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Date: 1/27/03 3:10PM
Subject: Amended TA_99C-7

Daron,

Attached is the TA with my edits that correspond to the revised plan. I will get you 7 complete clean copies before Feb. 3, 2003.
<<TA_99C7.doc>>

Dennis Oakley
Environmental Engineer

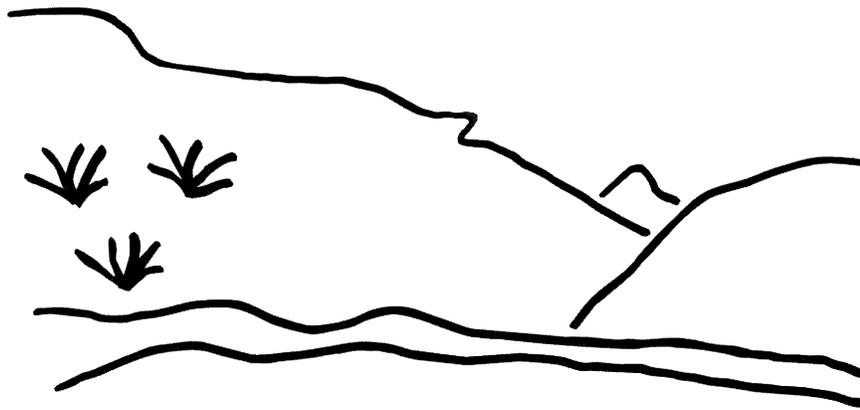
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State of Utah



Utah Oil Gas and Mining

Coal Regulatory Program

Deer Creek Mine
Revision to Reclamation Plan
C/015/018-AM99C-7
Technical Analysis
January 14, 2003

TABLE OF CONTENTS

INTRODUCTION.....	3
GENERAL CONTENTS.....	5
PERMIT APPLICATION FORMAT AND CONTENTS	5
REPORTING OF TECHNICAL DATA	5
OPERATION PLAN	7
TOPSOIL AND SUBSOIL.....	7
RECLAMATION PLAN.....	11
APPROXIMATE ORIGINAL CONTOUR RESTORATION.....	11
BACKFILLING AND GRADING.....	14
General.....	15
MINE OPENINGS.....	18
TOPSOIL AND SUBSOIL.....	20
Redistribution.....	20
ROAD SYSTEMS AND OTHER TRANSPORTATION FACILITIES	21
Reclamation	22
HYDROLOGIC INFORMATION	22
Water Quality Standards and Effluent Limitations.....	22
Diversions	23
STABILIZATION OF SURFACE AREAS	25
MAPS, PLANS, AND CROSS SECTIONS OF RECLAMATION OPERATIONS	26
Reclamation Backfilling and Grading Maps.....	26
Reclamation Facilities Maps.....	27
Final Surface Configuration Maps.....	28
BONDING AND INSURANCE REQUIREMENTS.....	28
Determination of Bond Amount	28

TABLE OF CONTENTS

TECHNICAL ANALYSIS

The Division ensures compliance with the Surface Mining Control and Reclamation Act of 1977 (SMCRA). When mines submit a Permit Application Package or an amendment to their Mining and Reclamation Plan, the Division reviews the proposal for conformance to the R645-Coal Mining Rules. This Technical Analysis is such a review. Regardless of these analyses, the permittee must comply with the minimum regulatory requirements as established by SMCRA.

Readers of this document must be aware that the regulatory requirements are included by reference. A complete and current copy of these regulations and a copy of the Technical Analysis and Findings Review Guide can be found at <http://ogm.utah.gov/coal>

This Technical Analysis (TA) is written as part of the permit review process. It documents the Findings that the Division has made to date regarding the application for a permit and is the basis for permitting decisions with regard to the application. The TA is broken down into logical section headings which comprise the necessary components of an application. Each section is analyzed and specific findings are then provided which indicate whether or not the application is in compliance with the requirements.

Often the first technical review of an application finds that the application contains some deficiencies. The deficiencies are discussed in the body of the TA and are identified by a regulatory reference which describes the minimum requirements. In this Technical Analysis we have summarized the deficiencies at the beginning of the document to aid in responding to them. Once all of the deficiencies have been adequately addressed, the TA will be considered final for the permitting action.

It may be that not every topic or regulatory requirement is discussed in this version of the TA. Generally only those sections are analyzed that pertain to a particular permitting action. TA's may have been completed previously and the revised information has not altered the original findings. Those sections that are not discussed in this document are generally considered to be in compliance.

INTRODUCTION

INTRODUCTION

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	May 9, 2002	Burton

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

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 Abandoned Mine Lands program will reclaim the terraced hillside south of the disturbed area.

GENERAL CONTENTS

GENERAL CONTENTS

PERMIT APPLICATION FORMAT AND CONTENTS

Regulatory Reference: 30 CFR 777.11; R645-301-120.

Analysis:

Plate DS-1810-D has been corrected to accurately place sampling locations.

The areas to be sampled will be at accessible sites ~~between 3+00 and 31+00 (as stated on page 2-2) or~~ 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.

