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June 21, 2002

TO: Internal File

THRU: Susan M. White, Sr. Reclamation Specialist/Biology, Team Lead *SMW*

FROM: Peter H. Hess, Sr. Reclamation Specialist/Engineering *PHH by an*

RE: Phase 2 Reclamation Plan, Energy West Mining Company/PacifiCorp, Des-Bee-Dove Mine, C/015/017-01D-1

SUMMARY:

A technical analysis generated by the Utah Division of Oil, Gas, and Mining relative to the Phase 2 reclamation plan at the Des-Bee-Dove Mine contained several deficiencies and was forwarded to the permittee on January 15, 2002. The Division received this response on May 2, 2002.

The following document will analyze the permittee's responses relative to the deficiencies aired with respect to engineering requirements of the Phase 2 reclamation plan.

TECHNICAL ANALYSIS:

RECLAMATION PLAN

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 deficiency aired by this reviewer in the January 15, 2002 Division document was stated as follows:

TECHNICAL MEMO

“The information provided does not meet the minimum regulatory requirements of this section.

R645-301-542.600 and -553.110, Prior to a recommendation for approval, the permittee must clarify what maximum slope gradients will be utilized in the reclamation of the main access and ancillary access roads. The permittee must also commit to conducting and verifying the compaction of the backfill materials to at least 90% of the maximum laboratory density as determined by ASTM D 1557-91.”

The permittee has responded in the May 2, 2002 submittal in the following manner; as committed to in the revised reclamation plan (as submitted on May 2, 2002), the permittee will reclaim all slopes in the following manner; “**Overall reconstructed slopes** will be placed on a 2H:1V or flatter configuration (refer to Map 500-4).”

An analysis of the cross sections depicted on Map 500-4 was conducted. Each evaluated cross-section will be discussed relative to the adequacy of its design specifications and the relevance of meeting the requirements of the R645 coal rules.

Cross Section -1+44.99

This cross section only contains a minor fill area that will be constructed to reclaim that portion of the primary access road that exists within that section. According to *Appendix B* (as submitted 05/02/2002), 323 cubic yards of fill will be required to reclaim this road section to AOC requirements. Analysis of the cross section on Map 500-4 indicates that the reclaimed “**fill**” slope will achieve a final slope configuration of 5.33H:1V. The minimum 2H:1V “or flatter” requirement has been met.

Cross Section -1+00

Cross section -1+00 consists of two reconstructed slopes, the first being the reclaimed access road fill area. Approximately 2700 yards of fill will be required to reclaim the road in this area, as well as a small fill at the head of the second reconstructed slope area. The final slope configuration depicted for the reclaimed access road is 3.33 H:1V.

The second reconstructed slope area exists at the southern end of what is usually referred to as the bathhouse pad. A cut of approximately 350 cubic yards will be made at the toe of this reconstructed slope to achieve a final surface configuration of 2.75 H:1V.

Cross Section 0+00

Cross Section 0+00 contains three areas where reclamation efforts will take place. One area is the channel bottom that will not receive further discussion. The second area to receive

reclamation activities will again be a section through the bathhouse pad on the west side of the disturbed area. It will utilize both a cut at the head of the outslope and a fill at the base of this pad to achieve a final surface configuration of 2.15H:1V. Mass balance calculations included as *Appendix B* indicate that the cut will entail 600 cubic yards; the fill in section 0+00 will utilize approximately 4200 cubic yards. The access road portion of 0+00 will be reclaimed to a final slope configuration of 3.75H:1V.

Cross Section 1+00

Cross Section 1+00 will involve three reclamation areas, one of which will require work in the channel bottom. Similar to the previous two cross sections, reclamation work will also occur on the bathhouse pad, and in a section of access road.

The bathhouse pad reclamation work will utilize a cut at the head of the outslope, and a fill at the base of this cutbank to achieve a final surface configuration of 2.02H:1V.

The reclamation of the access road in Cross Section 1+00 will utilize but a small portion of the 3781 cubic yards of fill anticipated here. A final slope configuration of 2.3H:1V will be achieved at the access road reclamation.

