From: Chandrika Manepally
Sent: Thursday, January 25, 2007 12:21 PM
To: Kaushik Das; 'hbasagaoglu'
Subject: RE: Temperature gradient

I guess you both must've responses for Randy's comments. Let me know when you are ready to discuss this with me.
I also think we should run it by Stu when he has a few minutes.

-Chandrika

-----Original Message-----
From: Randall Fedors [mailto:RWF@nrc.gov]
Sent: Wednesday, January 24, 2007 2:23 PM
To: Chandrika Manepally; Kaushik Das; 'hbasagaoglu'
Subject: Re: Temperature gradient

My only rambling thoughts are:

1. It sounds like you are not seeing an effect on L. Can we neglect the period before the dryout zone is entirely in the rubble? This means neglecting the period 50-150 years. Essentially, this tells us to avoid putting much effort into reflux3, and focus on the rubble reflux model (which right now, is Winterle's diffusion model). This leads to the question of how the diffusion model results vary with time, or rather, vary with dryout thickness in the rubble.

2. The definition of Delta-T in O.M. Phillips' model is vague; he assumes delta-T is uniform over the entire distance L. We know that delta-T varies in the dryout zone from high values near the crown to low values near the reflux zone (boiling isotherm). We also know that the gradients decrease with time. If you try to define delta-T representative of an average through the dryout zone (is this valid?), the the area term should also reflect the average area (not just be the area at the drift crown). Also, can't area be removed from from the analysis in equations 2 through 4 (Qheat = qwp * Area; and qwp does not vary with radial distance, only the area changes). Anyway, this does not eliminate the vagueness of how to estimate delta-T. An aspect of this issue is the question of whether the 1 to 20 range for delta-T is reasonable. Can a plot of delta-T over time be developed so that we get a sense of when the small and large values occur (I guess this means using the mountain-scale conduction model to estimate delta-T over time).

3. Note Q in equations 2 through 4 is Q(heat), whereas Q in equation 1 is water flux.

4. The range of effective thermal conductivity for the rock (1.02 -2.13 W/m-C) doesn't seem valid. As you suggest/imply elsewhere, a reasonable value is nearer the dry thermal conductivity for the host rock. However, using lower values for the the effective thermal conductivity will increase the L distance.

5. I wasn't clear on why the rubble and air gaps were brought into Figure 1. Were we going to try to use the algorithm on a mixed rubble/hostrock dryout zone? I say we decide

question 1, first. Then, see if we can make the reflux3 module work for hostrock (without temperature threshold to constrain). Then look at doing a mixed dryout zone.

Check with Ron Green to see how firm he is on allowing water to breach the dryout zone before peak temperatures occur. I'll go downstairs to talk to Pohle.

--Randy

>>> Kaushik Das <kdas@cnwra.swri.edu> 01/23/2007 11:43 AM >>>

Dear Randy,

I have attached a write up about the temperature gradient required to calculate the finger length in O M Philips model.
We are not sure if this approach will fix the problem of determining L in the TPA code but it seems that all the quantities required to find the gradient will be readily available within the subroutine and provide a realistic temperature gradient.
Let us know your thoughts about it.

Thanks

Kaushik

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Subject: RE: Temperature gradient
Sent Date: 1/25/2007 12:21:27 PM
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From: Chandrika Manepally

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Recipients:
"Kaushik Das" <kdas@cnwra.swri.edu>
Tracking Status: None
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Tracking Status: None

Post Office: cnwra.swri.edu

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MESSAGE	3441	1/25/2007 12:21:27 PM

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