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LETTER REPORT

TITLE: *Review of the Report: An Assessment of the Important Radionuclides in Nuclear Waste, by J. F. Kerrisk, LA-10414-MS, Los Alamos National Laboratory, October 1985*

AUTHOR: *A. D. Kelmers*

PROJECT TITLE: *Technical Assistance in Geochemistry*

PROJECT MANAGER: *G. K. Jacobs*

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This report explored some of the parameters which can be used to identify the important or key radionuclides for modeling the performance of the Yucca Mountain candidate repository site. The report stated that four factors were considered in the assessment of the radionuclides:

(1) the quantity present in the waste form,
(2) the EPA release limits,
(3) retardation processes such as solubility and sorption, and
(4) the physical and chemical forms of the radionuclides.

Uncertainties as to waste form, transport pathways, and supporting data were noted in the report. The report followed a stepwise process to identify the important radionuclides. First, the quantity present in the various waste forms at different times after emplacement was calculated. Next, the rate of dissolution of these radionuclides from the waste form into groundwater was considered. Finally, retardation due to solubility limits and/or sorption processes was evaluated relative to the groundwater migration rate.

Many uncertainties or undefined parameters are involved in making such a performance analysis. It appears that the report may have been originally intended to be a more ambitious quantitative assessment of radionuclide performance, but that the cumulative uncertainties in the successive release pathway steps under consideration may have overwhelmed the quantitative aspects of the analysis. Only very general and somewhat speculative observations are drawn in some sections of the report. Elements which have high solubility and low sorption coefficients were identified as C, Tc, and I, and elements which have moderately high solubility and intermediate sorption coefficients were identified as Ni, Np, and U. The report states that these elements have the shortest travel times and highest release rates to the environment. The conclusions consist only of recommendations for additional work. The main conclusion was a call for development of a solubility and sorption data base for 16 radionuclides.

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The report may be of insufficient substance to warrant a specific DOE/NRC meeting. Although the report does contain some interesting ideas, it is unlikely to have a major impact on resolving the issues surrounding the release of key radionuclides from a repository at Yucca Mountain. The report may be generally illustrative of the difficulties which may be encountered in quantifying radionuclide behavior in geologic systems and in modeling radionuclide releases relative to repository performance criteria.

A. D. Kelmers/jo

A. D. Kelmers, 4500-N, MS B-12 (4-6870)

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