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August 20, 2001

TO: Internal File

THRU: Wayne H Western, Reclamation Specialist, Team Lead WHW

FROM: James D. Smith, Reclamation Specialist JDS

RE: Revision to Reclamation Plan (Highwall) Energy West Company Deer Creek Mine, C/015/019-AM99C-4

RECLAMATION PLAN

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:

Water quality standards and effluent limitations

The operator has provided a water monitoring plan in Appendix A of Volume 9 (which covers Deer Creek, Cottonwood-Wilberg, and Des-Bee-Dove Mines). The plan contains a commitment on page 177 of Volume 9 that discharges of water from areas disturbed by coal mining and reclamation operations will be made in compliance with all Utah and federal water-quality laws and regulations and with effluent limitations for coal mining promulgated by the EPA and set forth in 400CFR Part 434. UPDES information is in Appendix B, Volume 9.

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

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

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

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

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

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

R*K*LS*C*P = A (estimated soil loss – Table 7-1)

R*K*LS*C*SDR = SY (estimated sediment yield)

Diversions

Two ephemeral draws in Elk Canyon have been included in the channel design (DS-1780D) and final reclamation contour map (DS-1782D). Small ephemeral draws between the Terrace Enhancement Project area and Deer Creek may collect and convey water. The drainage areas of these small draws are not significant enough to require designed channels, but these are areas with the potential for gully formation. **NOTE**: the reference stations on DS1780D are measured along the channel length and do not correspond with the cross-section locations on DS1782D.

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

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

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

1. The design for using root wads in the transition areas looks acceptable. Having log ends pointing downstream is acceptable, but it is imperative that the operator plant enough sedges and willows behind the logs.

2. The value of placing anything in the middle of the channel is questionable. Placing wattles in the middle of the stream is a practice with which Dick is not familiar. Wattles are mainly intended for streambank protection, not for trying to establish islands. Using them to establish islands might work in some situations, but this doesn't appear to be a good place; nevertheless, it might be worth trying with one or two as an experimental practice.

3. Rocks in the middle of the channel will impede the flow and tend to create scour points that could become nick points.

4. The base material for the channel is a concern. Sieve analysis is not discussed, and probably cannot be known until the channel is actually excavated. The operator needs to commit to do sieve analyses during reclamation to help determine a stable final channel design.

5. A riprap channel with lots of vegetation on the sides would be a reasonable design option.

In response to Mr. Rol's comments, the commitment is made on page 7-13 to do sieve analyses and, if the particle-size is not sufficient to control down-cutting erosion, to modify the design to either control flow velocities to better armor the streambed. In comments included with the March 8, 2001 response to deficiencies, the permittee commented that Mr. Rol's comments were appreciated but that based on their evaluation, the stream channel as designed would be stable. The placement of logs, boulder clusters, willow wattles, etc. will direct flow towards the center of the channel in a meandering fashion. Willow wattles and U- or V-shaped weirs will provide flow dissipation to slow velocities and promote sedimentation.

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

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

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

Findings:

The plan meets minimum regulatory requirements for this section.

RECCOMENDATIONS:

Approval of the proposed amendment is recommended.

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