mean annual soil temperature at 50 cm is less than 59 F as estimated from the mean annual air temperature of 46 F, reported in Section 220. Mr. Larsen has judged the soil moisture regime to be aridic, bordering on ustic, which is to say that at a depth of 20 inches (50 cm), there is a difference in soil temperature greater than 9 F between summer and winter and the soil moisture control section from 12 – 35 inches deep for sandy soil is dry for 90 or more cumulative days in most years, but it is not dry in all parts for more than half the time that the soil temperature is above 9 F at a depth of 50 cm. (Soil Survey Staff. 1990. Keys to Soil Taxonomy, fourth edition. SMSS technical monograph no.6. Blacksburg, Virginia. pp 33 –35.)

The disturbed area vegetation is primarily pinyon-juniper and grass-shrub communities (Plate 3-2). On good years the grass-shrub can be expected to produce 600 – 800 lbs/acre (see Appendix 3-2, July 8, 1998 letter from Mr. George S. Cook, NRCS Range Conservationist), however recent estimations place the disturbed area productivity at 350 lbs/acre and the grass/shrub reference area at 450 lbs/ac due to drought (see Appendix 3-2 letter dated August 22, 2003 from Mr. M. Dean Stacey, NRCS RangeManagement Specialist).

Soil Characterization

Soil pedon descriptions were recorded on standard NRCS forms and are provided in Appendix D within Appendix 2-3. The soil horizons were sampled and analyzed according to DOGM guidelines for topsoil and overburden. (Leatherwood, J. and Dan Duce. 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.) Soil texture, rock fragment content (percent by volume), and Munsell color were determined in the field. Generalized soil properties, including percent surface stones and boulders, are summarized in Table 3.21, Properties of Soil Map Units, on page 9 of Appendix 2-3. Soil sampling locations are shown on Plate 2-2, Detailed Soils Map of the Mine Facilities Site.

Soil samples were sent to InterMountain Laboratories, Inc. for analysis. Appendix C of Appendix 2-3 contains the laboratory data sheets for all analysis on the 22 samples and duplicate analysis. Overall, soil laboratory test results show a good rating for soil chemistry and fair rating for soil water holding capacity after correction for coarse fragments (Appendix B of Appendix 2-3), except as noted below:

LC1 was rated poor for water holding capacity below 10 inches (after coarse fragment correction)

LC3 was rated poor at depth of 24 – 48 inches for pH = 8.6

LC3 was rated unacceptable at depth of 48 – 53 inches for Sodium Adsorption Ratio (SAR) = 18 and Exchangeable Sodium Percentage (ESP) = 22%

LC5 was rated poor below three inches for water holding capacity and unacceptable for coarse textured soils at depth 40 – 58 inches for SAR = 15, Electrical Conductivity (EC) = 8.89 mmhos/cm, and pH 8.2.

LC10 was rated fair at 0 – 4 inch depth for an EC = 2.58

LC 11 and LC 12 entire profiles were rated poor for water holding capacity after correction for coarse fragments.

The percent rock content within the proposed facilities area is the main deterrent for soil salvage suitability based on the current Division guidelines (citation previously noted). However, Appendix 2-3 indicates that native soils, with a higher rock content than the current guidelines allow, can and should be salvaged.

Organic matter content is relatively low in these soils. Generally, the surface soils ranged between 1.0 to 1.5% organic matter and the subsoils were about 0.5 percent. Analytical reports indicate that the nitrate nitrogen content of the surface soils is between 1.06 and 2.16 ppm; the available phosphorus is between 4.00 and 7.34 ppm; and the available potassium varies between

3.2 and 44.8 ppm (Appendix 2-3, BYU Soil and Plant Analysis Laboratory May 1, 2003). This information will be referred to at final reclamation as a comparison with the nutrient content of the redistributed topsoil.

A calcic horizon was verified in soil pedons LC1, LC5 and LC6 with calcium carbonate ranging between 20 to 21%. Pedons LC3 and LC4 have some calcium carbonate accumulation in the subsoil but it is less than the 15% needed to be classified as a calcic horizon. Below the calcic horizon, at depths of 30 inches, the soluble calcium decreases and magnesium increases with depth. Usually, the reverse is the case where calcium exceeds magnesium in the soil solution, because calcium is retained much more readily than magnesium on soil colloid exchange sites. But in this case, calcium is being removed from the soil solution by calcium carbonate precipitation in the calcic layer. As a result, soluble magnesium exceeds soluble calcium in the lower soil horizons.

In accordance with R645-301-232.200, since the A horizon is less than six inches deep, the topsoil recovered will be a mix of both the A and B horizon soils. Depths of salvage range from 6 to 18 inches over the site (see Available Soil Resources table in Section 232.100). Large stones, 36 inches or less, are considered part of the soil layer and are included in the topsoil volume estimates.

Findings:

The information provided meets the requirements of the Regulations to provide environmental soils resource information.

LAND-USE RESOURCE INFORMATION

Regulatory Reference: 30 CFR 783.22; R645-301-411.

