



State of Utah

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

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TO: Internal File

THRU: Wayne H. Western, Senior Reclamation Engineer/Team Lead *W#W*

FROM: Priscilla W. Burton, Senior Reclamation Specialist/Soils *PB*

RE: Revision to Reclamation Plan, Energy West Mining Company, Deer Creek Mine, C/015/018-AM99C-(6)

SUMMARY:

The Division requested information from Energy West in a letter dated July 16, 1998 as part of a mid-term review of the Deer Creek Mine. The chronology of the mid-term review is itemized below along with the reviewer of each submittal.

Energy West Submittals	Division Review Date	Soils Reviewer
8/7/98 initial mid term submittal	September 14, 1998 request for highwall elimination plan	
May 26, 1999 revised reclamation plan including highwall elimination	July 6, 1999	Davidson
December 6, 1999	March 13, 2000	Davidson
September 21, 2000	November 3, 2000	Baker
March 22, 2001	May 18, 2001	Baker
July 20, 2001	September 27, 2001	Burton
November 9, 2001	February 28, 2002	Burton
April 8, 2002	This review	Burton

The information submitted supercedes that in the approved MRP, Volume 2, Part 4.

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The Permittee has characterized the refuse as toxic forming (due to SAR and pH). The submittal indicates that all toxic and acid-forming material will be covered with four feet of fill material. Sampling of the site in 2002 will further characterize and quantify the waste.

The submittal identifies enough cover for a twenty-seven inch substitute topsoil depth over the entire site, including the salvage of the twenty-four inches from the reclaimed out slopes for use in the top four feet over the salt laden soils of the materials storage yard.

The terraced hillside south of the disturbed area will be reclaimed by the Abandoned Mine Lands program.

TECHNICAL ANALYSIS:

OPERATION PLAN

TOPSOIL AND SUBSOIL

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

Analysis:

Topsoil Substitutes and Supplements

Exploration/Sampling Program - Substitute Topsoil

The Deer Creek Mine was developed prior to enactment of the Surface Mining Control and Reclamation Act (SMRCA), and topsoil was not salvaged or stockpiled during construction and mine development activities. The applicant intends to use construction fills within the disturbance area as substitute topsoil. Much of this fill material came from the terraced area on the south side of Deer Creek Canyon.

In 1999, eighteen samples were taken from the terraces from which much of the fill originated, and these were analyzed for the parameters in the Division's soils guidelines. Sample locations are shown on DS-1810-D and results are in Appendix R645-301-200-C. There is no information about the depth of sampling or whether these samples were composites. Clay percentages are high (averaging 32% in the upper two terraces) and textures are listed mostly as clay loam. The pH is just above neutral. The Electrical Conductivity is less than 0.7 mmhos/cm.

Total Organic Carbon content was on the average 5.3%, whereas total Nitrate Nitrogen averaged 0.39 ppm.

Most of the samples from 1980 and 1983 show few problems with EC or SAR values; however, two samples from the parking lot fill slope had EC values of 9.0 (assumed to be

mmhos cm^{-1}). This could be a result of using salt as discussed above, and the problem may have grown progressively worse to where some of these soils are now unusable.

The Permittee commits in this application to conduct a soils sampling program during in June through October of 2001 and 2002. The areas to be sampled will be at accessible sites between 9+00 - 15+00 and 24+00 - 30+00 shown on map DS-1782-D (as stated in Appendix R645-301-200-A). As stated on page 2-2 and in Appendix A, testing will be done according to the Division's soils guidelines. The timetable commitment is acceptable, and it is important that the Permittee and the Division ensure soil samples are actually taken and analyzed and that the mining and reclamation plan is amended accordingly.

Fill materials, which have been seeded for 15 to 20 years, may also be a source of cover material to be used a cover over the site.

Exploration/Sampling Program – Refuse Piles

Within Chapter 3 of the current mining and reclamation plan, page 3-65, Table 7, Deer Creek Mine - Waste Rock Analysis, several problems are identified associated with materials taken from roof and floor materials. Data is incomplete since no determinations were made for selenium or for acid base potential. One of the samples had a paste pH value of 5.87, which indicates there could be acid forming potential. One Blind Canyon floor sample apparently had a very high SAR value, which indicates that although some areas may meet the Division's criteria, there are probably isolated problem areas.

The Division lacks confidence in the data in Table 7 because some of the SAR values do not correlate with the reported calcium, magnesium, and sodium values. Either some of the SAR values were calculated incorrectly or the sodium, calcium, and magnesium values were not reported correctly.

