STATE OF UTAH
NATURAL RESOURCES
Oil, Gas & Mining

007/006 #2

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

355 W. North Temple • 3 Triad Center • Suite 350 • Salt Lake City, UT 84180-1203 • 801-538-5340

September 15, 1987

TO: John Whitehead, Permit Supervisor

FROM: Tom Munson, Reclamation Hydrologist TM

RE: Final Reclamation and Channel Restoration for Star Point Mine, Plateau Mining Company, Star Point Mine, ACT/007/006, Folder #2, Carbon County, Utah

Introduction

Plateau was requested to submit for inclusion into the MRP, designs, calculations, profiles, cross sections, and drawings to detail final reclamation and channel restoration measures, including restoration or enhancement of riparian vegetation. This was to include post-mining drainage patterns, and water monitoring locations.

Plateau has recently submitted information regarding the applicability of the Division's 100-year, 24-hour Type II rainfall distribution to design reclaimed channels. They propose to use the Farmer-Fletcher second quartile storm distribution because it predicts peak flows greater than those developed by the GBEA 24-hour storm distribution or the SCS 6-hour distribution, and is thereby conservative, and (2) it is a distribution developed for mountainous areas in Utah and therefore, more reasonably fits the storm distribution patterns experienced in the Price area. Plateau also feels that the Farmer-Fletcher second quartile storm distribution is not only most applicable to the design of appropriate runoff facilities, but also produces more reasonable results when compared to the extreme SCS 24-hour distribution developed out of state.

Discussion

It is my opinion that the use of the 6-hour distribution is only part of the problem we have encountered during the review of design storms and peak flow. The rainfall distribution ascertained from the data collected at the Great Basin Experimental Area is, by all indications, accurate, and is the closest yet to defining storm rainfall distributions for the Wasatch Plateau. Unfortunately, many

other factors are involved in deriving peak flow designs for reclaimed channels. It is also unfortunate that these other factors are not well defined and documented for the Wasatch Plateau. To list a few of these factors, the following comes to mind:

1. Curve number methodology.
2. Short duration, high intensity thunderstorms and their role regarding infiltration and runoff.
3. Lack of rainfall - runoff relationships to document the accuracy of the curve number peak flow predictions.

There are probably many more unknowns and estimations which exist that are being incorporated into current reclaimed channel design because of no better reason than it is "accepted design methodology". The Division has somewhat blindly accepted the use of the SCS Type II rainfall distribution and the 100-year, 24-hour rainfall criteria based on regulatory requirements. To date, very few structures have failed because of underdesign but probably more because of poor design implementation in the field. For reasons of conservancy, a margin of safety which is acceptable to the Division has been inherent in the use of the 100-year, 24-hour rainfall and SCS Type II rainfall distribution.

The Division hydrologists feel uncertain at this point in time that the peak flows generated by the Farmer-Fletcher second quartile storm distribution are representative of actual peak flows. A major uncertainty in peak flow estimation is the lack of rainfall-runoff relationships site specific to Plateau's mine site and the Wasatch Plateau as a whole.

The current U.S. Department of Commerce's NOAA Atlas 2 data base was developed using many non-recording precipitation gages. The data represented in the current NOAA 2 is the amount of precipitation that falls in 24 hours. This precipitation may or may not have come from one or more storms. Furthermore, most of the 6-hour storm data was generated from regression techniques derived from 24-hour precipitation data. Since most of the NOAA data was based on a time period and not a design storm, then it may be more appropriate to apply the 24-hour rainfall amount to the six hour distribution, resulting in higher peak flows.

Recommendations

If a study was implemented with the help of Plateau to better define rainfall-runoff relationships, then we could hopefully feel more confident in our design of structures using lower peak flows. It is almost certain that storm distributions are only a portion of the overall estimation of peak flows and actual rainfall-runoff relationships need to be developed to better define the watershed systems we are dealing with.

If Plateau was allowed to implement a study which would hopefully address the issues discussed previously, then they could collect rainfall and runoff data to substantiate their claims over the next 10 to 20 years. A revised reclamation plan could then be submitted after this study was concluded, prior to closure of the mine, based on assessment of the data collected during the study.

It is the Division's current stance that Plateau be required to design their reclamation structures using the 100-year, 24-hour storm criteria. Then, Plateau could pursue the "Experimental Practices" avenue of the regulations, UMC 785.13, to study the rainfall-runoff relationships at the Star Point Mine, leaving the regulatory avenue open for change of design peak flows at the end of their study period.

It is also my opinion that Plateau should help with the study by supplying time and money to help operate the instruments once the study is initiated. A target date of Spring 1988 would be appropriate for initiation of the study. This winter would be used to organize and formulate an appropriate study plan. Funding could possibly be obtained through the Western Technical Service Center branch of the Office of Surface Mining. Recording rainfall gages and other equipment may be available through this branch of OSM.

djh
9486R/14-16