Cross Section 2+00

Cross Section 2+00 utilizes three fill areas and two cuts to reclaim three areas within the section. This section will utilize a cut 25 feet in depth to establish the proper longitudinal gradient for the reclamation channel at this section.

The area of the bathhouse pad to be reclaimed within Section 2+00 will incorporate both a cut and a fill to reclaim the area to a final surface configuration having a slope of 3.5H:1V.

The reclamation channel in this section will require a cut approximately twenty-five feet in depth to establish the proper channel gradient here. A small fill is required on the East slope to make the final surface configuration aesthetically pleasing. The toe of this fill will be twenty-eight feet above the channel bottom, so that the potential for stream flow to erode the fill material will be minimal.

Section 2+00 also contains a section of the primary access road that will be reclaimed utilizing a fill. The final surface configuration of the slope will achieve a 2.8H:1V gradient.

Cross Section 3+00

This cross section will also utilize three areas in its reclamation, the bathhouse pad, the reclamation channel, and the access road reclamation. These reclamation areas will be discussed going from West to East.

TECHNICAL MEMO

The bathhouse pad will be reclaimed utilizing a cut at the head of the outslope, with a fill making up the remainder of this reclamation. The final surface configuration will achieve a 3.37H:1V gradient.

The reclamation channel will utilize a fill with a maximum depth of approximately thirty feet to establish the proper gradient for channel flow. It will be necessary to armor this area to provide adequate protection for the design event.

The access road reclamation will utilize a small amount of fill to reclaim the area to a 2H:1V gradient.

Cross Section 4+00

This section will also utilize reclamation in three areas. The bathhouse pad area will use a small cut at the head of the outslope; the remainder of the reclamation here will utilize fill. A final surface slope configuration of 2.85H:1V will be achieved.

The reclamation channel in Cross Section 4+00 will be constructed on fill having a forty-foot depth. Once again, adequate armoring will be necessary to prevent any flows up to the 100 year six hour design event volume from impacting the reclamation channel.

The road section in Cross Section 4+00 will be reclaimed by cutting down the head of the outslope and filling the base of the cut bank. A final surface configuration of 2.73H:1V will be achieved on the reclaimed slope.

Cross Section 5+00

Cross Section 5+00 has only two major reclamation areas; the access road in this section will be reclaimed with the East slope of the reclamation channel.

The bathhouse pad area will utilize a small cut at the head of the outslope and a large fill to reclaim the cut slope and what appears to look like either a safety bench, or an ancillary road. The final slope gradient at this reclamation area will be 2.6H:1V.

The proper gradient for the reclamation channel will be established by filling the existing drainage with approximately 33 feet of material. The access road will be reclaimed by removing 28 vertical feet of material. The west slope of the re-established drainage will be configured by filling until a slope of gradient of 2H:1V is achieved. The toe of this fill will be the West bank of the reclamation channel.

Cross Section 6+00

All reclamation work in Cross Section 6+00 will occur on either the west slope or in the reclamation channel itself.

The bathhouse pad area, which sits on the upper West slope, will utilize two minor cuts and a significant fill to achieve a 2.27H:1V finished slope.

The proper slope gradient for the reclamation channel in Cross Section 6+00 will be established by adding approximately 28 feet of material to the existing channel. The center of the reclamation channel will be moved about 45 feet to the West. This will place the center of the reclamation channel on the toe of the currently existing West slope. Once again, armoring is necessary to prevent erosion of the fill from events up to and including the 100 year six hour event.

Cross Section 7+00

This cross section will reclaim two areas, the extreme north end of the bathhouse pad, and the channel bottom.

The reclamation of the bathhouse pad will be completed by filling the section until a final slope configuration of 2.36H:1V is obtained.

The proper slope gradient in the channel will be achieved by filling the existing configuration with a maximum of 15 feet of material. Armoring of the fill will be necessary to prevent erosion.

Cross Section 8+00

This cross section will utilize a cut at the head of the outslope and two fills to achieve a final surface configuration on the West slope of 2.07H:1V **in the fill areas only**. Overall, the finished surface configuration of the West slope will be established at 1.77H:1V.

