From: "Adkins, Harold E" <Harold.Adkins@pnl.gov>
To: Christopher Bajwa <CSB1@nrc.gov>
Date: Thu, Mar 20, 2003 9:06 PM
Subject: The "BTF Stuff"

Chris,

I went ahead and ran a 45 minute and 60 minute long 10CFR71.73 type fully engulfing fire to add to our set of data points (2D BTF and standard 10CFR71.73 case). The magnitude of heat consumed per axial inch of cask over the fire duration has been determined as follows.

- For the 2D BTF, I come up with 43,475 BTU's total per axial inch over the 7 hour span. This works out to be approximately 6211 BTU's/hour as an average. However, do NOT focus on the average because it is deceiving. As you know, the cask will suck up much more heat at the beginning of the fire and then taper off as the fire continues to cessation.

- For the 30 minute 10CFR71.73 fire, I get 12,506 BTU's total per axial inch of cask over the 0.5 hour span. This is approximately 25,012 BTU's/hour on average.

- For the 45 minute "10CFR71.73-like" fire, I get 15,869 BTU's total per axial inch over the 0.75 hour span.
This works out to be approximately 21,159 BTU's/hour on average.

- For the 60 minute "10CFR71.73-like" fire, I get 18,857 BTU's total per axial inch over the 1.0 hour span.
(~ 18,857 BTU's/hour on average)

As you can see, the average magnitude of heat absorption is initially significantly higher for the engulfing fire than that of the BTF case. However, as the engulfing fire duration is extended, the average magnitude starts to drop dramatically as expected. We obviously didn't get where you wanted to be as far as predicting how long it would take the engulfing fire energy input to match the BTF but we have enough information to make an estimate.

Plotting the three data points and assuming that the extended response will be close to linear, we come up with the linear relationship,

(BTU's/axial inch) = 12,701xTime(hours) + 6218

The equation predicts roughly 2.9 hours. I will verify this next week.

One final point to note is that the inner contents of this cask heats up surprisingly slow. I believe the reason to be that the Holtite-A and limited fin area are shunting the transient heat absorption a bit more than other casks we will be evaluating down the road.

That's all for now. I will hook up with you on Monday about this.

Take care and have a good weekend.

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