

# ARGONNE NATIONAL LABORATORY

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August 2, 1984

Dr. Enrico Conti  
Waste Management Branch  
Division of Radiation  
Programs and Earth Sciences  
Office of Nuclear Regulatory  
Research  
U.S. Nuclear Regulatory  
Commission  
Washington, DC 20555

Dear Dr. Conti:

Enclosed is the requested review of the issues regarding the use of backfill materials in a basalt repository and a tuff repository. I have also enclosed a report I solicited from Prof. Donald Peacor, Dept. of Geological Sciences, University of Michigan.

There are two key points in my report. First, in short-term laboratory tests, the ability of bentonite to swell in water is severely degraded by moisture at temperatures approaching 250°C. This may place serious constraints on the design of backfill mixtures for high-temperature use in a basalt repository. Second, I believe that the use of bentonite in a tuff repository has been rejected partly for misleading or erroneous reasons, and that properly used, bentonite-based backfill may increase the margin of safety of a tuff repository.

With regard to a basalt repository, Prof. Peacor is of the opinion that a high clay/filler ratio is needed to ensure that the system remains closed, and therefore to prevent degradation of the backfill material. I agree that if bentonite does not retain its very high initial swelling capacity, 25% bentonite will not be sufficient to maintain a closed system.

If you or your staff have any questions, please do not hesitate to call me at FTS 972-4385 or -4383.

Sincerely,

*Rex A. Couture*

Rex A. Couture  
Chemical Technology Division

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Enclosures: "Some Issues on the Use of Backfill Materials in  
High-Level Nuclear Waste Repositories" (2)  
Manuscript by Prof. Donald Peacor (2)

cc: (w/enclosures)  
Dr. K. Kim, NRC  
Prof. D. Peacor, U. of Mich.

U.S. DEPARTMENT OF ENERGY

THE UNIVERSITY OF CHICAGO