

Sandia National Laboratories

Albuquerque, New Mexico 87185

WM DOCKET CONTROL CENTER

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WM Project 10, 11, 16
Docket No. _____
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Leslie A. Peeters
Repository Projects Branch
Division of Waste Management
7915 Eastern Avenue
Silver Spring, MD 20910

Distribution:
L Peeters
(Return to WM, 623-SS) C2

Dear Ms. Peeters:

I am writing in response to your request for an expanded explanation of the particular set of events in the final event list for FIN A-1165, Task 3.

Hydrology: Ground-water flow is generally considered to be the most probable mechanism for release of waste from a repository. It seems likely from most of the hydrological work that has been done in waste management that ground-water flow will be treated, for the most part, deterministically. It is possible, however, that some aspects of ground-water occurrence or flow will be treated probabilistically. Hydrology has been included so that, first, we can determine whether or not probabilistic treatment of ground-water flow is appropriate, and second, if probabilistic treatment is not appropriate, what methods exist for deterministic treatment.

Climatology: To the best of my knowledge, no methods exist for the deterministic prediction of climatic changes. Climatic changes are important, however, to ground-water modeling, because climate determines the volumes and positions of recharge to the ground-water system, surface-water flow, and so on.

Volcanism & seismicity: Earthquakes, and to a lesser extent volcanism, could pose a threat to a closed repository by damaging waste packages or backfills or by altering ground-water-flow regimes. At the present time, there are no deterministic methods for predicting the occurrence of earthquakes or the eruption of volcanos, but it seems likely that some useful probabilistic techniques may exist.

Mining engineering: There are apparently no existing methods for deterministically predicting the collapse of mines in hard-rock repositories, although there are some codes that deal with creep in salt. Collapse or creep will affect the flow of water through the closed repository. In addition, the failure of seals or backfill might be considered here.

Tectonism: Repository integrity or ground-water flow through the repository could be affected by the occurrence of new folds, faults, breccia pipes, or

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other tectonic features. There are no methods for predicting such occurrences deterministically.

Resource exploration: Human intrusion into the repository could substantially affect the isolation and containment of the waste, possibly even without the intruder's awareness that a repository had been encountered. A primary reason for such intrusion is likely to be resource exploration. Although future human behavior cannot be predicted deterministically, it seems likely that resource exploration can be treated probabilistically.

Thermomechanical effects: Normal repository effects will include heat and various mechanical effects of heating the rocks. While the amount of heat generated by the waste can be predicted accurately, the effects of the heat on the rock may have to be modeled probabilistically.

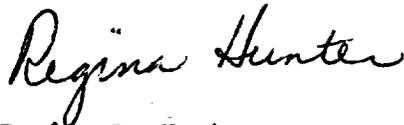
Probability & statistics: Most of the experts retained for this study will not be selected for mathematical expertise. Some assistance in evaluating the currently available probabilistic techniques may be necessary. If developmental work is required after the currently funded work is complete, the services of experts in probability and statistics will be required. At that time, it will be helpful to have had a mathematician involved from the beginning of the project.

Mathematical geology: The application of a probabilistic or statistical technique to a particular field of study is not always straightforward. The assumptions made by a given technique may not actually be appropriate for a particular field of geology for which it might seem to be. The services of an expert in the field of mathematical geology will be required to ensure that the suggested techniques are applied appropriately.

Regulatory specialist: The probabilistic treatment of future geological events and processes is a subject of considerable academic interest. This project, however, must be constrained to those aspects of the general topic that are of regulatory interest, in particular, of interest to the NRC. The comments of someone familiar with the wording and intent of the regulations will tend to keep the project on track.

I hope that these brief comments on the reasons for the inclusion of these events are helpful. Please feel free to call me if you need more information.

Sincerely,



Regina L. Hunter
Waste Management Systems
Division 6431