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

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August 24, 1989

TO: Susan Linner, Permit Supervisor

FROM: Mike DeWeese, Reclamation Hydrologist RPS for MD

RE: New Surface Facilities Amendment, Soldier Creek Coal Company, Soldier Canyon Mine, ACT/007/018-89B, Carbon County, Utah

SUMMARY:

The operator's latest submittal received August 16, 1989 has been reviewed regarding hydrologic concerns enumerated in the Division's last review. This submittal differs from the original in the stream culvert outlet design. The remainder of the surface drainage control system remains essentially unchanged. Comments regarding the operator's response are preceeded by the original review comments.

ANALYSIS:

UMC 817.42 Hydrologic Balance: Water Quality Standards and Effluent Limitations - MMD

The new portal pad will include a topsoil stockpile at the southern end of the new disturbance, as depicted on Drawing D-264. No discussion of the drainage control at the topsoil stockpile was found in the submittal although the stockpile is depicted as not reporting to the sedimentation pond in the drawing. The operator must provide alternate sediment control measures as required for small area amendments under subsection (a)(3(i) of this regulation. A detailed description of this area must be submitted describing the sediment control measures to be implemented and the exact acreage of the area. The topsoil stockpile must be clearly labeled as a small area exemption and the acreage depicted on Drawing D-264 or an equivalent drawing. All appropriate sections of the MRP must be revised to describe the new topsoil stockpile as a small area exemption.

OPERATOR'S RESPONSE:

The topsoil stockpile has been included in the drainage area reporting to the sedimentation pond on Exhibit 10.2.4-1.

The operator's response is adequate.

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UMC 817.43 Hydrologic Balance: Diversions and Conveyance of Overland Flow, Shallow Ground Water Flow, and Ephemeral Streams - MMD

The existing disturbed drainage system has been analyzed to determine if it is adequate to convey the additional surface runoff from the new disturbance. The current diversion system employs a combination of concrete, concrete and cobblestone, and half round culvert ditches. The operator has demonstrated that the concrete and concrete/cobblestone ditches will adequately convey the expected runoff from the 10 year 24 hour design storm. The half round culvert will convey the design storm but cannot maintain the required freeboard depth of 0.3 feet. Division calculations determined that the peak flow during this event can be conveyed at a freeboard slightly greater than 0.1 foot. This freeboard is considered to be adequate because the channel reach in question is constructed with non-erosive material. Furthermore any flow which breaches the culvert will be collected immediately downstream in the concrete ditch section.

Drawing D-264 depicts a berm along the lower perimeter of the new storage pad area adjacent to the road. The submittal must be revised to include the dimensions of the proposed berm. The remainder of the drainage system (i.e. the half round culvert) is not shown on this drawing. Drawing E026 of the approved plan depicts the existing drainage system. From this drawing it does not appear that the half round culvert extends to the berm location on Drawing D-264. This discrepancy must be corrected to depict the existing drainage system in conjunction with the proposed expansion facilities. Structures such as culverts and diversion ditches must be labeled on this drawing to coincide with appropriate design calculations and specifications.

OPERATOR'S RESPONSE:

The diversion berm has been replace with a 24" half-round culvert along the lower boundary of the portal pad. A grated concrete ditch constructed to the same dimensions as the existing diversions will be used at two access road crossings. The locations of these diversions is depicted on Exhibit 10.2.4-1. Both diversion structures contain adequate capacity to convey the 10 year 24 hour design storm runoff with more than the required 0.3 feet freeboard.

The operator's response is adequate.

Page 10-4 states that Surface runoff from the new portal pad area will be diverted into the existing diversion system by an 18 inch diameter culvert. Drawing D-264 depicts a berm and concrete ditch below the portal pad and adjacent to the county road which will divert runoff to the culvert inlet. However it is not clear on this drawing where these structures join. The exact locations and lateral extent of these structures must be clearly labeled and depicted on this or other appropriate drawing.

OPERATOR'S RESPONSE:

Exhibit 10.2.4-1 depicts the 18 inch culvert as extending approximately 150 feet from the portal pad to the existing diversion system. The Division has determined that the design storm peak runoff can be conveyed at a headwater depth of 1.0 foot, therefore the culvert is adequately sized.

The operator's response is adequate.

