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December 22, 1986

Dr. Michael McNeil
Nuclear Regulatory Commission
Washington DC 20555

Dear Michael:

Thank you for obtaining an invitation for me to attend the Materials Characterization Center (MCC) workshop on Stress Corrosion Cracking (SCC). I enjoyed the meeting and feel that I was able to contribute to the overall objective which was to recommend procedures for addressing the issue of SCC in a salt repository. The agenda for the meeting is attached. As indicated, there were three phases; on Tuesday morning, the Department of Energy (DOE) researchers presented a summary of their current work on SCC in salt repositories. Copies of their handouts are attached. On Tuesday afternoon, the attendees were split into two groups; one which focused on SCC of low alloy steels and one which focused on SCC of alternate materials. Within each group, we discussed issues associated with i) what environmental variables must be obtained to assess SCC susceptibility, ii) what are the shortcomings of the test techniques currently used, and iii) what techniques should be used. On Wednesday morning, the entire group met again and the conclusions from each working group were discussed. Below is a partial list of the conclusions from the groups, taken from my notes.

LOW ALLOY STEELS

- The research needs to consider worst case environmental conditions as well as nominal conditions.
- The research needs to define limits over which SCC can occur.
- Must consider effects of potential.
- Welds should be stress relieved.
- Need to test full size components.
- Need to consider start-up conditions.
- Need to consider two cases of SCC; 1) with pre-existing cracks and 2) with no cracks.

ALTERNATE MATERIALS GROUP

- Sulfides may be a problem for nickel base alloys.
- Need better modeling for radiolysis.
- The research needs to consider solution volume to surface area ratios.
- Copper should be reexamined for consideration.

Overall I think the conclusions for the meeting vindicated the approach that the NRC and Battelle Columbus Division have taken in our overpack corrosion effort in that many of the criticisms of existing DOE programs that were made at the meeting have been addressed in the NRC research. For example, probably the single biggest criticism of the salt repository research on SCC is related to the focus on the testing on nominal or near nominal repository conditions. Thus, it was argued by several of the attendees that stress corrosion cracking rarely occurs under nominal conditions and thus the research should attempt to study wide ranges of environmental variables. Similarly, it was also argued that the research has focused on non-cracking conditions without attempting to define the regions of environmental factor space where cracking can occur. As you are aware, we have addressed these issues through the statistical experimental design approach in conjunction with the electrochemical and slow strain rate testing techniques.

Very truly yours,

J. A. Beavers
Associate Manager
Corrosion Section

JAB:mg

Enclosures

AGENDA FOR MATERIALS CHARACTERIZATION CENTER WORKSHOP ON STRESS CORROSION CRACKING FOR THE SALT REPOSITORY PROJECT

DECEMBER 16-17, 1986
SEATTLE RESEARCH CENTER, SEATTLE, WA.

8:30 a.m.	Introductory Comments	Dan Merz, MCC Roger Wu, DOE/CH
8:45	Comments on Workshop Objectives	Don Shannon, PNL John Carr, SRP
9:00	Conceptual Design, Expected Environments and Alternate Materials for the Waste Package Container	Ray Giesert, SRP Paul Cloke, SRP
9:45	Coffee Break	
10:00	Review of SCC Testing of Candidate Container Materials in Brines	Dick Westerman, PNL Stan Pitman, PNL
11:45	Lunch at Seattle Research Center Dining Room	
1:15	Summary of Recommendations from Previous MCC Workshop on Stress Corrosion Cracking	Dan Merz
1:35	Questions and Instructions for Working Groups	Dan Merz Don Shannon
1:45	Break into Working Groups:	
	Working Group 1: Low strength steels	Don Shannon
	Working Group 2: Alternate materials including copper-, nickel- and titanium-based alloys	Dan Merz
4:15	Report Recommendations to Workshop Group	Don Shannon Dan Merz
5:00	Social Hour	Suite C-5