Analysis:

The land in permit area "B" is zoned M & G – 1 for mining and grazing (Section 411.130). The Bureau of Land Management owns and manages 4,256.37 acres within the permit area. State and private holdings account for 289.06 and 1,446.64 acres, respectively. In March 1999, the Emery County Board of Commissioners approved a Large Scale Industrial Site Plan for the Lila Canyon Operation (Appendix 4-2 letter dated June 4, 1999 from Bryant Anderson Emery County Zoning Administrator to Jay Marshall, UEI).

Pre-mining land uses include wildlife habitat, grazing, recreation and mining (Section 410 and 411). Grazing allotments are listed in Table 4-3 and allotment boundaries are shown on

Plate 4-2. Water rights (including those for stock watering) are tabulated in Table 7-2 and illustrated on Plate 7-3.

Lila Canyon is within an area identified by the BLM as the Range Valley Mountain Habitat Management Plan Area (Chap. 4, page 3, and Plate 3-1). A habitat management plan was adopted in 1991 to provide management of wildlife and for access management. Wildlife habitat is shown on Plate 3-1.

Plate 4-4 shows the permit area boundary overlaps areas of Turtle Canyon Wilderness Study Area (WSA). All previously identified wilderness inventory units have been removed from Plate 4-4, subsequent to the April 2003 "Stipulation and Joint Motion to Enter Order Approving Settlement and To Dismiss the Third Amended And Supplemented Complaint" (2:96CV0870 B) in the United States District Court District of Utah, Central Division.

Lease readjustment for U-0126942 restricts surface occupancy in the Turtle Canyon. The lease readjustment can be modified if it interferes with the lessee's right to explore, access, and extract the coal resource, because the lease is a valid existing right.

Exploration and mining activity has occurred previously in Lila Canyon (Section 411.200). County road 126 into Lila Canyon was built in the 1950's to provide access for coal exploration. Existing roads and trails are shown on Plate 5-1 and described in Appendix 5-4. Existing borehole disturbances are shown on Plate 6-2. Kaiser Coal Company drilled the S series holes in 1980. The IPA holes were drilled in 1994. The IPA holes have been monitored. Pre-existing surface disturbances within the Lila Canyon Extension permit area "B" have been limited to these drill holes and associated access roads (personal communication between Jay Marshall and Priscilla Burton on June 8, 2004).

Within the Horse Canyon permit area "A", two sealed breakouts, located in the left fork of Lila Canyon, were used post-SMCRA for ventilation of the Horse Canyon Mine. These reclaimed breakouts are on Plate II-2 of Permit Area "A" (Horse Cyn).

Underground areas mined previously are shown on Plate 5-1.

Findings:

Information provided in the application meets the requirements of the Regulations.

ALLUVIAL VALLEY FLOORS

Regulatory Reference: 30 CFR 785.19; 30 CFR 822; R645-302-320.

Analysis:

Alluvial Valley Floor Determination

This section summarizes the land use, soil, plants, geology, surface- and ground-water information reviewed by the Division in making the findings required under R645-302-320.

The Lila Canyon Extension is situated in the western Book Cliffs escarpment. Numerous small seeps and springs exist within and adjacent to the permit area (Section 731.220). Steeply dipping joints transmit ground water from the surface (Section 6.5.3.5) as illustrated in Figure VI-5. The surface expressions of the faulting are grabens and draws. The general strike of the beds in the permit area "B" is N22°W dipping at 11 to greater than 16% towards the East (Figure VI-3 and Plate 7-1-B and Section 6.4.2, Section 6.5.3.3).

Water inflow through the Geneva Tunnels is anticipated (Section 6.6.1). Water inflow associated with fault or fracture systems are possible, but not expected to be significant. The Sunnyside sandstone contains the two coal seams of interest: Upper Sunnyside and Lower Sunnyside Seams. The sandstone beneath the Lower Sunnyside coal seam is considered to be a potential aquifer (Section 6.4.1). Historical records for the Geneva Mine (now known as the Horse Canyon Mine) indicate that the mine was dry until the Sunnyside Fault was intercepted. This suggests that as mining progresses down dip, "substantial" water may be encountered, but this water will be isolated from the surface recharge zone (Section 6.6.3.1) and indications are that the Sunnyside Fault will not be encountered within the permit area "B" boundary (Section 6.5.3.3).

The Mancos Shale forms the slopes below the base of the Book Cliffs, overlain in places by pediment deposits (Section 6.4.1 and Plate 6-1). In the permit area, drainages flow in response to snow melt and precipitation events (Section 731.220 and Plate 7-1). Coleman Wash receives the Lila Canyon drainage. Grassy Wash and Marsh Flat Wash collect the flow from the Mancos slopes further south. Little Park Wash channels the flow on the plateau above. There is no valley holding a perennial stream in the permit area (Section 724.700).