A section of roadway will be reclaimed with the West slope. The reclamation process will entail making a cut halfway through the roadway width, and backfilling the remaining width at the base of the cut bank. Although the overall slope gradient on the West slope (1.77H:1V) is steeper than 2H:1V, the 1.77H:1V gradient is aesthetically more pleasing to the eye as it is very nearly collinear with the disturbed slope. The volume of fill to be utilized in the road reclamation is small; the bulk of this volume will rest directly on the road surface, and as such should remain stable even if saturated.

The reclamation channel and the reclamation of the East slope will be accomplished in the following manner:

TECHNICAL MEMO

- 1) A ten-foot cut will be made to establish the slope gradient for the channel.
- 2) A cut 136 feet in width ranging in depth from zero to nineteen feet will be made to establish the gradient of the East slope. A final configuration of 3.17H:1V will be achieved.

Cross Section 9+00

Cross Section 9+00 will utilize a cut process through 90% of the 350-foot cross-section width. The remaining 10% will use a fill approximately halfway up the West bank. **The final configuration of this fill, as depicted on drawing #500-4, and calculated to utilize 458 cubic yards of material, will be 1.88H:1V.** The overall slope gradient of the West slope, which will consist of mostly cut (84%), will achieve a final surface configuration of 1.55H:1V.

The slope on the East side of the reclamation channel will be established by removing material until a 3.7H:1V gradient is established overall. The area will be established as relatively flat adjacent to the channel, but will become concave as the slope reaches the last forty feet of its run.

The ancillary access road will be reclaimed as part of the west slope. The finished configuration of this fill is 1.88H:1V.

Cross Section 10+00

Cross Section 10+00 will also utilize a small fill on the West bank (789 cubic yards). The West slope will be filled at the toe of the Cut on the West Slope. A cut approximately 170 feet in width and about 22 feet in depth will be made to establish the correct longitudinal gradient for the reclamation channel. The East slope will travel on a near horizontal run until it ties into the east slope with a 25-foot convex radius. No reclamation activities will occur on the East slope above the channel bottom.

Two sections of ancillary access road will be reclaimed as part of the West slope. The lower road will be filled to achieve a final surface configuration of 2.22H:1V. A cut on the outslope between the two roads will reclaim the upper road to a final configuration of 1.25H:1V. Since this is a cut, there will be no stability concerns with this final gradient.

Cross Section 11+00

Cross Section 11+00 will utilize both minor cuts and fills to reclaim the West slope to a final surface configuration of 1.46H:1V. The reclamation slope will nearly parallel the existing slope, with minimal redisturbance. Material stability should not present a problem. This West slope will reclaim the ancillary access road by filling it to a final configuration of 2.8H:1V.

A large cut will be made to establish the proper longitudinal slope gradient in the reclamation channel bottom. To blend this cut in, it will be extended up the East slope a

horizontal distance of 115 feet. A vertical rise of about 55 feet will establish a final slope gradient at 2.1H:1V.

Cross Sections 12+00, 13+00, 14+00 and 15+00

These cross sections will not be analyzed as all depict large cuts in the head of the channel. As cuts will be made in these sections to provide part of the fill for other areas, the stability of material relative to gravitational failure will not be a problem.

Regulatory Reference: R645-301-542.600. Roads

Pages 18 and 19 of APPENDIX XVI, Phase 2 Area Reclamation Plan, section 500, Engineering discusses the proposed reclamation requirements committed to for the **Main Access Road Reclamation** and the **Ancillary Access Road Reclamation**. A deficiency aired in the Division's January 15, 2002 document required the permittee to clarify the maximum slope gradients to be utilized in the reclamation of the main access and ancillary access roads. The permittee has committed to constructing the reclamation areas associated with the roads to a 2H:1V gradient "or flatter". An analysis of the cross sections depicted on drawing #500-4 confirms that all road reclamation activities will be accomplished to a 2H:1V or flatter slope configuration. This commitment adequately addresses the deficiency aired in the Division's January 15, 2002 document.

