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

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November 6, 2000

Chucks Semborski, Environmental Supervisor
Energy West Mining
P O Box 310
Huntington, Utah 84528

Re: Deer Creek Reclamation Plan & Vol. 9, PacifiCorp, Deer Creek Mine, [redacted]M99C-3 & AM00D, Ou[redacted] File

Dear Mr. Semborski:

The Division has reviewed your September 21, 2000, revision to the reclamation plan and the August 31, 2000, revisions to the water monitoring plan for the Deer Creek Mine. For review purposes we combined these proposals. A copy of the technical analysis and findings is enclosed for your information and records. There are deficiencies that will need to be corrected before the amendments can be approved. As you work to resolve the deficiencies, we urge you to contact our staff to answer any questions.

For us to keep these amendments active in our system, please submit a response by January 8, 2001. If you have any questions, please call me at 801-538-5325 or Paul Baker at 801-538-5261.

Sincerely,

Daron R. Haddock

Daron R. Haddock
Permit Supervisor

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Enclosure:
cc: Price Field Office
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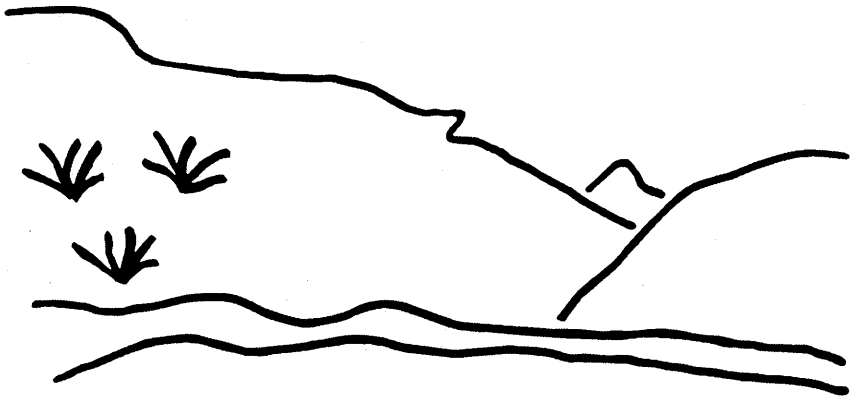
State of Utah



Utah Oil Gas and Mining

Coal Regulatory Program

Deer Creek Mine
Revised Reclamation Plan
C/015/018-AM99C-3
Technical Analysis and Findings
November 3, 2000

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TECHNICAL ANALYSIS

INTRODUCTION

On June 7, 1999, the Division received a proposal from PacifiCorp to revise the reclamation plan for the Deer Creek Mine. This proposal was somewhat conceptual, but the Division reviewed it and sent the review July 7, 1999. A revised proposal was received December 6, 1999, and the Division's analysis was sent March 13, 2000. Most of the proposal reviewed in the current technical analysis was received September 21, 2000. Certain modifications to the hydrology section of the plan were received August 31, 2000, but are reviewed in this analysis.

There are several deficiencies that need to be addressed before the proposal can be approved. Many of these deficiencies are in the water monitoring program, but others relate to the soils, backfilling and grading, and channel reconstruction plans.

INTRODUCTION

SUMMARY OF OUTSTANDING DEFICIENCIES

The Technical Analysis regarding the proposed permit changes is not complete at this time, pending submittal of additional information by the applicant and further review by the Division, to address outstanding deficiencies in the proposal. A summary of those outstanding deficiencies is provided below. Additional comments, concerns and deficiencies may also be found within the analysis and findings made in this Draft Technical Analysis which have not been presented in this summary. Upon finalization of this review, any outstanding deficiencies will be evaluated for compliance with the regulatory requirements. Such deficiencies may be conditioned to the requirements of the permit issued by the Division, result in denial of the proposed permit changes, or may result in other executive or enforcement action as deemed necessary by the Division at that time to achieve compliance with the Utah Coal Regulatory Program.

Accordingly, the applicant must address those deficiencies as found within this Draft Technical Analysis and provide the following, prior to approval, in accordance with the requirements of:

R645-301-121.200, It would possibly be better to simply continue the five-year sequence of analyses for baseline parameters from operations into reclamation rather than start a new sequence of 5th and 9th (10th) year analyses at final reclamation. In the extreme case, there could be a ten-year gap between the last five-year baseline analyses during mine operation and the 5th year reclamation analyses: monitoring during the first year of reclamation would be another option that would eliminate such a situation. In any case, the commitment for a set of baseline analyses in the next-to-last or last year of reclamation should be maintained. 37

R645-301-121.200, On page 5-12 of the proposed reclamation plan, reference is made to Plate 5-1, Drawing CM-10673-DR, in Volume 7 for the locations of all ASCAs in the Deer Creek disturbed area. Plate 5-1 in Volume 7 is Drawing CM-10584-DS, the Plan Sheet for the Deseret Coal Road to Wilberg Coal Road, and it shows no ASCAs for the Deer Creek Mine. 36

R645-301-121.200, The tables in Appendix A indicate that in the 5th and 9th years after final reclamation, analyses are to be done for baseline parameters for all surface-water monitoring sites, springs, and well T-18 (Oliphant). There is a commitment in the plan to monitor the Deer Creek portals for baseline parameters in the 5th and 10th year after final reclamation. Identifying the 9th year for most cases and the 10th year for another is potentially confusing. 36

R645-301-121.200, The footnote to Table 7-2 states that Drawing CM-10529-EM is in Appendix 700-A, but that drawing is in Appendix 700-B. 36

R645-301-121.200, -722, Survey stations for stream channel profiles on Drawing DS-1780-D are the reverse of survey stations shown on Drawings DS-1782-D and DS-1783-D. 36

R645-301-121.200, -731.214, A commitment to monitor any discharge from the Deer Creek portals in the 5th and 10th year after final reclamation is made on pages 5-5 and 7-14. Ground-water Hydrology - Reclamation Sampling Table 2 in Appendix A of Volume 9 should indicate the commitment to baseline monitoring of the Deer Creek portal during reclamation. 37

R645-301-121.200, -731.214, According to the reclamation monitoring tables in Appendix A, East Mountain and Trail Mountain springs will be monitored in July and August for operational parameters, and East Mountain - Rilda Canyon springs will be monitored quarterly for operational parameters. Text on page 10 of Appendix A states that during reclamation East Mountain and Trail Mountain springs will be field monitored during July and August and does not mention Rilda Canyon springs. Both the monitoring frequency and the parameters to be measured need to be clarified. 37

R645-301-121.200, -731.214, Wells in Cottonwood and Rilda Canyons will be monitored for water levels in March and June through December according to the reclamation monitoring tables in Appendix A. Text on page 11 states that, subject to access, piezometric surface wells will be monitored monthly for level only. The monitoring frequency needs to be clarified. 37

R645-301-233.200, The applicant needs to provide chemical and physical analyses of the soil materials proposed for use in reclamation. As an alternative to providing this information immediately, the applicant could include a schedule for sampling, analysis, and appropriate revisions to the mining and reclamation plan. 12

R645-301-233, The application says the refuse samples were taken to determine if the refuse is acid or toxic or can be used as a soil substitute. The applicant needs to clarify this statement. If the applicant intends to use the refuse as a substitute subsoil or topsoil, the Division needs to have more information about its chemical and physical properties and whether it will support vegetation that meets the performance standards. Until further sampling and data are supplied, the worst case scenario must be assumed and the refuse piles and coal mine waste be covered with a minimum of four feet of the best available, nontoxic and noncombustible material. 25

R645-301-241, The application needs to give estimated volumes and cover depths for soils over the reclaimed site. At this time, there is not enough information in the plan or application about soils or refuse materials to determine how much soil is needed or is available. 25

R645-301-244, The application says a soil tackifier will be used on slopes greater than 20% to help stabilize surface soils. The application needs to clarify how the soil tackifier would be used and what type of product would be applied. 25

R645-301-341.100, Reclamation schedules in the application need to include soil separation and replacement. 25

R645-301-341.210, The applicant needs to place greater emphasis on planting certain portions of the bioengineered channel, such as behind logs and root wads. The applicant needs to ensure these areas are stable. Possible methods include dense willow plantings, willow wattles, and combinations of willows with grasses and/or sedges. 44

R645-301-341.250, The application includes a method of measuring diversity, but it needs to give a success standard. 44

R645-301-412.200, The applicant must show that the landowner, U.S.F.S., has approved the on site disposal of building and road debris particularly the on site asphalt disposal. 21

R645-301-542.00, The applicant must make the backfilling and grading maps for the Rilda Canyon area more clear by labeling the disturbed area boundary, portals and highwalls on drawing. The Division needs this information to verify highwall elimination. 20

R645-301-542.00, The applicant must submit as-built backfilling and grading maps for the 9th East Grimes Wash Portals area. 46

R645-301-542.00, The applicant must submit backfilling and grading maps for the 9th East North Meetinghouse Portals areas before the Division can approve the reclamation plan. 46

R645-301-542.00, The applicant needs to make the backfilling and grading maps for the Deer Creek area more clear by (1) show the disturbed area boundary on drawing DS1782D, DS1783D and DS1784D and (2) have the scale of Maps DS1783D and DS1784D be the same as the base map (1" = 100"). 46

R645-301-542.00, The applicant will make the backfilling and grading maps for the Rilda Canyon area more clear by (1) labeling the disturbed area boundary, portals and highwalls on drawing CE-10891-EM and (2) have the scale of Map CE-10891-EM be the same as the base map (1" = 100"). 46

R645-301-542.200 and R645-301-121.200, The applicant must state how they plan to compensate for the 21,000 cubic yard fill shortage. 20

R645-301-542.200 and R645-301-521.110, The applicant must give the Division a reclamation plan for the 9th East North Meetinghouse Portals. The reclamation plan must also include the location of all pre law sites surrounding the 9th East North Meetinghouse Portals. 21

