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

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

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

July 7, 1999

Chuck Semborski, Environmental Supervisor
Energy West
P. O. Box 310
Huntington, Utah 84528

Re: Deficiencies in Revised Reclamation Plan, PacifiCorp, Deer Creek Mine, ACT/015/018-99C, File #3, Emery County, Utah

Dear Mr. Semborski:

The Division has completed a review of your revised reclamation plans for the Deer Creek Mine. Your application has some deficiencies in it that will need to be corrected before we can approve it. A partial technical analysis is enclosed which discusses the issues that will need to be resolved. We are also returning your revised plans so that you can make the necessary changes and resubmit them as a complete package. You should note that one of the review copies was sent to the Forest Service and you will need to retrieve it from them in order to correct it.

In order for us to keep this in our review cycle we will expect a response by no later than August 9, 1999.

Please call if you have any questions.

Sincerely,

Daron R. Haddock

Daron R. Haddock
Permit Supervisor

tm
Enclosure: Technical Analysis
Reclamation plans
cc: Janette Kaiser, USFS
Price Field Office
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State of Utah
Division of Oil, Gas and Mining
Utah Coal Regulatory Program

Technical Analysis and Findings with Deficiencies
Deer Creek Mine
ACT/015/018
Revised Reclamation Plan
July 6, 1999

INTRODUCTION

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

Often the technical review of an application finds that the application contains some deficiencies. The deficiencies are discussed in the body of the TA and are identified by a regulatory reference which describes the minimum requirements. In this Technical Analysis we have summarized the deficiencies at the beginning of the document to aid in responding to them.

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

SUMMARY OF DEFICIENCIES

R645-301-121, The applicant did not provide instructions on how to insert some of the material in the application into the mining and reclamation plan. This needs to be done in such a way that page numbers correspond with adjacent portions of the plan and so page numbers are not duplicated.

R645-301-123, The Division has no record of receiving a C-1 form with the notarized signature of a responsible official of the applicant indicating the information in the application is true and correct to the best of the official's information and belief.

R645-301-130, Sampling must be performed by a Certified Professional Soil Scientist or a qualified Soil Scientist. Sufficient information must be submitted with the amendment to enable the Division to determine the qualifications of the Soil Scientist for conducting a soil survey.

R645-301-224 and R645-301-233, The amendment and MRP must follow the Division Guidelines for Topsoil and Overburden to adequately show and delineate the location, acreage, salvage depth and resulting volumes of substitute topsoil areas for both the Reclamation Sampling Program and for the Operation Sampling Program.

R645-301-232.720, If sufficient substitute topsoil cannot be identified and verified within the disturbance area to achieve successful reclamation, then PacifiCorp will be required to import soil borrow material of the quality and quantity necessary to achieve revegetation standards.

R645-301-242, Clearly and consistently describe within all applicable amendment sections the logistics that will be followed for salvaging and using any identified suitable substitute topsoil during reclamation.

R645-301-243, The amendment identifies on-site fills as possible substitute topsoil. However, since sampling is incomplete and does not follow the Division's Guidelines for Topsoil and Overburden, data is inconclusive for making determinations for soil nutrients and amendments.

R645-301-244, Define "discontinuous tilling." If tilling is being proposed, the amendment must describe and explain how tilling will be utilized and accomplished in steep terrain reclamation using rocky soils.

R645-301-553.252, R645-301-233, R645-301-120 and R645-301-130, The refuse piles and coal mine waste must be covered with a minimum of four feet of the best available, nontoxic and noncombustible material. Since excess fills exist within the Deer Creek portal surface disturbance area, there is no logical reason why a minimum of four feet of material cannot be obtained for covering the refuse. If less than four feet is requested, the amendment and MRP must contain adequate information for the Division to make a determination of waste acceptability. Sampling must follow the Division's Guidelines for Topsoil and Overburden. Sampling protocol must be explained. Sampling must be performed by a qualified person.

R645-301-341.100, The applicant needs to clarify the reclamation schedule to show compliance with

R645-301-354.

R645-301-341, The applicant needs to clarify the sections of the application dealing with surface preparation.

R645-301-341, R645-301-358, The applicant must show how it will use the best technology currently available to restore or replace riparian vegetation. The applicant has designed riprap-lined channels for the entire length of the mine, but riprap-lined channels are not as conducive to vegetation growth and establishment as those designed using soft armoring or bioengineering. Certain parts of the channels presumably need to be riprapped, but it would probably be feasible to use other designs in less steep areas, such as the one where the grade is about 2%. The applicant needs to investigate these design options.

R645-301-341.250, The application needs to discuss density standards for woody plants. For these standards, the applicant could use either the density values shown in the current mining and reclamation plan or could commit to use the values obtained when sampling for bond release. In the latter case, it would be necessary to obtain specific Division and Wildlife Resources approval for the new standard.

R645-301-250, The application does not discuss success standards for some of the general revegetation requirements in R645-301-353. In particular, it should discuss how diversity and erosion control will be measured and what standards will be used.

R645-301-342, The macro invertebrate study conducted in 1991 and in 1994 needs to be repeated in Deer Creek and Huntington Creek in the spring and fall the year before reclamation, in the fifth year after reclamation, and in the last year of the extended liability period just before applying for final bond release.

In addition to these requirements, the Division has several suggestions for the reclamation plan:

1. The application is not required to have a revegetation monitoring schedule, but the schedule shown is not adequate for showing revegetation success for bond release. Woody plant density needs to be measured in the fourth and eighth years following seeding, and vegetation cover needs to be measured in the ninth and tenth years.

2. A very effective mulching technique at other mines in Utah has been to apply about one ton per acre of straw followed by application of a tackifier and 500 pounds per acre of wood fiber hydromulch.

R645-301-553.500 and R645-301-553.600, The Permittee must demonstrate that the reclamation plan will eliminate all highwall to the extent practical. Highwalls can only be left if there is insufficient material to reclaim them or the reclaimed highwall would not be stable.

R645-301-537, The Permittee must reclaim the refuse piles to AOC standards unless they the areas can be excluded under the settled and revegetated fill provision of R645-301-537.

R645-301-121.200, The Permittee must identify each existing highwall and each proposed highwall

remnants that will be left after final reclamation.

R645-301-552.130, The Permittee must show that the assumptions used for the stability charts are valid for the reclaimed slope. The assumption used the Permittee are that the soils will be homogeneous and dry. The refuse piles will be covered with 4-feet of cover so the slope may not be homogenous. Also, some slopes have the potential to become saturated such as the areas by the French drain and the intake portal.

R645-301-537, The Permittee must either backfill and regrade the refuse piles (waste rock piles) to meet AOC standards or show that the refuse piles meet the requirements of R645-301-537 and should be left as settled and revegetated fills.

R645-310-553.300, The Permittee must show how the requirements of R645-301-553.300 will be met. This regulation requires that all coal seams and acid- and toxic-forming materials will be adequately covered to control surface impact or contaminate surface or groundwater.

R645-301-553.140, The Permittee did not show how erosion and water pollution would be minimized. The proposed slopes are straight rather than concave. Concave slopes tend to minimize erosion more that straight slopes.

R645-301-551, The Permittee must provide the Division with portal closure plans for all portals including those not at the Deer Creek site. Those additional portals include but are not limited to the North Fork Meetinghouse Canyon site, the Grimes Wash Canyon site and Rilda Canyon. See the analysis section of the TA for detailed concerns.

R645-301-551, The Permittee must show that the designs for the intake portal at the Deer Creek site are adequate for long term discharge from the mine. The Division concerns are if one pipe is used it could get clogged, that a long pipe will clog more easily than a short pipe (see analysis for details), how the system will be monitored and what type of remediation could be done.

