

**CANYON FUEL COMPANY, LLC  
SKYLINE MINE  
C/007/005**

**WASTE ROCK PILE EXPANSION**

**MAY 2007**

File in:

Confidential

Shelf

Expandable

Refer to Record No 0023 Date 05/03/07

In C/007/005, 2007, Incoming

For additional information

**Scofield Waste Rock Site Expansion  
2007**

**INTRODUCTION**

The following is intended to serve as a guidance document addressing the regulatory requirements of expanding the waste rock pile at the Scofield, Utah, Waste Rock site. Without the proposed expansion, the current waste rock site is nearing capacity for stockpiling waste rock within the current disturbed area. The proposed expansion is within the permit area. The only modification to the permit is to expand the disturbed area as it exists within the permit area. Supporting information includes studies on vegetation, wildlife, soils, sedimentation and runoff calculations, slope stability analysis and cultural resources. Although the permit modification increases the disturbed area (approximately 5.13 acres), sections of the area are being contemporaneously reclaimed with the active disturbance likely remaining under approximately 3-acres. The expansion will be done incrementally, with topsoil removal and storage only being advanced as the pile expands.

This document provides a discussion of general engineering aspects, an operation plan, a reclamation plan, design criteria, and performance standards related to the waste rock pile expansion. The activities associated with the construction and reclamation of the refuse pile will be designed, located, constructed, maintained, and reclaimed in accordance with the operation and reclamation plans. Relevant information is located in either this document, or the currently approved M&RP. Attachments to this document include the following reports prepared by EarthFax Engineering, Inc. of Midvale, Utah: Waste Rock Pile Slope Stability Analysis, Skyline Mine – February 2007, and Analysis of Sedimentation Pond Capacity following Waste Rock Pile, April 2007; A soil survey conducted by Clement Drilling and Geophysical, Inc. – January 2007; EarthTouch, Inc. of Layton, Utah; A Cultural Resource Inventory for Expansion of Waste Rock and Drainage Control for the Skyline Mine, just Southeast of Scofield in U.P. Canyon, Carbon County, Utah – November 2006; and a vegetation survey conducted by Mt. Nebo Scientific, Inc. of Springville, Utah: Preliminary Vegetation Report for the Proposed Waste Rock Expansion Site for the Skyline Mine – February 2007. Followup vegetation and raptor surveys will be conducted and submitted after May 2007.

**R645-301-100**

See General Chapter 1 of currently approved M&RP. Also see Exhibit A at the end of Section 3.2 of currently approved M&RP for new Waste Rock Lease Agreement.

**R645-301-200 Soils**

**-210; N/A.** For undisturbed portions of the area, refer to Appendix Volume A-2, Volume 2 for the following: Soil Survey conducted by Clement Drilling & Geophysical, Inc. at the Waste Rock site, near Scofield, Utah.

**-222;** See Appendix Volume A-2, Volume 2 for the Clement Drilling & Geophysical, Inc., Soil Survey. The Waste Rock site and the surrounding area were evaluated using the United States Department of Agriculture (USDA), Natural Resources Conservation Services' (NRCS) WEB Soil Survey utility. Section 4.6.4.1 of the M&RP provides a narrative of the topsoil /

subsoil removal and placement plan. Suitable soil and subsoil, where encountered will be salvaged, and stockpiled within the disposal site.

-231; suitable topsoil will be separated, stored, marked with appropriate signage for protection, to be used during reclamation of the site. Topsoil pile locations are currently located on Map 3.2.8-2.

-232; Based on the Clements soil survey, approximately 24-inches of topsoil will be salvaged from the proposed Waste Rock expansion area. A more accurate depth will be determined during stripping and excavation of the topsoil. These volumes will be identified in the field as the abundant root material disappears and the amount of clay in the material increases. No topsoil stockpile currently exists at the site, so all suitable topsoil will be salvaged. Expansion will be incremental, with contemporaneous reclamation activities being conducted simultaneously. It is estimated that no more than approximately 3-acres will be without topsoil at one time.

-233; The site as a whole is at a deficit concerning adequate topsoil for reclamation. Any suitable topsoil should be considered. See the Clement Soil Survey located in Appendix Volume A-2, volume 2 for topsoil descriptions.

-234; salvaged material will be stockpiled in designated topsoil pile areas located on Map 3.2.8-2. The placement will be stable, protected from wind and water erosion through prompt establishment of vegetative cover. Sediment control measures such as silt fencing or straw bales will be implemented temporarily at the base of slope until vegetation is established.

- 240; see Section 4.6 of the currently approved M&RP for the Topsoil / Subsoil handling plan at reclamation.

### **R645-301-300 Biology**

No permit modifications necessary for the current amendment concerning vegetation and wildlife. See Sections 2.7 through 2.10 of currently approved M&RP.

- 321; see Section 2.7 and Appendix A-2 for existing Vegetation information on the Waste Rock Disposal site. Also see Preliminary Vegetation Report for the Proposed Waste Rock Expansion Site for the Skyline Mines by Mt. Nebo Scientific – 2006 (Appendix A-2, Volume 2). The report was intended to collect *preliminary* qualitative vegetation data and cite a suitable reference area hoping to expedite the review of additional qualitative and quantitative data to be collected as soon as possible in summer 2007. The Permittee hopes to be able to receive 'conditional approval' based on the commitment to collect the qualitative data in 2007.

- 322; see Sections 2.8 through 2.10 and Appendix A-2 for existing Wildlife information. No modifications were necessary to Section 2.8 (Aquatic Wildlife Resources) or Section 2.9 (Terrestrial Wildlife) of the M&RP, respectively. Mr. Leroy Meade of the Utah Division of Wildlife resources was provided information on the site on April 4, 2007. He then conducted a field survey of the area and reported on April 18, 2007, indicating there were no wildlife concerns other than DOGM may request a raptor survey for the area. A survey will be conducted in May 2007.

### **R645-301-400 Land Use and Air Quality**

**-410;** pre-mining or pre-permitted use of the site was assumed to be grazing and wildlife. When permitted the site was previously disturbed by mining activities. See Section 3.2.8 of currently approved M&RP for a detailed description of the site.

**-411;** see Appendix Volume A-3 for existing Cultural and Historic Resource information. For information specific to the proposed refuse pile expansion, see Appendix Volume A-3 for archeological information collected in 2006. The map included in the cultural report identifies a proposed sedimentation pond. This pond is no longer proposed to be built - the application was withdrawn in March 2007.

**-412;** at the request of the property owner, the site will be leveled off and reclaimed to native rangeland for subsequent use as a corral. See Sections 4.1, 4.6, and 4.7 of the currently approved M&RP for details.

**-413;** the site had been previously mined primarily by underground methods, but also surface disturbance and not reclaimed prior to the site being permitted. The site will be compared to those uses that the land previously supported. See Section 4.7 of the approved M&RP of details.

**-420;** no modification to permit necessary; See Section 2.6, Appendix Volume A-1 of the currently approved M&RP, and Air Quality permit DAQE-AN0092007-03 for details.

### **R645-301-500 Engineering**

**-512;** for Maps and Cross sections for the Scofield Waste Disposal site see Section 3.2 of currently approved M&RP for narrative of site, certified engineering commitments, and maps 3.2.8-4.

**-512.240;** all design maps have been certified by a licensed Professional Engineer (P.E.) Supporting calculations are located in Analysis of Sedimentation Pond Capacity Following Waste Rock Pile Expansion – April 2007 located in Volume 5, Section 15a of approved M&RP.

**-513.400;** the refuse pile meets the requirements of MSHA, 30 CFR 77.214 and 30 CFR 77.215. See Section 3.2.8 for the Waste Rock Disposal Operational Plan

**514;** commitments for inspections are located in Section 3.2 of currently approved M&RP.

**-514.120;** inspections of both the Refuse pile and Sedimentation pond are conducted quarterly. The Refuse Pile or Waste Rock pile is inspected quarterly by a qualified registered professional engineer. The Sedimentation ponds is inspected quarterly by a qualified professional specialist under the guidance of a qualified registered professional engineer and inspected and re-certified annually by said professional engineer. Also see Waste Rock Pile Slope Stability Analysis, Skyline Mine – February 2007 for additional support for the stability of the Refuse Pile.

**-514.140;** copies of each inspection report are retained on or near the mine site.

**-515.200;** if an examination or inspection discloses that a potential hazard exists, the person who examined the impoundment will promptly inform the Division of the finding and of the emergency procedure formulated for public protection and remedial action. The mayor of Scofield, Utah, or other available residents will be notified immediately of the status of the hazard, and an evacuation will be implemented if necessary.

**-520; Operation Plan;** maps that best illustrate the refuse pile expansion initiated in 2007 are 3.2.8-2 (Waste Rock Facilities and Drainage Control), 4.16.1-1B (Waste Rock Disposal Site Reclamation Plan) Narratives of the Sedimentation pond and Waste Rock site are also located in Sections 3.2.1, and 3.2.8, respectively. Supporting Engineering calculations are also included in Volume 5, Section 15a – Engineering Calculations, Analysis of Sedimentation Pond Capacity following Waste Rock Pile, April 2007, and Waste Rock Pile Slope Stability Analysis – Skyline Mine, February 2007.

**-521.124;** Plates 1.6-3, 3.2.8-1, 3.2.8-2, 3.2.8-4, 4.16.1-1B, 4.16.1.1C, and Exhibit A located at the end of Section 3.2 of the currently approved M&RP for the lease.

**-521.132;** see map 3.2.8-2 for illustration and Exhibit A located at the end of Section 3.2 of the currently approved M&RP for lease agreement containing legal description and right of entry.

**-521.163;** See chapter 4 of currently approved M&RP for bond modification.

**-521.169;** see appropriate maps for certification.

**-521.270;** Topsoil identification markers will be placed at the topsoil stockpiles located at the Waste Rock site.

#### **-528; Handling and Disposal of Coal, Overburden, Excess Spoil, and Coal Mine Waste**

**-528.100;** see Section 3.2.3 of currently approved M&RP for Coal Processing plan.

**-528.320;** see Section 3.2.8 of currently approved M&RP for narrative of Handling of Coal Mine Waste.

#### **-534. Roads**

**-534.100;** N/A – no changes to the road system are proposed with the Refuse pile expansion initiated in 2007.

**-534-120;** nonacid- or non-toxic forming substances will be used for road surfacing.

**-534.140;** the existing roads on the property will be retained at reclamation and will not be reclaimed, per landowner request.

**-534.150;** control of erosion, siltation, and dust control for air quality will be provided through a combination of vegetation, silt fences, and watering of roads or other current, prudent engineering practices.

#### **-536. Coal Mine Waste**

The operational plan for the placement of waste rock at the Scofield site has not been modified with the 2007 expansion. Expansion is accomplished through placing additional material to the top of the pile. The report titled, "Waste Rock Pile Slope Stability Analysis, Skyline Mine – February 2007" provides sound engineering support for the expansion of the pile.

**-536.100;** See Section 3.2.8, Waste Rock Operational Plan of the currently approved M&RP for details of the design criteria indicating the compaction, lifts not exceeding 2 feet in thickness, testing of the materials being placed, etc.

**-536.110;** The Waste Rock Slope Stability Analysis – February 2007 uses Bishop's Method of Slices to demonstrate all the slopes have a long-term static safety factors greater than 1.5.

**-536.120;** Appendix A of Waste Rock Slope Stability Analysis – February 2007 provides a geophysical analysis illustrating the stable condition of the existing pile and its foundation.

**-536.200;** See Section 3.2.8, Waste Rock Operational Plan of the currently approved M&RP for commitments of the material being placed in a controlled manner, maintain stability, not create a public hazard and prevent combustion.

#### **-540 Reclamation Plan**

**-542.100;** reclamation of the Sediment Pond at the Waste Rock site will not occur until after the site is full or mining ceases. See Sections 4.1.1, 4.2, 4.6, 4.7, and 4.12 of the currently approved M&RP.

**R645-301-542.320,** see Plates 4.16.1-1B and 4.16.1-1C of the M&RP illustrating locations of roads at reclamation. Note that the only difference between the two plates is the presence/absence of the pond. Both scenarios are shown in case the pond is relocated or the landowner determines they no longer want a pond.

**-542.400;** the property owner has requested a permanent pond remain on the site at reclamation. The Mine has committed to assisting the property owner in acquiring the proper permitting from the various regulatory agencies to allow the pond to remain for both livestock and wildlife uses. Two reclamation maps have been submitted; 1) where the proposed pond remains; and 2) where it has been completely reclaimed. The permittee commits to ensure any permanent structures remaining intact at reclamation meet the requirements of permanent structures.

#### **-552 Permanent Features**

**-552.200;** the property owner has requested a pond remain intact at reclamation. This is consistent with the post-mining land use of grazing and wildlife use.

**-553;** see Sections 3.2.8 (Waste Rock Disposal Plan), 4.4, 4.6.4.1, 4.7, and 4.16 of M&RP for details. Page 3-50 of the M&RP commits to placement of the "refuse in compacted layers not exceeding two feet in thickness, in combination of with the operational necessity of operating heavy vehicles on the fill, leading to a very stable fill". Also refer to Waste Rock Pile Slope Stability Analysis – February 2007 included in Volume 5, Section 15a of approved M&RP.

## **R645-301-700 Hydrology**

**-711.300;** methods and calculations utilized to achieve compliance with hydrologic design criteria are available in Volume 5, Section 1, Section 2, Section 14, Section 15, Section 15a, and Section 16 of the currently approved M&RP for the existing pond. No modifications to the drainage controls were necessary with the proposed expansion. The area of actual disturbance will remain relatively consistent at approximately 3 acres. As the pile is expanded into previously undisturbed areas, other portions of the pile are being contemporaneously reclaimed. Runoff curve numbers reflect these modifications. See Volume 5, Section 15a for specific reports specifically addressing the hydrologic design support for the Waste Rock Pile Expansion.

### **-731.100. Hydrologic-Balance Protection**

**-731.111;** Groundwater quality is protected by handling earth materials and runoff in a manner that minimizes acidic, toxic, and other harmful infiltration into the groundwater systems. Section 4.4.5 of the currently approved M&RP commits to sampling and analyzing the waste rock every 2000- tons. Section 4.6.4.1 commits to having a minimum of 48-inches of total non-toxic or acid forming materials over any unsatisfactory material.

**-731.121;** Surface-water quality will be protected by handling of earth materials , ground-water discharges and runoff in a manner that minimizes the formation of acidic or toxic drainage; prevents, to the extent possible using the best technology currently available, additional contributions of suspended solids to streamflow outside the permit area. The Analysis of Sedimentation Pond Capacity Following Waste Rock Pile Expansion – April 2007, demonstrates that the current pond has adequate capacity to control and treat runoff. Acidic and toxic drainage is handled by sample analysis and burying any acidic and/or toxic materials below 4-ft of cover.

**-731.200;** No modifications to the Water monitoring program are necessary with the proposed Waste Rock pile expansion.

**-731.300;** Handling of Acid- and Toxic-forming materials are already addressed in Section 4.4.5 and 4.6.4.1 of the currently approved M&RP with sampling and analyzing waste rock to ensure acid- or toxic- materials are buried under 4-ft of cover.

**-731.500;** Discharges from the site are covered under an existing UPDES permit. The Analysis of Sedimentation Pond Capacity Following Waste Rock Pile Expansion – April 2007, demonstrates the pond is adequately sized. In the last 20 years of operation, the pond has never discharged.

**-731.600;** No modifications to Stream Buffer Zones are necessary with the Waste Rock Pile expansion.

### **-732. Sediment Control Structures**

**-732.100;** Siltation structures are constructed and maintained to comply with the regulations. No modifications are necessary with the Waste Rock Pile expansion.

### **-732.200. Sediment Ponds**

Analysis of Sedimentation Pond Capacity Following Waste Rock Pile Expansion – April 2007, provides a demonstration that the current pond is adequately sized to control sediment and runoff from the proposed Waste Rock Pile Expansion.

### **-733. Impoundments**

**-733.110;** see Analysis of Sedimentation Pond Capacity following Waste Rock Pile, April 2007 located in Volume 5, Tab 15a of the currently approved M&RP for calculations demonstrating the current pond is adequately sized for the proposed waste rock pile expansion. No modifications to the pond that has been in place for 20+ years have been made. Plate 3.2.8-4 has been updated to reflect the current configuration of the pond.

**-733.222;** water quality of the water retained in the pond will be adequate for livestock and wildlife. Water that is discharged will meet effluent limitations based on the retention time built into the design.

**-733.223;** based on the performance of the current pond over the last 20 years, any available water in the pond has been used by livestock and wildlife. Unfortunately, minimal water normally reports to the pond.

### **-742. Sediment Control Measures**

**- 742.111;** Additional contributions of sediment to stream flow or to runoff outside the permit area is prevented, to the extent possible, through the use of silt fences, straw bales, and properly designed ditches and sedimentation pond.

**-742.112;** Effluent limitations are regulated through UPDES discharge point 003, which is the discharge of the sedimentation pond.

**-742.123;** Runoff flow reporting to disturbed ditches DD-16 and DD-17 were evaluated for erosive velocities in Analysis of Sedimentation Pond Capacity Following Waste Rock Pile Expansion, Skyline Mine – April 2007. See Volume 5, Section 15a.

### **-742.220 Sedimentation Ponds.**

**-742.221.31;** the pond is designed with adequate sediment storage. See Analysis of Sedimentation Pond Capacity Following Waste Rock Pile Expansion – April 2007.

**-742.221.32;** the pond is designed with adequate detention time. See Analysis of Sedimentation Pond Capacity Following Waste Rock Pile Expansion – April 2007.

**-742.221.33;** the pond is designed to contain or treat the 10-year, 24-hour precipitation event. See Analysis of Sedimentation Pond Capacity Following Waste Rock Pile Expansion – April 2007.

**-742.221.34;** the non-clogging dewatering device is adequately sized. See Volume 5 Section 15a of approved M&RP for Analysis of Sedimentation Pond Capacity Following Waste Rock Pile Expansion – April 2007.

**-742.221.35;** Short-circuiting will be minimized based on the designed freeboard above the designed precipitation event. See Volume 5 Section 15a of approved M&RP for Analysis of Sedimentation Pond Capacity Following Waste Rock Pile Expansion – April 2007.

**-742.221.36;** Sediment will be removed from the pond to maintain adequate volume by having sediment marker located at 100 percent sediment levels. The 100 percent level is the existing discharge pipe.

**-742.221.37;** Excessive settlement will be avoided with quarterly inspections.

**-742.223;** The pond is designed to safely discharge a 25-year, 6-hour precipitation event as demonstrated in Analysis of Sedimentation Pond Capacity Following Waste Rock Pile Expansion – April 2007

**-742.223.2;** the pond is earth-lined and designed to carry short-term infrequent flows at non-erosive velocities where sustained flows are not expected.

**-743.100;** the pond is below the size criteria of the Class B or C criteria for dams.

**-743.120;** the Sedimentation pond is designed, prepared, and certified as described under R645-301-512. The pond has adequate freeboard to resist overtopping by sudden increases in storage volume. See Analysis of Sedimentation Pond Capacity Following Waste Rock Pile Expansion – April 2007.

**-743.130;** the Sedimentation pond is designed to include a combination of both principal and emergency spillways. See Waste Rock Runoff and Sedimentation Impoundment Analysis Design, Skyline Mine – January 2007.

**-743.140;** the Sedimentation pond will be inspected on a quarterly basis by a qualified person and at a minimum, annually by a certified Professional Engineer.

#### **-744. Discharge Structures.**

**-744.100;** the peak outflow for the primary and emergency spillways for the 25-year, 6-hour precipitation event has been calculated to be 6.60cfs with a velocity of 1.3 fps. Flow will discharge into the native existing stream channel. The low flow and velocity of this outflow can be accommodated by the channel without modifications. See Analysis of Sedimentation Pond Capacity Following Waste Rock Pile Expansion – April 2007

#### **760. Reclamation**

**-763.100;** the sedimentation pond will be maintained and not be removed any sooner than two years following the last augmented seeding of the area unless authorized by the Division.

**-763.200;** the sedimentation pond may be left at reclamation as a permanent impoundment based on the request of the property owner. See Sections 3.2, 4.7, and 4.12 of M&RP for landowner request.

-764; the sedimentation pond may be left at reclamation as a permanent impoundment based on the request of the property owner. See Sections 3.2.4.7, and 4.12 of the currently approved M&RP for the landowner request.

**830. Determination of Bond Amount**

-830.140; the bond has been modified to include an adjustment based on the modification of increased size of the disturbed area. See Chapter 4 of M&RP – information included in current application.

Investigations as to potential cultural resources within rock disposal and the adjacent areas have been conducted. Results of these investigations are presented in Appendix A-3. Results of the cultural resource investigation were transmitted to the State of Utah Historical Preservation Office (SHPO) concurrently with a request for approval, which was granted on November 12, 1981 (also see Appendix A-3). Additional work was conducted in 2006 - expanding the area disturbed area to the southeast. The report detailing the investigation is included in Appendix A-3. No sites of significance were noted in the area proposed for disturbance.

