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

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September 4, 1998

TO: File

THRU: Joe Helfrich, Permit Supervisor

THRU: Daron Haddock, Permit Supervisor

FROM: Michael Suflita, Reclamation Hydrologist

RE: Proposed Culvert Removal on Out Slope of #1 Mine Access Road, White Oak Mining & Construction Co., White Oak Mine #1, ACT/007/001-98C, File #2, Carbon County, Utah

SUMMARY:

The out slope referred to in this proposal has been an ongoing problem due to erosion below and beside the half-round culvert extending down a slope that is visible from the main highway. On July 31, 1998 the Division received a proposal to plug the inlet to the culvert, thus bypassing it, and diverting the flow into a concrete-lined ditch alongside the road. This flow goes to Eccles Creek as it did before, but at a different point. The old culvert would be removed and the slope revegitated. This evaluation considers the hydrologic aspects of the proposal.

TECHNICAL ANALYSIS:

OPERATION PLAN

Diversions

Regulatory Reference R645-301-742.300

Analysis:

The proposed plan to plug the input to C-23-24 included an analysis of the impact of adding the design flow of the culvert to the ditch, D-21. The analysis showed a freeboard of 1.1 inch in the ditch downstream of the culvert inlet. While this keeps the flow in the ditch, the slightest obstruction could cause flows to leave the ditch. The application included calculations for the riprap lined ditch below the concrete lined ditch and for a rock check dam to help control sediment. All revised calculations were checked and compared to the original plan and appear appropriate.

Comparison of the drainage areas for the two adjacent culverts shows that, although C-22 and C-23 are both 24 inches in diameter, the drainage area of C-22 is about one-fourth that of C-23. Since C-23 is being eliminated, it would be less detrimental for it's runoff to flow into the remaining C-22.

This would function as a "safety valve" in the event flows left the concrete lined ditch and flowed into C-22, a desirable condition.

A field trip was made on 9/3/98 to assess site conditions. Vicki Miller, the mine's Resident Agent accompanied this reviewer. The following conditions were noted and documented with photographs, which are attached:

1. The inlet to culvert C-22-24 is partially plugged with rocks and debris and needs cleaning. The triangular area adjacent to the culvert inlet, between the road and cliff, contributes sediment to runoff and the area needs to be riprapped.

2. The concrete lined ditch is in immediate need of repair all along the road, and especially below the inlet to the culvert to be removed, to prevent further deterioration.

3. The entire ditch, from Eccles Creek up to the mine site, needs maintenance to clean up and remove rock and debris which has accumulated along and in the ditch.

4. The area below the culvert to be eliminated is completely full of accumulated sediment and needs to be cleaned out immediately. This should be included as part of the reclamation of the culvert.

Findings:

The proposed plan does not meet minimum regulatory requirements. Prior to approval, the Applicant must provide **as part of the proposed plan**, the following in accordance with the requirements of:

R645-301-742.300, clean out and maintain clear the inlet to all culverts, especially in this case, C-22-24. Install riprap over the triangular area above and below the inlet to C-23-24, between the cliff and edge of the drainage ditch. Perform ditch maintenance to remove debris in and along the ditch must begin at the inlet to the culvert that carries all of Eccles Creek, C-21-48, and continue up the entire road.

R645-301-534.330 and .340, repair of the concrete ditch all along the roadway. The repairs must bring the ditch up to the same quality standard as before the deterioration occurred.

Road Drainage

Regulatory Reference R645-301-742.420

The proposed design shows showed a freeboard of 1.1 inch in the ditch downstream of the culvert inlet. The regulations require road drainage ditches to "be designed to prevent uncontrolled drainage over the road surface and embankment". While this is the case, the slightest obstruction could cause flows to leave the ditch. The situation below the point where the culvert inlet would be plugged has the road sloping up from the ditch and a cliff on the other side of the ditch. Thus, if flows were to exceed design, there would be minimal impact. See attached photos and comments. It is crucial that this length of the ditch be maintained to be free of debris which could obstruct the ditch.

Findings:

The proposed plan does not meet minimum regulatory requirements. Prior to approval, the Applicant must provide **as part of the proposed plan**, the following in accordance with the requirements of:

R645-301-742.300 and 742.420, clean out and maintain clear the inlet to all culverts, especially in this case, C-22-24. Install riprap over the triangular area above and below the inlet to C-23-24, between the cliff and edge of the drainage ditch. Ditch maintenance to remove debris in and along the ditch must begin at the inlet to the culvert that carries all of Eccles Creek, C-21-48, and continue up the entire road.

R645-301-534.330 and .340, repair of the concrete ditch all along the roadway. The repairs must bring the ditch up to the same quality standard as before the deterioration occurred.

Sediment Control Measures

Regulatory Reference R645-301-732.100 and 742.100

Analysis:

The siltation structure at the bottom of culverts C-22 and C-23 are completely filled with sediment and are about to overtop the straw bales. See attached photos. This continues up to and including the lower end of the culvert to be removed. This sediment must be removed, the area cleaned up, and new straw bales installed. It is logical to include this as part of the restoration of the area where the culvert is removed.

Findings:

The proposed plan does not meet minimum regulatory requirements. Prior to approval, the Applicant must provide **as part of the proposed plan**, the following in accordance with the requirements of:

R645-301-732.100 and 742.100, removal of all sediments in the siltation structure below the culvert to be removed. The area must be cleaned up and new straw bales installed.

