

CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

TRIP REPORT

SUBJECT: Geologic Disposal of High-Level Waste Course
Project No. 20.06002.01.352
AI No. 20.06002.01.352.615

DATE/PLACE: May 4–6, 2006
Las Vegas, Nevada

AUTHORS: J. Durham

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AUTHOR: J. Durham

PERSONS PRESENT: J. Durham (Center for Nuclear Waste Regulatory Analyses),
19 students, and 8 faculty

BACKGROUND AND PURPOSE OF TRIP:

Following the International High-Level Radioactive Waste Management Conference, an opportunity arose to attend the Geologic Disposal of High-Level Waste course presented by the International Training Center (ITC). A separate trip report has been prepared for the conference.

SUMMARY OF PERTINENT POINTS AND ACTIVITIES:

The ITC, a non-profit organization based in Switzerland, trains professionals in the aspects of nuclear waste disposal. This 3-day course provided an excellent overview of international efforts to establish deep geological disposal facilities, focusing on lessons learned and the key issues involved in gaining public acceptance of the site. The lectures on concepts for geologic repositories included the engineered barrier system, a history of the Yucca Mountain project, security aspects, and social aspects of geologic disposal. The primary instructors, C. McCombie and N. Chapman, who are experienced in both geologic disposal and teaching, provided a strong technical framework for the course.

Several lectures were of particular interest. L. Barrett [former head of the U.S. Department of Energy (DOE) Office of Civilian Nuclear Waste Management] gave an insightful lecture on the historical development of the Yucca Mountain site, including many anecdotes on both the political and technical sides. T. Isaacs (Lawrence Livermore National Laboratory) presented a strong argument for linking deep geologic disposal of high-level waste to national security and suggested an international cooperative plan to reduce security threats. P. Alford (Nuclear Waste Technical Review Board) gave a unique and thought-provoking lecture on societal issues and what is important to the public. Finally, A. Van Luik (DOE) lectured on performance assessment and gave insights into the proposed U.S. Environmental Protection Agency standards for Yucca Mountain. His lecture did not provide much insight into the DOE total system performance assessment model other than to state that the first waste package will fail in about 80,000 years, the median failure will occur in about 300,000 years, and that some waste packages are expected to remain intact for more than 1,000,000 years. He also opined

that DOE would probably retract the drip shield, although possibly not until after submitting the license application. A copy of the class agenda is attached to this report, and a copy of the slides will be kept on the shared drive for 30 days following issuance of this report under the ITC subdirectory. Class materials are also available on request.

IMPRESSIONS AND CONCLUSIONS:

This course was a positive experience that will benefit my review of the potential license application because it put many issues associated with high-level waste into perspective. It provided (i) an appreciation of international efforts to develop deep geologic repositories, (ii) insight into the technical and social aspects of repositories, and (iii) gave a broad perspective on repositories in general.

PROBLEMS ENCOUNTERED:

None.

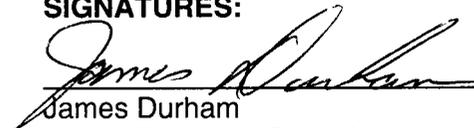
PENDING ACTIONS:

None.

RECOMMENDATIONS:

This class is highly recommended for (i) new staff who have completed several months of employment, (ii) staff who are focused on a single aspect of the repository design and need to expand their knowledge of the overall picture, and (iii) staff who are not cognizant of the crucial nature of public acceptance of repositories. The class clearly delineates the importance of the U.S. Nuclear Regulatory Commission review in achieving public acceptance of Yucca Mountain.

SIGNATURES:

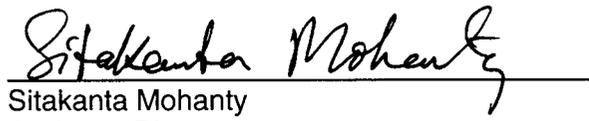

James Durham
Senior Research Scientist

6/6/06
Date

CONCURRENCE:


James Winterle
Manager
Performance Assessment

6/5/06
Date


Sitakanta Mohanty
Assistant Director
Engineering and Assessment Systems

6/7/06
Date

Day 1 (Thursday May 4th 2006)		
08:30 – 09:00	Introduction to the training session Objectives; how the week will work (structure of course) Participants introduce themselves.	Neil Chapman ITC
09:00 – 09:30	Welcome and overview of current status of US program Intended principally as orientation for non-US participants	Russ Dyer Chief Scientist DOE/OCRWM
09:30 – 10:30	Nuclear fuel cycle and radioactive waste The nuclear fuel cycle; the origins of spent fuel and high-level waste; reprocessing and the wastes its produces; amounts of SF/HLW existing worldwide; how they are conditioned for disposal; advanced fuel cycles and their implications for repository design; other wastes (LL-ILW, DU, Pu, DRSs) requiring geologic disposal; what other countries are doing with their HLW/SF	Charles McCombie McCombie Consulting
10:30 – 10:45	Break	
10:45 – 11:45	The concept of geologic disposal Radioactive wastes in context with other wastes; what geologic disposal means (generic concepts), its technical and non-technical objectives and why it has been selected; key current issues in geologic disposal worldwide	Neil Chapman ITC
11:45 – 13:00	Lunch	
13:00 – 14:00	Chemical, thermal and hazard characteristics of HLW/SF Radionuclides that they contain; chemical form; radiological and toxic hazard potential with time; waste form characteristics with respect to disposal (half-lives, thermal impacts, radiation impacts); stability of fuel cladding; impacts of pre-disposal storage.	Mick Apted Monitor Scientific
14:00 – 15:00	Geologic environments for disposal Range of geologic environments being considered worldwide, the hydrogeologic, structural and geochemical properties that make them suitable and which need to be understood; the tectonic and natural evolution issues associated with the formations and the types of environment in which they can occur.	Neil Chapman ITC
15:00 – 15:15	Break	
15:15 – 16:15	Design concepts for repositories and underground stores Basic safety concept of the multibarrier EBS - NBS system; different ways that this can be implemented for HLW and SF; how a safety concept integrates different geologic environment with different repository designs; why designs and safety concepts vary from country to country (different ways of achieving safety); examples of designs, why they were selected and how they have changed with development; how storage can be fitted into design concepts.	Mick Apted Monitor Scientific
16:15 – 17:00	Open discussion of Day 1	Neil Chapman
17:00	Adjourn for Day 1	

