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MAY 22 1980

W. L. ROGERS

May 10, 1980

Mr. Bruce Gallaher  
Water Pollution Control Section  
New Mexico Environmental Improvement Division  
P. O. Box 968  
Santa Fe, NM 87503

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EID: WATER  
POLLUTION CONTROL

Dear Bruce:

I have reviewed the two letters from Bill Rogers of Gulf Mineral Resources to James Mackin, dated April 17 and April 22, 1980. I have also studied the report by Langmuir submitted to W. A. Wahler and Associates, data August 16, 1979. My comments follow:

1. I have no comments on the letter to Mackin, dated April 17, 1980.
2. Regarding the discussion of a possible breach in the evaporation pond dam, contained in the letter to Mackin of April 22, I feel that the analysis of the movement and chemical changes in the fluid is quite weak. There are very few data supplied from which we can draw conclusions regarding the consequences of such a break. I am concerned, for example, about the possibility that the alluvium in San Lucas Canyon may eventually become saturated with flow from the mine. If this is the case, a spill from the evaporation pond might have greater significance than if the alluvium is not already saturated.

Similarly, it is not valid to assume that the alluvium along the path of fluids from such a spill will exert any cleansing capacity on the raffinate; Langmuir did not study such materials in his work for Gulf.

Gulf seems to be relying on the effects of unsaturated alluvium and possible dilution of the raffinate from such a spill. I hope that they can quantify their arguments a bit more in the hearing.

3. I am hard-pressed to evaluate the significance of Langmuir's work in the context of possible contamination of groundwater by the fluids from the Gulf tailings system. Langmuir certainly showed that neutralization and precipitation of some components will occur if the raffinate percolates through the strata beneath the site. However, he also showed that the TDS will probably increase in the percolating fluid. His work also demonstrated that the neutralizing capacity of the Gallup Sandstone is much less than reported earlier

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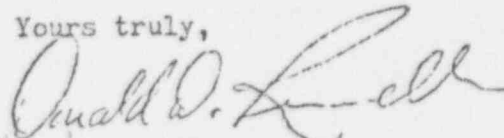
in the Gulf Plan. It is not clear to me how these observations are to be used. Langmuir mentions several times in his report that he was under a severe time limitation, and it is fairly obvious that he was not able to go back and repeat the experiments with better choices of core length, rate of flow, concentrations of ions, etc. He did a good job under the circumstances.

It is puzzling to see the results of the chemical experiments presented in the Plan, with no incorporation of the results into an overall model for movement of the fluid and its contained species. Other than the empirical observations regarding neutralization and precipitation, the Plan does not use the experimental data to predict the movement (or lack of movement) of the dissolved materials.

Finally, I am troubled by the fact that uranium was not included in the list of components measured in the fluid after reaction with the rocks. Uranium may move quite differently than some of the components that were determined. Even more surprising is the fact that dissolved thorium is not mentioned anywhere in Langmuir's report, including the analyses of fresh raffinate. This should be addressed during the hearing.

I continue to generally support the Gulf Plan. From the geochemical point of view, both the site and the method of disposal seem very sound. The enormous volumes of unsaturated materials that underlie the site offer great protection to groundwater.

Yours truly,



Donald D. Runnells  
Consultant