From: Roland Benke <rbenke@cnwra.swri.edu>
To: "Brittain Hill" <BEH1@nrc.gov>
Date: 12/14/2005 1:19:26 PM
Subject: RE: FW: volcano conduit parameter
cc: "Donald Hooper" <DHOOPER@cnwra.swri.edu>,"Nathan Franklin" <NFRANKLIN@cnwra.swri.edu>,"Ronald Janetzke" <RJANETZKE@cnwra.swri.edu>,"John Trapp" <JST@nrc.gov>

Britt,

Thanks for the quick response. The TPA 5.1Beta code will yield 1-10 WP entrained, corresponding to 5.5-55 MTU as you noted for conduit diameters ranging from 5 to 50 m. Therefore, changes to the end points for the conduit diameter parameter are neither needed nor will be pursued at this time.

I'll leave the decision up to Nathan and John on whether or not DIRECT1 staff will pursue a stochastic approach for more rigorously determining the probability distribution function for the conduit diameter input parameter. Any such work would have to completed and incorporated into a Software Change Report this month, if code or input changes are to be included and acceptance tested in the TPA Version 5.1Beta code.

Roland

-----Original Message-----
From: Brittain Hill [mailto:BEH1@nrc.gov]
Sent: Wednesday, December 14, 2005 6:56 AM
To: nfranklin@cnwra.swri.edu; rbenke@cnwra.swri.edu
Cc: rjanetzke@cnwra.swri.edu; <Don Hooper; John Trapp
Subject: Re: FW: volcano conduit parameter

Roland - I suggest a more straightforward approach that links MTU to meters of drift. Our basic data are conduit diameters on order of 5m to 50m. These are not precise values, though, and we should abstract conduit diameters to reflect 1-10 WP entrained and not quibble decimal places (i.e., 5m conduit with 5.265m WP spacing gives 0.95 WP, etc!).

The base configuration unit is 3 SNF, 1 GL, 2 SNF, 1 GL. This is 7 WP, with spacing of 5.265m thus representing a drift length of 36.9m.

MTU in this configuration is:
SNF = 5 x 7.89 = 39.5
GL = 2 x 0.259 = 0.5
Total = 40 MTU/36.9 m

New average WP loading per meter = 1.1MTU/m

So, a minimum conduit diameter of 5m represents 5.5 MTU and a maximum represents 55 MTU with the current WP loading strategy. It is straightforward to then adjust the MTU ejected (i.e., effective conduit diameter) if the loading strategy changes.

This still represents a uniform distribution. We might think of doing a stochastic simulation using actual WP loadings (3-1-2-1) with sampled 5-50m diameters, to derive a more representative PDF rather than simple uniform.

I can't be at the meeting tomorrow afternoon, so please give me a call if y'all need to talk anything else over. I didn't see any problems with what was proposed for any of the 5.1 changes under discussion, except for the usual SEISMO issues from mechfail etc. that are still under discussion.

Thanks-
Britt

>>> Roland Benke <rbenke@cnwra.swri.edu> 12/13/05 6:39 PM >>>

Nathan and Britt,

See Ron's email below presenting a calculation for the range in conduit diameter corresponding to 7.89 - 78.9 MTU erupted.

Since the revised TEHPRA lookup table will be based on 1 MTU of HLW erupted and ASHREMOB will scale the lookup table results for HLW by the actual MTU erupted as calculated by the VOLCANO module for both CSNF and non-CSNF waste
packages,
is this change to the range in conduit diameter needed?

Currently, the change is *not* included in a Software Change Report (SCR). It is, however, closely related to SCR619. If this change is needed, please attend the Thursday meeting discussion (see attached).

Thanks, Roland

-----Original Message-----
From: Ron Janetzke [mailto:rjanetzke@cnwra.swri.edu]

Sent: Tuesday, December 13, 2005 5:24 PM
To: Roland Benke
Subject: volcano conduit parameter

The tephra lookup table for ASHREMOB is based on an ejected MTU quantity of 7.89 to 78.9 MTU. Note that the lower end of the range is 10% of the upper end. With the addition of glass waste form, the average payload per package has been reduced. It is desired to determine the new conduit diameter range to account for the new average payload.

Fraction of repository in glass form = 0.0126
Fraction of repository in SF form = 0.9874
Total MTU in repository = 70040.0 MTU
Total MTU in glass form = 70040.0 x 0.0126 = 882.5 MTU
Total MTU in SF form = 70040.0 x 0.9874 = 69157.0 MTU

Glass package = 0.258641 MTU
SF package = 7.89 MTU
Number of glass packages = 882.5 / 0.258641 = 3412 packages
Number of SF packages = 69157.0 / 7.89 = 8765 packages

Ratio of SF to glass packages = 8765 / 3412 = 2.569

For the purposes of emplacement the packages are assumed to be placed in a linear geometric 3 1 2 1 pattern (SF SF SF GL SF SF GL). This gives a ratio of SF to glass of 5/2 = 2.5 which is close to the ratio of 2.569 based on MTU.

Package spacing = 5.265 m

A sequence of 14 cans = 10 x 7.89 + 4 x 0.258641 = 79.9356 MTU

This is close to the 78.9 MTU that the tephra lookup table is based on.

Package spacing = 5.265 m

Upper end of conduit diameter range = 14 x 5.265 = 73.71 m
Lower end of conduit diameter range = 73.71 x 0.10 = 7.371 m

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Ron Janetzke
PI, TPA Code Development
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Creation Date: 12/14/2005 1:19:26 PM
From: Roland Benke <rbenke@cnwra.swri.edu>

Created By: RBENKE@cnwra.swri.edu

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"Donald Hooper" <DHOOPER@cnwra.swri.edu>
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"Ronald Janetzke" <RJANETZKE@cnwra.swri.edu>
"John Trapp" <JST@nrc.gov>
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