Montgomery Archaeological Consultants investigated James Canyon to determine the potential cultural resources at the dewater drill location, associated access road, and pipeline. The investigation resulted in the documentation of three historical sites that consisted of two aspen art and a historical road. The sites are recommended as not eligible for NRHP inclusion.

Montgomery

recommended that the sites be considered "no historical properties affected" pursuant to Section 106, CFR 800. During construction and drilling, the sites will not be disturbed. Results of the cultural resource investigation are presented in Appendix A-3.

North Lease

Statements regarding cultural and historical resources found within the North Lease area are made within the 1995 Environmental Assessment completed by the USDA Forest Service, USDI Bureau of Land Management, and the USDI Office of Surface Mining Reclamation and Enforcement; within the 1990, 1991, 1995, 1996 and 2002 cultural resources reports, which provide additional historical

and density were not taken, nor requested, by federal and state officials.

- All surfaces on both U. S. Forest and private lands disturbed during explorational activities and mine development (e.g., drill holes, access roads, and service areas) were intensively evaluated for historic and prehistoric cultural resources.

No prehistoric or historic cultural resources of any significance were observed during the surveys. The remains of two historic structures were found outside the project boundary. Both have marginal resource value and, since peripheral to the zone of activity, are not endangered by the Skyline project. No cemeteries, National Trails or Wild and Scenic Rivers, public parks or National Register status properties exist on or adjacent to the project area. No surface mines, active or abandoned, exist on the project mining area. The surface facilities area of the old abandoned underground Eccles Mine has been completely encompassed by the Skyline Mines portal facilities. The waste rock disposal area is an abandoned contour mine.

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## HABITAT LOSS

In the unlikely event it is determined that mining-related subsidence causes material damage or a loss

Revised: 08-24-05

2-62

of riparian habitat, the Permittee commits to using the best technology currently available (BTCA) to mitigate the damage. The repair efforts will be coordinated and agreed upon by Mine, DOGM, and USFS personnel. Repairs related to disruption of a water supply are addressed in Section 2.5.3.

### 2.7.7 VEGETATION OF THE SCOFIELD WASTE ROCK SITE

The Scofield Waste Rock site was expanded in 2007 into areas (approximately 5.13 acres) that were previously undisturbed by mining activities. In the 1990s the northern and eastern portions of the area were disturbed with logging activities. Soils and Vegetation information that was collected in 1981-82 was updated in 2007 with information specific to the Refuse pile expansion. The 2007 information is grouped into two (2) separate reports, the first report summarizing the preliminary qualitative vegetation data with the second compiling the remaining qualitative and quantitative data. Quantitative data was not collected during the preliminary report due to the season of data collection (late Fall). Two separate reports were submitted to expedite the review process - anticipating 'conditional approval' could be granted for the project pending completion of the second report. The 2007 reports focused on baseline information for reclamation and identification of threatened and endangered species. No threatened or endangered species were identified. The 1981-82 information is located in Appendix Volume A-2, with the 2007 reports being located in Appendix Volume A-2, Volume 2, respectively.

Revised: 08-24-05/18/07

2-63

of riparian habitat, the Permittee commits to using the best technology currently available (BTCA) to mitigate the damage. The repair efforts will be coordinated and agreed upon by Mine, DOGM, and USFS personnel. Repairs related to disruption of a water supply are addressed in Section 2.5.3.

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In May 2007, a goshawk survey of the Scofield Waste Rock site and immediate area will be conducted by Terra Teck. It is anticipated no goshawks or nests will be detected during the survey within the proposed disturbed area. No other surveys are planned for the area.

#### 2.10.1 Conclusion

Raptor species, normally found in conifer forests, occur in small numbers on the Skyline Mine area. Nesting habitat for tree nesting species provides the only readily available habitat there. Bald eagles pass through the area and stop over in adjacent regions during that migration. They, however, move on as winter sets in. Peregrine falcons may also pass over the area in migration, but any number that would do so is certainly small. No nesting sites of either species are known nor suspected in the Skyline area. The nearest known sites are in excess of 20 miles from the Skyline area. The overall elevation of the mining region is high enough and the habitat such as to restrict the density and diversity of raptors. It is concluded that development of the skyline Mine area will not have an adverse effect on critical raptor species, and any species that may be affected are common enough that the impact will be minimal on the populations.

In May 2001, a goshawk survey of Burnout Canyon and adjacent areas was conducted by Dr. Clayton White. No goshawks were detected during the survey. The U. S. Forest Service used this information to determine that a goshawk survey of James Canyon would not be required.

In May 2007, a goshawk survey of the Scofield Waste Rock site and immediate area will be conducted by Terra Teck. It is anticipated no goshawks or nests will be detected during the survey within the proposed disturbed area. No other surveys are planned for the area.

#### 2.10.1 Conclusion

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stratigraphic interval had preferred orientations, and tend to be stacked in echelon or otherwise concentrated along trends of high sandstone percentage.

Using these results, relative proportions of the several lithologies can be extrapolated to the portal area, even through individual channels may not be correlated between boreholes. In the 200 feet of strata immediately overlying the Aberdeen Sandstone, paleochannels have a preferred east-west orientation in the portal area. Based on extrapolation along this trend, percentages of lithotypes have been estimated for the portal area. For the described 200-foot stratigraphic interval, and excluding coal seams, the major lithologies are: sandstone 40%, siltstone 30%, and claystone 30%.

These lithologies have been described in detail in Section 2.2 (Geology) and in Volume A-3. The percentages may vary considerably from percentages in many boreholes drilled by D&M in the portal area. However, on the average these percentages are more representative of the character of the non-coal strata than estimated for individual boreholes.

#### Scofield Waste Rock Site

A complete description of the vegetation and soil is available in Appendix Volume A-2 in the report, "Report of Vegetation and Soils, Proposed Waste Rock Disposal Site", prepared by Endangered Plan Studies, Inc., November, 1981. Drawing Number 2.11-2 on Page 2-120(b) shows the soil typing of the waste rock area. A second soil survey report conducted in 2006 by Clement Drilling & Geophysical, Inc.", (Appendix Volume A-2, Volume 2) uses the United States Department of Agriculture (USDA), Natural Resources Conservation Services' (NRCS) WEB Soil Survey (WSS) utility. This survey was conducted in areas previously undisturbed by mining activities where topsoil exists. In 2007, the proposed disturbance is to expand the Waste Rock pile up the hill. The disturbance may eventually cover approximately 5.13 acres should be area expand to proposed capacity. Expansion of the pile will be done incrementally, stripping only the topsoil and subsoil necessary for the estimated area necessary for approximately one (1) to two (2) years of waste rock placement. Suitable topsoil and subsoil will be separated, stored, marked with appropriate signage for protection, to be used during reclamation of the site (Map 3.2.8-2).

CHANGES TO

TEXT

Section 2.11

Page 2-120

~~Section 2.11~~

~~Page 2-120~~

Date 04/18/2007

stratigraphic interval had preferred orientations, and tend to be stacked in echelon or otherwise concentrated along trends of high sandstone percentage.

Using these results, relative proportions of the several lithologies can be extrapolated to the portal area, even through individual channels may not be correlated between boreholes. In the 200 feet of strata immediately overlying the Aberdeen Sandstone, paleochannels have a preferred east-west orientation in the portal area. Based on extrapolation along this trend, percentages of lithotypes have been estimated for the portal area. For the described 200-foot stratigraphic interval, and excluding coal seams, the major lithologies are: sandstone 40%, siltstone 30%, and claystone 30%.

These lithologies have been described in detail in Section 2.2 (Geology) and in Volume A-3. The percentages may vary considerably from percentages in many boreholes drilled by D&M in the portal area. However, on the average these percentages are more representative of the character of the non-coal strata than estimated for individual boreholes.

#### Scofield Waste Rock Site

A complete description of the vegetation and soil is available in Appendix Volume A-2 in the report, "Report of Vegetation and Soils, Proposed Waste Rock Disposal Site", prepared by Endangered Plan Studies, Inc., November, 1981. Drawing Number 2.11-2 on Page 2-120(b) shows the soil typing of the waste rock area. A second soil survey report conducted in 2006 by Clement Drilling & Geophysical, Inc.", (Appendix Volume A-2, Volume 2) uses the United States Department of Agriculture (USDA), Natural Resources Conservation Services' (NRCS) WEB Soil Survey (WSS) utility. This survey was conducted in areas previously undisturbed by mining activities where topsoil exists. In 2007, the proposed disturbance is to expand the Waste Rock pile up the hill. The disturbance may eventually cover approximately 5.13 acres should be area expand to proposed capacity. Expansion of the pile will be done incrementally, stripping only the topsoil and subsoil necessary for the estimated area necessary for approximately one (1) to two (2) years of waste rock placement. Suitable topsoil and subsoil will be separated, stored, marked with appropriate signage for protection, to be used during reclamation of the site (Map 3.2.8-2).

CHANGES TO

TEXT

Section 2.11

Page 2-120

Date 04/18/2007

2-120

TABLE 2.12.2-1

GRAZING POTENTIAL FOR THE AREA TO BE AFFECTED BY  
 MINING SURFACE OPERATIONS AND FACILITIES  
 (Does not include State Highway SR-264)

Surface Facilities Area	General Area Classification	Land Area (Acres)	Units (AU)	Grazing Potential		
				Animal Unit Month (AUM)	Animal	Animal
1. Portal Yard Area	Spruce-Fir	16.47	0.0	0.00		
	Aspen		7.93	114.0	3.80	
	Sagebrush			2.50	84.0	2.80
	Disturbed		8.50		0.0	0.00
	Riparian			<u>1.00</u>	<u>38.0</u>	<u>1.30</u>
Subtotal			36.40	236.0	7.90	
2. Conveyor Corridor	Aspen		3.20	32.0	1.50	
	Sagebrush		<u>5.77</u>	<u>151.0</u>	<u>5.00</u>	
Subtotal			8.97	183.0	6.50	
3. Railroad Loadout Area	Grass-Forb		10.32		126.0	4.20
	Spruce-Fir	3.50	0.0	0.0		
	Riparian			<u>.04</u>	<u>1.5</u>	<u>.05</u>
Subtotal			13.86	127.5	4.25	
4. Waste Rock Disposal Area	Disturbed		<del>7.68</del> <u>12.81</u>	<u>0.0</u>	<u>0.00</u>	
Subtotal			<del>7.68</del> <u>12.81</u>	0.0	0.00	
5. Water Tank and Well Pads South Fork Breakout	Aspen		.26	18.0	1.00	
	Spruce-Fir		<u>.96</u>	<u>0.0</u>	<u>0.00</u>	
Subtotal			<u>1.22</u>	<u>18.0</u>	<u>1.00</u>	
TOTAL			<del>68.13</del> <u>73.26</u>	564.5	19.65	

ADDITION TO		TEXT		
Table 2.12.2-1	Page 2-128	Section 2.12	Page 2-128	Date 08/09/93

State and Federal laws require protection of certain cultural resources. The mining operation is considered compatible with the requirements of all agencies in this area, since to date, there are no known archaeological or paleontological sites within the proposed disturbed areas. Section 2.1.1 and Appendix Volume A-3 contain additional discussion and documentation on these cultural resources.

#### **BUILDINGS, PUBLIC ROADS, AND OTHER MAN-MADE FACILITIES**

There are few man-made features located within the Skyline Mine permit area. One abandoned gas well is located within the permit area in Eccles Canyon. The only building located within the permit area is a small structure associated with Gas Well No.8. A natural gas pipeline traverses the permit area and an associated gas tank is located east of the southeastern boundary of the lease area. The location of public roads, including SR-264, within and adjacent to the lease area are illustrated in Map 2.12.1-1. A USGS gauging station was located near the mouth of Eccles Canyon but was removed during the summer of 1985. (See also the reclamation discussion in Part 4.)

#### **CEMETERIES, NATIONAL TRAILS AND WILD RIVERS**

There are no cemeteries, national trails, or wild rivers located within or adjacent to the Skyline Mine lease and permit areas. The Mine's rock disposal site is adjacent to the Scofield, Utah cemetery, but currently there are no plans to disturb any areas immediately adjacent to the cemetery. The area of disturbance is located approximately 1/2-mile southeast of the existing cemetery.

#### **SCOFIELD WASTE ROCK SITE**

As mentioned in Section 2.12.2, the Waste Rock disposal area was previously disturbed by mining activities. However, the disposal area was expanded in 2007 into areas previously undisturbed by mining activities (the area was logged in the 1990s). A archeological study conducted in 2006 concluded the expansion will "have no effect on any known cultural resource sites (See Appendix A-3).

#### **LAND USE OF THE NORTH LEASE TRACT AREA**

The North Lease Tract Area is located north and adjacent to the Skyline Mine. Consequently, the landuse of the North Lease Tract Area is very similar to that described in Section 2.12 for the Skyline property.

The general area of the Skyline property lies within both Carbon and Emery counties, whereas, the North Lease Tract lies only within Carbon County.

TABLE 2.12.2-1

GRAZING POTENTIAL FOR THE AREA TO BE AFFECTED BY  
 MINING SURFACE OPERATIONS AND FACILITIES  
 (Does not include State Highway SR-264)

Surface Facilities Area	General Area Classification	Land Area (Acres)	Units (AU)	Grazing Potential Animal Unit Month (AUM)		
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	Aspen		7.93	114.0	3.80	
	Sagebrush			2.50	84.0	2.80
	Disturbed		8.50		0.0	0.00
	Riparian			<u>1.00</u>	<u>38.0</u>	<u>1.30</u>
Subtotal			36.40	236.0	7.90	
2. Conveyor Corridor	Aspen		3.20	32.0	1.50	
	Sagebrush		<u>5.77</u>	<u>151.0</u>	<u>5.00</u>	
Subtotal			8.97	183.0	6.50	
3. Railroad Loadout Area	Grass-Forb		10.32		126.0	4.20
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	Riparian			<u>.04</u>	<u>1.5</u>	<u>.05</u>
Subtotal			13.86	127.5	4.25	
4. Waste Rock Disposal Area	Disturbed		<u>12.81</u>	<u>0.0</u>	<u>0.00</u>	
Subtotal			<u>12.81</u>	0.0	0.00	
5. Water Tank and Well Pads South Fork Breakout	Aspen	.26		18.0	1.00	
	Spruce-Fir		<u>.96</u>	<u>0.0</u>	<u>0.00</u>	
Subtotal			<u>1.22</u>	<u>18.0</u>	<u>1.00</u>	
TOTAL			73.26	564.5	19.65	

ADDITION TO		TEXT		
Table 2.12.2-1	Page 2-128	Section 2.12	Page 2-128	Date 08/09/93

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#### **BUILDINGS, PUBLIC ROADS, AND OTHER MAN-MADE FACILITIES**

There are few man-made features located within the Skyline Mine permit area. One abandoned gas well is located within the permit area in Eccles Canyon. The only building located within the permit area is a small structure associated with Gas Well No.8. A natural gas pipeline traverses the permit area and an associated gas tank is located east of the southeastern boundary of the lease area. The location of public roads, including SR-264, within and adjacent to the lease area are illustrated in Map 2.12.1-1. A USGS gauging station was located near the mouth of Eccles Canyon but was removed during the summer of 1985. (See also the reclamation discussion in Part 4.)

#### **CEMETERIES, NATIONAL TRAILS AND WILD RIVERS**

There are no national trails, or wild rivers located within or adjacent to the Skyline Mine lease and permit areas. The Mine's rock disposal site is adjacent to the Scofield, Utah cemetery, but currently there are no plans to disturb any areas immediately adjacent to the cemetery. The area of disturbance is located approximately ½-mile southeast of the existing cemetery.

#### **SCOFIELD WASTE ROCK SITE**

As mentioned in Section 2.12.2, the Waste Rock disposal area was previously disturbed by mining activities. However, the disposal area was expanded in 2007 into areas previously undisturbed by mining activities (the area was logged in the 1990s). A archeological study conducted in 2006 concluded the expansion will "have no effect on any known cultural resource sites (See Appendix A-3).

#### **LAND USE OF THE NORTH LEASE TRACT AREA**

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The general area of the Skyline property lies within both Carbon and Emery counties, whereas, the North Lease Tract lies only within Carbon County.

## 3.2 COMPONENTS OF OPERATION

### 3.2.1 Ponds, Impoundments, and Dams

Three sedimentation ponds are included in the design of the Skyline Mine plan (Map 3.2.1-2b, 3.2.1-4, and 4.16.1-1B). Each retention pond was originally designed to provide adequate volume for sediment containment and also adequate volume for a theoretical 24-hour detention of run-off resultant of a 24-hour, 10-year rainstorm. The minesite sedimentation pond also contains additional volume to adequately treat mine water discharge. An engineer's certification to meet requirements of R645-301-743-110 and R645-301-514 ~~may be found in this section~~ **is located on all necessary designs and calculations for the ponds in the appropriate appendices and inspection reports.** A copy of this certification will be retained at the minesite. Quarterly inspections are also retained at the minesite. All Inspections will meet the requirements of R645-515-200. The location and design characteristics for each of these three ponds are described in the following:

The sediment level will be determined by cross sectioning the sediment level through B-B' on Map 3.2.1-2B and through A-A on Map 3.2.1-4 at no greater than 3 year intervals. During sediment clean out the pond may be drained of all water that will meet permit requirements. Water not meeting discharge requirements will be hauled to the other sediment pond. Mine water discharge during clean out of the mine site sediment pond shall by-pass the pond but shall still meet UPDES Discharge Permit requirements. Sediments will be disposed of as outlined in Section 4.16.

#### Mine Site Sediment Pond

A detention pond is located at the mine site adjacent to the crushing and truck loading station. It will detain surface run-off from the 33.79 acres disturbed mine site area plus 2.69 acres of undisturbed area, all of which reports to the sedimentation pond shown on Map 3.2.1-1. Precipitation from a 10-year, 24-hour rainstorm is expected to be 2.43 inches. After

The plan view of the load-out sediment pond and the pond cross section with detailed construction notes are shown in Map 3.2.1-4. Engineering calculations justifying the 4:1 total slope design are included in Volume 5. The stage volume curve is located in Section 13, Volume 5.

Decant structure and outlet pipe have been modified. The modification is shown on Map 3.2.1-4A.

#### Rock Disposal Sediment Pond

A sediment pond is located at the west end of the disposal site. ~~It will detain surface~~ that treats run-off from a water shed containing approximately 18.7 acres. Prior to an expansion in 2007, approximately 5.81 acres of disturbed area which reported to the sedimentation pond shown on Map 3.2.8-2. Although the disturbed area was expanded in 2007, the effective disturbed area (areas absent of contemporaneous reclamation) is consistently less than approximately three (3) acres. Precipitation from a 10 year, 24 hour rainstorm is expected to be ~~2.43~~ 1.99 inches (NOAA data in Analysis of Sedimentation Pond Capacity Following Waste Rock Expansion - April 2007, Volume 5, Section 15). with a total volume of ~~42,780~~ 35,036 ft<sup>3</sup> (See Table 1 of Analysis of Sedimentation Pond Capacity Following Waste Rock Expansion - April 2007, Section 15, Volume 5).

The combination primary and emergency spillway was designed using a ~~100~~ 10 year, 24 hour rainstorm event (~~Section 2, Vol. 5~~ NOAA data in Analysis of Sedimentation Pond Capacity Following Waste Rock Expansion - April 2007, Volume 5, Section 15). Two rainstorm events were modeled to determine which would have the largest peak runoff. They were the 25 year, 6 hour event with ~~1.85~~ 1.58 inches (~~Section 2, Vol. 5~~ NOAA data in Analysis of Sedimentation Pond Capacity Following Waste Rock Expansion - April 2007, Volume 5, Section 15) and the ~~100~~ 10 year, 24 hour event with ~~3.5~~ 1.99 inches (Section 2, Vol. 5). The peak runoff for the ~~100~~ 10 year, 24 hour and the 25 year, 6 hour rainstorm event were ~~8.62~~ 11.72 cfs and ~~5.41~~ 9.22 cfs, respectively.

The hydraulic capacity of the pond (calculated in Analysis of Sedimentation Pond Capacity Following Waste Rock Expansion - April 2007, Volume 5, Section 15a of M&RP) indicates the pond has the design capacity to contain the runoff from a 10-year, 24-hour precipitation event in

addition to approximately two (2) years of sediment yield. Furthermore, the combined primary and secondary spillways have been designed to convey the peak flow from the 25-year, 6-hour precipitation event that immediately follows the 10-year, 24-hour event. In this scenario, the discharge from the spillway was calculated to be 6.60 cfs at a velocity of 1.3 fps. The pond will also contain runoff from a 100-year, 6-hour precipitation event. This discharge is considered non-erosive, requiring no erosion protection to the embankment.

Volume 5, Section 14 provides calculations and designs for drainage control ditches for the Waste Rock site. Analysis of Sedimentation Pond Capacity Following Waste Rock Expansion - April 2007, (Volume 5, Section 15a of MRP) provides a demonstration that the disturbed area ditches are adequately sized to accommodate the pile expansion.