R645-301-542.100, The Permittee must include the reclamation of all portal areas in the reclamation timetable.

R645-301-542.100, The Permittee needs to include the reclamation for the C1 and C2 access roads in the reclamation timetable.

R645-301-542.200 and R645-301-533, The Permittee must include detailed typical cross sections for the reclamation of the C1 and C2 belt line access road. The cross sections must be drawn to scale and show the county road and the drainage system.

R645-301-542 and R645-301-521.163 The Permittee must show the disturbed area boundaries on the reclamation maps and cross sections. Some disturbed areas not shown on the Deer Creek mine site include the conveyor from the Deer Creek mine to the power plant, the North Fork Meetinghouse Canyon portal area and the Grimes Wash Canyon portal area. Unless the Permittee identifies the disturbed area boundaries on the maps and cross sections, the Division will be unable to evaluate the reclamation plan.

R645-301-542.310, The Permittee must show the final surface configuration extending 100 feet outside

the disturbed area boundaries for all reclaimed areas. Map DS1782D does not show the contours in and around the reclaimed areas at the Deer Creek site. Specifically, the Permittee did not show the contour lines in the upper bench at the Deer Creek site, nor at the other portal locations and the conveyor belt line from the mine to the power plant.

R645-301-542.310, The Permittee must show the final surface configuration for all reclaimed areas. Drawings DS1783D and DS1784D do not show the cross sections for all areas of the Deer Creek site. The Permittee did not show the cross sections for the upper bench at the Deer Creek site, nor at the other portal locations. Specifically, the Permittee did not show the cross section for the upper bench at the Deer Creek site, nor at the other portal locations and the conveyor belt line from the mine to the power plant.

R645-301-553.260 and R645-301-542.200, The Permittee must show the location of the coal mine waste disposal areas (refuse piles) on the reclamation maps and cross sections.

R645-301-553.300 and R645-301-542.200, The Permittee must show the location of each coal seam, acid-and toxic-forming materials and combustible materials on the reclamation contour maps and cross sections.

R645-301-553.200 and R645-301-542.200, The Permittee must show the location of all highwalls that will not be fully reclaimed on the final surface contour maps and cross sections. The Permittee must show the actual cross sections of all highwall remnants that will be left not typical cross sections.

R645-301-542.300, The contour intervals on the reclamation maps must be no greater that 5 feet intervals.

R645-301-542.320, The Permittee will show the location of each permanent feature that will be left after final reclamation. Such features include but are not limited to the coal mine waste disposal area (refuse pile and waste rock sites).

R645-301-521.150 and R645-301-542.300, The Permittee must show the final surface configuration for all reclaimed areas. Drawings DS1783D and DS1784D do not show the cross sections for all areas of the Deer Creek site. The Permittee did not show the cross sections for the upper bench at the Deer Creek site, nor at the other portal locations. Specifically, the Permittee did not show the cross section for the upper bench at the Deer Creek site, nor at the other portal locations and the conveyor belt line from the mine to the power plant.

R645-301-521.123, The Permittee must show the location of each public road that is within 100 feet of the reclaimed areas. The Permittee does not show the location of the county road next to the reclaimed conveyor belt.

R645-301-830.130, The Permittee did not include a detailed reclamation cost estimate in the amendment. The Permittee 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 Permittee must submit a detailed reclamation cost estimate.

R645-301-731. Provide a monitoring plan specific to reclamation that: 1) Commits to provide quarterly monitoring for the minewater discharge through bond release and includes a full baseline

parameter list for the 5th year of reclamation and the year prior to bond release. Any additional requirements from the Department of Health UPDES permit must also be reported. 2) Commits to survey areas down dip and below the mined seam for springs that may develop or increase in discharge from mining. The survey should at a minimum be conducted during the 5th year and one year prior to bond release. Include water quality and quantity monitoring where flow accumulation is measurable.

R645-301-731.221. Provide a monitoring plan specific to reclamation to assure impacts to hydrologic balance are prevented, and 1) include commitments made in Volume 9, page 17 for continued monitoring of HM-2 and HM-3, 2) describe how the State Water Quality Standards, Utah Administrative Code R317-8, for the Deer Creek, Huntington Creek, and any other stream receiving minewater discharge will be shown to meet water quality standards. The Division recommends a minimum high and low flow season monitoring for (selected) parameters over the full period of reclamation. Parameters should be reflective of all potential in-mine contaminants, 3) Include a map showing flow direction and groundwater divides in the permit and adjacent area for each mined seam which identifies existing mine floor elevations, in-mine discharge locations, pertinent geologic controls, mine controls such as sealed mine sections, and changes to previously existing hydrologic barriers, 4) Provide a water monitoring plan that; a) determines whether changes in flow hydrology will occur along the Straight Canyon Syncline during the time mining has idled, b) determines whether baseflows to the Cottonwood Canyon Stream increase, c) identifies the difference between changes due to climate, or from ground water discharge by including age dating to be conducted every 2nd year during the low flow period for; radio carbon dating, tritium dating, and stable hydrogen and oxygen isotopes (for meteoric waterline determinations) in the Cottonwood Canyon wells and Cottonwood Creek streamflow below well CCW-1S, 5) Repeat the macro invertebrate study conducted in 1991 and in 1994 in the Deer Creek and Huntington Creek during the spring and fall, the year before reclamation, and in the 5th and final year prior to bond release.

R645-301-742. Details, maps and plans, which indicate how drainage will be conveyed to the pond within the disturbed areas not undergoing reclamation construction during the reclamation period.

R645-301-725.210. A grading plan that considers small tributary ephemeral drainages for the draws adjacent to Elk Canyon, and the draw above the Storage Dock that will control or prevent erosion.

R645-301-625. A demonstration showing the proposed method for backfilling the mine portal will not plug from calcium carbonate precipitation. Calcium carbonate precipitate was identified to be widespread within the Deer Creek drainage through a Macro Invertebrate Study done to assess minewater discharge impacts to fisheries.

R645-301-752.210. and -752.250. Address stability of the cut slope across from the Mine Office and Bath House area, and its relation to the proposed Deer Creek Drainage location. The channel abuts an area that was predisposed to failure in 1992 when a tension crack developed from water ponding in a diversion ditch. Destabilization, or rock fall from this cut slope could cause channel failure.

R645-301-742.314. 1) Remove item number two on the Final Reclamation Hydrology Map DS1780D or provide additional site specific detail (The practice of using geotextile filter fabric is not an acceptable reclamation practice in the State of Utah because it does not promote channel stability. The Division will accept this practice only for pre-approved site specific locations). 2) Provide designs for the channel transitions between the upstream and downstream natural channel and the

reclaimed channel.

R645-301-742. The applicant needs to provide additional information for the proposed sediment control measures during the reclamation phase to meet BTCA for alternate sediment control measures. Specific issues are identified in the technical assessment.

ADMINISTRATIVE INFORMATION

APPLICATION FORMAT AND CONTENTS

Regulatory Reference: R645-301-120

Analysis:

The Division has no record of receiving C-1 and C-2 forms with this submittal. There is no notarized statement from an official of the applicant that the information in the application is true and correct to the best of the official's information and belief.

The cover letter submitted with the amendment includes some of the information required in the C-2 form, but it does not show where to put much of the text. For example, the cover letter says pages 4-1 through 4-56 and 4-66 and 4-67 should be removed. This is most of the current reclamation plan. However, the letter does not show where to insert the new pages of the reclamation plan, and some page numbers in the new reclamation plan overlap with page numbers in other sections of the current mining and reclamation plan. This could become very confusing and needs to be corrected.

Findings:

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

R645-301-121, The applicant did not provide instructions on how to insert some of the material in the application into the mining and reclamation plan. This needs to be done in such a way that page numbers correspond with adjacent portions of the plan and so page numbers are not duplicated.

