HLWYM HEmails

From: Donald Hooper
Sent: Monday, November 20, 2006 12:46 PM
To: 'John Trapp'; James Rubenstone; Brittain Hill; Roland Benke
Cc: Keith Compton; John Stamatkos
Subject: informal comments on Pelletier presentation and redistribution

All,

I'm quite late in getting these typed up. -Don Hooper

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Informal comments on the presentation by Jon Pelletier (OR Office Visit on Tephra Redistribution)

Date of presentation (OR Office visit): Sept. 28, 2006

Related Report: Atmospheric Dispersal and Deposition of Tephra from a Potential Volcanic Eruption at Yucca Mountain, Nevada (MDL-MGR-GS-000002, REV 02, August 2005)

1. The FAR (Fortymile Ash Redistribution) model was presented. DOE and its contractors will have to demonstrate how FAR and ASHPLUME are coupled within GoldSim (if used) as the final model or code for License Application. For example, how much of this work will be stand-alone or off-line calculations? How will it be incorporated into TSPA?

2. Understandably, this model primarily focuses on fluvial redistribution.
Eolian remobilization was acknowledged, but not accounted for in the current FAR model. Will eolian remobilization be treated quantitatively?

3. Is soil-geomorphic mapping of the Fortymile Wash fan complete? Is data acquisition complete for tephra redistribution modeling?

4. The steepness of slope angles within the Fortymile Wash catchment basin was described as one of the parameters that controls erosion (sediment transport). This approach will have to be reviewed to determine the significance of slope angle in sediment transport measurements.

5. There is a new discussion on slopes in REV 02 of the AMR that was not in earlier versions. While a fresh deposit of tephra may indeed create unstable slopes, employing a landslide hazard model may be overstating the hazard, significance, and process. Segerstrom (1950) in his work at Paricutin recognized the removal of tephra by landslides, but noted this was occurring on slopes of 70- to 100-percent and with thicknesses of at least
1.6 meters. Nonetheless, once friction is overcome, landslides could be expected on Yucca Crest and other steep slopes, such as Busted Butte.

6. The RMEI (Reasonably Maximally Exposed Individual) is misapplied and
incorrectly(?) defined. In one section of the AMR it is defined as an area of 30 km2 within the depositional fan of Fortymile Wash. And even in the Pelletier presentation, it is placed within the active channel of Fortymile Wash. It is unlikely that the receptor population would build, farm, or live within an active wash.

7. The FAR model utilizes a drainage density parameter, but how do they calculate the drainage density of a fresh tephra deposit since it would be unknown? Are they using an analog? What about the high porosity of a

fresh tephra deposit? [While heavily dissected badlands have a very high drainage density, the Sunset Crater tephra deposit has a very low drainage density.]

8. The assumption that hillslopes presently contribute very little material to sediment transport is acceptable. The DOE report on Extreme Erosion (YMP, 1993) notes low erosion rates from Yucca Mountain region hillslopes and colluvial hillslopes. However, hillslopes covered with a fresh tephra deposit would be expected to support a higher sediment transport rate (or sediment yield) until this material is depleted.

9. The statement that there is no sediment storage in the Fortymile Wash system may need to be re-evaluated, especially if colluvial slopes are included. This comment should be evaluated in context of the previous comment on hillslopes, as well as whether Yucca Mountain area slopes are transport-limited versus weathering-limited.

10. A complete review must be made of the portion of the model that describes or calculates fresh tephra mixing with older, pre-existing sediment. This is the dilution-mixing model. It was stated that there is 1.5% dilution (i.e., very little tephra) at the Fortymile Wash basin outlet (at a time just after the potential eruption). The details of this calculation must be reviewed because this is extremely low considering the mass of tephra that could be deposited within the Fortymile Wash catchment basin during a potential eruption. This does not appear to be an improvement over the previous DOE assertion that the amount of remobilized tephra would be small, mixed with ambient sediment, and not significantly affect airborne mass loads for the receptor (RMEI).

11. There is no explicit mention or calculation of a Fortymile Wash sediment yield. It is difficult to properly treat tephra dilution over time without knowing the sediment yield for Fortymile Wash.

12. Net erosion during the regulatory period still appears to be heavily dependent on observed field studies utilizing 50-year cesium-137 tracer data. This methodology is still suspect for an arid, alluvial environment like the Yucca Mountain-Fortymile Wash region. Furthermore, there is uncertainty in extrapolating rates and processes acting over a short time period (~50 years) to longer time periods. This radionuclide tracer approach (as applied to dilution calculations) may benefit from the addition of stream scour calculations.

13. It was stated that an advection-diffusion component to the model would be added. This would be beneficial, but may not be critical depending on FAR model assumptions.

14. Caution is advised when using dust from dry playa lakes as an analog for eolian characteristics of fresh basaltic tephra.

15. The FAR model still relies heavily on the geomorphologic and sediment transport characteristics of the present Fortymile Wash drainage system.
The model should consider how this system would respond after receiving a fresh tephra-fall deposit. DOE should provide a clear methodology relating geomorphic processes and rates observed recently in Fortymile Wash to processes and rates likely to occur if appreciable amounts of easily redistributed volcanic tephra are deposited in this drainage system. Model analyses need to consider appropriate uncertainties in data and address site-specific processes.

16. The model would benefit greatly from the inclusion of mass balance for key components such as tephra, redistributed tephra, and ambient sediment.

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From: Donald Hooper

Created By: dhooper@cnwra.swri.edu

Recipients:
"Keith Compton" <Keith.Compton@nrc.gov>
Tracking Status: None
"John Stamatkos" <jstam@cnwra.swri.edu>
Tracking Status: None
"'John Trapp'" <JST@nrc.gov>
Tracking Status: None
"James Rubenstone" <James.Rubenstone@nrc.gov>
Tracking Status: None
"Brittain Hill" <Brittain.Hill@nrc.gov>
Tracking Status: None
"Roland Benke" <rbenke@cnwra.swri.edu>
Tracking Status: None

Post Office: cnwra.swri.edu

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