Order III soil survey (Plate 2-1) of the mine permit area soils indicates that the soils on the plateau in Little Park Wash are Neto Fine Sandy Loam (Section 220.200). This soil is comparable to the Glenberg soil described in the published Carbon County Soil Survey, according to Mr. Leland Sasser (telephone conversation between Priscilla Burton of DOGM and Mr. Leland Sasser, Soil Scientist and Survey Project Leader with the NRCS, Price Field Office, Utah on 06/05/01).

Plate 3-2, Vegetation indicates that the dominant species growing on the plateau in the vicinity of Little Park Wash are Atriplex, Artemesia and Elymus, none of which are wetland

species, according to Cooper. (Cooper, David J. 1989. A Handbook of Wetland Plants of the Rocky Mountain Region. EPA Region VIII.) Little Park Wash falls within the Little Park grazing allotment (Plate 4-2). The land use is unimproved rangeland and wildlife habitat.

There is no farming activity upstream or downstream of the permit area, therefore, the proposed operations will not interrupt, discontinue, or preclude farming on an alluvial valley floor. Based on the information provided in the plan, in accordance with R645-302-321.100, the Division determines that there is no probable existence of an alluvial valley floor.

Findings:

Based on the information provided in the plan, in accordance with R645-302-321.100, the Division determines that there is no probable existence of an alluvial valley floor.

PRIME FARMLAND

Regulatory Reference: 30 CFR 785.16, 823; R645-301-221, -302-270.

Analysis:

The Natural Resources Conservation Service (NRCS) determined in 1998 that there are no Prime Farmlands at the site (see Appendix 2-1).

Findings:

The Division concurs with the NRCS determination made in 1998 that there are no Prime Farmlands at the site.

OPERATION PLAN

AIR POLLUTION CONTROL PLAN

Regulatory Reference: 30 CFR 784.26, 817.95; R645-301-244, -301-420.

Analysis:

First year production from the mine is estimated to be 200,000 tons, increasing in the second through fifth year to between 1,000,000 and 1,500,000 tons. Long wall mining could be utilized to generate as much as 4,500,000 tons a year (Section 523).

Appendix 4-3 contains correspondence between UEI and the Department of Environmental Quality, Division of Air Quality (DAQ). In the cover letter for the Notice of Intent dated December 22, 1998, UEI requested approval for a Minor Source of up to 2,000,000 tons/year. An Approval Order (DAQE-702-99) was issued August 27, 1999.

The Approval Order (AO) indicates public comments were considered in developing the requirements of the AO for this new source. The DAQ received five public comments on degradation of the environment in general and one comment referring to air quality degradation in particular.

The AO is predicated on UEI operating according to the Notice of Intent submitted to the DAQ on December 24, 1998, and additional information submitted to the DAQ on February 19, 1999 and May 11, 1999.

The following equipment was approved with the AO:

- One enclosed crusher rated at 500 tons/hr equipped with dust suppression spray at its exhaust.
- One truck loading facility with enclosed 450 tons surge bin and sprays as needed
- One (80 ft tall) stacking tube with associated coal stockpile (27,000 Tons of open storage, Section 520 of the PAP)
- One reclaim system conveyor
- Associated conveyors equipped with dust suppression sprays at all transfer points.
- Mobile diesel equipment.
- 0.68 miles of paved road, posted speed limit 25 mph, as per General Condition #13.

The requirements of the AO include:

- annual training of employees;
- control of disturbed or stripped areas through treatment;
- maintenance of 4.0% moisture content of fines;
- watering storage piles, as conditions warrant;
- limitations on the silt-size coal fines in stored coal (5.1%) and haul roads (10%);
- visible emissions limits (20% opacity);
- maintaining the surface of unpaved roads and pad areas in a damp/moist condition;
- a production limit of 1,500,000 tons of coal per rolling 12 month period;
- a consumption limit of 63,000 gallons of diesel fuel per rolling 12 month period;
- use of #2 fuel oil only; and
- sulfur content of fuel oil or diesel is not to exceed 0.5% by weight

The AO from the DAQ ensures that particulates and pollutants will be controlled through very specific dust suppression requirements, pollution control equipment, limited fuel consumption and proper equipment maintenance, limited production, employee training and record keeping.

The Permittee has informed the DAQ of the delay in construction of the Lila Canyon site in a letter dated June 10, 2000, as required by AO DAQE-702-99 General Condition #6 (E-mail communication between Maung Maung and Priscilla Burton on June 3, 2004).

A rain gauge will be installed at the site to comply with the Air Quality Approval Order (Section 724.411).

Findings:

The Division finds that the Permittee has obtained the required DAQ permit, however the operations plan must include the following information to be in compliance with the AO DAQE-702-99:

R645-301-420, **(1)** In accordance with the approved Air Quality Order DAQE-702-99 General Conditions # 10 – 17, the PAP should indicate that the haul road will be paved and that all unpaved roads and pad areas used by mobile equipment will be treated with water or dust suppressant and that open stockpiles will be watered as conditions warrant. **(2)** The Permittee should continue to keep the DAQ informed about delays in construction of the Lila Canyon site (AO DAQE-702-99 General Condition #6).