Other text stated on these pages is adequate to indicate that it is the permittee's intent to immediately reclaim the access roads as reclamation work is completed and the site is retreated. Cross Section 9+00 is the only area that will reclaim a road at a gradient steeper than 2H:1V. The amount of material to be used here is small; therefore, if a rotational failure did occur, it would have to travel approximately seventy feet down slope to impact the channel flow. It is felt that the permittee's commitment is adequate to address the requirements of -542.600.

The Division's January 15, 2002 document also required the permittee to commit to conducting and verifying the compaction of the backfill materials to at least 90% of the maximum laboratory density as determined by ASTM D 1557-91. Adequate compaction is crucial in meeting the requirements necessary to ensure a minimum long-term static safety factor of 1.3, as required under R645-301-553.130. As noted in the permittee's 05/02/2002 response, previous experience gained during the Phase 1 reclamation of the Des-Bee-Dove Mine has shown that adequate compaction of the backfill can be achieved by making a minimum of four passes over the material using a rubber tired dozer or sheep's foot. Appendix XIV Phase 1 Reclamation R645-301-500, Engineering Section: Appendix C, contains the Rollins, Gunnell, and Brown slope stability analysis that was developed for the reclamation of the Des-Bee-Dove Mine. Conclusions determined via the RG&B report have determined that adequate compaction of back-placed fill can be achieved by making four passes of a D-9 or equivalent dozer. This is in reference to fills utilizing lift thickness not exceeding three feet with a material gradation of +4" to 8".

TECHNICAL MEMO

The deficiency aired in the Division's January 15, 2002 document specifically requests that the permittee commit to meeting a compaction requirement determined by ASTM testing method ASTM D 1557-91. As indicated by the RG&B report, this method is only utilized where lift thickness not exceeding one foot of minus 4" to 8" granular material has been used. The permittee's May 2, 2002 submittal does not address material gradation anywhere within that submittal. Therefore, it is assumed that the permittee intends to utilize three-foot lift thickness in all areas requiring rock fills. Fills meeting the criteria shown on Page 2 of the RG&B report will achieve internal angles of friction equal to or greater than 45 degrees.

Regulatory Reference: R645-301-553.110. Approximate Original Contour

As noted above, the permittee's commitment to reclaim the access roads to a finished slope gradient of 2H:1V "or flatter" is crucial to help meet the requirements relative to a post mining slope achieving a minimum long term static safety factor of 1.3. The stability of the reclamation takes precedent over the meeting of requirements to achieve approximate original contour, which is essentially established as meeting or not meeting the requirements by aesthetic or "pleasing to the eye" justification. The reestablishment of stable drainages is part of meeting the requirements of AOC. The analysis of the various cross sections performed above has revealed that very nearly all of the reconstructed slopes will achieve 2H:1V or flatter gradients **where fill material has been utilized to establish an overall slope configuration.** The cross sections depicted on drawing #500-4 show that approximate original contour is being achieved because the areas where slope reconstruction has been necessary very nearly follow the slope as it existed during mining activities. There are no pre-mining surface topographic maps or aerial photographs available as initial construction activities at this site occurred prior to the development of modern mapping technology. Where large cuts have been made, the justification to do so has come from the need to either establish the proper longitudinal channel gradient or a need to provide clean fill material for other areas of the site. The requirements necessary to adequately meet approximate original contour have been met.

Findings:

The permittee has adequately responded to the deficiencies relative to **R645-301-542.600** and **-553.110.**

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

The proposed Phase 2 reclamation plan makes the commitment to reclaim the Deseret Mine portal areas and the associated access road to approximate original contour. The Des-Bee-

Dove Mine meets the criteria of a "continuously mined area, (CMA)", as defined by the R645 coal rules.

The permittee has conducted a slope stability analysis for the Phase 1 area of the Des-Bee-Dove Mines that includes the portals of the Little Dove and Beehive Mines and their associated facilities. The reclamation plan for the Phase 2 area, as submitted on May 2, 2002 references the slope stability analysis conducted by Rollins, Gunnell, and Brown relevant to certain design criteria necessary in order to meet the minimum long-term static safety factor of 1.3.

