



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

Michael O. Leavitt
Governor
Kathleen Clarke
Executive Director
Lowell P. Braxton
Division Director

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

November 5, 2001

TO: Internal File

THRU: James D. Smith, Hydrologist and Team Lead *JDS*

FROM: Priscilla W. Burton, Reclamation Soils Scientist *PB*

RE: Ballpark Drainage, CO-OP Mining Company, Bear Canyon Mine,
C/015/025-AM01A-2

SUMMARY:

There are 37.17 acres within the disturbed area boundary of Bear Canyon Mine. Within the disturbed area boundary, there will be approximately 26 acres regraded during final reclamation. The plan calls for a cover of 12 inches of suitable topsoil substitute over most of the site, including the tipple and coal yard. Appendix 3-L and Chapter 8 explain the details of backfilling and grading. There is ample soil within the fill that will qualify as substitute topsoil for the site. An excess of 3,098 cubic yards of spoil will be available from location TS 5 to cover any areas determined unsuitable for plant growth during final reclamation.

TECHNICAL ANALYSIS:

ENVIRONMENTAL RESOURCE INFORMATION

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

SOILS RESOURCE INFORMATION

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

Analysis:

Native soil types are identified on Plate 8-1 as Datino-Sheepcan-Winetti bouldery loams, 5 – 20% slopes (DZE) in the vicinity of the coal storage yard, and Travessilla-Rock outcrop Strych complex (TR) in the upper pad location. Appendix 8-B contains the 1980 soil survey.

TECHNICAL MEMO

Datino-Sheepcan-Winetti bouldery loams, 5 – 20% slopes (DZE)

In a typical profile of both the Datino and Sheepcan bouldery loams, the soil survey in Appendix 8-B indicates that above the B horizon there is about a foot of loam (page 8B-7). The narrative in Chapter 8 also indicates that there is a foot or more of loam in the surface layer. In the Datino profile, the four-inch topsoil layer is underlain by a seven-inch thick (B_w) loam layer which differs from the A horizon only in color and structure. The Sheepcan bouldery loam also has a five- inch topsoil layer underlain with an eleven-inch subsoil loam.

The Datino bouldery loam is classified as a loamy skeletal, mixed Typic Haploborall. The Sheepcan bouldery loam is classified as a fine-loamy, mixed (Calcareous), frigid Typic Ustorthent.

The Winetti is classified as Loamy-skeletal, mixed (calcareous), frigid, Typic Ustifluvents. It occurs along stream banks and is subject to flooding and erosion. As a result, a shallow topsoil horizon (one inch) lies over the recently deposited alluvium.

Rooting depth of these soils is approximately 60 inches and the available water capacity is 5 – 8 inches to a depth of 60 inches.

Travessilla-Rock outcrop Strych complex (TR)

The Travessilla very bouldery fine sandy loam occurs on ridges and side slopes. It is classified as a loamy mixed, calcareous, mesic, Lithic Ustic Torriorthent. The typical profile has a two-inch A horizon over the fine sandy loam C horizon and bedrock at approximately 14 inches.

The Strych soils are found in the draws and concave positions. Strych soils are loamy-skeletal, mixed, mesic Ustollic Calciorthids. They typically have a four-inch thick loam horizon over a four-inch (B_w) loam layer. A layer of clay accumulation (B_k) lies from 8 – 36 inches below. The C horizon extends to 60 inches.

Substitute topsoil

In 1985, 3,400 cubic yards of soil was imported to the mine site and stored in the “Ball Park.” The soil was deposited over the 1.28 acres to a depth of 24 inches. Appendix 8-A contains the results of soil sampling of the imported ballpark topsoil. Currently the reclamation plan does not propose the use of the ball park soil. Rather, reclamation will utilize buried soil within the operations pads as substitute topsoil.

