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December 14, 2001

TO: Internal File

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

FROM: James D. Smith, Sr. Reclamation Specialist/Hydrogeology *JDS*

RE: Technical Analysis for Amending the Reclamation Plan – Phase II, Energy West Mining Company, Des-Bee-Dove Mine, C/015/017-AM01D

SUMMARY:

The Deseret, Beehive, and Little Dove Mines were temporarily sealed in 1987. The permit was taken out of temporary cessation in 1999 in order to begin reclamation. The reclamation plan that is in the current MRP must be modified because the Tipple pad, which is the main mine pad, has been excavated to recover and market the coal from which this pad was built.

Proposed amendment C/015/017-AM01D is for what Energy West calls the Phase II area, which is the Deseret Mine portals and pad, the Bathhouse pad, the Tipple pad, the main road from Castledale, and the access roads to the Deseret Mine and Bathhouse pads. The separation of this project into two phases is becoming increasingly confusing: the reclamation of this site needs to be planned as single, integrated project, although execution of the can apparently be done in phases. Neither Phase I nor Phase II include reclamation of the sedimentation pond.

Utah Coal Mining Rules require a coal mine operator to demonstrate steps to be taken to minimize disturbance to the hydrologic balance within the permit and adjacent areas and to prevent material damage outside the permit area. The following is an technical analysis by UDOGM of probable impacts from removal of these silt fences and installation of the pvc pipe.

TECHNICAL MEMO

TECHNICAL ANALYSIS:

RECLAMATION PLAN

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:

Mine openings were closed to MSHA standards in 1987 when production ceased. In 1999, the portals were backfilled.

Locations of the seals are on Drawing CS1660B.

Findings:

Mine Openings Reclamation Information is considered adequate to meet the requirements of this section.

HYDROLOGIC INFORMATION

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

Analysis:

General

The Des-Bee-Dove Mines are in a small, unnamed canyon that is tributary to Grimes Wash and part of the Cottonwood Canyon Creek drainage. Hydrologic resources of the entire East Mountain area, which includes the Cottonwood/Wilberg, Deer Creek, and Des-Bee-Dove Mines, are described in Volume 9 - Hydrologic Section.

No ground-water resources have been documented in the Des-Bee-Dove area, the strata east of the Deer Creek Canyon fault being essentially dry. There are some small springs farther down the canyon that will not be affected by this phase of the reclamation.

The sedimentation pond was designed for total containment of runoff from not only the disturbed area but also from a large undisturbed area around the mines. The pad for the Beehive and Little Dove Mines was built across three small, ephemeral channels at the head of the drainage. Flow from the two northernmost channels was designed to cross the Beehive and Little Dove pad, enter a 48-inch culvert that carries the flow down to the main tipple pad, and from there reports to the sedimentation pond below the minesite. The undisturbed channel at the south end of the Beehive and Little Dove pad has been diverted around the pad by a berm, but a ditch on the Deseret pad was built to capture the flow at that level. Construction of the road to the water tank disrupted another small drainage. Flows from numerous small washes or gullies plus sheet flow from the steep canyon slopes also cross the disturbed area to reach the sedimentation pond.

Drainage from the Deseret and Bathhouse pads and adjacent undisturbed areas was designed to be diverted to the sedimentation pond. Since removal of the coal from the Tipple pad, this drainage has reported to the bottom of the Tipple pad excavation, where it has evaporated or percolated into the soil.

For reclamation of the Des-Bee-Dove area, channel and slope stability are more important than getting the fill all the way to the top of cut-slopes. The channel and the filled slopes should be designed and built so that water cannot get into the fill and destabilize it.

Materials used to construct the channels will be gradational from fine material at bottom to coarse at top, as shown in Drawing CS1819A (Phase I), and on Plate 4 - 1 - sheet 2 of 5 in Volume 4. The engineered channels will be embedded into the fill. Beyond merely separating out boulders, some method will be needed on site to obtain adequately graded materials for filter and riprap. Boulders and coarse materials need to be placed so as to be stable, not just dumped.