R645-301-123, The Division has no record of receiving a C-1 form with the notarized signature of a responsible official of the applicant indicating the information in the application is true and correct to the best of the official's information and belief.

OPERATION PLAN

TOPSOIL AND SUBSOIL

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

Analysis:

Topsoil Substitutes and Supplements

No topsoil was salvaged at the Deer Creek site, and therefore, construction fills within the surface disturbance area will be used as 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 activities. The amendment states that no other topsoil is available for reclamation and that soil material will be obtained from the existing fills within the surface disturbance area.

The existing MRP contains several commitments for obtaining and characterizing Substitute Soils within the Deer Creek Mine surface disturbance area. These commitments include a Reclamation Sampling and Operational Sampling programs.

Reclamation Sampling Program

After mining and prior to reclamation, (1) a sampling program will be implemented to determine the extent of suitable substitute topsoil material and (2) identify acid and toxic-forming materials. The plan discusses 13 sampling sites (SS1 thru SS13) which are identified on Map 3-9 (Drawing DS202E), Deer Creek Mine Surface Yard Map. *The following are needed for the Reclamation Sampling Program:*

- *The plan must clarify sampling procedures on how samples will be taken, depth of sampling, soil horizon designation, composite requirements, etc.*
- *Sampling sites (SS1 thru SS13) must identify substitute topsoil by delineating the quality and quantity of the soil materials.*
- *Sampling must be performed by a Certified Professional Soil Scientist or a qualified Soil Scientist. In the later case, sufficient information must be submitted with the amendment to enable the Division to determine the qualifications of the Soil Scientist for conducting a soil survey according to the standards of the National Cooperative Soil Survey.*
- *Sampling must be performed and reported by depth intervals sufficiently to characterize surface and subsurface materials.*
- *Data generated during sampling, mapping, and analysis must be used to prepare a substitute topsoil map identifying substitute soils, depth of salvage.*
- *The substitute topsoil map must be correlated with a reclamation cut and fill map to ensure that substitute topsoil are adequately identified for salvage and placement.*
- *Based on the surface disturbance acreage, an average replacement thickness needs to be specified for each area of reclamation.*

Operational Soil Sampling

Soil materials from fill slopes will be sampled every 5 years. The MRP commitments for sampling the fill slopes every 5 years have not been met. The only soil sampling periods included samples taken during 1980 and 1983. Appendix 2-A, Table 2-A list soil sample analysis for disturbed, undisturbed and coal waste of the Deer Creek Mine area for years 1980 and 1983. The amendment states that soil tests

on the disturbed and undisturbed areas and coal waste show that the materials in the portal area should support selected vegetative materials with the conclusion that procurement of borrow topsoil for reclamation is not needed. *Operational Sampling during the 1980 and 1983 periods did not follow the Division Guidelines for Topsoil and Overburden. Therefore, information contained in the amendment does not show that the fill materials in the portal area are suitable for achieving the revegetation standards. As mentioned under the Reclamation Sampling Program, sampling must delineate quality and quantity of soil materials. Sampling must be performed by a Certified and/or qualified Soil Scientist. Sampling must be performed and reported by depth intervals sufficiently to characterize the soils. If sufficient substitute topsoil cannot be identified within the disturbance area, then PacifiCorp will be required to import soil material of the quality and quantity necessary to achieve revegetation standards.*

Findings:

Information provided in the application is not considered adequate to meet the requirements of this section of the regulations. The applicant must provide the following in accordance with:

R645-301-130, Sampling must be performed by a Certified Professional Soil Scientist or a qualified Soil Scientist. Sufficient information must be submitted with the amendment to enable the Division to determine the qualifications of the Soil Scientist for conducting a soil survey.

R645-301-224 and R645-301-233, The amendment and MRP must following the Division Guidelines for Topsoil and Overburden to adequately show and delineate the location, acreage, salvage depth and resulting volumes of substitute topsoil areas for both the Reclamation Sampling Program and for the Operation Sampling Program.

R645-301-232.720, If sufficient substitute topsoil cannot be identified and verified within the disturbance area to achieve successful reclamation, then PacifiCorp will be required to import soil borrow material of the quality and quantity necessary to achieve revegetation standards.

RECLAMATION PLAN

TOPSOIL AND SUBSOIL

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

Analysis:

Soil Redistribution

The amendment states that reclamation at the site will be sequenced from top to bottom. The statement is made that available topsoil will distributed and the surface roughened by discontinuous tilling and/or deep gouging. *Surface roughening by "discontinuous tilling" is not understood. In steep terrain*

reclamation using rocky soils, tilling is not only impracticable, but impossible.

The amendment is unclear and inconclusive as to what logistics will be followed for obtaining or recovering any identified suitable substitute topsoil during reclamation. At one point, the amendment states that soil will redistributed, but no information is given to salvaging any soils or suitable fills as substitute topsoil. Table 3-1, Reclamation Schedule, does not list soil salvage from vegetated slopes that will be re-contoured; nor does the table list soil replacement as referenced under sections R645-301-242: Soil Redistribution and R645-301-244: Soil Stabilization. In addition, section R645-301-541: General, does not list soil salvage and replacement. Section R645-301-553: Backfilling and Grading, does not list soil salvage and replacement.

Soil Nutrients and Amendments

The amendment identifies on-site fills as possible substitute topsoil. *However, since sampling is incomplete and does not follow the Division's Guidelines for Topsoil and Overburden, data is inconclusive for making determinations for soil nutrients and amendments.*

Soil Stabilization

After topsoil distribution, the surface will be roughened 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.

Rills and gullies which develop to a depth of nine inches or greater in areas that have been regraded and topsoiled and which either; (1) disrupt the approved postmining land use or the reestablishment of the vegetative cover, or (2) causes or contributes 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 MRP states that refuse within the Deer Creek Portal surface disturbance area will be covered by less that four feet of material. *Since excess fills exist within the Deer Creek portal surface disturbance area, there is no logical reason why a minimum of four feet of material cannot be obtained for covering the refuse.*

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. *According to the Division's Guidelines for Topsoil and Overburden, unacceptable criteria are identified for Blind Canyon floor samples for SAR and pH. Poor criteria are met on Blind Canyon split samples for SAR and on Hiawatha floor samples for pH. Data is incomplete since no determinations were made for selenium or for Acid Base Potential.*

The amendment Table 2-A-1, lists several samples taken in 1980 for Coal Waste. *However, the*

data is incomplete and no final determination can be made by the Division concerning waste acceptability since no analyses are listed for selenium, boron, acid base potential, available water capacity, rock fragments, texture, % saturation, and % coal fines. In addition, no information is provided on how the samples were taken, or the sampling procedures involved. In order to make a finding on whether sampling represents the waste material, sampling protocol must be explained.

The Division cannot make a determination of waste acceptability since sampling is inadequate and does not follow the Division's Guidelines for Topsoil and Overburden. Sampling protocol must be explained. Sampling must be performed by a qualified person. Since toxicity is identified in roof and floor analysis, the refuse piles and coal mine waste must be covered with a minimum of four feet of the best available, nontoxic and noncombustible material.

Findings:

Information provided in the application is not considered adequate to meet the requirements of this section of the regulations. The applicant must provide the following in accordance with:

R645-301-242, Clearly and consistently describe within all applicable amendment sections the logistics that will be followed for salvaging and using any identified suitable substitute topsoil during reclamation.

R645-301-243, The amendment identifies on-site fills as possible substitute topsoil. However, since sampling is incomplete and does not follow the Division's Guidelines for Topsoil and Overburden, data is inconclusive for making determinations for soil nutrients and amendments.

