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U.S. Nuclear Regulatory Commission
ATTN: Mrs. Deborah A. DeMarco
Two White Flint North
11545 Rockville Pike
Mail Stop T8A23
Washington, DC 20555

Subject: Programmatic Review of Abstract

Dear Mrs. DeMarco:

The enclosed abstract is being submitted for programmatic review. This abstract will be submitted for presentation at the Geological Society of America, to be held November 12–16, 2000, in Reno, Nevada. The title of this abstract is:

> "Modeling of Zeolite Ion-Exchange Equilibria Using the Wilson Equation" by R.T. Pabalan and P. Bertetti

This abstract is a product of the CNWRA and does not necessarily reflect the view(s) or regulatory position of the NRC.

Please advise me of the results of your programmatic review. Your cooperation in this matter is appreciated.

Sincerely,

Budhi Sagar
Technical Director

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Enclosure

cc:				
	B. Meehan	D. Brooks	N. Coleman	T. Nagy (SwRI Contracts)
	E. Whitt	S. Wastler	K. Stablein	
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Modeling of Zeolite Ion-Exchange Equilibria Using the Wilson Equation

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Natural zeolites exhibit favorable ion-exchange selectivity for certain cations such as cesium, strontium, and ammonium, and have been studied for potential use in the treatment of nuclear, municipal, and industrial wastewaters and acid mine drainage waters. Zeolites could also serve as reactive barriers for radionuclide migration from the proposed nuclear waste repository at Yucca Mountain, Nevada, which is underlain by diagenetically altered, zeolite-rich volcanic tuffs. Thermodynamic models are useful in predicting ion-exchange equilibria under conditions not previously studied in laboratory experiments. In this work, experimental data on binary ion exchange involving the zeolite mineral clinoptilolite and alkali/alkaline-earth cations are used to derive equilibrium constants for the ion-exchange reactions and the parameters for a zeolite solid solution model based on the Wilson equation. The Wilson equation does not require parameters beyond the binary terms, thus it can be applied to ternary or more complex mixtures typical of geochemical systems. The derived equilibrium constants and parameters are used successfully to predict ion-exchange isotherms as functions of aqueous composition and ionic strength.

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