HLWYM HEmails

From: Randy Fedors [rfedors@cnwra.swri.edu]
Sent: Wednesday, October 06, 2004 2:19 PM
To: Osvaldo Pensado
Cc: 'George R. Adams'; Sitakanta Mohanty; Ronald Janetzke; Roberto Pabalan; dfarrell@cnwra.swri.edu; Alexander Sun
Subject: RE: George's validation test results

You heard the caveats yesterday. I'll try to state them differently here.

The seepage threshold temperature is a rule of thumb. In a way, it is an abstraction of the reflux3 approach (yes, an abstraction of an abstraction).
The rule of thumb is really statistical in nature. Statistically-speaking, more seepage can occur as the above-boiling temperature approaches the boiling point of free water (as opposed to water in porous media). Higher seepage fractions occur near 100 C. Conversely, there will be some smaller amount of seepage at temperatures near 120 C (smaller in quantity and smaller in spatial occurrence). A confluence of extreme conditions and porous media properties will bring water into the drift at even higher temperatures. Heterogeneities in the natural systems will lead to seepage at temperatures above the boiling point of free water.

In Browning, et al. (MRS paper, 2004), we conceptualized thermohydrologic environments which would control the chemistry of water contacting the engineered barrier system. I believe Browing et al. is where the TPA environments were derived. The paper focused on chemistry in those environments. "For this paper, we consider the dry environment to exist when drift wall temperatures exceed 105 C." Note there was very little said in the paper on a seepage threshold temperature; i.e., no support, only a statement that we use a threshold temperature to discuss our chemistry of water environments.

With that said, however, if we put a reasonable distribution in for the seepage threshold temperature, then the two models will produce generally similar results (for performance assessment modeling). Is setting the seepage threshold temperature equal to 100 C defensible, or 105 C? No.
That's like setting net infiltration to 1 mm/yr for all place and all times.

Even if TSPAI never wants to use the reflux modules, reflux3 may be a tool we could use to help define the distribution of the seepage temperature threshold. I had also mentioned Birkholzer's work as another place to find some support.

--Randy

-----Original Message-----
From: Osvaldo Pensado [mailto:opensado@cnwra.swri.edu]
Sent: Wednesday, October 06, 2004 12:13 PM
To: dfarrell@cnwra.swri.edu; asun@cnwra.swri.edu; rfedors@cnwra.swri.edu
Cc: 'George R. Adams'; Sitakanta Mohanty; Ronald Janetzke; Roberto Pabalan
Subject: RE: George's validation test results

A comment ...

There are limitations with the reflux model 3. For TPA purposes, we have modified the reflux model by setting a seepage threshold temperature (around 100 C), above which water does not contact waste packages. This addresses TPA needs.

It is interesting learning that reflux model 3 is independent of the temperature, and thus it leads to situations such as seepage contacting the DS or WP at temperatures up to 140 C. We are not comfortable with reflux 3 model in the way it is now.

I fully endorse pursuing a model that we feel confident; however, there is no such an urgent need for TPA if you believe the seepage threshold temperature concept (don't you?).

For example, if you predict that water can hit the DS or WP at temperatures as high as, say, 130 C, what is the chemistry of the resulting evaporated solution? What is the frequency of this chemistry? Suddenly, what we call Environment I could become very significant.

My point is that, yeah, you fix the reflux 3 model, but that is not the end of the story in what TPA code concerns.

We currently have a defensible approach that relies, heavily, on the seepage threshold temperature concept. Chemistry for Environment I and Environment II was selected thinking on this threshold temperature.

Thus, TEF fellows, you are welcome to polish the reflux model. However, from TPA code point of view I see no rush (unless you oppose the seepage threshold temperature concept). We need to caveat users of limitations/inconsistencies of the reflux 3 model.

Osvaldo

-----Original Message-----
From: David Farrell [mailto:dfarrell@cnwra.swri.edu]
Sent: Wednesday, October 06, 2004 10:50 AM
To: asun@cnwra.swri.edu; rfedors@cnwra.swri.edu
Cc: 'George R. Adams'; 'Osvaldo Pensado'
Subject: RE: George's validation test results

We don't really have an alternative ... the rest of us are tied up with reviews ... if you want to do a review then I can get some one else to do the analysis. Review response are due at the end of the month. By the way Sitakanta will assign your GoldSim task to some one else.

David

-----Original Message-----
From: Alexander Sun [mailto:asun@cnwra.swri.edu]
Sent: Wednesday, October 06, 2004 10:23 AM
To: rfedors@cnwra.swri.edu
Cc: 'George R. Adams'; 'Osvaldo Pensado'; 'David Farrell'
Subject: RE: George's validation test results

Randy,
I have not used TPA before. I think it'll save a lot time if you ask someone with TPA experience to run the reflux module. I hope there is an alternative.

Regards,

Alex

-----Original Message-----
From: Randy Fedors [mailto:rfedors@cnwra.swri.edu]

Sent: Wednesday, October 06, 2004 9:57 AM
To: Ronald Janetzke
Cc: 'George R. Adams'; Osvaldo Pensado; David Farrell; Alexander Sun
Subject: George's validation test results

There were three things I was responsible for from our meeting Tuesday afternoon on George's validation testing of nfenv module in TPA 5.0.0d.

Before commenting on the 3 items, do I remember correctly that George used the first realization of parameters and subarea 1? Is is possible to use basecase parameters and subarea 1? I am still wondering why George's results for TPA 5.0.0d validation were approx 20 C cooler than Carol's results in TPA 5.0y validation testing (Carol used subarea 7, but there is no reason for subarea 7 to be hotter than subarea 1; if anything, subarea 7 should be slightly cooler at later times).

1. The late time response of relative humidity I agree with the TPA results after checking some of the calculations. I now see that my uneasiness with the RH response was caused by familiarity with RH response when no rubble pile was present. The response at late times differs markedly when a rubble pile is present.

2. Reflux3
I talked with Barbados about Alex exercising the reflux3 module in the next couple weeks. The goal would be to identify parameter ranges that lead to thermal seepage results that TEF can justify based on "expert" concensus, whatever that is. Barbados talked with Sitakanta about freeing up Alex's time to work on the reflux3 parameter input distributions. [This task falls outside the realm of George's validation testing, especially if TPA 5.0.0d results using reflux3 agree with TPA 4.1j results.]

3. Distribution of vaporization barrier seepage threshold temperature TEF still needs to talk about this one, specifically what distribution to use instead of a constant value of 100 C. I anticipate using some of the results of Birkholzer's work to provide some basis for a distribution. We have not done any thermal seepage numerical modeling ourselves.

--Randy

Hearing Identifier: HLW_YuccaMountain_Hold_EX
Email Number: 1210

Mail Envelope Properties (004001c4abd0$f530f470$95c8a281)

Subject: RE: George's validation test results
Sent Date: 10/6/2004 2:19:01 PM
Received Date: 10/6/2004 2:17:01 PM
From: Randy Fedors

Created By: rfedors@cnwra.swri.edu

Recipients:
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