Findings:

Information provided in the proposal is clear and concise and in an acceptable format. Upon approval, it is expected that the Permittee will provide the Division with seven (7) clean copies of the application to be stamped "Incorporated" and to be inserted into the MRP.

REPORTING OF TECHNICAL DATA

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

Analysis:

In Appendix R645-301-200-A, contains laboratory data for Site #1 and Site #6. The information provided is a complete analytical suite of parameters and includes the name of the laboratory conducting the work (InterMountain Laboratory, Sheridan WY).

Findings:

The information provided is adequate for the purposes of the regulations.

OPERATION PLAN

OPERATION PLAN

TOPSOIL AND SUBSOIL

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

Analysis:

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 (pg 5-7).

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.

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. **Tables I and II will be eliminated from the plan when the revised reclamation plan is incorporated into the MRP.**

~~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 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:

OPERATION PLAN

- 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. (Personal communication, January 2, 2002, with Dennis Oakley, Environmental Engineer, Energy West Mining Company.). 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.

RECLAMATION PLAN

RECLAMATION PLAN

APPROXIMATE ORIGINAL CONTOUR RESTORATION

Regulatory Reference: 30 CFR 784.15, 785.16, 817.102, 817.107, 817.133; R645-301-234, -301-270, -301-271, -301-412, -301-413, -301-512, -301-531, -301-533, -301-553, -301-536, -301-542, -301-731, -301-732, -301-733, -301-764.

Analysis:

The requirements for restoring a site to the approximate original contour (AOC) are couched in the backfilling and grading regulations. The only regulation that specially mentions AOC requirements is R645-301-553.110 that states the following:

Achieve the approximate original contour (AOC), except as provided in R645-301-553.500 through R645-301-553.540 (previously mined areas (PMA's), continuously mined areas (CMA's) and areas subject to the AOC provisions), R645-301-553.600 through R645-301-553.612 (PMA's and CMA's), R645-302-270 (non-mountaintop removal on steep slopes), R645-302-220 (mountaintop removal mining), R645-301-553.700 (thin overburden) and R645-301-553.800 (thick overburden);

Since some of the highwalls at the Deer Creek site are CMA's the Permittee can leave highwall remnants when allowed under R645-301-553.600 through R645-301-553.612. Thus the Permittee can leave some highwalls remnants and still meet the AOC requirements at the Deer Creek Mine site.

The Division's technical memo Tech-002 gives additional AOC guidelines. Those guidelines were also used to evaluate the Deer Creek Mine for AOC compliance.

Except as specifically exempted, all disturbed areas shall be returned to the approximate original contour. The final surface configuration shall closely resemble the general surface configuration of the land prior to mining. To evaluate compliance with this requirement, the term "surface configuration" must be clarified. Surface configuration refers to the premining and postmining topography of the mine site and surrounding area.

The term AOC does not mean that the land is restored to the original contours. Elevation of the premining and postmining site plays a minor role if any in evaluating AOC.

The main question that the Division answers when evaluating AOC is "Does the postmining topography, excluding elevation, closely resemble the premining configuration?" The Division evaluates premining and postmining topography on slope length and angle, and whether restoring the site to the original contours would violate other rules.

In some cases the Permittee cannot restore the site to the premining contours without violating other regulations, such as slope stability and erosion. Many of the natural slopes in the area are at the angle-of-repose. When a slope is at its angle-of-repose, the safety factor is 1.0 or slightly greater. The minimum safety factor for reclaimed slopes is 1.3. If all slopes were

returned to the premining conditions, the safety factor requirement could not be met.

When the natural slope has a safety factor less than 1.3, the Permittee usually opts to reduce the slope angle by either extending the toe or decreasing the height. Extending the slope's toe may block the drainage which violates other regulations. If the Permittee decreases the slope height then a cut slope will be left.

The Deer Creek mine consists of four separate surface facilities. This TA will address how each of those facilities will be reclaimed.

Deer Creek

The final contour map for the main Deer Creek site is Drawing DS1782D, Creek Mine Disturbed Area Final Reclamation Contour Map, and the reclamation cross sections are on Drawing DS1783D and DS1784D. The reclamation contours maps show the locations of the highwall remnants, the location of the cross sections, the refuse piles, drainage systems and the cut and fills quantities. The cross section maps show the locations of the Blind Canyon coal seam and the concrete and asphalt disposal areas.

The cross sections are not always perpendicular to the contours. Thus the cross sections show slopes that are less steep than the maximum slope angle. This is important to remember when evaluating highwall reclamation.

The main Deer Creek facilities area is considered a pre law site, because it was constructed before May 3, 1978. Because the site is pre law, the Permittee only has to eliminate highwalls to the extent practical. On page 5-12 the Permittee explains why highwall remnants will remain as follows:

Highwall remnants are proposed at the Deer Creek Mine since sufficient fill material does not exist to completely eliminate these areas. The areas are outlined on maps DS-1782-D, 1 of 1 and DS-1783-D 1 of 2, 2 of 2. The Deer Creek Mine is considered a continuously mine area (CMA). Development of the portals began before the passage of SMCRA and therefore, no spoil material was ever salvaged. Since it is impossible to completely eliminate the highwall areas, the idea is to blend these areas into the natural surroundings of the canyon to become compatible with the approved post mining land use.

