BellBendCOLPEm Resource

From: Canova, Michael
Sent: Wednesday, June 22, 2011 9:08 AM
To: 'Sgarro, Rocco R'; 'BBNPP@pplweb.com'; 'melanie.Frailer@unistarnuclear.com'; Wayne Massie (wayne.massie@unistarnuclear.com); Woodring, Kathryn L
Cc: BellBendCOL Resource; Colaccino, Joseph; Dehmel, Jean-Claude; Clark, Phyllis; Roach, Edward
Subject: Bell Bend COLA - FINAL Request for Information No. 108 (RAI No. 108)- CHPB 5575
Attachments: Final RAI Letter 108 - CHPB 5575.doc

Attached is RAI No. 108 for the Bell Bend COL Application. Per our discussion on 6/21/2010, we understand that you have no further questions on this RAI. You are requested to respond by August 22, 2011. If additional time is required to respond, please inform me of your proposed schedule your earliest opportunity.

If you have any questions, please contact me.

Michael A. Canova
Project Manager - Bell Bend COL Application
Docket 52-039
EPR Project Branch
Division of New Reactor Licensing
Office of New Reactors
301-415-0737

Hearing Identifier: BellBend_COL_Public
Email Number: 519

Mail Envelope Properties (77BCCD26C6050B42A72FE3939CF492ED8B739001EC)

Subject: Bell Bend COLA - FINAL Request for Information No. 108 (RAI No. 108)- CHPB 5575
Sent Date: 6/22/2011 9:07:37 AM
Received Date: 6/22/2011 9:07:39 AM
From: Canova, Michael

Created By: Michael.Canova@nrc.gov

Recipients:
"BellBendCOL Resource" <BellBendCOL.Resource@nrc.gov>
Tracking Status: None
"Colaccino, Joseph" <Joseph.Colaccino@nrc.gov>
Tracking Status: None
"Dehmel, Jean-Claude" <Jean-Claude.Dehmel@nrc.gov>
Tracking Status: None
"Clark, Phyllis" <Phyllis.Clark@nrc.gov>
Tracking Status: None
"Roach, Edward" <Edward.Roach@nrc.gov>
Tracking Status: None
"'Sgarro, Rocco R'" <rrsgarro@pplweb.com>
Tracking Status: None
"'BBNPP@pplweb.com'" <BBNPP@pplweb.com>
Tracking Status: None
"'melanie.Frailer@unistarnuclear.com'" <melanie.Frailer@unistarnuclear.com>
Tracking Status: None
"Wayne Massie (wayne.massie@unistarnuclear.com)" <wayne.massie@unistarnuclear.com>
Tracking Status: None
"Woodring, Kathryn L" <KFitzpatrick@pplweb.com>
Tracking Status: None

Post Office: HQCLSTR01.nrc.gov

Files	**Size**	**Date & Time**
MESSAGE	717	6/22/2011 9:07:39 AM
Final RAI Letter 108 - CHPB 5575.doc	38394	

Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

RAI Letter 108
Application Revision 2

6/22/2011

Bell Bend
PPL Bell Bend LLC.
Docket No. 52-039

QUESTIONS for Health Physics Branch (CHPB)

Request for Additional Information No. 5575

SRP Section: 02.04.13 - Accidental Releases of Radioactive Liquid Effluents in Ground and Surface Waters
Application Section: 2.4.13

02.04.13-4

Standard Review Plan (SRP, NUREG-0800) Section 2.4.13 requires the COL applicant to provide information on the site groundwater and near field hydrology as it applies to a failure scenario and radiological consequence analysis, as described in SRP Section 11.2 and Branch Technical Position 11-6, "Postulated Radioactive Releases Due To Liquid-Containing Tank Failures". The objectives of the guidance is to demonstrate that when using a simplified conservative modeling approach, the concentration of radioactive materials at a potable water location are below the limits as defined in 10 CFR 20, Appendix B, Table 2, Column 2, Effluent Concentration Limits (ECL).
In its application, the applicant has provided supplemental information in FSAR Tier 2, Sections 2.4.13.1 through 2.4.13.3, which includes: a failure scenario description that establishes the basis of the radioactive source term, basic failure mechanism, leakage assumptions; a description of the site groundwater and surface waters conceptual model; a proposed mathematical model to analytically describe the scenario and groundwater conceptual model; and calculations to demonstrate that the concentration of radioactive materials that eventually reach a potable water location is below ECL limits defined in 10 CFR 20, Appendix B, Table 2, Column 2. However, the staff has determined that there is a need for technical clarification on specific aspects of the information and analysis presented by the applicant. The staff requests that the applicant review the staff's observations, listed below, and revise FSAR Tier 2, Section 2.4.13 accordingly. The applicant is requested to:

1. Verify the source term information provided in BBNPP FSAR Tier 2, Table 2.4-57. The staff notes an unexplained discrepancy between this table and the U.S. EPR FSAR Tier 2, Table 11.1-2 that shows an initial value for Pu-239 of 2.0E-08 uCi/g rather than a value of 0 uCi/ml as proposed by the applicant. The staff further notes that the data presented in Table 2.4-57 are consistent with the data in U.S. EPR FSAR Tier 2, Table 2.1-2. The applicant should provide a justification for the assumed Pu-

239 concentration and provide a reference for the radionuclide concentrations used for the source term in the accidental release analysis.