Page one of Appendix C states that the undisturbed diversion above the new portal will remain as a permanent diversion after reclamation. Permanent diversions must be designed based on the 100 year 24 hour storm event. Design calculations presented in the appendix are based on the 10 year 24 hour storm. Furthermore the diversion design was conducted as part of the original preliminary analysis and is depicted in plate A1-1 as reporting to the stream channel. This design must be revised to accommodate the present portal and pad area configuration. The operator's calculations used a curve number of 73 for the undisturbed watershed area above the portal. The approved plan uses a curve number of 75 for undisturbed areas. The operator must present site specific data justifying the use of a lower curve number in this area.

OPERATOR'S RESPONSE:

The undisturbed drainage diversion above the portal pad has been reclassified by the operator as a temporary diversion. Revised calculations use a curve number of 75, consistent with the approved permit. The operator has demonstrated that the channel design contains adequate capacity to convey the design storm runoff. Exhibit 10.2.4-1 depicts a break in channel slope where the diversion crosses the existing exploration road and extending to the stream channel confluence. Division calculations demonstrate that this channel reach will produce erosive velocities at the design storm peak discharge. The operator has recognized this as a

marginally stable reach and recommended riprap through this area. However no riprap design or calculations were located. Therefore the operator must commit to design and install riprap in the undisturbed diversion channel from the road to the top of the stream channel bank riprap. Supporting design calculations and material size gradations must be submitted.

The operator's response is not adequate.

UMC 817.44 Hydrologic Balance: Stream Channel Diversions - MMD

Design calculations have demonstrated that the erosive velocities will occur during the 100 year 24 hour event (Appendix D). The operator has proposed a riprap basin energy dissipator be installed at the culvert outlet. The proposed design specifications are as follows:

length of pool	82 ft.
length of apron	41 ft.
span	19.9 ft.

Contour information indicates a vertical drop of approximately 6 ft. from the culvert outlet to the end of the riprap basin (Drawing D-264). However proposed design calculations utilize an assumed basin slope of one percent, or approximately one foot of vertical drop from the culvert outlet to the end of the basin. Therefore the proposed basin outlet will be five feet higher than the natural channel bottom at this location. The operator must revise this design to accommodate the natural stream channel elevation at the basin outlet. Riprap will be required only on the channel sideslopes because the natural channel bottom is in bedrock material. Since the riprap basin will be excavated in bedrock, the operator proposes to install riprap material only on the apron section of the structure. The operator has submitted design calculations for riprap and filter blanket material gradations. However the exact location and extent of the riprap section is not clear from submitted drawings. The operator must submit an accurate detailed plan view and longitudinal profile of the energy dissipator including structural dimensions and extending at a minimum from the culvert outlet to the natural channel below the structure.

OPERATOR'S RESPONSE:

The riprap basin at the stream diversion culvert outlet has been eliminated from the proposed design due to the excessive disturbance which would be required by construction. The operator has submitted an alternative design which utilizes a combination of roughness rings in the downstream portion of the culvert and riprap in the stream channel below the culvert outlet.

Roughness element design procedures in HEC-14 are based on a circular culvert shape. However, no design for pipe arch culverts is presented in HEC-14. Due to the similarity of hydraulic characteristics between the two culvert shapes the operator assumed that the design procedure for circular culverts was applicable to both shapes. The resulting proposed design requires five rings in the culvert placed at 14 foot intervals. Each ring will have a 10 foot wide gap centered at the culvert bottom and extend along the culvert rib to a height of three feet. The furthest upstream ring will be two feet high and each of the four remaining rings will be one foot high. Each ring will be reinforced be gussets to provide extra strength. These roughness rings will reduce the 100 year 24 hour design storm velocity to approximately 21 ft./sec.

The operator proposes to install a riprap energy dissipator at the culvert outlet to mitigate the remaining erosive velocities. The proposed design requires a d_{50} of six inches on the channel bottom and 12 to 18 inches on the channel banks. The length of the apron is based on criteria presented in HEC-2 which states that the necessary transition length is four times the average side constriction at the culvert. Using this criteria the operator determined the necessary apron length to be 28 feet. However, when determining the average constriction, the operator used the maximum culvert width (20 ft.). Division calculations determined the average culvert width to be approximately 8.5 feet resulting in an apron length of 34 feet. Therefore, the operator must commit to installing riprap to this distance downstream from the culvert outlet or submit revised calculations using an accurate average constriction value.

The operator's response is not adequate.

