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DIVISION OF OIL, GAS AND MINING

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October 3, 2001

TO: Internal File
THRU: Peter H. Hess, Sr. Reclamation Specialist, Team Lead *PHH*
FROM: Michael J. Suflita, Sr. Reclamation Specialist/Hydrologist *MJS*
RE: Highwall As-Built, West Ridge Resources, Inc., West Ridge Mine, C/007/041-DO00A-4

SUMMARY

As a result of a Division request, the Operator submitted As-Built drawings of the newly constructed minesite area. The purpose was to compare the As-Built conditions to those that were approved in the Mining and Reclamation Plan (MRP). The first submittal resulted in deficiencies and a second submittal was received by the Division on September 18, 2000. A second submittal was received on July 2, 2001. This was returned as an incomplete response and has since been updated. This Technical Memo is a review of primarily the Hydrologic aspects of the latest submittal and is not all-inclusive. There are NO deficiencies resulting from the review.

TECHNICAL ANALYSIS:

OPERATION PLAN

HYDROLOGIC INFORMATION

Regulatory Reference: 30 CFR Sec. 773.17, 774.13, 784.14, 784.16, 784.29, 817.41, 817.42, 817.43, 817.45, 817.49, 817.56, 817.57; R645-300-140, -300-141, -300-142, -300-143, -300-144, -300-145, -300-146, -300-147, -300-147, -300-148, -301-512, -301-514, -301-521, -301-531, -301-532, -301-533, -301-536, -301-542, -301-720, -301-731, -301-732, -301-733, -301-742, -301-743, -301-750, -301-761, -301-764.

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Analysis:

Based on the first Technical Analysis (TA), the Division expected to receive two maps relating to the as-built hydrology of the minesite. Instead, an entirely new Appendix 7-4, Westridge Mine Sedimentation and Drainage Control Plan was submitted. The Operator indicated there were so many changes that the whole appendix had to be redone. This TA review compared the original, approved, Appendix 7-4 to the new, as-built version. The new appendix was also reviewed on its own merits. All maps, design calculations, and as-built construction in the new submittal are certified by a Professional Engineer. It's worth noting that the text is clearly written, understandable, and explanations are easy to follow.

Diversions

Comparing the old and new Map 7-2, Mine Site Drainage Map, several changes were noted that appear necessary due to the revised configuration of the site. These configuration changes included changing the right fork of the site from five levels to four levels. The road configuration was changed accordingly. These changes appear to have little hydrologic impact.

- DC-8 was moved under the road to the coal storage pile.
- DD-4A and DC-4A were added.
- DC-5 designation was changed to DC-6 and DC-5 is now at a new location across the canyon.
- DD-8 goes around the base of the "nose" instead of above the lower road.
- UC-DD and UC-FF have different alignments. These culverts direct undisturbed drainage flows from the channel outside the site to the main culvert under the site. The three main culverts under the site follow the originally approved alignment. This is important to reclamation and was essential to retain.
- DD-11 goes directly to upper Cell A of the Sediment Pond instead of to DC-12 and into the lower Cell B.
- DD-8A was added between two roads.
- Snow storage sites were reduced from 18 to 15, but the overall site is smaller too.
- UD-15, which drains the county road, remains the same. The county road segment also remained the same near the site.
- The roads to the "nose" and to the portals are less steep, but are longer. There is a large added safety berm at the base of the highwall.

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All disturbed area diversions, ditches and culverts, have been designed to a 10-year, 24-hour design per the Division Position Paper. This exceeds the 10-year, 6-hour regulatory design, but is consistent with the 10-year, 24-hour design of the sediment pond and the ASCA areas. The design storm is an SCS Type II. The runoff curve numbers were decided using Division inputs. Nearly all runoff numbers remained the same with some increasing and one decreasing. This is important since the design runoff flows are sensitive to the runoff curve numbers.

Ditches, disturbed and undisturbed, have a minimum freeboard of 0.5 feet, which is at least 20% of the flow depth. This is good engineering design. All ditches having flows greater than 5 feet per second are concrete lined. The number of undisturbed drainage ditches was reduced from seven to two.

With one exception, the bypass culvert sizes remained the same. Culvert UC-HH was reduced from 3 feet to 2 feet. The design calculations appear appropriate and there is 10 feet of headwater available at the inlet, should that be needed.

Bypass Culvert	Old Design Flow (CFS)	New Design Flow (CFS)
UC-AA	45.5	45.5
UC-HH	28	25
UC-JJ	2.14	2.16
UC-DD	0.91	0.91
UC-MM	0.50	0.52
UC-FF	0.95	0.95

The three main bypass culvert lengths were reduced. These are the three legs of the "Y" formed by the left, right, and main channels. The reduction was from 5007.2 feet to 4329.2 feet, a reduction of 677.7 feet.