TOPSOIL AND SUBSOIL

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

Analysis:

The Permittee has outlined a disturbed area boundary on Plate 5-2 and has shaded undisturbed areas within those areas on Plate 5-2, however the legend misidentifies this shaded area as “disturbed”. All the entire disturbed area will be bonded (Section 521.163), topsoil will be removed from only 25.30 acres (Available Soil Resources Table Section 232.100) to develop the surface facilities described in Section 542.200. The disturbed area boundary will encompass 42.6 acres (Section 116.100, Section 542.200, Appendix 5-8). The application mistakenly indicates a disturbed area of 40.77 acres in Section 411.110. The application must consistently state the proposed disturbed acreage in each section. The Available Soil Resources Table

(Section 232.100) indicates that there are potentially 48.23 acres of surface disturbance. This table was taken from the soil survey and does not accurately reflect the Permittee's intention to include 42.6 acres of disturbance within the disturbed area boundary.

Since Regulation 645-301-232.100 requires topsoil removal from all disturbed areas. The application describes islands of undisturbed land (17.3 acres) within the disturbed area. These islands of undisturbed ground will be signed (Section 231.100) and protected by a 20 ft buffer zone (Section 234.220). In places, the islands will be protected with rock barriers (Plate 5-2). This is an excellent means of protecting the undisturbed islands from vehicle traffic and the Division would like the Permittee to expand its use. The Division has made additional recommendations to protect these lands from incidental coal fine deposition under the Surface Facilities heading of this TA.

For the purposes of removal, the PAP defines topsoil as all soil from the surface down to eighteen inches (Section 231.100). Plate 2-3 Soil Salvage and Replacement provides guidance for the topsoil removal. Plate 2-3 shows removal of eighteen inches of topsoil from the central and northwest portion of the disturbed area with twelve to eight inches being removed from the roadway and twelve to eighteen inches removed from the sediment pond location and eight to eighteen inches removed from beneath the coal stockpile and coal storage bin.

Soils will be removed from all disturbed areas including stony areas to a depth of eighteen inches or to shale (Section 232.100 and 232.300) with the following exceptions:

- The steep rocky slopes within the disturbed area below and between the conveyor and coal storage pile (Section 232.710).
- The two bents to be constructed for the conveyor.
- The area of topsoil storage (topsoil will be removed from the access road to and around the topsoil pile, but not from beneath the topsoil pile, Section 232.100).
- The slope between the coal pile road and the portal access road (Plates 2-3 and 5-2). [No disturbance is anticipated for this slope, consequently, the Permittee will evaluate the condition of the slope after road construction and label the slope either disturbed or undisturbed, as appropriate, on an As Built site map.]

The Permittee will install an enclosed conveyor (Section 232.710) in an attempt to keep the native soils (beneath the conveyor and in undisturbed islands) free of coal accumulations. Installation of jersey barriers will protect the slope from encroachment by the coal stockpile. A commitment to vacuum on either side of the conveyor a distance of twenty feet has been included in the event that coal fines are blown from the stockpile (Section 232.710). Vacuuming has been found to be very disruptive to undisturbed soils and is in itself a disturbance. The Permittee is encouraged to closely monitor the undisturbed soils for coal fine deposition, see discussion under Support Facilities in this TA.

Soils to be salvaged are estimated to be 50,236 bank CY or 59,278 loose CY (Table of Available Soil Resources in Section 232.100). The table divides salvageable soil by map unit type. Soils will be removed from the 25.3 acres to be disturbed with a crawler-tractor, grader, front-end loader, and/or trackhoe.

To protect the soil resource, the Permittee has committed to handling the soils at an optimum moisture content, when the soils are loose and friable (Section 231.100), adding moisture or allowing the soils to dry as needed.

The Permittee commits in Sections 231.100 and 232.100 to employing a qualified soils specialist to oversee the soil salvage, construction of subsoil storage site, and reclamation of the site. The Permittee further commits in Section 232.500 to maintaining records of materials removed and placement of materials either in the topsoil storage pile or in the fill. Soil pedestals will be left to verify soil removal depths (Section 232.500). Further the PAP provides a commitment to develop As-Built maps showing where subsoil materials have been used as fill material (Section 232.500).

SUWA previously commented on the need for soil-borrow areas. Topsoil will be recovered from all disturbed areas (from a minimum depth of 6 inches from RBT soil up to 18 inches from VBJ, SBG and DSH soils). The total recovery of topsoil is estimated at 50,236 bank cubic yards. On the average, this represents a replacement depth of 15 inches over the proposed 25 disturbed acres. Furthermore, the Order 1 Soil Survey that suggests subsoils are also suitable for plant growth down to a depth of 48 inches (Appendix 2-3). These subsoils will be placed where they can be recovered and utilized to increase the rooting depth at reclamation. There is no need to develop a soil borrow area.

