Colorado State University
Knowledge to Go Places

Department of Geosciences
1482 Campus Delivery
Fort Collins, Colorado 80523-1482
(970) 491-5661
FAX: (970) 491-6307
www.cnr.colostate.edu/geo/

To: Neil Coleman
From: Sara Rathburn
Re: ACNW Meeting and Reports
Cc: Bill Heinze

My review of Hooper, D.M., 2005, Modeling the long-term fluvial redistribution of tephra in Fortymile Wash, Yucca Mountain, Nevada as requested by Neil Coleman is detailed herein. Overall, I think the report is relatively thorough, though I have major concerns about the approach of trying to capture "long-term redistribution processes" by using empirical equations in a sediment budget without any field data. I raised this question to Britt Hill in the February meeting, and his answer was essentially acknowledging the limitations of the data, but stating that what they have done was the best approach possible under the circumstances. I suggested collecting at least a few real-time suspended sediment samples for known discharges, which I guess is not possible. Britt also mentioned that he is not aware that individual crystals of ash, following a hypothetical volcanic eruption, would travel in suspension similar to individual silt or clay particles. Which leads to my next issue that there is no discussion of uncertainty, or of an attempt to quantify the uncertainty related to sediment transport in Fortymile Wash. I understand data limitations, but if limited or no field data are used, and if the physical characteristics of the sediment (ash) are unknown (e.g. clumps of ash crystals vs. individual crystals), then using empirical equations in the sediment budget involves major assumptions that have a large bearing on the results and how they are to be used. It is imperative, then, that an effort be made to bracket the estimates of sediment production, delivery to channels, and transport. This is done all the time in scientific articles and helps the reader interpret the results and conclusions. Otherwise, the report reads with an unjustified amount of confidence in the sediment budget numbers.

I have identified specific pages in the report where the text was unclear and therefore raised questions for me.

Pg. 1-12 statement that the Yucca Mountain hillslopes "can be considered sediment starved." Given the lack of vegetation on the hillslopes, there is always a ready supply of

sediment for movement if the precipitation is received by the basin. A sediment starved condition does not seem possible.

Pg. 2-1 not familiar with Gringorten (1963) plotting formula. Looked into it and use is okay.

Pg. 2-2. Did authors use any paleoflood evidence to determine magnitude of largest, historical or paleofloods? Seems like a good environment for preservation of paleoflood deposits.

Pg. 4-2 What about using data from the 1950's on particulate distribution after weapons testing at the Nevada Test Site? Seems a good source of data for estimates of the processes of posteruption sediment transport.

Pg. 4-3 Which sediment transport equation was used to compute the relative sediment yield? Is it one suited for the slopes and grain sizes involved?

Pg. 5-2 Only one scenario of A_{teph}? What if coverage is much more, or different thicknesses of the deposit occur?

The relative importance of fluvial versus eolian transport of sediment in my view, is that fluvial will be much more important in transporting the greatest volume of sediment. If the basin does indeed produce low quantities of sediment as Britt Hill suggests, then for any given precipitation event, as much sediment will be entrained as is supported by the carrying capacity of the flow. In my opinion, sediment production within the basin will always be relatively high, given the lack of vegetation and the constancy of weathering of substrate material. Every time Fortymile Wash receives flow there is a flood that will transport sediment downstream until transmission losses overwhelm transport capacity. The sediment transport will be episodic and punctuated by the large flows, some of which have been shown by Neil Coleman to deliver water and sediment to the Amargosa River.

Please feel free to contact me if you have questions about my review. My office number is 970-491-6956.