All undisturbed area culverts are equipped with ramped trash-racks to reduce culvert plugging. The trash-racks are 3/4-inch bars, 6 inches on center. Riprap extends to 6 inches above the elevation head required for the design flow. Although not a regulatory requirement, this is good design and will enhance performance and reduce maintenance. Culverts diverting undisturbed areas have all been designed using a 100-year, 6-hour storm that exceeds regulatory requirements.

ASCA-Z has been appropriately designed. This ASCA is directly below the lowest

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sediment pond. This was changed from the original design where flows did not leave the site to flows leaving the site. The disturbed and undisturbed drainages have been separated. Undisturbed drainages bypass the disturbed areas. The slope of the area was reversed and disturbed drainages are directed to a sediment trap before flows leave the site in an 18-inch culvert emptying at the main culvert riprap apron. Vegetation in the ASCA should reduce sediment runoff also.

Discharge structures

The riprap at the outlet of the main mine site culvert is appropriately designed. It remains the same as originally approved with a correctly designed filter bed below the riprap. The water exit velocity is 5 feet per second while the natural stream velocity is 10 feet per second. This should prevent any stream channel scouring.

Sedimentation Ponds

Comparing the old and new Map 7-4, Sediment Pond Plan and Profile, some changes were noted that appear necessary due to the revised configuration of the site. These changes appear to have little hydrologic impact. Other elements remained the same.

- DD-11 flows to DC-13 and into upper Cell A, instead of into DC-12 and lower Cell B.
- The roads are in basically the same location.
- Both cells of the sediment pond are very close to the original design. The cells do not cut into the hillside and are positioned right next to one-another as originally approved.

The disturbed area drainages flowing to the pond were all designed with the appropriate 10-year, 24-hour storm. The volume of flows reporting to the pond remained the same from the approved plan to the as-built plan. The sum of the runoff from the Disturbed Area, Undisturbed Area, Direct Precipitation, and 3-years of sediment is 7.051 acre-feet. The combined capacity of the two cells of the pond is 8.170 acre-feet, or about 16% greater than design calculations.

The Open-Channel Spillway between cells was designed to meet the appropriate 25-year, 6-hour storm. There is only about one foot of freeboard at that flow, but that would probably be adequate. The Principal and Emergency Spillways are designed to independently pass the required 25-year, 6-hour design event. This conservative design means either spillway could be plugged and the design flow would still flow out of the lower cell. Similar to the upper cell, the freeboard at that flow would be a little over one foot.

All culverts leading to both cells of the sediment pond were checked for capacity and appear to be adequate. In addition, the flows into and through the pond cells showed the

following: 1) Total inflow into the upper cell, Cell A, is 27.52 cfs. Total flow into the lower cell, Cell B, is 13.51 cfs. This means slightly more than two times the flow enters the upper cell and can flow out the Open-Channel Spillway. The upper cell has a 4.667 acre-feet volume while the lower cell has a 3.482 acre-feet volume. It's preferable that the greater volume flows to the larger (upper) cell. 2) The Open-Channel Spillway can pass the flows from the upper cell to the lower cell. That spillway can accommodate the 27.52 cfs with about 1 foot of freeboard. 3) The total inflow to the lower cell is 41.03 cfs (27.52 + 13.51) and the outflow from the lower cell is at least 48 cfs. The Principal and Emergency Spillways can function without the other to provide this capacity. This means there appears to be no restriction to flow through the multi-cell sediment pond and its associated inlet culverts, open spillway, and two outlet spillways.

One intent of the submittal was to compare the constructed highwalls to the one approved in the MRP. Hydrologically there are really no changes at the highwalls. The approved highwall was about 40 feet high while the constructed one is about 90 feet tall. Additionally, there is a safety bench at the base of the highwalls that was not in the original submittal. The drainage area remains the same and no added runoff would result.

Findings:

The submittal meets minimum regulatory requirements.

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:

In the originally approved MRP there was an Optional Reduction of Mineyard Extent. This option was exercised during construction and the As-Built yard is slightly less than originally approved. The reduced area quantified as a reduction of 0.06 acres on the C2 Form.

Diversions

Comparison of original Fig. 10 and new Fig. 12, Restored Channel Typical Sections,

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shows that the reclaimed main channel and the side channels remained essentially the same. Flow depth, freeboard, and velocity were checked. Reclaimed channels RC-GG and RC-KK have slightly reduced velocities of flow. All designs were and are based on the required 100-year, 6-hour storm.

Other Hydrologic aspects of the Reclamation Plan remained essentially the same. The sediment calculations are the same. The roughening and mulching reclamation method will still be used and result in less sediment than natural conditions. The series of silt fences used to minimize sediment contribution to the stream will still be used. That includes those at the lowest point in the stream at the southernmost end of the site.

Findings:

In its present form the submittal meets minimum regulatory requirements.

RECOMMENDATION:

The proposed amendment should be approved.