Storage of the approximately 59,000 loose cubic yards of topsoil will be in a stockpile (Section 232.100 Available Soil Resources Table) with the approximate dimensions 26 ft high X 246 ft long X 146 ft wide (Section 232.100), with 2h:1v side slopes. Plate 5-2 and Plate 2-4 show the location of the topsoil stockpile. Cross-sections 4+00 and 6+00 on Plate 5-7A-2 show the proposed stockpile. The Mass Balance Table 1 of Appendix 5-4 calculates from these cross-sections that there will be approximately 14,000 CY of soil in the stockpile. A clarification of this apparent discrepancy is requested.

The topsoil stockpile is located on Plate 5-2 and Plate 5-7, among others. Topsoil stockpile will be an Alternate Sediment Control Area (ASCA) protected from upstream flow by drainage ditches (design shown in Appendix 7-4). The stockpile will be loosely piled with a rough, irregular, pitted surface retain moisture and reduce erosion (Section 231.100 and 231.400). The Division notes that this practice is described in the Practical Guide to Reclamation (DOGM, 2000), available at http://dogm.nr.state.ut.us.

The topsoil will be retained in place with the use of berm/ditches or silt fences surrounding the pile. The stockpile will be mulched and seeded in the fall (after September 15) using the mix in Table 3-4 (Section 231.400). Table 3-4 is a mix of native grasses, forbs and shrubs. Species in the mix should control erosion yet maintain the natural beauty of the landscape. Section 231.100 and Section 231.400 must indicate that if seeding does not immediately follow topsoil pile construction, the pile will be roughened again immediately prior to seeding.

The surface layer of soil is valuable, for it contains seeds, cryptogam filaments, other microorganisms, organic matter, elevated levels of nitrogen and phosphorus. The Permittee has committed to gathering a single five gallon bucket of cryptogamic soil separately from the remainder of the topsoil salvage (Section 232.100). (As discussed below, this is not enough material to provide adequate inoculum.) The Permittee proposes to try to establish cryptogams on the topsoil stockpile by adding two ounces of crushed and sieved surface soil containing cryptogam colonies to each load of wood fiber mulch hydrosprayed on the surface of the gouged topsoil pile (Section 234.230). The biologic soil crusts established on the topsoil pile could be later harvested for inoculation of the reclaimed site.

The Division previously recommended that the topsoil pile receive an initial irrigation after the 2 – 4 inch surface layer is applied, to ensure good contact, based upon the paper: Jayne Belnap, "Cryptobiotic Soil Crusts: Basis for Arid Land Restoration (Utah)," Restoration and Management Notes 12:1 Summer 1994. The Permittee has declined to irrigate. Since the research on this issue is limited, the Division will not press the issue, unless further evidence of the benefits of irrigation in establishing transplanted cryptogam filaments becomes known.

The procedure that the Permittee has outlined for distribution of cryptogam filaments during final reclamation might be the best way of establishing the cryptogams on the topsoil pile. However, the percentage of cryptogamic soil to be added to the hydromulch should probably be on the order of 1% by volume. The area of the proposed topsoil stockpile is 246 ft X 146 ft with 2:1 side slopes or about one acre. Approximately 4,000 gallons of hydromulch spray are required for one acre, therefore eight, 5 gallon buckets of screened cryptogamic soil (through a ¼ inch sieve) should be added to the tank to create a 1% concentration (conversation between Priscilla Burton and Bill Lee, Skyline Reclamation, on May 27, 2004).

Storage of topsoil from the topsoil access road will be in berms around the topsoil stockpile (Section 232.100). Storage of topsoil from the fan portal will be in a berm around the fan disturbance (Section 234.100). Plate 5-2 shows the location of the topsoil berm at the fan site. To avoid contamination with rock dust, the berm will not extend in front of the fan. The bermed fan portal soil will be protected with a silt fence and vegetated (Section 234.100).

Subsoils

The recommendation for soil salvage of between six and 48 inches of topsoil and subsoil from the disturbed area is based upon the Order 1 Soil Survey (Appendix 2-3 and Section 232.500).

The PAP states that subsoil from 12 – 30 inches from cut areas will be used as fill material during operations (Section 232.500). Subsoil will also be used as cover over the waste rock disposed of in the refuse area (pages 2-3, Appendix 5-7). Section 232.700 specifies the subsoil recovery for soil types SBG, DSH, and VBJ, based upon recommendations found in Part 3.4 of Appendix 2-3 Soil Inventory. **The Division understands that the recovery depth in inches is the depth of salvageable subsoil remaining after topsoil removal. Thus, for SBG soil the 30 inch removal thickness would come from between 18 inches and 48 inches in the profile.**

SUWA previously commented that a subsoil stockpile should be required. An average recovery depth of 15 inches from the site will provide an adequate supply of topsoil for final reclamation. In addition the location of subsoil with suitable reclamation characteristics will be mapped for ease of recovery and replacement during reclamation (Section 232.500, Section 241, Section 242.100). These subsoils will be used as fill underneath parking areas, roads, buildings, and storage sites. These subsoils will be protected during operations by asphalt, concrete, or gravel over an impervious membrane (Section 232.500). The PAP indicates that upon reclamation, subsoils found to be contaminated with oil, grease or salts through visual evaluation will be hauled to a landfill site.