R645-301-244, Define "discontinuous tilling." If tilling is being proposed, the amendment must describe and explain how tilling will be utilized and accomplished in steep terrain reclamation using rocky soils.

R645-301-553.252, R645-301-233, R645-301-120 and R645-301-130, The refuse piles and coal mine waste must be covered with a minimum of four feet of the best available, nontoxic and noncombustible material. Since excess fills exist within the Deer Creek portal surface disturbance area, there is no logical reason why a minimum of four feet of material cannot be obtained for covering the refuse. If less than four feet is requested, the amendment and MRP must contain adequate information for the Division to make a determination of waste acceptability. Sampling must follow the Division's Guidelines for Topsoil and Overburden. Sampling protocol must be explained. Sampling must be performed by a qualified person.

REVEGETATION PLAN

Regulatory Reference: R645-301-341

Analysis:

Revegetation and Monitoring Schedules

Table 3-1 shows the timing of various steps in reclamation, and Table 3-2 is a schedule of monitoring activities. Under the reclamation schedule, seedbed preparation, fertilization, and seeding and planting would be done in early April or in late July through September.

The applicant needs to clarify this schedule and show compliance with R645-301-354. Mid-summer seeding or planting should be avoided. The normal time for seeding in Utah is as late in the fall as possible. Planting bare root stock, cuttings, or rooted cuttings needs to be done in early spring, and containerized plants can be planted in early spring or in the fall. Early spring seeding is sometimes successful but should also be avoided.

The application is not required to have a revegetation monitoring schedule, but the schedule shown is not adequate for showing revegetation success for bond release. Under R645-301-356.232, 80% of trees and shrubs counted toward the woody plant success standard must have been in place for at least 60% of the extended liability period, and all woody plants counted toward the standard must have been in place for at least two years. This requirement necessitates that woody plants be counted in the fourth and eighth years after seeding and planting. In addition, the success standards for vegetation cover must be met for at least two years; therefore, it is necessary to take cover measurements in both the ninth and tenth years.

Surface Preparation Techniques

Sections 240 and 340 discuss soil redistribution and surface preparation. As areas are recontoured and topsoil is distributed, they will be roughened by discontinuous tilling and/or deep gouging with a trackhoe bucket or similar equipment. Where feasible or helpful to prevent slope slippage, rocks and boulders will be randomly placed on slopes. These methods are designed to control slope slippage, reduce runoff and erosion, promote micro habitats, and provide a more aesthetically-pleasing appearance. Where deemed necessary, especially on slopes greater than 20%, a soil tackifier will be incorporated.

In section 340, the application says certified fertilizer will be applied and weed free alfalfa hay will be incorporated into the soil following contouring Pocking will mix the straw mulch and fertilizer into the upper portion of the soil.

The applicant needs to clarify these sections. Discontinuous tillage is described in at least one text as being done with a notched disc, but it is not certain whether this is what the applicant intends. It is uncertain what a soil "tackifier" is, how it would be used, and whether it would be beneficial for erosion control and vegetation establishment.. While the application describes incorporating hay into the soil, it also mentions using straw. If hay is mixed into the soil, it is more properly referred to as a soil amendment rather than as mulch which is usually on the surface. In addition, while the application says certified weed free hay would be used, the applicant is probably referring to certified *noxious* weed free hay.

Seeding and Planting Mixtures and Revegetation Methods

The applicant has revised the three seed mixes in the mining and reclamation plan. 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. However, the Division has a few suggestions to improve diversity.

In riparian areas, Wood's rose would be planted at the rate of 500 per acre within 20 feet of the stream. The most common woody species in the riparian area was Rocky Mountain maple followed by Wood's rose and red osier dogwood. It is suggested the applicant reduce the number of Wood's rose plants to 200 per acre and add Rocky Mountain maple at the rate of 300 per acre.

Bluebunch wheatgrass, although a native species, is sometimes aggressive, and it tends to exclude other species. For this reason, it is suggested the amount seeded be reduced to one or two pounds of pure live seed per acre.

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.

The *Interagency Forage and Conservation Planting Guide for Utah* indicates forbs do not normally need to be planted in riparian areas because, with proper management, they will come in on their own. Some forbs have been included in the seed mix, but these are species that would normally grow in more xeric upland sites rather than true riparian areas. It is anticipated that seeds of sedges, rushes, broadleaf forbs, and other plants would be washed into the riparian area from areas above the mine.

The applicant has designed riprap-lined channels for the entire length of the mine. At the confluences of Deer Creek with the channels from Deer and Elk Canyons, small pools would be built that could hold water and become small wetlands. Riprap-lined channels are not as conducive to vegetation growth and establishment as those designed using soft armoring or bioengineering. Certain parts of the channels likely need to be riprapped, but it would probably be feasible to use other designs in less steep areas, such as the one where the grade is about 2%. The applicant needs to investigate these design options. This is discussed further in the section of this analysis concerning hydrologic designs.

The applicant has committed to specific spacing for willows, dogwoods, and cottonwoods. In the Division's experience, there are not always enough places to plant along a restored stream during the first year after reclamation. Depending on the reclamation methods used, it may be necessary to allow bars to build up in the stream before some of the plants can be planted. Also, the spacing is usually not very even in situations like this, and the applicant may want to add a statement indicating the plants may not be all planted at the same time and that the spacing may not be regular.

The seed mixtures will be broadcast seeded using a hurricane-type seeder or with a hydroseeder. If the seed is hydroseeded, a small amount of wood fiber mulch will be added to mark the coverage area. Otherwise, the areas will be raked to cover the seeds. Either of these methods is acceptable.

Finally, a wood fiber or other acceptable mulch will be applied at the rate of about 2000 pounds per acre. Using a wood fiber mulch is acceptable, but other mulching methods have proven to be more durable and to provide better erosion protection. At other coal mines, the best results have come with using about one ton per acre of certified noxious free straw mulch followed by application of a tackifier and about 500 pounds of wood fiber mulch. The tackifier and wood fiber mulch bind the straw and help keep it from blowing away. Straw does not decompose as quickly as the wood fiber mulch.

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.

The application says rills and gullies will be filled and the soil reseeded. For repaired areas larger than 15% of the total reclaimed area, the Division will be notified and the affected area will be reported in the annual report. Repairs and seeding of up to 15% of the area is allowed for the first two years of the responsibility period without restarting it. After two years, seeding this large of an area would increase the length of the extended liability period. This is not considered a deficiency in the application, but the applicant needs to be aware of the potential problem.

Revegetation Success Standards

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 Division is required to consult with the Division of Wildlife Resources about woody plant density success standards. In many cases, the numbers of woody plants in reference areas are not ideal for the type of habitat sought. When measured in 1980, the mixed conifer, pinyon juniper, and riparian reference areas had 3320, 584, and 3412 woody plants per acre, respectively. These are considered acceptable standards for these areas.

The applicant has two options for setting the woody plant density standards: 1) The applicant can use the specific numbers shown above, or, 2) The number of woody plants in the reference areas can be measured at the time of final reclamation. With the second option, the measured density values would need to be approved by the Division and Wildlife Resources. The application needs to specifically discuss the woody plant density standard and show what this standard is or how it will be obtained.

The application does not discuss success standards for other general revegetation requirements in R645-301-353. In particular, it should say how diversity and erosion control will be measured and what standards will be used. Without approved standards in the plan and without methods of measuring these

parameters, it becomes very difficult to decide whether success has been achieved.

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.

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, and it is not known what the flow or chemistry of this discharge would be or what effects it would have on organisms in Deer and Huntington Creeks. The macro invertebrate study conducted in 1991 and in 1994 should be repeated in Deer Creek and Huntington Creek in the spring and fall the year before reclamation, in the fifth year after reclamation, and in the last year of the extended liability period just before applying for final bond release. This monitoring will allow assessment of whether fisheries are adversely affected.