R645-301-542.200, The applicant must give the Division as built drawings for the 9th East Grimes Wash Portals. 21

R645-301-542.200, The applicant must give the Division detailed as built topographic maps and cross sections for the 9th East Grimes Wash Portals. The drawings must show the location of the reclaimed highwalls and other features that show that the site meets AOC requirements. 16

R645-301-542.200, The applicant must provide the Division detailed topographic maps and cross sections for the 9th East North Meetinghouse Portals. The drawings must show the location of the highwalls and other features that show that the site meets the AOC requirements. 16

R645-301-551, The applicant must give the Division portal closure plans for North Fork Meetinghouse Canyon 22

R645-301-553.100 and **R645-301-121.200,** The cross sections for Section A-A' and Section B-B' on drawing DS1784D do not match the topography on the drawing DS1782D. The cross sections show that terraces will be left after reclamation while the contour map does not. The applicant must clarify the discrepancies. If terraces are to be left, the applicant must address the issue. See the analysis section for more details. 16

R645-301-553.100 and **R645-301-542.200,** The applicant must show the location of the reclaimed highwalls for the Rilda Canyon site on the reclamation cross section. 16

R645-301-731.210, Flow at Cottonwood Spring has proven to be measurable as gain in stream flow in Cottonwood Creek, but not directly as discharge from a pipe or other identifiable point source. This is the measurement method used by the USGS. The monitoring plan does not make it clear that the operator will continue to monitor Cottonwood Spring discharge by using weirs to measure this gaining reach on Cottonwood Creek. 36

R645-301-731.520, According to pages 169 and 170 in Volume 9 of the MRP, there is a potential of post-mining discharge of up to 200 gpm from all portals, most of which will probably discharge from the Cottonwood Mine portal in Miller Canyon, which is at the lowest elevation of all the portals; however, the access and conveyor tube portals in Cottonwood Canyon--constructed in 1994 and 1995-

-are lower in elevation and the potential for gravity discharge from these portals is not discussed. 38

R645-301-731, In the operation monitoring plan in Volume 9, Appendix A, there is no indication that monitoring of ground-water for baseline parameters is to be done every five years during mine operation, as recommended in the Division's Directive Tech 004. There is such a commitment for surface-water monitoring sites during mine operation, and surface- and ground-water sites are to monitored for baseline parameters during the 5th and 9th year of reclamation. 36

R645-301-731, The proposed reclamation plan provides for a survey, to be conducted during the Annual Subsidence Monitoring Surveys, to identify new discharge locations within or below sealed portals. Commonly, subsidence surveys are conducted for two years following longwall mining, but the duration for monitoring for these new discharges is not mentioned. The operator should formulate a water-quality and -quantity monitoring plan for new, measurable flows that are found issuing from these areas during the reclamation period. 37

R645-301-742.312, For the bioengineered reaches of the reclaimed channels: **(1)** It is imperative that the operator plant enough sedges and willows behind the logs. **(2)** The value of placing anything, rocks or wattles, in the middle of the channel is questionable. Wattles are mainly intended for streambank protection, not for trying to establish islands; nevertheless, it might be worth trying 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. 38

R645-301-752, In Tables 7-1a and 7-1b, the operator has multiplied the values for R, K, LS, and C by both P and SDR, which gives an erroneous and extremely small value for A in Table 7-1a: in Table 7-1b the value used for SDR is 1, so it does not affect the final result even though the process is incorrect. Correctly calculating the soil loss will still indicate a small loss of soil is expected, on the order of 4e-05 tons per acre per year for the reclaimed areas, but Tables 7-1a and 7-1b need to be corrected. 38

R645-301-752, It states on page 7-3 that NRCS soil survey data on pages 2-176 through 2-181 and 1-181.42 through 2-181.52 in the MRP were used to obtain physical properties of the soil for determining the K-factor. These pages contain a abundance of information with no way of distinguishing what the operator actually used to determine the K-factor: the actual parameter values and

assumptions used to determine the K-factor for input to RUSLE (including rainfall and other data, as in the CITY database) should be identified. 38

R645-301-752, It states on page 7-3 that the R-factor was determined using the data in the CITY database within RUSLE for the nearby Hiawatha area: no data for Hiawatha could be found in the version of the CITY database on the 3.5" disc provided in the submittal. The CITY database is also used in RUSLE to determine the K-factor. Source for rainfall and other data used in the determination of the R-factor needs to be clarified. 37

R645-301-830.130, The applicant did not include a detailed reclamation cost estimate in the amendment. The applicant informed the Division that the reclamation cost estimate would not be submitted until the reclamation plan was approved. The Division agreed to that procedure. Prior to final approval the applicant must submit a detailed reclamation cost estimate. 47

R645-310-553.130, The applicant must address the slope stability requirements in the Rilda Canyon, 9th East Grimes Wash Portals and 9th East North Meetinghouse Portals. The Division does not expect the applicant to conduct as extension analysis as in Deer Creek they could site that study if they felt the sites were comparable. 21

R645-310-553.300, The applicant must address how any exposed rider coal seams will be reclaimed. 21

OPERATION PLAN

TOPSOIL AND SUBSOIL

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

Topsoil Substitutes and Supplements

Exploration/Sampling Program - Substitute Topsoil

The Deer Creek Mine was developed prior to the Surface Mining Reclamation Control 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.

The application contains limited information about the substitute soils that would be used for reclamation. Core samples were taken from seven locations and from various depths at each location. These locations are shown on Drawing DS-1810-D. The samples were taken for the purpose of doing stability analyses, so the locations were not necessarily the same as those from which the applicant proposes to gather substitute topsoil. Two samples were taken in the refuse piles, three near some of the highwalls, and two from the fan portal area at the upper end of the disturbed area.

The results of these analyses are in Appendix R645-301-200-C. Samples 1, 2, 3, 4, and 5 had either high sodium adsorption ratio (SAR) or high electrical conductivity (EC) values. Generally, the highest SAR and EC values were in the upper few feet, and, according to verbal information from the applicant's representative, this may be because of salt applications to keep the roads free of ice. High pH readings were found in samples 3 and 6. The upper layers of material near one of the portals had high selenium values. The only site where all samples in the profile met all the Division's criteria for acceptable soils was 2A near the fan.

In addition to these samples taken in 2000, several other samples were taken in 1980 and 1983. These samples were of fill, coal refuse, and slag. Results of analyses on these samples are in the existing mining and reclamation plan, Chapter 4, Tables I and II. With a few exceptions, these samples do not show problems with the physical or chemical characteristics of the fill, but the samples were not analyzed for all the parameters 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 the 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 the plan 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. Further sampling using current guidelines needs to be performed before a determination can be made concerning substitute soil and refuse suitability.

Most of the samples from 1980 and 1983 show little or no problem 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 may not now be usable.

The application says a soil exploration/sampling program will be implemented during the operation period of the Deer Creek Mine to determine the extent of substitute topsoil available for reclamation. Samples will be taken by a staff member qualified in collecting soil samples. This will be done along the corridor of the proposed drainage and near the culvert in Deer Creek and Elk Canyons. Appendix A of the Division's *Guidelines for Management of Topsoil and Overburden for Underground and Surface Coal Mines* will be used as the criteria to determine if the soil is suitable. If suitable soil is not found in the drainage corridor, test plots will be established on a fill slope to test the adaptability of the seed mixture to existing soil conditions. If this fails, the applicant would use a borrow area.

To make a complete determination whether the reclamation plan is acceptable, the Division needs complete laboratory analysis and mass balance data. This information is lacking in both the current plan and in the application. The chemical analyses in the plan indicate there could be some problems with substitute soil materials, but it is not certain.

The commitment in the application to have a sampling program during operations is acceptable , but the applicant needs to be actively working toward gathering enough information to fully develop the reclamation plan. In addition, as substitute soils are identified, these resources need to be protected so they are not contaminated with salts or other materials.

The Division recognizes the difficulty of developing the soils reclamation plan with the available information and that it will take some time to take and analyze samples and to make necessary changes to the backfilling and grading plan. In lieu of the applicant providing all this information now, the Division would accept a schedule showing when and approximately where samples will be taken. The samples should be taken and analyzed as soon as reasonably possible which the Division expects would be by the summer of 2001. They should be taken from the areas where the applicant anticipates salvaging substitute topsoil materials. The applicant should also commit to inform the Division a few days in advance of taking the samples. Having a Division representative on site during sampling protects the applicant and helps the Division interpret sample results.

In the reclamation section of the existing mining and reclamation plan are the headings "Interim Vegetation Establishment" and "Fill Slopes." This section discusses interim revegetation efforts on fill slopes at the equipment yard and run of mine conveyor. The plan says the interim vegetation plan will provide the basis for developing final revegetation plan by testing revegetation techniques and plant species. Another purpose for this interim revegetation plan is to develop the fill material as a substitute for topsoil by establishing a root system in the top layers along with organic material buildup and an environment suitable for microorganism colonization.

Commitment 7 in the maintenance and monitoring section of the interim revegetation section of the plan says the soil materials on the fill slopes will be sampled at five year intervals. Because

development of these soils is part of the reclamation plan, results of these analyses need to be included in the application.

Exploration/Sampling Program - Refuse Piles

Appendix R645-301-200-C contains analyses of two core samples from the refuse piles, one from Deer Creek Canyon and one from Elk Canyon. The analyses of the Deer Creek Canyon refuse, site 1 on Drawing DS-1810-D, show high salt levels in the upper part of the profile similar to the soil samples gathered elsewhere. This could be because the sample site was near two storage docks where salt may have been used. Further sampling of the refuse in Deer Creek Canyon might show other portions of the refuse pile do not have the high salt levels found at site 1. The refuse in Elk Canyon, site 6, does not have the high salt concentrations, but it does have high pH values (9.0) in the upper layers. No acid forming potential was identified in these samples.