Findings:

The proposal does not meet the requirements of the Regulations. The Permittee must provide the following, prior to approval and in accordance with:

R645-301-234.230, The Permittee has outlined a novel procedure for distribution of cryptogam filaments during final reclamation, however, the percentage of cryptogamic soil to be added to the hydromulch should probably be on the order of 1% by volume, rather than 2 ounces as stated in Section 234.230.

R645-301-232.100, The Permittee should plan on gathering enough cryptogamic soil prior to topsoil salvage to have a minimum of 1% by volume to add to the hydrospray of the topsoil stockpile.

R645-301-121.200, (1) The disturbed acreage of 42.6 acres must be consistently stated in the application. i.e. Section 411.110 indicates 40.77 acres and the Available Soil Resources Table Section 232.100 suggests a potential disturbance of 48.23 acres. **(2)** Correctly label the legend of Plate 5-2 to indicate the un-disturbed areas within the disturbed area.

R645-301-232.100, The concept of rock barriers and incidental rock distribution along the boundaries of undisturbed ground (illustrated on Plate 5-2) should be expanded to provide protection for all undisturbed areas within the permit area.

R645-301-234.230, Section 231.100 and Section 231.400 must indicate that if seeding does not immediately follow topsoil pile construction, the pile will be roughened again immediately prior to seeding.

R645-301-232.100, (1) The condition of the slope between the coal pile road and the portal access road (shown on Plates 2-3 and 5-2) will be evaluated after road construction and will be labeled either disturbed or undisturbed, as appropriate, on an As Built site map. **(2)** The vacuuming procedure described in Section 232.710 should be removed from narrative.

R645-301-234.100, The Permittee must clarify the apparent discrepancy between the projections in the Mass Balance Table 1 of Appendix 5-4 that indicate approximately 14,000 CY of fill in the topsoil stockpile between cross-sections 4+00 and 6+00, and estimates in Section 232.100 Available Soils Resources Table that project the salvage of 59,000 CY of topsoil.

SPOIL AND WASTE MATERIALS

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

Analysis:

Disposal Of Noncoal Mine Wastes

The PAP indicates in Section 542.640 that a minimum of two feet of cover will be placed over sand and gravel road surfacing materials and asphalt will be disposed off-site. Concrete will be buried by four feet of cover (Section 542.741) in the location shown on Plate 5-6.

Refuse Piles

The Permittee shows the location of the refuse pile on Plate 5-2. Section 520 (Refuse Piles) states the refuse- pile capacity as 44,400 CY. In Appendix 5-7, the Permittee explains that 25,000 cubic yards of excavated rock from the tunnel development will be used as structural fill in a portion of the refuse site and that the remainder of the refuse site could hold 19,473 cubic yards of coal processing waste.

Figures 1 and 2 of Appendix 5-7 show the refuse pile in plan view and cross section. The Permittee will salvage the top 18 inches of pre-disturbed ground as topsoil, then remove the subsoil from 12 – 30 inches (Section 232.500). **The Division understands that the recovery depth in inches is the depth of salvageable subsoil remaining after topsoil removal. Thus, for SBG soil the 30 inch removal thickness would come from between 18 inches and 48 inches in the profile.**

Upon reclamation, the Permittee shows that they will cover the coal mine waste with 18 inches of topsoil and 30 inches of fill material, totaling 48 inches of cover, complying with the requirements of R645-301-553.252 (Figure 2, Appendix 5-7). The Permittee will treat and dispose of all coal mine waste as if the material were acid- or toxic-forming. All coal mine waste will be disposed of under four feet of material.

The Permittee outlines the testing of coal mine waste in Appendix 5-7. The Permittee will test all rock slope material five times. The Permittee will only use rock slope material as structural fill. The testing will take place during the initial start up, at the ¼ mark, the ½ mark, and the ¾ mark and near completion. The Permittee will test other coal mine waste, generated during operations from the crusher and underground development, containing coal every 6,000 cubic yards.

Findings:

The information provided meets the cover requirements for coal mine waste.

HYDROLOGIC INFORMATION

Regulatory Reference: 30 CFR Sec. 773.17, 774.13, 784.14, 784.16, 784.29, 817.41, 817.42, 817.43, 817.45, 817.49, 817.56, 817.57; R645-300-140, -300-141, -300-142, -300-143, -300-144, -300-145, -300-146, -300-147, -300-147, -300-148, -301-512, -301-514, -301-521, -301-531, -301-532, -301-533, -301-536, -301-542, -301-720, -301-731, -301-732, -301-733, -301-742, -301-743, -301-750, -301-761, -301-764.

Analysis:

Acid- and Toxic-Forming Materials and Underground Development Waste

The Permittee has committed to periodic sampling of the materials to be placed in the refuse pile; samples will be collected and analyzed five times during construction of the rock-slope tunnels and from every 6,000 tons of waste rock placed on the refuse pile during mine operation: parameters to be analyzed are in Table 2 of Appendix 5-7.