The portion of the highwalls remaining consist of near vertical fluvial channel sand escarpments associated with the Blackhawk formation (refer to Volume 8, Geologic Section). The fill material below these areas is combination of crushed concrete and underground development wastes. Stability of these areas are presented below. A conceptual highwall elimination plan for the Deer Creek is presented in Appendix R645-301-500-D. Cut and fill estimates agree with the highwall elimination plan.

The main reasons why the Division allows highwall remnants to remain are (1) slope stability problems and (2) lack of fill material. Many highwalls in Utah are located in steep canyon. If the Permittees were to completely backfill the highwalls in some steep canyon the

RECLAMATION PLAN

results would be either the slope is too steep to achieve the 1.3 safety factor or the backfill would interfere with the drainage plans. The Division reviewed the cross section and found that the Permittee could eliminate the highwall remnants by placing more fill. The additional fill could be placed without decreasing the safety factor below 1.3 or interfering with the drainage plan. See Appendix R645-301-500-E for the slope stability study. Therefore, slope stability concerns are not the reason that the Division would allow highwall remnants to remain.

The Division reviewed the cut and fill calculations. The Permittee does not have enough fill material on the site to totally eliminate the highwalls and have the reclaimed topographies blend into the surrounding topography. The Permittee could place more fill against the highwall to reduce or eliminate the highwall remnants. If the Permittee did eliminate the highwalls then they would not have enough fill to grade the rest of the site so that it blended into the surrounding topography. If the Permittee placed most of the fill along the highwalls then the valley floor would have to be flat. The surrounding topography is V-shaped valleys not valleys with steep slopes and a flat bottom.

The valley walls consist mostly of soil overlying bedrock. If the Permittee were to get more fill on site their only option would be to use bedrock.

The highwalls are usually at the base of natural cliffs. If the Permittee placed more fill along the highwalls they would not eliminate the safety hazards associated with cliffs or restore the area to the natural topography.

The surrounding area contains natural cliffs. The highwall remnants at the cliff bases will blend into the surrounding topography.

The Division has determined the Permittee has met the minimum requirements of R645-301-553.600. The Permittee cannot reclaim all the highwalls because they do not have access to enough reasonably available fill material.

Rilda Canyon

The reclamation plans for Rilda Canyon are shown on drawing CE-10884-EM. Rilda Canyon Final Reclamation of Surface Facilities and Access Road and the cross sections on drawing CE-10891-EM (sheet 1 and sheet 2) Rilda Canyon Access Road/Facilities Cross Sections. The cross sections show that the area will be restored to a configuration similar to the original topography. The main difference is some slopes will be less steep because the Permittee needs to place excess material along the slopes.

The Permittee shows the location of the highwalls both on the topographic map and cross sections. The cross sections show that the highwalls (portal face up) boundaries. During reclamation the highwalls will be completely covered.

The slope angles are no steeper than 2H:1V, which the Division considers stable under most circumstances. The Permittee did not address slope stability at the Rilda Canyon site.

9th East Grimes Wash Portals

The Grimes Wash portal area has been reclaimed. The as built drawings were approved on February 14, 2001 and are located in Appendix 14 of Volume 3 of the MRP. The plans show that the highwalls have been reclaimed. Most of the highwalls were constructed in vertical out crops. Therefore, the extent of the highwall was limited to the approximate portal dimensions.

9th East North Meetinghouse Portals

The 9th East North Meetinghouse Portals consist of two breakouts that are 20 ft. long, 20 ft. wide and 8 ft. tall. The reclamation plan for the portals is as follows:

- Backfill the portals for approximately 25 ft. from the opening using rock materials from inside the mine.
- Construct a solid concrete block seal.
- Remove all noncoal waste from the surface area. No coal waste is located at the site.
- Backfill the portals openings at a 2 H to 1 V slope. Approximately 120 CY of material is needed per portal.
- Soil will be placed over the backfill material.
- The site will be seeded.

Map DS1798C shows the location of the portals, the underground workings and a picture of each portal. The Division usually requires maps and cross sections that show the premining, operational and reclaimed site. However, because the site is so small the Division will not require any additional maps and cross sections. The pictures and narrative provide enough information for the Division to analysis the reclamation plan and make a finding.

The pictures on Map DS1798C show that only a small highwall exists at the site (area of disturbance above the portal.) The reclamation plan calls for the area to be backfilled and grade. During the backfilling the highwalls will be eliminated. Since the reclaimed slopes will be 8 to 10 ft. high and have a 2 H to 1 V slope the site should be stable. The Division finds that the reclamation plan is adequate to meet the requirement of the coal rules.

Findings:

The Permittee has met the minimum regulatory requirements for Approximate Original Contour.

BACKFILLING AND GRADING

RECLAMATION PLAN

Analysis:

General

Deer Creek Site

The general backfilling and grading requirements are that the site be restored to the approximate original contours; the elimination of all highwalls, spoil piles and depressions; have stable slopes; minimize erosion and water pollution both on and off the site; and support the approved postmining land use.

