ArevaEPRDCPEm Resource

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Sent: Friday, July 24, 2009 4:19 PM
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Subject: U.S. EPR Design Certification Application RAI No. 256 (2937, 2938, 2940), FSAR Ch. 2
Attachments: RAI_256_RSAC_2937_2938_2940.doc

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on July 7, 2009, and discussed with your staff on July 23, 2009. No changes were made to the Draft RAI Questions as a result of that discussion. As we informed you during our discussion, the questions in this RAI are considered potential open items for Phases 2 and 3 reviews. As such, the schedule we have established for your application assumes technically correct and complete responses prior to the start of Phase 4 review. For any RAIs that cannot be answered prior to the start of Phase 4 review, it is expected that a date for receipt of this information will be provided so that the staff can assess how this information will impact the published schedule.

Thanks,
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U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 02.03.01 - Regional Climatology
SRP Section: 02.03.04 - Short Term Atmospheric Dispersion Estimates for Accident Releases
SRP Section: 02.03.05 - Long-Term Atmospheric Dispersion Estimates for Routine Releases
Application Section: FSAR Ch. 2

QUESTIONS for Siting and Accident Conseq Branch (RSAC)

02.03.01-13

POTENTIAL OPEN ITEM

Clarify the definitions of the 0% and 1% exceedance air temperature site parameter values presented in FSAR Tier 2 Table 2.1-1. In particular, revise the FSAR as necessary to:

1. Indicate in Tier 2 Table 2.1-1 whether the maximum and minimum 1% air temperature site parameters represent annual or seasonal 1 percent exceedances.
2. Indicate in Tier 2 Table 2.1-1 whether the maximum 0% and 1% exceedance coincident wet bulb temperatures represent mean or maximum values.
3. Indicate in Tier 2 Table 2.1-1 that the definition of zero percent exceedance excludes peaks of temperatures less than two hours in duration (per the response to RAI 02.03.01-7).
4. Indicate in Tier 2 Section 2.3.1.1 that the zero percent exceedance air temperature values in Table 2.1-1 are based on conservative estimates of 100-year return period values and historic extreme values, whichever is bounding. General Design Criterion (GDC) 2 to Appendix A to 10 CFR Part 50 states, in part, that the design bases for structures, systems, and components important to safety shall reflect appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area, with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated. In order to be compliant with GDC 2, the ambient design temperature site characteristics should be based on the higher of either historic or 100-year return period values. Temperatures based on a 100-year return period are considered to provide sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated as required by the regulation.

02.03.01-14

POTENTIAL OPEN ITEM

This question is related to the applicant's supplement 1 response to RAI 02.03.01-10 and supplement 1 response to RAI 02.03.02-11.

FSAR Tier 2 Table 2.1-1 presents a set of site parameters which are the postulated physical, environmental, and demographic features of an assumed site which the U.S. EPR standard design is based. FSAR Section 2.0 states that these site parameters represent more demanding conditions than normally expected for most U.S. nuclear power plant sites.

U.S. EPR Combined License Information Item 2.0-1 (from FSAR Table 1.8-2) states a COL applicant that references the U.S. EPR design certification will compare site-specific data to the design parameter data in Table 2.1-1. If the characteristics for the site fall within the assumed site parameter values in Table 2.1-1, then the U.S. EPR standard design is bounding for the site. For site characteristics that are outside the bounds of the assumptions presented in Table 2.1-1, the COL applicant will confirm that the U.S. EPR design acceptably meets any additional requirements that may be imposed by the more limiting site characteristics, and that the design maintains conformance to the design commitments and acceptance criteria described in the FSAR.

The response to RAI 02.03.01-10 states that although the 81 °F zero percent exceedance non-coincident wet bulb design point may be exceeded at locations throughout the U.S, it was used as design point for the ultimate heat sink (UHS) cooling towers. The U.S. EPR UHS design was also evaluated using site specific meteorological data for several COL applicants referencing the U.S. EPR design to verify that the site-specific data yield acceptable UHS basin temperatures. Similarly, the response to RAI 02.03.01-11 states the UHS cooling tower basins are design based on zero percent exceedance coincident wet bulb and dry bulb temperatures such that no makeup to the basin is required for three days following the initiation of a design basis accident under the worst case environmental conditions. The sizing of the U.S. EPR UHS cooling tower basins was also evaluated using site-specific meteorological data for several COL applicants referencing the U.S. EPR design.