~~The original sediment pond at the NE corner of the site has temporarily been retained as a stock water pond. Only undisturbed drainage will enter the pond and any over-flow will exit via the overflow structure and enter the undisturbed drainage system. (See Sec. 14 Vol 5 for engineering calculations UD-3A). No surface drainage from the disturbed area will enter this pond. If this pond contains water on a regular basis it will be considered to be added as a water monitoring point.~~

Revised: 4/18/2007

3-18a

The required volume for **annual** sediment storage has been estimated ~~as 6,906 cubic feet. The combined volumes equal 42,780~~ **at 10,330 cubic feet (See Analysis of Sedimentation Pond Capacity Following Waste Rock Expansion - April 2007, Section 15, Volume 5 and Map 3.2.8-4). The 100 percent sediment 'clean-out' marker is the 8-inch decant pipe located in the pond. The original sediment pond on the upper level is not in these calculations. The livestock permittee The landowner representative** has requested ~~that this~~ **a** pond be left as a stock watering pond **at reclamation** (see Section 4.12).

### 3.2.2 Overburden and Topsoil Handling

A comprehensive discussion pertaining to this operational component of the mine plan is presented in Section 4.6 - TOPSOIL AND SUBSOIL HANDLING PLAN.

### 3.2.3 Coal Processing

Maps 3.2.3-1 and 3.2.3-1A are flow diagrams of the entire coal handling system. Designated capacities represent maximum design capabilities necessary to handle surges in the system. The average throughput, a substantially lower figure, is reflected in the annual production schedule.

The disposal site and access road are located upon land owned by the Estate of George Telonis. The legal right of access and use of the lands for the disposal of rock waste ~~has been~~ was originally granted to Coastal by the heirs of the Estate in a lease effective January 1, 1982 and expiring, unless renewed, on December 31, 2011 (See Exhibit A for copy of lease). The lease was modified in 2006 and amended in 2007 to include lands that were previously disturbed and located adjacent to the Scofield cemetery. The lands referred to in the lease include a ~~7.00~~ 0.97 acre right of way for the disposal site access road and a ~~17.83~~ 36.51 acre tract of land containing the rock waste disposal site. Although the lease was modified in 2007, the size of the disturbed area increased by approximately 5.13 acres to accommodate expansion of the pile. The legal description of the leased lands is:

A. Access Road

A right-of-way for the purpose of maintaining a road over a strip of land 100 feet wide over a portion of the East half of Section 5, Township 13 South, Range 7 East, Salt Lake Base and Meridian, in the County of Carbon, State of Utah, the center line of which is described as follows:

Commencing at the found stone of the Northeast corner of Section 5;

Thence South 582.76 feet and West 1228.10 feet to the point of beginning;

~~thence North 37° 25' 46" East 350.00 feet; thence North 79° 06' 42" East 100.00 feet; thence South 16° 40' 44" East 100.00 feet; thence South 40° 19' 44" East 500.00 feet; thence South 29° 23' 14" East 600.00 feet; thence South 14° 29' 44" East 100.00 feet; thence South 29° 11' 14" East 311.76 feet; thence South 84° 53' 29" East 100.00 feet; thence North 79° 55' 31" East 500.00 feet.~~

thence North 52°20'45" West 50.58 feet;

thence North 36°43'48" East 369.12 feet;

thence North 78°34'35" East 104.33 feet;

thence South 05°29'03" West 104.52 feet;

thence South 78°34'35" West 35.70 feet;

thence South 36°43'48" West 330.88 feet;

thence North 53°16'12" West 50.00 feet to point of beginning..

The side lines of said right-of-way to be prolonged or shortened to meet at angle point intersections.

Contains approximately 0.97 acres

CHANGE TO		TEXT		
Section 3.2	Page 3-46	Section 3.2.1	Page 3-46(a)	Date 04/18/07

3-46(a)

The bearings in the above description are based on the Utah State Plane Coordinate system, Central Zone.

B. Disposal Site

~~A tract of land located in Section 4, Township 13 South, Range 7 East, Salt Lake Base and meridian, Carbon County, Utah, being further described as follows:~~

~~———— Commencing as the Northwest corner of said section, thence South  $0^{\circ} 00' 04''$  East (basis of bearing taken from Utah State Plane Coordinate System) a distance of 1603.39 feet along the West line of said section to the Northerly Right-of-Way line of a road; thence South  $39^{\circ} 22' 14''$  East a distance of 337.81 feet along said North Right-of-Way line to the point of beginning; thence North  $79^{\circ} 18' 09''$  East a distance of 320.00 feet; thence South  $41^{\circ} 33' 38''$  West a distance of 1273.99 feet; thence North  $19^{\circ} 32'$  West a distance of 1060.85 feet to the Southerly Right-of-Way line of said road; thence the following 6 courses along said Right-of-Way line, South  $84^{\circ} 53' 29''$  East a distance of 127.64 feet; thence North  $79^{\circ} 55' 31''$  East a distance of 506.66 feet; thence North  $10^{\circ} 04' 29''$  West a distance of 100.00 feet; thence South  $79^{\circ} 55' 31''$  West a distance of 493.34 feet; thence North  $39^{\circ} 22' 14''$  West a distance of 13.76 feet to the point of beginning.~~

A tract of land located in Sections 4 and 5, Township 13 South, Range 7 East, Salt Lake Base and Meridian, Carbon County, Utah, and Section 32, Township 12 South, Range 7 East, Salt Lake Base and Meridian, Carbon, County, Utah, being further described as follows:

Commencing at the Northwest corner of said Section 4;

Thence South  $0^{\circ} 28' 36''$  East (basis of bearing taken from Utah State Plane Coordinate System), a distance of 1603.82 feet along the West line of said section to the Northerly right-of-way line of a road;

thence South  $39^{\circ} 54' 11''$  East a distance of 337.96 feet along said North right-of-way line to the point of beginning;

hence North  $79^{\circ} 23' 34''$  East a distance of 834.50 feet;

thence South 76°48'06" East a distance of 320.00 feet;  
thence South 07°02'16" East a distance of 224.51 feet;  
thence South 41°01'41" West a distance of 1413.36 feet;  
thence North 26°33'44" West a distance of 1855.35 feet;  
thence North 24°10'17" West a distance of 588.80 feet;  
thence North 05°40'59" East a distance of 78.98 feet;  
thence North 40°51'41" West a distance of 252.84 feet;  
thence North 40° 51' 41" West a distance of 252.84 feet;  
thence North 17° 12' 41" West a distance of 65.28 feet;  
thence North 05° 29' 03" East a distance of 263.95 feet;  
thence South 88° 43' 20" East a distance of 256.20 feet;  
thence North 00° 27' 51" East a distance of 98.03 feet;  
thence North 86° 08' 07" East a distance of 222.33 feet;  
thence South 07° 02' 02" West a distance of 190.58 feet;  
thence South 00° 35' 18" West a distance of 271.35 feet;  
thence South 60° 54' 14" West a distance of 233.31 feet;  
thence South 40°50'20" East a distance of 242.58 feet;  
thence South 29°55'11" East a distance of 611.32 feet;  
thence South 15°01'42" East a distance of 95.51 feet;  
thence South 39°54'11" East a distance of 654.24 feet to the point of beginning, containing approximately 36.51 acres.

The site and access roads are part of a larger area previously disturbed by surface and underground mining and never reclaimed. Coastal The Permittee believes that operations will not further de-

grade the environmental state of the area, but rather will, by way of back filling the abandoned strip pit and waste rock area, grading, seeding and other reclamation techniques, greatly improve a portion of the previously disturbed area.

CHANGE TO	TEXT
Section 3.2      Page 3-47	Section 3.2.1      Page 3-47(a)      Date 04/18/2007

3-47(a)

In 2007 the Disposal site was modified to allow expansion of the refuse pile further up the hill, expanding the disturbed area footprint. Reports have been prepared for Coastal the Permittee (presented in Appendix Volume A-1A-2, Volume 2) detailing the existing vegetation and soils of the area to be affected by disposal site expansion. In addition cultural, wildlife, runoff, and slope stability, analyses have been provided. The pre-mining land use of the disposal site area is assumed to have been for native rangeland. Since the previous mining activity left the area in very poor condition, the existing baseline information is of little use in establishing reclamation goals for determining the success of reclamation efforts within the original pit area. The studies conducted in the expansion area in 2006 and 2007 were impacted by timbering activities conducted in the 1990s. Portions of the surface to be affected have been used for grazing after abandonment of the strip pit and waste area, although the pre-existing conditions (lack of reclamation and underground coal fires) have greatly reduced the area's potential for grazing or for any other use.

No aquatic resource inventories have been prepared due to the intermittent ephemeral flows character of waterways in the study area. Water is present only for the very brief periods during and immediately following precipitation events and/or during spring runoff. The climate of the study area is similar to that described for the lower elevations of the Skyline permit area. No additional monitoring is proposed.

CHANGE TO		TEXT		
Section 3.2	Page 3-48	Section 3.2.1	Page 3-48	Date 04/18/07

the West by faulting and erosion. The above factors effectively sterilize any un-mined coal beneath or adjacent to the site.

The Permittee uses the disposal site to dispose of underground coal mine waste produced during mining operations which cannot be permanently stored underground due to either the lack of adequate storage room or the content of coal which has the potential for combustion. The volume of material which must be disposed of at a surface disposal site will be limited to a very small fraction of the total waste produced because of the large volume of potential underground waste storage areas which result from mining coal. The economics of loading, hauling, and disposing of waste at any point other than underground effectively mitigate against the extensive use of a surface rock waste storage site. Coal mine waste deposited at the site may also contain other materials such as concrete, roof bolts, metal and other non-combustible materials.

The roof and floor rock for the three mineable Skyline coal seams is estimated to be comprised of 60 percent sandstone, 30 percent shale, and 10 percent clay stone. The igneous dike rock varies in composition but is essentially comprised of 100 percent ferromagnesian minerals. The majority of dike rock which would require surface disposal appears very similar to basalt and is very durable being extremely resistant to weathering. The volumetric swell factor for the igneous and sedimentary rock is estimated to be 30 percent.

The Permittee estimates that approximately 49,840 tons or approximately 8,000 cubic yards (at 110 91 lb./cubic feet density) per year of waste will be disposed of at the site (Volume 5, section 16). However, this could fluctuate considerably due to changing mining conditions. The 2007 expansion added approximately 300,294 cubic yards of potential storage to the site.

3-49(a)

The waste disposal site is unique in that it is an abandoned strip pit and waste area. The configuration of the area and the requirements of 30 CFR:77.215(h) which requires that refuse be

disposed of in compacted layers not exceeding two feet in thickness, will, in combination with the operational necessity of operating heavy vehicles on the fill, lead to a very stable fill.

Limited hydrologic information is available for the quality and quantity of the ground water of the area ~~due to the existence of coal fires~~. One monitoring well has been developed down gradient from the site. ~~Coastal~~ **The Permittee** believes that the proper sealing of the waste containment area, as outlined in the Development and Operations Plan, will prevent the communication of any accidental ignitions of the rock/coal waste into the adjacent coal seams, thereby eliminating degradation of the ground water resources beyond the effects of the existing underground coal fires.

~~No~~ **Minimal** surface water information is ~~presented~~ **available** herein due to the ~~intermittent~~ **ephemeral nature of** surface water flows in the disposal site area. ~~Coastal~~ **The Permittee** redirected any surface runoff waters around the site into the original pre-strip mining drainage system in order to prevent contamination of the surface runoff by the disposal activities. ~~Surface runoff from the area above the highwall area is collected in a ditch at the base of the highwall and is directed into the undisturbed drainage system.~~ ~~Coastal~~ **The Permittee** ~~will~~ **directs** all runoff water from **both the undisturbed drainage above the site and** within the disturbed area to a sedimentation pond.

3-50

Revised:

**4/18/07**~~R05/02/94~~

Site Development

The development of the waste disposal site required upgrading the existing unpaved access road to the abandoned pit as well as the development work required to convert the abandoned strip pit and waste area into a disposal site.

at a considerable distance from the edge of the highwall.

2. The topography of the area above the highwal (see Map 3.2.8-3) is such that only a small area is actually tributary to the disposal pit.

3. The area above the highwal is a moderately well vegetated slope that supported a heavy stand of mixed Aspen and conifer trees prior to timbering in the 1990s.

Due to the slope of this area, the construction of a drainage ditch would destroy a considerable portion of this stand of timber and would create more of an erosion hazard than it would solve. Since a by-pass ditch is impractical, the original upper sedimentation pond in the abandoned pit will be used to treat any additional surface run-off that may flow off the highwall and the area above it. A ditch at the base of the highwall has been constructed to catch this surface runoff. This pond was removed in 1999, due to needed rock storage space and lack of water reporting to the pond.

The swale to redirect the drainage across the road above the site and into the undisturbed drainage channel was constructed of concrete. The swale where the water is redirected across the access road is also constructed of concrete and located so that water is directed into the original stream channel to the south of the road (Map no. 3.2.8-2).

The four feet of compacted non-combustible fill was placed along the floor and walls of the pit in order to isolate the coal seams and venting cracks or fissures.

3-54

Revised: 04/18/07

The material to isolate exposed coal and venting cracks or fissures along the walls was built up and compacted in lifts during normal waste disposal operations after an initial 4 foot high barrier is

~~The second location where coal is exposed is in the extreme east end of the abandoned pit in the highwall. This location will probably never require sealing since the pit will not reach the location upon attaining final fill configuration (Maps 4.16.1-1C). A small work area will be constructed at the lower end of the area. This area will be used to park equipment on, and will have no structures built on it (Map 3.2.8-2).~~

## Waste Rock Disposal Operational Plan

### A. Access Road

During operations, the access road will be maintained using a road grader and any other equipment which may be necessary to ensure compliance with the pertinent requirements. Drainage ditches and cross drains will be maintained to ensure proper functioning. The outfall of the cross drains are rip rapped to control erosion and sediment. Additional gravel will be selectively placed as required to ensure approximately four inches of road base gravel on the road. Map 3.2.8-1 shows the boundary and location of the access road. A guard rail has been installed along portions of the road as required by MSHA along with other MSHA requirements.

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3-55

Accidental spillage of coal mine waste during haulage from the minesite to the disposal site will be minimized by not overloading the haulage trucks. Accidental spills, if they occur, will be cleaned up by and transported to the disposal site within 24 hours after the accidental spill occurs.

waste will be removed from the permitted area without approval of the Division.

The pile was extended further up the hill, from the initial surface mining disturbance in 2007. The same operational plan remained in place with minimal changes. The out slopes of the pond remain the same. Engineering reports titled, "Waste Rock Pile Slope Stability Analysis - Skyline Mine, February 2007", and "Analysis of Sedimentation Pond Capacity following Waste Rock Pile Expansion - Skyline Mine, April 2007" are located in Volume 5, Sections 15 and 16, respectively. These reports demonstrate the current pile is adequately stable to expand the pile up the hill, and that the Sedimentation pond and existing disturbed drainage ditches are adequately designed to accommodate the expansion. Additional studies on soils, vegetation, archeology, and wildlife are addressed in the appropriate sections of the M&RP.

Site preparation for expansion will be conducted in the following manner. Expansion will be done incrementally, disturbing only enough additional area for approximately 1 to 2 years of anticipated Waste Rock placement. To accommodate 1-2 years of expansion, it is anticipated the disturbance will likely move up the hill in 20 to 30 foot increments. In the first stage, approximately 50 feet extending from existing disturbance the trees will be cut and cleared. Topsoil will then be removed from 20 to 30 feet horizontally up the hill. As the topsoil is removed, it will either be placed and used in contemporaneous reclamation or stored in a UDOGM-approved location identified on Plate 3.2.8-2. It is anticipated that through the combination of contemporaneous reclamation of the pile and the narrowing footprint of the pile, no more than approximately 3 acres will not be in a stage of reclamation at any time.

The compacted layers of fill will be sloped to direct any surface runoff to ditches on the edges of the pile. The ditches collect and direct any drainage from the disturbed disposal area into the sediment pond (Map 3.2.8-2A).

Shrubs that are along the north and west sides of the disposal area will be removed just prior to the time the area they occupy will be covered with waste rock.

The material will be placed in compacted two foot layers and sloped to the east on a 2:1 slope (Map

3.2.8-2). When an approximate overall twenty foot lift is reached, it, and each succeeding 20' lift, will be reclaimed as outlined in section 4.6.4.1.

On occasion, should economics warrant the process, the Waste Rock pile may be re-mined and screened (on site) with the screened product sold as high-ash coal. Sufficient waste rock will remain in the pile to establish Approximate Original Contours (AOC) at reclamation. If an area to be re-mined has had topsoil place in conjunction with contemporaneous reclamation, topsoil/subsoil will be stripped and stored in an approved location.

Revised 03/02/07 4/18/07

The spreading and compaction of the waste will be accomplished through the use of a dozer/loader and dump trucks. The dozer/loader will be used to spread and level the material and both the dozer/loader and the dump truck will be used to compact the material. Repeated, long-term operation of the equipment on each lift of material will ensure adequate compaction of the fill.

The Permittee cannot commit to the size of the dozer or the number of trucks to be used during the infrequent use of the pit. The Permittee will use its 10-ton capacity truck that may be supplemented by others which, in addition to the dozer, will be used as the need occurs.

There is approximately 1,444 yd<sup>3</sup> of topsoil which was salvaged by the 1992 AML project which ~~will be saved for final~~ has been used in contemporaneous reclamation (Map 3.2.8-2). The old waste site contains approximately 13,470 yd<sup>3</sup> of growth cover material. This material will be salvaged as each twenty foot lift is reclaimed. All other necessary topsoil necessary for reclamation will be imported to the site unless suitable material is located on site.

In 2007 the original pit was near capacity and the permit was modified to allow expansion of the Waste Rock pile further up the hill. Studies to insure safe expansion of the pile included wildlife, vegetation, soils, and slope stability analysis. All studies are located in the appropriate appendices. The rock waste disposal site will be inspected at least quarterly during active disposal operations.

All ditches, ponds and swales have been designed and certified. These calculations and descriptions are found in the engineering calculations in Volume 5.

Revised: 04/18/07

3-56(a)

## 3.2 COMPONENTS OF OPERATION

### 3.2.1 Ponds, Impoundments, and Dams

Three sedimentation ponds are included in the design of the Skyline Mine plan (Map 3.2.1-2b, 3.2.1-4, and 4.16.1-1B). Each retention pond was originally designed to provide adequate volume for sediment containment and also adequate volume for a theoretical 24-hour detention of run-off resultant of a 24-hour, 10-year rainstorm. The minesite sedimentation pond also contains additional volume to adequately treat mine water discharge. An engineer's certification to meet requirements of R645-301-743-110 and R645-301-514 is located on all necessary designs and calculations for the ponds in the appropriate appendices and inspection reports. A copy of this certification will be retained at the minesite. Quarterly inspections are also retained at the minesite. All inspections will meet the requirements of R645-515-200. The location and design characteristics for each of these three ponds are described in the following:

The sediment level will be determined by cross sectioning the sediment level through B-B' on Map 3.2.1-2B and through A-A on Map 3.2.1-4 at no greater than 3 year intervals. During sediment clean out the pond may be drained of all water that will meet permit requirements. Water not meeting discharge requirements will be hauled to the other sediment pond. Mine water discharge during clean out of the mine site sediment pond shall by-pass the pond but shall still meet UPDES Discharge Permit requirements. Sediments will be disposed of as outlined in Section 4.16.

#### Mine Site Sediment Pond

A detention pond is located at the mine site adjacent to the crushing and truck loading station. It will detain surface run-off from the 33.79 acres disturbed mine site area plus 2.69 acres of undisturbed area, all of which reports to the sedimentation pond shown on Map 3.2.1-1. Precipitation from a 10-year, 24-hour rainstorm is expected to be 2.43 inches. After

The plan view of the load-out sediment pond and the pond cross section with detailed construction notes are shown in Map 3.2.1-4. Engineering calculations justifying the 4:1 total slope design are included in Volume 5. The stage volume curve is located in Section 13, Volume 5.

Decant structure and outlet pipe have been modified. The modification is shown on Map 3.2.1-4A.

#### Rock Disposal Sediment Pond

A sediment pond is located at the west end of the disposal site that treats run-off from a water shed containing approximately 18.7 acres. Prior to an expansion in 2007, approximately 5.81 acres of disturbed area reported to the sedimentation pond shown on Map 3.2.8-2. Although the disturbed area was expanded in 2007, the effective disturbed area (areas absent of contemporaneous reclamation) is consistently less than approximately three (3) acres. Precipitation from a 10 year, 24 hour rainstorm is expected to be 1.99 inches (NOAA data in Analysis of Sedimentation Pond Capacity Following Waste Rock Expansion - April 2007, Volume 5, Section 15). with a total volume of 35,036 ft<sup>3</sup> (See Table 1 of Analysis of Sedimentation Pond Capacity Following Waste Rock Expansion - April 2007, Section 15a, Volume 5).

The combination primary and emergency spillway was designed using a 10 year, 24 hour rainstorm event (NOAA data in Analysis of Sedimentation Pond Capacity Following Waste Rock Expansion - April 2007, Volume 5, Section 15a). Two rainstorm events were modeled to determine which would have the largest peak runoff. They were the 25 year, 6 hour event with 1.58 inches NOAA data in Analysis of Sedimentation Pond Capacity Following Waste Rock Expansion - April 2007, Volume 5, Section 15a) and the 10 year, 24 hour event with 1.99 inches. The peak runoff for the 10 year, 24 hour and the 25 year, 6 hour rainstorm event were 11.72 cfs and 9.22 cfs, respectively.