Findings:

Information provided in the proposal is not considered 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, The applicant needs to clarify the reclamation schedule to show compliance with R645-301-354.

R645-301-341, The applicant needs to clarify the sections of the application dealing with surface preparation.

R645-301-341, R645-301-358, The applicant must show how it will use the best technology currently available to restore or replace riparian vegetation. The applicant has designed riprap-lined channels for the entire length of the mine, but riprap-lined channels are not as

conducive to vegetation growth and establishment as those designed using soft armoring or bioengineering. Certain parts of the channels presumably need to be riprapped, but it would probably be feasible to use other designs in less steep areas, such as the one where the grade is about 2%. The applicant needs to investigate these design options.

R645-301-341.250, The application needs to discuss density standards for woody plants. For these standards, the applicant could use either the density values shown in the current mining and reclamation plan or could commit to use the values obtained when sampling for bond release. In the latter case, it would be necessary to obtain specific Division and Wildlife Resources approval for the new standard.

R645-301-250, The application does not discuss success standards for some of the general revegetation requirements in R645-301-353. In particular, it should discuss how diversity and erosion control will be measured and what standards will be used.

R645-301-342, The macro invertebrate study conducted in 1991 and in 1994 needs to be repeated in Deer Creek and Huntington Creek in the spring and fall the year before reclamation, in the fifth year after reclamation, and in the last year of the extended liability period just before applying for final bond release.

In addition to these requirements, the Division has several suggestions for the reclamation plan:

1. The application is not required to have a revegetation monitoring schedule, but the schedule shown is not adequate for showing revegetation success for bond release. Woody plant density needs to be measured in the fourth and eighth years following seeding, and vegetation cover needs to be measured in the ninth and tenth years.

2. A very effective mulching technique at other mines in Utah has been to apply about one ton per acre of straw followed by application of a tackifier and 500 pounds per acre of wood fiber hydromulch.

3. It is suggested the applicant reduce the number of Wood's rose plants to be planted in the riparian area to 200 per acre and add Rocky Mountain maple at the rate of 300 per acre.

4. Bluebunch wheatgrass, although a native species, is sometimes aggressive, and it tends to exclude other species. For this reason, it is suggested the amount seeded be reduced to one or two pounds of pure live seed per acre.

LAND USE RECLAMATION PLAN

Regulatory Reference: R645-301-412

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:

On Page 5-8 of the May 26, 1999 submittal, the Permittee said that all areas will be reclaimed to AOC except some highwall areas and parts of the refuse piles in Deer and Elk Canyon. The Permittee did not identify the highwall areas and areas of the refuse piles that will not be reclaimed to the AOC. Neither did the Permittee state why AOC could not be achieved. Without supporting information that shows there is insufficient material to reclaim the highwalls, or that the reclaimed highwalls would be unstable or that disturbance of settled and revegetated fills would cause environmental problems the Division cannot approve the amendment.

Findings:

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

R645-301-553.500 and R645-301-553.600, The Permittee must demonstrate that the reclamation plan will eliminate all highwall to the extent practical. Highwalls can only be left if there is insufficient material to reclaim them or the reclaimed highwall would not be stable.

R645-301-537, The Permittee must reclaim the refuse piles to AOC standards unless they the areas can be excluded under the settled and revegetated fill provision of R645-301-537.

R645-301-121.200, The Permittee must identify each existing highwall and each proposed highwall remnants that will be left after final reclamation.

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.

Slope stability: The Permittee used the stability charts from Rock Slope Engineering to show that the reclaimed slopes would be stable. The charts are based on the assumption that the material in the slope is homogeneous. The Permittee needed to show that the failure surfaces would occur in homogeneous material (provide detailed cross sections). Information in the approved MRP and the amendment show, some slopes will not have homogeneous soils. For example the refuse piles will be covered with 4 feet of material that may have different properties than the refuse. The stability charts are also based on the assumption that the failure surface will be circular. The Permittee must address the possibility that non circular failure could occur.

The slope stability analyses were done under the assumption that the soil was unsaturated. There are at least two sources of groundwater in the areas to be backfilled, the seeps by the French drains and the intake portal. The Permittee must analyze the slope for saturated conditions or show why they would remain unsaturated.

Settled and Revegetated Fills: On Page 5-8 of the May 26, 1999 submittal, the Permittee stated that the refuse piles in Deer Creek and Elk Canyon will not be reclaimed to AOC. The Permittee did not state why the refuse piles would not be reclaimed to AOC standards. The only reason why the Division could allow the refuse pile to not meet AOC standards is if the Permittee demonstrated that:

- the refuse piles are composed of nonacid-or-nontoxic forming materials
- the refuse piles will not be detrimental to the environment, or public health and safety.
- the refuse piles have a safety factor of at least 1.3
- vegetation standards have been met

Exposed coal seams, acid- and toxic-forming materials: The Permittee stated on Page 5-9 of the May 26, 1999 submittal that the refuse pile would be covered with less than 4 feet of material. However, on Page 3-67 of the approved MRP the Permittee committed to cover the refuse piles with 4 feet of materials. The Permittee did not show that the refuse piles needed less cover. Information in the MRP shows that some areas of the refuse piles have high acid-forming potential.

Minimize erosion and water pollution: The Permittee did not address how erosion and water pollution would be minimized. The proposed slopes in the amendment are straight. Slopes that are concave tend to reduce erosion and minimize water pollution better that straight slopes. The Permittee will have to show that straight slopes will minimize erosion and water pollution prior to approval of the backfilling and grading plan.

Findings:

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

Slope stability

R645-301-552.130, The Permittee must show that the assumptions used for the stability charts are valid for the reclaimed slope. The assumption used the Permittee are that the soils will be homogeneous and dry. The refuse piles will be covered with 4-feet of cover so the slope may not be homogenous. Also, some slopes have the potential to become saturated such as the areas by the French drain and the intake portal.

Settled and Revegetated fills

R645-301-537, The Permittee must either backfill and regrade the refuse piles (waste rock piles) to meet AOC standards or show that the refuse piles meet the requirements of R645-301-537 and should be left as settled and revegetated fills.

Exposed coal seams, acid- and toxic-forming materials

R645-310-553.300, The Permittee must show how the requirements of R645-301-553.300 will be met. That regulation requires that all coal seams and acid- and toxic-forming materials will be adequately covered to control surface impact or contaminate surface or groundwater.

Minimize erosion and water pollution

R645-301-553.140, The Permittee did not show how erosion and water pollution would be minimized. The proposed slopes are straight rather than concave. Concave slopes tend to minimize erosion more that straight slopes.

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 portals will be sealed after the mine has been shut down. 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 for the intake portal.

The intake portal is located down dip from the aquifers. The Permittee does not want to place a

hydrologic seal in the portal because the surrounding rock is fractured and water would seep around the seal. The Permittee proposes to place a pipe behind the seal and let the water flow through the pipe into the stream channel.

The Permittee needs to describe how the portal discharge will be monitored during the bond liability period and what steps would be taken if the drainage system failed. The Division is concerned that if the pipes clog then water would flow through the portal backfill. The pipes could be clogged from silt or chemical precipitations.

The Abandoned Mine Reclamation staff reviewed the portal closure plan for the intake portal. They determined that:

- One pipe would not be adequate because it could get plugged. They recommended that two to four pipes be used and that some of the pipes be place above the floor.

- Instead of having the pipe go from the portal to the Deer Canyon drainage have the pipe go to a French drain near the portal. Water from the French drain would then flow into the Deer Canyon drainage. The AMR staff believes that over time the pipe in the proposed plan would become plugged and that the water would then find a new path.

