HLWYM HEmails

From: Randall Fedors
Sent: Tuesday, January 23, 2007 7:01 AM
To: Goodluck Ofoegbu
Cc: Asadul Chowdhury; Budhi Sagar; Chandrika Manepally; Luis Ibarra; Scott Painter; Marissa Bailey; Christopher Grossman; Jack Davis; Brittain Hill; Mysore Nataraja; Timothy McCartin; Mahendra Shah; James Rubenstone
Subject: Re: Preliminary Analsysis to estimate the effects of rubble on drift-wall temperature

Goodluck,

Britt asked a few questions early on, but I've missed most of the discussion. But, I have heard some question about the possibility of degradation being arrested because thermal expansion would no longer cause spalling as drift wall temperatures dropped. The biggest reason to expect the drift ceiling temperature to drop during degradation is that the drift ceiling is no longer at the original location, but rather ~10 meters further from the heat source (your last comment in the email below). As Rubenstone mentioned, it is important to find the temperature threshold at which thermal expansion would not cause rubble to form. I'm not sure what Scott's analysis adds to answering the question on arresting degradation.

Figure 3-4 of Manepally et al 2004 showed that the drift wall reaches it's maximum temperature before the rubble covers the drip shield (using base case MechFail output). The host rock temperatures are dropping before the rubble covers the drip shield. The drift crown temperature (at the degraded ceiling height) drops below 100 C between 300 and 400 years. At 100 C, do you still expect spalling to occur? Note that degradation continues for 1,000 years in the MechFail abstraction, though I believe the base case value for the "end of degradation" was ~ 750 years.

What I never heard was a description of your (Goodluck's) heat transfer approximation as used in the rock mechanics analysis. Do you use a maximum temperature and uniform temperature field, or a heat transfer model that provides a time profile with spatial variability, or what?
--Randy

>>> Goodluck Ofoegbu <ofoegbu@cnwra.swri.edu> 01/22/2007 5:10:07 PM >>>
We have performed an analysis to estimate the effects of rubble on temperature at the drift roof considering the insulating effects of rubble only. The analysis was performed to address an NRC staff enquiry regarding whether insulation of waste packages by rubble could cause drift degradation to be arrested prior to the drift filling with rubble. As discussed last week, we had intended to perform heat flow and thermal-mechanical analyses to address the subject of the inquiry. A heat flow analysis performed by Scot Painter, which is described in the attached document, indicates any decrease in temperature at the drift roof owing to the insulating effects of rubble alone would be negligible. Because of the results of Painter's analysis, we do not recommend performing additional analysis to investigate the effects of rubble insulation on thermal-mechanical conditions at the drift roof.

We are considering other analyses to investigate a second aspect of the problem, regarding potential effects of the increasing distance of the drift roof from waste packages as a drift degrades. We can meet to discuss the results if so desired. Please provide any comments you may have.

Thank you.

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Subject: Re: Preliminary Analsysis to estimate the effects of rubble on drift-wall temperature
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