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DIVISION OF OIL, GAS AND MINING

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TO: Daron Haddock, Permit Supervisor

FROM: Rick P. Summers, Senior Hydrologist

RE: Comments on TDN #X-91-02-244-9 and TDL #91-02-244-6 (received November 22, 1991), Skyline Mine, Utah Fuel Co., ACT/007/005, Folder #2, Carbon County, Utah

SUMMARY

This memo provides notes and comments relative to the issues cited above. The mine pond spillway system and the diversion of undisturbed drainage from the refuse pile at the waste rock disposal site in Scofield are addressed. In summary, the Division has been aware of the spillway situation since the adoption of the new rules helped clarify the interpretation of the wording "combination of principal and emergency spillways" contained in 817.46. The Division was in the process of a complete technical analysis of the spillway system at the mine pond during the time of the oversight inspection. The refuse diversion was addressed and reviewed during the last permit renewal and it was determined that the drainage that would report to a refuse diversion would be minimal. The following discussion itemizes the conditions surrounding these permitting issues.

Mine Site Sedimentation Pond Spillway System.

To understand the current problems associated with the requirement that an impoundment must have a combination of principal and emergency spillways, one must examine the evolution of the requisite rules and the regulatory authorities' (both DOGM and OSM) interpretation of those rules. First, the previous rule used to review and permit the majority of the impoundments in the State was UMC 817.46 (i). That rule reads (with emphasis added):

> "(i) An **appropriate combination of principal and emergency spillways shall be provided** to discharge safely the runoff from a 25-year, 24-hour precipitation event, or larger event specified by the Division, plus any inflow from the underground mine. The elevation of the crest of the emergency spillway shall be a minimum of 1.0 foot above the crest of the principal spillway. Emergency spillway grades and allowable velocities shall be approved by the Division."

Based upon the interpretation of that rule at that time, the permit reviewer had some latitude in the permitting of ponds with a single spillway. The pond could be approved if the reviewer determined that a single spillway was **appropriate**, further the rule could be interpreted that the term "combination of principal and emergency spillways" meant a single spillway with the functions of a primary and emergency spillway combined as long as the discharge criteria (25 yr. - 24 hr.) was met.

This was a common interpretation for both DOGM and OSM as evidenced by the large numbers of ponds with a single spillway permitted by OSM during that period (1983-1984) and the final review and approval of DOGM permits with those types of ponds. Also, it seems that the two spillway question was never an oversight inspection issue until the new rule adoption. I still think that this interpretation of the rule is not a gross error when the rule is read as is. The term "appropriate" must have had some intent to allow a decision of the appropriateness of the spillway system for the pond, or it would not have been included and the rule would have simply mandated the use of separate principal and emergency spillways.

However, with the adoption of the R614-Coal Mining Rules on April 12, 1990, the rule was rewritten and had language added that clarified the rule's intent. Rule R614-301-742.223 essentially dropped the word "**appropriate**" and added two (2) subsections:

742.223 "....Such ponds may use a single spillway if the spillway is:

742.223.1 An open channel of nonerodible construction and capable of maintaining sustained flows: and

742.223.2 Not earth- or grass-lined."

With the addition of the single spillway criteria language, the interpretation of the rule becomes obvious to mean separate principal and emergency spillways. 20-20 hindsight.

In a gross sense, the question could be whether the lack of two spillways was a performance standard violation during the entire period that the "old" rules (817.46) were in effect or, is this a permitting revision required due to the adoption of the "new" rules? If so, it would be more appropriately handled during the next major permit action (mid-term or renewal) as outlined in OSM Directive REG-29 (4)(b).

Rather than belabor the interpretation of the "old" 817.46 rule, the Division

elected to proceed with upgrading the existing spillways in the State to comply with the new rule. Further, rather than waiting until the next review for the permit (REG-29), we acted diligently by proceeding to contact operators and request modifications to upgrade the ponds to achieve compliance with R614-301-742.223. The Division has always felt that the use of two spillways (one an open channel) is generally, technically and prudently, the preferred design alternative for any impoundment; however, retrofitting a designed and constructed pond with this system may always not be desired. Such was the case with the Skyline Mine sediment pond.

