From: Mark Kirk / RES
To: Steven Long / NRR
Date: 7/3/02 4:43PM
Subject: Fwd: Failure Model for DB

Steve -

Attached please find a report from ORNL regarding the state of their model of DB in the "as found" condition. Paul is currently putting the finishing touches on this report (please consider the attached only a draft).

The short summary of this report is as follows:

1. If we use a Weibull cumulative probability function to represent the uncertainty associated with the failure criteria we arrive at an absolute lower bound burst pressure of 5.5 ksi. Because the 3 parameter Weibull function has a finite lower bound value there is - according to this model - zero probability of failure at pressures below 5.5 ksi

2. If instead we adopt a Normal cumulative probability function to represent the uncertainty associated with the failure criteria we arrive at a cumulative probability of failure of 8.4E-10 at the operating pressure of 2.165 ksi. At a slight overpressure (2.5 ksi) the probability of failure goes up by about an order of magnitude to 8.9E-9. In either event, these are very small numbers. Also, please bear in mind that in constructing the geometric and material models we intentionally adopted pessimistic viewpoints (i.e. we modeled the wastage area as being a little bigger than the measurements suggested it should be, and we modeled the stress strain properties as being somewhat lower than the measurements suggested they should be). Thus, these very small failure probabilities are likely closer to upper bound than to mean values.

Please remember that this is hot off the press and, therefore, subject to some revisions next week.

Next week we will begin calculations on larger footprints for the wastage area. In this regard, it is i think worthwhile to note that - given the high failure pressures that the "as found" model predicts - it is quite likely that when we "grow" the cavity it will engulf nozzle 11 long before it fails. Once Nozzle 11 enters the picture it seems to me that our simple cavity growth models become much more questionable / uncertain. I feel we should keep this in mind as we pursue calculations on larger footprint areas, so that we don't delude ourselves regarding how well these models really represent reality.

All the best for the 4th

Mark

CC: Bass, Richard - ORNL; Edwin Hackett; Nilesh Chokshi; Wallace Norris; William Cullen; Williams, Paul - ORNL

H-69