In 1991 a search for other substitute topsoil (Section 8.9.1) identified the downcast material from the road cuts (further information is in Appendix 8-A and 8-D); the “in-place” soil

covered over by pad development (information in App 8-E); the reclaimed outslope of the coal storage pad (page 8-29). The in-place soils were sampled and analyzed (Appendix 8-E). The soil sampling conducted in 1991 of the substitute topsoil did not include analysis of acid/base accounting, selenium, or boron levels. These analyses have been standard for the use of overburden as substitute topsoil since the implementation of the Division's 1988 guidelines.¹ Most of these soils are buried beneath the operations pad, which is in continual use. Therefore, a commitment in the plan (page 8-26), states that the proposed substitute topsoil material will be re-tested in the final five years of operations. Sample locations will correlate with those areas generating the most substitute topsoil material as described in Appendix 3-L. Samples will be analyzed according to Table 3K-1 and will include Total Petroleum Hydrocarbons by EPA methods 8015 for diesel fuel and 418.1 for waste oil. Table 3-K includes the analysis of selenium, boron, total organic carbon and acid/base accounting according to the methods described in Table 6 of the Division's 1988 guidelines.

Table 8.9-2, Available Substitute Topsoil Material, reports a volume available based upon utilization of the entire depth of the drill sample. i.e. Drill Depth X Area = Volume Available. (Drill hole and sample locations are illustrated on Plates 8-5 B through G.) This information assumes that all soils tested are equally valuable for substitute topsoil usage and that the entire reclamation area (acreage) will be recontoured (which is not the case according to Tables 8.9-3 and 8.9-4).

The Minimum Cut Depth column in Table 8.9-2 indicates the depth of soil to be excavated to arrive at the proposed cover depth for each reclamation area. On page 8-26, the reader is referred to Appendix 3-L for further descriptive information about regrading.

In Appendix 3-L (page 3L-6) the reader is referred to sections 8.9 and 8.10 for information on topsoil depths and sources. Section 8.10 indicates the volume of soil required from each section to achieve the cover depths, but does not discriminate the depths of recovery of the most suitable soil for the reader. So the following questions come to mind: After reviewing the soils information available, are there any soils that should be isolated and buried? Are there any soils should be selectively sorted because of qualities that would make them superior? Or were all soils tested equally valuable for substitute topsoil use.

Patrick Collins of Mt. Nebo Scientific evaluated the soil test results in 1992. His conclusion (found in Appendix 8E) was that "no significant problems exist in the spoils that were sampled."

The Division has reviewed the soil tests and makes the following recommendations:

¹ Leatherwood, James and Dan Duce. 1988. Guidelines for Management of Topsoil and Overburden for Underground and Surface Coal Mining. State of Utah. Department of Natural Resources. Division of Oil, Gas and Mining.

TECHNICAL MEMO

Area TS-3

Sediment Pond B and Scalehouse Pad

- The west embankment will be used to fill the pond and substitute topsoil will come from the removal of culvert C-10U.
- Sediment pond B surface soils (from 0 – 2 feet) have a lower Electrical Conductivity (2.68 mmhos/cm) and are therefore better than those soils sampled **between 2 – 4 feet deep. Soils between 2 – 4 feet deep have EC values of 6.24 mmhos/cm, probably due to contact with the salts diffusing into the soil from pond waters, and are not recommended for use as substitute topsoil.**
- **The top six inches of soil in the vicinity of the Scalehouse should not be used as substitute topsoil resource due to high SAR (7.98 and 8.2) and EC (4.68 – 5.64 mmhos/cm) values.**

Area TS-4

Sediment Pond A

- Eastern and western embankments will be used to fill sediment pond A.
- This soil is represented by SEDA-2 in Appendix 8-3.
- **This soil was sampled to a depth of 2 feet, but the cross-sections show that there will be about ten feet of cut from the sediment pond banks.**