Within the MRP's Chapter 3, 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 with 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 soils guidelines.

The Division cannot make a determination of waste acceptability because of errors in the data, incomplete data, and because several samples show unacceptable salt, SAR, and pH levels. 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 cannot make a determination of waste acceptability.

There is some evidence not all of the refuse is toxic to plants. This is discussed further in the reclamation plan section of this analysis.

Findings:

Information in the application is not adequate to meet the requirements of this section of the regulations. Prior to final approval, the applicant must supply the following in accordance with:

R645-301-233.200, The applicant needs to provide chemical and physical analyses of the soil materials proposed for use in reclamation. As an alternative to providing this information immediately, the applicant could include a schedule for sampling, analysis, and appropriate revisions to the mining and reclamation plan.

RECLAMATION PLAN

POSTMINING LAND USES

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

Analysis:

According to Section 412 of the application, the postmining land uses will be grazing and wildlife habitat, and these are the same as the premining land uses. Both the Forest Service and Bureau of Land Management have indicated no foreseeable changes to this use, and the area is zoned by the county for grazing, mining, and recreation.

Findings:

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

APPROXIMATE ORIGINAL CONTOUR RESTORATION

Regulatory Reference: 30 CFR Sec. 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 general requirements for restoring a site to the approximate original contours are (1) the reclaimed site blends into the surrounding topography, (2) the restored drainages complement the natural drainages, (3) all post law highwalls exist are completely eliminated and (4) all pre law highwalls must be reclaimed to the extent practical. The Deer Creek mine consists of 4 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, Deer Creek Mine Disturbed Area Final Reclamation Contour Map, and the reclamation cross sections are on Drawing DS1783D and DS1784D. The reclamation contour maps shows the locations of the highwall remnants, the location of the cross sections, the refuse piles, drainage systems and the cut and fill 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 applicant only has to eliminate highwalls to the extent practical. On page 5-12 the applicant explains why highwall remnants will remain as follows:

1. 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.

2. 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 locate in steep canyon. If the applicants were to completely backfill the highwalls in some steep canyon the results would be either the slope is to 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 applicant could eliminate the highwall remnants by placing more fill. The addition 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 applicant 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 applicant could place more fill against the highwall to reduce or eliminate the highwall remnants of. If the applicant did eliminate the highwalls then they would not have enough fill to grade the rest the site so that it blended into the surrounding topography. If the applicant 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 on soil overlying bedrock. If the applicant 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 applicant 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 applicant has met the minimum requirements of R645-301-553.600. The applicant cannot reclaim all the highwalls because they do not have access to enough reasonably available fill material.

On Drawing DS1784D the applicant shows the cross sections for Section A-A' and Section B-B' and the location of the sections is shown on Drawing DS1782D. Section A-A' and Section B-B' are for the spoil storage area.

The cross section for Section B-B' shows that two terraces will be left after reclamation. The terrace at elevation 7415 feet is 20 feet wide and the terrace at elevation 7375 feet is 40 feet wide. However, the contour lines on drawing DS1782 are no further apart than 10 feet. According to drawing DS1782D the terraces could be no wider than 10 feet. Similar terraces are also shown on Section A-A'. The applicant must clarify the inconsistency between the cross sections and the topographic maps regarding the terraces on the spoil storage area after reclamation.

Terraces do not blend into the surrounding topography. Therefore, the Division will not allow terraces to be part of the postmining topography unless the applicant can show that the terraces are needed.

Rilda Canyon

The reclamation plans for Rilda Canyon are shown on drawing CE-10884-EM (4-1A) Rilda Canyon Final Reclamation of Surface Facilities and Access Road and the cross sections on drawing CE-10891-EM (4-4A) 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 applicant needs to place excess material along the slopes.

The applicant did not show the location of the highwalls on the topographic map or cross sections. The Division needs that information in order to determine that the highwalls will be eliminated.

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

9th East Grimes Wash Portals

The applicant states that the Grimes Wash portal area has been reclaimed. The applicant needs to include as built drawing for the area so that the Division can determine if the site has been reclaimed to the approximate original contours.

9th East North Meetinghouse Portals

The applicant did not include a reclamation plan for the 9th East North Meetinghouse Portals. The applicant stated in Appendix R645-301-500-B that the plan would be added when it because available. Before the Division can approve the reclamation plan the applicant must submit a detailed reclamation plan for the 9th East North Meetinghouse Portals area. The plan must contain enough information for the Division to determine that the site will be restored to the approximate original contours, adequate highwall elimination and slope stability.

Findings:

Information provided in the proposed amendment is not considered adequate to meet the requirements of this section. Prior to approval, the applicant must provide the following in accordance with:

R645-301-553.100 and **R645-301-121.200,** The cross sections for Section A-A' and Section B-B' on drawing DS1784D do not match the topography on the drawing DS1782D. The cross sections show that terraces will be left after reclamation while the contour map does not. The applicant must clarify the discrepancies. If terraces are to be left, the applicant must address the issue. See the analysis section for more details.

R645-301-553.100 and **R645-301-542.200,** The applicant must show the location of the reclaimed highwalls for the Rilda Canyon site on the reclamation cross section.

R645-301-542.200, The applicant must give the Division detailed as built topographic maps and cross sections for the 9th East Grimes Wash Portals. The drawings must show the location of the reclaimed highwalls and other features that show that the site meets AOC requirements.

R645-301-542.200, The applicant must provide the Division detailed topographic maps and cross sections for the 9th East North Meetinghouse Portals. The drawings must show the location of the highwalls and other features that show that the site meets the AOC requirements.

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 requirements

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 applicant 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 applicant does not have to completely eliminate the highwalls to comply with the AOC requirements.

The main problem that the applicant has with highwall elimination is lack of fill material. On drawing DS1782D, Deer Creek Mine Disturbed Area Final Reclamation Contour Map, the applicant shows the cut and fill quantities. The applicant shows that 149,721 cubic yards of cut material are available and 170,834 cubic yards of fill material are needed. The applicant is faced with a shortage of fill material. How the material shortage will be met is not explained in the reclamation plan.

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 applicant 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 applicant could place more fill at the top of the highwall to eliminate it. However, the applicant 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 applicant could increase the slope angle and eliminate more highwall remnants. If the applicant 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 applicant 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 applicant 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 applicant shows the location of the concrete and asphalt storage areas. The Division has been informed by the surface owner, USFS, that asphalt may be prohibited from being disposed on site. If on site asphalt disposal is prohibited then the applicant will have to develop an alternative asphalt disposal plan. The applicant must address this issue.

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 applicant claims that the reclamation plan calls for the complete elimination of all highwall in Rilda Canyon. The portals and highwalls are not shown on the cross section. Therefore, the Division is unable to make a finding about highwall elimination.

The applicant did not address slope stability at Rilda Canyon. The applicant needs to show that the slopes will have a minimum safety factor of 1.3.

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 applicant must show the location of the disturbed areas that do not need to be reclaimed by the applicant because they are pre-SMCRA.

The applicant states that the Grimes Wash portal area has been reclaimed. The applicant needs to include as built drawing for the area and comments about slope stability.

9th East North Meetinghouse Portals

The applicant did not include a reclamation plan for the 9th East North Meetinghouse Portals. The applicant stated in Appendix R645-301-500-B that the plan would be added when it because available. Before the Division approves the reclamation plan, the applicant must submit a detailed reclamation plan for the 9th East North Meetinghouse Portals area. The plan must contain enough information for the Division to determine that the site will be restored to the approximate original contours, adequate highwall elimination and slope stability.

Variance From the Approximate Original Contour Requirements

The applicant 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 applicant does not mention spoil in the reclamation plan. However, on Map DS1782D, Deer Creek Mine Disturbed Area Final Contour Map, the permit labels the area between station 4+00 and 5+00 in Elk Canyon as a spoil storage area. The applicant needs to clarify in the text and on the maps whether or not spoil exists on the site. If spoil exists on the site then the applicant must state how the spoil will be handled during final reclamation.

The applicant 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 applicant to cover all refuse piles with 4 feet of material unless the Division approve a lesser amount. On page 5-13 the applicant 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 applicant committed to include the information when it became available.

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

1. Suitable substitute soil as determined by the soil sampling/exploration program or barrow pit will be separated and stored in the area of the dismantled truck loadout and storage area (Area #2, see DS-1796-D in Appendix R645-301-500A). 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.

2. 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 as fill in these areas. This will create a slope of less than 2:1.

The applicant does not show on the drawing DS1782D the location of the refuse that will be used as fill material in the material storage yard. The Division needs to know the location of the refuse that will be used as fill. By using refuse as fill the applicant is creating another refuse pile.

The applicant must also say how much clean material will be placed over the refuse. If the applicant plans to use less than 4 feet of material then they must meet the requirements of R645-301-553.252.

The other sites were brake out portals and there was no refuse associated with those site.

Exposed Coal Seams

The applicant shows the location of the Blind Canyon coal seam in drawings DS1783D and DS1784D. The applicant did not show the location of any rider seams at the Deer Creek site or other locations. The applicant needs to state how all coal seams including rider seams will be covered.

Cut-and-Fill Terrances

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

Previously Mined Areas

The Division made the finding that the applicant 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:

Information provided in the proposed amendment is not considered adequate to meet the requirement of this section. Prior to approval, the applicant must provide the following in accordance with:

R645-301-542.200 and R645-301-121.200, The applicant must state how they plan to compensate for the 21,000 cubic yard fill shortage.

R645-301-542.00, The applicant must make the backfilling and grading maps for the Rilda Canyon area more clear by labeling the disturbed area boundary, portals and highwalls on drawing. The Division needs this information to verify highwall elimination.

R645-301-412.200, The applicant must show that the landowner, U.S.F.S., has approved the on site disposal of building and road debris particularly the on site asphalt disposal.