The May 2 submittal provides new reclamation cross sections for the Deseret Mine portals, the bathhouse/office pad, the tipple pad, and the associated primary and ancillary access roads, as well as the reclamation channel in the lower canyon. Final surface configurations are depicted on those cross sections (drawing # 500-4).

The Division indicated in the deficiency document dated January 15, 2002 that the slope stability analysis that had been conducted for the Phase 1 area was acceptable for use for the Phase 2 area due to similarities of the in-place materials.

The RB&G study recommended maximum slope gradients for rock fill slopes versus earth fill slopes within the Phase 1 area. The RB&G study indicated that rock fills could be constructed up to as steep as 1.25H:1V. Earth fills could only be constructed up to as steep as 2H:1V. A deficiency aired in the Division's January 15, 2002 document indicated that the permittee needed to indicate which of the fill slopes depicted on drawing #500-4 were to be rock fills (maximum allowable slope of 1.25 H:1V) and which of the fill slopes were to be earth fills, (maximum allowable slope of 2H:1V). The permittee has addressed this deficiency by submitting a revised drawing #500-4 and revised text that indicates that all reconstructed slopes **will (overall) be built at a maximum gradient of 2H:1V**. Whether those slopes will be constructed of earth or rock is of no consequence, as the permittee has committed to reconstructing **all** slopes to a maximum gradient (overall) of 2H:1V. Thus, the previously aired deficiency is now addressed.

The January 15, 2002 document indicated that slope gradients should also be depicted for specific reclamation areas. Although this has not been performed on drawing #500-4, analysis of Cross Sections -1+44.99 through 11+00 under **APPROXIMATE ORIGINAL CONTOUR RESTORATION** indicates that all of the slopes that are to be reconstructed will generally meet a 2H:1V finished slope gradient. Any variation to the slope of same which would be steeper than 2H:1V would be of a very short distance utilizing a minimal volume of fill. Cut areas which would utilize a gradient steeper than 2H:1V would be of no concern because of the self-cementing nature of the undisturbed soils in the area.

The revised drawing #500-4 submitted on May 2, 2002 correctly delineates the disturbed areas that will be addressed by the reclamation plan in Cross Sections 0+00, 1+00, and 2+00.

TECHNICAL MEMO

Findings:

The permittee's revised submittal, as received on May 2, 2002 has adequately addressed the deficiencies aired in the section titled **APPROXIMATE ORIGINAL CONTOUR RESTORATION**.

MAPS, PLANS, AND CROSS SECTIONS OF MINING OPERATIONS

Regulatory Reference: 30 CFR Sec. 784.23; R645-301-512, -301-521, -301-542, -301-632, -301-731, -302-323.

Analysis:

Final Surface Configuration Maps

Cross sections, as submitted with the revised drawing #500-4 on May 2, 2002, are accurately depicted. As previously discussed, cross-sections 0+00, 1+00 and 2+00 were incorrect in that they showed reclamation work being conducted outside of the permittee's disturbed area. These have been corrected with the new drawing # 500-4.

Drawing #500-2, revised and submitted on May 2, 2002, depicts a "TYPICAL ROAD SECTION 9" (in reference to drawing #500-1). The revised section indicates that all reclamation work of access road area will be configured to a 2H:1V "or flatter" final configuration. This now coincides with the maximum slope gradient recommendation in the RB&G slope stability analysis for earth fills. If the road sections are reclaimed using rock fill, the maximum slope gradient utilized will still be 2H:1V "or flatter". This meets the requirements of the R645 coal rules.

Findings:

The information provided is adequate to meet the minimum regulatory requirements for this section of the R645 coal rules as they relate to the reclamation of the Phase 2 area.

RECOMMENDATIONS:

The information provided is adequate to meet the minimum regulatory requirements of the R645 coal rules as they relate to the reclamation of the Phase 2 area. It is recommended that this amendment be approved.