The Permittee did not address how the portals outside the Deer Creek facility would be sealed. The Division needs to know how and when the other portals will be sealed. The Permittee did not include the reclamation of the portals outside the Deer Creek site in the timetable.

Findings:

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

R645-301-551, The Permittee must provide the Division with portal closure plans for all portals including those not at the Deer Creek site. Those additional portals include but are not limited to the North Fork Meetinghouse Canyon site, the Grimes Wash Canyon site and Rilda Canyon. See the analysis section of the TA for detailed concerns.

R645-301-551, The Permittee must show that the designs for the intake portal at the Deer Creek site are adequate for long term discharge from the mine. The Division concerns are if one pipe is used it could get clogged, that a long pipe will clog more easily than a short pipe (see analysis for details), how the system will be monitored and what type of remediation could be done.

R645-301-542.100, The Permittee must include the reclamation of all portal areas in the reclamation timetable.

TOPSOIL AND SUBSOIL

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

Analysis:

NA Engineering

Findings:

NA Engineering

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.

Minimum Regulatory Requirements:

Analysis:

On Page 7-1 of the May 26, 1999 submittal the Permittee state that the fan pad access road will be reclaimed as reclamation activities proceed down the Deer Creek Canyon. The mine access road will also be reclaimed, as it is no longer needed for hauling fill material. The mine access road will be removed to the point where the county road terminates in the canyon. At this point, a vehicle turnaround will be developed.

The road accessing the C1 and C2 beltline will be restored as outlined in the typical cross-section in Drawing DS-1782-D in Appendix 5-C. The culvert passing under the C1 beltline road will be removed and the channel returned to its original position.

The Permittee did not state if there are any roads associated with the other portal site. If roads exist at the other portal sites, the Permittee must describe how the roads will be reclaimed.

The Permittee plans to reclaim all roads at the Deer Creek mine site. They also plan to reclaim the access road for the C1 and C2 belt line. The cross sections for the C1 and C2 belt line access road on Map DS1782D were not drawn to scale and do not show the county road. The Division needs to have typical cross sections that are drawn to scale and show the county road.

The Permittee did not include the reclamation of the C1 and C2 belt line access road in the reclamation timetable.

Findings:

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

R645-301-542.100, The Permittee needs to include the reclamation for the C1 and C2 access roads in the reclamation timetable.

R645-301-542.200 and R645-301-533, The Permittee must include detailed typical cross sections for the reclamation of the C1 and C2 belt line access road. The cross sections must be drawn to scale and show the county road and the drainage system.

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:

Affected area boundary maps.

Bonded area map.

The Permittee shows some of the areas that are covered by the reclamation bond on Map DS1782D (Deer Creek Mine Disturbed Area Final Reclamation Contour Map), Map CE-10884-FM (Deer Creek Mine Rilda Canyon Final Reclamation of Surface Facilities and Access Road). Map DS1782D does not show the disturbed area boundaries. The disturbed area boundaries must include full length of the conveyor belt as well as the mine site.

Map CE-10884-FM does show the disturbed area boundaries for the Rilda Canyon area. That map is considered adequate.

The Permittee does not show the disturbed area boundaries for the North Fork Meetinghouse Canyon portals or the Grimes Wash Canyon portals. The Permittee must include in the amendment reclamation maps of the North Fork Meetinghouse Canyon portals and the Grimes Wash Canyon that show the disturbed area boundaries.

Reclamation backfilling and grading maps.

Map DS1782D shows the proposed final surface configuration for the Deer Creek Mine Site. The cross sections for the Deer Creek Mine are shown on Drawing DS1783D (2 sheets) and Drawing DS1784D (1 sheet). The Permittee did not include final surface topographic maps or cross section for the North Fork Meetinghouse Canyon portal area or the Grimes Wash Canyon portal area.

The deficiencies for Map DS1782D are listed below:

- The contour lines do not extend 100-feet outside the disturbed area boundaries. In some parts of the disturbed area boundary there are no contour lines (upper ledge).
- The Permittee does not identify the location of the waste rock sites. The Division needs this information to evaluate the refuse pile reclamation plan.
- All areas that are proposed to have highwall remnants must be identified.
- The contour interval in the disturbed area and the area 100 feet outside the disturbed area must be no larger than 5-feet.

The deficiencies for Cross Section DS1783D and DS1784D are listed below:

- The disturbed area boundaries area not shown on the cross section.
- The cross sections do not extend 100-feet from the disturbed area boundaries.
- The locations of the remaining highwalls are not shown.
- The location of coal seams and acid-and toxic-forming materials must be shown.
- The location of the refuse piles must be shown.
- Some disturbed areas are not shown on the cross sections, such as the upper terrace and the conveyor belt line.

Reclamation facilities maps.

The Permittee proposes to remove the structures and most of the facilities from the permit area. The Permittee plans to leave the coal mine waste facilities (refuse piles) on the mine site. They did not show the location of the refuse piles or other facilities that will be left after final reclamation.

Final surface configuration maps.

The Permittee did not provide the Division with sufficient final surface configuration maps. The contour map of the Deer Creek facility did not show the contour for the entire disturbed area and the area 100 feet beyond the disturbed area boundaries. The Permittee did not give the Division contour maps for the other disturbed areas (portal areas).

Reclamation monitoring and sampling location maps.

Reclamation surface and subsurface manmade features maps.

The Permittee must show the location of each public road that will be located within 100 feet of the permit area. The Permittee did not show the location of the county road that is next to the conveyor belt on the reclamation maps.

Reclamation treatments maps.

Findings:

Information provided in the proposed amendment is not considered adequate to meet the

requirement of this section. Prior to approval, the Permittee must provide the following in accordance with:

Bond area maps

R645-301-542 and R645-301-521.163 The Permittee must show the disturbed area boundaries on the reclamation maps and cross sections. Some disturbed areas not shown on the Deer Creek mine site include the conveyor from the Deer Creek mine to the power plant, the North Fork Meetinghouse Canyon portal area and the Grimes Wash Canyon portal area. Unless the Permittee identifies the disturbed area boundaries on the maps and cross sections, the Division will be unable to evaluate the reclamation plan.

Reclamation backfilling and grading maps

R645-301-542.310, The Permittee must show the final surface configuration extending 100 feet outside the disturbed area boundaries for all reclaimed areas. Map DS1782D does not show the contours in and around the reclaimed areas at the Deer Creek site. Specifically, the Permittee did not show the contour lines in the upper bench at the Deer Creek site, nor at the other portal locations and the conveyor belt line from the mine to the power plant.

R645-301-542.310, The Permittee must show the final surface configuration for all reclaimed areas. Drawings DS1783D and DS1784D do not show the cross sections for all areas of the Deer Creek site. The Permittee did not show the cross sections for the upper bench at the Deer Creek site, nor at the other portal locations. Specifically, the Permittee did not show the cross section for the upper bench at the Deer Creek site, nor at the other portal locations and the conveyor belt line from the mine to the power plant.

R645-301-553.260 and R645-301-542.200, The Permittee must show the location of the coal mine waste disposal areas (refuse piles) on the reclamation maps and cross sections.

R645-301-553.300 and R645-301-542.200, The Permittee must show the location of each coal seam, acid-and toxic-forming materials and combustible materials on the reclamation contour maps and cross sections.

R645-301-553.200 and R645-301-542.200, The Permittee must show the location of all highwalls that will not be fully reclaimed on the final surface contour maps and cross sections. The Permittee must show the actual cross sections of all highwall remnants that will be left not typical cross sections.

R645-301-542.300, The contour intervals on the reclamation maps must be no greater that 5 feet intervals.

Reclamation facilities maps

R645-301-542.320, The Permittee will show the location of each permanent feature that will be left after final reclamation. Such features include but are not limited to the coal mine waste disposal area (refuse pile and waste rock sites).