Area TS-5

Tipple and Loadout Area

- Coal storage pad samples are represented in Appendix 8E as CSP1-5.
- EC values are between 1 and 3.5 mmhos/cm with the exception of a higher value (5.04 mmhos/cm) recorded at CSP-1 in the top four feet. However, the SAR values are all very low (less than 1.0) due to the fact that the salt creating the conductivity appears to be magnesium.
- Cuts shown in cross-sections provided in Appendix 3-L are deeper than testing of the soils. **Soils remaining on the surface as substitute topsoil must be tested at the time of reclamation for the parameters described in Table 3K-1.**

Area TS-6

Portal Access Road

- Portal access road samples are represented by sample PAR – 1 at station 8+00 in Appendix 8-3.
- 2,553 cubic yards of material will be generated from the cuts and taken to areas TS – 7 and TS-8.
- 7,111 cubic yards of substitute topsoil will come mainly from station 14+00 and station 26+00. Station 8+00 will yield only 52 cubic yards of substitute topsoil. **The next sampling undertaken in Area TS-6 should correlate sampling locations with the areas generating the most substitute topsoil.**

Area TS-7

Blind Seam Portal Pad

- This area was sampled down to a depth of 10 feet and is represented by LHP-1 in Appendix 8-3.
- **Sample location LHP-1** as shown on Plate 8-5C represents the material from cross section station 2+00 where according to Table 3L-6, 578 cubic yards of substitute topsoil will be generated. **This soil has high SAR values and is not recommended for surface cover.**

Area TS-8

Upper Storage Pad

- This area was sampled down to a depth of 10 feet and is represented by USP-1 in Appendix 8-3. **EC is elevated in the top six inches.**

Area TS-9

Sediment Pond C and Bathhouse Pad

- 1,008 yards of topsoil were salvaged and are stored for use in the location of TS-9.
- 1,762 cubic yards of soil from the bathhouse parking area will be used to fill the ditch leading to sediment pond C and also sediment pond C.
- Samples REF-1 and 2 represent the quality of the topsoil salvaged from this location.
- **A sample of the bathhouse pad parking lot should be taken within five years of reclamation.**

In summation, pad material samples provide an idea of the quality of the material to be found on the surface, but specifics will not be available until final reclamation grading brings the subsoils that will function as substitute topsoil to the surface. **The Permittee should note that there are some areas which have high salts: TS3, TS7 and TS8. There is no information on area TS 9 for the bathhouse pad and little information on TS6, portal access road soils. It is imperative that sampling plan committed to on page 8-26 is conducted and concentrates on the areas that are to yield substitute topsoil.** Sampling after reclamation grading should also be conducted on the exposed surface soils for a limited number of parameters outlined in Table 3K-1.

Findings:

Information provided in the proposed amendment is considered adequate to meet the soils resource information requirements of the Regulations.

TECHNICAL MEMO

OPERATION PLAN

TOPSOIL AND SUBSOIL

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

Analysis:

Removal

Sections 8.9 and 8.10 of the Mining and Reclamation Plan describe the sources of topsoil and substitute topsoil.

Table 8.9-1, Reclamation Area Summary, outlines the total area to be reclaimed (37.17 acres) and identifies the acreage that falls within each reclamation area as shown on Plates 8-5 A through G. Table 8.9-1, Reclamation Area Summary, shows that the Ball Park soils will not be used as substitute topsoil during final reclamation.

Table 8.9-3, Substitute Topsoil Summary, indicates that in addition to the 14,734 cubic yards of topsoil stored on site, there is 51,842 cubic yards of substitute topsoil stored in the fill. Table 8.9-3 also indicates that 36,452 cubic yards of substitute topsoil are required for Reclamation Areas TS 3 through TS 9. Therefore, there is more than enough substitute topsoil available for reclamation from within the fill.

Table 3L-1 indicates that after grading to the contour, and supplying all areas with substitute topsoil there will be an "Excess Volume" of 3,098 cubic yards that will be absorbed through modification of the contours in Reclamation Area TS 5.