The hydraulic capacity of the pond (calculated in Analysis of Sedimentation Pond Capacity Following Waste Rock Expansion - April 2007, Volume 5, Section 15a of M&RP) indicates the pond has the design capacity to contain the runoff from a 10-year, 24-hour precipitation event in addition to approximately two (2) years of sediment yield. Furthermore, the combined primary and

secondary spillways have been designed to convey the peak flow from the 25-year, 6-hour precipitation event that immediately follows the 10-year, 24-hour event. In this scenario, the discharge from the spillway was calculated to be 6.60 cfs at a velocity of 1.3 fps. The pond will also contain runoff from a 100-year, 6-hour precipitation event. This discharge is considered non-erosive, requiring no erosion protection to the embankment.

Volume 5, Section 14 provides calculations and designs for drainage control ditches for the Waste Rock site. Analysis of Sedimentation Pond Capacity Following Waste Rock Expansion - April 2007, (Volume 5, Section 15a of MRP) provides a demonstration that the disturbed area ditches are adequately sized to accommodate the pile expansion.

The required volume for annual sediment storage has been estimated-at 10,330 cubic feet (See Analysis of Sedimentation Pond Capacity Following Waste Rock Expansion - April 2007, Section 15, Volume 5a and Map 3.2.8-4). The 100 percent sediment 'clean-out' marker is the 8-inch decant pipe located in the pond. The landowner representative has requested a pond be left as a stock watering pond at reclamation (see Section 4.12).

### 3.2.2 Overburden and Topsoil Handling

A comprehensive discussion pertaining to this operational component of the mine plan is presented in Section 4.6 - TOPSOIL AND SUBSOIL HANDLING PLAN.

### 3.2.3 Coal Processing

Maps 3.2.3-1 and 3.2.3-1A are flow diagrams of the entire coal handling system. Designated capacities represent maximum design capabilities necessary to handle surges in the system. The average throughput, a substantially lower figure, is reflected in the annual production schedule.

The disposal site and access road are located upon land owned by the Estate of George Telonis. The legal right of access and use of the lands for the disposal of rock waste was originally granted to Coastal by the heirs of the Estate in a lease effective January 1, 1982 and expiring, unless renewed, on December 31, 2011 (See Exhibit A for copy of lease). The lease was modified in 2006 and amended in 2007 to include lands that were previously disturbed and located adjacent to the Scofield cemetery. The lands referred to in the lease include a 0.97 acre right of way for the disposal site access road and a 36.51 acre tract of land containing the rock waste disposal site. Although the lease was modified in 2007, the size of the disturbed area increased by approximately 5.13 acres to accommodate expansion of the pile. The legal description of the leased lands is:

A. Access Road

A right-of-way for the purpose of maintaining a road over a strip of land 100 feet wide over a portion of the East half of Section 5, Township 13 South, Range 7 East, Salt Lake Base and Meridian, in the County of Carbon, State of Utah, the center line of which is described as follows:

Revised: 4/18/07

3-46

Commencing at the found stone of the Northeast corner of Section 5;  
Thence South 582.76 feet and West 1228.10 feet to the point of beginning;  
thence North 52°20'45" West 50.58 feet;  
thence North 36°43'48" East 369.12 feet;  
thence North 78°34'35" East 104.33 feet;  
thence South 05°29'03" West 104.52 feet;  
thence South 78°34'35" West 35.70 feet;  
thence South 36°43'48" West 330.88 feet;  
thence North 53°16'12" West 50.00 feet to point of beginning..

The side lines of said right-of-way to be prolonged or shortened to meet at angle point intersections.

Contains approximately 0.97 acres

CHANGE TO	TEXT
Section 3.2      Page 3-46	Section 3.2.1      Page 3-46(a)      Date 04/18/07

3-46(a)

The bearings in the above description are based on the Utah State Plane Coordinate system, Central Zone.

B. Disposal Site

A tract of land located in Sections 4 and 5, Township 13 South, Range 7 East, Salt Lake Base and Meridian, Carbon County, Utah, and Section 32, Township 12 South, Range 7 East, Salt Lake Base and Meridian, Carbon, County, Utah, being further described as follows:

Commencing at the Northwest corner of said Section 4;

Thence South  $0^{\circ} 28' 36''$  East (basis of bearing taken from Utah State Plane Coordinate System), a distance of 1603.82 feet along the West line of said section to the Northerly right-of-way line of a road;

thence South  $39^{\circ} 54' 11''$  East a distance of 337.96 feet along said North right-of-way line to the point of beginning;

hence North  $79^{\circ} 23' 34''$  East a distance of 834.50 feet;

thence South  $76^{\circ} 48' 06''$  East a distance of 320.00 feet;

thence South  $07^{\circ} 02' 16''$  East a distance of 224.51 feet;

thence South  $41^{\circ} 01' 41''$  West a distance of 1413.36 feet;

thence North  $26^{\circ} 33' 44''$  West a distance of 1855.35 feet;

thence North  $24^{\circ} 10' 17''$  West a distance of 588.80 feet;

thence North  $05^{\circ} 40' 59''$  East a distance of 78.98 feet;

thence North  $40^{\circ} 51' 41''$  West a distance of 252.84 feet;

thence North  $40^{\circ} 51' 41''$  West a distance of 252.84 feet;

thence North  $17^{\circ} 12' 41''$  West a distance of 65.28 feet;

thence North  $05^{\circ} 29' 03''$  East a distance of 263.95 feet;

thence South  $88^{\circ} 43' 20''$  East a distance of 256.20 feet;

thence North  $00^{\circ} 27' 51''$  East a distance of 98.03 feet;

thence North  $86^{\circ} 08' 07''$  East a distance of 222.33 feet;

thence South  $07^{\circ} 02' 02''$  West a distance of 190.58 feet;

thence South  $00^{\circ} 35' 18''$  West a distance of 271.35 feet;

thence South 60° 54' 14" West a distance of 233.31 feet;  
thence South 40°50'20" East a distance of 242.58 feet;  
thence South 29°55'11" East a distance of 611.32 feet;  
thence South 15°01'42" East a distance of 95.51 feet;  
thence South 39°54'11" East a distance of 654.24 feet to the point of beginning, containing approximately 36.51 acres.

The site and access roads are part of a larger area previously disturbed by surface and underground mining and never reclaimed. The Permittee believes that operations will not further de-grade the environmental state of the area, but rather will, by way of back filling the abandoned strip pit and waste rock area, grading, seeding and other reclamation techniques, greatly improve a portion of the previously disturbed area.

CHANGE TO	TEXT
Section 3.2      Page 3-47	Section 3.2.1      Page 3-47(a)      Date 04/18/2007

3-47(a)

In 2007 the Disposal site was modified to allow expansion of the refuse pile further up the hill, expanding the disturbed area footprint. Reports have been prepared for the Permittee (presented in Appendix Volume A-2, Volume 2) detailing the existing vegetation and soils of the area to be affected by disposal site expansion. In addition cultural, wildlife, runoff, and slope stability, analyses have been provided. The pre-mining land use of the disposal site area is assumed to have been for native rangeland. Since the previous mining activity left the area in very poor condition, the existing baseline information is of little use in establishing reclamation goals for determining the success of reclamation efforts within the original pit area. The studies conducted in the expansion area in 2006 and 2007 were impacted by timbering activities conducted in the 1990s. Portions of the surface to be affected have been used for grazing after abandonment of the strip pit and waste area, although the pre-existing conditions (lack of reclamation and underground coal fires) have greatly reduced the area's potential for grazing or for any other use.

No aquatic resource inventories have been prepared due to the ephemeral character of waterways in the study area. Water is present only for the very brief periods during and immediately following precipitation events and/or during spring runoff. The climate of the study area is similar to that described for the lower elevations of the Skyline permit area. No additional monitoring is proposed.

CHANGE TO		TEXT		
Section 3.2	Page 3-48	Section 3.2.1	Page 3-48	Date 04/18/07

## Description of Site

The general location of the waste disposal site is shown on the USGS 7-1/2 minute Scofield quadrangle map (Map 4-16-1A). The land affected by the disposal of rock waste is located in the SW 1/4 of the NW 1/4 of Section 4, Township 13 South, Range 7 East, Carbon County, Utah. The Estate of George Telonis owns the surface of the lands to be affected and the Western Reserve Coal Company owns the minerals in the subject lands and adjacent areas. A copy of the Telonis lease agreement is appended to this Section as Exhibit A. Mining in the coal seams beneath and adjacent to the abandoned strip pit is extremely unlikely due to variable seam thickness, seam pinch outs, and coal fires in one of the abandoned underground mines adjacent to the site. In

addition, the coal seams are terminated to the East by large displacement faulting and terminated to the West by faulting and erosion. The above factors effectively sterilize any un-mined coal beneath or adjacent to the site.

The Permittee uses the disposal site to dispose of underground coal mine waste produced during mining operations which cannot be permanently stored underground due to either the lack of adequate storage room or the content of coal which has the potential for combustion. The volume of material which must be disposed of at a surface disposal site will be limited to a very small fraction of the total waste produced because of the large volume of potential underground waste storage areas which result from mining coal. The economics of loading, hauling, and disposing of waste at any point other than underground effectively mitigate against the extensive use of a surface rock waste storage site. Coal mine waste deposited at the site may also contain other materials such as concrete, roof bolts, metal and other non-combustible materials.

The roof and floor rock for the three mineable Skyline coal seams is estimated to be comprised of 60 percent sandstone, 30 percent shale, and 10 percent clay stone. The igneous dike rock varies in composition but is essentially comprised of 100 percent ferromagnesian minerals. The majority of dike rock which would require surface disposal appears very similar to basalt and is very durable being extremely resistant to weathering. The volumetric swell factor for the igneous and sedimentary rock is estimated to be 30 percent.

The Permittee estimates that approximately 9,840 tons or approximately 8,000 cubic yards (at 91 lb./cubic feet density) per year of waste will be disposed of at the site (Volume 5, section 16). However, this could fluctuate considerably due to changing mining conditions. The 2007 expansion added approximately 300,294 cubic yards of potential storage to the site.

The waste disposal site is unique in that it is an abandoned strip pit and waste area. The configuration of the area and the requirements of 30 CFR:77.215(h) which requires that refuse be disposed of in compacted layers not exceeding two feet in thickness, will, in combination with the operational necessity of operating heavy vehicles on the fill, lead to a very stable fill.

Limited hydrologic information is available for the quality and quantity of the ground water of the area. One monitoring well has been developed down gradient from the site. The Permittee believes that the proper sealing of the waste containment area, as outlined in the Development and Operations Plan, will prevent the communication of any accidental ignitions of the rock/coal waste into the adjacent coal seams, thereby eliminating degradation of the ground water resources beyond the effects of the existing underground coal fires.

Minimal surface water information is available herein due to the ephemeral nature of surface water flows in the disposal site area. The Permittee redirected any surface runoff waters around the site into the original pre-strip mining drainage system in order to prevent contamination of the surface runoff by the disposal activities. The Permittee directs all runoff water from both the undisturbed drainage above the site and within the disturbed area to a sedimentation pond.

3. The area above the highwall is a moderately vegetated slope that supported a heavy stand of mixed Aspen and conifer trees prior to timbering in the 1990s.

Due to the slope of this area, the construction of a drainage ditch would destroy a considerable portion of this stand of timber and would create more of an erosion hazard than it would solve. Since a by-pass ditch is impractical, the original upper sedimentation pond in the abandoned pit will be used to treat any additional surface run-off that may flow off the highwall and the area above it. A ditch at the base of the highwall has been constructed to catch this surface runoff. This pond was removed in 1999, due to needed rock storage space and lack of water reporting to the pond.

The swale to redirect the drainage across the road above the site and into the undisturbed drainage channel was constructed of concrete. The swale where the water is redirected across the access road is also constructed of concrete and located so that water is directed into the original stream channel to the south of the road (Map no. 3.2.8-2).

The four feet of compacted non-combustible fill was placed along the floor and walls of the pit in order to isolate the coal seams and venting cracks or fissures.

barrier was built-up of incombustible material and was obtained from the slope detritus along the highwall. The material was dumped alongside and on top of the coal and compacted to form the barrier between the exposed coal and material being dumped.

## Waste Rock Disposal Operational Plan

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Revised 4/18/2007

3-55

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#### B. Disposal Site

The underground development waste rock sediment pond sediments and excess fill material will be emplaced and compacted in layers not exceeding two feet in thickness. The permittee is not responsible for the already existing coal fires in the area. However, they will extinguish any fires which may occur in underground development waste material that they deposit at the site. Only employees who have been trained and authorized by the operator will be used to extinguish these potential fires. These employees will follow a plan approved by MSHA and the Division. No burning coal or burned coal mine waste will be removed from the permitted area without approval of the Division.

The pile was extended further up the hill, from the initial surface mining disturbance in 2007. The same operational plan remained in place with minimal changes. The out slopes of the pond remain the same. Engineering reports titled, "Waste Rock Pile Slope Stability Analysis - Skyline Mine, February 2007", and "Analysis of Sedimentation Pond Capacity following Waste Rock Pile Expansion - Skyline Mine, April 2007" are located in Volume 5, Sections 15 and 16, respectively. These reports demonstrate the current pile is adequately stable to expand the pile up the hill, and that the Sedimentation pond and existing disturbed drainage ditches are adequately designed to accommodate the expansion. Additional studies on soils, vegetation, archeology, and wildlife are addressed in the appropriate sections of the M&RP.

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Revised: 04/18/07

3-56(a)

**SHORT FORM MEMORANDUM OF  
AMENDED LEASE AND EASEMENT AGREEMENT**

This Short Form Memorandum of Amended Lease and Easement Agreement ("Short Form"), made and entered into as of March 1, 2007, by and between Fotini Telonis, Angelo G. Telonis, Thomas G. Telonis and John G. Telonis, whose address is c/o 190 North Carbon Avenue, Price, Utah 84501 ("Lessor") and Ark Land Company, a Delaware corporation, whose address is One CityPlace Drive, Suite 300, St. Louis, Missouri 83141 ("Lessee").

Recitals

A. The parties have heretofore entered into that certain Lease and Easement dated effective August 1, 2006 ("Lease Agreement"). Capitalized terms used herein and not otherwise defined shall have the meanings assigned to them in the Lease Agreement. A Short form Memorandum of Lease and Easement Agreement was filed for recording on August 28, 2006 in the office of the Carbon County Recorder, Carbon County, Utah, and recorded in Book 627 at page 180.

B. The parties have entered into an Amendment to Lease and Easement dated as of March 1, 2007 ("Lease Amendment"), amending the Lease Agreement in certain respects, including, without limitation, revising the description of the Premises.

C. The parties desire to enter into this Short Form for purposes of placing of record a notice of the Lease Agreement as amended by the Lease Amendment.

Short Form

NOW, THEREFORE, for and in consideration of the covenants of the Lease Agreement, as amended by the Lease Amendment, and other good and valuable consideration, the receipt and adequacy of which are hereby acknowledged, the parties agree as follows:

1. Grant.

(a) Lessor has leased to Lessee and hereby makes a confirmatory lease to Lessee of, the lands situated in Carbon County, Utah, more fully described on **Exhibit 1 - Amended** attached hereto and by this reference made a part hereof ("Premises") for the purposes set forth herein.

(b) Lessor has granted to Lessee and hereby makes a confirmatory grant to Lessee of, a right of way and easement over and across lands owned by Lessor and more particularly described on **Exhibit 2** attached hereto ("Access Lands") for purposes of ingress and egress to and from the Premises. Lessee shall have the right to construct, maintain and use access roads on the Access Lands as are necessary and reasonable to travel to and from the Premises for all purposes related granted under the Lease Agreement.

(c) Subject to Lessor's reservations set forth in the Lease Agreement, Lessee shall have the right to use the Premises for the following purposes:

(i) Construction and operation of a coal waste-rock site to be used in connection with the Skyline Mine for the disposal of waste rock as permitted by the Utah Division of Oil, Gas and Mining;

(ii) Operation of a sedimentation pond to be used in conjunction with the coal waste-rock site; and

(iii) Construction and use of an access road "turn around" to be used in conjunction with the coal waste-rock site.

2. Term. The term of the Lease Agreement shall commence on August 1, 2006 and shall remain in full force and effect for a term of fifteen (15) Lease Years ("Term") (each twelve (12) month period beginning on the Effective Date is referred to herein as a "Lease Year").

3. Miscellaneous.

(a) All notices provided for herein shall be given to the parties at the following address:

If to LESSOR:

c/o Nick Sampinos  
190 North Carbon Avenue  
Price, Utah 84501

If to LESSEE:

Ark Land Company  
Attn: President  
One CityPlace Drive, Suite 300  
St. Louis, MO 63141  
Telephone: 800-238-7398  
Fax: (314) 994-2940

With a copy to:

Skyline Mine  
Attn: Mine Manager  
Telephone: (435) 448-2619  
Fax: (435) 448-2632

or at such other address or number as shall be designated by either party in a notice to the other party given in accordance with this section. Except as otherwise provided in the Lease Agreement, all such communications shall be deemed to have been duly given, (a) in the case of a notice sent by regular mail, on the date actually received by the addressee, (b) in the case of a notice sent by registered or certified mail, on the date receipted for (or refused) on the return receipt, (c) in the case of a notice delivered by hand, when personally delivered, (d) in the case of a notice sent by facsimile or electronic transmission, upon transmission subject to telephone

confirmation of receipt, and (e) in the case of a notice sent by overnight mail or overnight courier service, the date delivered at the designated address, in each case given or addressed as aforesaid.

(b) The Lease Agreement as amended by the Lease Amendment contains terms and conditions that are not set forth in this Short Form but which nevertheless are by reference made a part hereof. If there is a conflict between the terms of this Short Form and the terms of the Lease Agreement, as amended, the terms of the Lease Agreement, as amended, shall control in all respects. Lessor and Lessee intend that the terms of the Lease Agreement, as amended, remain separate and distinct from and not merge into the terms of this Short Form. Requests for information regarding the Lease Agreement should be made to the parties at the addresses set forth above.

(c) This Short Form may be executed in any number of counterparts, and each counterpart hereof shall be deemed to be an original instrument, but all such counterparts shall constitute but one original.

*[Remainder of Page Intentionally Left Blank]*

IN WITNESS WHEREOF, the parties have hereunto set their hands the day and year first above written.

**LESSOR**

Fotini Telonis, Angelo G. Telonis, Thomas G. Telonis and John G. Telonis

By: *Neil Sampson*  
Its: *Attorney in fact*

**LESSEE**

Ark Land Company

By: \_\_\_\_\_  
Its: \_\_\_\_\_

IN WITNESS WHEREOF, the parties have hereunto set their hands the day and year first above written.

**LESSOR**

Fotini Telonis, Angelo G. Telonis, Thomas G. Telonis and John G. Telonis

By: \_\_\_\_\_  
Its: \_\_\_\_\_

**LESSEE**

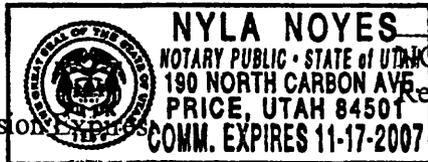
Ark Land Company

By: \_\_\_\_\_  
Its: \_\_\_\_\_

\_\_\_\_\_

STATE OF UTAH )  
 : ss.  
COUNTY OF CARBON )

On the 19 day of March, 2007, personally appeared before me Nick Sampinos, who being by me duly sworn, did say that pursuant to a power of attorney the said instrument was signed on behalf of Fotini Telonis, Angelo G. Telonis, Thomas G. Telonis and John G. Telonis and he duly acknowledged to me that he executed the same.



My Commission Expires 11/17/2007  
Residing at: Price, Utah

STATE OF \_\_\_\_\_ )  
 : ss.  
COUNTY OF \_\_\_\_\_ )

On the \_\_\_ day of \_\_\_\_\_, 2007, personally appeared before me \_\_\_\_\_, who being by me duly sworn, did say that he is the \_\_\_\_\_ Ark Land Company, and that the said instrument was signed on behalf of said company and the said \_\_\_\_\_ duly acknowledged to me that said company executed the same.

\_\_\_\_\_  
NOTARY PUBLIC  
Residing at: \_\_\_\_\_

My Commission Expires:  
\_\_\_\_\_

*A.S.*

STATE OF UTAH )  
 : ss.  
COUNTY OF \_\_\_\_\_ )

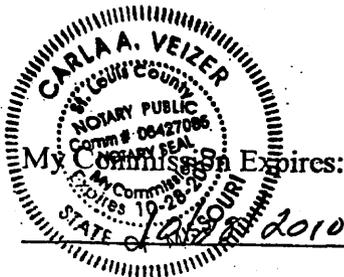
On the \_\_\_ day of \_\_\_\_\_, 2007, personally appeared before me Nick Sampinos, who being by me duly sworn, did say that pursuant to a power of attorney the said instrument was signed on behalf of Fotini Telonis, Angelo G. Telonis, Thomas G. Telonis and John G. Telonis and he duly acknowledged to me that he executed the same.