Wednesday, Dec. 17

8:30	Discussion of Working Group Recommendations on Steels	Don Shannon
10:00	Break	
10:15	Discussion of Working Group Recommendations on Alternate Materials	Dan Merz
11:30	Individual Comments	
12:00	Adjourn (Lunch provided at SRC dining room)	

Expected attendees:

John Carr, SRP
Ray Giesert, SRP
Paul Cloke, SRP

Roger Wu, DOE/CH/SRP
Caesar Collantes, DOE/RL
Hal Cleary, DOE/CH/SRP

Dan Merz, PNL/MCC
Don Shannon, PNL/MCC
Max Kreiter, PNL/MCC
Russ Jones, PNL
Dick Westerman, PNL
Stan Pitman, PNL
Billie Neth, PNL/MCC

Bill Gerberich, University of Minn.

Joe Payer, Case Western Reserve University

David Duquette, Rennselear Polytechnic Institute

Howard Birnbaum, University of Illinois

Dan Van Rooyen, BNL

Bom Soon Lee, BNL/NRC
John Beavers, BCL/NRC

Ed Aitken, GE
Gary Stimmell, GE

Ron Sorenson, SNL/WIPP

Haskell Weiss, LLNL/NNWSI

Darrel Duncan, RHO/BWIP

Lee James, WHC

Evelyn Gause, Weston

BWIP- Basalt Waste Isolation Project
CH- Chicago Operations
GE- General Electric, San Jose
LLNL- Lawrence Livermore National Laboratory
MCC- Materials Characterization Center
MIO- Materials Integration Office
NNWSI- Nevada Nuclear Waste Site Investigation
PNL- Pacific Northwest Laboratory
RHO- Rockwell Hanford Operations
RL- Richland Operations
SNL- Sandia National Laboratory
SRP- Salt Repository Project
WHC- Westinghouse Hanford Operations
WIPP- Waste Isolation Pilot Plant

WORKING GROUPS FOR MCC/SRP WORKSHIP ON STRESS CORROSION CRACKING

December 16, 1986 - Seattle, WA

LOW STRENGTH STEELS

Group Leader - Don Shannon
PNL-MCC

Ed Aitken /GE
Howard Birnbaum /Univ.ILL.
John Carr /SRP
Hal Cleary /DOE-SRPO
Darrel Duncan /RHO-BWIP
Dave Duquette /RPI
Ray Giesert /SRP
Bill Gerberich /Univ.Minn.
Lee James /WHC-BWIP
Max Kreiter /PNL-MCC
Dick Westerman /PNL-WPP
Bom Soon Lee /BNL

ALTERNATE MATERIALS, including copper-, nickel- and titanium-based alloys

Group Leader - Dan Merz
PNL-MCC

John Beavers /BCL-NRC
John Carr /SRP
Paul Cloke /SRP
Caesar Collantes /DOE-RL
Evelyn Gause /Weston
Russ Jones /PNL-BES
Joe Payer /Case Western
Stan Pitman /PNL-WPP
Dan Van Rooyen /BNL
Rob Sorenson /SNL-WIPP
Gary Stimmell /GE
Haskell Weiss /LLNL-NNWSI
Roger Wu /DOE-SRPO

Questions posed to working groups:

1. Are the environments expected in a salt repository as represented by the information presented at this meeting sufficient to assess stress corrosion cracking? Are there considerations for the environment that appear to be overlooked and should be strengthened by additional data?

2. Are there well-defined instances of stress corrosion cracking for the material of concern in environments that are similar to or are the same as the expected environments in a salt repository project?

3. What test methods or data will most strongly support the use of the material of concern with regard to stress corrosion cracking resistance during service in a salt repository?

If the group has time, the following questions can be addressed or the participants may want to consider these questions for comment during the second day of the workshop.

4. What features of design or material treatment will be practical and will strengthen the case for container (overpack) integrity over the time period of service in a salt repository?

5. Can the group arrive at a consensus that one class of materials is likely to be better than others with respect to stress corrosion cracking resistance for the environments expected in a salt repository? Derive a prioritized list if possible and the rationale.