Day 2 (Friday May 5th 2006)		
08:30 – 09:30	Safety standards and regulations Basic international ethical and radiological principles underlying regulatory standards (IAEA, ICRP, etc); concepts of dose and risk; other components of regulations - e.g. non-human impacts, requirements for contents of safety assessment, treatment of timescales, uncertainty, etc; how standards and principles are applied in different countries; future developments internationally	Charles McCombie McCombie Consulting
09:30 – 10:30	Showing it is safe: presenting the evidence The use of safety assessment results and multiple lines of evidence to present a set of reasoned arguments on long-term safety for the regulator and other audiences (geological stability, natural geochemical fluxes and concentrations, natural analogs, natural radiation background, etc)	Neil Chapman ITC
10:30 – 10:45	Break	
10:45 – 11:45	Experiments and demonstrations in URLs A review of thirty years work in URLs, the main issues addressed by experimental studies and the future of full-scale demonstration work.	Neil Chapman ITC
11:45 – 13:00	Lunch	
13:00 – 14:30	The Yucca Mountain project: a historical perspective Discussion of the history of the YMP and the US approach to nuclear waste disposal; drivers for waste policy and the current situation; technical insights from performance assessment; regulatory and policy issues.	Lake Barrett Consultant
14:30 – 14:45	Break	
14:45 – 16:15	Selecting a repository site International guidelines on site suitability; national experience in selecting sites; political and technical constraints; stepwise narrowing down to an acceptable site; current status of national siting programs worldwide; contentious issues in siting	Charles McCombie McCombie Consulting
16:15 – 17:00	Open discussion of Day 2	Neil Chapman
17:00	Adjourn for Day 2	

Day 3 (Saturday May 6th 2006)		
08:30 – 09:30	<p><i>Repository site characterization in different geologic environments</i></p> <p>Stages in characterising a site during the selection process; deployment of various field techniques - appropriate strategies for regional and site scale characterisation; advanced geosciences techniques; managing data & QA; data synthesis and interpretation of site properties; evolution into descriptive models; approaches for different geologic environments and different repository concepts.</p>	Neil Chapman ITC
09:30 – 10:30	<p><i>Total system performance assessment</i></p> <p>Development and application of probabilistic modeling in assessing the performance of a geologic repository over thousands of years. Discussion will focus on scenario development, treatment of uncertainties and model abstraction. Results of other national program safety assessments.(putting YMP analyses in context). Some key issues internationally in developing and presenting TSPAs</p>	Abe Van Luik, OCRWM/ORD
10:30 – 10:45	<i>Break</i>	
10:45 – 11:45	<p><i>International case studies on societal issues</i></p> <p>The Forum on Stakeholder Confidence (FSC) facilitates sharing of experience in addressing the societal dimension of radioactive waste management, explores means of ensuring an effective dialogue with the public with a view to strengthen confidence in decision-making processes among players at national, regional and especially at local levels. A broader, more realistic view of decision making is taking shape.</p>	Paula Alford NWTRB
11:45 – 13:00	<i>Lunch</i>	
13:00 – 14:30	<p><i>International aspects of disposal and fuel cycle security</i></p> <p>Safeguards for spent fuel repositories; impact of retrievability; current initiatives on internationalization of the nuclear fuel cycle to enhance global security; implications for spent fuel and HLW disposal: international fuel cycle facilities and shared regional repositories</p>	Tom Isaacs DOE/LLNL
14:30 – 14:45	<i>Break</i>	
14:45 – 15:45	<p><i>Geologic disposal, past and future</i></p> <p>Where the concept originated and how it has developed since the 1950s; how national programmes started and developed; successes and failures; major evolutionary changes in the concept; alternative ideas that have been abandoned; future developments - international repositories, likely obstacles to national programmes, remaining technical issues to be solved.</p>	Charles McCombie McCombie Consulting
15:45 – 16:45	<p><i>Orientation for the Yucca Mountain Field Visit</i></p> <p>Background and preparation for the Monday tour</p>	Abe van Luik OCRWM
16:45 – 17:15	<i>Open discussion of Day 3 and Course Wrap-up</i>	Neil Chapman
17:15	<i>Adjourn for Day 3</i>	



Day 4 (Monday May 8th 2006)		
All day: early start	<i>Field trip to the Yucca Mountain site, surface and underground</i>	Guided by OCRWM/YMP