\_\_\_\_\_  
NOTARY PUBLIC  
Residing at: \_\_\_\_\_

My Commission Expires:  
\_\_\_\_\_

STATE OF Missouri )  
 : ss.  
COUNTY OF St Louis )

On the 19<sup>th</sup> day of March, 2007, personally appeared before me Steven F. McCurdy who being by me duly sworn, did say that he is the President Ark Land Company, and that the said instrument was signed on behalf of said company and the said Steven F. McCurdy duly acknowledged to me that said company executed the same.



Carla A. Veizer  
\_\_\_\_\_  
NOTARY PUBLIC  
Residing at: St. Louis, MO

**EXHIBIT 1 - Amended  
to Short Form of Amended Lease and Easement Agreement**

PREMISES

A tract of land located in Sections 4 and 5, Township 13 South, Range 7 East, Salt Lake Base and Meridian, Carbon County, Utah, and Section 32, Township 12 South, Range 7 East, Salt Lake Base and Meridian, Carbon, County, Utah, being further described as follows:  
Commencing at the Northwest corner of said Section 4;

Thence South  $0^{\circ} 28' 36''$  East (basis of bearing taken from Utah State Plane Coordinate System), a distance of 1603.82 feet along the West line of said section to the Northerly right-of-way line of a road;

thence South  $39^{\circ} 54' 11''$  East a distance of 337.96 feet along said North right-of-way line to the point of beginning;

thence North  $79^{\circ} 23' 34''$  East a distance of 834.50 feet;

thence South  $76^{\circ} 48' 06''$  East a distance of 320.00 feet;

thence South  $07^{\circ} 02' 16''$  East a distance of 224.51 feet;

Thence South  $41^{\circ} 01' 41''$  West a distance of 1413.36 feet;

Thence North  $26^{\circ} 33' 44''$  West a distance of 1855.35 feet;

thence North  $24^{\circ} 10' 17''$  West a distance of 588.80 feet

thence North  $05^{\circ} 40' 59''$  East a distance of 78.98 feet;

thence North  $40^{\circ} 51' 41''$  West a distance of 252.84 feet;

thence North  $40^{\circ} 51' 41''$  West a distance of 252.84 feet;

thence North  $17^{\circ} 12' 41''$  West a distance of 65.28 feet;

thence North  $05^{\circ} 29' 03''$  East a distance of 263.95 feet;

thence South  $88^{\circ} 43' 20''$  East a distance of 256.20 feet;

thence North  $00^{\circ} 27' 51''$  East a distance of 98.03 feet;

thence North  $86^{\circ} 08' 07''$  East a distance of 222.33 feet;

thence South  $07^{\circ} 02' 02''$  West a distance of 190.58 feet;

thence South  $00^{\circ} 35' 18''$  West a distance of 271.35 feet;

thence South 60° 54' 14" West a distance of 233.31 feet;

thence South 40°50'20" East a distance of 242.58 feet;

thence South 29°55'11" East a distance of 611.32 feet;

thence South 15°01'42" East a distance of 95.51 feet;

thence South 39°54'11" East a distance of 654.24 feet to the point of beginning, containing approximately 36.51 acres.

*A.S.*

**EXHIBIT 2**  
**to Short Form of Amended Lease and Easement Agreement**

**ACCESS LANDS**

A right-of-way for the purpose of maintaining a road over a strip of land 100 feet wide over a portion of the East half of Section 5, Township 13 South, Range 7 East, Salt Lake Base and Meridian, in the County of Carbon, State of Utah, the center line which is described as follows:

Commencing at the found stone of the Northeast corner of Section 5:

Thence South 582.76 feet and West 1228.10 feet to the beginning;

thence North 52°20'45" West 50.58 feet;

thence North 36°43'48" East 369.12 feet;

thence North 78°34'35" East 104.33 feet;

thence South 05°29'03" West 104.52 feet;

thence South 78°34'35" West 35.70 feet;

thence South 36°43'48" West 330.88 feet;

thence North 53°16'12" West 50.00 feet to point of beginning.

The side lines of said right-of-way to be prolonged or shortened to meet at angle-point intersections.

Contains approximately 0.97 acres.

## Bonding Calculations

## Direct Costs

Subtotal Demolition and Removal	\$1,936,268.00
Subtotal Backfilling and Grading	\$898,350.00
Subtotal Revegetation	\$876,537.00
Direct Costs	\$3,711,155.00

## Indirect Costs

Mob/Demob	\$371,116.00	10.0%
Contingency	\$185,558.00	5.0%
Engineering Redesign	\$92,779.00	2.5%
Main Office Expense	\$252,359.00	6.8%
Project Mainagement Fee	\$92,779.00	2.5%
Subtotal Indirect Costs	\$994,591.00	26.8%

Total Cost 2005	\$4,705,746.00
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Escalation factor	4
Number of years	0.012
Escalation	\$91,767.00

Reclamation Cost Escalated	\$4,797,513.00
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Bond Amount (rounded to nearest \$1,000) 2009 Dollars	\$5,137,000.00
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Posted Bond September 19, 2006	\$5,137,000.00
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Difference Between Cost Estimate and Bond	\$0.00
Percent Difference	0.00%

	Equipment Cost	Hourly Operating Costs	Equipment Overhead	Operator's Hourly Wage Rate	Hourly Cost	Number of Men or Eq.	Total Eq. & Lab. Costs	Units	Quantity	Units	Production Rate	Units	Equip. + Labor Time/Dis.	Units	Cost
Skyline Mine Waste Rock Disposal 09															
Backfilling and Grading															
CAT 345BL II (10-23)(2nd2005) 2005	15170	66.35	0.1	55.4	223.2	1	223.2 \$/HR						4.49 HR	1002	
6X4 70,000lbs 12-18 CY (20-11) (2nd2005)	3725	31.25	0.1	43.3	100.96	2	201.92 \$/HR						4.49 HR	907	
980G Series II EROPS (9-37) (2nd2005)	9635	45.65	0.1	55.4	165.83	1	165.83 \$/HR						4.49 HR	745	
D6R Series II (9-54) (2nd2005)	7465	33.8	0.1	55.4	139.24	1	139.24 \$/HR						4.49 HR	625	
Pickup Truck Crew 4x4 1 ton (20-17) (2nd2005)	900	5.4	0.1	0	11.57	1	11.57 \$/HR						4.49 HR	52	
CLAB					42.65	1.5	63.98 \$/HR						4.49 HR	287	
Foreman Average, Outside					59.9	1	59.9 \$/HR						4.49 HR	269	
Topsill Placement															
6X4 70,000lbs 12-18 CY (20-11) (2nd2005)	3725	31.25	0.1	43.3	100.96	3	302.88 \$/HR						200 HR	60576	
988G EROPS (9-37) (2nd2005) 2005	9010	40.05	0.1	55.4	155.77	1	155.77 \$/HR						200 HR	31154	
CLAB					42.65	1	42.65 \$/HR						200 HR	8530	
14H EROPS (9-11)(2H2005)	8220	34.4	0.1	55.4	144.62	1	144.62 \$/HR						200 HR	28924	
410G EROPS 4WD EXTEN. (9-28)(2nd2005)	3620	17.3	0.1	55.4	97.06	1	97.06 \$/HR						200 HR	19412	
Pickup Truck Crew 4x4 1 ton (20-17) (2nd2005)	900	5.4	0.1	0	11.57	1	11.57 \$/HR						200 HR	2314	
CLAB					42.65	1	42.65 \$/HR						200 HR	8530	
Foreman Average, Outside					59.9	1	59.9 \$/HR						200 HR	11980	
Subtotal															175307

	Equipment Cost	Hourly Operating Costs	Equipment Overhead	Operator's Hourly Wage Rate	Hourly Cost	Number of Men or Eq.	Total Eq. & Lab. Costs	Units	Quantity	Units	Production Rate	Units	Equip. + Labor Trimer/Dis.	Units	Cost
Portal 01															60984
Water Tank 02															7692
Lower Terrace 03															128012
Middle Bench 04															176859
Upper Bench West Fork 05															80398
Southwest Fork 06															75632
Loadout Facilities 07															143364
South Fork Portal Area 08															44873
Waste Rock Disposal 09															175307
Pond Enlargement Interim 10															1204
Pond Diversion DI2 Interim 11															260
Interim Sediment Control 12															2889
Overland Conveyor 13															1076
James Canyon 14															0
<b>Total</b>															<b>698250</b>

Ref.	Description	Materials	Means Reference Number	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost	
	Vegetation Costs Skyline Mine																			
	South Facing Slopes 1H 3H or Greater																			
	Seeding	South Facing Slopes Seed 1H : 3H or gentle	Skyline07051	687 /AC																
	Mulch	Hay 1" material only 029105000250	Reveg001	69.85 /MSF																
	Fertilizer	Fertilizer Hydros Spread Mat. Only	Reveg006	8.9 /MSF																
	Equipment	Hydro Spreader (equip. & labor) B-81	Reveg002	19.8 /MSF																
	Subtotal																			197439
	North Facing Slopes																			
	Seeding	North Facing Slopes Seed	Skyline07052	691 /AC																
	Mulch	Hay 1" material only 029105000250	Reveg001	69.85 /MSF																
	Fertilizer	Fertilizer Hydros Spread Mat. Only	Reveg006	8.9 /MSF																
	Equipment	Hydro Spreader (equip. & labor) B-81	Reveg005	19.8 /MSF																
	Subtotal																			14048
	Riparian Habitat																			
	Seeding	Riparian Habitat Seed	Skyline07053	42.25 /AC																
	Mulch	Hay 1" material only 029105000250	Reveg001	69.85 /MSF																
	Fertilizer	Fertilizer Hydros Spread Mat. Only	Reveg006	8.9 /MSF																
	Equipment	Hydro Spreader (equip. & labor) B-81	Reveg005	19.8 /MSF																
	Subtotal																			162
	Soth to West Facing Slopes																			
	Seeding	Riparian Habitat Seed	Skyline07053	42.25 /AC																
	Mulch	Hay 1" material only 029105000250	Reveg001	69.85 /MSF																
	Fertilizer	Fertilizer Hydros Spread Mat. Only	Reveg006	8.9 /MSF																
	Equipment	Hydro Spreader (equip. & labor) B-81	Reveg005	19.8 /MSF																
	Subtotal																			162
	North to East Facing Slopes																			
	Seeding	Riparian Habitat Seed	Skyline07053	42.25 /AC																
	Mulch	Hay 1" material only 029105000250	Reveg001	69.85 /MSF																
	Fertilizer	Fertilizer Hydros Spread Mat. Only	Reveg006	8.9 /MSF																
	Equipment	Hydro Spreader (equip. & labor) B-81	Reveg005	19.8 /MSF																
	Subtotal																			172569
	Waste Rock																			
	Seeding	Waste Rock Slopes Seed	Skyline07056	61.5 /AC																
	Mulch	Hay 1" material only 029105000250	Reveg001	69.85 /MSF																
	Fertilizer	Fertilizer Hydros Spread Mat. Only	Reveg006	8.9 /MSF																
	Equipment	Hydro Spreader (equip. & labor) B-81	Reveg005	19.8 /MSF																
	Subtotal																			85174
	James Canyon																			
	Seeding	Waste Rock Slopes Seed	Skyline07056	61.5 /AC																
	Mulch	Hay 1" material only 029105000250	Reveg001	69.85 /MSF																
	Fertilizer	Fertilizer Hydros Spread Mat. Only	Reveg006	8.9 /MSF																
	Equipment	Hydro Spreader (equip. & labor) B-81	Reveg005	19.8 /MSF																
	Subtotal																			178
	Riparian Stem Supplement																			
	Stems	Bare root seedlings, 11" to 16" med. soil	02915.400.0562	1.31 Ea																
	Subtotal																			16818
	Silt Fence Interim Vegetation																			
	Stems	Bare root seedlings, 11" to 16" med. soil	02915.400.0562	1.31 Ea	20000															
	Subtotal																			58704
	Revsal Loadout Sediment Pond																			
	Seeding	Riparian Habitat Seed	Skyline07053	42.25 /AC																
	Mulch	Hay 1" material only 029105000250	Reveg001	69.85 /MSF																
	Fertilizer	Fertilizer Hydros Spread Mat. Only	Reveg006	8.9 /MSF																
	Equipment	Hydro Spreader (equip. & labor) B-81	Reveg005	19.8 /MSF																
	Subtotal																			26200
	Revegetation	25% of Initial Seeding																		
	Subtotal																			175229
	Total																			516537

## Bonding Calculations

## Direct Costs

Subtotal Demolition and Removal	\$1,936,268.00
Subtotal Backfilling and Grading	\$898,350.00
Subtotal Revegetation	\$876,537.00
Direct Costs	\$3,711,155.00

## Indirect Costs

Mob/Demob	\$371,116.00	10.0%
Contingency	\$185,558.00	5.0%
Engineering Redesign	\$92,779.00	2.5%
Main Office Expense	\$252,359.00	6.8%
Project Mainagement Fee	\$92,779.00	2.5%
Subtotal Indirect Costs	\$994,591.00	26.8%

Total Cost 2005	\$4,705,746.00
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Escalation factor		4
Number of years		0.012
Escalation	\$91,767.00	

Reclamation Cost Escalated	\$4,797,513.00
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Bond Amount (rounded to nearest \$1,000) 2009 Dollars	\$5,137,000.00
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Posted Bond September 19, 2006	\$5,137,000.00
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Difference Between Cost Estimate and Bond	\$0.00
Percent Difference	0.00%

	Equipment Cost	Hourly Operating Costs	Equipment Overhead	Operator's Hourly Wage Rate	Hourly Cost	Number of Men or Eq	Total Eq. & Lab. Costs	Units	Quantity	Units	Production Rate	Units	Equip. + Labor Time/Dis.	Units	Cost
Skyline Mine Waste Rock Disposal 09															
Backfilling and Grading															
CAT 345BL II (10-23) (2nd2005) 2005	15170	66.35	0.1	55.4	223.2	1	223.2 \$/HR						4.49 HR	1002	
6X4 70,000lbs 12-18 CY (20-11) (2nd2005)	3725	31.25	0.1	43.3	100.96	2	201.92 \$/HR						4.49 HR	907	
980G Series II EROPS (9-37) (2nd2005)	9635	45.65	0.1	55.4	165.83	1	165.83 \$/HR						4.49 HR	745	
D9R Series II (9-54) (2nd2005)	7465	33.8	0.1	55.4	139.24	1	139.24 \$/HR						4.49 HR	625	
Pickup Truck Crew 4x4 1 ton (20-17) (2nd2005)	900	5.4	0.1	0	11.57	1	11.57 \$/HR						4.49 HR	52	
CLAB					42.65	1.5	63.98 \$/HR						4.49 HR	287	
Foreman Average, Outside					59.9	1	59.9 \$/HR						4.49 HR	269	
Topsoil Placement															
6X4 70,000lbs 12-18 CY (20-11) (2nd2005)	3725	31.25	0.1	43.3	100.96	3	302.88 \$/HR						200 HR	60576	
988G EROPS (9-37) (2nd2005) 2005	9070	40.06	0.1	55.4	155.77	1	155.77 \$/HR						200 HR	31154	
CLAB					42.65	1	42.65 \$/HR						200 HR	8530	
14H EROPS (9-11) (2H2005)	8220	34.4	0.1	55.4	144.62	1	144.62 \$/HR						200 HR	28924	
410G EROPS 4WD EXTEN. (9-28) (2nd2005)	3620	17.3	0.1	55.4	97.06	1	97.06 \$/HR						200 HR	19412	
Pickup Truck Crew 4x4 1 ton (20-17) (2nd2005)	900	5.4	0.1	0	11.57	1	11.57 \$/HR						200 HR	2314	
CLAB					42.65	1	42.65 \$/HR						200 HR	8530	
Foreman Average, Outside					59.9	1	59.9 \$/HR						200 HR	11980	
<b>Subtotal</b>															<b>175307</b>

	Equipment Cost	Hourly Operating Costs	Equipment Overhead	Operator's Hourly Wage Rate	Hourly Cost	Number of Men or Eq.	Total Eq. & Lab. Costs	Units	Quantity	Units	Production Rate	Units	Equip. + Labor Time/Dis.	Units	Cost
Portal 01															60984
Water Tank 02															7692
Lower Terrace 03															128012
Middle Bench 04															176659
Upper Bench West Fork 05															80398
Southwest Fork 06															75632
Loadout Facilities 07															143364
South Fork Portal Area 08															44873
Waste Rock Disposal 09															175307
Pond Enlargement Interim 10															1204
Pond Diversion DU2 Interim 11															260
Interim Sediment Control 12															2689
Overland Conveyor 13															1076
James Canyon 14															0
<b>Total</b>															<b>898350</b>

Ref	Description	Materials	Means Reference Number	Unit Cost	Unit	Length	Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit	Swell Factor	Quantity	Unit	Cost	
	Vegetation Costs																				
	Skyline Mine																				
	South Facing Slopes 1H-3H or Greater																				
	Seeding	South Facing Slope Seed 1H, 3H or greater	Skyline07051	667 /AC	AC					39.81										39.81 AC	26553
	Mulch	Hay 1" material only 029105000250	Reveg001	69.85 /MSF	MSF					39.81										1734 MSF	121120
	Fertilizer	Fertilizer-Hydror Spread Mat. Only	Reveg006	8.9 /MSF	MSF					39.81										1734 MSF	15433
	Equipment	Hydro Spreader (equip. & labor) B-81	Reveg002	19.8 /MSF	MSF					39.81										1734 MSF	34333
	<b>Subtotal</b>																				<b>197439</b>
	North Facing Slopes																				
	Seeding	North Facing Slopes Seed	Skyline07052	691 /AC	AC					20.33										20.33 AC	14048
	Mulch	Hay 1" material only 029105000250	Reveg001	69.85 /MSF	MSF					20.33										1734 MSF	51887
	Fertilizer	Fertilizer-Hydror Spread Mat. Only	Reveg006	8.9 /MSF	MSF					20.33										1734 MSF	7885
	Equipment	Hydro Spreader (equip. & labor) B-81	Reveg005	19.8 /MSF	MSF					20.33										1734 MSF	17343
	<b>Subtotal</b>																				<b>101953</b>
	Riparian Habitat																				
	Seeding	Riparian Habitat Seed	Skyline07053	42.25 /AC	AC					0.04										0.04 AC	2
	Mulch	Hay 1" material only 029105000250	Reveg001	69.85 /MSF	MSF					0.04										2 MSF	140
	Fertilizer	Fertilizer-Hydror Spread Mat. Only	Reveg006	8.9 /MSF	MSF					0.04										2 MSF	0
	Equipment	Hydro Spreader (equip. & labor) B-81	Reveg005	19.8 /MSF	MSF					0.04										2 MSF	40
	<b>Subtotal</b>																				<b>162</b>
	Soth to West Facing Slopes																				
	Seeding	Riparian Habitat Seed	Skyline07053	42.25 /AC	AC					39.81										39.81 AC	1682
	Mulch	Hay 1" material only 029105000250	Reveg001	69.85 /MSF	MSF					39.81										1734 MSF	121120
	Fertilizer	Fertilizer-Hydror Spread Mat. Only	Reveg006	8.9 /MSF	MSF					39.81										1734 MSF	15433
	Equipment	Hydro Spreader (equip. & labor) B-81	Reveg005	19.8 /MSF	MSF					39.81										1734 MSF	34333
	<b>Subtotal</b>																				<b>172848</b>
	North to East Facing Slopes																				
	Seeding	Riparian Habitat Seed	Skyline07053	42.25 /AC	AC					20.33										20.33 AC	859
	Mulch	Hay 1" material only 029105000250	Reveg001	69.85 /MSF	MSF					20.33										1734 MSF	61887
	Fertilizer	Fertilizer-Hydror Spread Mat. Only	Reveg006	8.9 /MSF	MSF					20.33										1734 MSF	7885
	Equipment	Hydro Spreader (equip. & labor) B-81	Reveg005	19.8 /MSF	MSF					20.33										1734 MSF	17543
	<b>Subtotal</b>																				<b>88174</b>
	Waste Rock																				
	Seeding	Waste Rock Slopes Seed	Skyline07056	61.5 /AC	AC					12.81										12.81 AC	788
	Mulch	Hay 1" material only 029105000250	Reveg001	69.85 /MSF	MSF					12.81										558 MSF	38976
	Fertilizer	Fertilizer-Hydror Spread Mat. Only	Reveg006	8.9 /MSF	MSF					12.81										558 MSF	4966
	Equipment	Hydro Spreader (equip. & labor) B-81	Reveg005	19.8 /MSF	MSF					12.81										558 MSF	11048
	<b>Subtotal</b>																				<b>54980</b>
	James Canyon																				
	Seeding	Waste Rock Slopes Seed	Skyline07056	61.5 /AC	AC					4.85										4.85 AC	298
	Mulch	Hay 1" material only 029105000250	Reveg001	69.85 /MSF	MSF					4.85										211 MSF	14738
	Fertilizer	Fertilizer-Hydror Spread Mat. Only	Reveg006	8.9 /MSF	MSF					4.85										211 MSF	1678
	Equipment	Hydro Spreader (equip. & labor) B-81	Reveg005	19.8 /MSF	MSF					4.85										211 MSF	4178
	<b>Subtotal</b>																				<b>20794</b>
	Riparian Stem Supplement																				
	Stems	Bare root seedlings, 11" to 16" med. soil	02915 400 0562	1.31 /Ea	Ea					9800										12538 Ea	16818
	<b>Subtotal</b>																				<b>89704</b>
	Slit Fence Interim Vegetation																				
	Stems	Bare root seedlings, 11" to 16" med. soil	02915 400 0562	1.31 /Ea	Ea					20000										20000 Ea	26200
	<b>Subtotal</b>																				<b>26200</b>
	Revegetation																				
	Seeding	Riparian Habitat Seed	Skyline07053	42.25 /AC	AC					0.3										0.3 AC	13
	Mulch	Hay 1" material only 029105000250	Reveg001	69.85 /MSF	MSF					0.3										13 MSF	908
	Fertilizer	Fertilizer-Hydror Spread Mat. Only	Reveg006	8.9 /MSF	MSF					0.3										13 MSF	116
	Equipment	Hydro Spreader (equip. & labor) B-81	Reveg005	19.8 /MSF	MSF					0.3										13 MSF	257
	<b>Subtotal</b>																				<b>1284</b>
	Revegetation																				
	25% of Initial Seeding																				
	<b>Subtotal</b>																				<b>175229</b>
	<b>Total</b>																				<b>876837</b>

disturbance will be reseeded and have silt fences and/or straw bales to treat the runoff from the disturbance until the area is released.

