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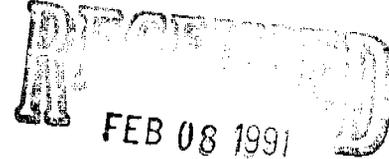
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ELECTRIC OPERATIONS GROUP

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February 6, 1991

Mrs. Pam Grubaugh-Littig
Permit Supervisor
Division of Oil, Gas, and Mining
355 West North Temple
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Salt Lake City, Utah 84180-1203



Re: Escarpment Study Geotechnical Update

OIL, GAS & MINING

Dear Escarpment Study Steering Committee:

This memo is to up-date individuals on the steering committee of the Cottonwood Mine South Lease Escarpment Study on current geotechnical aspects of the project. The following is an overview of 2-dimensional modeling performed by both the University of Utah (U. of U.) and United States Bureau of Mines (USBM), an update on the progress of the University of Utah and United States Bureau of Mines on 3-dimensional modeling, and Rilda Canyon's Escarpment Study geotechnical baseline data which was distributed to the U. of U. and USBM.

OVERVIEW OF THE 2-DIMENSIONAL MODELING BY USBM AND U. OF U.

The University of Utah and United States Bureau of Mine 2-dimensional methods were used to analyze the escarpment but are limited to individual cross-sections perpendicular to the Castlegate Sandstone Escarpment. The cross-sections limit the modeling to only finite locations along the escarpment. The information provided by the 2-dimensional models are the stress (tensile and compressive), rock strain, and displacements induced within the distinct rock mass from the mining of longwall panels.

PacifiCorp Electric Operations, University of Utah, and United States Bureau of Mines analyzed the information from the 2-dimensional models and felt 3-dimensional models may be more representative of the South Lease area, especially with the varying escarpment and surface topography. The 3-dimensional Finite Element Analysis may provide the ability to model varying surface topography and rock mass formations of the entire South Lease area along with the extraction of the successive longwall panels. With the University of Utah and United States Bureau of Mines both utilizing 3-dimensional methods, the results may be compared to identify where fine tuning of the models maybe needed. This ability to compare models may help to develop a very accurate, representative simulation of South Lease escarpment subsidence.

Mrs. Pam Grubaugh-Littig
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ESCARPMENT STUDY UPDATE - GEOTECHNICAL PORTION

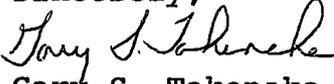
The University of Utah has completed a report on rock properties testing of East Mountain overburden core. The core was acquired from PacifiCorp Electric Operation's East Mountain exploration drilling. The University of Utah has once again commenced research on the Finite Element 3-Dimensional Analysis beginning January, 1991. The University of Utah has a preliminary 3-dimensional mesh developed and will continue developing and fine tuning the 3-dimensional model.

The USBM has completed their training on the DENA 3-Dimensional Finite Element Analysis and Finite Element Graphics System (FEGS). The USBM has commenced preliminary modeling on FEGS so a mesh can be developed. As of late, the USBM has encountered communication problems between the DENA and FEGS computer programs, and are in the process of getting the problem resolved.

RILDA CANYON ESCARPMENT STUDY'S BASELINE DATA

The baseline data for a Rilda Canyon Escarpment Study has been distributed to the U. of U. and USBM. Enclosed is a copy of the baseline data for your files.

If there are any questions, please contact me.

Sincerely,

Gary S. Takenaka
Senior Mining Engineer

GT

Enclosures:
Rilda Canyon Escarpment Study's Baseline Data