

CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

TRIP REPORT

SUBJECT: Attendance at the Waterloo DNAPL Course, hosted by Waterloo Educational Services (20.01402.158)

DATE/PLACE: December 8-10, 1999
San Francisco, CA

AUTHOR: James Winterle

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BACKGROUND AND PURPOSE OF TRIP:

The acronym DNAPL refers to Dense Non-Aqueous-Phase Liquids. The Waterloo DNAPL Course is held approximately yearly and typically draws several hundred environmental professionals from diverse regions. With over 200 attendees, this year was no exception. The theme of this year's class was "DNAPLs in Fractured Geologic Media." This focus on fractured-geologic media made many of the course topics directly applicable to the hydrology at Yucca Mountain (YM). The purpose of the trip was to capitalize on this excellent opportunity to learn from and interact with environmental professionals that face many of the same issues we face at YM.

SUMMARY OF PERTINENT POINTS:

The course was taught by four leading experts, each with a different specialty. John Cherry (Univ. of Waterloo) gave several lectures on saturated zone flow and transport. Dr. Cherry delivered an especially informative lecture covering several case histories where transport through fractured rock was an important consideration. The case histories included the Woburn, MA site, which gained notoriety from the book and recent movie, *A Civil Action*.

Beth Parker (University of Waterloo) gave several lectures explaining the importance of matrix diffusion on accelerating the dissolution of DNAPLs in fractures, and its effect on limiting the spread of contaminants. Much of the information presented in these lectures is directly applicable to the investigations of matrix diffusion at YM.

David McWhorter (Colorado State Univ.) presented lectures related to multiphase flow and transport—a topic applicable to CNWRA investigations of unsaturated zone flow and transport.

F. Peter Haeni (USGS) gave a single lecture on the use of surface-geophysical and borehole-imaging techniques to characterize fractured rocks. Many of the methods he described are those that have been used recently by CNWRA staff at YM to obtain confirmatory measurements and to test alternative hypotheses. An important lesson imparted by Dr. Haeni is that an integrated approach is necessary when employing

geophysical methods. That is, one should *never* make determinations based on a single geophysical technique in the absence of other supporting site data.

Between lectures, attendees were afforded the opportunity to converse with several vendors of borehole-based monitoring and measuring equipment. One such vendor, with whom I spoke at length, was a representative from Westbay Instruments who had been involved in the design of several monitoring systems used in the Nye County wells near YM. From this conversation I gained a better understanding of the quality of data obtained from these monitoring systems.

CONCLUSIONS:

Most of the topics presented in the class are directly applicable to work performed at CNWRA for the NRC. Perhaps the most important experience gained from the class is an improved understanding of how conceptual models evolve for flow and transport at geologically complex sites.

PROBLEMS ENCOUNTERED:

None.

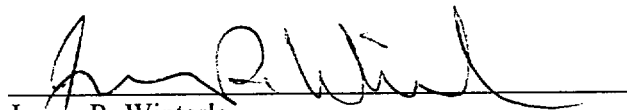
PENDING ACTIONS:

None.

RECOMMENDATIONS:

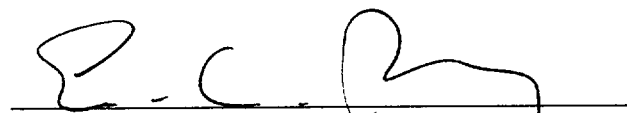
I highly recommend this course for staff and managers who are seeking a professional development opportunity that will provide them with an in-depth overview of the very complex process of flow and transport in fractured geologic media.

SIGNATURES:



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