The reclamation plan specifies 4 feet of subsoil and topsoil will be placed over the refuse pile. The slope-rock underground development waste used to build the pads will be left in place and buried under 4 feet of subsoil and topsoil as well (Chapters 2, 5, and 7, and Appendix 5-7).

Findings:

The information provided meets the requirements of the Regulations.

SUPPORT FACILITIES AND UTILITY INSTALLATIONS

Regulatory Reference: 30 CFR Sec. 784.30, 817.180, 817.181; R645-301-526.

Analysis:

The disturbed area boundary for permit area "B" encompasses 42.6 acres, however there will be only 25.3 acres actually disturbed for the operations area. This leaves 17.3 acres of undisturbed ground within the disturbed area boundary. Leaving as much land undisturbed as possible fulfills the requirements of R645-301-333, "…the operator will minimize disturbances and adverse impacts." This undisturbed land within the disturbed area boundary must be protected from disturbance, however.

Plate 5-2 shows the facilities to be developed at the site. The Plate shows a Run of Mine (ROM) storage pile containing approximately 27,000 Tons of open storage at the upper end of the permit area, within 20 ft of undisturbed slopes. The Lila Canyon ROM stockpile will be somewhat protected from wind by the escarpment to the east and north (personal communication between Jay Marshall and Priscilla Burton, June 8, 2004). The Permittee has included in the PAP several means by which deposition of coal fines on the undisturbed slope will be controlled:

- enclosed conveyor (Section 520) from the portal to the ROM storage pile.
- 80 ft distribution tube to control the drop of ROM coal.
- jersey barriers to prevent encroachment against the canyon slope.
- ROM stockpile will be 8 inch minus (personal communication between Jay Marshall and Priscilla Burton on June 8, 2004).
- water sprays at the head roller to moisten the coal as it falls into the pile.
- in-line crusher with covered conveyor from ROM to loadout bin.
- water sprays at all transfer points.

In addition, the deposition of coal fines onto undisturbed ground from the ROM storage pile will be visually monitored (personal communication between Jay Marshall and Priscilla Burton on June 8, 2004). If monitoring reveals coal fine deposition, then water sprays on the open stockpile will be warranted as per the August 27, 1999 Approval Order (DAQE-702-99) General Condition #16. In addition, the Permittee could broaden the area of topsoil salvage

within the disturbed area or employ additional measures, such as a wind fence. [A silo was considered, but three concrete structures would be required to handle 27,000 Tons of ROM and that's a lot of concrete to be buried on site during reclamation.]

Findings:

The information provided does not meet the requirements of the Regulations. The Permittee must provide the following, prior to approval and in accordance with:

R645-301-526.222, To protect islands of undisturbed area within the permit area, the Permittee will include in the PAP a commitment to visually monitor undisturbed ground within the permit area for coal fine deposition. If monitoring reveals coal fine deposition, then water sprays on the open stockpile will be warranted as per August 27, 1999 Approval Order (DAQE-702-99) General Condition #16.

RECLAMATION PLAN

POSTMINING LAND USES

Regulatory Reference: 30 CFR Sec. 784.15, 784.200, 785.16, 817.133; R645-301-412, -301-413, -301-414, -302-270, -302-271, -302-272, -302-273, -302-274, -302-275.

Analysis:

The postmining land use is in accordance with the BLM's management plans. Appendix 4-2 contains a letter from the BLM stating the postmining land use for the area is wildlife habitat, grazing, and incidental recreation. Should these plans change, the Permittee will accommodate the landowner (BLM) and Emery County at the time of reclamation (Section 412.140).

The reclamation plan is presented in Appendix 5-8 and Chapters 2, 3, and 5 of the PAP. The site will be monitored for 10 years prior to final bond release. Should monitoring indicate that livestock grazing is detrimental to the achievement of bond release, fencing the site will be considered along with supplemental seeding. There will be no roads left in the disturbed area.

SUWA previously commented that the PAP fails to restore the land to a quality capable of supporting wilderness designation. In the 2003 settlement with the State of Utah, the Secretary of Interior agreed that public lands other than Section 603 WSA's and Congressionally designated wilderness could not be managed or otherwise treated as wilderness study areas, absent congressional authorization.

SUWA previously commented that the restoration plan is inadequate to ensure that the water sources and other wildlife habitats will be returned to the postmining land use. These issues are addressed in the reclamation section of this TA.

Findings:

Information provided in the application meets the minimum Postmining Land Uses requirement of the regulations.

TOPSOIL AND SUBSOIL

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

Analysis:

Redistribution

The PAP describes in Section 241 grading the surface to AOC, replacement of subsoils in the root zone, ripping, replacement of topsoil, replacement of boulders and gouging and treatment of the surface with an inoculum.

The Permittee has provided Plate 2-3 outlining Soil Salvage and Replacement. In addition, the grading sequence is itemized in steps a through f. The sequence begins with: "a. Grade all areas where no subsoil is being stored. b. Replace subsoil on areas from which it was removed." SUWA previously commented that the sequence as written was very confusing. Crucial to the understanding of steps a and b in the regrading sequence will be the As-Built map (Section 232.500) that will provide the operational location of the subsoils suitable for placement in the top four feet rooting zone. i.e. subsoil from soil map units SBJ, DSH and VBJ identified in the Order 1 Soils Survey. The As-Built map is referred to in the discussion of Section 241 and 242.100 and 232.500. The Division understands and follows the concept of salvaging the subsoil and documenting its placement for use at final reclamation.

