HLWYM HEmails

From: Brittain Hill
Sent: Thursday, March 22, 2007 7:49 AM
To: Debashis Basu; Donald Hooper; John Stamatkos; Nancy Adams; John Trapp; James Rubenstone
Cc: James Winterle; Roland Benke; Wesley Patrick
Subject: Re: FW: Comments on ACNW volcanism white paper (Item 4)

I appreciate your work in tracking this down. I understand how challenging these tasks are, given that the sources of apparent concern rarely have appropriate citation to the relevant publication.

Another potential source of misunderstanding, relevant to SNF size distribution, may relate to data in NUREG-1320 (Ayer et al., 1988; Nuclear fuel cycle accident analysis handbook), which I think Coleman flashed on the screen. This particle-size distribution may be the "data" alluded to, even if mistakenly attributed to TPA3.0.

Nevertheless, the NUREG data showed SNF size distributions following a crush-impact event at ambient conditions for some types of fuel, resulting in fining of the fuel to a median diameter on order of 0.1 mm plus/minus a log unit of size. As discussed in (but ignored in ACNW report), for example, IRSR (1999, p. 85-86) additional consideration needed to be given to the thermal, mechanical and chemical stresses on SNF during a potential igneous event, relative to a crush-impact event. The team consensus, which included SNF experts (T. Ahn, H. Karimi, M. Jarzemba w/ consultation to R. Einzinger) was that an additional order-of-magnitude reduction in high-burnup SNF size appeared reasonable, given the conditions of a potential igneous event relative to an ambient crush-impact event in NUREG-1320. DOE's independent analysis reached the same conclusion with a slightly different size distribution (median 0.02mm vs 0.01mm), which was not significantly different (KTI agreement 2.02).

NRC (1999, p. 85) also discusses how preliminary SNF particle-size distributions were used in Jarzemba and Laplante (1996), which did not consider igneous conditions. Again, this report could be selectively used to show that the SNF distribution may have "changed" through time, however, such changes cannot be conveniently decoupled from the change in the technical basis used to derive the size distributions.

While not particularly emphasized, we did include the lack of relevant information regarding NRC basis for SNF sizes as one of our numerous comments on the ACNW draft white paper.

Britt

>>> Don Hooper <dhooper@cnwra.swri.edu> 3/21/2007 10:11:07 PM >>>
All,

Thanks to Roland who started working on this before I even read the first email. The figure in question is on slide 32 of Neil Coleman's February 2007 ACNW presentation titled "Morphology and Flood History of Fortymile Wash - Importance to Volcanism at Yucca Mountain" (see attachment). As noted in the figure, it is modified from Codell (Nuclear Technology, v. 148,

p. 208, 2004). In this paper Codell uses an alternative model in which the main assumption is that the fraction of fuel mass incorporated into the tephra is proportional to the mass of the tephra. Codell (2004) admits that the model is based on parsimony and the actual process of fuel incorporation is unknown. Figure 1 in the Codell paper shows a plot of the fine fuel distribution based on Cerro Negro data from Hill, et al. (1998). Neil Coleman has labeled this distribution "NRC TPA 4.0", although Codell mentions that TPA 5.0 is currently under development.

As part of his alternative model, Codell (2004) created a similar fuel particle diameter distribution as the Cerro Negro data, but one order of magnitude coarser. It is labeled coarse fuel. Despite the figure explanation given in the Codell caption and text, Coleman (ACNW presentation, Feb. 2007) has labeled this "NRC TPA 3.0". However, through the hard work of Roland and others we have verified that the HLW particle size distribution has NOT changed in the TPA code. It is incorrect to label the theoretical Codell distribution as NRC TPA 3.0.

-Don

-----Original Message-----
From: Roland Benke [mailto:rbenke@cnwra.swri.edu]
Sent: Wednesday, March 21, 2007 5:52 PM
To: Donald Hooper
Cc: James Winterle; Maria Padilla; Michelle Eroh; Ronald Janetzke; Arnold Galloway; Robert Brient; Patrick Mackin
Subject: RE: Comments on ACNW volcanism white paper (Item 4)

Don,

After obtaining the QA records for the TPA Version 3.0 code, I verified that the HLW particle size distribution has not changed. Based on this information and investigation of other versions of the TPA code (see email below), there has only been one default HLW particle size distribution in the TPA code. The implication in the Coleman slide that the HLW particle size distribution has changed in the TPA code is incorrect. Hopefully, this information will be helpful either in tomorrow's ACNW discussion or with its follow-up.