There are several site design parameters listed in Table 2.1-1 that can be deleted from FSAR Tier 2 Table 2.1-1 because (1) comparison with site characteristic values will not be particularly meaningful and/or (2) there are (or can be) Combined License Information Items providing more specific details regarding demonstrating that the design of the U.S EPR is acceptable at a proposed COL site. In particular:

1. Consider deleting the hourly wet bulb temperature and concurrent dry bulb temperature values presented in FSAR Tier 2 Table 2.1-3 (containing the design values for maximum evaporation and drift loss of water from the UHS) as site parameters. It is not clear how COL applicants can demonstrate that the wet bulb temperature and concurrent dry bulb temperature characteristics for their site are bounded by the 72 sets of hourly wet bulb temperature and concurrent dry bulb temperature site parameter values presented in Table 2.1-3.
2. Consider adding a Combined License Information Item to FSAR Tier 2 Table 1.8-2 stating that a COL applicant that references the U.S. EPR design certification will

demonstrate that no makeup water to the UHS cooling tower basin is required for three days following the initiation of a design basis accident under the worst case site-specific environmental conditions pursuant to Regulatory Guide (RG) 1.27, "Ultimate Heat Sink for Nuclear Power Plants."

3. Consider deleting the 81 °F zero percent exceedance non-coincident wet bulb air temperature as a site parameter. The supplement 1 response to RAI 02.03.01-10 states that although this site parameter value (which is used solely as a design point for the sizing of the UHS cooling towers) may be exceeded at locations throughout the U.S., the UHS design was evaluated using site-specific meteorological data from COL applicant referencing the U.S. EPR design. There is no benefit specifying a site parameter value that is known to be exceeded at number of locations.
4. Consider deleting the hourly wet bulb temperature and concurrent dry bulb temperature values presented in FSAR Tier 2 Table 2.1-4 (containing the design values for minimum water cooling from the UHS) as site parameters. It is not clear how COL applicants can demonstrate that the wet bulb temperature and concurrent dry bulb temperature characteristics for their site fall within the 24 sets of hourly wet bulb temperature and concurrent dry bulb temperature site parameter values presented in Table 2.1-4.
5. Consider adding a Combined License Information Item to FSAR Tier 2 Table 1.8-2 stating that a COL applicant that references the U.S. EPR design certification will demonstrate that the UHS cooling tower design is validated with site-specific time dependent wet bulb temperature profiles to verify that the site-specific data yield acceptable maximum UHS basin temperatures pursuant to RG 1.27.
6. Consider deleting the potential for water freezing in the UHS water storage facility as a UHS meteorological condition site parameter. Combined License Information Item 2.4-8 in FSAR Tier 2 Table 1.8-2 already directs a COL applicant that references the U.S. EPR design certification to evaluate the potential for freezing temperatures that may affect the performance of the ultimate heat sink makeup, including the potential for frazil and anchor ice, maximum ice thickness, and maximum cumulative degree-days below freezing.

02.03.01-15

POTENTIAL OPEN ITEM

This question is related to the applicant's response to RAI 02.03.01-12.

Revise the snow load site parameters proposed for FSAR Tier 1 Table 5.0-1 and Tier 2 Table 2.1-1 as follows:

1. Change "Normal ground precipitation load: <100 psf (100-yr MRI)" to "Normal winter precipitation event ground load: <100 psf"

   Change "Normal roof precipitation load: <70 psf (100-yr MRI)" to "Normal winter precipitation event roof load: <70 psf"

These revisions will clarify that the loads being discussed are winter precipitation (e.g., snow) loads. Also, the normal winter precipitation event loads are not limited to a 100-yr MRI. ISG-07 states that the normal winter precipitation event used to determine the normal winter precipitation live roof load should be the highest weight among (1) the 100-yr return period snowpack, (2) the historical maximum snowpack, (3) the 100-year return period snowfall event, or (4) the historical maximum snowfall event.

2. Change "48-hour PMWP liquid roof load:0 psf" to "Extreme liquid winter precipitation event roof load:0 psf"

   This revision will implement terminology consistent with ISG-07 and the other snow load site parameters.

3. Change "48-hour PMWP frozen ground load: <43 psf (based on 55 inches)" to "Extreme frozen winter precipitation event ground load: <43 psf (based on 55 inches of snow)"

   Change "48-hour PMWP frozen roof load: <30 psf" to "Extreme frozen winter precipitation event roof load: <30 psf"

   This revision will implement terminology consistent with ISG-07 and the other snow load site parameters. Also, the extreme frozen winter precipitation event loads are not associated with the 48-hr PMWP. ISG-07 states that the extreme frozen winter precipitation event used to determine the extreme winter precipitation live roof load should be the highest weight between (1) the 100-yr return period snowfall event, and (2) the historical maximum snowfall event.

