From: Tae Ahn
To: Darrell Dunn
Date: 1/22/04 3:30PM
Subject: RE: Perforations on WP Surface

Thanx very much, Darrell. All sound good. I meant that the absence of DS would fall rocks on the WP surface, which may in turn lead to the crevice on the top WP area. We need to talk to geochemists about the mineral deposits. Also, trunnion is a potential crevice.

>>> Darrell Dunn <ddunn@cnwra.swri.edu> 01/22/04 01:52PM >>>
The corrosion rates in the Configuration Generator Model In-Package Criticality document are under passive conditions. I don't believe localized corrosion is considered even for 316 Stainless steel.

(1) Uniform corrosion: Random distribution may be a good approximation. Taking an example from atmospheric exposure suggests that the lower or underside of the WP may see preferential accumulation of water. As a result the underside of the WP may have conditions that support corrosion reactions when the upper side of the WP does not. Accumulation of dust (and deliquescence of dust) may change this since dust would be expected to greater accumulation on the top side of the WP.

(2) Occurrence could be random but the orientation would likely be radial if driven by hoop stress. Cracks parallel to the weld can also be promoted by stresses that develop during solidification. Weld defects such as lack of fusion between weld passes would likely be oriented parallel to the weld.

(3) Juvenile failures or perhaps initial defects are more likely to be in weld regions. The ability to do NDE of the disposal container is greater than the loaded and closed WP. Therefore, initial defects are more likely to be in the closure welds. Recall that even though we have questions about the use of NDE to inspect the final closure welds, the DOE has shown that UT can detect linear defects that may act as initiation sites for mechanical failure or SCC.

(4) "intuitively crevice corrosion is more likely to occur at the bottom in the presence of DS." I don't understand this statement. Do you mean that crevice corrosion is more likely because of the WP/pallet contact? Unless the Drip shield is in contact with the WP I do not see how the presence of the drip shield should affect the initiation (or promote) localized corrosion of the WP. The WP/Pallet contact is very likely to be sufficient for crevice corrosion initiation assuming the necessary environmental conditions are also present. It is not clear to me that dust could form a crevice unless there were insoluble compounds that could tightly adhere to the WP. We have observed crevice corrosion on Alloy 825 under silica deposits. The deposits developed in a period of less than 2 months as a result of dissolution of our glass test cells (we did not add silica to the test solution). In other words, even small silica deposits can act as crevices.

-----Original Message-----
From: Tae Ahn [mailto:TMA@nrc.gov]
Sent: Thursday, January 22, 2004 6:31 AM
To: DDUNN@cnwra.swri.edu; gcragno@cnwra.swri.edu
Subject: Perforations on WP Surface

** High Priority **

One of the action items in CLST Team Meeting Path Forward is to update the groundwater flow mode in the failed WP. I have thought about it for a while along with reviewing Configuration Generator Model In-Package Criticality and a related AMR. Please comment on my summary and questions:

(1) from uniform corrosion: patch corrosion could occur randomly from the bottom to the top;

(2) from SCC: from close-weld, cracks could occur randomly from the bottom to the top;

(3) from juvenile failure: cracks could occur randomly from the bottom to the top;

(4) from localized corrosion: intuitively crevice corrosion is more likely to occur at the bottom in the presence of DS. However, for the crevice corrosion to occur, a critical crevice geometry (tight and large crevice area) is needed for this type of passive metals. It is unclear whether the current design of pallet and invert would give this type of crevice geometry. Additionally, localized corrosion would occur mostly from dust deposits in the presence of DS. Do dust or salt deposits induce crevice too? If so, perforations would occur randomly.

It is clear that (1), (2) and (3) support the current TPA scenario while (4) seems to be somewhat uncertain.