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Subject: Comments concerning "Draft Staff Technical Position - Design of Erosion Protection Covers for Stabilization of Uranium Mill Tailings Sites"

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To Whom It May Concern:

EarthFax Engineering, Inc. was pleased to receive and review the August 1989 "Draft Staff Technical Position - Design of Erosion Protection Covers for Stabilization of Uranium Mill Tailings Sites". In general, we found that the document is well written and recommends appropriate technical methods.

With regard to Section 2.2.1 ("Selection of Design Flood and Precipitation Event"), we recommend that a discussion be provided not only on the return period of the precipitation event but also on the storm distribution used as input into the flow model to derive the hydrograph. It has been the experience of EarthFax that the selected storm distribution can significantly affect the computed peak flow.

Although perhaps not equally applicable to the entire United States, this concern for selection of an appropriate storm distribution is based primarily on our experience in the Colorado River and Great Basin drainages (i.e., that area covered by the report prepared by Hansen et al., 1977).

It is recognized that Hansen et al. (1977) recommend that the PMP be distributed through time such that the peak hour of rainfall occurs near the middle of the storm. However, this recommendation was based on two publications (U.S. Weather Bureau [1947] and U.S. Army Corps of Engineers [1952]) that do not apply to the Colorado River and Great Divide drainages. The U.S. Army Corps of Engineers (1952) cautions that their publication is valid only for the eastern United States (east of the 105th meridian) while the mass curve derived by the U.S. Weather Bureau (1947) is based on data obtained from eastern Ohio where meteorologic conditions are significantly different than those found in the geographic area covered by Hansen et al. (1977). Hence, neither of these curves is appropriate for use in the western U.S.

Several investigators have indicated that, in much of the Colorado River and Great Basin drainages as well as elsewhere in the southwestern United States, large thunderstorms (the PMP being the

ultimate example) are typified by a major percentage of the total rainfall occurring at the beginning of the storm (i.e., during a small portion of the total storm duration). Frederick et al. (1981), in a study of precipitation in the western United States, indicated that the major portion of a 6-hour precipitation event in the southwest begins in the first hour of the event. Furthermore, even though they recommended otherwise later in their report, Hansen et al. (1977) similarly concluded that "a large portion of the total storm should occur in the first hour and almost all within 3 hours" of the beginning of a 6-hour PMP in the Colorado River and Great Basin drainages.

Little information is available on actual storm distributions in the western United States. Keppel (1963) studied a high-intensity event in eastern New Mexico and found that 89 percent of the total storm rainfall occurred within the first 25 percent of the storm duration. Renard (1970) and Renard and Simanton (1975) presented depth-duration data for three individual storms in eastern New Mexico and southeastern Arizona that showed similar mass-curve patterns (greatest depths at the onset of the storm). Farmer and Fletcher (1972) examined mass curves from several storms in central, eastern, and southern Utah and similarly found the majority of total storm precipitation in their region of investigation occurs within the initial stages of a storm.

While it is recognized that the approach normally recommended by NRC (use of a storm distribution with the peak intensity near the middle of the storm) will result in the maximum peak flow, this scenario is not considered necessary. A worst-case storm depth has already been assumed in choosing the PMP. To compound the safety factor by also requiring a worst-case storm distribution is not considered prudent engineering design.

The fact that the regulations permit selection of a 200-year design where the 1000-year design is not feasible indicates that the intent of the regulations is to base the design on engineering prudence. We recommend, therefore, that the storm distribution issue again be considered, either in this staff technical position or elsewhere.

We appreciate the opportunity to provide these comments. Please contact us if you have any questions.

Sincerely,

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