

HLWYM HEmails

From: Michael Waters
Sent: Monday, July 24, 2006 3:42 PM
To: Biswajit Dasgupta
Subject: Fwd: RE: My comments on worker technical basis document for workerdoses.

Gentlemen:

I greatly appreciate Mike Water's thoughtful comments.

I will document some preliminary thoughts related to the high-level comments, but a thorough response will require modification of the draft report. Also, on further reflection, some of my preliminary thoughts may change. My comments are in BLUE type.

1. The realistic near-field dispersion phenomena is very complex. From reading the draft, I have no real sense at all, of the accuracy and uncertainty associated with the predictions from the worker modules....either from a quantitative benchmark standpoint, or a qualitative engineering gut-feeling. The outside worker dose module appears to be derived from an IAEA screening method. Should the module in the PCSA Tool be considered as a bounding(?) screening tool calculation, rather than portrayed as something more accurate?

I agree that the air dispersion phenomena near the building are very complex. Figure 7.15 in the report illustrates the point. These micrometeorological effects are noted for their unpredictability. For example, if the wind direction happens to be just right, narrow contaminant plumes can be produced from corners of the building that extend large distances from the building, but not in the main direction of the wind flow! Change in wind direction by a few degrees has the potential to produce a completely different flow pattern downwind of a building lacking cylindrical symmetry. Very complicated, but non-transparent models may be able to model more phenomena, but only after considerable effort and with data inputs that may be currently unavailable. The IAEA screening method on which the approach is based is intended to be conservative, not realistic. Furthermore, the IAEA states that their approach is intended for chronic releases and should not be used for accidental releases. I presume this caution is placed in their document, because the philosophy behind their method takes advantage of averaging over long times, so a lot of the phenomenological "noise" averages out. I'd be happy to assist in the development of a more rigorous model, but the CNWRA and NRC should evaluate just how sharp a point they want on this pencil. This is especially the case, since the response by DOE to a potential problem will likely be to enhance the system to reduce the frequency of releases or further mitigate their consequences. For sure, the revised draft should better characterize this model.

Bottomline, the confidence of the dose predictions from this module need to be spelled out, if we want to use it to support our licensing review bases.

For example, if I calculate 90 mrem in a confirmatory calculation and the limit is 100 mrem, what does that mean? Please consider directly addressing how the predicted values line up against available experimental data (i.e. benchmarks), or code-to-code comparisons (e.g. RSAC, ARCON, MACCS results). And any other qualitative discussions.

I could try to place the model predictions in context by comparing to experimental data or other codes. However, the report already shows that this model will produce much higher concentrations (hence doses) than the wake model incorporated in RSAC.

2. I did not the time to delve into the mathematical model derivations for either module. Please let me know how these have been independently peer reviewed from both a phenomena-modeling and mathematical derivation standpoint. We need to have a second set of eyes on this part (perhaps the CNWRA review process covers this).

George Adams reviewed parts of the derivation during implementation of the model in the PCSA Tool and found some errors which were corrected. I'd welcome an additional check.

3. I am concerned about the unexplained discrepancies in the RSAC code for wake modeling (e.g. results for 1 x1 case). Is it a fallacy in the model that represents the phenomena, or it is an error in the coding?

We rely on RSAC as the workhorse in the PCSA Tool for off-site public dose calculations. I realize they are two different RSAC modules, but I am concerned the credibility of the entire code is diminished if there is something unexplained/wrong in the wake modeling module. We need to resolve this discrepancy and consider contacting the RSAC code developer if necessary.

I will try to clarify the discussion in Appendix A and in the main text. I do not believe the RSAC code is misrepresenting the Randerson model. However, the RSAC code programmers might want to limit how small the building size can be and still invoke the Randerson approach. The Randerson approach was developed to provide a more accurate portrayal of near field concentrations from releases near reactor containment buildings. The objective was to obtain more realistic methods to assess control room habitability given accidental releases of toxic substances. Reg Guide 1.78 adopts this model and advocates use of the HABIT code or codes with similar capabilities such as ARCON96. For sure, the Randerson model produces lower concentrations, even at substantial distances from the source, than would be expected with a standard Gaussian plume model (see Figure A-2). Some authors believe this is a physically justified result, since the turbulence induced by the presence of the building has been shown to persist for large distances, thereby reducing concentrations. Since this feature of RSAC is only invoked when the release is at ground level, it is not clear to me how this may or may not have impacted the public dose calculations. I had suggested at the time the report was submitted that more explanation of the Randerson model be provided, but there was insufficient time to fully address this issue.

4. The draft document needs to go through a technical editor before being published.

I will address the editorial comments and try to improve the text, but I'd welcome any help.

Once again, thanks for the good comments.

Regards,

NAE

Norman A. Eisenberg

-----Original Message-----

From: Bis Dasgupta [<mailto:bdasgupta@cnwra.swri.edu>]

Sent: Friday, March 03, 2006 10:59 AM

To: 'Michael Waters'

Cc: rbenke@cnwra.swri.edu; 'Albert Wong'; 'Tae Ahn'; 'Norman A. Eisenberg'

Subject: RE: My comments on worker technical basis document for worker doses.

Mike: Thanks very much for your comments and suggestions on the approach to calculate dose to outside workers. I really appreciate you taking time from your busy schedule to go through the report in a short time and pointing out some issues that need to be addressed.

All: During my visit to Rockville this week, I and Mike thought that we need to find a way to close the draft report developed by Norm. We specially need this report completed because we are using the PCSA Tool module for dose calculations in the PCSA exercise.

Norm: Please go thorough Mike's comments and let us know if you have any follow up questions or suggestions. Once this report is finalized we expect to run through the Center's review process.

Thanks,

Bis

-----Original Message-----

From: Michael Waters [<mailto:MDW1@nrc.gov>]

Sent: Thursday, March 02, 2006 4:49 PM

To: bdasgupta@cnwra.swri.edu

Cc: rbenke@cnwra.swri.edu; Albert Wong; Tae Ahn

Subject: My comments on worker technical basis document for worker doses.

Bis,

I am sorry I missed you before you left back to Texas. Attached are my comments/questions (green highlight) on the document.

I had more comments than expected. I hope it does not put a wrinkle in your plans, but I not sure if we can finalize it as-is. We should consider publishing the technical basis document in the context, that new dose module is a screening tool under development, with a few open items to address.

Below is a synopsis of my more significant comments that currently lead me to this conclusion. Please disseminate comments to others as necessary, and let's discuss further.

Mike

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4. The draft document needs to go through a technical editor before being published.

NOTE: My comments are initial thoughts, pending further consideration, and do not reflect official Agency views.

Hearing Identifier: HLW_YuccaMountain_Hold_EX
Email Number: 421

Mail Envelope Properties (s4c4ea62.002)

Subject: Fwd: RE: My comments on worker technical basis document for workerdoses.
Sent Date: 7/24/2006 3:42:07 PM
Received Date: 7/28/2006 10:40:01 AM
From: Michael Waters

Created By: Michael.Waters@nrc.gov

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Tracking Status: None

Post Office: NRNWMS05.NRC.GOV

Files	Size	Date & Time
MESSAGE	10361	7/28/2006 10:40:01 AM

Options
Priority: Standard
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Reply Requested: No
Sensitivity: Normal
Expiration Date:
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