The Deer Creek site meets the general requirements for being reclaimed to the approximate original contour requirements. The general requirements are that the site blend into the surrounding area, the reclaimed drainages complement the natural drainages and highwalls are eliminated. Because the Deer Creek site is pre law, the Division will allow some highwall remnants to remain.

The main facilities are in steep canyons and were constructed before the enactment of SMCRA. The steep slopes and pre law development combine to prevent the Permittee to restoring the site to the original configuration. However, the reclamation plan shows that the site will have a topography similar to the surrounding areas. See the final reclamation contour map and cross sections drawings (see drawings DS1782D, DS1783D and DS1784D for details). The restored channels will be in the bottom of the canyons and will complement the existing drainages.

The portals in the main Deer Creek facilities area were constructed before the enactment of SMCRA, May 3, 1978. Because the portals are pre SMCRA, the Permittee does not have to completely eliminate the highwalls to comply with the AOC requirements.

The main problem that the Permittee has with highwall elimination is lack of fill material. On drawing DS1782D, Deer Creek Mine Disturbed Area Final Reclamation Contour Map, the Permittee shows the cut and fill quantities. The Permittee shows that 175,918 cubic yards of cut material are available and 156,279 cubic yards of fill material are needed. The Permittee is faced with a shortage of fill material. Since soil volume calculations are at best $\pm 10\%$ and the difference between the cut material (material to be moved) to the fill material (material to be placed during reclamation) is 12% the Division considers the cut and fill quantities to balance.

The cross sections that show the cut slopes are shown on drawings DS1883D and DS1784D. The highwall at station 18+00 is at the base of a cliff. The Permittee could place more fill against the highwall to eliminate it but would gain almost nothing. The steep cliff above the highwall is more of a safety hazard than the highwall itself. During reclamation the contractor could feather the restored slope with the natural slope so that the transition zone would appear almost natural.

The highwall located along stations 21+00 to 23+00 are also at the base of a steep natural cliff. The Permittee could place more fill at the top of the highwall to eliminate it. However, the

Permittee would gain little because the natural cliff is more of a safety hazard than the highwall. The highwalls will be reclaimed with 2H:1V slopes as shown in Appendix R645-301-500D. The cross sections for the reclaimed highwall on drawings DS1883D and DS1784D have slopes less than 20°. The reason for the gentler slope is that the cross sections are not perpendicular to the strike (maximum steepness) of the slope.

The safety factors for the reclaimed highwall slopes are greater than 1.3. The Permittee could increase the slope angle and eliminate more highwall remnants. If the Permittee were to increase the fill used to eliminate the highwalls then they would have to decrease the fill in other areas. A lack of fill in other areas could prevent the site from blending into the surrounding areas. R645-301-553.600 allows the Permittee to leave pre SMCRA highwall remnants if they do not have enough fill material. The Division has reviewed the backfilling and grading plan and determined that the Permittee does not have enough material on the site to eliminate the per SMCRA highwalls.

On drawing DS1783D, Deer Creek Mine Deer Creek Canyon Final Reclamation Cross Sections, the Permittee shows the location of the concrete storage areas. Concrete will be used a fill material because of a lack of on site material.

Rilda Canyon

The breakouts at Rilda Canyon are post SMCRA. The reclamation contour map for Rilda Canyon is Map 4-1A Deer Creek Mine - Rilda Canyon Final Reclamation of Surface Facilities and Access Road (Drawing # CE-10884-EM) and the cross sections are shown on Map 4-4A Deer Creek Mine Rilda Canyon Access Road/Facilities Cross Sections (Drawing # CE-10891-EM). The reclamation plan calls for the complete elimination of all highwall in Rilda Canyon. The highwall remnants are shown on the cross section.

The Permittee did not address slope stability at Rilda Canyon. The reclaimed slopes will have slope of 3H to 1V. In other areas slopes with angles of 2H to 1V have safety factors greater than 2. Based on other safety factor studies in the area the Division considers the slopes to be stable.

9th East Grimes Wash Portals

The portal site was originally disturbed by coal mining activities dating back prior to 1920. Evidence of the early mining activities can be seen by the remnants of 2 partially open portals, a coal handling area south of the portals and evidence of a wooden coal chute above the Wilberg Mine fan. The Permittee reclaimed the area and the Division approved the as-built drawings on February 14, 2001. See Appendix XIV of Volume 3 of the MRP for more details.

9th East North Meetinghouse Portals

The 9th East North Meetinghouse Portals consist of two breakouts that are 20 ft long, 20 ft. wide and 8 ft. tall. The reclamation plan for the portals is as follows:

RECLAMATION PLAN

1. Backfill the portals for approximately 25 ft. from the opening using rock materials from inside the mine.
2. Construct a solid concrete block seal.
3. Remove all noncoal waste from the surface area. No coal waste is located at the site.
4. Backfill the portals openings at a 2 H to 1 V slope. Approximately 120 CY of material is needed per portal.
5. Soil will be placed over the backfill material.
6. The site will be seeded.