R645-310-553.130, The applicant must address the slope stability requirements in the Rilda Canyon, 9th East Grimes Wash Portals and 9th East North Meetinghouse Portals. The Division does not expect the applicant to conduct as extension analysis as in Deer Creek they could site that study if they felt the sites were comparable.

R645-310-553.300, The applicant must address how any exposed rider coal seams will be reclaimed.

R645-301-542.200, The applicant must give the Division as built drawings for the 9th East Grimes Wash Portals.

R645-301-542.200 and R645-301-521.110, The applicant must give the Division a reclamation plan for the 9th East North Meetinghouse Portals. The reclamation plan must also include the location of all pre law sites surrounding the 9th East North Meetinghouse Portals.

MINE OPENINGS

Regulatory Reference: 30 CFR Sec. 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 applicant 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.

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 portal are located up dip the applicant believes that hydraulic seals are not needed.

The Deer Creek intake and belt are located down dip from the coal seams. The applicant 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 applicant will place pipes behind the seal and let the water flow through the pipe into the stream channel.

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.

9th East North Meetinghouse Portals

The applicant states that they will amend Appendix R645-301-500-B, which contains information about the portal closure plan, when the information becomes available.

The applicant states that they reclaimed the Grimes Wash Canyon site in the fall of 1999. The applicant needs to give the Division as-built maps and cross section of the Grimes Wash Canyon site so that the Division can make a finding about the portal closures.

Rilda Canyon

The applicant 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 applicant's propose is consistent with the standard portal sealing procedures.

Findings:

Information provided in the proposed amendment is not considered adequate to meet the requirements of this section. Prior to approval, the applicant must provide the following in accordance with:

R645-301-551, The applicant must give the Division portal closure plans for North Fork Meetinghouse Canyon

TOPSOIL AND SUBSOIL

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

Analysis:

Soil Redistribution

The amendment states that reclamation will involve three disturbed areas: Deer Creek Canyon, Deer Canyon, and Elk Canyon. The Deer Creek mine site disturbed area will be reclaimed by redistributing soil and spoil by cutting and/or filling the existing mine site footprint. Reclamation will be completed sequencing activities from top to bottom, thus minimizing construction equipment travel over redistributed material. According to the backfilling and grading plan in Section R645-301-553, suitable substitute soil material, either from on site or from a borrow pit, will be separated and temporarily stored in the area of the dismantled truck loadout and storage area. 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.

Once soil has been distributed, the soiled surface will be roughened by deep gouging (pocking) using a trackhoe to create depressions approximately 3' dia x 1.5' deep. The amendment says these depressions will be developed throughout the reclaimed area and will influence moisture retention and greatly reduce sediment loss.

Since soil sampling and exploration will be done as part of the operations, the reclamation schedules do not include this activity. Table 3-1, Reclamation Schedule, and Section R645-301-541 General, need to include soil separation and replacement in the reclamation schedule.

The amendment identifies on-site fills as possible substitute topsoil. The exploration program assumes that adequate quantities of substitute soil are available, but gives no estimated volumes and cover depths for the reclaimed site. If suitable soil is not found in the drainage corridor, a designed test plot will be used to test whether the existing spoil material can be used to support vegetation that meets the performance standards. If the test plots do not show that adequate vegetation can be established, suitable soil from a borrow area will be used.

If the results of physical and chemical testing indicate that substitute soil is in the "unacceptable" category according to the soils guidelines, it is unlikely test plots will be successful unless they are managed very intensively. Test plots of this nature would need to be installed very carefully with strict controls to ensure they meet postmining conditions as well as possible.

A more intensive soil exploration and sampling program is likely to yield more valuable data than test plots. It appears from the limited data available that many of the surface materials have been adversely affected by salt applications and that soils at lower levels in the profiles have acceptable chemical characteristics. Although moving the upper layers aside to get acceptable soils from beneath is not as easy as simply grading the surface, it is a far better option than using borrow soils.

At this time, there is simply not enough information in the plan or application about soils or refuse materials to determine how much soil is needed or is available. The surfaces of two portions of the refuse piles are considered unacceptable according to the Division's guidelines and would need to be

covered by four feet of growth media, but it is possible other portions of the refuse piles are not as bad. The plan and application contain no information about the quantities of substitute soils that might be available, so it is not known how much soil could be spread over the site. Results of laboratory analyses are essential before these determinations can be made, but the entire reclamation plan, including the backfilling and grading plan, the revegetation plan, and the hydrology plan, is not complete without this information.

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.

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.

Soil Stabilization

After topsoil distribution, the biology chapter says certified noxious weed free alfalfa hay will be applied at the rate of 2000 pounds per acre. This and the fertilizer will be incorporated into the soil by deep gouging. 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. On slopes greater than 20%, a soil tackifier will be used to help stabilize surface soils.

It is not clear how the soil tackifier would be used or what type of product would be applied. For example, would this tackifier be applied before or after seeding? Is it a tackifier similar to what is used with hydromulch, or is it one of the commercially available soil stabilizers? This needs to be clarified so the Division can be certain this technique does not conflict with seeding.

After seeding, the biology section R645-301-341, Revegetation, 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 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.

Refuse Pile Reclamation

The application says the refuse samples were taken to determine if the refuse is acid or toxic or can be used as a suitable soil substitute. It is not clear from the application whether the applicant desires to use refuse as a substitute topsoil or as a subsoil closer than four feet to the surface. Although there is some vegetation growing on the refuse piles, the available chemical analyses indicate the material is not suitable as a growth medium. Future sampling could show that some of the refuse could be used as a subsoil, but the applicant would need to demonstrate its suitability.

Evidence that some of the refuse may not be toxic is in the vegetation currently growing on part of the refuse pile in Deer Creek Canyon. 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.

If the applicant can adequately identify and isolate those areas of the refuse where toxicity problems are located, it may be possible to use part of the refuse as a subsoil substitute. Refuse with unacceptable chemical or physical characteristics would need to be segregated and buried under at least four feet of non-toxic, non-acid forming, and noncombustible material. Until there is a complete demonstration that the refuse is suitable as a substitute topsoil, however, the Division must assume the worst case scenario which is that the entire refuse pile will need to be covered with four feet of soil material.

Findings:

Information in the application is not adequate to meet the requirements of this section of the regulations. Prior to final approval, the applicant must supply the following in accordance with:

R645-301-341.100, Reclamation schedules in the application need to include soil separation and replacement.

R645-301-241, The application needs to give estimated volumes and cover depths for soils over the reclaimed site. At this time, there is not enough information in the plan or application about soils or refuse materials to determine how much soil is needed or is available.

R645-301-244, The application says a soil tackifier will be used on slopes greater than 20% to help stabilize surface soils. The application needs to clarify how the soil tackifier would be used and what type of product would be applied.

R645-301-233, The application says the refuse samples were taken to determine if the refuse is acid or toxic or can be used as a soil substitute. The applicant needs to

clarify this statement. If the applicant intends to use the refuse as a substitute subsoil or topsoil, the Division needs to have more information about its chemical and physical properties and whether it will support vegetation that meets the performance standards. Until further sampling and data are supplied, the worst case scenario must be assumed and the refuse piles and coal mine waste be covered with a minimum of four feet of the best available, nontoxic and noncombustible material.

ROAD SYSTEMS AND OTHER TRANSPORTATION FACILITIES

Regulatory Reference: 30 CFR Sec. 701.5, 784.24, 817.150, 817.151; R645-100-200, -301-513, -301-521, -301-527, -301-534, -301-537, -301-732.

Analysis:

The applicant 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.

Findings:

The applicant met the minimum requirements of this section.

HYDROLOGIC INFORMATION

Regulatory Reference: 30 CFR Sec. 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.

Ground-water Monitoring

Ground-water monitoring points are described in Appendix A of Volume 9. Map HM-1 shows the location of all reclamation monitoring points.

Both baseline and operational ground-water monitoring parameters are listed in Table 2 of Appendix A, Volume 9: there is no separate list of reclamation parameters. This table is the same as Table 4 in the Division's Directive Tech 004 except that total alkalinity is not included: although total alkalinity is not listed in the operator's tables, this parameter has nonetheless been included on most water-quality reports submitted by the operator. (Also, total alkalinity is used to determine carbonate and bicarbonate and, if the need arises, it can be back-calculated from the reported values for those two parameters.)

There is no indication that monitoring for baseline parameters is to be done every five years at ground-water monitoring sites, as recommended in the Division's Directive Tech 004. Such a commitment is absent from both the operation monitoring plan and the reclamation monitoring plan.

According to pages 170 and 171 in Volume 9 of the MRP, there is a potential of post-mining discharge of up to 200 gpm from all portals, most of which will probably discharge from the Cottonwood Mine portal in Miller Canyon, which is at the lowest elevation of all the portals; however, the access and conveyor tube portals in Cottonwood Canyon - constructed in 1994 and 1995 - are at least 50 feet lower in elevation and the potential for gravity discharge from these portals is not discussed.

UPDES discharge permit 22896-004 was obtained for the Miller Canyon portals in 1982 and monitoring began in February 1983 (Appendix XXII - MRP). The three portals were temporarily sealed in 1984 following the Wilberg Mine fire and permanently sealed in 1987. A pipe was installed in the seal of the eastern (#1) portal and extended at least 500 feet down the canyon to facilitate the collection of water samples. Initially there were only sporadic discharges: 25 gpm in both October and November 1986, 12.5 gpm in June 1987, and 4 and 12 gpm in, respectively, September and November 1988. Consistent water flow began in April 1989 and discharge jumped to 70 gpm. The highest discharge was 78 gpm in August 1989, after which flow-volume trended downward. There were some high flows in the spring of 1991, but flow-volumes decreased significantly in 1994 and there has been no reported discharge since July 1996. In May 1999 it was discovered that the pipe had been pinched-off by caving of the portal openings and that water was flowing from the seals, over the rock ledge, and to the canyon floor where it dissipates within a few hundred feet: flow from portal #1 was estimated at 3 gpm. It is unknown how long the pipe was pinched-off and what effect this has had on the accuracy of flow measurements. Photos taken in June 1999 during backfilling of the portals show water seeping from the top of the Starpoint Sandstone ledge just below the portals: French drains were installed in 1999 in the base of the fill to prevent slope failure due to saturation. The water-sampling pipe was also removed at that time and the UPDES monitoring point is now in the stream bed of Miller Canyon near the confluence with Cottonwood Creek. Pinching-off of the pipe and moving of the monitoring point farther from the portals probably account for the consistency of recent "no-flow" reports.

