

CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

TRIP REPORT

SUBJECT: Kick-off Meeting of the U.S. Department of Energy (DOE) Waste Package
Materials Performance Peer Review
Project Number 20.01402.571

DATE/PLACE: May 23, 2001
Las Vegas, Nevada

AUTHOR: Gustavo A. Cragolino

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PERSONS PRESENT: The meeting was attended by approximately 60 people including DOE/YMP and Betchel SAIC Company (BSC) staff and contractors. State of Nevada technical staff and contractors were present. Charles Greene [U.S. Nuclear Regulatory Commission (NRC)] was also present.

BACKGROUND AND PURPOSE OF TRIP:

The purpose of the trip was to attend the kick-off meeting of the DOE peer review panel on waste package (WP) materials performance, in which the panel was presented with background information on WP corrosion studies conducted by DOE contractors.

SUMMARY OF PERTINENT POINTS:

After introductory remarks by DOE/YMP and BSC managers, Joe Payer (Case Western Reserve University), who is the peer review chairman, described the objectives and scope of the peer review, and introduced the other members of the panel: John A. Beavers (CC Technologies Laboratory), Thomas M. Devine (University of California at Berkeley), Gerald S. Frankel (The Ohio State University), Russell H. Jones (Pacific Northwest National Laboratory), Robert G. Kelly (University of Virginia) and Ronald M. Latanision (Massachusetts Institute of Technology). He emphasized the broad range of expertise in corrosion science and engineering of the panel members but noted that the panel will be assisted by 12–15 subject matters experts from the U.S. and abroad on specific issues (i.e., geochemistry, hydrology, nickel alloys, welding, etc). The issues to be addressed by the panel are: (i) assessment of potential degradation modes; (ii) long-term performance of passive metals; (iii) composition of waters in contact with WP surfaces; (iv) understanding and control of crevice corrosion and pitting and (v) understanding and control of stress-corrosion cracking. The panel is currently scheduled to issue an interim report and present preliminary findings with recommendations to DOE/M&O in a public meeting in September 2001, in Las Vegas, Nevada. The panel will issue a final report and present its findings in a public meeting in February 2002, in Las Vegas, Nevada.

Jean Younker (BSC) described the M&O organization structure responsible for WP activities and Thomas Doering (BSC), who is the WP project manager, provided an updated overview of WP and drip shield (DS) design and fabrication. Tammy Summers (LLNL), who is the current WP Science and Analysis

Manager, described the approach and processes considered for evaluating WP and DS performance, the staff and contractors involved, and the scope of the plan to verify long-term corrosion performance, as an introduction to the following presentations.

Greg Gdowski (LLNL) gave the presentation on the environment on the WP surfaces, providing a description of the characteristics of in-drift environment and the range of possible aqueous solutions that can be formed on WP and DS surfaces. The presentation was based on literature information and the results of work conducted at LLNL and was followed by a summary of the path forward, patterned after the DOE/NRC agreements reached at the CLST and ENFE technical exchanges. This type of path forward summary was a characteristic of all the presentations and reflected the impact of the recent DOE/NRC public interactions on the DOE program.

Gerald Gordon (Framatome) presented the information on Alloy 22 general corrosion rates, summarizing the current status and the approach to be used for long-term extrapolation. His presentation included data from the DOE studies in the Long-Term Corrosion Test Facility (LTCTF) at LLNL, from the open literature, and from CNWRA work. The approach to modeling long-term corrosion of Alloy 22 based in the point defect model developed by Macdonald (who is now one of the M&O contractors) was summarized.

Dan McCright (LLNL) presented the current status and the planned program for the evaluation of localized corrosion resistance of the WP and DS materials using a combination of literature data, CNWRA data, and results from their own studies at LLNL. A broad range of additional studies was described.

David Shoesmith (University of Western Ontario, Canada) made a presentation on Titanium DS issues, including passive behavior, localized corrosion and hydrogen absorption/cracking based on his own work at AECL, a review of the literature, and the data available from the LTCTF and other tests at LLNL. In his presentation, the importance of evaluating further the influence of fluoride on passive corrosion and the subsequent hydrogen absorption was clearly recognized.

The final presentation was made by Peter Andresen (General Electric Corporate Research and Development) on WP and DS stress corrosion cracking assessment and mitigation. This was the presentation in which the relationship between the experimental work and the model abstraction included in the AMR/PMR and the TSPA-SR was clearly articulated. New data on stress corrosion cracking (SCC) of Alloy 22 and Ti Grade 7 was provided, covering a range of material conditions in the case of Alloy 22 (i.e., cold worked, thermal treated, and welded tensile specimens were used). Whereas crack growth of Alloy 22 was observed under cyclic loading conditions on compact tension specimens, no SCC was obtained in constant loaded smooth tensile specimens at stresses well above the yield strength in aerated and saturated alkaline solutions based on J-13 water at 105 °C. Also, approaches to stress mitigation to avoid SCC for discussed in certain detail

It should be noted the members of the panel intervened at many occasions to ask questions to the presenters ranging from experimental details to fundamental corrosion concepts and covering also various aspects of the design and fabrication of the WPs.

At the end of the meeting, Alberto Sagiúes (NWTRB) announced the NWTRB International Workshop on Long-Term Extrapolation of Passive Behavior to be held on July 19–20, 2001 in Washington, DC in which at least 9 international experts are going to participate. He described the scope and informal format of the workshop, at which we have been invited to participate.

IMPRESSION/CONCLUSIONS:

Overall, it is considered that attendance was beneficial because the meeting provided an opportunity to have an updated review of the DOE work on performance of WP and DS materials. As noted, all presentations contained a path forward description that reflected the impact of the agreements reached in recent DOE/NRC technical exchanges on CLST and ENFE.

PROBLEMS ENCOUNTERED:

None.

PENDING ACTIONS:

The chair of the peer review panel expressed an interest in arranging a visit of some members of the panel to CNWRA to get more acquainted with several aspects of our research work in WP and DS materials. This visit and any further public interaction with the DOE peer review panel should be encouraged but always emphasizing our technical independence with respect to the DOE and our contractual relationship with the NRC.

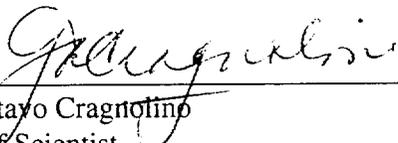
RECOMMENDATIONS:

Future attendance to these type of meetings is useful to keep track of the DOE engineered barriers program.

REFERENCES:

The handouts of the various presentations are available upon request from the author.

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