<u>UMC 817.45 Hydrologic Balance: Sediment Control Measures - MMD</u>

Page 10-19 of the submittal states that drainage from the pad area will be treated utilizing silt fences during reclamation. The operator has not addressed sediment control measures to be used during construction of the pad. The Division believes that temporary straw bale check dams placed in the stream channel below the disturbance will provide adequate sediment control during both the construction and reclamation process. The operator must submit sediment control plans to be used during construction and revise the reclamation plan to utilized straw bales in conjunction with silt fences.

OPERATOR'S RESPONSE:

The operator has committed to installing straw bale check dams in the stream channel during culvert installation and silt fences and/or straw bales below disturbed areas during construction.

The operator's response is adequate.

UMC 817.46 Hydrologic Balance: Sedimentation Ponds - MMD

UMC 817.49 Hydrologic Balance: Permanent and Temporary Impoundments - MMD

The operator has proposed the following modifications to the existing pond structure in order to meet design criteria:

1. The pond spillway will be flared from 18 inches to 24 inches at the inlet to increase efficiency.

2. The manual decant inlet will be lowered to provide more runoff storage volume.

Input variables used in the submitted calculations differ slightly from Division values but produce design peak flows within an acceptable range of error (less than 10%). In addition, the operator used a conservative value of 0.1 acre foot per acre for sediment volume calculations. However the operator based the pond stage-discharge relationship on the assumption that the initial water level in the pond would be at the decant inlet elevation. Therefore the submittal must include a commitment to maintain the water level in the pond at the decant elevation.

OPERATOR'S RESPONSE:

The operator has committed to maintain the water level in the pond at the decant inlet level.

The operator's response is adequate.

UMC 817.47 Hydrologic Balance: Discharge Structures - MMD

Appendix A presents a calculated peak discharge velocity of 9.5 ft./sec. from the pond spillway. Analysis indicates a riprap d_{50} of 1.25 feet is necessary at this velocity. Visual inspections by the operator determined the average riprap size to be 1.5 to 3.0 feet in diameter, therefore the spillway outlet is adequate. The location and extent of the spillway apron must be included in the final as-built drawing of the sedimentation pond.

No information regarding an energy dissipation structure at the manual decant was found. The present decant is an 18 inch diameter pipe which could produce erosive velocities during any discharge. Therefore the operator must address the design or reason for a lack of an energy dissipation structure at this discharge point. Any structure implemented at the decant outlet must also be included in the as-built drawing.

OPERATOR'S RESPONSE:

The operator has stated that the existing riprap at the decant spillway meets the same criteria as the riprap at the primary spillway outlet. A commitment has been made to include the riprap structure on the as-built drawing of the reconstructed sedimentation pond.

The operator's response is adequate.

UMC 817.50 Hydrologic Balance: Underground Mine Entry and Access Discharges - MMD

The new portal entry will be constructed on a down dip gradient and will not produce any discharge.

UMC 817.57 Hydrologic Balance: Stream Buffer Zones - MMD

The operator states on page 10-19 that the stream culvert will be removed as part of the final reclamation process. The operator further states that the stream channel will be stabilized by regrading the sideslopes. Subsection (a)(1) of this regulation states that the Division may allow disturbance within 100 feet of a perennial stream upon finding that the original stream channel will be restored and water quality will not be adversely affected. Information presented in the submittal is not sufficient to make this determination. The operator must submit a detailed reclaimed stream channel design including but not limited to design specifications for final cross sections, stream gradient, channel linings, and reclamation sediment control.

OPERATOR'S RESPONSE:

Appendix F contains designs of the reclaimed stream channel. This design requires a 20 foot bottom width with 2:1 sideslopes. The channel will be lined with nine inch median diameter riprap on the channel bottom and one foot median diameter riprap on the channel sideslopes. The operator has adequately demonstrated that the proposed channel depth of 6.25 feet will convey the design storm runoff with the required freeboard.

Sediment control will be provide by straw bale check dams in the stream channel and silt fences along the channel banks during reclamation.

The operator's response is considered adequate.

RECOMMENDATIONS:

The Division recommends that the proposed new surface facilities amendment be denied final approval until such time as the operator has submitted the following:

1. A commitment to extend the proposed riprap apron at the stream culvert outlet to a length of 34 feet or revised calculations using an accurate average constriction value.

2. Riprap calculations for the undisturbed diversion reach extending from the exploration road to the top of the stream channel bank riprap.

cc: R. Summers
BT98/78-85