Map DS1798C shows the location of the portals, the underground workings and a picture of each portal. The Division usually requires maps and cross sections that show the premining, operational and reclaimed site. However, because the site is so small the Division will not require any additional maps and cross sections. The pictures and narrative provide enough information for the Division to analysis the reclamation plan and make a finding.

The pictures on Map DS1798C show that only a small highwall exists at the site (area of disturbance above the portal.) The reclamation plan calls for the area to be backfilled and graded. During the backfilling the highwalls will be eliminated. Since the reclaimed slopes will be 8 to 10 ft. high and have a 2 H to 1 V slope the site should be stable. The Division finds that the reclamation plan is adequate to meet the requirement of the coal rules.

Variance From the Approximate Original Contour Requirements

The Permittee did not request a variance from the approximate original contour requirements for any disturbed areas at the Deer Creek Mine.

Spoil and Underground Development Waste

The Permittee conducted slope stability studies for the two refuse piles. The study for the refuse pile in Elk Canyon shows the reclaimed site will have a safety factor of 1.58. The study in Deer Creek shows the refuse pile will have a safety factor of 2.3. The Division reviewed the slope stability studies done by RB&C Engineering and considered them adequate to show that the reclaimed refuse piles will meet the minimum safety factor requirements.

R645-301-553.252 requires the Permittee to cover all refuse piles with 4 feet of material unless the Division approve a lesser amount. On page 5-13 the Permittee states that the results from chemical and physical analysis for the refuse are in given in Appendix R645-301-200A. However, Appendix R645-301-200A was not included in the submittal. The Permittee committed to include the information when it became available.

On page 5-9 the Permittee explains the reclamation of the refuse pile in Deer Creek as follows:

- Suitable substitute soil as determined by the soil sampling/exploration program will be separated and stored as shown on Drawing DS 1816 D in Appendix R645-301-500C. This soil will be used in areas where lesser quality soils exist and/or used as cover over

the slope of the refuse pile in Deer Creek Canyon.

- The material storage yard will be excavated and used as fill along the parameter of the material storage yard and portal area. The outslope of the refuse will also be excavated and used to cover high SAR soils (pg 5-7). This will create a slope of less than 2:1.

The other sites were break-out portals and there was no refuse associated with them.

Exposed Coal Seams

The Permittee shows the location of the Blind Canyon coal seam in drawings DS1783D and DS1784D. Rider seams may occur in the area. However, the Division will only require the Permittee to backfill coal seams that were uncovered due to mining activities. The lack of available fill material is the major reason that the Division will not require that all rider seams be backfilled.

Cut-and-Fill Terrances

The Permittee does not plan to use any cut-and-fill terraces.

Previously Mined Areas

The Division made the finding that the Permittee cannot eliminate all the highwall remnants at the Deer Creek mine due to lack of fill material. See the approximate original contour section of this TA for details.

Findings:

The Permittee has met the minimum regulatory requirements for backfilling and grading.

MINE OPENINGS

Regulatory Reference: 30 CFR 817.13, 817.14, 817.15; R645-301-513, -301-529, -301-551, -301-631, -301-748, -301-765, -301-748.

Analysis:

The Deer Creek Mine has a total of 16 portals and 1 exhaust shaft. The Permittee backfilled and sealed 7 portals, 4 of the sealed portals are in Deer Creek Canyon the other 3 are in Grimes Wash.

The general portal closure plan is shown on Figure 5-1. A block seal will be placed in the portal 25 feet from the entrance and then backfilled. The general portal sealing and backfilling plan is adequate for all portals in the Deer Creek site except the intake portal.

RECLAMATION PLAN

Deer Creek Intake Portals and Belt Portal

All portals except for the Deer Creek Canyon intake and belt portals are located up dip from the mined out entries. Because the portals are located up dip the Permittee believes that hydraulic seals are not needed.

The Deer Creek intake and belt are located down dip from the coal seams. The Permittee does not want to place a hydrologic seal in the portal because the surrounding rock is fractured and water would seep around the seal. The Permittee will place pipes behind the seal and let the water flow through the pipe into the stream channel.

Rilda Canyon

The Permittee states that the concrete portal liners with the two portals will be demolished and removed from the permit area for disposal at the Deer Creek Waste Rock Site. The portals will be sealed and backfilled as depicted in Figure 1, page 4-3. Backfill material will be obtained from the facility pad. The Permittee's propose is consistent with the standard portal sealing procedures.

9th East Breakouts Grimes Wash Canyon

The 9th East Grimes Wash portals were developed in June 1977. The portals were used for intake ventilation from 1977 until 1990 when they were permanently sealed.

The portal site was originally disturbed by coal mining activities dating back prior to 1920. Evidence of the early mining activities can be seen by the remnants of 2 partially open portals, a coal handling area south of the portals and evidence of a wooden coal chute above the Wilberg Mine fan. On February 14, 2001, the Division approved the as-built drawings for the reclamation work at the 9th East Grimes Wash portal. At that time the Division found the reclamation work met the minimum backfilling and grading requirements.

