PMComanchePeakPEm Resource

From: Monarque, Stephen
Sent: Tuesday, November 15, 2011 10:25 AM
To: John.Conly@luminant.com; Donald.Woodlan@luminant.com; 'cp34-rai-luminant@mnes-us.com'; Eric.Evans@luminant.com; joseph tapia; 'Kazuya Hayashi'; Matthew.Weeks@luminant.com; 'Russ Bywater'; MNES RAI mailbox (cp34-rai-luminant@mnes-us.com)
Cc: ComanchePeakCOL Resource; Reyes, Ruth
Subject: Comanche Peak RCOL Chapter 6 - Section 6.4 - RAI Number 240
Attachments: RAI 6158 (RAI 240).docx

The NRC staff has identified that additional information is needed to continue its review of the combined license application. The NRC staff's request for additional information (RAI) is contained in the attachment. Luminant is requested to inform the NRC staff if a conference call is needed.

The response to this RAI is due within 35 calendar days of **November 15, 2011.**

Note: The NRC staff requests that the RAI response include any proposed changes to the FSAR.

thanks,

Stephen Monarque
U. S. Nuclear Regulatory Commission
NRO/DNRL/NMIP
301-415-1544

Hearing Identifier: ComanchePeak_COL_Public
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Request for Additional Information (RAI) No. 6158, COLA Revision 2

RAI Letter Number 240

11/15/2011

Comanche Peak Units 3 and 4
Luminant Generation Company, LLC.
Docket No. 52-034 and 52-035
SRP Section: 06.04 - Control Room Habitability System
Application Section: 6.4

QUESTIONS for Containment and Ventilation Branch 1 (AP1000/EPR Projects) (SPCV)

06.04-14

The staff notes that CP COL 6.4(2) and STD COL 6.4(2) first appeared in Revision 2 of RCOLA Part 2 FSAR Section 6.4.7 next to Combined License Information item 6.4(2), "Automatic and manual action for the MCR HVAC system that are required in the event of postulated toxic gas release." COLA Revision 1 FSAR had only labeled item 6.4(2) as CP COL 6.4(2). The staff believes that US-APWR DCD subsection 6.4.3 contains wording that is only application specific. In particular, the RCOLA applicant cannot apply the conclusions of US-APWR DCD subsection 6.4.3 to each subsequent SCOLA applicant.

The staff requests additional information/justification as to why the applicant elected to assign the label “STD COL 6.4(2)” to the information contained in FSAR subsection 6.4.3.

06.04-15

This is follow-up RAI to RAI Letter No. 172 (4678) Question 06.04-9.

In Question 06.04-9, the staff asked a four part question that prompted the applicant to perform a sensitivity analysis to justify and show the effects of changes to the original analysis described in FSAR subsection 6.4.4.2 (i.e. the bounding case above). The applicant responded on October 6, 2010 (ADAMS Accession ML102810224) with the outcomes of changing the inputs of (1) control room intake height; (2) solar radiation and maximum ambient dry bulb temperature; and (3) stability class and wind speed. The staff verified that Revision 2 of RCOLA FSAR subsection 6.4.4.2 contained the outcomes of these sensitivity analyses. The staff performed confirmatory modeling for all the applicant’s findings of FSAR Table 2.2-214 and replicated the sensitivity analysis described above.

In addition, the staff performed HABIT modeling for extended runs beyond the applicant’s HABIT models which were programmatically limited by timing out (e.g. 12.5 minutes for chlorine). The results of the staff’s HABIT modeling of the chlorine accident yielded a MCR concentration still below the IDHL limits but not substantially below. In particular, for the extended run modeling of the chlorine event the staff used an elevated MCR intake of 14.3 meters and a 5% exceedance temperature [i.e. 36.11˚C (97˚F)]. This model resulted in a maximum peak MCR concentration equal to 8.8 ppm which occurred at 28.25 minutes into the event. This lack of significant margin prompted further

investigation by the staff. The staff notes that the ALOHA manual defines a heavy gas as "*A gas that has a molecular weight greater than that of air (the average molecular weight of air is about 29 kilograms per kilomole) will form a heavy gas cloud if enough gas is released.*" Chlorine with a molecular weight of 70.9 grams/mole fits the definition of a heavy gas. Based on this, the staff modeled in ALOHA the chlorine event as a heavy gas based on a 5% exceedance temperature and other parameters similar to the HABIT modeling. The staff notes that there is one limitation of the ALOHA model in that MCR intake elevations cannot be factored into the model. The ALOHA heavy gas model for the chlorine event yielded a peak internal building concentration of 46.5 ppm occurring at approximately 25 minutes into the event. Internal building concentration for this chlorine model exceeded the IDHL limit of 10 ppm at approximately 18 minutes into the event. In light of the comparative results of the HABIT versus ALOHA modeling for chlorine, the staff produced a ALOHA heavy gas model for a 93% by weight sulfuric acid solution. The molecular weight of a sulfuric acid solution equals 98.1 grams/mole with an IDHL of 15 mg/m^3.

The ALOHA heavy gas model for sulfuric acid assumed a continuous release over 60 minutes and used a 5% exceedance temperature and a stability class consistent with Regulatory Guide 1.78 guidance. The results of the ALOHA heavy gas analysis for sulfuric acid yielded an indoor concentration of 8,090 mg/m^3 at 60 minutes with an onward (beyond the graph) slope of 10-15º rising. It appears that the IDLH within the building at ground level (i.e. not representative of an elevated MCR) could be exceeded at about 5 minutes after the event (i.e. sulfuric tank rupture). As a point of comparison, the staff ran a HABIT model adhering to the temperature and stability class guidance of RG 1.78. A non-elevated MCR intake and a "Liquid Tank Burst" were also assumed. The staff's Habit run, timed out at 18.9 min with both the external and internal concentrations still slowing rising. At 18.9 min the CRE concentration was up to 5.082E-2 mg/m^3. The IDHL is 15 mg/m^3.

The staff also notes that both the applicant's and the staff's HABIT modeling illustrate the sensitivity of the EXTRAN results to the parameter of MCR intake height. The staff believes that the MCR HVAC intake height used in the habitability analyses needs to be captured as a plant attribute in FSAR 6.4.4.2 "Toxic Gas Protection". The staff requests that the applicant revise FSAR 6.4.4.2 accordingly.

In summation, the staff posits that since chlorine and sulfuric acid clearly fit the definition of a heavy gas that ALOHA modeling is the more appropriate program (i.e. as opposed to HABIT) to use for determining MCR habitability. More specifically, the use of the HABIT Gaussian model may be producing non-conservative results for these two heavy gases. The staff requests that the applicant re-evaluate their findings of FSAR 6.4.4.2 and address the fact that chlorine and sulfuric acid are heavy gases and provide a comprehensive justification for why the results are appropriate and conservative.