September 24, 2002

Dr. Vijay Jain, Manager
Container Life and Source Term
Center for Nuclear Waste Regulatory Analyses
6220 Culebra Road, Building 189
San Antonio, Texas 78238-5166

SUBJECT: COMPLETION OF INTERMEDIATE MILESTONE - IM 1402.571.240 (STRESS CORROSION CRACKING AND HYDROGEN EMBRITTLEMENT OF CONTAINER AND DRIP SHIELD MATERIALS)

Dear Dr. Jain:

The U.S. Nuclear Regulatory Commission staff has completed its review of the subject report, which was sent to us by the Center for Nuclear Waste Regulatory Analysis (CNWRA), on September 9, 2002. With consideration given to the attached comments and corrections this report is programmatically and technically acceptable for public release. It was sent on time and provides input to our ongoing issue resolution work. Analyses of the validity of the assumptions supporting environmentally assisted cracking as a major degradation mode for the Waste Package (WP) and Drip Shield (DS) are an important component of CLST. This report addresses a review of the Department of Energy's results and current models for stress corrosion cracking (SCC) of the WP and DS, review of the State of Nevada's investigation into minor species affecting SCC, the review of recent CNWRA experimental data on SCC, and proposed future work that may be needed to better support current models.

If you have questions, please contact me at (301) 415-6626.

Sincerely,
/RA/

Tamara E. Bloomer, Program Element Manager
Division of Waste Management
Office of Nuclear Material Safety and Safeguards

Attachment: As stated

cc: J. Linehan
B. Meehan
B. Sagar, CNWRA

September 24, 2002

Dr. Vijay Jain, Manager
Container Life and Source Term
Center for Nuclear Waste Regulatory Analyses
6220 Culebra Road, Building 189
San Antonio, Texas 78238-5166

SUBJECT: COMPLETION OF INTERMEDIATE MILESTONE - IM 1402.571.230 (PASSIVE DISSOLUTION OF CONTAINER MATERIALS - MODELING AND EXPERIMENTS)

Dear Dr. Jain:

The U.S. Nuclear Regulatory Commission staff has completed its review of the subject report, which was sent to us on July 25, 2002. With consideration given to the comments and corrections supplied to the Center for Nuclear Waste Regulatory Analysis (CNWRA), this report is programmatically and technically acceptable for public release. It was sent on time and provides input to our ongoing issue resolution work. Analyses of the validity of the assumptions supporting the long-term degradation estimates of the Waste Package (WP) are an important component of CLST. This report addresses the review of current models for passive dissolution of the WP, the review of recent experimental data, and a proposed model to estimate the penetration rate of a surface that roughens with time and supports the results of the current experimental data. While the proposed model is a starting point, further evaluation may be needed.

If you have questions, please contact me at (301) 415-6626.

Sincerely,
/RA/

Tamara E. Bloomer, Program Element Manager
Division of Waste Management
Office of Nuclear Material Safety and Safeguards

Attachment: As stated
cc: J. Linehan
B. Meehan
B. Sagar, CNWRA

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Overall, the report is acceptable summarizing the status of DOE/NRC/State efforts in SCC with appropriate literature evaluations

General Comments

1. In the discussion of issue resolutions for many involved agreements, the risk approach and the design approach need to be considered.

2. It is unclear whether potential or threshold stress intensity controls the initiation of WP SCC. If the potential is controlling, how does it affect the current TSPA results. Will it be more conservative? Also it is unclear, then, how the solution chemistry is factored in the two criteria.

3. Remove all references to the thickness of the WP (either layer). Examples are on page1-1.

Specific Comments

1. DOE considers rock fall stress can be elastic by proper designs of DS and WP. Also, DOE did not see any SCC from U-bend (plastic stress) specimens in LTCTF.

2. In p. 2-11, the 1st paragraph 2.1.3, under what conditions did DOE observe SCC?

3. The double cantilever beam and compact tension specimens were periodically removed from the test cells for inspection in p. 2-17. Does it change the local chemistry?

4. In the second paragraph of p. 2-22, is this SCC, corrosion fatigue, or fatigue crack propagation? How is this relevant to the repository system?

5. In p. 2-27, the compliance change may not mean an indication of crack propagation. Then why does it happen? Is the use of plane stress conditions valid for mapping them into the repository conditions? The normal practice is to use the plain stress.

6. In p. 3-5, it is unclear why lead nitrate is not included. What would happen to the speciation curves at T greater than 100 C.

7. Fluoride enhanced Ti corrosion needs to address the fluoride mass-limited corrosion too.

8. It is unclear how fluoride affects the SCC susceptibility of Ti 7 in the Center tests. Is it due anodic dissolution or hydrogen embrittlement? If it is due to anodic dissolution, the agreements related to hydrogen embrittlement can be complete.

Minors

- In p. 1-1, clarify the 17th sentence.

- “drift collapse” was suggested to be “drift degradation.”

ATTACHMENT