Acid and toxic-forming materials

Samples collected from mines operated by PacifiCorp in both East and Trail Mountains indicate very low pyritic sulfur and high neutralization potential. Appendix A of proposed amendment C/015/017 AM01D contains analysis results for a number of in-mine samples, which include boron, selenium, pyritic iron, and percent carbonate, but not neutralization potential.

Discharges into an underground mine

Mine openings are sealed, backfilled, and will be covered with additional material during reclamation. There will be no surface drainage towards the buried portals and no discharge into underground mines.

TECHNICAL MEMO

Gravity discharges

No gravity discharge will occur from the portals. The mines were dry, and water was imported for mine operations: rocks that overlie the coal seams contain low-permeability strata that inhibit vertical movement of ground water, and the surface is generally steep with poorly developed soils so recharge is minimal.

Portals were sealed to MSHA standards in 1987 and backfilled in 1999. The planned reclamation will place additional fill and growth medium over the sealed portals.

Water quality standards and effluent limitations

Monitoring of surface water will continue at the sedimentation pond outfall, UPDES permit UTG040022, which is the only monitoring site in the Des-Bee-Dove permit area (Section 750 – Surface Water). Monitoring will continue until removal of the monitoring site is approved by the Division (Section 731.200 – Surface Water). The permittee commits that any discharges will be made in compliance with Utah and federal water-quality laws and regulations and with effluent limitations for coal mining promulgated by the EPA, as set forth in 40CFR Part 434 (Section 751). The current monitoring plan in Volume 9 calls for additional monitoring points immediately above and below the sedimentation pond site after the pond is removed.

A monitoring point just outside the upper disturbed area boundary could measure flow and sediment concentrations and other water-quality factors in runoff from the reclaimed areas and could be a means of demonstrating the effectiveness of the sediment control measures. But, because streamflows in this canyon are from summer thundershowers or snowmelt and generally of high-intensity and short duration, the real value of such a monitoring point in achieving this purpose is questionable.

Diversions

All diversions and drainage control structures constructed for mine operations will be removed and the areas reclaimed. Flows will be returned to natural channels or constructed channels at the approximate locations of the original, natural channels.

Calculations for peak storm discharge and volume used to design the constructed channels are in Appendix A of the Phase I amendment. Calculations were done using the STORM program, which is available through OSMRE's TIPS program. An SCS Upland Curve 7 - ephemeral channel - was used. The parameters and method are discussed on pages 20 to 24 and results are summarized in Table 7-1 on page 24.

Calculations for channel design, including filter and riprap sizing, were done using FlowMaster (version 5.13), which is based on Manning's equation. Parameters and calculation methodology for channel design are explained on pages 25 through 30. Channel dimensions,

expected flow characteristics, and D_{50} riprap requirements are summarized in Table 7-2 on page 29. Results of channel design by Hansen, Allen & Luce, Inc. are in Appendix A. The design work in Appendix A is not certified, but the same designs are on Drawing 500-2, which is certified by David Hansen, PE.

Channel design has been done for Upper, Intermediate, and Lower Zones. Reclamation will begin at the top and work downstream.

The Upper Zone includes natural sandstone cliffs between the Beehive and Little Dove pad above and Deseret pad below. It is approximately 120 feet long. To dissipate the energy of water flowing from above onto the Deseret pad, boulders and riprap will be used to cover portals, coal seams, and highwalls or faceups. Where drainage from above is not expected, available, ungraded fill will be used and compacted in lifts.

The Intermediate Zone is on rock outcrop. It is approximately 450 feet long. It will approximate the natural, pre-mining channel and involve no riprap or engineered channel design. Large boulders will generally not be placed within the channel because they can obstruct and divert flow, causing erosion of adjacent reclaimed areas. Water will flow over outcrops and energy will be dissipated as natural drop structures develop.

The Lower Zone is the longest, approximately 1,200 feet, extending from the lowest outcrop of the Intermediate Zone to the disturbed area boundary. This zone will be reclaimed through construction of a trapezoidal channel. The channel will be excavated to approximate original contour and then lined with riprap.

The method used to determine riprap and filter gradation requirements is referred to on page 30. Table 7-3 contains the riprap and filter gradations determined for what the permittee considers two probable slopes in the Lower Zone, 13.1% and 32.3%. These slopes were determined from current survey and topographic information; however, it is expected that some rock outcrops will be encountered during construction that will necessitate modifications to the design, such as the small drop structures and pools shown in the "alternate riprap channel design" on Drawing 500-2.

