

TO Brooks  
From Whatley

LR-287-3  
06/11/85

See B0287 4/11/85

## LETTER REPORT

TITLE: Review of "The Potential of Natural Analogues in Assessing Systems for Deep Disposal of High-Level Radioactive Waste," by N. A. Chapman, I. G. McKinley, and J. A. T. Smellie, IER-Bericht Nr. 545, 1984.

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PROJECT TITLE: Technical Assistance in Geochemistry

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The subject document presents an excellent discussion of how natural analogs may be useful in helping to increase the level of confidence in models of performance for high-level radioactive waste repositories. The report emphasizes crystalline host rocks because the study was commissioned by the Swedish and Swiss repository programs. However, because of the nature of natural analog studies, much of the report is relevant to any host rock under consideration for repository development.

A strong positive aspect of the report is that a conceptual model of geochemical processes important to a repository is presented that forms the basis for the remainder of the report. A discussion of important considerations in selecting and applying natural analogs then follows. This portion of the report points out many of the limitations associated with natural analog studies that have been neglected by many previous authors trying to "push" natural analogs. The chapter summarizing past work on natural analogs is excellent because each analog discussed is related to a specific geochemical process included in the conceptual model. The report, written from the perspective of geologists' directly involved in repository development, provides excellent insight into many of the natural analogs and is supported by 166 references. However, the report, by necessity, skims over many important details. But if the document is taken in a total context, it is quite complete and accurate in its assessment of specific analogs.

The discussion of future work is unique compared to most reports of this type -- the authors not only assigned relative priorities to specific natural analog studies, but they also indicated areas where further study is not justified (either because enough information has been obtained, or because the information is more readily obtained through site-specific field studies or laboratory efforts). There is one shortcoming to the list of priorities, however. The list is based on only one conceptual model of repository performance (Burkholder, 1983). Burkholder concludes that retardation processes in the far field of any site is likely to be the most important process in limiting the release of radionuclides to the accessible environment. Changes in the boundary conditions and/or assumptions in this model could lead to significantly different conclusions. However, this problem does not greatly diminish the usefulness of this report.

## REFERENCE

Burkholder, H. C., "Engineered components for radioactive waste isolation systems - are they technically justified?," ONWI-286, Office of Nuclear Waste Isolation, Battelle Project Management Division, Columbus, OH, 1983.

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