

CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES
TRIP REPORT

SUBJECT: Staff Exchange of Personnel Between the Center for Nuclear Waste
Regulatory Analyses and U.S. Nuclear Regulatory Commission
(20.01402.871)

DATE/PLACE: April 22 through May 3, 2002
U.S. Nuclear Regulatory Commission Headquarters
Rockville, Maryland

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discussions was that DOE may be neglecting the effects of small colloid size fractions. In looking in-depth at DOE colloid abstractions, we could see that small-colloid effects could have impact on estimates of the sorptive capacity of colloids and on the suitability of microsphere test results for parameter formulation for irreversible colloid transport in total system performance assessment. We identified a need to devise simple calculations estimating the potential dose effects.

During my trip, contacts were made with DOE to schedule teleconferences on the status of colloid-relevant agreements. With NRC staff, I revised the technical bases for the agreements in preparation for the discussions. It is hoped these meetings will take place within the next few weeks. Other colloid topics addressed with NRC staff included the reasonableness of assuming complete colloid dilution during pumping. A meeting was held with Phil Reed on plans for colloid transport research to be supported by the NRC Office of Nuclear Regulatory Research. The office is preparing statements of work on a number of topics including the effects of organic constituents, colloid measurement methods, and colloid sorption kinetics.

At the end of my stay, I attended a meeting with Bill Dam, radionuclide transport lead John Bradbury, evolution of the near-field environment lead, Dave Brooks, and repository site section leader Andy Campbell to discuss the colloid issue. It was emphasized that we should have a better grasp on the potential compliance effect of colloids, in terms of dose and multiple barrier requirements. The approaches agreed to be useful were (i) the calculations noted above on the potential effect of small colloids, (ii) the abstraction of colloid release and transport to be included in Total-system Performance Assessment 5.0, and (iii) refinement of previous, relatively simple bounding dose calculations.

In collaboration with Bret Leslie, I worked on the final set of uranium and thorium isotopic data from the Nopal I natural analog site. Data on caliche total rocks and leachates were analyzed in order to gain confidence in absolute radiometric age interpretations. The data form the basis for a journal article in preparation on the episodic nature of uranium release from the ore body.

Several other radionuclide transport topics were touched on during the trip, with the intention of ensuring CNWRA staff awareness of relevant issues. These topics included (i) effects on dose of intermittent pumping, (ii) DOE use of groundwater isotopic data, (iii) the implications of the active fracture model and the particle tracking model approach, (iv) the 10 CFR 63.331 methods for estimating radionuclide concentrations, and (v) the extrapolation of laboratory-scale results to field-scale modeling.

Total System Performance Assessment and Integration Key Technical Issue

While at Rockville, Maryland, I completed my portion of the first phase of the review of DOE GoldSim Total System Performance Assessment implementation. Teaming with John Bradbury and Chris Grossman, I reviewed Total System Performance Assessment expressions and data governing colloid release and invert transport models. In the next phase, we will review the colloid abstraction from the perspective of overall model confidence. These activities neatly complement colloid efforts under the radionuclide transport key technical issue.

Incidental Waste Methodology for Idaho National Engineering Environment Laboratory Tanks

I began my review of radiochemical and geochemical aspects of the incidental waste determination report for tank farms at the Idaho National Engineering and Environmental Laboratory. My staff exchange allowed direct interaction with NRC team lead Kris Banovac.

Container Life and Source Term Key Technical Issue

Disposal criticality issues were discussed briefly with Meraj Rahimi and Dennis Galvin, in anticipation of an upcoming review of a new revision of a DOE report describing their methodology for assessing criticality risk at the proposed Yucca Mountain repository.

Evolution of the Near-Field Environment Key Technical Issue

A small portion of my time spent on colloid issues focused on the technical bases for evolution of the near-field environment key technical issue agreements.

CONCLUSIONS:

The staff exchange was extremely valuable in helping me focus on the regulatory relevance of our activities in support of the NRC, as well as on the specific interests and concerns of members of the staff. The trip allowed me to share ideas and information with staff, and to work with them on devising approaches to risk evaluation and issue resolution.

PROBLEMS ENCOUNTERED:

None.

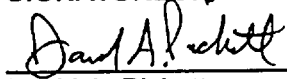
PENDING ACTIONS:

The approach to assessing the compliance significance of colloid release and transport is being coordinated with NRC staff.

RECOMMENDATIONS:

None.

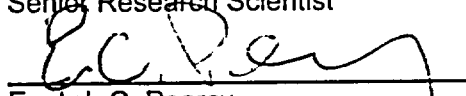
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BACKGROUND AND PURPOSE OF TRIP:

This staff exchange was conducted in accordance with Center for Nuclear Waste Regulatory Analyses (CNWRA) Administrative Procedure (AP)-008 entitled, "Exchange of Personnel Between the CNWRA and the U.S. Nuclear Regulatory Commission (NRC)." The main purpose of the staff exchange was to interact directly with NRC staff on geochemical issues relevant to high-level waste disposal at the potential repository at Yucca Mountain. Key NRC staff were John Bradbury, Bill Dam, and Bret Leslie, and the technical focus was on the radionuclide transport key technical Issue. More specifically, my main activity was directed toward developing strategies to resolving the risk significance of colloidal release and transport. Other activities are discussed below.

SUMMARY OF PERTINENT POINTS:

The chief accomplishment of the trip was to formulate with NRC staff an approach to assessing the risk significance of colloidal release and transport that can inform our interactions with U.S. Department of Energy (DOE). More generally, the trip allowed direct interaction and sharing of ideas on NRC and CNWRA efforts on radionuclide transport key technical issues. Other activities included review of DOE performance assessment, analysis of U-Th isotopic data from the Nopal I natural analog site, attendance at NRC staff meetings, and review of Idaho National Engineering and Environmental Laboratory documents supporting an incidental waste determination.

SUMMARY OF ACTIVITIES:

Radionuclide Transport Key Technical Issue

The majority of my time was spent on radionuclide transport issues, and colloid release and transport was the dominant topic. Discussions of colloids with Bill Dam and John Bradbury were focused on how the lack of complete understanding of colloid behavior could affect estimates of dose effects at Yucca Mountain. Already, there are a total of 12 agreements under the radionuclide transport, evolution of the near-field environment, and total system performance assessment and integration key technical issues that address colloids. During my trip the NRC received two letter reports that are relevant. The first was addressed to radionuclide transport agreements on plans for the Alluvial Testing Complex, and mentions the intended use in cross-hole tracer tests of, in addition to synthetic microspheres, natural colloids doped with Sm-152. The use of natural colloids is notable because the other letter report addresses the suitability of microspheres in this type of tracer test. A potentially important issue that arose from our