Final surface configuration maps

R645-301-521.150 and R645-301-542.300, The Permittee must show the final surface configuration for all reclaimed areas. Drawings DS1783D and DS1784D do not show the cross sections for all areas of the Deer Creek site. The Permittee did not show the cross sections for the upper bench at the Deer Creek site, nor at the other portal locations. Specifically, the Permittee did not show the cross section for the upper bench at the Deer Creek site, nor at the other portal locations and the conveyor belt line from the mine to the power plant.

Reclamation surface and subsurface manmade features maps

R645-301-521.123, The Permittee must show the location of each public road that is within 100 feet of the reclaimed areas. The Permittee does not show the location of the county road next to the reclaimed conveyor belt.

BONDING AND INSURANCE REQUIREMENTS

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

Analysis:

Form of bond. (Reclamation Agreement)

NA

Determination of bond amount.

The Permittee did not include a revised reclamation cost estimate in the amendment. The Division was informed by the Permittee 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.

Terms and conditions for liability insurance.

NA

Findings:

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

R645-301-830.130, The Permittee did not include a detailed reclamation cost estimate in the amendment. The Permittee 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 Permittee must submit a detailed reclamation cost estimate.

HYDROLOGIC INFORMATION

Regulatory Reference: 30 CFR Sec. 701.5, 784.14

Analysis:

Ground-water monitoring plan.

According to table 3-2, section 340 the applicant proposes to monitor the flow from the mine portal quarterly for the first two years and annually thereafter. This will not be adequate for bond release purposes for the following reasons.

1. The recharge process is slow: it may be several years before all mine voids are recharged to capacity.

2. Water quality equilibrium may not be reached until the mine workings are flooded to their full extent. Oxidation and other chemical and physical processes may not be complete or representative during the first two years following reclamation.

3. The minewater quality seasonal variation and climatic variation may not be realized within the first two years following reclamation. Biannual monitoring may not be adequate to show the variation that might exist in minewater discharged over the reclamation period.

The applicant needs to provide quarterly monitoring for the minewater discharge through bond release. Any additional requirements from the Department of Health UPDES permit must also be reported.

The void created by mine workings may redirect water and result in new discharge locations within or below the mined seam at low points and outcrop locations. The plan should provide for a survey for springs that may issue from these areas along and below the mined seam. The survey should be conducted during the 5th and 9th years following mine reclamation and should include baseline water quality and quantity monitoring where flows accumulate in a measurable stream.

Volume 9 of the MRP describes the groundwater gradient as conforming to the Straight Canyon Syncline, and groundwater will flow in the direction of Cottonwood Canyon Creek. This amendment also suggests water will be discharged through the Deer Creek Portal. Some reference points provided in Table 5-2 identify points that direct, or act as a barrier to in-mine flows. Because numerous locations were identified to have a potential to receive minewater discharge, the Division requests the applicant submit a map showing the flow directions and groundwater divides/watersheds for each mined seam. The Division recognizes that flow direction may change with changes in water surface elevation and these elevations should also be identified. The existing map CE-10478-EM does not differentiate between aquifers and the changes in flow that is predicted to occur due to mining. Although some pertinent information is contained in the existing plan it is scattered and does not provide a clear picture the potential ground water recharge and discharge zones. Where boundary faults were crossed by mining a pre-existing hydrologic barrier may now transmit water. The information to be identified on the maps should include existing mine floor elevations, in mine discharge locations, pertinent geologic controls, mine controls such as sealed mine sections and changes to previously existing hydrologic barriers.

Volume 9, pg 17, states that a series of wells in the Deer Creek and Cottonwood/ Wilberg Mine (HM-2 and HM-3) will continue and be utilized to document potential impacts related to dewatering and recovery from mining. Although the water monitoring parameter list provided in Volume 9 includes post-mining reclamation monitoring. Specific water monitoring points were stated to be locations to be monitored above and below the last sediment pond following reclamation backfilling. The plan needs to be specific to reclamation monitoring for surface water and ground water.

In Volume 9, Appendix C the permittee conducted a study after dewatering the Roans Canyon Fault. The Fault might have previously recharged the alluvium. During the monitoring period the confined groundwater in the Star Point Aquifer increased. This increase in the Star Point Aquifer could result from increased recharged from water intercepted during mining which then recharged the Star Point and traveled along the Straight Canyon Syncline. It was also stated that this water is discharging from the floor in the mine. The applicant needs to provide a water monitoring plan that: 1) determines whether changes in flow will occur along the Straight Canyon Syncline during the time mining has idled, and 2) determines whether baseflows to the Cottonwood Canyon Stream increase. In order to confirm conclusions made in their study and to identify the difference between changes due to climate, or from ground water discharge, the following age dating should be conducted in the Cottonwood Canyon wells every 2nd year during the low flow period; radio carbon dating, tritium dating, and stable hydrogen and oxygen isotopes (for meteoric waterline determinations). This should be completed in conjunction with streamflow monitoring.

Surface-water monitoring plan.

The applicant needs to provide a surface water monitoring plan that determines whether changes in flow result during the time mining has idled. In order to identify the difference between changes due to climate, or from mine water discharge, the following age dating should be conducted every 2nd year during low flow; radio carbon dating, tritium dating, and stable hydrogen and oxygen isotopes (for meteoric waterline determinations) in Cottonwood Creek below well CCW-1S. In conjunction a standard monitoring program for streamflow should be developed for the reclamation period.

The macro invertebrate study conducted in 1991 and in 1994 should be repeated in Deer Creek and Huntington Creek in the spring and fall, the year before reclamation, and in the 5th and final year prior to bond release. This monitoring will allow assessment as to whether impacts to fisheries occurs, improves, or remains insignificant over the reclamation period.

Acid and toxic-forming materials.

The applicant has stated that no acid and toxic-forming materials are located at the site. Further discussion can be found in the soils technical analysis.

Transfer of wells.

A discussion on the Transfer of wells was not found in this amendment but might be located in other sections in the plan.

Discharges into an underground mine.

No discharges into an underground mine are proposed by the applicant.

Gravity Discharges.

Water will be gravity discharged out of the Deer Creek Portal. The applicant designed this discharge with an 8 foot height of gravel and sand to filter solids, prior to discharge. A concern with the proposed method is raised when reading the Macro Invertebrate Study. This study indicated calcium carbonate precipitation is widespread in Deer Creek therefore, the potential for the proposed backfill to plug with precipitate is high. The applicant needs to demonstrate that the proposed method will not plug from precipitate. It is recommended at a minimum a second pipe be used to dewater behind the bulkhead.

Water quality standards and effluent limitations.

The applicant has not described how the State Water Quality Standards for Deer Creek and Huntington Creek will be shown to meet water quality criteria. The applicant needs to provide a water monitoring plan that demonstrates that the water quality criteria for surface streams are met so the Division can make a finding for Bond release. The Division recommends a minimum high and low flow season monitoring for these parameters over the full period of reclamation.

Diversions.

The ephemeral draws adjacent to Elk Canyon drainage should be considered in the grading plan and channel design. At a minimum, grading should be completed to allow water to be conveyed to the Elk Canyon channel. The ephemeral draw above the storage dock should be considered in the site design. These areas tend to collect water and cause gully formation when grading does not consider ephemeral flows from these locations.

The design capacity for perennial and intermittent streams need to be demonstrated to be at least equal to the unmodified channel upstream and downstream from the diversion. This requirement can be met through providing channel cross sections upstream and downstream from the site and estimated channel forming flows. Designs for channel transitions between the upstream and downstream natural channel to the reclamation channels also needs to be provided.

