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

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August 8, 1995

TO: Joe Helfrich, Inspection and Amendment Supervisor

FROM: Sharon Falvey, Senior Reclamation Hydrologist

RE: Proposed Sediment Pond Removal, Mountain Coal Company, Huntington #4 Mine, ACT/015/004-95B, Emery County, Utah

SYNOPSIS

On March 8, 1995, the Division determined the Huntington #4 Mine reclaimed areas would not contribute additional suspended solids outside of the permit area, and that Phase II bond release was contingent upon removal of the Huntington #4 Mine pond. This amendment presents the Permittee's proposal for the final configuration and regrading of the pond area. The Forest Service has deemed the proposal acceptable through the memo received at the Division on August 2, 1995. However, additional changes were incorporated at the request of the Division, through phone conversations with Dan Guy, then resubmitted on August 2, 1995. Since the changes in the August 2, 1995 proposal are not significantly different from the original proposal, it is not expected that the Forest Service will have any additional comment on the changes.

Analysis:

The Operator proposes the following:

- Existing rip-rap from the pond inlets and outlets will be removed and temporarily stored for re-use;
- The berm along the lower cell will be pushed into the cell and compacted as fill:
- The dam of the upper cell will be lowered by approximately 8' and compacted into the lower cell area as backfill;
- A 36" culvert will be installed from the upper basin across the Mill Fork Road;
- Riprap on the existing pond inlet will be re-set with voids filled in with the existing soil;

- The basin and culvert inlet structure will be rip-rapped using a 12" D50 or larger rock with soil in the voids;
- The culvert outlet will be installed using 6" D50 or larger rip-rap placed to a minimum depth of 9" over a bedding of filter fabric;
- All exposed soil areas will be roughened by hand and/or using the backhoe teeth;
- The entire re-disturbed area will be seeded and mulched using the approved seed mix in the permit;
- The road drainage will be restored, and the temporary fence will be replaced along the pond side of the road.

The Permittee uses hydrologic information for the 36 inch culvert design using operational CN's and Watershed Areas. The postmining topography and watershed areas vary somewhat to the operational area. The permittee however, has used a conservative CN value of 90 for the reclaimed areas. The Division has compared the Permittee's results with values obtained using postmining topography and watershed boundaries on Plate 1 in the Phase II bond release amendment. The Division divided the watershed according to areas draining to the main culvert. CN's were obtained using TR-55 methodology while precipitation design values were obtained from the NOAA Precipitation Frequency Atlas. The Division's calculated peak flow rate indicate the Permittee's calculated peak flow is adequate and the proposed 3 foot culvert exceeds design requirements for a 100 year-6 hour storm event.

The Permittee provided designs for the proposed D50 riprap for the channel leading to the 36 inch culvert and for the culvert inlet and outlet. Presently, the channel leading to the culvert is an inlet to the existing pond, and has shown some erosive movement. This channel has seen a few significant events, according to Susan White, DOGM inspector, but has not had a complete failure. No designs were presented during the operational phase for this channel section as it was the inlet to the pond. The Permittee now provides a design for a trapezoidal channel with a 4 foot bottom width, a one foot depth, and 2:1 side slopes. The average channel bottom slope is 45.71 % and a design riprap D50 of 20 inches was obtained from a diagram of the "Design of Road Side Drainage Channels" Hydraulic Design Series No. 4, May 1965, U.S. Department of Commerce, Bureau of Public Roads. It should be noted however, this design method assumes channel slope or bottom at 12:1 and provides additional design based on the side slopes. The Division calculated a D50 for a channel slope of 45 % would be 5' to obtain a safety factor of one, using the tractive force methodology in Barfield Warner and Haan (1981). However, the slope of this channel exceeds the limitations of the testing of these design methodologies. Since the slope of this

channel exceeds the design standards for available methodologies, the following riprap construction similar to what might be present on a slope in this area is proposed.