The Scofield Waste Disposal site was expanded into previously undisturbed by mining in 2007. The Disposal site and the surrounding area were evaluated using the United States Department of Agriculture (USDA), Natural Resources Conservation Services' (NRCS) WEB Soil Survey utility (See the Clement Soil Survey located in Appendix Volume A-2 Volume 2). Based on the soil survey, approximately 24-inches of the A horizon will be salvaged from the proposed Waste Rock Expansion area. Assuming the entire 5.13 acres of the proposed expansion are eventually disturbed, approximately 16,553 cu-yds of material would be salvaged and used in reclamation. These volumes will be identified in the field as abundant root material disappears and the amount of clay increases. No topsoil pile currently exists at the site, so all suitable topsoil will be salvaged. The expansion will be incremental, with contemporaneous reclamation activities being conducted simultaneously. It is estimated that no than more than approximately 3-acres will be without topsoil at one time.

A stockpile of topsoil will likely not exceed approximately 4,500 cu-yds because it will be used in contemporaneous reclamation. Topsoil storage will be contained in areas identified on Plate 3.2.8.2. As stated in other sections of this M&RP the topsoil will be stored, marked with appropriate signage for protection, and used during reclamation. The topsoil placement will be stable, protected from wind and water erosion through prompt establishment of vegetative cover. Sediment control measures such as silt

fencing or straw bales will be implemented temporarily at the base of pile until vegetation is established. Should other storage areas be necessary, the site will be located in an UDOGM-approved location.

#### 4.6.5 South Fork Breakout

Before any top soil was removed, all woody vegetation was removed from the project area. Soils are basically a sandy loam mixture and have been classified by the S.C.S. as Uinta Family loam/tozc Family fine Sandy loam. Core sampling in the area shows that the soils vary in depth from 24 - 36+" in depth.

disturbance will be reseeded and have silt fences and/or straw bales to treat the runoff from the disturbance until the area is released.

The Scofield Waste Disposal site was expanded into previously undisturbed by mining in 2007. The Disposal site and the surrounding area were evaluated using the United States Department of Agriculture (USDA), Natural Resources Conservation Services' (NRCS) WEB Soil Survey utility (See the Clement Soil Survey located in Appendix Volume A-2 Volume 2). Based on the soil survey, approximately 24-inches of the A horizon will be salvaged from the proposed Waste Rock Expansion area. Assuming the entire 5.13 acres of the proposed expansion are eventually disturbed, approximately 16,553 cu-yds of material would be salvaged and used in reclamation. These volumes will be identified in the field as abundant root material disappears and the amount of clay increases. No topsoil pile currently exists at the site, so all suitable topsoil will be salvaged. The expansion will be incremental, with contemporaneous reclamation activities being conducted simultaneously. It is estimated that no than more than approximately 3-acres will be without topsoil at one time.

A stockpile of topsoil will likely not exceed approximately 4,500 cu-yds because it will be used in contemporaneous reclamation. Topsoil storage will be contained in areas identified on Plate 3.2.8.2. As stated in other sections of this M&RP the topsoil will be stored, marked with appropriate signage for protection, and used during reclamation. The topsoil placement will be stable, protected from wind and water erosion through prompt establishment of vegetative cover. Sediment control measures such as silt

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A stockpile of topsoil will likely not exceed approximately 4,500 cu-yds because it will be used in contemporaneous reclamation. Topsoil storage will be contained in areas identified on Plate 3.2.8.2. As stated in other sections of this M&RP the topsoil will be stored, marked with appropriate signage for protection, and used during reclamation. The topsoil placement will be stable, protected from wind and water erosion through prompt establishment of vegetative cover. Sediment control measures such as silt

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#### 4.6.5 South Fork Breakout

Before any top soil was removed, all woody vegetation was removed from the project area. Soils are basically a sandy loam mixture and have been classified by the S.C.S. as Uinta Family loam/tozc Family fine Sandy loam. Core sampling in the area shows that the soils vary in depth from 24 - 36+" in depth.

fiber matting will be used since all slopes are expected to be either flat or less than 1.5h:1v. Revegetation success will be evaluated. All ditches and retaining walls will be maintained until the vegetation success standards of R614-301-356 are met. No reclamation is planned for the access roadway at the request of the property owner's representative.

The livestock permittee through the owner has requested that the sedimentation pond not be reclaimed. If, over a period of time, it shows that the pond holds natural runoff water and will be beneficial for livestock and wildlife use, it will not be removed. However, for planning and bonding purposes the sedimentation pond is to be removed and reclaimed (Map 4.16.1C). In the event the pond is not removed, Map 4.16.1B illustrates the reclamation work.

#### 4.7.8 South Fork Breakout

After the area has had the soils redistributed, as outlined in Section 4.6.5, the site will be revegetated. The aspen site will use the seed mixture shown on Table 4.7-4 while the spruce-fir site will use the mixture shown on Table 4.7-5. Following the distribution of topsoil, the area will be evenly covered with certified weed-free straw mulch. The soil with the straw cover will then be deep gouged. The straw will be incorporated in the soil during the deep gouging activities. The appropriate seed mix will then be hand-broadcast and/or through the use of an appropriate hand-held mechanical device at the prescribed rate of application.

Fertilizer rates and applications are discussed in the soil preparation and fertilizer plan (Section 4.5).

#### James Canyon Area

Refer to Section 2.7 for a discussion of the revegetation success standards for the James Canyon Project area. Refers to Sections 2-11 and 4-20 for additional information pertaining to the project.

fiber matting will be used since all slopes are expected to be either flat or less than 1.5h:1v. Revegetation success will be evaluated. All ditches and retaining walls will be maintained until the vegetation success standards of R614-301-356 are met. No reclamation is planned for the access roadway at the request of the property owner's representative.

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Fertilizer rates and applications are discussed in the soil preparation and fertilizer plan (Section 4.5).

#### James Canyon Area

Refer to Section 2.7 for a discussion of the revegetation success standards for the James Canyon Project area. Refers to Sections 2-11 and 4-20 for additional information pertaining to the project.

The mine support roads will be reclaimed in the permit area. Culverts and blacktop surfacing material will be removed. Reclamation would then include recontouring, ripping, adding cross drains, water bars, topsoil and seed.

#### Removal of Scofield Waste Disposal Site Sedimentation Pond

The livestock permittee through the owner has requested that ~~both the upper original~~ sedimentation pond ~~and the lower sedimentation pond~~ not be reclaimed. If, over a period of time, it shows that these ponds hold natural runoff water and will be beneficial for livestock and wildlife use, they will not be removed. However, for planning and bonding purposes ~~both of the sedimentation ponds~~ ~~are~~ ~~is~~ to be removed and reclaimed (Map 4.16.1C). In the event the pond is not removed, Map 4.16.1B illustrates the reclamation work. ~~and are shown on both maps 4.16.1 1B and 4.16.1C.~~

Revised: 04/04/07

4-78 (a)

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The livestock permittee through the owner has requested that the sedimentation pond not be reclaimed. If, over a period of time, it shows that these ponds hold natural runoff water and will be beneficial for livestock and wildlife use, they will not be removed. However, for planning and bonding purposes the sedimentation pond is to be removed and reclaimed (Map 4.16.1C). In the event the pond is not removed, Map 4.16.1B illustrates the reclamation work.

The rock wastes are hauled by truck from the Skyline Mine site (portal area) and the unit train loadout facility to the waste disposal area.

The rock disposal site and access road are located upon land owned by the Estate of George Telonis. The legal right of access and use of the lands for the disposal of rock waste has been granted to the Permittee by the heirs of the Estate in a lease effective January 1, 1982 and expiring, unless renewed on December 31 2011. **The lease agreement was modified in 2006 and 2007 to include additional lands totaling approximately 37.5 acres and extending the lease through December 31, 2020.** ~~The lands referred to in the lease include a 7.00 acre right-of-way for the disposal site access road and a 17.83 acre tract of land containing the proposed rock waste disposal area.~~ The disposal site and access road are part of larger area previously disturbed by surface and underground mining and never reclaimed.

Portions of the surface affected have been used for grazing after abandonment of the strip pit, although the pre-existing conditions (lack of reclamation and underground coal fires) have greatly reduced the area's potential for grazing or for any other use.

Investigations as to potential cultural resources within the area to be affected and the adjacent areas have been conducted.

Water is present only for a brief period during and immediately following precipitation events and/or during spring runoff.

The climate of the study area is similar to that described for the lower elevations of the Skyline permit area.

The Permittee uses the rock disposal site to dispose of underground rock waste produced during mining operations which cannot be permanently stored underground due to either the lack of adequate storage room or the content of coal exceeding the limits specified in 30 CFR:75.400 through 30CFR:75.403.

The volume of material which must be disposed of at a surface disposal site will be a very small fraction of the total rock waste produced because of the large volume of potential underground

disposing of rock waste at any point other than underground effectively prohibit the extensive use of a surface rock waste storage site.

If favorable market conditions exist, material may occasionally be recovered from the waste storage site and returned to the product stream. Surface royalties and fees will be paid for all recovered material. Material placed in the waste rock disposal site is neither toxic nor acid generating as indicated by routine sampling and analysis. The sample results are submitted to the Division annually.

The roof and floor rock for the three mineable Skyline coal seams are estimated to be 60 percent sandstone, 30 percent shale, and 10 percent claystone. The igneous dike rock varies in composition, but is essentially comprised of ferromagnesian minerals. The majority of dike rock which would require surface disposal is anticipated to be very similar to basalt and would be very durable and extremely resistant to weathering. The volumetric swell factor for the igneous and sedimentary rock is estimated to be 30 percent.

~~The Permittee estimates that approximately 4,000 tons or 2694 cubic yards (at 110-91 lb/cubic ft. density) per year of rock will be disposed of at the site.~~

The Permittee expanded the storage capacity of the Waste Rock site in 2007. Due to changing mining conditions it is hard to provide a reasonably accurate estimate of the amount of material that will be deposited at the site. The expansion provides an estimated 300,294 yds<sup>3</sup> of additional storage, which should be adequate for the term of the lease.

The rock wastes are hauled by truck from the Skyline Mine site (portal area) and the unit train loadout facility to the waste disposal area.

The rock disposal site and access road are located upon land owned by the Estate of George Telonis. The legal right of access and use of the lands for the disposal of rock waste has been granted to the Permittee by the heirs of the Estate in a lease effective January 1, 1982 and expiring, unless renewed on December 31 2011. The lease agreement was modified in 2006 and 2007 to include additional lands totaling approximately 37.5 acres and extending the lease through December 31, 2020. The disposal site and access road are part of larger area previously disturbed by surface and underground mining and never reclaimed.

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The volume of material which must be disposed of at a surface disposal site will be a very small fraction of the total rock waste produced because of the large volume of potential underground

rock waste storage areas which result from mining coal. The economics of loading, hauling and disposing of rock waste at any point other than underground effectively prohibit the extensive use of a surface rock waste storage site.

If favorable market conditions exist, material may occasionally be recovered from the waste storage site and returned to the product stream. Surface royalties and fees will be paid for all recovered material. Material placed in the waste rock disposal site is neither toxic nor acid generating as indicated by routine sampling and analysis. The sample results are submitted to the Division annually.

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Table of Contents

VOLUME 5

<u>TAB</u>	<u>Section</u>	<u>CONTENTS</u>
1		Slope Stability Evaluations and access Road Embankments - Sedimentation Ponds, Miscellaneous Fills, Facilities and Designs
2		Estimate of Peak Flow Discharge
3		Mine Site CSP Design
4		Portal Area Swale and Concrete V-Ditch Design
5		Undisturbed Areas Drainage Ditch Designs
6		Disturbed Area Drainage Portal Area
7		Stage Volume Portal Area
8		Topsoil Diversions
9		Train Loadout Undisturbed Area Drainage
10		Train Loadout Disturbed Drainage
11		Train Loadout Area Swale Design
12		Hydrology Stud Culver East End Train Loadout CU-16
13		Loadout Area Sedimentation Pond
14		Drainage Control Waste Rock Disposal Site
15		Waste Rock Disposal Sediment Pond
15a		2007 Waste Rock Disposal Site Expansion - Slope Stability and Drainage Control
16		Waste Rock Disposal Area Capacity and Schedule
17		Reclamation Costs
18		Reclamation Channel Design
19		Hydrology Study South Fork Breakout Area
20		Designs For ASCA Treatments
21		Demonstrations for Exempt Areas
22		James Canyon Water Wells
23		Environmental Assessment - Winter Quarters Tract

## Table of Contents

### VOLUME 5

<u>Section</u>	<u>CONTENTS</u>
1	Slope Stability Evaluations and access Road Embankments - Sedimentation Ponds, Miscellaneous Fills, Facilities and Designs
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14	Drainage Control Waste Rock Disposal Site
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16	Waste Rock Disposal Area Capacity and Schedule
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18	Reclamation Channel Design
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21	Demonstrations for Exempt Areas
22	James Canyon Water Wells
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Revised: 4-18-07

## Waste Rock Storage Area Usage

The disposal area was initially designed and estimated to hold approximately 131,000 Yd<sup>3</sup> of material. As of 13 August 1987, approximately 11,541 yd<sup>3</sup> had been placed at the disposal site. Hauling of material is based on weight not volume, and both the weight and volume can vary considerable, whether the waste rock is of igneous or sedimentary origin. Originally, the density was calculated at 110 lb/cu-ft (1.45 tons/yd<sup>3</sup>). After additional years of testing, the standard has been modified and is now estimated at 91 lb/cu-ft (1.23 tons/yd<sup>3</sup>). All the stored volumes listed below are based on a calculated density of 1.23 tons per yd<sup>3</sup>. The capacity listed in the following table uses the capacity calculated in a 1999 survey. Based on the original estimates, the disposal area would have been out of available space in 1996. No changes in the disturbed area or pile configuration occurred during that time. Again in both 2005 and 2006 the pile was resurveyed and determined to still have storage capacity available. A September 2005 survey estimated approximately 71,700 tons of storage remained, yet after storing an estimated 65,862 yd<sup>3</sup>, a December 2006 survey estimated approximately 25,000 – 30,000 yd<sup>3</sup> of storage was still available in the pile. Based on variability in annual use, weight, volume, and limits of the surveys, the table is intended to be used as an estimated figure only.  
- (estimated use)

<u>Year</u>	<u>Volume Stored (Yd<sup>3</sup>)</u>	<u>Capacity (Yd<sup>3</sup>)</u>
1984		271,646
1987	11,541	260,105
1988	(1,300)	258,805
1989	(1,300)	257,105
1990	(1,300)	256,205
1991	3,252	252,953
1992	6,504	246,449
1993	3,252	243,197
1994	9,756	233,441
1995	24,461	208,980
1996	43,902	165,078
1997	37,797	127,281
1998	82,849	44,432
1999 – Expanded	18,823	49,390
2000	4,243	45,145
2001	244	44,901
2002	13,068	31,833
2003	10,624	21,209
2004	0	21,209
2005 – Re- Surveyed (Sept. @71,700)	8,870	67,710
2006 – Re-surveyed (Dec.)	65,862	25,000-30,000
2007 - Expanded		325,294 – 330,294

The lease that was re-negotiated in 2006 and modified in 2007 provides ample room for Waste Rock storage through the 15-year term of the lease.

Revised: 04-18-07

## Waste Rock Storage Area Usage

The disposal area was initially designed and estimated to hold approximately 131,000 Yd<sup>3</sup> of material. As of 13 August 1987, approximately 11,541 yd<sup>3</sup> had been placed at the disposal site. Hauling of material is based on weight not volume, and both the weight and volume can vary considerable, whether the waste rock is of igneous or sedimentary origin. Originally, the density was calculated at 110 lb/cu-ft (1.45 tons/yd<sup>3</sup>). After additional years of testing, the standard has been modified and is now estimated at 91 lb/cu-ft (1.23 tons/yd<sup>3</sup>). All the stored volumes listed below are based on a calculated density of 1.23 tons per yd<sup>3</sup>. The capacity listed in the following table uses the capacity calculated in a 1999 survey. Based on the original estimates, the disposal area would have been out of available space in 1996. No changes in the disturbed area or pile configuration occurred during that time. Again in both 2005 and 2006 the pile was resurveyed and determined to still have storage capacity available. A September 2005 survey estimated approximately 71,700 tons of storage remained, yet after storing an estimated 65,862 yd<sup>3</sup>, a December 2006 survey estimated approximately 25,000 – 30,000 yd<sup>3</sup> of storage was still available in the pile. Based on variability in annual use, weight, volume, and limits of the surveys, the table is intended to be used as an estimated figure only.

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Revised: 04-18-07

Table of Contents

VOLUME A-2, Volume 2

SOILS AND VEGETATION

GOB Pile Expansion Soils Report (November 1998)

James Canyon Vegetation Study, Mt. Nebo Scientific (September 2001)

James Canyon Soils Report, EIS Environmental and Engineering Consultants (September 2001)

Exhibit 2.75 - Data Adequacy Information for the Skyline Mine: Vegetation of the Winter Quarters tract, Mt Nebo Scientific (May 14, 1992)

Sample Analysis Results of Waste Rock and Electric Lake Sediment Used to Reclaim South Fork Portals, Mine 1 (2003)

Exhibit 2.14b - NRCS Prime Farmland Determination (August 1996)

Riparian Plant Community Survey Near Scofield, Utah. Winter Quarters Canyon and Woods Canyon 2002, Mt Nebo Scientific

EarthFax Engineering Perennial Length and Gradient Studies of Winter Quarters Canyon and Woods Canyon, 2002

Biological Studies in Winter Quarters Canyon Creek and Woods Canyon Creek - A Study Plan, May 9, 2005

Soil Survey conducted by Clement Drilling & Geophysical, Inc. at the Waste Rock site, near Scofield, Utah, Clement Drilling and Geophysical, January 25, 2007

Preliminary Vegetation Report for the Proposed Waste Rock Expansion Site for the Skyline Mines, Mt. Nebo Scientific, Inc. 2006

TERRESTRIAL WILDLIFE

Biological Studies in Winter Quarters Canyon Creek & Woods Canyon Creek - A Study Plan, May 9, 2005 (See document behind Soils and Vegetation tab)

AVIFAUNA REPORTS

Biological Studies in Winter Quarters Creek and Woods Canyon Creek - A Study Plan, May 9, 2005, Mt. Nebo Scientific (See document behind Soils and Vegetation tab)

Revised ~~08-29-2006~~04-18-07

## Table of Contents

VOLUME A-2, Volume 2

### SOILS AND VEGETATION

GOB Pile Expansion Soils Report (November 1998)

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Revised 04-18-07



4114 West 9950 North  
Cedar Hills, Utah 84062  
Phone 801-372-3685  
Fax 801-785-5748

January 25, 2007

Mr. Gregg Galecki,  
Skyline Mines  
HC 35 Box 380  
Helper, Utah 84526

Dear Mr. Galecki,

This letter report summarizes the methodology and results of the soil survey conducted by Clement Drilling & Geophysical, Inc. at the Waste Rock site, near Scofield, Utah.

#### NRCS Soil Data

The Waste Rock site and the surrounding area were evaluated using the United States Department of Agriculture (USDA), Natural Resources Conservation Services' (NRCS) WEB Soil Survey (WSS) utility. Figure 1 presents the map generated by the utility with annotation added showing the approximate location of the soil test pits.