Storage

Table 8.9-5, Topsoil Summary, outlines the following yardage of topsoil that has been segregated for reclamation:

1,000 cu yds from the tank house road
+ 1,200 cu yds from the shower house
+ 1,480 cu yds from the main topsoil pile
+11,054 cu.yds from the Wild Horse Ridge topsoil pile
14,734 cu yds Total in storage

Topsoil recovered from the Wild Horse Ridge conveyor belt, access road and portal development is shown on Plate 8-5F. The Wild Horse Ridge topsoil pile is designated for the Wildhorse Ridge disturbance and will not be used for any other areas at the Bear Canyon Mine.

The tank seam topsoil is stored in two piles that together hold 1,000 cubic yards. The tank seam topsoil is reserved for reclamation of the tank seam pad and access road. The pile configurations are shown on Plate 8-6. Plates 8-5E shows the location of the tank seam pad pile. The revision of Plate 8-5C submitted with this amendment shows the topsoil pile, but does not have it labeled. Charles Reynolds² indicated that in two more weeks, the tank seam would be mined out and then in the next year the pad and access road would be reclaimed. Since the topsoil pile will remain in its location along the access road for a very short time, the Division decided not to request another map revision of Plate 8-5C to identify the tank seam access road topsoil pile.

The 1,200 cubic yards from the shower house disturbance will remain in area TS 9, sediment pond C and the bathhouse pad.

The 1,480 cubic yards from the main topsoil pile is reserved for use area TS 4.

Areas TS 5 through TS8 (15.3 acres as noted on Table 8.9-3) will require 24,683 cubic yards of substitute topsoil to blanket the fifteen acres with one foot of substitute topsoil (Table 8.9-3). Table 8.93 further indicates that for reclamation areas TS 5 through TS 8 as much as 40,862 cubic yards of backfill could qualify as substitute topsoil. Essentially, Table 8.9-3 indicates that although one foot of substitute topsoil will be replaced on the reclamation areas TS 5 through TS 8, the effective rooting depth will be twice that depth, since the entire fill is rated as suitable for plant growth.

Section 8.9.1, On-Site Material, states that material on the outslope of the coal storage pad will be protected from contamination by berms and retaining walls and slopes will be stabilized with erosion control matting until a good vegetative cover is established. Any coal spilled on the outslope will be removed. This location should be posted as a substitute topsoil site, with a sign.

Findings:

Information provided in the proposed amendment is considered adequate to meet the operations plan topsoil and subsoil requirements of the Regulations.

² Telephone conversation on October 31, 2001 between Charles Reynolds, Mining Engineer for C.W. Mining Co. and Priscilla Burton.

TECHNICAL MEMO

RECLAMATION PLAN

BACKFILLING AND GRADING

Regulatory Reference: 30 CFR Sec. 785.15, 817.102, 817.107; R645-301-234, -301-537, -301-552, -301-553, -302-230, -302-231, -302-232, -302-233.

Analysis:

General

Table 8.9-1 outlines that approximately 26 acres will be regraded during reclamation. Of these, approximately 18 acres will receive substitute topsoil.

Appendix 3-L provides cut and fill calculations. In Appendix 3-L, Table 3L-1 is a cut and fill summary of reclamation areas TS-3 through TS-9. Reclamation areas and cross-sections are illustrated on Plates 8-5 B through G for current contours and Plates 3-2A through G for reclamation contours.

Table 3L-1 balances cut and fill volumes for each reclamation area. Soil within the fill of Areas TS-3, TS-4, and TS-5 will be used to reclaim those areas. Soil will be exported from TS 5 and TS 6 to Reclamation Areas TS-7 and TS-8. Substitute topsoil for Reclamation Areas TS 7 and TS 8 will be generated within TS7 and TS8, but the deficit in fill shown in Tables 3L-6 and 3L-7 will be imported from Area TS 5 (see Table 8.9-3 for acreages). Table 3.4L in Appendix 3-L indicates that 15,428 cubic yards of excess fill will be generated in Area TS 5, enough to supply the deficit of 13,534 cubic yards in areas TS 7 and TS 8.

