

**See, Kenneth**

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**From:** Goutam Bagchi  
**Sent:** Tuesday, May 12, 2009 9:19 AM  
**To:** Christopher Cook; Kenneth See  
**Cc:** Melanie Galloway; Jeffrey Mitman; Richard Raione; Scott Flanders; Jeff Circle; Rex Wescott  
**Subject:** RE: ONS: Notes from 5/11 meeting

Ken and Chris,

My overall view of the meeting is that the licensee wants to use the latest 1D HEC-RAS results to show that the SSF will not be flooded; therefore, there is no adequate protection concern. The latest result is dramatically lower - flood elevation at the yard is 3.5 ft above vs. 12.5 ft above from the 1992 result. They were pushing very hard to get out of the 50.54f process on adequate protection need, and arguing with NRR management to put upstream dam break issue into a generic issue process. Chris's Points 1 and 2 are very important. The veracity of the latest modeling is going to be critical to the adequate protection determination.

The flow rates from the upstream Jocassee dam break at Keowee are not all that different 3.3 vs. 3.22 million cfs. So where is all that water going to go? According to their latest model it will mostly go to the Keowee Lake. To account for the dynamic onrush of water (momentum) a multi-dimensional model right around the Keowee Dam area would have to be used. FERC staff from Atlanta had raised this point about the flow rates. The geometry of the Keowee Lake near the dam is quite complex, the channel narrows down near the dam before veering to the west and south into the lake, so the momentum of the flow near the dam will tend to go directly south to the Oconee site. Something in their model assumption does not quite make sense to me.

*Thank you,  
Goutam*

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**From:** Christopher Cook  
**Sent:** Monday, May 11, 2009 6:19 PM  
**To:** Kenneth See  
**Cc:** Melanie Galloway; Jeffrey Mitman; Richard Raione; Scott Flanders; Goutam Bagchi; Jeff Circle  
**Subject:** ONS: Notes from 5/11 meeting

Ken,  
Below are my notes and observations from the closed-door meeting NRC had with Duke today. In addition to my points below, I put three new maps from Duke on your chair.

**1. Increased interpolation does not result in increased topographic knowledge.**

In my opinion, uncertainty exists regarding which flows paths to the SSF are reasonable. This uncertainty is due to a lack of detailed topography at/near the ONS site. In other words, closely-spaced contour lines generated via interpolation do not result in an increase of topographic knowledge. Duke's HEC-RAS report cites 1:24,000 scale topographic maps as the data source (Section 3, pg 8; Appendix B, pg 3). This is OK far from the site, but NRC's questions are near-field. The USGS "vertical accuracy standard requires that the elevation of 90 percent of all points tested must be correct within half of the contour interval" (<http://egsc.usgs.gov/isb/pubs/factsheets/fs17199.html>). **Most USGS 1:24,000 scale maps have 10 ft contour intervals, so I would expect the vertical accuracy to be +/- 5 ft.** During the meeting I asked what the vertical accuracy was near/around the ONS site. I did not get a direct answer to my question, although I did

get a 'best guess' of +/- 2 ft. An action was taken during the meeting to check the vertical accuracy around the site and to report back to NRC.

**2. Complex flows near the ONS site require application of a multi-dimensional model.**

The Keowee Dam forebay and areas near the ONS site (e.g., from the Highway 183-190 bridge downstream and past the intake canal) should be simulated using a multi-dimensional model. The hydrodynamic flow paths in this area are not one-dimensional. Hydraulic conditions (water heights, water velocities, etc) in these area will not be accurately computed using a one-dimensional model such as HEC-RAS. Note that HEC-RAS may be appropriate for areas upstream and downstream of these areas, and application of a one-dimensional model in these far-field zones may reduce the overall computational effort. For example, HEC-RAS could be used to set the dynamic upstream/downstream boundary conditions for the multi-dimensional model.

**3. Sensitivity of ONS Site Flooding with Keowee Dam Breach Location.**

Question 8 on the Question List for today's meeting asks (paraphrased), 'How did Duke pick the placement of the Keowee Dam breach?' We discussed this question during the meeting, but I found Duke's answer to be unsatisfying. I believe Duke took an action to examine failure of the western portion of Keowee Dam and the resulting impact(s) on the ONS switchyard and site. Just by inspection, this flow path seems credible. I recommend you pursue this flow path as an alternative for flooding of the site; although perhaps it's best to wait until the topography is better known.

**4. Other worthy comments were made during the meeting.**

Additional comments that I'd recommend include a sensitivity study of Jocassee Dam breach timing and breach size, sensitivity of Manning's n due to debris flow, etc. However, I felt these concerns were sufficiently articulated during the meeting so I won't elaborate on them here. In other words, this list isn't inclusive of all the good ideas that were discussed. Please talk with Melanie, Jeff, Rex and others when you return.

If you have any questions or comments, please don't hesitate to stop by.

Regards,  
Chris

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