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Contract No. NRC–02–97–009
Account No. 20–01402–871

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 8th International Conference on the Chemistry and Migration Behavior of Actinides and Fission Products in the Geosphere, Migration '01, to be held September 16–21, 2001, in Bregenz, Austria. The title of this abstract is:

> "^{238}U- ^{234}U- ^{20}Th ages of secondary deposits and evidence on the rate of recent radionuclide migration at the Nopal I natural analog" by David A. Pickett, William Murphy, and Bret Leslie

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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d:\gh&gc\fiscal 2001\letters\demarco\20.01402.871\ages of secondary deposits and evidence
Enclosure

cc:			
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^{238}U-^{234}U-^{230}Th ages of secondary deposits and evidence on the rate of recent radionuclide migration at the Nopal I natural analog

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The Nopal I uranium deposit at Peña Blanca, Chihuahua, Mexico, is a natural analog to the proposed geologic repository for high-level nuclear waste at Yucca Mountain, Nevada, USA, in part because of its striking geochemical similarities. Secondary deposits of caliche and opal around the Nopal I deposit record mobilization and redeposition of uranium. These deposits provide information on the rates and the episodic nature of radionuclide migration. Opals have uranium as high as 10,000 ppm, carbonate-rich caliches contain up to 350 ppm uranium, and crystalline calcites also have relatively high uranium concentrations, up to 30 ppm. All crystalline calcites and one opal yield ^{230}Th ages greater than 200,000 years. Caliches, however, have ^{230}Th model ages ranging from 18,000 to 136,000 years, with clustering around 50,000 years. In addition, an opal yielded a 54,000-year age, supporting episodic uranium deposition at this time. A lower limit on the rate of episodic uranium deposition is calculated to be 30 g/y [0.07 lb/y] assuming a conservatively long episode of 10,000 years, minimum excess uranium of 100 ppm in caliche, and estimated caliche volume of 1,000 m^3 [35,000 ft^3] (based on field observations). Deposition rate provides, in turn, a lower limit on release rate. An upper limit on the long-term uranium release rate for the site based on solubility-limited uranium concentration and water flux is also 30 g/y [0.07 lb/y] (Murphy and Pearcy, 1992). Although these two calculated values reflect different processes, consistency between the independently estimated upper limit on the long-term release rate and lower limit on the episodic deposition rate lends credibility to the magnitude of these natural analog estimates for radionuclide migration rates. These rates can be used to evaluate rates used in performance assessments of the proposed repository. This work, funded by the U.S. Nuclear Regulatory Commission (NRC) under contract NRC–02–97–009, does not necessarily reflect the views or regulatory position of the NRC.

Reference

Murphy, W.M., and E.C. Pearcy. 1992. Source-term constraints for the proposed repository at Yucca Mountain, Nevada, derived from the natural analog at Peña Blanca, Mexico. *Scientific Basis for Nuclear Waste Management XV.* C.G. Sombret, ed. (Mater. Res. Soc. Proc., *257.* Pittsburgh, PA), pp 521-527.