Contribution ID: **3** Type: **ORAL**

Investigations of SCC on Spent Fuel Dry Storage Canisters used for Long Term Storage

In 2009 the United States made a decision to discontinue pursuing a license for a long-term geologic repository for used nuclear fuel. Until another license is pursued, used nuclear fuel will accumulate and remain in dry storage for longer than originally planned. At the end of 2013, the US had over 22,000 Metric Tons Uranium (Initial) of used nuclear fuel in 1850 dry storage casks, stored in over 60 sites at reactor sites across the United States (Carter & Vinson, 2014). Most of this fuel is placed in metal canisters (usually welded 304SS) which are either stored horizontally in a concrete bunker or vertically in individual concrete over packs. Each canister/cask system is passively cooled using open vent ports to allow natural convection to cool the canister inside the over pack. These open vents also allow dusts and other particulates from the outside air to enter and settle on the canister surface. The US Department of Energy and the US Nuclear Regulatory Agency are interested in understanding potential failure mechanisms for these casks during long term dry storage; one being stress corrosion cracking (SCC). Few visual inspections have occurred because 1) it is difficult to remove the canister once it is inside the overpack, 2) there is very little space between the canister and the overpack, and 3) there are high radiation levels. Because of these limitations, the DOE is working to understand the mechanisms for SCC of these canisters.
In order for stress corrosion cracking to occur, three conditions must be met. There must be:
1. A susceptible material: 304SS is known to be susceptible to SCC.
2. A corrosive environment: Samples of the dust ,salts, and temperature on canisters in various locations have been collected.
3. Tensile Stress: A full-scale diameter cylindrical mock-up is being used to measure residual stresses near the welds and heat affected zones.

The analysis of these experiments will be discussed in this paper.
It is very important to maintain leak tight canisters; therefore the US Nuclear Regulatory Agency is considering visual inspections of individual canisters while in storage. The R&D being performed in this project will be used to help determine the need for this testing, potential start times, locations, and frequencies of that monitoring to help ensure that the entire fleet of canisters remains as protective as designed for the duration of the storage life.

Country/ int. organization

Sandia National Laboratories

Primary author: Ms SALTZSTEIN, Sylvia (Sandia National Labs)

Co-author: Mr SORENSON, Ken (Sandia National Labs)

Presenter: Ms SALTZSTEIN, Sylvia (Sandia National Labs)