RECOMMENDATION:

Prior to approval, the Applicant must provide the items outlined above in accordance with the referenced regulations.

Added Recommendation:

During the field visit some potential problems were noted at the two culverts up the road from the proposed work area. These are culverts C-24-24 and C-25-36. At both culverts there are fabric tubes attached to the culvert outlets. These tubes are removed in the winter and reinstalled in the spring, apparently to prevent freezing. The wires holding the tube on C-25-36 are not functioning as intended. Originally the wires were attached to trees which held up the tube. The trees have been washed out and fallen and are now pulling DOWN on the tubes.

Both culverts would be greatly improved by adding steel culvert to replace the fabric tubes currently in place. Protection of the channel is essential, but the tubes present ongoing maintenance problems and costs. They are at risk of being torn off during storm events. The resulting damage and sediments generated off site would very likely result in issuance of a Notice of Violation.

The Division would strongly recommend that the Operator replace the fabric tubes with steel culvert of the same length or somewhat longer. The present inadequate fastening of the tubes must be corrected regardless.

Photo Log Comments

White Oak Mine ACT/007/001 Access Road Site Visit September 1, 1998
Attendees: DOGM Mike Suflita, Operator Vicki Miller

Photos start at the lower end of the road and progress uphill to the location of the proposed culvert modification. Included are areas below the culvert and two other culverts above the one to be modified.

Photo 1: Lower right shows where the ditch enters Eccles Creek. Note established armoring of the ditch. Note existing check dam in ditch and the change from concrete lined ditch to riprap lined ditch. Straw bales treat surface runoff before reaching the ditch and stream.

Photo 2: Close up of rock check dam. Angular rock. Sediment has collected upstream.

Photo 3: Ditch between check dam and concrete lined ditch. Sediment removal and straw bale maintenance is needed. Two places the flow passes UNDER the bales and do not trap sediment.

Photo 4: Transition from concrete lined to riprap lined ditch. Note that in event the flow in the ditch should exceed design flows, the road slopes up from the ditch on one side and the rock cliff face would confine flows on the other side.

Photos 5, 6, and 7: Walking up the road showing the concrete lined section up to the inlet of the culvert proposed to be bypassed. See photo 16 for the actual inlet. General cleaning of rock debris is needed to maintain flow capacity in the ditch.

Photo 8: Bottom of photo is inlet to culvert C-22-24. The rocks need to be cleaned out to maintain design flow capacity. This entire triangular area between the road and cliff should be riprap lined to minimize the sediment being transported into the culvert. This would reduce the sediment load to be cleaned out at the culvert outfall. See photos 19, 20, and 21.

The inlet to the culvert to be bypassed can be seen in the concrete lined ditch, in the sunlight, at the upper end of the photo. There is concern that the shallowness of the concrete lined ditch and lower elevation of the ground could result in flows leaving the concrete lined ditch and flowing into C-22-24. The ground along the ditch needs to be built up to prevent this.

Photos 9, and 10: Note the deteriorated condition of the concrete apparently resulting from heavy truck wheel loads and subsequent water washing out fines. These need to be fixed along the ENTIRE ditch length to prevent further deterioration and loss of soil.

Photos 11, 12, 13, 14, and 15: These show the slope below the outfall of the culvert to be bypassed. The half-round culvert has not confined flows adequately and significant erosion has occurred along the entire length, especially on the lower end.

This is an ongoing problem as evidenced by the attempts along the culvert to revegitate the area. The horizontal logs combined with matting appear to have helped, however the problem is obviously not even controlled, much less solved. The volume of soil being lost is clear in photos 19, 20, and 21. The vertical logs have had no effect.

Photo 16: This is the inlet to the culvert which is proposed to be plugged. Note that is has already naturally plugged with debris, although maintenance would have prevented that.

Photos 17 and 18: These show the outlet of culvert C-22-24 and the resulting erosion channel down the slope. Note that the ground naturally armors from the flows and vegetation has taken hold adequately. There appears to be minimal but adequate topsoil to support vegetation.

Photos 19, 20, and 21: These show the sediment that has been trapped below the two culverts. The coarse material has stopped at the bottom or the slope with the finer materials being carried to the basin confined by straw bales. The basin needs to be cleaned out as it is completely full and the straw bales replaced. Given the separation of the fine particle size sediments, it appears their use to restore the cuts in the slope would be unsuccessful. They would be too easily eroded.

Photo 22: This is the outlet of culvert C-24-24. The fabric tube at the outfall has prevented erosion from greatly deepening the channel. However, this is an ongoing maintenance problem and is at risk to being ripped off during storm events. The Resident Agent indicates the tube is removed during winter to prevent freezing in the tube. Replacing the fabric tube with a metal culvert that extends down the slope to the same point where the fabric is now would greatly improve this situation. The channel below that point is less steep and has already self-armored.

Photos 23 and 24: These show culvert C-25-36 and the fabric tube at the outfall. As with C24-24, the fabric tube at the outfall has prevented erosion from greatly deepening the channel. However, this is an ongoing maintenance problem and is at risk to being ripped off during storm events. In addition, the tube support wires were once held by nearby trees. Now the trees have fallen and are pulling DOWN on the tube.

Replacing the fabric tube with a metal culvert that extends down the slope to the top of the fabric which has pulled loose (near the bottom of the photo) would greatly improve this situation. The channel below that point is less steep and has already self-armored.