The Deer Creek Mine portals in Deer Creek and Meetinghouse Canyons could potentially discharge after mining operations cease (pages 170 and 171, Volume 9). The Deer Creek portals are the lowest in the Deer Creek Mine and are down-dip from the mined-out areas. The reclamation design for one of the Deer Creek portals calls for a sand and gravel filter behind the seal and four 6-inch pipes to drain water through the seal and into a French drain system that will direct the water to the surface (page 5-4 and Drawing DS-1780-D - #5 of 5). Water discharged at the surface, if any, will be monitored for UPDES parameters. In the 5th year after reclamation begins, discharge will be analyzed for baseline parameters, and baseline monitoring will be repeated in the 10th year, before final bond release (pages 5-5 and 7-14). Tables in Appendix A should indicate this monitoring commitment. Baseline monitoring is not indicated for other UPDES discharge points during the reclamation period.

Current operational discharge from Deer Creek Canyon portals is under a UPDES permit. Deer Creek is a High Quality Water - Category 2, as defined in UAC R317-2. There is no UPDES permit for the potential discharge to Meetinghouse Canyon.

Currently, water samples collected for UPDES monitoring are analyzed monthly for both UPDES and operational parameters. According to Table 3-2 in Section R645-301-341, the operator proposes to monitor post-mining flow from portals according to the UPDES permit until the end of the Phase III ten-year vegetation-monitoring responsibility period. Details on reclamation monitoring have been added to Appendix A of Volume 9, where it states that UPDES monitoring will continue as needed according to the UPDES permit stipulations, and that after portals are sealed the operator will monitor downdip for development of seeps or springs as part of the annual subsidence reconnaissance survey (Groundwater Hydrology - Reclamation Sampling Table 2). UPDES permit requirements are the federal and state water quality standards for discharge into surface waters; therefore, the proposal is adequate for the Division to determine that the discharged waters meet all state and federal water quality criteria.

The tables in Appendix A indicate that in the 5th and 9th years after final reclamation, analyses are to be done for baseline parameters for all springs and well T-18 (Oliphant), but not for other wells. A commitment to monitor the Deer Creek portals for baseline parameters in the 5th and 10th year after final reclamation is discussed above. If any of the baseline analyses in either sample set exceed water-quality criteria, the Division may require additional sampling to establish that water quality-standards have been met. The current operational monitoring plan calls for baseline analyses every five years beginning in 1996. It would possibly be better to simply continue that five-year sequence from operations into reclamation rather than start a new sequence at final reclamation, although a final set of analyses should be made for final bond release determination.

Wells in Cottonwood and Rilda Canyons, except for TM-1B, will be monitored only for water levels and only in March and June through December according to the reclamation monitoring tables in Appendix A. Text on page 11 states that, subject to access, piezometric surface wells will be monitored monthly for level only. The monitoring frequency needs to be clarified.

Wells at the Cottonwood and Deer Creek waste rock sites and TM-1B at Trail Mountain will be monitored quarterly for operational parameters until bond release (page 14, Appendix A). No periodic

monitoring for baseline parameters is indicated. Bond will be released only when state and federal and post-mining land use water-quality standards have been met.

Volume 9, page 17, states that monitoring of a series of in-mine wells in the Deer Creek and Cottonwood/Wilberg Mine, shown on Plates HM-2 and HM-3, will continue and data collected will be utilized to document potential impacts related to ground-water dewatering and to determine the rate of recovery "once mining has been terminated." Page 14 in Appendix A of the proposed amendment clarifies that quarterly monitoring will continue until the mine is sealed or the sites become inaccessible.

According to the reclamation monitoring tables in Appendix A, East Mountain and Trail Mountain springs will be monitored in July and August for operational parameters, and East Mountain - Rilda Canyon springs will be monitored quarterly for operational parameters. Text on page 10 states that East Mountain and Trail Mountain springs will be field monitored during July and August and does not mention Rilda Canyon springs. Both the monitoring frequency and the parameters to be measured need to be clarified.

Voids created by mine workings may redirect water and produce new discharge locations within or below the mined seam. The proposed reclamation plan provides for a survey, to be conducted during the Annual Subsidence Monitoring Surveys, to identify new discharge locations within or below sealed portals. (Groundwater Hydrology - Reclamation Sampling - Table 2). Commonly, subsidence surveys are conducted for two years following longwall mining, but the duration for monitoring for these new discharges is not mentioned. The operator should formulate a water-quality and -quantity monitoring plan for new, measurable flows that issue from these areas during the reclamation period.

The proposed amendment states that water will be discharged through the Deer Creek Portal during and possibly after reclamation. Some reference points provided in Table 5-2 identify elevations that might act to control postmining ground-water flow gradients. Where boundary faults were crossed by mining, a pre-existing hydrologic barrier may now transmit water. Maps HM-2 and HM-3 show mine floor elevations, in-mine water source locations, pertinent geologic controls, and other controls such as sealed mine sections. Interbasin diversion of flow between the Cottonwood and Huntington Creek drainages is discussed on pages 169 and 170 of Volume 9; the conclusion is that interbasin water probably be less than 1 percent of the annual discharge in either drainage.

In Volume 9, Appendix C the applicant provides a hydrogeologic investigation, initially done in 1992 and updated in 2000, that was prepared in response to a citizen complaint (July 31, 1991) that mining at Deer Creek Mine had dried up flow from Cottonwood Spring. Representatives for the complainant, the mine operator, the USFS, the Division of Water Rights, and the Division of Oil, Gas and Mining had an on-site meeting at the spring in August 1991. Questions were raised concerning the proximity of mining to the Roans Canyon Fault, in particular the 3rd North fault crossing and the longwall mining in 1st and 2nd Right off 4rd South, where it was suspected that the mine was intercepting water that had previously recharged Cottonwood Spring. The mine and its consultants have concluded that the hydrologic system in the lower Cottonwood Canyon and lower Blackhawk Formation were independent hydrologic systems. (In a letter dated October 27, 1998, the Division concluded that no

definitive connection between the mine and the spring had been cited or proven and stated that the Division had made findings to conclude the citizen complaint.)

In response to three possible actions recommended by the USFS to resolve the Cottonwood Spring issue, the operator conducted gain/loss surveys along the Cottonwood drainage for two years, 1998 through 2000. These measurements indicate that:

1. During drought periods, flow in Cottonwood Canyon Creek is limited to the discharge from the alluvium at the mouth of Roans Canyon;
2. The stretch downstream from Roans Canyon for several miles is a losing reach where water enters the alluvium;
3. Flow data correlate with climatic trends and compare directly with USGS data collected in 1978 and 1979.

Based on these two years of data collection and on information from the USGS (page 9, Volume 9), the operator concluded that baseline or historic flow data for Cottonwood Spring was obtained by measuring this gaining reach of the stream. Flow at Cottonwood Spring has proven not to be directly measurable as discharge from a pipe or other identifiable point source, and the flow from the PVC pipe that was measured for several years was not representative of Cottonwood Spring. The monitoring plan does not make it clear that the operator will continue to monitor Cottonwood Spring discharge by using weirs to measure this gaining reach on Cottonwood Creek.

Based on other information, the operator supports a conclusion that Cottonwood Spring flow has not been impaired by mining operations in their East Mountain mines.

1. Geology and geomorphology indicate that:

   a. In Cottonwood Canyon, the Roans Fault system consists of two or more fractures with little or no displacement;
   b. Cottonwood Spring is on the north dipping limb of the Straight Canyon Syncline;
   c. Cottonwood Spring flows from alluvium at the bottom of a glacially-formed U-shaped valley, just above where the canyon transitions to a stream-cut V-shaped valley.

2. Drilling and well-completion data indicate that:

   a. There is no connection between the lower Blackhawk Formation - Starpoint Sandstone and the upper Blackhawk - alluvium in Cottonwood Canyon;
   b. Water elevations in the alluvium vary in direct response to precipitation;

3. Resistivity and induced polarization surveys indicate that:

   a. Depth of alluvium is fairly constant along the length of the canyon surveyed, from approximately 2 ½ miles north of Cottonwood Spring to approximately ½ mile south of

the spring, but width of alluvial deposits increases from south to north to point just north of Cottonwood Spring;

b. A possible extension of the Mill Fork Canyon fault system was detected a little over one mile upstream of Cottonwood Spring;
c. Fractures and faults cut lower Cottonwood Canyon (apparently just below Cottonwood Spring);
d. The faults and fractures dam the flow of water through the alluvium and the water level rises in the vicinity of Cottonwood Spring. (The narrowing of the valley and the transition from glacial to non-glacial alluvium probably contribute to this also);
e. Seeps and springs along the east side of Cottonwood Canyon also contribute water to the alluvium.

Monitoring of Cottonwood Spring and other springs and wells in Cottonwood Canyon will be continued during reclamation, although less frequently than during mine operation. The Division previously recommended that analyses be done for carbon-14, tritium, deuterium, and oxygen-18 for the Cottonwood Canyon wells to differentiate level changes due to climate from those due to ground water discharge. Although there may be some intermixing of alluvial water and water from the Starpoint Sandstone, available information strongly indicate that ground-waters in the alluvium and consolidated rock are not related and there is little pertinent information to be gained from isotopic analyses.

