

0017

Norman H. Bangerter
GovernorDee C. Hansen
Executive DirectorDianne R. Nielson, Ph.D.
Division Director

State of Utah

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203
801-538-5340

September 1, 1988

TO: File

FROM: Rick Summers, Reclamation Hydrologist
Mike DeWeese, Reclamation HydrologistRE: Review of Proposed Aberdeen Mine Hydrologic Structures
(received August 9, 1988 Andalex Resources, Inc.,
Centennial Project, ACT/007/019, Carbon County, UtahSUMMARY

Discrepancies, inconsistencies, and conflicts still exist in the MRP. The review is considered to be in the very early stages and approval does not appear to be forthcoming in a time frame consistent with the operator's construction schedule. An effort needs to be made to thoroughly present a consistent, accurate, technically correct, and complete plan in order for the review to proceed. The Division's reviews to this point have largely been a task of editing the document. Due to the approaching close of the construction season and the need to grant approval for the installation of the hydrologic structures, the proposal has not been reviewed relative to reclamation plans and designs at this time. The following review cannot be considered to be a complete review of the proposal. The listed items are examples of problems encountered in the review that prohibit a thorough and complete technical review and analysis.

ANALYSISUMC 817.43 Hydrologic Balance: Diversions

Significant differences exist between peak flow values calculated by the Division and values submitted by the applicant. Further differences were discovered in flow depths and diversion channel velocities. Division calculations generally exhibited higher velocities and lower flow depths than submitted values.

Page 157 of the MRP states that flow velocities less than 6.5 feet per second are not erosive. Reference is made to UMC 784.22 for justification of this threshold value, although this section could not be found in the submitted MRP. Page 197 references erosion charts on page 176 for an explanation of allowable erosive velocities. However, page 176 contains a table presenting calculated velocities. The Division has determined the erosive velocity threshold to be lower than 6.5 feet per second. Values calculated by the Division and submitted by the applicant were therefore considered to produce erosive velocities in all diversions.

An adequate rip rap design should be included in the submittal for diversions UD2, UD4, UD5, and DD4. Diversions UD4 and UD5 have increasingly steep channel slopes in the reach extending approximately 150 feet upstream of the confluence with the natural stream channel. A separate riprap design should be calculated for these reaches to provide channel stability where channel slopes are exceedingly steep. Energy dissipators should be installed at the discharge points of UD4 and UD5 or justification provided for their absence. Plate 13 of the MRP shows riprap in UD4 and the emergency spillway drop structure, which discharges into UD4. Page 149 of the MRP states that the emergency spillway structure shall be riprapped "through the point of discharge and into the main channel." No other mention of riprap in UD4 could be found. Please include design calculations for riprap in the reach extending from the main stream channel approximately 150 feet upstream.

Section 2.20, page 162, contains an incorrect formula for Manning's equation. The numerator for the n-value portion should be 1.49 and not 1.0. The R value is incorrectly identified as the wetted perimeter times the area divided by the wetted perimeter. The R value is the hydraulic radius in feet.

Plate 8 of the MRP shows the proposed surface diversions and culvert system. This map is unclear as to the extent of the proposed surface diversions. For example, the lower boundaries of the drainage areas delineated in the map for UD4 and UD5 extend beyond the diversions. The drainage between CD-5 upstream to the road cross drain is unclear. Does this drainage flow to pond C via the cross drain or Pond E via CD-5 and CD-6?

The culvert analysis submitted in Appendix O and Chapter IV is not complete. The following items need to be addressed:

