HLWYM HEmails

From: Andy Jung
Sent: Tuesday, January 23, 2007 11:12 AM
To: Ronald Janetzke
Cc: Osvaldo Pensado; Pavan Shukla; Yi-Ming Pan; Xihua He
Subject: RE: TPA parameter changes

Hi Ron,

I have additional changes in the input parameters in EBSFAIL/DSFAIL modules as below. Please incorporate these changes to the TPA code. Thank you.

Input Block in tpa.inp	Parameter Name	Description	Distribution Type and Parameter Value(s)	Remarks
DSFAIL	DripShieldCorrosionRate[m/yr]	Drip shield corrosion rate [m/yr]	uniform 7.6e-8 1.32e-6	Based on the data in the literature, the corrosion rate bounds of 3.8 ×1 0^{-8} and 6.6 × 10^{-7} m/yr are selected. Because corrosion happens in the underside of the drip shield, these bounds are multiplied by 2 and a uniform distribution is selected (Bechtel SAIC Company, LLC, 2004; Blackwood, et al., 1988; Hua and Gordon, 2004; Schutz, 2003).
EBSFAIL	CriticalRelativeHumidityAqueousCorrosion	Critical RH above which aqueous corrosion may initiate [unitless]	constant 0.2	This parameter controls the onset of aqueous corrosion. It represents the equilibrium relative humidity for deliquescence. The TPA model assumes that localized corrosion cannot be supported by deliquescence environments due to the presence of localized corrosion inhibitors, such as nitrate, in dust. TPA results are relatively insensitive to the exact time for the onset of aqueous corrosion. The current parameter value is a reasonable selection for the deliquescence relative humidity based on experimental values at temperatures close to 100 °C. In general, experimental data are available to define the dependence of the deliquescence relative humidity on the temperature for various systems; see Scientific Notebook 464 (Yang, **YEAR**). However, a single value for this parameter is sufficient given the relative lack of sensitivity of TPA results on this parameter. The value was lowered from 0.3 to 0.2 because recent studies showed that aqueous corrosion can take place at lower RH (Yang, 2006). But the effect by the amount of solution is uncertain. Must be evaluated further.

EBSFAIL	CriticalRelativeHumidityHumidAirCorrosion	Critical relative humidity above which humid-air corrosion may initiate [unitless]	constant 0.15	It is assumed that the rate of humid air oxidation is negligible in Alloy 22 in the basecase. TPA code results are independent of the value of the parameter CriticalRelativeHumidityHumidAirCorrosion, but this parameter must not exceed the CriticalRelativeHumidity AqueousCorrosion parameter. This value was lowered from 0.2 to 0.15 to be consistent with the change in CriticalRelativeHumidity AqueousCorrosion.
EBSFAIL	OuterWPThickness[m]	Thickness of the outer overpack [m]	constant 0.025	Engineering specification taken from the repository design and having no significant uncertainties; current value conforms to the clearance between the drip shield bulk head and 21 PWR waste package (CRWMS M&O, ANL–XCS–ME–000001, 2000; Snell, 1999; and CRWMS M&O, 2000f). Consistent with current DOE design.
EBSFAIL	InitialFailureTime[yr]	Failure time for initially defective WPs [yr]	constant 0.0	The choice of the value is arbitrary and conservative.
EBSFAIL	WeldAdvectiveFraction[]	Initial defective fraction of waste package [unitless]	loguniform 1.0e-4 1.0e-2	Fractions computed by estimating the total area of welds on the WP surface (assumed a weld thickness equal to 2 cm, one circumferential weld on the bottom lid and another in the top lid, two circumferential welds on the lower trunnion collar and two in the upper one, one circumferential fabrication weld, and one longitudinal fabrication weld). The total weld length is around 40 m, and the total WP surface is around 30 m^2.

Andy

-----Original Message-----
From: Osvaldo Pensado [mailto:opensado@cnwra.swri.edu]
Sent: Thursday, January 18, 2007 5:44 PM
To: Ronald Janetzke; Rwrice@aol.com
Cc: Hundal "Andy "Jung; Pavan Shukla; Yi-Ming Pan; Xihua He
Subject: TPA parameter changes

Ron, there are some parameters that for some reason were not updated like 1.5 years ago. Here are revised values. I hope we can incorporate these changes in the next version of the TPA code. Thanks

Ebsflo.def		Adjust fwet column to 1.0 values
OuterOverpackErpIntercept	triangular 1541.2, 1591.2, 1641.2	mV_{SHE} Reference: CNWRA 2005-02, Table 5-2

TempCoefOfOuterPackErpIntercept	constant -13.1	mV/°C Reference: CNWRA 2005-02, Table 5-2
OuterOverpackErpSlope	constant -362.7	mV Reference: CNWRA 2005-02, Table 5-2
TempCoefOfOuterPackErpSlope	constant 2.3	mV/°C Reference: CNWRA 2005-02, Table 5-2
CritChlorideConcForFirstLayer[mol/L]	constant 1.0E-4	mol/L Reference: CNWRA 2005-02 Note that Table 5-2 recommends a value of 0.5. However, localized corrosion at [Cl^-]=0.05 mol/L at 95°C in mill an Since critical chloride threshold does not appear to be wel and O. Pensado recommend to disregard such a threshold concentration to a small value is equivalent to disregardin Note that the minimum chloride concentration in Figure 5 this parameter change has no effect in the total system resu
WeldCritChlorideConc[mol/L]	constant 1.0E-4	mol/L Reference: CNWRA 2005-02 Table 5-2 recommends a value of loguniform(0.01, 0.25). threshold value to be a distribution may artificially disrega where the corrosion potential exceeds the repassivation po reports localized corrosion at [Cl^-] as low as 10^{-3} mol/L i annealed material at 95°C. . Since critical chloride thresho to be well defined, D. Dunn and O. Pensado recommend t threshold (setting the concentration to a small value is equ disregarding a threshold). Note that the minimum chloride Figure 5-4 is 4 mol/L; thus, this parameter change has no system results.

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