Materials for constructing these channels are to be obtained on-site. Riprap sizes must be varied rather than uniform. The Procedural Steps of Reclamation Table in Section 540 of the Phase I amendment states that sieve analysis will be done to assure riprap gradation meets design criteria: there is no analogous statement in the Phase II amendment, but the Division expects proper gradation of riprap and fill at all stages of reclamation construction.

Riprap should be angular rather than rounded: boulders that will be excavated on-site may be more rounded than is desirable and a method of breaking them into more angular material may be needed. The permittee states in the September 15 cover letter to the second Phase I submittal that they do not anticipate a need to crush or break boulders available on site.

TECHNICAL MEMO

to obtain appropriate angular material because most available boulders are the result of recent weathering and tend to be angular rather than rounded.

Drawing 500-2 shows cross-sections and profiles of various structures. Drawing 500-2 refers to 500-1, but Drawing 500-1 does not show where these typical structures are located or are to be built, and it is not always clear from the text which structures are intended for specific uses. Schematic cross-sections of engineered channels on Drawing CS1819A in the Phase I amendment show that the soil immediately adjacent to the channels will overlap the uppermost riprap and cover the upper edge of the engineered channel to provide a transition from the constructed channel to soil and avoid a visible, hard edge. This transition will not only be visually more like the existing channels, but will promote vegetation growth in the coarser material, which helps anchor it, and eliminate an edge that could facilitate and concentrate erosion parallel to the channel: there is no analogous design in the Phase II amendment, but the Division expects similar design and construction criteria to be used at all stages of reclamation construction.

Experience has shown that channels built on fill are subject to many problems, including failure, if not constructed correctly. Acknowledging that it is the permittee who has the authority to control, direct, and supervise construction of the reclamation channels, the Division would like to have a hydrologist or other Division representative present during placement of the filter and riprap. The permittee has stated, in the cover letter dated September 15, 2001, that they expect division representatives to be at the site as much as possible during construction to facilitate communication, and that they will make every effort to keep the division informed on progress and timing of construction.

Sediment control measures

The sedimentation pond will remain for sediment control.

Contouring, pocking, and vegetation are the methods to be used to keep sediment in place on reclaimed surfaces. Weed-free alfalfa hay will be incorporated into the soil at a rate of 2,000 lbs/acre. (R645-301-341). A soil tackifier will be applied to protect against erosion until vegetation is established (R645-301-244). Hydroseeded areas will receive wood-fiber mulch. Surfaces will be roughened by pocking or deep gouging to retain sediment and moisture and to mix the straw mulch into the upper portion of the soil. Rock litter on the surface will also aid in sediment control, and enhance vegetation establishment, create micro-habitats, and help provide a natural aesthetic appearance (R645-301-244). If erosion is identified during routine monitoring or monitoring after precipitation events, silt fence will be installed and, if needed, the surface will be enhanced and reseeded. No method other than examination in the field is proposed to evaluate the success of these sediment control measures.

The small drainage at the south end of the Bathhouse pad, which passes beneath the pad in a 30-inch culvert, will be reestablished. The plan does not have an engineered design or

indicate the use of riprap in this channel. There is no profile for this drainage or the other small drainages that currently flow onto the Bathhouse pad.

Siltation structures

Basins, traps, straw bales, etc. are proposed for sediment control during the construction phase of reclamation. Weed-free alfalfa will be incorporated into the soil. When reclamation is complete, pocking or roughening of the surface and rock litter and boulders will assist in sediment control. Removal of the sedimentation pond is not included in Phase I or Phase II reclamation.

There is no standard proposed to determine the success of these proposed sediment-control methods. RUSLE or similar methods can provide an estimate of sediment contribution from reclaimed and undisturbed watersheds (as was done at the nearby Deer Creek Mine); however, there do not appear to be water-quality or sediment load baseline data for this Des-Bee-Dove drainage to allow a similar comparison: this lack of baseline or background data will need to be accounted for in any method used to evaluate the effectiveness of the proposed sediment control measures. Such an evaluation may indicate the proposed measures are not adequate and more robust methods of sediment control are needed for this steep, dry, rocky, exposed site.

