Norman H. Bangerter
Governor
Dee C. Hansen
Executive Director
Dianne R. Nielson, Ph.D.
Division Director

State of Utah

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203
801-538-5340

0038

October 9, 1991

TO: Daron Haddock, Permit Supervisor

FROM: Rick P. Summers, Senior Hydrologist

RE: Review Emergency Spillway Amendment (received July 22, 1991), U. S. Fuel Company, Skyline Mine, ACT/007/005, Folder #2, Carbon County, Utah

PROPOSAL AND ANALYSIS

Loadout Area Sedimentation Pond Emergency Spillway:

The above referenced proposal consists of a request to install an emergency spillway at the sedimentation pond located at the loadout facilities. The emergency spillway is necessary in order to meet the requirements of R614-301-742.223. The proposed spillway is an open channel design. The primary spillway currently in use at the site (drop inlet type) is currently designed to pass the 25 yr - 24 hr. precipitation event. The emergency spillway, therefore will only function during an event larger than that required by the regulations. The spillway system at this pond will then be conservative with respect to passage of the design flow.

The proposed design is to construct a 10 ft. wide open channel emergency spillway across the existing embankment with a design capacity for the 25 yr. - 6 hr. precipitation event. The existing spillway is designed to pass the flow for the 10 yr. -24 hr. event at an elevation below the crest of the proposed emergency spillway.

The proposed designs are adequate for the spillway across the crest of the embankment. However, the design for the outslope portion of the spillway is incorrect. The velocity calculation used in the design is based upon the continuity equation. The area factor in the equation appears to be in error. The proposal used the planimetric area of the spillway for this factor. This area is to be the cross-sectional area of the flow (i.e. appx. 10' x .4' rather than 10' x 15'). For example, if we assume a 2:1 outslope, a Q = 5.26 cfs, the cross-sectional area of flow will be approximately 0.44 ft2. This results in a velocity on the order of 11 fps. This velocity will required riprap protection. The determination of spillway velocity and riprap sizing criteria is best done using permissible velocity methods (Barfield and Haan) or open channel flow theory. The Division requests that the operator resubmit the application with the following information:

1. Designs for riprap protection for the emergency spillway down the outslope of the embankment.

2. A revised stage-discharge curve depicting the flow characteristics for the spillway system that incorporates both the drop inlet and emergency open channel spillways.

Mine Facilities Area Sedimentation Pond Variance:

Also included in the proposal is a request for a variance from the requirements of R614-301-742.223 (combination of principal and emergency spillways) for the sedimentation pond at the minesite facilities area. The request is based upon the following information:

1. The pond is essentially incised in nature with the current spillway discharging directly into an undisturbed bypass culvert running the length of the mine site pad.

2. The current drop inlet spillway has been designed to pass safely the 100 yr. - 24 hr. precipitation event. Current rules only require a spillway design flow for the 25 yr. - 6 hr. precipitation event. The current spillway is over designed with respect to passage of the hydrograph peak flow.

3. The installation of an open channel-type emergency spillway is impractical based upon the site configuration. The location of the state highway adjacent to the site would necessitate the installation of a culvert to direct the flow under the highway and ultimately to Eccles Creek.

4. Protection measures installed at the site minimize the risk of undisturbed watershed debris passing to the disturbed area and pond and therefore, the risk of the debris clogging the spillway is minimized.

5. The installation of an additional drop inlet discharging to the bypass culvert was considered, however, the practical logistics of installing the spillway would necessitate an alternative plan to handle mine water and storm water runoff discharge. Approximately 300,000 gpd of minewater discharge is currently treated in the sedimentation pond

(constant discharge). The installation would require complete decanting of the pond, allowing the pond to dry and dredging the pond bottom to expose the bypass culvert. The practicality of this installation and the potential increased risk to the stream environment during the installation may outweigh the benefits of the second spillway installation.

6. The current spillway is equipped with an skimmer device that further reduces the risk of failure due to debris clogging. Experience with the pond to date (approximately 10 years) indicates that debris from the minesite property is not a concern.

7. Foremost, the installation of an additional spillway would probably result in **decreased** pond performance. Pond theory dictates that a large spillway reduces detention time for the runoff treatment by spilling the water rapidly. This results in a outflow hydrograph with a shorter time duration, higher peak, and shorter lag time. This moves the centroid of the hydrograph closer (timewise) toward the centroid of the inflow hydrograph and results in a decreased detention time and potential decreased pond performance.

   The installation of a second spillway could be done by excavating the pond and installing an additional riser that connects directly to the site culvert bypass. However, current freeboard available at the pond would not allow the riser (emergency spillway) to be installed at an elevation above the current spillway elevation without sacrificing pond freeboard and head available to pass the required event.

   Therefore, the emergency spillway installation could be at the same elevation as the current pond spillway. This would compound the detention time problem discussed previously by essentially spilling the water at a faster rate than currently exists with the single spillway. This reduction in detention time and related pond performance deterioration is not quantified at this time.

Therefore, the operator is requested to quantify the reduction in pond performance and include this factor in the request for the variance. The variance is not approvable at this time.

SUMMARY

The proposal is not approvable at this time. The operator should revise the submittal to incorporate the above noted deficiencies so review can proceed.

cc: L. Braxton, DOGM
P. Burton, DOGM
S. Demczak, PFO
S. Falvey, DOGM
SKYSPILL.RS