Surface-water Monitoring

Both baseline and operational surface-water monitoring parameters are listed in Table 1 of Appendix A, Volume 9: there is no separate list of reclamation parameters. This table is the same as Table 3 in the Division's Directive Tech 004 except that total alkalinity is not included: although total alkalinity is not listed in the operator's tables, this parameter has nonetheless been included on most water-quality reports submitted by the operator. (Also, total alkalinity is used to determine carbonate and bicarbonate and, if the need arises, it can be back-calculated from the reported values for those two parameters.)

During reclamation, water samples will be collected and analyzed quarterly for operational parameters at surface monitoring sites listed in Appendix A, Volume 9 (except field parameters only at CCC01). Quarterly monitoring will include one sample at high flow and one at low flow. Streams receiving discharges from UPDES sites will be monitored quarterly for operational parameters both upstream and downstream of reclaimed disturbed areas and UPDES discharge points in Grimes Wash and Deer Creek and Cottonwood Canyons. Monitoring will be done only downstream of the Meetinghouse Canyon portals. Following Phase I reclamation backfilling and grading, monitoring will be done at points immediately above and below remaining sediment ponds (page 4, Appendix A). Water monitoring information will be reported to the Division quarterly (page 14 - Appendix A, Volume 9 revision). The operator proposes to report annually on sediment production information from points above and below the mine (page 3-7).

In the 5th and 9th years after final reclamation, analyses will be done for baseline parameters for all surface-water monitoring sites (Appendix A). If any of the analyses results exceed water-quality

criteria, additional sampling may be needed to establish that water quality-standards have been met before final bond release can be made.

The Division recommended that the macro-invertebrate study conducted in 1991 be repeated in Deer Creek and Huntington Creek, in the spring and fall during the year before reclamation and in the 5th and final year prior to bond release, to allow assessment as to whether impacts to fisheries occur or remain insignificant over the reclamation period. The operator indicated in the December 6, 1999 cover letter to the application that the results from monitoring conducted in 1990, 1991, 1992 and 1994 showed no differences in macro-invertebrate densities in Huntington Creek and that additional studies are not warranted.

Gravity Discharges

According to pages 169 and 170 in Volume 9 of the MRP, there is a potential of post-mining discharge of up to 200 gpm from all portals, most of which will probably discharge from the Cottonwood Mine portal in Miller Canyon (UPDES permit 22896-004), which is at the lowest elevation of all the portals. However, the conveyor tube and access portals in Cottonwood Canyon - constructed in 1994 and 1995 - are at least 50 feet lower in elevation and the potential for gravity discharge from these portals is not discussed.

The three Miller Canyon portals were sealed in 1987, but French drains were installed to allow drainage from the mine, and a water-sampling pipe was installed in the seal of the eastern portal: there has been no reported discharge since July 1996. Water samples collected for UPDES monitoring are analyzed for both UPDES and operational parameters. The Deer Creek Mine portals in Deer Creek and Meetinghouse Canyons could potentially discharge after mining operations cease. Current operational discharge from Deer Creek Canyon portals is under a UPDES permit, but there is no UPDES permit for the potential discharge to Meetinghouse Canyon.

The operator designed the seal for the Deer Creek Portal with a French drain system, using a sand filter behind the portal and four 6-inch pipes. The operator planned for multiple pipes to decrease the possibility that calcium carbonate precipitation from minewater could plug the discharge system.

Water Quality Standards and Effluent Limitations

The operator has provided a water monitoring plan in Appendix A. The plan contains a commitment on page 1777 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 EPA and set forth in 400CFR Part 434. UPDES information is in Appendix B, Volume 9.

In Tables 7-1a and 71b, the operator has provided the values for the parameters used in RUSLE to estimate annual sediment contributions to Deer Creek from reclaimed and undisturbed watersheds. A 3.5" computer disc with the information used to determine sediment loss for eleven of the fourteen areas, shown on Drawing DS-1795-D (Appendix R645-301-700-C), is included in Appendix 700-C: files for

areas A1-1D, A1-1U, and A1-2U were not included on the disc, but one for area A2-5U, which is not on the map, was included.

It is stated on page 7-3 that the R-factor was determined using the data in the CITY database within RUSLE for the nearby Hiawatha area: data for Hiawatha could not be found in the version of the CITY database on the 3.5" disc provided in the submittal. Determination of the R-factor needs to be clarified.

It states on page 7-3 that NRCS soil survey data on pages 2-176 through 2-181 and 1-181.42 through 2-181.52 in the MRP were used to obtain physical properties of the soil for determining the K-factor. These pages contain a abundance of information with no way of distinguishing what the operator actually used to determine the K-factor: the actual parameter values and assumptions used to determine the K-factor for input to RUSLE should be identified. It is unclear where the CITY data used in RUSLE to determine the K-factor came from.

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 C-factor for the undisturbed areas was determined using real data from past reference area vegetative monitoring, and Dr. Patrick Collins verified the cover entries that were used (pages 7-3 and 7-4).

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 RUSLE Spreadsheet Table. The P value in the table should be used for conservation planning, while the SDR (Sediment Delivery Ratio) 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).

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

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

The equation for estimating A is shown on page 7-2. It does not include SDR (the sediment delivery ratio) as a factor, which is correct. In Tables 7-1a and 7-1b the operator has multiplied the values for R, K, LS, and C by both P and SDR, which gives an erroneous and extremely small value for A in Table 7-1a: in Table 7-1b the value used for SDR is 1, so it does not effect the final result even though the process is incorrect. Correctly calculating the soil loss will still indicate a small loss of soil is expected, on the order of 4-5 tons per acre per year for the reclaimed areas, but the calculation results in Tables 7-1a and 7-1b need to be corrected.

Diversions

Two ephemeral draws in Elk Canyon have been included in the channel design and grading plan shown on DS-1782-D and other maps. Small ephemeral draws between the Terrace Enhancement Project area and Deer Creek may collect and convey water. The drainage areas are not significant enough to require designed channels, but these are areas with the potential for gully formation.

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 of 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.

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. Locations are shown on Drawing DS-1782-D and several other drawings.

The operator adjusted the channel location to minimize the potential for destabilizing the cut slope across from the Mine Office and Bath House. This area was predisposed to failure in 1992 when a tension crack was developed due to ponding water along the diversion ditch.

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 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.

Sediment Control Measures

The operator proposes to begin reclamation at the upstream end of the site and work downstream. If flow occurs in the undisturbed channels as the undisturbed bypass culverts are being removed, water from the channels will be diverted around the construction area using a sediment trap and a 12" flexible culvert and discharged back into the undisturbed drainage culvert below the work section (page 7-1).

Sediment control measures for treatment of runoff from the disturbed areas will remain intact below reclamation construction. During removal of the disturbed area culvert, runoff from the disturbed area will be directed by a berm to the remaining disturbed culvert segment. A sediment trap is to be used to remove sediment before the water enters the culvert, and the runoff will be treated again by the pond at the outlet of the culvert (page 7-2). The sediment pond will be removed as part of the final reclamation.

After each segment is backfilled and graded, sediment transport will be controlled as required by the Coal Mining Rules. Deep gouging or pocking of the surface is one BCTA that is specified for use to control sediment runoff (page. 7-1). Other methods are referred to on page 7-15 and design details for other sediment control measures such as berms, silt fences, and rock gabions are on Figure 7-4A. Straw bales are mentioned as an alternative sediment control measure and design details are on Plate 3-8 (GENS-1555-A). All sediment control structures will be removed by the time reclamation is complete.

Because of the reclamation techniques being used, sediment will be retained within the disturbed area and no siltation structures will be needed after the completion of reclamation (page 7-15).

Sedimentation Ponds

The sediment pond and the undisturbed culvert at its north end will be removed after all other reclamation work is done (page 7-6). The pond will be removed by filling it and compacting the material to minimize settling. The designed Deer Creek channel will be routed across the fill material and tied to the existing drainage at a channel transition area (Drawing DS-1782-D). As the pond is being filled, any flows will be diverted to the remaining undisturbed culvert at the north end of the pond, and upon completion of the pond reclamation and channel restoration, flow will be turned into the new channel and the remainder of the undisturbed culvert will be removed.

Findings:

The plan does not meet minimum regulatory requirements for this section. The applicant must provide the following in accordance with:

R645-301-731.210, Flow at Cottonwood Spring has proven to be measurable as gain in stream flow in Cottonwood Creek, but not directly as discharge from a pipe or other identifiable point source. This is the measurement method used by the USGS. The monitoring plan does not make it clear that the operator will continue to monitor Cottonwood Spring discharge by using weirs to measure this gaining reach on Cottonwood Creek.

R645-301-121.200, The footnote to Table 7-2 states that Drawing CM-10529-EM is in Appendix 700-A, but that drawing is in Appendix 700-B.

R645-301-121.200, -722, Survey stations for stream channel profiles on Drawing DS-1780-D are the reverse of survey stations shown on Drawings DS-1782-D and DS-1783-D.

R645-301-121.200, On page 5-12 of the proposed reclamation plan, reference is made to Plate 5-1, Drawing CM-10673-DR, in Volume 7 for the locations of all ASCAs in the Deer Creek disturbed area. Plate 5-1 in Volume 7 is Drawing CM-10584-DS, the Plan Sheet for the Deseret Coal Road to Wilberg Coal Road, and it shows no ASCAs for the Deer Creek Mine.

R645-301-731, In the operation monitoring plan in Volume 9, Appendix A, there is no indication that monitoring of ground-water for baseline parameters is to be done every five years during mine operation, as recommended in the Division's Directive Tech 004. There is such a commitment for surface-water monitoring sites during mine operation, and surface- and ground-water sites are to monitored for baseline parameters during the 5th and 9th year of reclamation.