9th East North Meetinghouse Portals

The Permittee will backfill the portals for approximately 25 feet from within the mine. After backfilling the portals, the Permittee will place solid concrete block seals. This is the standard procedure to seal for portals.

On February 14, 2001, the Division approved the as-built drawings for the reclamation work at the 9th East Grimes Wash portals. At that time the Division found the reclamation work met the minimum backfilling and grading requirements.

Findings:

The Permittee has met the minimum regulatory requirements for the Mine Openings section of the Regulations.

TOPSOIL AND SUBSOIL

Regulatory Reference: 30 CFR 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~~ layers 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 less desirable soils (high SAR) in the material storage yard (pg 5-7). The procedure will be as follows:

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

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 Division encourages operators to use minimal amounts of fertilizer, and these quantities are relatively low.

RECLAMATION PLAN

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. **This is the material storage yard. No seeding was conducted to establish any vegetation.**

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.

ROAD SYSTEMS AND OTHER TRANSPORTATION FACILITIES

Analysis:

Reclamation

The Permittee plans to reclaim all roads at the Deer Creek mine site. They also plan to reclaim the access road for the C1 and C2 belt line. The road reclamation plan is as follows:

- The remainder of the Deer Creek mine road to the Emery County road (asphalt and base) will be excavated and transported to the waste rock site for disposal.
- Excavation will extend approximately 410 feet past station 0+00, to the point where the county road terminates.
- Approximately 25,042 cubic yards of material will be cut and 21,301 cubic yards of fill will be moved in this area.
- A 100-foot diameter turnaround (unpaved) will be constructed at the end of the Emery County road so that vehicular traffic can exit the area properly.

The plan meets the minimum requirements of R645-301-542.600 because (1) the road will be removed because it is not needed for the postmining land use, (2) the road bed will be reseeded according to the approved reclamation plan and (3) the asphalt rubble will be disposed at the waste rock site.

The Permittee met the minimum regulatory requirements for the roads section of the reclamation requirements of the coal rules.

Findings:

The Permittee met the minimum regulatory requirements for the roads section of the reclamation requirements of the coal rules.

HYDROLOGIC INFORMATION

Regulatory Reference: 30 CFR 784.14, 784.29, 817.41, 817.42, 817.43, 817.45, 817.49, 817.56, 817.57; R645-301-512, -301-513, -301-514, -301-515, -301-532, -301-533, -301-542, -301-723, -301-724, -301-725, -301-726, -301-728, -301-729, -301-731, -301-733, -301-742, -301-743, -301-750, -301-751, -301-760, -301-761.

Analysis:

Water Quality Standards and Effluent Limitations

The operator has provided a water monitoring plan in Appendix A of Volume 9 (which covers Deer Creek, Cottonwood-Wilberg, and Des-Bee-Dove Mines). The plan contains a commitment on page 177 of Volume 9 that discharges of water from areas disturbed by coal mining and reclamation operations will be made in compliance with all Utah and federal water-quality laws and regulations and with effluent limitations for coal mining promulgated by the

RECLAMATION PLAN

EPA and set forth in 400CFR Part 434. UPDES information is in Appendix B, Volume 9.

In Table 7-1 of the Deer Creek Mine Reclamation Plan, the operator has provided the values for the parameters used in RUSLE to estimate annual sediment contributions to Deer Creek from reclaimed watersheds. A 3.5" computer disc with the information used to determine sediment loss for the seven disturbed areas shown on Drawing DS-1795-D (Appendix R645-301-700-C) is included in Appendix 700-C.

The R-factor was determined using the data in the CITY database within RUSLE for the nearby Hiawatha area. Hiawatha is #44399 in the applicant's data base, found on the 3.5" disc (Hiawatha is not in the standard database that comes with RUSLE).

It states on page 7-3 that the estimation of the K-factor was based on average percentages of sand, silt, and clay from the soil analyses in Appendix R645-301-200-C. No data were available for percent rock-cover, so the average percent rock-cover at the recently reclaimed Cottonwood Fan Portal area (1999 Vegetation Report, p. 243) was used. The estimated K-factor used in the calculations was 0.225.

In determining the C-factor for the RUSLE calculations for the disturbed areas, maximum roughness was used because of the planned pocking, and entries for other ground covers such as rock fragments and vegetative residue were used conservatively because no data have been established.

The hillslope lengths and gradients used in determining the LS-factor for input to RUSLE are shown on Drawing DS-1795-D in Appendix R645-301-700-C (page 7-3).

