Callaway2COLPEm Resource

From: Harvey, Brad
Sent: Wednesday, March 11, 2009 3:54 PM
To: Steve Hanna
Cc: Mazaika, Michael; Sandusky, William F III; Ramsdell, James V Jr (Van); Robert Kornasiewicz; Simmons, Mary Ann; Olson, Bruce; Charles Cox; Callaway2COL Resource
Subject: RE: Comments and requests for Callaway

Steve:

Great questions! I've tried to answer some of the technical ones below, but need to rely on either Bill or Van to respond to the EIS-specific ones.

Brad
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-----Original Message-----
From: Steve Hanna [mailto:steven_hanna@insightbb.com]
Sent: Wednesday, March 11, 2009 2:33 PM
To: Michael Mazaika; Sandusky, William F III; Ramsdell, James V Jr (Van)
Cc: Brad Harvey; Robert Kornasiewicz; Simmons, Mary Ann; Bruce Olson
Subject: Comments and requests for Callaway

Mike, Bill, and Van - I'm still trying to sort out what I need to do for Callaway. One thing that is asked that I be working on a draft EIS. In the Jan 27-28 Met/AQ orientation, I wrote down that templates and examples were available. I also heard the same thing during conf calls. But I do not have the details such as the name of the file(s) and/or their exact locations on the EARRTH or NRC web sites. Can somebody provide the precise locations and/or send them to me as attached files?

As I said in earlier e-mail messages, it is hard to start a draft EIS since the current ER is so deficient. How can I write anything about AQ when the ER has only a page or two on the topic? Hopefully the needed information will be made available at the site visit.

In preparation I have been reviewing the handouts and CD from the Jan 27-28 orientation and other files and CDs sent to me by PNNL and Numark and others. There are still a few questions that I have:

1) I asked about the difference between the met and AQ sections in the ER and Safety report. Brad and others responded and I have been reading the guidance but it is still very confusing, considering the overlap in both met and AQ. Also, it is non-intuitive that the ER shall address "routine" accidents and the Safety report shall address "Major" accidents. What is the difference? This is clear to those of you who have been working on NRC reviews for many years, but to new persons it is confusing. Let me try to answer this from the EIS perspective (Bill/Van - please correct me if I get any of this wrong). There are **two types of postulated accidents** evaluated in the ER/EIS: design-basis accidents (ER Section 7.1) and severe accidents (i.e., beyond design-basis accidents) (ER Section 7.2). As the environmental met/aq reviewer, all you need to worry about are the X/Q values used in the design-basis

accidents, which are presented in ER Section 2.7.6.2. You don't have any review responsibilities related to severe accidents.

There are also routine (non-accident) releases associated with normal station operation which are discussed in ER Section 5.4. As the environmental met/aq reviewer, you also need to review the corresponding "routine release" X/Q values presented in ER Section 2.7.6.1.

2) What is your definition of "reasonable agreement" as stated in the EIS guidance?

3) It has been entertaining to read the model documents and met and modeling Reg Guides (e.g., 1.145). I feel like I have been transported back in time about 30 years and am sitting in my office at ATDL in Oak Ridge with Frank Gifford's office up the hall a few steps one way and Gary Briggs' office the other way. It is good that Van and colleagues have updated many of the models so they run in Windows and can access data efficiently, but in most cases the basic science remains the same. The exception is Van's model for control rooms (ARCON96), which is a 1990's model. Despite the ancient science assumptions, the models probably work OK for simple scenarios. It would be good at some point to update the models, as has been done by nearly all other agencies. I don't disagree, but it's hard to convince management to spend resources to update regulatory guides that aren't "broken"; i.e., they still perform the agency's mission to ensure adequate protection of public health and safety. Remember that these are "screening" models.

I have some questions regarding topics that I can't find in the documents:

3.1 What is the fundamental averaging time for the models' calculations of X/Q? One hour? I notice that all models use close to the same formulas. The meandering assumption does have an implicit averaging time, since that component will increase with averaging time. The fundamental averaging time is one-hour, since the meteorological input is based on "hourly average" data. Note that nearly all of the design-basis accident releases we analyze are assumed to be at least 2 hours in duration, and the routine releases are multiple (hundreds) of hours in duration.

3.2 What met level (10 m or 60 m) on the local met tower is recommended for use in the AQ models? Is interpolation of WS and WD between 10 m and 60 m allowed? How is this coordinated with the instruction to use a power law to extrapolate winds to the stack height?
The **design-basis accident** atmospheric dispersion model PAVAN (RG 1.145) assumes all releases are "ground level" since none of the Callaway (EPR) release points qualify as an elevated release (e.g., a stack at least 2.5 higher than any building onsite). Therefore, the 10m met data JFD is input to PAVAN. Because Callaway has mixed mode **routine releases** (e.g., a stack higher but less than 2 times higher than any building onsite) per RG 1.111, XOQDOQ should be run with 10m met data and the program corrects the wind speeds to reflect the proper release elevation.

3.3 The assumption about the reduction of effective plume height by subtracting the max terrain ht difference out to 8 km is extremely conservative - possibly by many orders of magnitude. The EPA discarded that assumption about 25 years ago after carrying out several field and wind tunnel experiments involving plume dispersion in the presence of terrain obstacles. The only good thing that can be said about the NRC assumption is that it is indeed conservative. Remember, being conservative is "good" when trying to protect public health and safety! My question concerns the assumed wind speed for the AQ model when there is sufficient terrain. Suppose the

stack is 60 m high? Would the AQ model always use the winds observed at the 60 m level on the tower? Yes But if there is high terrain and the plume
centerline is therefore assumed to be at the ground, does the model
switch to using the 10 m level on the tower? The XOQDOQ model accepts only one set of wind data as input, and will not adjust wind speed as the plume encounters high terrain downwind. This is a mute point for the PAVAN model since all releases are assumed to be ground level.

3.4 I hope that the assumptions about mixing heights during stable
conditions have been checked with tracer observations. Note that neither PAVAN or XOQDOQ use mixing height data. I believe both models limit σ_z values to 1000 meters.

4) A possible reason for my negative IN comments about the met
analysis on the Callaway and NMP ER is that the applicants are
misinterpreting the NRC guidance about presentation of met summaries
at both the 10 m and 60 m levels of the met tower. This needs more
discussion at the site visit. And related to 3.2 above, if joint
distribution functions are developed separately for the 10 m and 60 m
levels, which one is chosen for an AQ analysis and how would they be
interpolated or extrapolated? As discussed above, the staff would execute the PAVAN and XOQDOQ models using the 10m level winds. All the design-basis PAVAN releases are considered to be ground-level releases so there is no wind speed extrapolation. The XOQDOQ model will extrapolate the 10m level winds to the release height if the release height is higher than any onsite buildings. The 60m level winds are used as input to the ARCON96 control room atmospheric dispersion model, which is not used in the ER/EIS evaluation. The 60m level winds may also be used in the applicant's real-time emergency response model, which is not evaluated as part of the ER/EIS scope.

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