

May 24, 1988

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SUBJECT: PREPARATION FOR UPCOMING SHAFT LOCATION MEETING  
WITH THE DOE

In the team meeting on May 18, 1988, King Stablein announced that the DOE is interested in meeting with the NRC staff during later part of June 1988 regarding exploratory shaft concerns expressed by the NRC staff in the CDSCP point papers. To prepare for this meeting, we should come up with a unified approach for discussions during the NRC/DOE interaction.

In the CDSCP Point Papers, the NRC staff has raised three Objections related to exploratory shaft facility design. These are (i) shaft locations, (ii) penetration into Calico Hills formation, and (iii) lack of ESF conceptual design details. It has been mentioned that the DOE is currently looking into ways to resolve the Calico Hills penetration concern. Also, the concern regarding lack of sufficient ESF conceptual design details can not be addressed until after the DOE has provided the necessary information. The subject of the proposed June 1988 meeting is likely to focus on the shaft locations issue.

The unresolved issues related to shaft locations are:

1. shafts are too close to Coyote Wash,
2. shafts are too close to each other,
3. shafts are too close to the underground main test area, and
4. shafts are too close to future waste emplacement areas.

Most of the staff discussions so far have mainly focussed on issues related to proximity of shaft locations with respect to Coyote Wash and the locations issue is often confused as a PMF issue. Consideration of PMF, infiltration, erosion, free drainage design concept, and uncertainties associated with these aspects over 10,000 years should be factored into the overall repository performance analysis. In addition, it is important to note that the current shaft locations may not be able to meet regulatory requirements if concerns 2, 3, and 4 identified above are also not satisfactorily factored in the DOE's design approach.

Concern 1 has been the key topic of discussion when shaft locations issue is talked about. While potential for flooding and erosion are concerns, the big issues are : (a) reliability of the analysis for present conditions without adequate site specific data and (b) ability to predict changes to these phenomena over the post-closure time period and their effects on repository performance in the long-run. It is really a question of margin of safety necessary in the design when there is no site specific experience related to underground conditions and there is a possibility of making a wrong decision with respect to the shaft locations which cannot be undone. The following paragraphs identify the specific inputs needed from the various technical sections. Geotechnical Engineering / Design Section has the lead responsibility to integrate the input from all the Sections.

There is a need to examine the shaft locations issue with respect to overall repository performance, assuming that the ESF becomes part of the future repository. The DOE cannot be expected to present a total performance analysis of the repository until after site characterization. Such an analysis will take into account all openings (deep boreholes, shafts, ramps, and drifts) and demonstrate compliance with EPA standard under reasonable scenarios of geohydrologic conditions and waste package failures under anticipated and unanticipated processes and events. Until such an analysis is completed by DOE, any preliminary analysis presented prior to site characterization should be expected to have large uncertainties. Compliance Demonstration Section should address the following questions: (1) How reliable is the current DOE preliminary performance analysis? (2) What is the impact of current ESF location on the overall repository performance during post-closure?

The input needed from the Hydrology Section include answers to the following questions: (1) Is there sufficient information available to review DOE's flood level calculations for ES-1 and ES-2 after the proposed cut and fill operations near the shaft locations? If yes, are the flood level estimates sufficiently conservative for pre-closure considerations? What are some of the key components of DOE's assumptions that would lead to the conclusion that the DOE's analysis is or is not sufficiently conservative? (2) What are some of the potential uncertainties in the DOE's flooding and infiltration calculations? (3) What is the reliability that the flood level estimates are adequate for the entire post-closure period of interest? (4) Are potential climatic changes sufficiently addressed? (5) How reliable are the DOE estimates of quantities and rates of infiltration into the repository taking into account the potential changes in the hydraulic conductivities with changing moisture contents of the unsaturated tuff?

The input needed from the Geology Section include answers to the following questions: (1) Are there sufficient data

available to predict future erosion at the locations of ES-1 and ES-2? (2) Is it reasonable to assume that erosion is likely to be the same throughout the site irrespective of the shaft locations, or, are the areas near the washes more likely to be susceptible to greater erosion than the areas near the peaks? (3) What are the uncertainties in predicting future rates of erosion for various areas of the site?

The Hydrology Section needs to evaluate the impact of possible future erosion on the rate of increase in surface water infiltration around the shafts. Also, the effect of uncertainties regarding lack of site specific data on hydraulic conductivities needs to be addressed.

The big unknown is the long-term performance of free drainage. The questions that need to be addressed mainly by the Geochemistry Section include: (1) Are there sufficient data available to evaluate if the DOE's free drainage concept can or cannot remain effective during the post-closure period? (2) What are some of the uncertainties with respect to the free drainage concept over a long period of time? (3) If there are sufficient data available for evaluation of free drainage, is DOE's analysis reasonably conservative? (The engineering aspects of the free-drainage design concept will be addressed by the Geotechnical Engineering / Design Section).

There has been discussion that some of these concerns may be equally valid for any location. However, it should be noted that if the locations are judiciously selected, the impact of these decisions may be less of a concern from a regulatory viewpoint. For example, if the shafts are located on the drainage divide and at appropriate elevations, the PMF may not be a concern. Also, greater margin would be available for erosion at shaft locations that are higher than the drainage channels. Similarly, with less potential for infiltration on a drainage divide, the need for relying on the long-term performance of a free drainage would be less.

As stated above, the shaft locations may actually be governed by many other considerations. For example, if there is no satisfactory resolution of CDSCP Comment number 10 (which states that there may be potential for interference for a horizontal distance of 1000 ft), then the DOE may need to rearrange the shaft locations with respect to each other, with respect to main test area and with respect to proposed waste emplacement areas. (REECO, the construction contractor for the ESF, has recently expressed practical concerns with respect to underground space requirements simply from an operational point of view. REECO's concerns may force DOE to significantly revise the ESF design and to relocate the shafts).

In summary, the question of ESF location is not simply a Geotechnical Engineering / Design concern but one of repository performance, potential for adverse impacts that are not

mitigable, and potential for affecting site characterization data gathering ability. Therefore, we need to arrive at an integrated approach to dealing with this issue. Written comments are required by COB 5/27/88. If you have any questions or need clarifications, please contact Dinesh Gupta or John Peshel.

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