The current NRCS data for the study area has been revised from the data presented in a previous soils report titled *Report of Vegetation and Soils, Proposed Waste Rock Disposal Site, Skyline Mine*, dated November 1981, prepared by Endangered Plant Studies, Inc, Orem, Utah. In the 1981 report the soils on the north-facing mountain slopes were correlated to the Croydon Series. The current NRCS soils data correlates the north-facing mountain slopes to the Pathead Series as presented on Figure 1. The Pathead Series was established in 1982 in Carbon County, Utah. The soils correlated to the Trag Series in the 1981 report are still correlated as such in the current data. The official series descriptions for the Pathead and Trag soil series that occur in the study area are presented in Appendix A.

#### Soil Test Pits

Two soil test pits were excavated at the study area on December 8, 2006 at locations that appeared to be representative of each of the two soil series in the study area. The locations of the test pits are approximately located on Figure 1 and coordinates collected using a GPS receiver are presented in the test pit logs. The test pits were excavated by hand to a depth of approximately 1 meter. A propane burner was used to thaw the uppermost, frozen soil to facilitate the excavation of the pits. The pits were logged and photographed. The logs are presented in Appendix B and the photographs in Appendix C. The soils observed in the test pits appear to generally correlate to the NRCS soil series map.

Please feel free to contact me if you have any questions regarding the results of the soil survey.  
I appreciate the opportunity to work with you on this project.

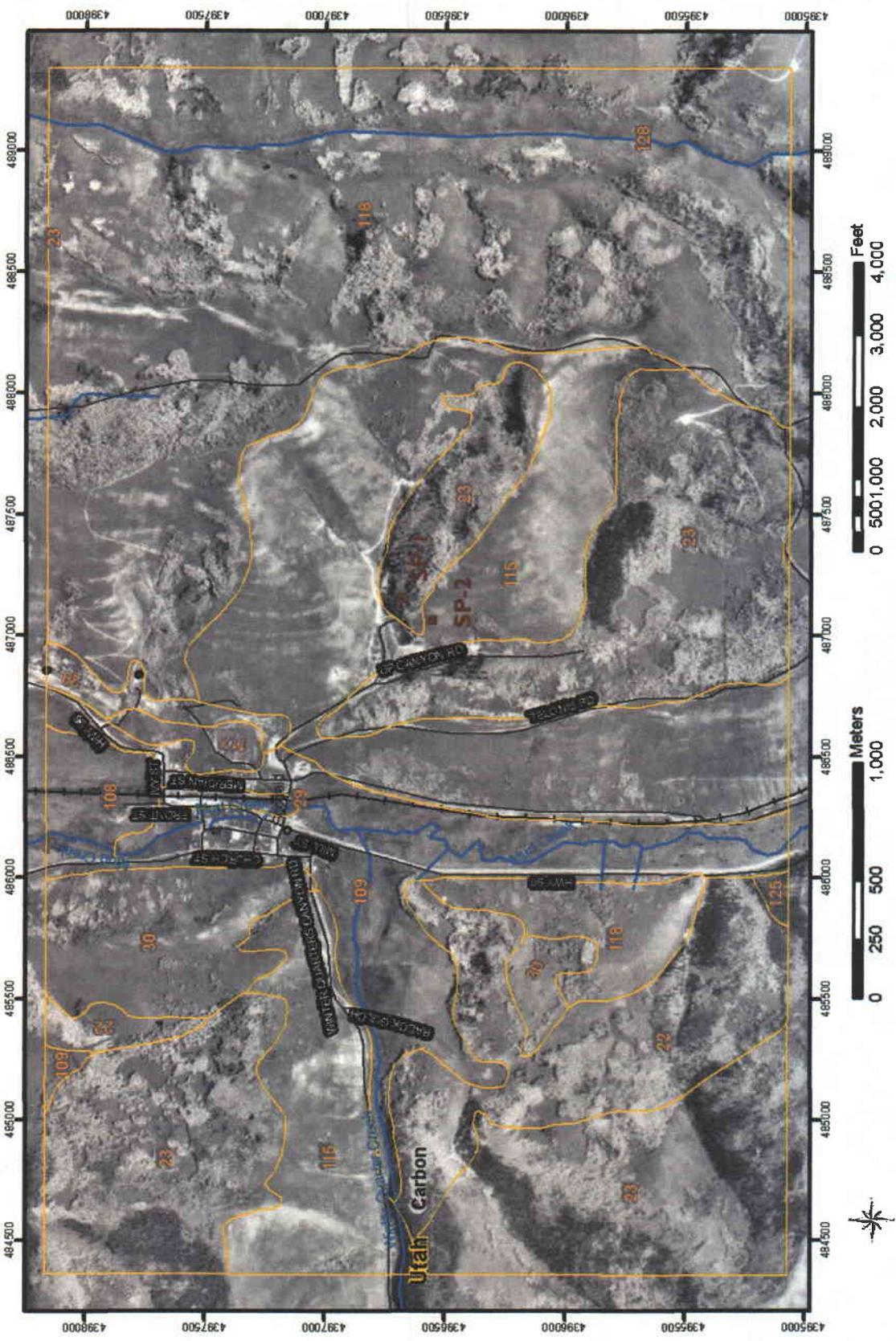
Sincerely,  
Clement Drilling & Geophysical, Inc.

*Craig M. Clement*  
Craig M. Clement, P.G.

# Figures

SOIL SURVEY OF CARBON AREA, UTAH, PARTS OF CARBON AND EMERY COUNTIES

Skylight Waste Rock Expansion



Web Soil Survey 1.1  
National Cooperative Soil Survey

1/25/2007  
Page 1 of 3

Figure 1  
Soil Map and Location of Test Pits

# SOIL SURVEY OF CARBON AREA, UTAH, PARTS OF CARBON AND EMERY COUNTIES

Skyline Waste Rock Expansion

## MAP LEGEND

- Soil Map Units
- Cities
- Detailed Counties
- Detailed States
- Interstate Highways
- Roads
- Rails
- Water
- Hydrography
- Oceans
- Escarpment, bedrock
- Escarpment, non-bedrock
- Gully
- Levee
- Slope
- Blowout
- Borrow Pit
- Clay Spot
- Depression, closed
- Eroded Spot
- Gravel Pit
- Gravelly Spot
- Gully
- Lava Flow
- Landfill
- Marsh or Swamp
- Miscellaneous Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Slide or Slip
- Sinkhole
- Sodic Spot
- Spill Area
- Stony Spot
- Very Stony Spot
- Perennial Water
- Wet Spot

**SP-1** Location of Test Pits

## MAP INFORMATION

Source of Map: Natural Resources Conservation Service  
 Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>

Coordinate System: UTM Zone 12

Soil Survey Area: Carbon Area, Utah, Parts of Carbon and Emery Counties

Spatial Version of Data: 1

Soil Map Compilation Scale: 1:24000

Map comprised of aerial images photographed on these dates:  
 9/30/1997, 10/5/1997

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.



Web Soil Survey 1.1  
 National Cooperative Soil Survey

1/25/2007  
 Page 2 of 3

Figure 2  
 Soil Map Legend

## Map Unit Legend Summary

### Carbon Area, Utah, Parts of Carbon and Emery Counties

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
22	Croydon loam, 30 to 50 percent slopes	284.0	7.3
23	Curecanti family-Pathead complex	906.2	23.2
29	Dumps,mine	41.3	1.1
30	Falcon-Rock outcrop complex	165.7	4.2
108	Silas loam	56.6	1.4
109	Silas-Brycan loams	322.0	8.2
115	Trag stony loam, 30 to 60 percent slopes	798.5	20.4
117	Trag-Beje-Senchert complex	22.7	0.6
118	Trag-Croydon complex	1,308.5	33.5
125	Uinta-Toze families complex	5.3	0.1
128	Water	0.4	0.0

Figure 3  
Soil Map Map Unit Legend

# **Appendix A**

## **Soil Series Descriptions**

LOCATION PATHEAD

UT

Established Series  
REV: JMD/LDS/SSP  
05/1999  
PATHEAD SERIES<sup>1</sup>

The Pathead series consists of moderately deep, well drained, moderately permeable soils that formed in slope alluvium and colluvium derived from sandstone and shale. These soils are on benches and mountain slopes. Slopes range from 25 to 80 percent. Average annual precipitation is about 18 inches, and mean annual temperature is about 42 degrees F.

**TAXONOMIC CLASS:** Loamy-skeletal, mixed, superactive, frigid Typic Haplustepts

**TYPICAL PEDON:** Pathead extremely stony loam, rangeland. (Colors are for air-dry soil unless otherwise noted.)

**A--0 to 3 inches;** brown (10YR 5/3) extremely stony loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine roots; few very fine pores; 5 percent angular gravel, 15 percent cobbles, 40 percent stones, and 5 percent boulders; strongly effervescent; carbonates are disseminated, (13 percent calcium carbonate equivalent); strongly alkaline (pH 8.6); abrupt smooth boundary. (2 to 7 inches thick)

**Bw--3 to 14 inches;** pale brown (10YR 6/3) very cobbly loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine, few fine and medium roots; many very fine pores; 20 percent angular gravel, 15 percent cobbles, and 5 percent stones; strongly effervescent; carbonates are disseminated, (10 percent calcium carbonate equivalent); strongly alkaline (pH 8.8); clear smooth boundary. (3 to 21 inches thick)

**Bk--14 to 26 inches;** pale brown (10YR 6/3) very cobbly loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; soft, friable, slightly sticky, and slightly plastic; common very fine, few fine roots; few very fine pores; 20 percent gravel, 25 percent cobbles, and 5 percent stones; strongly effervescent; carbonates are disseminated and segregated as common thin coatings on lower sides of rock fragments, (12 percent calcium carbonate equivalent); strongly alkaline (pH 8.8); clear smooth boundary. (12 to 26 inches thick)

**R--26 inches;** sandstone.

**TYPE LOCATION:** Carbon County, Utah; about 2 miles north and 4 miles west of Helper; 1,100 feet north and 400 feet west of the SE corner of sec. 6, T. 13 S., R. 9 E.

**RANGE IN CHARACTERISTICS:**

**Soil moisture:** The soil moisture control section is affected by precipitation that falls evenly throughout the year with a significant peak during late summer and early fall.

**Depth to lithic contact:** 20 to 40 inches to sandstone

Depth to cambic horizon: 2 to 6 inches  
Depth to secondary calcium carbonate: 10 to 28 inches

Particle-size control section: 18 to 27 percent clay and 35 to 80 percent rock fragments

**A horizon:**

Value: 5 or 6 dry, 3 to 5 moist  
Chroma: 2 or 3  
Calcium carbonate equivalent: 1 to 15 percent  
Reaction: slightly alkaline to strongly alkaline

**Bw horizon:**

Hue: 10YR or 2.5Y  
Value: 5 or 6 dry, 4 or 5 moist  
Chroma: 2, 3 or 4  
Texture: very stony loam, very cobbly loam, very stony fine sandy loam, extremely channery loam, very channery loam, stony loam or gravelly loam  
Calcium carbonate equivalent: 1 to 15 percent  
Reaction: moderately alkaline or strongly alkaline

**Bk or Bck horizon:**

Hue: 10YR or 2.5Y  
Value: 6 or 7 dry, 3 to 6 moist  
Chroma: 2 to 4  
Texture: very cobbly loam, extremely cobbly loam, very channery loam, extremely channery loam, extremely stony loam, very stony loam or very stony fine sandy loam, thin strata of gravelly loam or gravelly fine sandy loam are in the upper part of this horizon in some pedons.  
Calcium carbonate equivalent: 1 to 15 percent  
Reaction: moderately alkaline or strongly alkaline

**COMPETING SERIES:** These are the [Kadygulch](#), [Mowbray](#), [Repkie](#), [Specie](#), [Wilde](#), and [Wilspring](#) series.

Kadygulch, Mowbray, Repkie, and Specie: do not have a lithic contact within 60 inches of the mineral surface.

Wilde: has reaction more acid than pH 7.4.

Wilspring: have soil moisture control sections that are affected by peak precipitation during the spring.

**GEOGRAPHIC SETTING:**

Parent material: slope alluvium and colluvium derived from sandstone and shale  
Landform: benches and mountain slopes  
Slopes: 25 to 80 percent  
Elevation: 6,600 to 9,400 feet  
Mean annual temperature: 38 to 45 degrees F.

Mean annual precipitation: 16 to 22 inches, with a late summer peak  
Frost-free period: 60 to 110 days

**GEOGRAPHICALLY ASSOCIATED SOILS:** These are the [Doney](#), [Grobutte](#), [Guben](#), [Rabbitex](#), and [Sheepcan](#) soils. Doney soils are fine-loamy. Grobutte soils lack bedrock within a depth of 40 inches. Guben soils have a mollic epipedon, a calcic horizon, and lack bedrock within 40 inches. Rabbitex soils have a mollic epipedon, a calcic horizon, and are fine-loamy. Sheepcan soils are fine-loamy and lack bedrock within a depth of 40 inches.

**DRAINAGE AND PERMEABILITY:** Well drained; medium or high runoff; moderate permeability.

**USE AND VEGETATION:** Used mainly for rangeland and wildlife habitat. Present vegetation is Salina wildrye, black sagebrush, winterfat, bluegrass, pinyon, Utah juniper, curlleaf mountainmahogany, and some poor quality Douglas-fir.

**DISTRIBUTION AND EXTENT:** Eastern Utah. LRR E, MLRA 47 and 48A.

**MLRA OFFICE RESPONSIBLE:** Lakewood, Colorado

**SERIES ESTABLISHED:** Carbon County, Utah, 1982.

**REMARKS:** Diagnostic horizons and features in this pedon include:

Particle-size control section: The zone from 10 to 26 inches. (Bw and Bk horizons)

Ochric epipedon: The zone from 0 to 3 inches. (A horizon)

Cambic horizon: The zone from 3 to 26 inches. (Bw and Bk horizons)

Secondary calcium carbonate: The zone from 14 to 26 inches. (Bk horizon)

Lithic contact: The contact with sandstone bedrock at 26 inches. (R layer)

The cation exchange activity class was inferred from laboratory data from similar soils in the soil survey area.

The classification was changed from Typic Ustorthent to Typic Haplustept May 1999.

Taxonomic version: Eighth Edition, 1998.

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National Cooperative Soil Survey  
U.S.A.

<sup>1</sup> <http://www2.ftw.nrcs.usda.gov/osd/dat/P/PATHEAD.html> - 1-25-07

LOCATION TRAG  
Established Series  
Rev. DCM, GB, AP  
09/2000  
TRAG SERIES<sup>2</sup>

CO+NM UT

The Trag series consists of very deep, well drained soils that formed in material weathered from granite and schist. Trag soils are on mountains, slopes and fans. Slopes range from 1 to 40 percent. The mean annual precipitation is about 17 inches and the mean annual temperature is about 45 degrees F.

**TAXONOMIC CLASS:** Fine-loamy, mixed, superactive, frigid Typic Argiustolls

**TYPICAL PEDON:** Trag sandy loam, rangeland. (Colors are for dry soil unless otherwise noted.)

A--0 to 9 inches; dark grayish brown (10YR 4/2) sandy loam, very dark brown (10YR 2/2) moist; weak medium subangular blocks parting to moderate fine granular structure; soft, very friable; slightly acid; clear wavy boundary. (4 to 15 inches thick)

BA--9 to 15 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; weak medium prisms parting to moderate medium subangular blocky structure; hard, firm; thin patchy clay films; neutral; clear wavy boundary. (0 to 12 inches thick)

Bt--15 to 35 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; moderate medium prisms parting to moderate medium subangular blocky structure; very hard, firm; thin nearly continuous clay films; neutral; clear smooth boundary. (16 to 34 inches thick)

C--35 to 60 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; very hard, friable; neutral.

**TYPE LOCATION:** Larimer County, Colorado; 2,350 feet east and 600 feet south of the NW corner of Sec. 10, T. 7 N., R. 71 W.

**RANGE IN CHARACTERISTICS:**

Soil moisture: Ustic moisture regime.

Peak precipitation coming during the months of March through June.

Mean annual soil temperature: 45 to 47 degrees F

Mean summer soil temperature: 59 to 60 degrees F

Depth to secondary calcium carbonate: 40 or more inches

Particle-size control section (weighted average):

Clay content: 18 to 35 percent

Sand content: 30 to 65 percent

Rock fragments: 0 to 30 percent by volume

A horizon:

Hues: 7.5YR or 10YR

Value: 3 through 5 dry, 2 or 3 moist

Chroma: 2 or 3  
Base saturation: 75 to 100 percent  
Reaction: slightly acid to mildly alkaline

BA horizon (if present):  
Hues: 7.5YR or 10YR  
Value: 3 through 6 dry, 2 through 6 moist  
Chroma: 2 through 4  
Texture: clay loam, sandy clay loam, sandy loam, loam  
Reaction: slightly acid to mildly alkaline

Bt horizon(s):  
Hues: 7.5YR or 10YR  
Value: 4 through 6 dry, 3 through 5 moist  
Chroma: 2 through 6  
Texture: clay loam, sandy clay loam, loam, silty clay loam  
Clay content: 18 to 35 percent  
Reaction: neutral to mildly alkaline  
Bridging of clay between sand grains and clay films exist on vertical ped faces and in pores.

C horizon (if present):  
Hues: 7.5YR or 10YR  
Texture: clay loam, sandy clay loam, loam  
Base saturation: 90 to 100 percent  
Reaction: **neutral to moderately alkaline**

**COMPETING SERIES:** [Absarook](#) - calcium carbonate above 40 inches depth

[Archmesa](#) - moderately deep to bedrock

[Bielenberg](#) - deep to bedrock

[Burtoner](#) - moderately deep to bedrock

[Clancy](#) - moderately deep to bedrock

[Clasoil](#) - have hues as yellow as 2.5Y

[Dooley](#) - calcium carbonate above 40 inches depth

[Doughty](#) - calcium carbonate above 40 inches depth

[Empedrado](#) - calcium carbonate above 40 inches depth

[Fairfield](#) - calcium carbonate above 40 inches depth

[Farnuf](#) - calcium carbonate above 40 inches depth

[Farside](#) - lower elevations and more northerly latitudes

[Felor](#) - calcium carbonate above 40 inches depth

[Greenway](#) - calcium carbonate above 40 inches depth

[Gurney](#) - moderately deep to bedrock

[Hangdo](#) - formed in eolian material over alluvium

[Hoppers](#) - moderately deep to bedrock

[Hyalite](#) - lithologic discontinuity in Bt

[Jeffcity](#) - moderately deep to bedrock

[Kokoruda](#) - forested soil with O horizon

Livona - calcium carbonate above 40 inches depth  
Martinsdale - calcium carbonate above 40 inches depth  
Maudlin - moderately deep to bedrock  
Meagher - calcium carbonate above 40 inches depth  
Moen - moderately deep to bedrock  
Moento - moderately deep to bedrock  
Pianohill - moderately deep to bedrock  
Placerton - moderately deep to bedrock  
Reeder - moderately deep to bedrock  
Reedwest - moderately deep to bedrock  
Snakejohn - deep to bedrock  
Tragmon - formed sandstone and shale parent material  
Trazuni - redox features in the lower part  
Ulrant - deep to bedrock  
Vida - calcium carbonate above 40 inches depth  
Watne - calcium carbonate above 40 inches depth  
Watrous - moderately deep to bedrock  
Williams - calcium carbonate above 40 inches depth  
Yegen - calcium carbonate above 40 inches depth

**GEOGRAPHIC SETTING:** Trag soils are on mountain slopes and fans. Slopes range from 1 to 40 percent. The soil formed in material weathered from granite and schist that has been locally transported in places. Elevation ranges from 6,800 to 8,900 feet. The soils are in a cool semiarid climate with annual precipitation ranging from 15 to 22 inches. The mean annual temperature is 43 to 46 degrees F. The frost-free season is about 65 to 100 days. In New Mexico, precipitation ranges to 22 inches with air temperatures down to 40 degrees F. and frost-free periods up to 110 days.

**GEOGRAPHICALLY ASSOCIATED SOILS:** These are the Boyle, Bruce, Ratake, and Wetmore soils and the competing Farnuf and Moen soils. Boyle, Ratake and Wetmore soils have bedrock at depths of less than 20 inches. Bruce soils are coarse-loamy.

**DRAINAGE AND PERMEABILITY:** Well drained; medium to rapid runoff; moderate to moderately slow permeability.

**USE AND VEGETATION:** The soils are used for rangeland. Native vegetation is mainly blue grama, big and little bluestem, junegrass, some forbs and shrubs, and widely spaced ponderosa pine.

**DISTRIBUTION AND EXTENT:** Mountainous parts of Northern and central Colorado, eastern Utah, and central New Mexico. The series is of small extent.

**MLRA OFFICE RESPONSIBLE:** Lakewood, Colorado

**SERIES ESTABLISHED:** Larimer County, Colorado, 1975. The name is a coined name.

**REMARKS:** This soil has:

Mollic Epipedon: The zone from 0 to 15 inches

Argillic Horizon: The zone from 15 to 35 inches

Prior to 2/1999 OSD update the classification was a Typic Argiboroll, fine-loamy, mixed. The 2/1999 update reclassified this series to a Pachic Argiustoll, fine-loamy, mixed, superactive, frigid. Historically this series concept was not pachic. Therefore, in this update a one inch reduction in the thickness of the mollic epipedon was incorporated and adjustment to the range in characteristics to maintain the series concept as typic.