SUWA previously commented on the depth of topsoil replacement, believing that the PAP called for eighteen inches of topsoil to be replaced over the entire site. Section 242.100 describes the replacement of topsoil to approximate the variable depth of topsoil encountered at the site during the Order 1 Soil Survey (see Plate 2-3 Topsoil salvage and Replacement). Section 242.100 also outlines the equipment to be used to replace the topsoil.

Inoculum is referred to in Section 241 and soil amendments are referred to in Section 243. The inoculum will stimulate microbial activity in the soil. The PAP is not clear on what

product will be re-applied to the soil to re-establish bacteria, microhorizia [sic], and mycelium (Section 241), however the Division expects that the best technology available at the time of reclamation will be employed, as per R645-301-333.

Re-establishment of biologic soil crusts will be attempted on the surface of the topsoil storage pile (Section 231.400). If successful, this source of biologic soil crusts will be utilized to inoculate the reclaimed site (Section 244.200). At the time of reclamation more options for cryptogam re-establishment may be available. For example, the U.S. Army Corps of engineers is experimenting with cyanobacteria pellets, which may be commercially available in two years (see http://www.cecer.army.mil/td/tips/product/details.cfm?ID=527). Deficiencies regarding the plans for cryptogam establishment have been itemized under Operations Plan Topsoil and Subsoil R645-301-234.230 and R645-301-232.100.

Amendments will replace lost soil nutrients based upon testing of the topsoil stockpile prior to redistribution. Grab samples will be collected every 15 ft to a depth of 18 inches from the stockpile and analyzed for nitrogen, potassium, and phosphorus (Section 243) The Division would rather that the bottom and middle portions of the 25 ft deep pile are sampled to see what the effects of darkness, compaction, and sterility have been on the fertility of the topsoil stockpile. Therefore, the Division recommends that when the topsoil pile height is reduced to approximately 10 feet at its deepest end, then the sampling described in the application should be conducted, except that 4 or 5 grab will be sufficient.

Appendix 5-8 indicates fertilizer application to the reclaimed surface will be based upon the testing of the topsoil. In past reclamation, the Division has noted that the application of nitrogen was a detriment to the encouragement of native species. The application of fertilizer may be detrimental to the establishment of micro-organisms as well. Plant nutrients should be applied only in the case of severe deficiencies.

Findings:

The information provided in the application is adequate for the purposes of the Regulations with the following exception. Prior to approval and in accordance with:

R645-301-243, The PAP should indicates that grab samples will be collected from the topsoil stockpile after its height is reduced to 10 feet at the deepest end (Section 243), 4 or 5 grab samples should be sufficient to determine what the effects of darkness, compaction, and sterility have been on the fertility of the topsoil stockpile.

STABILIZATION OF SURFACE AREAS

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

Analysis:

For this site, the Order 1 Soil Survey identifies microbial crusts on the surface of the soil. Microbial crusts stabilize the soil through protection of the soil from water and wind erosion.

The plan recognizes the need to re-introduce microbial life in Section 241, and specifies a method in Section 244.200. Section 244.200 indicates that if soil crusts form on the topsoil pile, they will be added to the wood fiber mulch application in an attempt to reestablish biologic soil crusts on the reclaimed soil surface.

The best technology for re-introducing cryptogams on a large scale is still a subject of research. The internet site www.soilcrust.org provides excellent references. Introduction of biologic soil crusts may be as simple as sprinkling the crushed organisms over the surface and irrigating as described by Jayne Belknap in the publication, "Cryptobiotic Soil Crusts: Basis for Arid Land Restoration (Utah)," Restoration and Management Notes 12:1 Summer 1994. The Permittee's commitment to advancing this research is commendable.

Appendix 5-8 Reclamation and Enhancement Plan describes the means of soil stabilization including: gouging of the site to encourage a roughened appearance as shown in Figure 1; and placement of large rocks and boulders and vegetation; application of 500 lbs/acre wood fiber mulch and 100 lbs/acre of tackifier with seeding and then a second over spray of 1500 – 2000 lbs/acre of wood fiber mulch with 100lb/ac of tackifier and 200 lb/ac of 16-16-8 fertilizer. Appendix 5-8 further describes the use of wood fiber mulch over topsoil.

In accordance with R645-301-244.300, rills and gullies that contribute to a violation of water quality or that disrupt the post-mining land use will be filled, regraded or stabilized.

Findings:

The information in the PAP meets the requirements of the Regulations with regard to stabilization of the soil surface and control of erosion and air pollution attendant to erosion.

RECOMMENDATIONS:

Approval is not recommended at this time. The deficiencies outlined in this memo were brought to Mr. Jay Marshall's attention on June 8, 2004.