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A Division of Southwest Research Institute™  
6220 Culebra Road • San Antonio, Texas, U.S.A. 78228-5166  
(210) 522-5160 • Fax (210) 522-5155

April 30, 2003  
Contract No. NRC-02-02-012  
Account No. 20.06002.01.101

U.S. Nuclear Regulatory Commission  
ATTN: Dr. Mysore S. Nataraja  
Division of Waste Management  
Two White Flint North (Mail Stop 7-C6)  
Washington, DC 20555

Subject: Repository Design and Thermal-Mechanical Effects Key Technical Issue  
Intermediate Milestone No. 20.06002.01.101.340, The Characterization and  
Abstraction of Mechanical Loading and Performance of the Engineered Barrier  
System—CNWRA Report

Dear Dr. Nataraja:

Attached is the Center for Nuclear Waste Regulatory Analyses (CNWRA) document entitled "MECHFAL: A Total-system Performance Assessment (TPA) Code Module for Evaluating Engineered Barrier Performance Under Mechanical Loading Conditions, CNWRA 2003-06." To better reflect the content of the document, the title has been changed from that originally identified in the Operations Plan. This technical document fulfills the requirements for the subject milestone which is due May 2, 2003.

This report presents the basis and methodology used for estimating the potential number of drip shield and waste package failures caused by rockfall and seismic events within the TPA Version 5.0 code. Potential failure mechanisms of the drip shield that have been accounted for include accumulated equivalent plastic strains that exceed the allowable ductility of the drip shield materials. The potential for drip shield buckling under static rockfall loads and seismic excitation is accounted for as well. Although the abstractions have yet to be completed, the MECHFAL module includes placeholders for assessing waste package damage caused by direct seismic shaking and interactions with the drip shield caused by static and dynamic rockfall loads. Preliminary analyses indicate that, on average, 75 percent of the drip shields will fail by buckling within 520 years after cessation of maintenance of the ground support system.



Washington Office • Twinbrook Metro Plaza #210  
12300 Twinbrook Parkway • Rockville, Maryland 20852-1606

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If you have any questions regarding this report, please contact me at (210) 522-5151 or Doug Gute at (210) 522-2307.

Sincerely yours,



Asadul H. Chowdhury, Manager  
Mining, Geotechnical, and  
Facility Engineering

ACH: ar

cc:	D. DeMarco	J. Greeves	W. Patrick	<u>Letter only</u>
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