The channel abuts the cut slope across the Mine Office and Bath House. This area was predisposed to failure in 1992 when a tension crack was developed due to ponding water in the diversion ditch. The applicant needs to address stability of this slope and the relation to the proposed drainage. The destabilization or rock fall from this cut slope could cause channel failure.

The item number two on the Final Reclamation Hydrology Map DS1780D is not an acceptable reclamation practice. In the State of Utah the practice of using geotextile filter fabric substituted for granular filter material has not resulted in successful channel stability. The Division will not accept this practice except under specific conditions in pre-approved site specific areas.

Recommended Design Considerations:

- The proposed pool location associated with the converging Deer Creek and Deer Drainage is not located within an area that creates a deposition pool allowing increased vegetative habitat conditions. Because the proposed location is in an area that increases in gradient the result is more like a drop pool structure which provides energy dissipation rather than broad increased vegetative habitat. It is recommended that vegetative habitat be created in areas where the gradient flattens, such as in the Deer Drainage. Channel meanders and "Soft" bio-engineering practices could be used in this area.

- The angle produced at the Deer Drainage and Deer Creek Drainage confluence could promote downstream cutting against the north bank possibly starting somewhere between sections 15+00 and 16+00. It might be a good idea to change the angle so the converging Deer Drainage is not direct water toward the cut slope.

- Drop Pools and grade control drops in areas where the slope is greater than 20% would dissipate energy and increase channel stabilization if designed and implemented properly.

- The use of riprap where the channel abuts bedrock should be carefully reviewed. Riprap is easily lifted and transported if there is not an adequate depth of fill over a bedrock channel. It is preferred that no riprap be used in cases where competent bedrock is present in the channel bed.

Stream buffer zones.

Sediment Control Measures

The applicant proposes to begin reclamation at the upstream end of the site working

downstream. In Deer Creek the culverts will be removed and water will be diverted around the construction area to the downstream location. The upstream channel will be completed, and the water will be returned to the completed channel section. This activity will then be repeated in the next section. In ephemeral sections the applicant proposes to remove the culvert without drainage routing.

The applicant has presented the general construction sequence. However, the following questions need to be answered and additional information requested below needs to be provided:

1. What method will be used to minimize sedimentation during re-routing the Deer Creek drainage? Will a half round culvert, flexible culvert, sediment trap with silt fence, routing drainage to the disturbed area pond or other method be provided to treat\convey the water diverted around the construction area?

2. Assuming the mine portal is completed and will drain to the Deer Drainage prior to regrading, how will the water be handled during the construction period to minimize sediment contributions?

3. The applicant did not describe how sediment transport from the up-gradient slope to the completed channel will be minimized during construction after rerouting flow through the reclaimed channel. Will the up-gradient regraded sections be pocked, seeded and mulched prior to re-directing water down the reconstructed channel? If not, what treatment measures will be used to keep sediment from sloughing into the reconstructed channel section?

4. What sediment control measures will be conducted in the ephemeral channels should the construction be initiated and then a precipitation event occurs? A good approach could be to reclaim the upper portions in the ephemeral drainage prior to connecting the ephemeral drainages with the Deer Creek Drainage. For instance in Elk Canyon the drainage could be completed to the 7325 elevation and then use the existing drainage to convey any temporary runoff to the pond until the Deer Creek drainage is completed to the junction with Elk Canyon.

5. Specific information, maps, design detail, and maintenance information for the silt fence to be employed after removing the sedimentation pond needs to be provided.

Sedimentation Ponds.

According to page 7-1, the applicant states the sediment pond will be removed after all other reclamation work is completed to ensure that runoff is treated before leaving the disturbed area. However, no details are provided to indicate how the disturbed area drainage will be transported to the pond within disturbed areas which are not undergoing reclamation construction. Will the existing drainages be maintained through the reconstruction period?

Other Treatment Facilities.

No other treatment facilities are proposed for the reclamation phase.

Exemptions from Sediment Control Measures.

No exemption from sediment control measures are requested or granted with this amendment.

Discharge structures.

No discharge structures associated with impoundments are proposed for the reclamation period. The existing discharge structure associated with the sedimentation pond will be used temporarily during reclamation construction.

Impoundments.

See sedimentation ponds.

Casing and Sealing of wells.

The applicant stated that each well will be cased, sealed or otherwise managed, as approved by the Division.

Findings:

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

R645-301-731. Provide a monitoring plan specific to reclamation that: 1) Commits to provide quarterly monitoring for the minewater discharge through bond release and includes a full baseline parameter list for the 5th year of reclamation and the year prior to bond release. Any additional requirements from the Department of Health UPDES permit must also be reported. 2) Commits to survey areas down dip and below the mined seam for springs that may develop or increase in discharge from mining. The survey should at a minimum be conducted during the 5th year and one year prior to bond release. Include water quality and quantity monitoring where flow accumulation is measurable.

R645-301-731.221. Provide a monitoring plan specific to reclamation to assure impacts to hydrologic balance are prevented, and 1) include commitments made in Volume 9, page 17 for continued monitoring of HM-2 and HM-3, 2) describe how the State Water Quality Standards, Utah Administrative Code R317-8, for the Deer Creek, Huntington Creek, and any other stream receiving minewater discharge will be shown to meet water quality standards. The Division recommends a minimum high and low flow season monitoring for (selected) parameters over the full period of reclamation. Parameters should be reflective of all potential in-mine contaminants, 3) Include a map showing flow direction and groundwater devides in the permit and adjacent area for each mined

seam which identifies existing mine floor elevations, in-mine discharge locations, pertinent geologic controls, mine controls such as sealed mine sections, and changes to previously existing hydrologic barriers, 4) Provide a water monitoring plan that; a) determines whether changes in flow hydrology will occur along the Straight Canyon Syncline during the time mining has idled, b) determines whether baseflows to the Cottonwood Canyon Stream increase, c) identifies the difference between changes due to climate, or from ground water discharge by including age dating to be conducted every 2nd year during the low flow period for; radio carbon dating, tritium dating, and stable hydrogen and oxygen isotopes (for meteoric waterline determinations) in the Cottonwood Canyon wells and Cottonwood Creek streamflow below well CCW-1S, 5) Repeat the macro invertebrate study conducted in 1991 and in 1994 in the Deer Creek and Huntington Creek during the spring and fall, the year before reclamation, and in the 5th and final year prior to bond release.

R645-301-742. Details, maps and plans, which indicate how drainage will be conveyed to the pond within the disturbed areas not undergoing reclamation construction during the reclamation period.

R645-301-725.210. A grading plan that considers small tributary ephemeral drainages for the draws adjacent to Elk Canyon, and the draw above the Storage Dock that will control or prevent erosion.

R645-301-625. A demonstration showing the proposed method for backfilling the mine portal will not plug from calcium carbonate precipitation. Calcium carbonate precipitate was identified to be widespread within the Deer Creek drainage through a Macro Invertebrate Study done to assess minewater discharge impacts to fisheries.

R645-301-752.210. and -752.250. Address stability of the cut slope across from the Mine Office and Bath House area, and its relation to the proposed Deer Creek Drainage location. The channel abuts an area that was predisposed to failure in 1992 when a tension crack developed from water ponding in a diversion ditch. Destabilization, or rock fall from this cut slope could cause channel failure.

R645-301-742.314. 1) Remove item number two on the Final Reclamation Hydrology Map DS1780D or provide additional site specific detail (The practice of using geotextile filter fabric is not an acceptable reclamation practice in the State of Utah because it does not promote channel stability. The Division will accept this practice only for pre-approved site specific locations). 2) Provide designs for the channel transitions between the upstream and downstream natural channel and the reclaimed channel.

R645-301-742. The applicant needs to provide additional information for the proposed sediment control measures during the reclamation phase to meet BTCA for alternate sediment control measures. Specific issues are identified in the technical assessment.