- The channel area will be defined according to the design shown in Attachment A;
- Riprap will be re-set in the channel with the largest available at the base of the slope and decrease in size up the slope;
- Larger riprap will be placed on top of one another in a stair step fashion as much as possible;
- A mixture of gravel and fine materials (i.e. soil) will be compacted around the block with vibrating foot tamper or other tool able to achieve similar compaction.
- The area will be reseeded along with the reclaimed pond area.

If equipment access is deemed impractical in the field as much of the above procedure as possible will be performed by hand.

The Permittee's grading plan includes retention of a surge basin prior to entering the culvert. This design will reduce velocity and cause sediment deposition prior to discharge through the culvert and may require infrequent maintenance so the entrance remains clear. The length of the proposed culvert could have been reduced thus providing additional fill which may have been used to decrease the upstream gradient. However, the Permittee has chose to utilize the existing sandstone outcrop to provide the control for the basin and has reduced the previously existing pond embankment.

Riprap for the 36" CMP inlet was sized to be 20 " by the Permittee using the methodology discussed previously. The Permittee is proposing a 12" riprap size for this section indicating a 20 " size is not practical. Because the channel drops into the "surge basin", there is a change in gradient prior to the inlet to the culvert. This basin will slow the velocity at the inlet. Although no designs were computed for this section, the proposed sizing should be adequate due to the grade change.

The Permittee proposes the 36" culvert outlet be protected using an energy dissipation apron. The design is based on a method identified in Barfield Warner and Hann, developed by the EPA for 0 % outslope and a tail water depth greater than half the diameter of the culvert (TW $\geq$ .5 D). This method assumes the culvert is flowing full. It is not clear whether the proposed design uses the discharge through a 2.38 ft culvert flowing full which is equal to the 100 year-6 hour discharge, or discharge flowing full through a 3 foot culvert.

It appears the Permittee has presented a minimized design based on conditions of TW ≥ .5 D. However, a condition of TW ≤ .5 D more likely to occur in ephemeral systems before equilibrium is reached. The following design deminsions were determined by the Division for a culvert flowing full that is slightly smaller than that carrying the design flow and the proposed culvert flowing full.

Culvert Diameter/Apron Design	27"D/length of apron	27"D/width of apron	30"D/length of apron	30"D/ width of apron
TW ≥ .5 D	21'	10.7'	27'	13.8'
TW ≤ .5 D	18'	10.2'	22'	25'

For TW ≤ .5 D, the Permittee's proposed design length is 15', the proposed design width is 9', and the proposed D50 is 6 inches. The Permittee has provided a conservative design flow but has minimized the energy dissipation apron design. The maximum velocity expected from the 34.12 cfs discharged through a 2.38 ft (28.5 inch) culvert flowing full would equal the 100 year-6 hour discharge with a velocity of 7.82 fps. The same discharge flowing through a 3 foot culvert would however discharge at greater velocity of 9.3 fps.

The existing 24 " culvert is proposed to remain. The volume of flow this culvert receives from an approximate 7.4 acres is 2.98 cfs. The minimal amount of flow this culvert receives for the design event makes justification for retention questionable. However, this culvert does receive drainage from the Forest Service road. The Forest Service has deemed the general configuration of this plan acceptable in the memo received at the Division on August 2, 1995.

RECOMMENDATION

It is recommended this proposal be approved. The Permittee should consider increasing the length and width of the energy dissipation apron. The Forest Service has deemed the proposal acceptable in the memo received at the Division on August 2, 1995. The Permittee however, resubmitted this plan for approval on August 2, 1995. The approval letter received from the Forest Service did not indicate the recent changes were acceptable. Since the changes in the August 2, 1995 proposal are not significantly different from the original proposal, it is not expected that the Forest Service will have any additional comments. Prior to approval the Division should provide documentation of the Forest Service acceptance for the most recent changes through phone communication or approval letter. A response was requested on August 7, 1995.

cc: Susan White
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