Sediment levels above background levels are not expected (R645-301-242.130). Background levels for this site are not known. RUSLE is not intended for calculations of soil loss from steep slopes, but it could provide at least a calculated estimate of the expected sediment levels as a starting point for other evaluation methods.

There is a commitment on page 30 in Section 763 to retain and maintain all temporary sedimentation structures, including the berm along the access road, until completion of sequenced reclamation. Reclaimed areas will continue to report to the sedimentation pond (R645-301-553.100, p. 17). The sedimentation pond will remain until vegetation is established and the Division approves its removal (R645-301-541, page 500-2). Sediment should be controlled before it leaves the reclaimed or disturbed area. Henry Austin of OSM has expressed his opinion that if the sedimentation pond is to be used for sediment control, the entire drainage between the mine-site and the pond needs to be permitted. A letter from Mary Ann Wright, dated August 29, 2001 clarifies the Division's position that there will be no requirement to permit the wash that connects the disturbed area pad to the sediment pond.

Sedimentation ponds

Energy West is planning on reclaiming the sedimentation pond as the final step in reclamation. Until other sediment control measures are effective in the Phase I and Phase II areas, total containment of all runoff in the sedimentation pond will remain the primary sediment control.

TECHNICAL MEMO

Ponds, Impoundments, Banks, Dams, and Embankments

There is a temporary embankment or impoundment where the coal was removed from the Tipple pad. As Phase I reclamation proceeds, additional runoff will report to this structure, which is not designed or sized as a sedimentation pond. When and how this structure will be breached and removed needs to be clarified.

Findings:

R645-301-121.200, -121.300, The separation of this project into two phases is becoming increasingly confusing: the reclamation of this site needs to be planned as a single, integrated project, although construction can undoubtedly be done in phases if planned well. Clarify coordination between Phase I and Phase II.

R645-301-761, -730, 742.312, -742.314, The Procedural Steps of Reclamation Table in Section 540 of the Phase I amendment states that sieve analysis will be done to assure riprap gradation meets design criteria: there is no analogous statement in the Phase II amendment. Clarify that sieve analysis will be done during Phase II to assure that riprap gradation will meet design criteria.

R645-301-121.200, Drawing 500-2 and Appendix A show cross-sections and profiles of various structures. Drawing 500-2 refers to Drawing 500-1, but Drawing 500-1 does not show where these typical structures are located or are to be built, and it is not always clear from the text which structures are intended for specific uses. Clarify on both Drawing 500-1 and in the text the location of the structures shown on Drawing 500-2 and in Appendix A.

R645-301-742.312, The small drainage at the south end of the Bathhouse pad, which passes beneath the pad in a 30-inch culvert, will be reestablished. The plan does not have an engineered design or indicate the use of riprap in this reclaimed channel. Provide current and reclamation profiles for this culverted-drainage at the south end of the Bathhouse pad and the other small drainages that currently flow onto the Bathhouse pad, and clarify reclamation of these drainages.

R645-301-733.200, -521.169, -528.400, There is a temporary embankment or impoundment where the coal was removed from the Tipple pad. This structure is not designed or sized as a sedimentation pond, may not be stable, and might be subject to sudden failure during a large storm event. When and how this structure will be breached and removed needs to be clarified.

R645-301-751, -752, There is no standard proposed to determine the success of these proposed sediment-control methods. Sediment levels above background levels are not expected (R645-301-242.130), but background levels for this site are not known. An evaluation by a method such as RUSLE may indicate the proposed measures are not adequate and more robust methods of sediment control are needed for this steep, dry, rocky, exposed site. RUSLE is not intended for calculations of soil loss from steep slopes, but at a minimum it could provide a calculated estimate of expected sediment levels as a starting point for other evaluation methods. Use RUSLE or a method more suited for the steep slopes at Des-Bee-Dove to provide an estimate of sediment contribution from reclaimed and undisturbed watersheds.

RECOMENDATIONS:

Prior to approval, the requirements of the Coal Mining Rules must provided as outlined above.