The P-factor calculations in RUSLE yield not only the conservation planning value of the system (the P-factor itself), but also the Sediment Delivery Ratio (SDR). Both values are calculated in RUSLE and shown in the Spreadsheet Table generated by RUSLE. The P value in the table should be used for conservation planning, while the SDR should be used to estimate off-slope impact. When $R * K * LS * C$ are multiplied by P, the result is the A value (estimated soil loss) in the RUSLE Spreadsheet Table, while multiplying $R * K * LS * C$ by SDR gives an estimate of the sediment yield (SY). Table 7-1 tabulates the input and results of calculating A.

$$R * K * LS * C * P = A \text{ (estimated soil loss - Table 7-1)}$$

$$R * K * LS * C * SDR = SY \text{ (estimated sediment yield)}$$

Diversions

Two ephemeral draws in Elk Canyon have been included in the channel design (DS-1780D) and final reclamation contour map (DS-1782D). Small ephemeral draws between the Terrace Enhancement Project area and Deer Creek may collect and convey water. The drainage areas of these small draws are not significant enough to require designed channels, but these are areas with the potential for gully formation. NOTE: the reference stations on DS1780D are measured along the channel length and do not correspond with the cross-section locations on

DS1782D.

On page 104 of Volume 9, Deer Creek is described as an ephemeral stream based on observations by the operator; however, because the stream drains an area of more than one square mile, it is an intermittent stream by the definition in the Coal Mining Rules. Considered separately from the Deer Creek drainage, Deer and Elk are each an ephemeral drainage.

Design capacity for permanent, intermittent stream-channel diversions needs to be at least equal to the unmodified channel upstream and downstream from the diversion and able to safely pass a 100-year, 6-hour event. Small-scale cross sections of the unmodified channel immediately upstream and downstream of the site are on Drawing DS-1783-D, along with design cross sections for the reclaimed channels. Based on the NOAA Precipitation Frequency Atlas, 2.4 inches is the value for the 100-year, 6-hour storm event. Flows that would result from such a storm event were determined for Deer Creek Canyon, Deer Canyon, and Elk Canyon using STORM. Calculated watershed hydrographs are in Appendix 700-A, and results are summarized in Table 7-2. Five storm hydrographs were constructed: three for each of the drainages, one for routing Deer Canyon into Deer Creek Canyon, and one for routing all three drainages together. The designed drainage channel characteristics are summarized in Table 7-3 and channel design results are in Appendix 700-D.

Designs for channel transitions between the upstream and downstream natural channel to the reclaimed channels are shown on Figure 7-1A. Soft bioengineering methods for channel reclamation are described in on page 7-13 and designs are included in Figure 7-2A. These are to be used on three reaches where slopes are less than 5%. Dick Rol, formerly with the Division's AML section, reviewed these plans and the following evaluation is based on his comments.

1. The design for using root wads in the transition areas looks acceptable. Having log ends pointing downstream is acceptable, but it is imperative that the operator plant enough sedges and willows behind the logs.
2. The value of placing anything in the middle of the channel is questionable. Placing wattles in the middle of the stream is a practice with which Dick is not familiar. Wattles are mainly intended for streambank protection, not for trying to establish islands. Using them to establish islands might work in some situations, but this doesn't appear to be a good place; nevertheless, it might be worth trying with one or two as an experimental practice.
3. Rocks in the middle of the channel will impede the flow and tend to create scour points that could become nick points.
4. The base material for the channel is a concern. Sieve analysis is not discussed, and probably cannot be known until the channel is actually excavated. The operator needs to commit to do sieve analyses during reclamation to help determine a stable final channel design.
5. A riprap channel with lots of vegetation on the sides would be a reasonable design option.

In response to Mr. Rol's comments, the commitment is made on page 7-13 to do sieve analyses and, if the particle-size is not sufficient to control down-cutting erosion, to modify the

RECLAMATION PLAN

design to either control flow velocities to better armor the streambed. In comments included with the March 8, 2001 response to deficiencies, the Permittee commented that Mr. Roll's comments were appreciated but that based on their evaluation, the stream channel as designed would be stable. The placement of logs, boulder clusters, willow wattles, etc. will direct flow towards the center of the channel in a meandering fashion. Willow wattles and U- or V-shaped weirs will provide flow dissipation to slow velocities and promote sedimentation.

Designs for the channel transitions between the upstream and downstream natural channel and the reclaimed channel are on Drawing 7-1A in Appendix 700-B, and designs for energy dissipation basins are on Figure 7-3A. Locations for these structures are shown on Drawing DS-1780-D. NOTE: the reference stations on DS1780D are measured along the channel length and do not correspond with the cross-section locations on DS1782D.

The operator provided riprap and granular filter material designs for the riprapped reclamation channels. Riprap gradation calculations are in Appendix 700-E. Calculations and assumptions that were used to determine Manning's 'n' for the riprap channel have been included on page 7-11 in the proposed reclamation plan.

Maps are certified. Hydraulic analysis, calculations, designs, and drawings in the Hydrology Section are certified by John Christensen, Licensed Professional Engineer.

Findings:

The plan meets minimum regulatory requirements for this section.

STABILIZATION OF SURFACE AREAS

Regulatory Reference: 30 CFR 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.

Annual monitoring for rills and gullies will be conducted. Should they be present, they will be filled and the soil reseeded. Rill and gully repair will follow the regulations set forth in the Coal Rules R645-301-357.360 through R645-301-357.365. As repairs are recognized, the Division will be notified and the affected area will be reported in the annual vegetation report.