I'd like to thank Maria, Michelle, and Ron for obtaining and accessing the archived data from the initial release of the TPA code (Version 3.0) in a timely manner. Without their efforts, we would not have been able to formulate a solid answer in advance of tomorrow's ACNW discussion.

Roland

-----Original Message-----
From: Roland Benke [mailto:rbenke@cnwra.swri.edu]
Sent: Tuesday, March 20, 2007 1:14 PM
To: 'jwinterle@cnwra.swri.edu'
Cc: Donald Hooper
Subject: RE: Comments on ACNW volcanism white paper

Thanks. The comment relates to DIRECT modeling using the ASHPLUME code and comparisons of HLW particle sizes in erupting tephra. The referenced Coleman slide shows different HLW particle size distributions for TPA Versions 3.0 and 4.0. Inspecting tpa.inp for TPA Versions 3.3, 4.1, and 5.1Beta shows that the (default) HLW particle size ranges have not been changed in the TPA code for quite some time. To be sure, I'll dig into QA records for earliest version of the TPA code delivered to NRC and provide this information to Don.

Roland

-----Original Message-----
From: James Winterle [mailto:jwinterle@cnwra.swri.edu]
Sent: Tuesday, March 20, 2007 7:45 AM
To: Roland Benke
Subject: FW: Comments on ACNW volcanism white paper

Roland,
Item 4 of Wes' comments may be of interest to you.
--Jim

-----Original Message-----
From: Wesley Patrick [mailto:wpatrick@cnwra.swri.edu]
Sent: Tuesday, March 20, 2007 6:20 AM
To: jstam@cnwra.swri.edu; Debashis Basu; Nancy Adams; Donald Hooper; John Trapp; 'James Rubenstone'; beh1@nrc.gov
Cc: Budhi Sagar; Gordon Wittmeyer; James Winterle
Subject: RE: Comments on ACNW volcanism white paper

John,

Thanks for forwarding the subject comments for my information. As John Trapp notes, the comments convey some "interesting" perspectives. Following are some observations for consideration by you and the igneous activity (IA) team as you head into the ACNW sessions this week. It is

not clear to me what opportunity will be provided for NRC/CNWRA feedback to (discussion
with) the ACNW, but following are some areas where the IA team would be well-served by being prepared to do so.

1. It is interesting and should be professionally gratifying to the IA team to see a growing consensus arising in many of the critical areas associated with the risk of potential renewed volcanism and the associated complex processes. This is particularly evident in the evolving perspectives of DOE and NRC/CNWRA as they consider new data and analyses that are brought to bear on the underlying technical and regulatory questions.

2. The main concerns from EPRI appear to stem from a sense that the ACNW did not fully consider/weigh the results of their studies. To the extent their perception is accurate, NRC should be judicious in holding a position of "balance" and in supporting that the ACNW must, as a minimum standard, convey a balance of consideration of all pertinent/relevant perspectives.

3. NRC/CNWRA should be prepared to address the EPRI perspective (see p.14 of comments about lines 1099-1101 of the report) about the "CNWRA... adherence to the most conservative tails..."

4. NRC/CNWRA should be prepared to address the EPRI perspective (see p.16, comments about section 3.4.2 of the report) on particle size distribution and the possible EPRI implication that an error was made by CNWRA in lowering rather than raising the mean particle size in response to new data.

5. NRC/CNWRA should be prepared to address the EPRI perspective about the "dog-leg" scenario, which they somewhat disparaging refer to as a "sub-variant" and, more importantly, call for it to be "integrated" into [read: subsumed by?] other scenarios (discussed throughout their comments).

6. NRC/CNWRA should be prepared to address the EPRI concern about the 11-order-of-magnitude range in viscosities (see p.18 of comments about section 6.2.1.3), and the bases for same.

These are provided as "food for thought" and to assist in preparation for the meeting. No response is needed.

Wes.

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