The pond at the mine is essentially an incised pond within the large mine pad fill. The pond is separated from the receiving stream (Eccles Creek) by a State highway making the use of an open channel emergency spillway impractical. The existing spillway is designed for a **100 year - 24 hour precipitation** event. This design event is far more conservative than the currently required 25 yr. -6 hr. event. In fact, this design event is **2.7 times larger** than the current design event criteria requires (74.3 cfs vs. 26.84 cfs).

Concerns about spillway clogging and failure have been minimized with the use of a spillway skimmer and trash racks on and off the mine site property. Further, the current rule allows the use of two conduit spillways which could foreseeably both clog and fail during a large event. If spillway clogging and failure were the only reason to have an emergency spillway, the rules should require an open channel emergency spillway for all ponds. Therefore, the functions of an emergency spillway (passage of extreme or emergency events and protection of an embankment due to primary spillway failure) are reasonably well addressed in the current pond design.

Further, the mine site sedimentation pond is used for treatment of a constant mine water discharge and surface runoff. The operative pond function at Skyline's pond is to provide a detention time for the inflow rather than attempt total containment of the flows as is the case for the majority of Utah ponds. Pond hydraulic theory dictates that the detention time (or treatment time) will be decreased if the spillway design allows the inflow water to discharge too rapidly from the pond.

The detention time is defined as the centroid of the inflow and outflow hydrographs. As the controlling variable in a pond design, the outflow hydrograph can be adjusted by downsizing the spillway to maximize the outflow time. In otherwords, the pond is designed with as small a spillway as possible to spill the outflow as slowly as possible while maintaining capacity for the extreme event.

In addressing compliance with Rule 742.223 at this pond, it was noted that the

installation of a emergency spillway **could possibly** impair and decrease the treatment performance of the pond or sacrifice freeboard for the spillway system. The operator was informed of this potential and was asked to quantify the effects of the addition of an emergency riser-type spillway (letter to Utah Fuel Co. from D. Haddock, October 9, 1991). The concern was that freeboard requirements could possibly dictate that the spillway be installed at or near the elevation of the current spillway. If this were the case, the two spillways in combination would spill inflow water at a faster rate and would decrease the detention time and potentially impair pond performance.

The level of the suspected decrease in pond performance is not quantified at this time. Because the oversight inspection occurred during the process of this analysis, the modeling of the pond and confirmation of this concern have not been completed and further comment cannot be offered. The operator had retained a consultant to model the effects of the installation of an emergency spillway (Earthfax Engineering, Inc., Salt Lake City, Utah). I have been consulting with that company on the needs of the model and I feel the Division was proceeding diligently with the pond and a solution.

The other option would be to sacrifice some pond freeboard and install the emergency riser. The magnitude and consequences of this sacrifice have again not been quantified at this time. However, at extreme events, the water elevation in the pond would eventually increase and spill through this spillway. At that elevation the new spillway would become operational and the pond treatment function could be decreased for those large events.

The outcome of this situation is a mute point at this time. The oversight process has necessitated an expedient solution to this pond system in order to meet the time frames of the ten-day-letter process. The operator has elected to solve the situation by installing a perfunctory emergency spillway to satisfy the requirements of R614-301-742.223. An emergency spillway consisting of a 12 inch CMP culvert will be installed near the inflow point for the mine water discharge at the northwest corner of the pond. The culvert will simply discharge some overflow from an **extreme** (larger than the 100 yr. - 24 hr.) precipitation event to an existing bypass culvert access hole ("manhole"). This existing bypass culvert routes undisturbed upstream drainage beneath the mine pad and discharges to Eccles Creek.

No design criteria are necessary for the spillway as the design event criteria are more than adequately met with the existing spillway. In fact, the question of the culvert size was how small a pipe could we install to maximize primary spillway freeboard while maintaining some dignified concept of the purpose and term "emergency spillway". Approval

was granted to install the spillway on November 26, 1990 with the condition that as-built drawings and descriptions of the spillway are submitted to the Division along with appropriately updated facility maps. It is anticipated that the spillway will be installed before the response to the TDL is received by the AFO.