1. Peak flow values submitted for watersheds C1, C4, and C12 are lower than Division calculated values. Please correct.
2. The application does not contain a description of the method used to route the hydrographs. The description should include the methodology used in the computer program and all inputs and model assumptions. A copy of the software manual submitted under separate cover would greatly facilitate the review.
3. The application does not contain information on culvert sizes and a demonstration that the culverts are adequate to pass the calculated peak flows.
4. It appears as if the design peak flow values from the primary spillways of sediment ponds C and E were not included in the analysis for culverts C13 and C15. These flows must be considered in the culvert designs.
5. The asterisked peak flow values in Appendix O for culverts C9, C11, C13, and C15 are in error. The peak flow is greater than this value (usually occurring at approximately hour 12.1).
6. The peak flow values presented in Table IV-4 do not correspond with values presented in Appendix O.
7. Using Mannings equation and the peak flow value presented in Table IV-4, the Division calculated an exit velocity for culvert C15 substantially (approximately 2 times) greater than the value presented in Table IV-4.
8. The information presented in Table IV-3B is incorrect. The capacity with a HW/D of 1.0 for 18 and 24 inch culverts is 6 and 12 cfs respectively (FHWA HEC 5 nomograph). The table presents peaks in excess of 20 cfs for these areas. It appears as if these peaks are also incorrect (excessive).
9. Table IV-3B depicts culvert CD-5 as 2.0 ft., whereas Plate 8 depicts the culvert as 18 inches. Plate 13 depicts a culvert (18 inch) discharging into sediment pond E. Plate 8 shows culvert CD-7 as a 24 inch culvert. Please correct and clarify this situation.

UMC 817.46 Hydrologic Balance: Sedimentation Ponds

Section 2.6, page 142 presents calculations of the sedimentation pond capacity. These calculations use a disturbed area of 11.82 acres while on page 145 the first paragraph states that the disturbed area is 6.40 acres. These calculations also use an incorrect value for the 60% sediment storage cleaning elevation. Please correct and clarify these discrepancies.

On page 145 of the MRP the applicant states the emergency spillway will be a drop chute structure constructed of 12 inch M.D. grouted riprap. The Division assumes this to be the D50 diameter of the riprap material and the application should be specific on this statement. Figure IV-5 on page 181 shows the dimensions of the emergency spillway and drop structure. This figure shows a bottom width of four feet at the spillway crest and in the exit channel. The following page (figure IV-6 on page 182) presents a cross section of the emergency spillway with a bottom width of five feet. The design procedure referenced on page 181 of the MRP requires a bottom width of eight feet for this type of structure. Please submit a corrected emergency spillway design.

Plate 13 depicts the emergency spillway exit channel discharging into diversion UD4. A separate riprap design should be determined for the diversion channel reach extending from the emergency spillway discharge point to the confluence of the main stream channel. The design flow for this reach should include the spillway discharge and the diversion discharge.

The following conflicting items concerning the sedimentation pond design must also be addressed:

1. Plate 13 depicts the maximum water level at 6960 which is the same as the inlet to the primary spillway. The maximum water level will be greater than this due to the head required to pass the design peak.
2. Plate 13 does not depict the elevation of the 60% cleanout level for sediment removal as discussed on p. 135 and 145. The plate depicts a maximum sediment level. This should be relabeled or corrected.

3. Section 2.3 states that primary spillways will be constructed 2 ft. from the top and emergency spillways 1.5 ft. from the top. This conflicts with plate 13 and page 149.
4. Page 145 and 136 conflict relative to inlet protection (6 inch riprap vs. grouted riprap or culverts).
5. The number of anti-seep collars discussed in section 2.6-2 should be specified. These collars should increase the flow path at least 10% along the pipe.
6. Plate 16 depicts postmining hydrology. Page 145 states a check dam will be in place as shown on this plate 16. Will this check dam be installed during the operational phase? The location of energy dissipators should be included on Plate 13.
7. Calculations demonstrating the capacity of the primary spillway are incorrect. The primary spillway will operate under orifice flow conditions at the design flow. Please submit.
8. Section 2.19-1 states the runoff from the office area will not report to a sedimentation pond. This conflicts with other information presented in the plan (i.e. Plate 8).

Recommendations

The submitted MRP does not meet the general requirements of UMC 771.23 (b). Further technical analysis of the proposed surface facilities cannot be conducted until the above referenced deficiencies are corrected and clarified. The Division recommends postponing any final decisions until a complete technical analysis has been conducted.

c1
cc: B Team
WPOB62/8-12