R645-301-121.200, The tables in Appendix A indicate that in the 5th and 9th years after final reclamation, analyses are to be done for baseline parameters for all surface-water monitoring sites, springs, and well T-18 (Oliphant). There is a commitment in the plan to monitor the Deer Creek portals for baseline parameters in the 5th and 10th year after final reclamation. Identifying the 9th year for most cases and the 10th year for another is potentially confusing.

R645-301-121.200, It would possibly be better to simply continue the five-year sequence of analyses for baseline parameters from operations into reclamation rather than start a new sequence of 5th and 9th (10th) year analyses at final reclamation. In the extreme case, there could be a ten-year gap between the last five-year baseline analyses during mine operation and the 5th year reclamation analyses: monitoring during the first year of reclamation would be another option that would eliminate such a situation. In any case, the commitment for a set of baseline analyses in the next-to-last or last year of reclamation should be maintained.

R645-301-121.200, -731.214, A commitment to monitor any discharge from the Deer Creek portals in the 5th and 10th year after final reclamation is made on pages 5-5 and 7-14. Ground-water Hydrology - Reclamation Sampling Table 2 in Appendix A of Volume 9 should indicate the commitment to baseline monitoring of the Deer Creek portal during reclamation.

R645-301-121.200, -731.214, According to the reclamation monitoring tables in Appendix A, East Mountain and Trail Mountain springs will be monitored in July and August for operational parameters, and East Mountain - Rilda Canyon springs will be monitored quarterly for operational parameters. Text on page 10 of Appendix A states that during reclamation East Mountain and Trail Mountain springs will be field monitored during July and August and does not mention Rilda Canyon springs. Both the monitoring frequency and the parameters to be measured need to be clarified.

R645-301-121.200, -731.214, Wells in Cottonwood and Rilda Canyons will be monitored for water levels in March and June through December according to the reclamation monitoring tables in Appendix A. Text on page 11 states that, subject to access, piezometric surface wells will be monitored monthly for level only. The monitoring frequency needs to be clarified.

R645-301-731, The proposed reclamation plan provides for a survey, to be conducted during the Annual Subsidence Monitoring Surveys, to identify new discharge locations within or below sealed portals. Commonly, subsidence surveys are conducted for two years following longwall mining, but the duration for monitoring for these new discharges is not mentioned. The operator should formulate a water-quality and -quantity monitoring plan for new, measurable flows that are found issuing from these areas during the reclamation period.

R645-301-752, It states on page 7-3 that the R-factor was determined using the data in the CITY database within RUSLE for the nearby Hiawatha area: no data for Hiawatha could be found in the version of the CITY database on the 3.5" disc provided in the submittal. The CITY database is also used in RUSLE to determine the K-factor. Source for rainfall and other data used in the determination of the R-factor needs to be clarified.

R645-301-752, It states on page 7-3 that NRCS soil survey data on pages 2-176 through 2-181 and 1-181.42 through 2-181.52 in the MRP were used to obtain physical properties of the soil for determining the K-factor. These pages contain a abundance of information with no way of distinguishing what the operator actually used to determine the K-factor: the actual parameter values and assumptions used to determine the K-factor for input to RUSLE (including rainfall and other data, as in the CITY database) should be identified.

R645-301-752, In Tables 7-1a and 7-1b, the operator has multiplied the values for R, K, LS, and C by both P and SDR, which gives an erroneous and extremely small value for A in Table 7-1a: in Table 7-1b the value used for SDR is 1, so it does not affect the final result even though the process is incorrect. Correctly calculating the soil loss will still indicate a small loss of soil is expected, on the order of 4e-05 tons per acre per year for the reclaimed areas, but Tables 7-1a and 7-1b need to be corrected.

R645-301-731.520, According to pages 169 and 170 in Volume 9 of the MRP, there is a potential of post-mining discharge of up to 200 gpm from all portals, most of which will probably discharge from the Cottonwood Mine portal in Miller Canyon, which is at the lowest elevation of all the portals; however, the access and conveyor tube portals in Cottonwood Canyon--constructed in 1994 and 1995--are lower in elevation and the potential for gravity discharge from these portals is not discussed.

R645-301-742.312, For the bioengineered reaches of the reclaimed channels: **(1)** It is imperative that the operator plant enough sedges and willows behind the logs. **(2)** The value of placing anything, rocks or wattles, in the middle of the channel is questionable. Wattles are mainly intended for streambank protection, not for trying to establish islands; nevertheless, it might be worth trying 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.

REVEGETATION

Regulatory Reference: 30 CFR Sec. 785.18, 817.111, 817.113, 817.114, 817.116; R645-301-244, -301-353, -301-354, -301-355, -301-356, -302-280, -302-281, -302-282, -302-283, -302-284.

Timing

Table 3-1 shows the timing of various steps in reclamation, and Table 3-2 is a schedule of monitoring activities. 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. Advantageously, seeding will occur in the fall, but if recontouring is completed in the spring on the upper portions of the disturbed area, seeding will follow. Tree and shrub plantings will occur in early spring.

The seeding and planting schedule is acceptable, but the applicant should attempt to seed as much of the area as possible in the fall. Grading cannot usually begin in the spring until the ground has dried to some degree, and by this time, seeding would be very risky.

Although spring is recognized as a good time to plant seedlings, other operators have had good success planting containerized stock in the fall, particularly at mid- or higher elevation sites that are likely to have some snow cover for much of the winter. Snow cover reduces frost heaving.

The application is not required to have a revegetation monitoring schedule, but the schedule shown should be adequate for showing revegetation success for bond release.

Table 3-1 does not include topsoil salvaging or redistribution. This is discussed in the section of this review covering the reclamation plan for topsoil and subsoil.

Mulching, Seeding, and Other Soil Stabilization Practices

The section of this review addressing the reclamation plan for soils and subsoils discusses soil preparation techniques.

Seed and planting mixes

The applicant has revised the three seed mixes in the mining and reclamation plan and has followed Division recommendations. Many of the species have been tried at interim revegetation sites at the mine, and the recommendations were partly based on the successes at those sites. Every species in the mixtures is native to the area, and the mixtures are diverse and should lead to vegetation stands that comply with the revegetation performance standards. Drawing DS-1797-D shows which seed/planting mixes will be planted in which areas of the mine. The riparian seed mixture will be applied to the area within 20 feet either side of the channels. The conifer seed mixture will be applied to north-facing slopes, and the pinyon-juniper seed mixture will be applied on south-facing slopes.

The applicant is required by R645-301-358.400 to enhance where practicable, restore, or replace, wetlands and riparian vegetation along rivers and streams and bordering ponds and lakes. Since these areas are considered habitat of unusually high value, the applicant needs to use the best technology currently available to achieve these goals. Deer Creek above and below the mine supports a riparian community that needs to be restored as far as possible. The seed and planting mix contains many of the species assumed to have been in the riparian area before disturbance as shown in Table 6, page 2-156, of the current mining and reclamation plan. Many of the species in the seed and planting mix are upland species, but there are other species in the mix that would grow strictly in areas with enhanced moisture availability.

In Section R645-301-342, the application says channel design will incorporate soft bioengineering in slope areas of less than 5% along the Deer and Elk Creek drainages. Instead of riprap, alternative instream controls, such as wing deflectors, boulder clusters, and "U" or "V" shaped weirs, will be used. Locations where these techniques will be used are shown on Drawing DS-1780-D, and specific designs are in Figures 7-1A and 7-2A.

While the seed and planting mixtures are acceptable, the applicant needs to put additional emphasis on planting certain parts of the bioengineered channels. The areas behind logs and root wads are where erosion and scouring are likely to occur, and the applicant needs to be able to stabilize these areas. Possible options include:

1. Planting additional willows (coyote willow) in these areas. Willows could be planted very densely, or the applicant could consider putting willow wattles in these areas.

2. Planting plugs of sedges and grasses in these areas. This could be done in combination with willow wattles. The sedges and grasses would be planted behind the wattles. Inventories of the riparian vegetation do not show any sedges occurring along the stream, but it might be possible to establish beaked or wooly sedges. Grasses most likely to help stabilize the bank are Kentucky bluegrass (already in the seed mix) and redtop. Redtop could be planted from seed, but plugs could be obtained either from adjacent areas or commercial nurseries.

Additional discussion of the soft armoring is in the hydrology section of this review.

Seeding and mulching methods

Seed will be applied with a hurricane spreader or using a hydroseeder. If a hydroseeder is used, a small amount of wood fiber mulch will be added to mark the coverage area during application. These are standard seeding methods and are acceptable.

After seeding, 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 to anchor the straw mulch and stabilize the

soil. This mulching technique has worked very well at similar nearby mine sites. The applicant should not use an asphalt-based tackifier.

Two of the seed mixes include some combination of containerized plants, cuttings, rooted cuttings, bare root plants, and poles. In the riparian areas, 25% of each of these would be planted during each of the first four years. This allows some sedimentation and development of suitable planting sites to occur before all the seedlings are planted. In the Division's experience, there are not always enough places to plant along a restored stream during the first year after reclamation.

The concept of not planting all of the transplants at first was suggested by the Division, but the applicant needs to be aware it would lead to a longer extended responsibility period. The success standard for woody plants in the riparian area is 3412 per acre. R645-301-357.311 allows planting trees or shrubs at a rate of up to a cumulative total of 20% of the required stocking rate through 40% of the extended responsibility period without restarting the extended responsibility period. Therefore, up to 682 trees or shrubs per acre could be planted for the first four years after the initial planting without affecting the extended responsibility period. According to the application, however, about 1014 per acre would be planted each of the first four years for a total of about 3042. This, of course, is much greater than 682.