Again, the oversight process has necessitated an expedient solution to this pond system in order to meet the time frames of the ten-day-letter process. Further, there is a question that the Division may not have the authority to grant a variance from the rule regardless of the outcome of the pond modeling and technical merits of the situation. The installation of the emergency spillway has resulted in the primary spillway freeboard for the pond being reduced. The pond provided 3.15 feet of primary spillway freeboard before the TDL issue and 1.6 feet after the installation of the emergency spillway. Granted, the total freeboard for the pond remains unchanged, but the inclusion of the emergency spillway means some extreme event discharge will occur from the emergency spillway with significantly reduced treatment time.

Waste Rock Disposal Area Diversion

The requirement to provide a diversion to route drainage from a refuse pile (R614-301-746.212) was addressed in the last permit review. This rule essentially requires drainage from areas above the refuse and areas from the surface of the pile be diverted into stabilized diversion channels (100 yr. - 24 hr.). The waste rock disposal site is in an abandoned mine pit. The original approval called for diversion of the major intermittent channel around the disposal area. This drainage area is approximately 284 acres and the runoff is diverted from the site via diversions DU-5, UDD-2 and swale SW-10 (30.3 cfs). See Volume 5, Engineering Calculations, for design information for these structures. These structures route the majority of the undisturbed drainage from the disposal site. This undisturbed drainage is adequately permitted and is functioning in the field.

In addition to the major drainage, an extremely small undisturbed slope above the disposal pit is contributory to the surface of the pile. I assume this is the drainage of issue in the TDN. Because the information regarding the size and hydrology calculations for this area is found in section 15 of Volume 5 under the section heading "Waste Rock Disposal Pond", the drainage plan and significance of this area may not have been apparent during the inspection. However, to review the Division's permitting of this area the following is offered:

1. Section 15, Vol. 5, of the MRP states the area of the undisturbed slope contributing to the pile is 1.57 acres.

This size of area could only be considered minor within the scope of the project area.

2. That section shows the total runoff volume from this area to be 0.066 Ac.-ft for the 10 yr. - 24 hr. precipitation event (very low). In fact the 25 yr. -24 hr. runoff volume was used to design treatment measures for the drainage.

3. Division calculations demonstrate the peak discharge from the area for the 100 yr. - 6 hr. event is appx. 0.26 cfs. A diversion for this event for the area would only need to be a triangular ditch with a **depth of 3.1 inches**. This is minor to inconsequential flow.

4. The site was permitted with a catch basin that is designed to collect and contain the entire 25 yr. - 24 hr. precipitation event for treatment.

5. The runoff from the pile surface was to be diverted to the catch basin with grading and diversion in DD-16. Here exists a permit discrepancy. The language in the permit text (section 3.2.8, page 3-52) states: "Drainage onto the floor of the pit is directed to a pre-existing sump at the east end of the abandoned strip pit (Map 4.16.1-1B)". This map depicts drainage controls that are both in place and planned for reclamation. Diversion D-16 is depicted to route pile drainage to the pit. However, the plate is labeled "Reclamation Plan" and (as a permitting oversight) it should be clarified as to the drainage plan for the operational phase. The language leads one to believe the drainage from the pile is accounted for, but the cited map conflicts the text. I believe efforts to consolidate maps resulted in this discrepancy.

However, the issue is again a mute point. I feel the Division acted technically sound and prudently in not requiring such a minimal (3 ") diversion be installed for the diversion of undisturbed drainage. An oversight in the permit editing resulted in confusion about the pile surface drainage and diversion D-16 but regardless, diversion D-16 was not installed at the site during the time of the inspection.

However, to demonstrate compliance with 746.212, the operator has proposed to install a diversion at the east side of the pile to accommodate the required flows. In fact, the construction of the diversion began during the course of the oversight inspection (phone conversation w/ K. Zobel, 11/26/91). This diversion is constructed at the junction of the refuse and the undisturbed lands and will result in commingling of runoff from the surface of the refuse pile and the undisturbed area as allowed by R614-301-746.212. The operator stated that the diversion will be complete early this week (12/1/91). Preliminary size criteria were discussed on the phone and it was determined that a diversion with an approximate 1.5 ft. bottom width and 1.0 foot depth would be significantly oversized to handle the required events. Designs, including as-builts and 100 year - 6 hour event hydrograph information are being prepared and will be submitted to the Division during the week of 12/1/91.

cc: L. Braxton
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