USED FUEL STORAGE AND TRANSPORTATION ISSUE SCREENING FORM
Issue Number: N-10-01

Title: Dry Spent Fuel Storage Canister Chloride Induced Stress Corrosion Cracking

I. a. Problem Statement (Provide a clear, concise description of the issue.)

There is insufficient data to determine the minimum conditions (environmental and cask), and the associated time scales, necessary for potential initiation of stress corrosion cracking (SCC) in stainless steel dry spent nuclear fuel (SNF) storage canisters deployed at ISFSIs located in chloride atmospheres.

b. Background Information (Summarize industry events, licensing actions, inspection information, correspondence, and other documents germane to the issue. Attach documents as appropriate)

Austenitic stainless steels (304, 304L and 316L) used for confinement boundary in SNF storage canisters may be susceptible to SCC when exposed to a chloride atmosphere (References 1 through 4). Fog and spray aerosols from salt water bodies can contain high concentrations of chlorides that may deposit on canister surfaces, potentially leading to SCC. Degradation from this phenomenon may impact the ability of the storage system confinement boundary to perform its safety function over an extended operating period. SCC, if present, may also impact the future transportation performance (if the system or component is dual-purpose certified). The chloride induced SCC (CISCC) phenomenon has historically not been the subject of NRC review of applications for dry spent fuel storage system Certificates of Compliance, but has been the subject of some RAIs issued since 2012.

References 1 through 4 contain descriptions of laboratory experiments performed to simulate the CISCC phenomenon. However, the laboratory conditions do not accurately represent in-situ conditions at ISFSI sites. This difference between the laboratory and the in-situ conditions makes it impossible to determine the condition-based time scales under which SCC of stainless steel dry cask storage canisters could potentially occur.

References:
1. "Research Program on Stress Corrosion Cracking of Stainless Steel Canister for Concrete Cask," Central Research Institute of Scientific Power Industry (CRIEPI), Japan, January 16, 2007.
2. NUREG/CR-7030, "Atmospheric Stress Corrosion Cracking Susceptibility of Welded and Unwelded 304, 304L, and 316L Austenitic Stainless Steels Commonly Used for Dry Storage Containers Exposed to Marine Environments," USNRC, October 2010.
3. Report 1011820, "Effects of Marine Environments on Stress Corrosion Cracking of Austenitic Stainless Steel," Electric Power Research Institute, September 2005.
4. Report 1013524, "Climatic Corrosion Considerations for Independent Spent Fuel Storage Installations in Marine Environments," Electric Power Research Institute, June 2006.

II. Screening Criteria (Provide an explanation as to how the issue meets each of the screening criteria to be considered for generic issue resolution.)

1. Does the proposed issue involve spent fuel storage or transportation and affect multiple 10 CFR 71 and/or 10 CFR 72 regulated entities (provide basis)?

Yes. There are multiple ISFSIs located at sites in the United States which could potentially be classified as having chloride atmospheres.

2. Does the proposed issue warrant generic resolution (provide basis)?

Yes. A consistent approach is needed to determine what conditions define a chloride atmosphere in the context of chloride induced SCC of austenitic stainless steel and over what time frame SCC could cause deleterious effects to the SNF canister's confinement boundary.

3. Does the issue warrant engagement between the industry and NRC (provide basis)**?**
Yes. The NRC believes industry involvement would provide a better understanding regarding the extent of the condition and/or provide additional data to address salt deposition and potential degradation due to CISCC. This effort would inform future licensing requirements for spent fuel storage systems.

4. Will generic resolution of the issue produce tangible benefits (provide basis)**?**
Yes. The beneficial outcomes of resolving this issue using this protocol are a consistent licensee and CoC holder approach to addressing the issue and a stable, predictable licensing and inspection protocol.

5. Is the issue already adequately covered by another process (provide basis)**?**
No. This issue has not reached a level of urgency or safety significance to qualify it for the NRC's generic safety issue process because testing is inconclusive (laboratory conditions do not accurately represent in-situ conditions at ISFSI sites), actual conditions (atmosphere and cask) vary from site to site and from model to model and cask to cask; and actual field data is insufficient. Since there is not an immediate safety concern, use of this protocol permits a deliberate yet timely approach to understanding the issue and creating the necessary tools for licensing and implementing prevention and mitigation strategies, as necessary.

POC: Are all screening criteria satisfied ("Yes" responses to questions 1-4 and "No" to question 5) **?**
Yes ___X_____ **No**_____

III. Success Criteria (Describe the criteria to be used to define success for resolving this issue.)

Acquire and document data to determine:
1. The minimum conditions (cask and environment) necessary for potential initiation of CISCC.
2. The time scales under which CISCC could occur, based upon actual atmospheric and cask conditions.

IV. Date: __01/31/2013_____