Findings:

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

MAPS, PLANS, AND CROSS SECTIONS OF RECLAMATION OPERATIONS

Regulatory Reference: 30 CFR 784.23; R645-301-323, -301-512, -301-521, -301-542, -301-632, -301-731.

Analysis:

Reclamation Backfilling and Grading Maps

Deer Creek Canyon

The main facilities for the mine are located in Deer Creek Drainage, Deer Drainage and Elk Canyon Drainage. Drawing DS1782D, Deer Creek Mine Disturbed Area Final Reclamation Contour Map show the reclamation contours for those areas. The map scale is 1" = 100', which is adequate for the Division to verify mass balance calculations. The map has been certified by a professional engineer and shows the highwall remnants. ~~The map does not have the disturbed area boundaries labeled.~~ **Look at the map again.**

The cross sections are shown on Drawing DS1783D and DS1784D, Deer Creek Mine, Deer Creek Canyon Final Reclamation Cross Sections. The cross sections are at a scale of 1" = 80', which is different from the base map. The Permittee does not want to change the scale of the map for fear of losing details. While the Division recommends that the scales of the base maps and cross sections be the same no action will be taken at this time.

Rilda Canyon

The backfilling map for Rilda Canyon is drawing CE-10884-EM. The map shows the reclaimed contours for the site and the riprap. The map scale is 1" = 100'.

The cross sections are on drawing CE-10891-EM and do not show the location of the

RECLAMATION PLAN

portals, highwalls or disturbed area boundaries. The cross section scale is 1" = 20' which is not equal to the base map scale. The Division's staff prefers to have the scales of the maps and cross sections the same when practical.

9th East Grimes Wash Portals

The Permittee did not include backfilling and grading maps for the 9th East North Meetinghouse Grimes Wash Portals since this area was reclaimed in December, 1999. The Permittee needs to include as-built drawing for the area. As-built drawings were included in a separate amendment that was approved on February 12, 2002.

9th East North Meetinghouse Portals

The Permittee did not include backfilling and grading maps for the 9th East North Meetinghouse Portals. The Permittee did state in Appendix R645-301-301-500-B that the reclamation plan for the area would be updated when it became available. The backfilling and grading plans must be approved by the Division before the reclamation plan can be approved. **The plan is included in Appendix R645-301-500-B. The plan included soil fill quantities and an attachment to illustrate typical reclamation details.**

Reclamation Facilities Maps

Deer Creek Canyon

The main facilities for the mine are located in Deer Creek Drainage, Deer Drainage and Elk Canyon Drainage. Drawing DS1782D, Deer Creek Mine Disturbed Area Final Reclamation Contour Map show the reclamation contours for those areas. The cross sections are shown on Drawing DS1783D and DS1784D, Deer Creek Mine, Deer Creek Canyon Final Reclamation Cross Sections. The maps and cross sections show the rip rapped drainages and energy dissipaters. No other reclamation facilities are shown.

Rilda Canyon

Drawing CE-10884-EM shows the location of the reclamation facilities for Rilda Canyon. Those facilities consist of riprapped channels.

9th East Grimes Wash Portals

The Permittee gave the Division as-built drawings for the 9th East Grimes Wash Portal area in a separate amendment that was approved on February 12, 2001.

9th East North Meetinghouse Portals

Map DS1798C shows the location of the portals, the underground workings and a picture

of each portal. The Division usually requires maps and cross sections that show the premining, operational and reclaimed site. However, because the site is so small the Division will not require any additional maps and cross sections. The pictures and narrative provide enough information for the Division to analysis the reclamation plan and make a finding.

The pictures on Map DS1798C show that only a small highwall exists at the site (area of disturbance above the portal.) The reclamation plan calls for the area to be backfilled and grade. During the backfilling the highwalls will be eliminated. Since the reclaimed slopes will be 8 to 10 ft. high and have a 2 H to 1 V slope the site should be stable. The Division finds that the reclamation plan is adequate to meet the requirement of the coal rules.

Final Surface Configuration Maps

The backfilling and grading maps show the final surface configuration.

Findings:

The Permittee met the minimum regulatory requirements for this section of the regulations.

BONDING AND INSURANCE REQUIREMENTS

Regulatory Reference: 30 CFR 800; R645-301-800, et seq.

Analysis:

Determination of Bond Amount

The Division with the assistance of the Permittee calculated the bond for the Deer Creek mine. The Division based the reclamation cost estimate on information submitted by the Permittee.

The Division calculated the bond amount to be \$2,373,000 in 2004 dollars. Since the Division did the bond calculations, they were not submitted by the Permittee or were part of amendment AM_99C. The Division has the bond calculation in both hard and soft at its headquarters.

The Permittee has agreed to incorporate the Division's bond calculations into the MRP by a separate amendment.

The Permittee currently has a \$3,000,000 bond for the Deer Creek Mine. Since the current reclamation cost estimate is \$2,373,000 in 2004 dollars, the Permittee has the option of reducing the bond to a minimum of \$2,373,000

Findings:

RECLAMATION PLAN

The Permittee met the minimum regulatory requirements for the bonding and insurance requirements of the regulations.

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RECLAMATION PLAN