02.03.04-7

POTENTIAL OPEN ITEM

This question is related to the applicant's response to RAI 02.03.04-4. The staff finds the response to RAI 02.03.04-4 incomplete.

The response to RAI 02.03.01-4 provided a table titled "Input Parameters for Control Room χ/Q values." The intent of this table should be to <u>provide all future COL applicants that reference the U.S. EPR design certification values for all the input parameters required to execute the ARCON96 atmospheric dispersion model for generating main control room (MCR) and technical support center (TSC) χ/Q values</u>. In reviewing this table, the staff has the following comments:

1. Delete the parameter "temperature sensor separation." This is not an input parameter to ARCON96.
2. Delete the parameter "Annual average mixing layer height." This is not an input parameter to ARCON96.
3. Add an input parameter titled "release mode" along with a corresponding input values (i.e., ground-level) for each release pathway.

4. Revised the parameter “wind instrument heights” value to indicate that this is a site-specific input.
5. Revised the parameter “meteorological channel units of measure” title to “wind speed units” and revise the corresponding value to indicate that this is a site-specific input.
6. Add an input parameter titled “building area” along with corresponding input values for each modeled source-receptor combination.
7. Add an input parameter titled “vertical velocity” along with corresponding input values for each release pathway.
8. Add an input parameter titled “stack flow” along with corresponding input values for each release pathway.
9. Add an input parameter titled “stack radius” along with corresponding input values for each release pathway.
10. Add an input parameter titled “elevation difference” along with corresponding input values for each modeled source-receptor combination.
11. Add an input parameter titled “direction to source” along with corresponding input values (i.e., degrees from plant north) for each modeled source-receptor combination.
12. Add an input parameter titled “initial diffusion coefficients” along with corresponding input values for each modeled source-receptor combination.

Staff guidance on the input values for each of the input parameters identified above is provided in Appendix A to RG 1.194. Identify and justify any deviations from the guidance provided in RG 1.194.

02.03.04-8

POTENTIAL OPEN ITEM

This question is related to the applicant’s response to RAI 02.03.04-4. The staff finds the response to RAI 02.03.04-4 incomplete.

The response to RAI 02.03.04-4 provided a table which was intended to list values for all the ARCON96 atmospheric dispersion input parameters for generating main control room (MCR)/technical support center (TSC) <u>intake</u> χ/Q values. Provide another similar table for FSAR Tier 2 Section 2.3.4 which list values for all the ARCON96 atmospheric dispersion input parameters for generating MCR/TSC <u>unfiltered inleakage</u> χ/Q values. The issues identified in RAI 02.03.04-7 should also be addressed in responding to this RAI.

02.03.05-6

POTENTIAL OPEN ITEM

This question is related to the applicant’s response to RAI 02.03.05-4.

Include the annual average ground deposition (D/Q) value of 5.0E-08 m^{-2} (which is listed as an input to the GASPAR II computer code in FSAR Tier 2 Table 11.3-4) as a site parameter in FSAR Tier 2 Table 2.1-1.

Table 1 in Appendix A to SRP 2.0 lists routine release D/Q values at the site boundary as an example of a site parameter that should be listed in a design certification.

02.03.05-7

POTENTIAL OPEN ITEM

This question is related, in part, to the applicant's response to RAI 02.03.04-4.

The legend in FSAR Tier 2 Figure 1.2-3 (Plant Configuration) defines location "UKH" as the "vent stack."

1. Confirm that this is the same release location for the gaseous waste management system which is referred to as the "nuclear auxiliary building ventilation stack" in FSAR Tier 2 Section 11.3.1.2.3 and the "plant stack" in FSAR Tier 2 Section 11.3.3.3.
2. Confirm that this is the same release location for several design-basis accidents which is referred to as the "main stack" throughout FSAR Tier 2 Section 15.0.3.
3. Compare and explain the bases for the assumptions that (1) the release point for the gaseous waste management system is at the top of the plant stack (i.e., release height of 211 feet (64.3 meters) per FSAR Tier 2 Section 11.3.3.3) versus (2) one of the release points for many of the design-basis accidents is at the base of the main stack (i.e., release height of 32.1 meters per Table 2.3-3 provided in the response to RAI 02.03.04-4).
4. Confirm that the release point for the gaseous waste management system is uncapped and vertically oriented.