

CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES
TRIP REPORT

SUBJECT: 10th Conference of the European Clay Groups Association Meeting
(Euroclay 2003)
20.06002.01.141.006

DATE/PLACE: June 22–26, 2003
Modena, Italy

AUTHOR: F. Paul Bertetti

DISTRIBUTION:

CNWRA

W. Patrick
CNWRA Dirs
CNWRA Ems
L. Gutierrez

NRC-NMSS

D. DeMarco
E. Whitt
M. Leach
B. Meehan
J. Greeves
W. Reamer
J. Schlueter
K. Stablein
W. Dam
J. Ciocco
H. Arit
J. Bradbury
W. Ford
L. Hamdan
D. Brooks
A. Campbell
L. Campbell

SwRI

Record Copy B, IQS

CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

TRIP REPORT

SUBJECT: 10th Conference of the European Clay Groups Association Meeting
(Euroclay 2003)
20.06002.01.141.006

DATE/PLACE: June 22–26, 2003
Modena, Italy

AUTHOR: F. Paul Bertetti

PERSONS PRESENT: The European Clay Group Association conference is one of the largest meetings devoted to clays and related minerals and provides an opportunity to review the latest research in clay and zeolite mineralogy. The meeting represents a gathering of clay groups from over 22 nations throughout Europe and attracted more than 500 attendees. Most attendees were from Europe with the majority representing France, Spain, Italy, and Germany, but there was substantive representation by researchers from Japan and the United States.

PURPOSE OF TRIP: P. Bertetti attended the Euroclay 2003 meeting to make two presentations as part of a special session on the properties and applications of natural zeolites. The first presentation was a poster entitled, "Occurrence of Zeolites and Clays in the Saturated Alluvium South of Yucca Mountain, Nevada: Implications for Transport Modeling of Radionuclides" by P. Bertetti, J. Prikryl, and B. Werling, which focused on recent results of quantitative mineralogical and geochemical studies conducted on cuttings from Early Warning Drilling Program wells in Nye County. The second presentation was a talk entitled, "Experimental and Thermodynamic Modeling Studies of Binary and Ternary Ion-Exchange Equilibria in Clinoptilolite" by P. Bertetti and R. Pabalan, which presented results of recent work investigating the ion-exchange behavior of zeolites in multicomponent aqueous solutions.

SUMMARY OF ACTIVITIES: The meeting consisted of multiple presentation sessions with topics ranging from basic research methodologies, to the application of clays and zeolites to environmental problems, to optimizing clay-related industrial processes (the region around Modena has a rich history in the production of ceramics). The special session on natural zeolites was especially informative and included presentations on the thermodynamics of zeolite formation, studies of the behavior of zeolites under thermal and pressure stresses, and the ion- and water-exchange behavior of zeolites.

A series of plenary lectures was used during the meeting to introduce broad topics at the start of each morning and afternoon. The plenary lectures were given by invited speakers and were designed to not only provide some background and introductory information of general interest but also to highlight new areas of research and stimulate discussion in the technical sessions that followed. Examples of these lectures included a presentation by D. Bish (Los Alamos National Laboratory) on the "Structural Influences on Parallels and Distinctions Between Clays and Zeolites." In this lecture, Dr. Bish highlighted the ion exchange and hydration/dehydration behavior of zeolites and presented several example sets of thermogravimetric data collected

topical therapy. The zeolite powder must be loaded with erythromycin, an antibiotic, and Zn^{2+} , known to aid as a growth inhibitor for antibiotic resistant strains. The study results reveal a problem influencing the effective release of any exchanged or 'pre-loaded' cation from clinoptilolite. Namely, there must be some available exchanging cation (to replace Zn^{2+} in the zeolite) on the substrate or system of application. Competitive effects of Zn^{2+} and erythromycin release were observed as a result of the lack of available exchangeable cations. An international patent has been obtained for use of the powder in this pharmaceutical application.

Both presentations made by P. Bertetti were well received and generated numerous questions. Of particular interest to participants was our recent development of a thermodynamic modeling approach for ternary ion-exchange systems, based on the Wilson model for representing nonideality in the solid phase. The Wilson approach utilizes thermodynamic parameters from binary systems to represent ternary system behavior, offering a means to model multicomponent systems without the need to develop extensive sets of additional parameters. The poster presentation highlighting the occurrence of minerals in the alluvium of Fortymile Wash offered an opportunity to describe and discuss the proposed high-level waste repository and the roles of U.S. Nuclear Regulatory Commission (NRC) and U.S. Department of Energy to a number of researchers who had limited familiarity with the project.

CONCLUSIONS: The Euroclay 2003 meeting provided a good opportunity to gather information regarding the latest research on clays and clay minerals and was especially informative in that discussions with researchers from outside the U.S. provided additional perspectives on the direction of research. Many of the European researchers are driven by production of results that can be used in industry. A special session of the meeting was held to discuss the properties and applications of natural zeolites. As such, the meeting offered a forum to present both applied and theoretical studies conducted at CNWRA of the effects of mineralogy on the potential transport of radionuclides in the Yucca Mountain region. These studies are being conducted as part of the NRC high-level waste program and are important to understanding the overall performance of the proposed repository and understanding contributions of natural system components to the multiple barriers concept.

PROBLEMS ENCOUNTERED: None.

PENDING ACTIONS: None

RECOMMENDATIONS: Meetings such as Euroclay 2003, which are focused on a subset of topics, offer excellent opportunities to discuss research problems and opportunities in detail with a concentrated gathering of researchers knowledgeable in the field. Moreover, it is often beneficial to be able to solicit input on topics, such as the proposed repository at Yucca Mountain, from researchers outside of the typical Yucca Mountain 'community.' However, the best input is usually garnered from a group that is more focused on the topic of interest. For instance, I would have been able to gather more information if there had been a session dedicated to proposed European repository concepts. Staff should continue to pursue opportunities to interact and present in international forums, and the presence of special sessions within these forums, such as the special zeolite session in Euroclay 2003, should be a primary consideration in the selection of meetings to attend.