Tables I and II in Chapter 4 also show some chemical analyses of coal waste and one sample of slag. The slag sample had a very high pH (10.9), but otherwise, no problems were found in the refuse or slag samples. However, the applicant did not test these samples for several parameters listed in the Division's *Guidelines for Management of Topsoil and Overburden for Underground and Surface Coal Mines*. The Division recognizes that the 1980 thru 1983 operational sampling took place prior to implementation of the 1988 guidelines for topsoil and overburden. However, reclamation standards for soil and overburden are now rated using the 1988 guidelines. Therefore, since sampling did not follow the current 1988 Division guidelines for topsoil and overburden, information in Tables I and II is incomplete and does not show that the fill or refuse materials in Deer Creek and Elk canyons are suitable for achieving the revegetation standards.

The Division cannot make a determination of waste acceptability based upon early sampling. Errors exist within some of the data in the current plan, and some analyses are incomplete and do not follow the Division's soils guidelines. Furthermore, unacceptable criteria are identified for Blind Canyon floor samples for SAR and pH, and poor criteria are met on Blind Canyon split samples for SAR and on Hiawatha floor samples for pH. Therefore, since

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data errors exist, data is incomplete, and roof and floor analyses identify toxicity, the Division determines that the refuse is toxic forming and unacceptable for plant growth and must be covered with a minimum of four feet of acceptable material.

Appendix R645-301-200-A contains recent analyses (2001) of two core samples from the refuse piles, one from Deer Creek Canyon (site #1) and one from Elk Canyon (site #6). Sample locations are shown on Drawing DS-1810-D. Sites #1 and #6 were sampled to depths of 25 feet. The texture of the material at site #1 was a sandy loam with a clay loam layer between 6 and 7.5 feet. At site #6, the texture was a sandy loam with a higher clay content at three feet creating a loam texture. Acid base accounting information is positive for sample sites #1 and #6, however the refuse will require four feet of cover based upon the following information from the 2001 sampling:

- Extreme sodicity was found to a depth of 7.5 feet at site #1; SAR values were 30.7 and 42. This could be because the sample site was near storage docks where salt may have been used. The refuse in Elk Canyon, site 6, is also sodic, but not to the extreme noted at site #1. However an SAR value of 11.5 is combined with an extreme pH of 9.0 in the top 1.5 feet.
- Total Organic Carbon at site #1 was reported to be 22% in the top 2 feet and dropped to below 5% at fifteen feet depth. In addition, at site #6, the Total Organic Carbon content was 36% in the top two feet and remained above 21% for the entire depth of sampling, exceeding 50% at the nine to ten foot depth increments.
- At all depths, at both sites, selenium content exceeded the recommended limits in the Division guidelines.

Sampling to determine the extent of the toxic material and to discover substitute topsoil at depth in the fill will be continued in 2002 (submittal, page 2-4). Sample points will be placed randomly in the refuse areas, and samples will be taken at three-foot depth intervals to a point four feet below the grade of the proposed final surface configuration. Samples will also be taken along the proposed channel location. The 2002 sampling may include trenching at various locations.¹ This commitment is acceptable.

All soil and refuse sampling will be conducted according to R645-301-130: which is to say that names of individual collectors and dates and locations of collection will be reported (page 2-4). Qualified professionals will conduct technical analyses as per R645-301-132.

Findings:

Information provided in the proposal is adequate to meet the requirements of Operation Plan, Topsoil and Subsoil section of the Regulations.

¹ Personal communication on January 2, 2002 with Dennis Oakley, Environmental Engineer with Energy West Mining Company.

RECLAMATION PLAN

TOPSOIL AND SUBSOIL

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

Analysis:

Redistribution

Table 3-1 shows the timing of various steps in reclamation, and Table 3-2 is a schedule of monitoring activities. Except for soil sampling, the reclamation timetable does not show months in which the activities would occur, but a note below the table discusses the timing of seeding and planting more specifically. Soil salvage and replacement activities would be done during backfilling and grading operations.

Reclamation will involve three disturbed areas: Deer Creek Canyon, Deer Canyon, and Elk Canyon. According to the backfilling and grading plan in Section R645-301-553 of the application, reclamation will begin at the uppermost parts of the disturbed areas and will proceed down the canyons. Various stages of the process will be occurring simultaneously. Substitute topsoil will be excavated from the existing undisturbed drainage corridor. Substitute topsoil will be placed as shown on drawing DS-1816-D in Appendix R645-301-500C.

Maps DS1783D Sheets 1 and 2 illustrate substitute topsoil excavation along the length of the Deer Creek drainage. The locations of these cross sections are shown on map DS-1782-D. A statement on page 5-6 indicates that substitute topsoil will be taken from between stations 3+00 and 31+00. It is estimated 58,891.08 cubic yards of material can be obtained to provide an average cover depth of 27 inches over 16 acres as illustrated on Map DS-1816-D.