Appendix 3L reports the total volume of coal waste is expected to be 4,834 cubic yards. (When sediment and concrete are added to the waste calculation, the volume is 16,503 cubic yards.) As shown on the cross-sections and stated in the narrative (page 3L-13), in area TS 5, coal waste will be buried a minimum of four feet deep with a minimum of twelve inches of topsoil on the surface. Plate 8-5C illustrates two areas to the north and south of the Tipple that do not require regrading or topsoil within Reclamation Area TS 5. These areas will be cleaned of coal and the surface will be seeded.

Cross sections provided in Appendix 3-L have been spot-checked and match the contours provided on Plate 3-2B & C for Area TS-5 and TS-4.

Findings:

Information provided in the proposed amendment is considered adequate to meet the reclamation plan backfilling and grading requirements of the Regulations.

TOPSOIL AND SUBSOIL

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

Analysis:

Redistribution

Reclamation areas have been given TS designations that are identified on Plates 8-5 A-E.

Table 8.9-1 indicates that of the approximately 37 acres disturbed, 26 acres will be re-contoured and receive substitute topsoil or topsoil. Table 8.9-3, Substitute Topsoil Summary, shows that all areas will receive 12 inches of substitute topsoil, except TS-4 (sediment Pond A) where 10 inches of substitute topsoil cover is planned.

The Total substitute topsoil available column of Table 8.9-3 reflects that to the depth analyzed, the fill was determined to be suitable as substitute topsoil. There is a need for 36,452 cubic yards of substitute topsoil for the mine site (excluding Wild Horse Ridge and the tank seam portal and access road). The Deficit of topsoil will be made up from reclamation areas as discussed in Appendix 3-L and summarized below (see Plate 8-5A - E for TS designation locations and cross-section locations).

TS 1 (ball park soil) and TS 2 (lower haul road) will remain during final reclamation and will not be topsoiled.

TS 3 (sediment pond B) and T S4 (sediment pond A) will be reclaimed with embankment material and do not require additional imported substitute topsoil.

TS 9 (sediment pond C and the bathhouse pad) will be reclaimed with the 1,200 cubic yards of topsoil salvaged combined with an additional 2,952 cubic yards of substitute topsoil to provide a topsoil depth of twelve inches.

TS-5 will generate 21,492 cubic yards of substitute topsoil. Of this amount, 15,181 cubic yards will be used in TS 5 (9.41 acres) and the remainder 6,311 cubic yards will be available for backfill in TS-7, and TS-8.

TS 6 will generate 7,111 cubic yards of substitute topsoil. Of this amount, 5,243 cubic yards will be used in TS 6 (3.25 acres) and the remainder 1,868 will be available for use as backfill in TS 7 and TS 8.

TS 7 will generate 4,170 cubic yards of substitute topsoil. Of this amount 2,920 will be used in TS 7 (1.81 acres) and the remainder 1,250 will be available for use as backfill.

TECHNICAL MEMO

TS 8 will generate 3,552 cubic yards of substitute topsoil. Of this amount 1,339 will be used in TS 8 (0.87 acres) and the remainder 2,213 will be used as backfill.

A summary of the substitute topsoil sampling depth and quality is described in the Environmental Soil Resources section of this Technical Analysis and summarized again below.

TS-3

Sediment Pond B and Scalehouse areas

- Sediment pond B embankment was sampled to a depth of 4 feet.
- **The six to 48 inch sample had an EC of 6.24 mmhos/cm (represented by sample site SHP-1 in Appendix 8-E).**
- **Scalehouse soil samples (sampled to a depth of 5 feet) had higher than average EC and SAR values in the top foot (represented by samples SEDB-1 and SEDB-2 in Appendix 8-E).**
- **Therefore, based upon 1991 sampling, the top foot should be avoided for use as substitute topsoil in the scalehouse area and the top four feet should be avoided in the area of sediment pond B.**
- Table 8.9-3 indicates that 2,080 cubic yards of substitute topsoil will be generated from cuts on the site and 2,562 cubic yards of in-place soils will be prepared as substitute topsoil.