Taxonomic Version: Eighth Edition, 1998

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<sup>2</sup> <http://www2.ftw.nrcs.usda.gov/osd/dat/T/TRAG.html> - 1-25-07

**Appendix B**  
**Soil Test Pit Logs**

Site **SP-1** Skyline Mine Waste Rock Expansion

<b>Name</b>	Craig Clement	<b>Drainage</b>	WD	<b>Well Drained</b>	
<b>Date</b>	12/8/2006	<b>Flooding</b>	none		
<b>Weather</b>	Clear, 5°F	<b>Ponding</b>	none		
<b>Location</b>	N 39°43'11.935", W 111°8'58.731"	<b>Depth to Water Table</b>	245 ft	estimated	
<b>Datum</b>	NAD 83	<b>Earth Cover</b>	TOC	Mixed aspen and conifer	
<b>Topographic Map</b>	Scofield, UT; 1:24,000; 1997	<b>Parent Material</b>	COL	colluvium	
<b>Slope Aspect</b>	NNW	<b>Bedrock, Kind</b>	SST, SIS, SHA	Interbedded sandstone, siltstone and shale	
<b>Slope Gradient</b>	80%	<b>Bedrock, Fracture</b>	-		
<b>Slope Complexity</b>	Complex	<b>Bedrock, Hardness</b>	MO	Moderate	
<b>Slope Shape</b>	LV	<b>Bedrock, Depth</b>	200 cm	estimated	
<b>Hillslope Profile Position</b>	BS	<b>Erosion, Kind</b>	G	gully	
<b>Geomorphic Component</b>	SS	<b>Erosion, Degree</b>	1	>0 up to 25%	
<b>Microrelief</b>	MH	<b>Runoff</b>	VH	Very High	
<b>Drainage Pattern</b>	dendritic	<b>Surface Fragments</b>	Stony		
<b>Diagnostic Horizons</b>		<b>Color (moist)</b>		<b>Description</b>	
A	SP	From 0	23	5YR 2/1	Loam
		To	23	5YR 3/4	Silty Loam with trace fine sand
		Distinctness	Gradual		
		Boundary	Wavy		
B	SP	From 23	36		
Cu	SP	From 36	46		
		To	46	10YR 5/4	Silt with trace fine sand, abundant root material
		Distinctness	Gradual	10YR 8/6	Fine sand with minor amount of root material, moist
		Boundary	Wavy		
C	SP	From 46	97		
		To	97	10YR 7/4	Clayey silt with sandstone clasts (up to ~ 30 cm in length, minor amount of root material, moist, some Fe staining along root traces.
		Distinctness	Gradual		
		Boundary	Wavy		

Site **SP-2** Skyline Mine Waste Rock Expansion

<b>Name</b>	Craig Clement	<b>Drainage</b>	WD	<b>Well Drained</b>
<b>Date</b>	12/8/2006	<b>Flooding</b>	none	
<b>Weather</b>	Clear, 5°F	<b>Ponding</b>	none	
<b>Location</b>	N 39°43'9.294", W 111°9'5.541"	<b>Depth to Water Table</b>	245 ft	estimated
<b>Datum</b>	NAD 83	<b>Earth Cover</b>	SOS	Other shrub cover, primarily sagebrush
<b>Topographic Map</b>	Scofield, UT; 1:24,000; 1997	<b>Parent Material</b>	COL	colluvium
<b>Slope Aspect</b>	W	<b>Bedrock, Kind</b>	SST, SIS, SHA	Interbedded sandstone, siltstone and shale
<b>Slope Gradient</b>	80%	<b>Bedrock, Fracture</b>	-	
<b>Slope Complexity</b>	Complex	<b>Bedrock, Hardness</b>	MO	Moderate
<b>Slope Shape</b>	LV	<b>Bedrock, Depth</b>	200 cm	estimated
<b>Hillslope Profile Position</b>	BS	<b>Erosion, Kind</b>	G	gully
<b>Geomorphic Component</b>	SS	<b>Erosion, Degree</b>	1	>0 up to 25%
<b>Microrelief</b>	ML	<b>Runoff</b>	VH	Very High
<b>Drainage Pattern</b>	dendritic	<b>Surface Fragments</b>	Stony	
<b>Diagnostic Horizons</b>		<b>Color (moist)</b>		<b>Description</b>
A	SP	From To	0 25	10YR 5/4
		Distinctness	Gradual	Moderate yellowish brown
		Topography	Wavy	Clayey silt with abundant root material, sandstone clasts (up to ~ 20 cm in length), moist to frozen
B	SP	From To	25 58	10YR 6/6
		Distinctness	Gradual	Dark yellowish orange
		Topography	Wavy	Silt with clay and trace fine sand, some root material, Fe staining primarily around sandstone clasts (up to ~ 20 cm in length), moist
C	SP	From To	58 97	10YR 6/6
		Distinctness	Gradual	Dark yellowish orange
		Topography	Wavy	Clayey silt with little to no root material, abundant sandstone clasts (up to 15 cm in length) clasts are gray to rust colored, moist

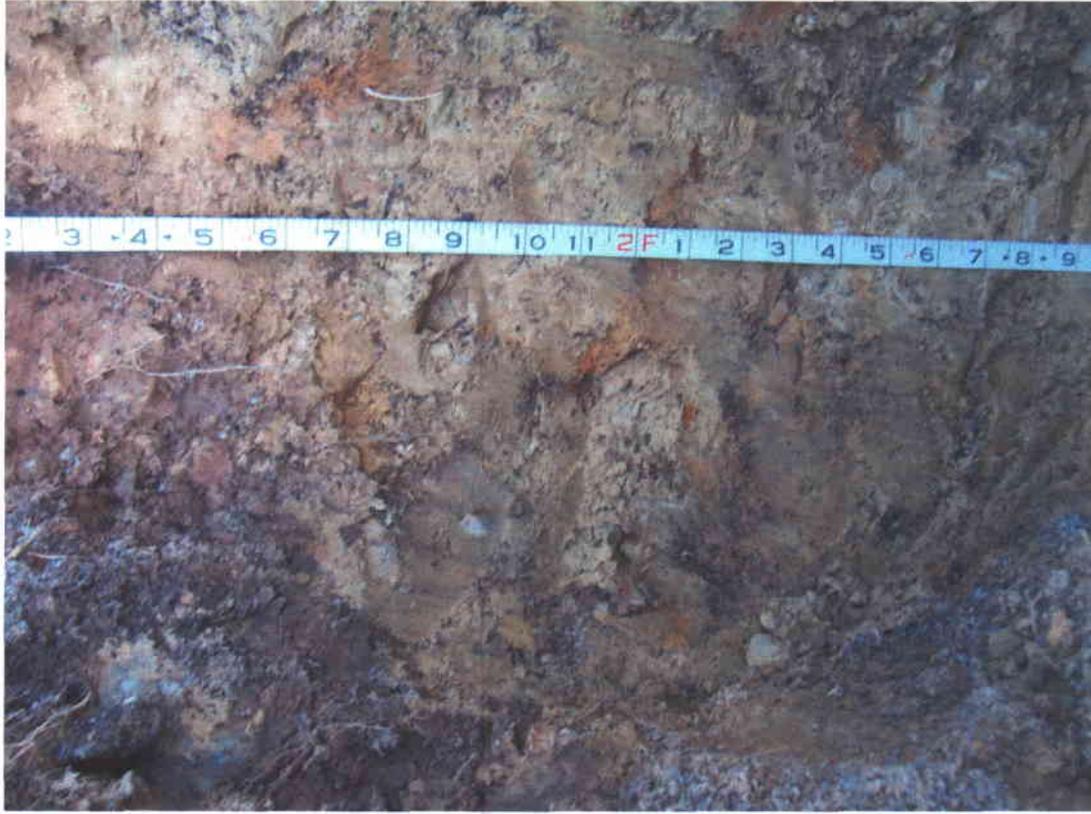
**Appendix C**  
**Soil Test Pit Photographs**



SP-1 Photograph 1  
Looking SSE at Test Pit



SP-1 Photograph 2  
Test Pit SP-1



SP-1 Photograph 4  
Approximately 12" to 33"



SP-1 Photograph 3  
Approximately 0" to 17"



SP-1 Photograph 5  
Approximately 24" to 38"



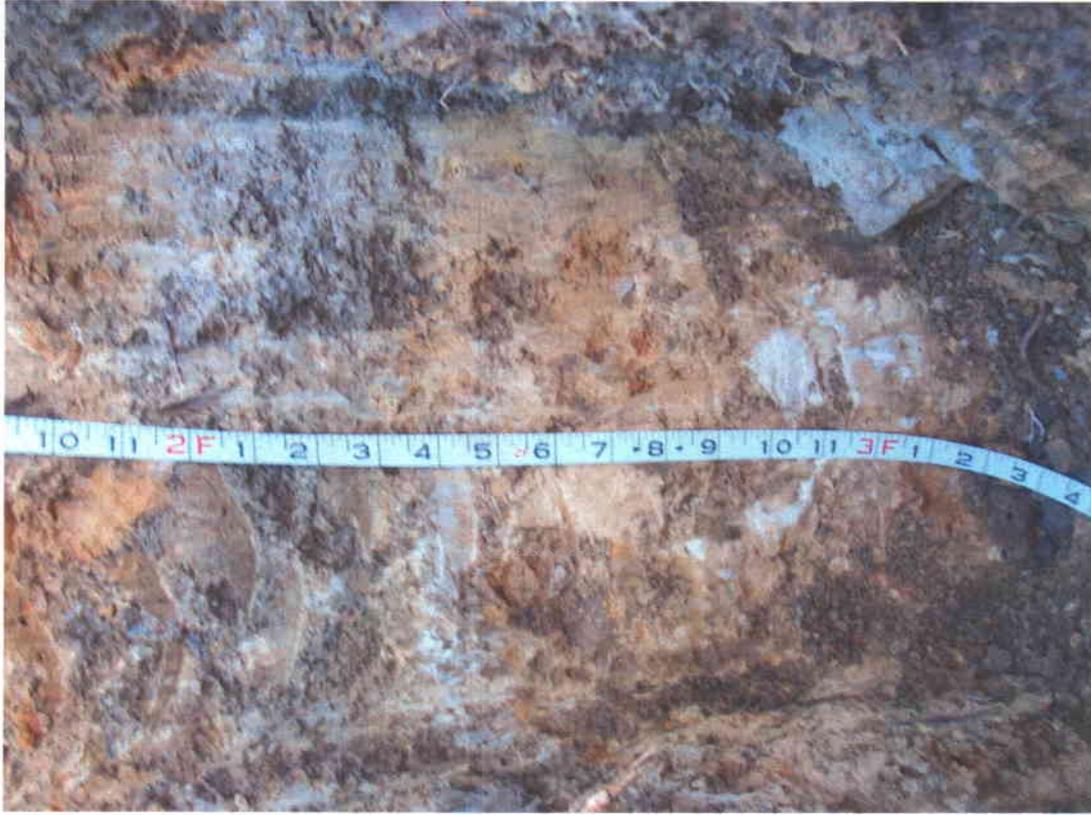
SP-1 Photograph 6  
Closeup of Fe staining and Sandstone Clast



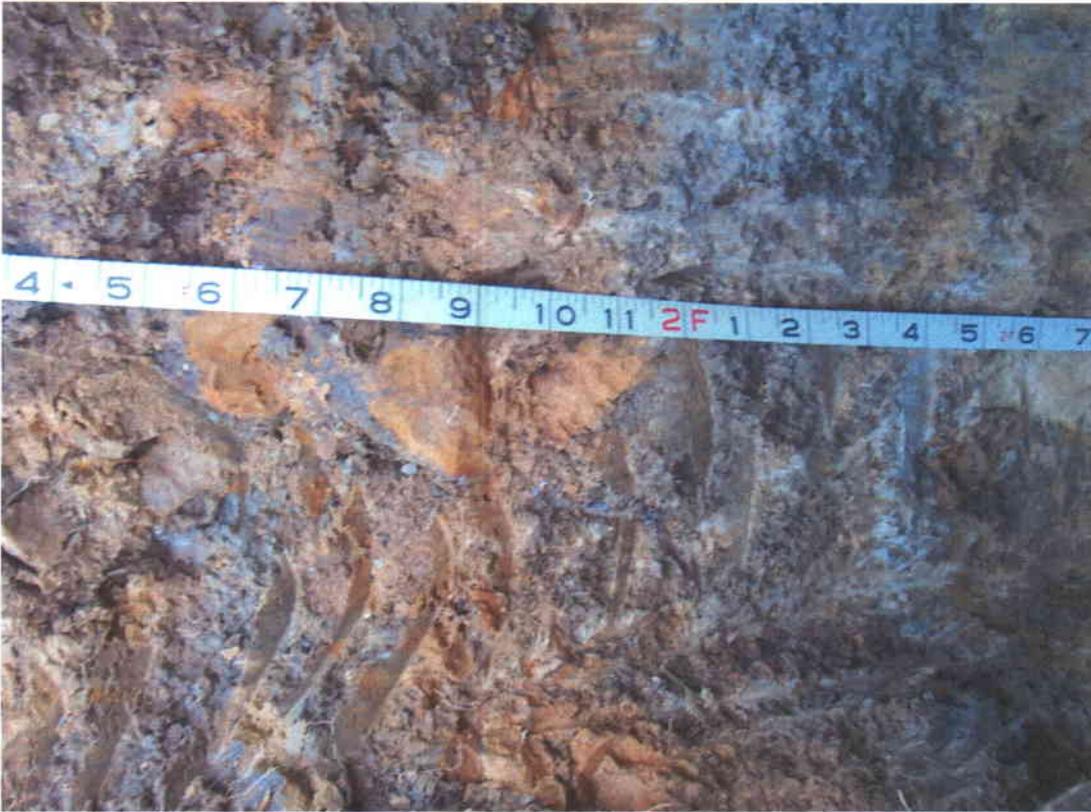
**SP-2 Photograph 1**  
**Looking E at Test Pit SP-2**



**SP-2 Photograph 2**  
**Approximately 0" to 18"**



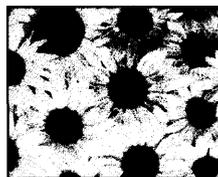
SP-2 Photograph 4  
Approximately 22" to 38"



SP-2 Photograph 3  
Approximately 16" to 30"

PRELIMINARY VEGETATION REPORT  
FOR THE PROPOSED  
WASTE ROCK EXPANSION SITE  
FOR THE SKYLINE MINES  
2006

A Summary  
of the  
Field Work Accomplished  
&  
Future Sample Plans



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February 2007



## TABLE OF CONTENTS

INTRODUCTION .....	1
METHODS .....	1
RESULTS .....	2
FUTURE SAMPLING .....	4
Sampling Design and Transect Quadrat Placement .....	4
Cover and Composition .....	4
Woody Species Density .....	5
Statistical Analyses .....	5
Photographs .....	5
Threatened & Endangered Species .....	5

## INTRODUCTION

Canyon Fuel Company is planning to expand their Skyline Mine waste rock site. The current waste rock site is located about one mile southeast of the town of Scofield, Utah. The proposed new expansion area is directly south and adjacent to the current waste rock site. Elevation of the expansion site ranges from 7,870 to 8,170 ft about sea level. Slope exposure is primarily south and east with angles from 20 to 25 degrees. The communities that would be impacted by the new site are sagebrush/grass and aspen/grass.

The purpose of this report is to provide *preliminary* information about the plant communities that would be impacted by expansion of the proposed new waste rock site. Because site planning was late in the 2006 growing season, it was too late to record credible quantitative vegetation data for permitting purposes at that time. Therefore, this report provides qualitative vegetation information about the site with descriptions of the areas including designs to be used to sample the vegetation when it can be sampled more accurately. Additional quantitative sampling has been designed and planned to be conducted in the beginning of the 2007 growing season (see FUTURE SAMPLING).

## METHODS

Field work to initiate data collection process was accomplished November 1, 2006. A map of the proposed new waste rock expansion area was provided by Canyon Fuel that delineated the new

site. The area boundary was also flagged in the field by Canyon Fuel personnel. The area was walked and surveyed to record qualitative notes about the plant communities proposed for new disturbance along with other appropriate environmental information.

Once the proposed disturbed areas were surveyed, similar plant communities outside the boundaries of the new waste rock site were surveyed for potential reference areas where quantitative sampling will also be conducted. The reference areas will provide future success standards at the time of final reclamation and revegetation.

## RESULTS

As mentioned above, the plant communities that would be impacted by the new site are sagebrush/grass and aspen/grass. The proposed disturbed and reference areas were marked using a GPS instrument near the center of the study areas. The coordinates of these areas are shown on Table 1.

<b>TABLE 1: Locations for the proposed disturbed and reference areas for the Skyline Mine Waste Rock Expansion Site.</b>					
<b>Waypoint Name</b>	<b>Zone</b>	<b>Easting (m)</b>	<b>Northing (m)</b>	<b>Notes</b>	<b>Name</b>
CFSPDS	12	0487100	4396364	New Waste Rock Expansion Area	Proposed Disturbed Sagebrush/Grass
CFSSRF	12	0487176	4396286	New Waste Rock Expansion Area	Reference Area Sagebrush/Grass
CFSPDA	12	0487183	4396424	New Waste Rock Expansion Area	Proposed Disturbed Aspen/Grass
CFSARF	12	0487305	4396387	New Waste Rock Expansion Area	Reference Area Aspen/Grass

Plant species observed for the proposed disturbance sagebrush/grass and aspen/grass community, and their respective reference areas are shown on Table 2.

<b>Table 2: Plant species observed plant communities of the in the proposed disturbed and reference areas at the expansion waste rock site for the Skyline Mines.</b>	
<b>Sagebrush/Grass Proposed Disturbed and Reference Areas</b>	<b>Aspen/Grass Proposed Disturbed and Reference Areas</b>
<b>TREES &amp; SHRUBS</b>	<b>TREES &amp; SHRUBS</b>
<i>Amelanchier utahensis</i>	<i>Abies lasiocarpa</i>
<i>Artemisia tridentata</i> var. <i>vaseyana</i>	<i>Artemisia tridentata</i> var. <i>vaseyana</i>
<i>Chrysothamnus nauseosus</i>	<i>Mahonia repens</i>
<i>Chrysothamnus viscidiflorus</i>	<i>Populus tremuloides</i>
<i>Mahonia repens</i>	<i>Symphoricarpos oreophilus</i>
<i>Purshia tridentata</i>	
<i>Symphoricarpos oreophilus</i>	
<b>FORBS</b>	<b>FORBS</b>
<i>Calochortus nuttalli</i>	<i>Achillea millefolium</i>
<i>Cirsium</i> spp.	<i>Lupinus argenteus</i>
<i>Lupinus argenteus</i>	
<i>Penstemon</i> sp.	
<i>Tragopogon dubius</i>	
<i>Wyethia amplexicaulis</i>	
<b>GRASSES</b>	<b>GRASSES</b>
<i>Elymus trachycaulus</i>	<i>Festuca thurberi</i>
<i>Elymus salinus</i>	<i>Poa pratensis</i>
<i>Festuca thurberi</i>	<i>Poa secunda</i>
<i>Poa pratensis</i>	
<i>Poa secunda</i>	
<i>Stipa columbiana</i>	

## FUTURE SAMPLING

As mentioned above, quantitative sampling methods will be conducted in the near future. The quantitative sampling will be done to measure total living cover, cover by species, frequency, composition and woody species density. This will be accomplished in the growing season of 2007 within the plant communities proposed for disturbance as a result of construction of the new waste rock site and the proposed new reference areas. Sampling methods to be used have been described below.

### Sampling Design and Transect/Quadrat Placement

Transect lines for vegetation sampling will be placed randomly within the boundaries of the proposed disturbed and reference areas. The transect placement technique will be implemented to record the data without preconceived bias by adequately sampling each area entirely using random numbers along the transect lines.

### Cover and Composition

Cover estimates will be made using ocular methods with meter square quadrats. Species composition, cover by species, and relative frequencies will be also assessed from the quadrats.

### Woody Species Density

Density of woody plant species for the proposed disturbed and reference areas will be estimated using the point-quarter method. In this method, random points will be placed on the sample sites and measured into four quarters. The distances to the nearest woody plant species will then be recorded in each quarter. The average point-to-individual distance will be equal to the square root of the mean area per individual. The number of individuals per acre will result from the calculations.

### Statistical Analyses

Student's t-tests will be employed to compare the total living cover and total woody species density of each proposed disturbed area with its respective reference area.

### Photographs

Color photographs of the sample areas will be taken at the time of sampling and included in the final report.

### Threatened & Endangered Plant Species

Prior to recording quantitative data on the plant communities, a sensitive plant species survey will

be conducted. To initiate the study, appropriate agencies will be consulted and other sources will be reviewed (sensitive species files at *Mt. Nebo Scientific, Inc.*) for potential plant species that are known to be rare, endemic, threatened, endangered or otherwise sensitive in the study areas.