The upper 18 – 24 inch layer on the fill slopes at the equipment yard and run of mine conveyor which were seeded twenty years ago will be used as substitute topsoil over the less desirable soils (high SAR) in the material storage yard (pg 5-7). The procedure will be as follows:

- Push the top seven feet of pad soils towards the cut slope.
- Utilize remaining soils to complete the 2:1 slope.
- Cover these salt-laden soils with the top twenty-four inches of remaining outslope material.

Substitute topsoil for the water tank and fan pad will come from the top layer of the berm and outslope of the pad (Section R645-301-500, page 5-7).

Soil Nutrients and Amendments

The biology chapter of the application says fertilizer will be applied at the rate of 40 pounds per acre of ammonium nitrate and 35 pounds per acre of triple superphosphate. The

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relatively low.

In addition to the fertilizer, the applicant commits to apply one ton per acre of certified noxious weed free hay, and the hay and fertilizer will be incorporated into the soil in the gouging process. This should help to increase the amount of organic matter and the fertility and structure of the substitute topsoil.

Refuse Pile Reclamation

To date, information on the refuse shows that it is unsuitable as a plant growth medium. However, sampling of vegetation established on portions of the refuse pile for interim erosion control indicates the refuse can, at least in some areas, support vegetation. In 1998, vegetation cover on the refuse pile was measured by the applicant's consultant as 40.5%, and in 1999, vegetation cover on the pinyon-juniper reference area was roughly estimated as about 40%. While this seems to indicate the refuse can, by itself, support adequate vegetation, there is no vegetation established on the area of the refuse pile where the high salt concentrations were found near the surface.

Refuse distributed in the fill must be covered by four feet of non-toxic material. Refuse that is cut during grading will be used as fill along cut banks and highwalls. Any acid-forming or toxic materials will be covered with four feet of non-acid and/or nontoxic material (pp 2-3, 5-9 and 5-10 of the submittal).

The Permittee has indicated that the volume of refuse requiring four feet of cover can not be estimated until the 2002 sampling program is completed. To date, sampling information indicates that the surface 7.5 feet will be excavated and buried in the fill. Sampling in the year 2002 will concentrate on the Deer Creek and Elk Canyon refuse piles. Page 5-10 also indicates that the spoil stored southeast of the coal bin (Elk Canyon) will be tested for acid/toxic characteristics prior to its use as fill within the top four feet.

Findings:

Refuse/Soil sampling will occur in the field season of 2002. Results of this sampling will be used to update the Mining and Reclamation Plan with the estimated volume of refuse in the Deer Creek refuse pile (vicinity of site #1) and the Elk Canyon refuse pile (vicinity of site #6). Information provided in the proposal is adequate to meet the requirements of Operation Plan, Topsoil and Subsoil section of the Regulations.

STABILIZATION OF SURFACE AREAS

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

Analysis:

Once substitute topsoil has been distributed, the surface will be roughened by deep gouging (pocking) using a trackhoe to create depressions approximately 3 feet diameter x 1.5 feet deep. The application says these depressions will be developed throughout the reclaimed area and will influence moisture retention and greatly reduce sediment loss. Deep gouging creates depressions across the surface, which increases water harvesting and helps reduce surface erosion. In addition, rock litter consisting of various sized rocks and boulders will be randomly placed on the slopes and/or nested into the soil to help control slope slippage.

After seeding, the application says certified noxious weed free straw mulch will be applied at a rate of 2000 pounds per acre followed by application of 500 lbs/ac of tackifier on slopes greater than 20% to anchor the straw mulch and stabilize the soil. This mulching technique has worked very well at similar nearby mine sites.

Rills and gullies which develop to a depth of nine inches or greater in areas that have been re-graded and topsoiled and which either; (1) disrupt the approved post-mining land use or the reestablishment of the vegetative cover, or (2) cause or contribute to the violation of water quality standards for receiving streams will be filled, regraded, or otherwise stabilized. The topsoil will be replaced and the areas will be reseeded.

Findings:

Information provided in the application is adequate to meet the requirements of this section of the regulations.

RECOMMENDATIONS:

The application is approved for insertion into the MRP. As a result of this series of reviews, the Permittee understands that the refuse is not acceptable as a plant growth medium and must be covered with four feet of material. There is no surplus of cover material. Refuse and spoil and fill slopes will be sampled and analyzed in 2002 to provide information on the volume of toxic mine waste on site. The MRP will be updated with the analytical results from this sampling and with any reclamation plan changes as a result of the sampling. This approach is acceptable. The information submitted should be incorporated into the MRP.

The reclamation plan does not include the four terraces created pre-law. This area has been brought to the attention of the Abandoned Mine Reclamation personnel.