The present submittal states on page 3L-8 that

1. The west embankment will be removed and used as fill for sediment pond B.
2. Additional substitute topsoil will come from soil backfilled over culvert - C10U.

TS-4

Sediment Pond A

- Sediment pond A was sampled to a depth of two feet.
- The material in the top two feet is adequate for substitute topsoil, as the Electrical Conductivity values of 3.67 – 4.23 mmhos/cm were not accompanied by elevated SAR values.

The present submittal states on page 3L-11 that

1. Fill for sediment pond A will come from the embankments.
2. Substitute topsoil (1,008 cubic yards) will also come from the embankments.

TS-5

Tipple and Loadout Area

- Represented by samples CSP1 -3 in Appendix 8-3 (sampled to a depth of 6 – 8 feet).
- The present submittal indicates in Appendix 3-L that
 1. Twelve inches of substitute topsoil material will be placed over fill and that the coal mine waste will be buried four feet deep within the fill (page 3L-4).
 2. Areas where operational contours (shown on Plate 8-5C) and reclamation contours (shown on Plate 3-2C) match will utilize the surface soil as substitute topsoil and no additional material will be brought to the location for cover.
 3. Where cuts created the reclamation contours, the exposed soil will become the substitute topsoil.
 4. Total volume of waste to be buried in location TS-5 is 16,503 cubic yards. This material will be buried four feet in the fill (pages 3L-4 and 3-L5).
 5. The required volume of substitute topsoil is 15,181 cubic yards (Table 8.9-3).
 6. According to Table 3L-4, there will be 21,492 cubic yards of cut that will be utilized as substitute topsoil. This soil will come mostly from the eastern side of the pad as stations 1+00, and 4+00 through 9+00.
 7. Excess substitute topsoil (approximately 6,311 cubic yards) will be moved from TS -5 for use as backfill in TS-7 and TS-8.

TS 6

Portal access road

- The portal access road outslope is represented by sample PAR-1 in App 8-3. (sampled down to 7 feet).
- The present submittal indicates in Appendix 3-L, page 3L-29 that
 1. The revegetated outslope shown on cross-sections at station 11+00, 12+00, 13+00, 15+00 and 16+00 will remain undisturbed through final reclamation. This extremely steep slope is shown as BTCA Area G on Plate 7-1D, Hydrology Map.
 2. 2,553 yards of material will be generated from this area for use in TS-7 and TS-8. The soil to be taken as fill to TS-7 and 8 will come from stations 14+00 and 26+00.

Findings:

Information provided in this submittal meets the minimum Reclamation Topsoil and Subsoil requirements of the Regulations.

TECHNICAL MEMO

RECCOMENDATIONS:

The Permittee should note that there are some areas which have high salts: TS3, TS7 and TS8. Based upon 1991 sampling of Reclamation Area TS3, the top foot of soil should be avoided for use as substitute topsoil in the scalehouse area and the top four feet should be avoided in the area of sediment pond B.

A commitment in the plan (page 8-26), states that the proposed substitute topsoil material will be re-tested in the final five years of operations. Sample locations will correlate with those areas generating the most substitute topsoil material as described in Appendix 3-L. Samples will be analyzed according to Table 3K-1 and will include Total Petroleum Hydrocarbons by EPA methods 8015 for diesel fuel and 418.1 for waste oil. Table 3-K includes the analysis of selenium, boron, total organic carbon and acid/base accounting according to the methods described in Table 6 of the Division's 1988 guidelines. It is imperative that the reclamation sampling plan focuses on areas that are to yield substitute topsoil.

The excess spoil volume generated in Reclamation Area TS5 may be utilized to cover areas of high salts as determined by final reclamation soil sampling.

The submittal is recommended for approval.