Maintenance and monitoring

The application does not discuss irrigation, so it is assumed the reclaimed area will not be irrigated. Rodent control measures will be implemented as necessary. Weed control will not be done unless it is necessary, but all noxious weeds will be eradicated if they become established on the site. The Division does not anticipate that irrigation or pest control will be needed except for noxious weeds. The husbandry practices in R645-301-357 allow control of noxious weeds through the entire extended liability period without affecting the length of this period.

The application says the annual monitoring will include inspection for rills and gullies. If present, they will be filled and the soil reseeded. Rill and gully repair will follow the requirements of rules R645-301-357.360 through R645-301-357.365.

Standards for Success

The plan contains information about three reference areas that will be used as revegetation success standards. It appears from the data and comparisons in the plan that these reference areas are acceptable.

The application discusses ways of measuring vegetation cover, productivity, and the density of woody plants. It also mentions the statistical tests that will be used, and these methods are acceptable.

The application says revegetation for tree and shrub species will be considered successful when the tree and shrub counts in the reclaimed areas are similar at the time of bond release to the counts in

the reference areas. Standards attained at the time of bond release will be approved by the Division and the Division of Wildlife Resources (DWR).

The Revised Universal Soil Loss Equation (RUSLE) will be used to model sediment loss from disturbed and reclaimed areas, and sedimentation will be monitored above and below the mine. While there are problems with every method developed for measuring erosion, those discussed in the application are acceptable.

At the time of bond release or when the extended period for successful revegetation has passed, one of the similarity indexes in Appendix B of the Division's "Vegetation Information Guidelines" will be used to compare life forms and/or species present in the reclaimed and reference areas.

The Division has found in comparing diversity between reclaimed and reference areas that diversity and similarity indexes are useful but that they do not always take enough factors into account. It is impossible with many to use a statistical test, so if the standard is not met, there is no alternative but to say the site does not meet bond release criteria.

The best method at this time appears to be to use a few indexes in combination with a qualitative evaluation of the vegetation diversity. Even with this combination of methods, though, the plan needs to contain a standard. Appendix B of the "Vegetation Information Guidelines," referenced in the application, says that *proposed* disturbed and reference areas can be considered adequately similar if the index value is at least 70%. This would be an acceptable standard for comparing life forms between the reclaimed and reference areas, but it should not be used to make comparisons of species.

Seasonality of established plant species is an important issue at some mines, but most or all of the species encountered in the vegetation sampling at Deer Creek were cool season species. These are generally much easier to establish than warm season species, so seasonality should not be a concern. To achieve revegetation success, essentially all of the species in the reclaimed area should be cool-season.

The other requirements in R645-301-353 would be very difficult to measure quantitatively, so a qualitative analysis at the time the applicant is seeking bond release is most appropriate.

Field Trials

The application includes no specific proposal for field trials, but field trials could be needed depending on the results of sampling refuse and substitute soils.

At this time, the Division cannot make a finding that revegetation is feasible using the proposed reclamation plan. The applicant has not presented a definitive soils reclamation plan. The applicant has committed to take soil samples during the operations phase and is being required to commit to a schedule for taking these samples. The application does contain analysis results for some soils and refuse, but, as discussed in the technical analysis for soils, there are problems with some of these materials and with incomplete and unreliable results. The Division does not know how much substitute soil will be available for reclamation or how much soil is needed.

It is vital that there be adequate suitable soils for revegetation. Most perennial species in Utah have relatively deep roots so they can extract water from increasing depths as the summer progresses. If root growth is inhibited by poor chemical or physical characteristics or if the soil has low water holding capacity, vegetative cover, production, diversity, and erosion control will all suffer.

Fish and Wildlife Habitat

The seed mixture in the application are acceptable for providing proper habitat conditions for wildlife.

According to the application, development of enhanced wildlife habitat is accomplished by constructing pools along portions of the Deer Creek drainage, and pools will be placed at the confluences of the drainages from Deer and Elk Canyons with Deer Creek.

No other enhancement measures are discussed in this section of the application, but the application says rocks and boulders would be placed on the surface. This enhancement method has been used successfully at other mines to create habitat for birds and small mammals.

The application discusses possible water discharge from the portal after reclamation. In the July 7, 1999, technical analysis, the Division required a program to study the effects of the discharge on macroinvertebrate populations in Deer Creek and Huntington Creek. The applicant responded in the cover letter that it believes there is no justification to perform a macroinvertebrate study before or after reclamation.

Volume 9A of the current mining and reclamation plan contains a report from the Ecosystem Research Institute about the water quality and macroinvertebrate studies done in Deer and Huntington Creeks in 1990, 1991, 1992, and 1994. The report concludes the water discharge from the Deer Creek mine had no measurable effects on the macroinvertebrate populations of Huntington Creek. However, it did affect Deer Creek.

Water from the mine had a pH of near 7, but as CO_2 was lost from the water, the pH increased to about 8.5 and calcium carbonate precipitated. The report estimates that 250,000 kg of calcium carbonate was deposited as limestone in Deer Creek over a three year period. The report concludes that this rate of precipitation would "seal the stream bottom and thus prevent accrual of stream water into the adjacent riparian community." It also says this precipitation would decrease the amount of macroinvertebrate colonization in Deer Creek. This could be through alteration of the substrate or direct effects on the macroinvertebrates as observed in the stonefly study.

The Division contacted DWR about this issue, and they are primarily concerned about any effects on Huntington Creek rather than Deer Creek. They do not feel the effects on Deer Creek are of enough significance to warrant further monitoring of the macroinvertebrate populations. Therefore, while there have been and probably will continue to be effects on the macroinvertebrate populations of Deer Creek, these are not significant enough to require further monitoring.

After the mine is reclaimed, there will, presumably, continue to be some discharge from the mine and calcium carbonate precipitation; however, most should occur near the disturbed area with less happening farther down the canyon. The report in the plan discusses the sealing effect the calcium carbonate had on the streambed and that it decreased infiltration into the soil. This could continue to occur after reclamation, but the area most likely to be affected would be the reclaimed area. As the report in the plan says, there were, unexpectedly, no effects of the water discharge on the riparian vegetation. The increased water should have had some effects on the vegetation composition and cover, but limestone precipitation apparently sealed the stream bottom to the point there were no measurable effects. When the mine water discharge is eliminated or greatly reduced, the effects of sealing the creek bottom will remain, so the amount of water available to riparian vegetation could be decreased compared to premining levels.

Findings:

Information in the application is not adequate to meet the requirements of this section of the regulations. Prior to final approval, the applicant must supply the following in accordance with:

R645-301-341.210, The applicant needs to place greater emphasis on planting certain portions of the bioengineered channel, such as behind logs and root wads. The applicant needs to ensure these areas are stable. Possible methods include dense willow plantings, willow wattles, and combinations of willows with grasses and/or sedges.

R645-301-341.250, The application includes a method of measuring diversity, but it needs to give a success standard.

MAPS, PLANS, AND CROSS SECTIONS OF RECLAMATION OPERATIONS

Regulatory Reference: 30 CFR Sec. 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.

The cross sections are shown on Drawing DS1783D and DS1784D, Deer Creek Mine, Deer Creek Canyon Final Reclamation Cross Sections. The cross section are at a scale of 1" = 80', which is different than the base map. The applicant needs to change the scale of the cross section to the base map scale and label the disturbed area boundaries.

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. Drawing CE-10884-EM does not show the location of the cross sections. The map scale is 1" = 100'.

The cross sections are on drawing CE-10891-EM and do not show the location of the 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 applicant did not include backfilling and grading maps for the 9th East North Meetinghouse Portals. The applicant needs to include as-built drawing for the area.

9th East North Meetinghouse Portals

The applicant did not include backfilling and grading maps for the 9th East North Meetinghouse Portals. The applicant did state in Appendix R645-301-301-500-B that the reclamation plan for the area would be updated when it because available. The backfilling and grading plans must be approved by the Division before the reclamation plan can be approved.

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 applicant needs to give the Division as-built drawings for the 9th East Grimes Wash Portal area. The drawings must show any facilities that will be left after reclamation.

9th East North Meetinghouse Portals

The applicant needs to give the Division drawings for the 9th East North Meetinghouse Portal area. The drawings must show any facilities that will be left after reclamation.

Final surface configuration maps

The backfilling and grading maps show the final surface configuration.

Findings:

Information provided in the proposed amendment is not considered adequate to meet the requirements of this section. Prior to approval, the applicant must provide the following in accordance with:

R645-301-542.00, The applicant needs to make the backfilling and grading maps for the Deer Creek area more clear by (1) show the disturbed area boundary on drawing DS1782D, DS1783D and DS1784D and (2) have the scale of Maps DS1783D and DS1784D be the same as the base map (1" = 100").

R645-301-542.00, The applicant will make the backfilling and grading maps for the Rilda Canyon area more clear by (1) labeling the disturbed area boundary, portals and highwalls on drawing CE-10891-EM and (2) have the scale of Map CE-10891-EM be the same as the base map (1" = 100").

R645-301-542.00, The applicant must submit as-built backfilling and grading maps for the 9th East Grimes Wash Portals area.

R645-301-542.00, The applicant must submit backfilling and grading maps for the 9th East North Meetinghouse Portals areas before the Division can approve the reclamation plan.

BONDING AND INSURANCE REQUIREMENTS

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

Determination of bond amount

The applicant did not include a revised reclamation cost estimate in the amendment. The Division was informed by the applicant that a cost estimate would not be included until the reclamation plan was approved. The Division agreed with the concept since the reclamation bond estimate must be based on the approved plan.

Findings:

Information provided in the proposed amendment is not considered adequate to meet the requirements of this section. Prior to approval, the applicant must provide the following in accordance with:

R645-301-830.130, The applicant did not include a detailed reclamation cost estimate in the amendment. The applicant informed the Division that the reclamation cost estimate would not be submitted until the reclamation plan was approved. The Division agreed to that procedure. Prior to final approval the applicant must submit a detailed reclamation cost estimate.

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