2. Verify the accuracy of several of the equations that the applicant presents to describe the one-dimensional transport relationship and the radiological decay kinetics. Based on referenced information from Javandel, et al, Eq. 2.4.13-1 specifies the wrong symbol in the variable definition list for the average linear groundwater velocity. In addition Eq. 2.4.13-10 should show the partial derivative of concentration as a function of "dt" and not "dx" as indicated. Eq. 2.4.13-11, 2.4.13-12, and 2.4.13-13 all have the wrong rate constant identified as "$lambda_1$" rather than "$lambda_{1\ prime}$." These errors based on NRC staff independent sample calculations do not appear to carry over to licensee calculations. The applicant needs to verify the correct presentation of these equations and ensure that the correct mathematical expressions were used in all calculations.

3. Evaluate the results for the radionuclide concentrations discharged to Walker Run after retardation is taken into account and reported in BBNPP FSAR Tier 2, Table 2.4-62, “Transport Analysis Considering Advection, Radioactive Decay, and Retardation”. The NRC staff could not reproduce the result for Y-90 (3.22E-05 uCi/ml) as it appears in this tabulation. The fact that Y-90 value is significantly greater than its secular equilibrium parent Sr-90 (4.39E-06 uCi/ml) does not fit the mathematical model based on the effect of retardation and the half-lives of the parent and decay product radionuclides. This calculation may have used the advection time travel for the contaminants, and not the value based on delay due to the retardation process.

4. Verify that in BBNPP Tier 2, Section 2.4.13.1.4.3 on dilution of radioactive contaminants, groundwater velocity used as the average linear or seepage velocity of 2.06E-05 m/sec (5.84 ft/day) (i.e., $v_s = -K\ dh/dx\ /n_e$) rather than the Darcy velocity of 6.63E-06 m/sec (1.88 ft/day) (i.e., $v_d = -K\ dh/dx$) in determining the volumetric flow into Walker Run. Although the use of the Darcy velocity value would result in a smaller dilution factor, the applicant should explain and justify all terms used in dilution calculations.

5. Provide in BBNPP FSAR Tier 2, Table 2.4-63, the assumed aquifer bulk density used in calculating all radionuclide retardation factors. Confirm whether the bulk density footnoted in BBNPP FSAR Tier 2, Table 2.4-61 was used for all analyses in light of the discussion presented in BBNPP FSAR Tier 2, Section 2.4.13.1.4.2. Also, contrary to the footnote of Table 2.4-61, BBNPP FSAR Tier 2, Table 2.4-34 does not provide information on aquifer bulk density, instead it describes water levels and flow rates at the Danville water monitoring station.

6. Provide a discussion of the technical basis for concluding that the postulated groundwater pathway is conservative and support the assumption; that a transport analysis that does not consider hydrodynamic dispersion is conservative for the constituents subject to decay, that all possible exposure pathways (e.g., dispersion in the aquifer past the Walker Run) are considered, and that the impact of the site construction (excavation and fill) on possible alternative transport pathways and discharge points have been considered in the analysis.

7. With respect to demonstrating compliance with SPR Section 2.4.13 and 11.2 acceptance criteria and Part 20 ECLs, BBNPP FSAR Tier 2, Section 2.4.13.1.5 makes specific commitments to include design features that would prevent the release of radioactivity in the environment. Specifically, rooms and cubicles housing tanks and components are designed to contain the expected inventories of radioactive liquids, rooms and cubicles are lined with stainless steel liners to a height that is equivalent to the expected liquid waste volume in the event of rupture, tanks are equipped with overflow protection sized to the largest inlet connection, tank rooms and cubicles include sumps to collect leakage, and tanks and sumps are equipped with level water monitoring systems. For each of these design features, the applicant is requested to confirm in BBNPP FSAR Tier 2, Section 2.4.13.1.5 whether these engineering features are augmentation on the U.S. EPR design, and, if so, provide the supplemental design details in the appropriate sections of the BBNPP FSAR.

8. Provide description of any changes to BBNPP FSAR Tier 2, Section 2.4.13 as a result of the relocation of the nuclear power block on the current site layout. This description would include any changes to the potential discharge path from the boundary of the RWB, implications on infiltration in the underlying aquifer, groundwater flow rates, distance to the assume down gradient release point, ground water concentrations at the point of discharge in unrestricted areas, and supporting assumptions and parameters used in revising the expected groundwater concentrations at the down gradient release point and in unrestricted areas.

9. The applicant is requested to describe in its response to the above observations and revisions of FSAR Tier 2, Section 2.4.13, the methodology, assumptions, and provide the supporting information and applied data to enable the staff to conduct an independent evaluation of the consequence analysis and confirm the results and conclusions presented by the applicant in BBNPP FSAR Tier 2, Section 2.4.13 in confirming compliance with SRP Sections 2.4.13 and 11.2 (including BTP 11-6) acceptance criteria.