LevyCountyRAIsPEm Resource

From: Habib, Donald
Sent: Monday, July 13, 2015 11:28 AM
To: LevyCountyRAIsPEm Resource
Subject: RAI Letter No. 129 Related to SRP Section 6.4, Control Room Habitability System, and Section 15.00.03. DBA Radiological Consequence Analyses, For LNP Units 1 and 2 COLA
Attachments: 2015-07-13 RAI Letter 129 for MCR Dose RPAC 8004 and 8005.docx

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UNITED STATES
NUCLEARREGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 13, 2015

Mr. Christopher M. Fallon
Vice President, Nuclear Development
Duke Energy Florida, Inc.
P.O. Box 1006 – EC12L
Charlotte, NC 28201-1006

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 129 RELATED TOSTANDARD REVIEW PLAN SECTION 6.4,CONTROL ROOM HABITABILITY SYSTEM,AND SECTION 15.00.03. DESIGN BASIS ACCIDENTS, RADIOLOGICAL CONSEQUENCE ANALYSES FOR ADVANCED LIGHT WATER REACTORS, FOR THE LEVY NUCLEAR PLANT UNITS 1AND 2 COMBINED LICENSE APPLICATION

Dear Mr. Fallon:

By letter dated July 28, 2008, as supplemented by a letter dated September 12, 2008, Progress Energy Florida, Inc., now Duke Energy Florida, submitted its application to the U. S. Nuclear Regulatory Commission(NRC) for a combined license (COL) for two AP1000 advanced passive pressurized waterreactors pursuant to 10 CFR Part 52. The NRC staff is performing a detailed review of thisapplication to enable the staff to reach a conclusion on the safety of the proposed application.

The NRC staff has identified that additional information is needed to continue portions of thereview. The staff's request for additional information (RAI) is contained in the enclosure to thisletter.

To support the review schedule, you are requested to respond within 30 days of the date of thisletter. If changes are needed to the final safety analysis report, the staff requests that the RAIresponse include the proposed wording changes.

C. Fallon

If you have any questions or comments concerning this matter, you may contact me at 301-415-1035.

Sincerely,

Donald Habib, Project Manager
Licensing Branch 4
Division of New Reactor Licensing
Office of New Reactors

Docket Nos. 52-029
52-030

eRAI Tracking Nos. 8004 and 8005

Enclosures:
Requests for Additional Information

C. Fallon

If you have any questions or comments concerning this matter, you may contact me at 301-415-1035.

Sincerely,

Donald Habib, Project Manager
Licensing Branch 4
Division of New Reactor Licensing
Office of New Reactors

Docket Nos. 52-029
52-030

eRAI Tracking Nos. 8004 and 8005

Enclosures:
Requests for Additional Information

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Request for Additional Information 129 (#8004)

Issue Date: 07/13/2015
Application Title: Levy County, Units 1 and 2 - Dockets 52-029 and 52-030
Operating Company: Duke Energy Florida
Review Section: 06.04 - Control Room Habitability System
Application Sections: 6.4, 9.4, 11.1, 12.2, 15

QUESTIONS

06.04-7

10 CFR 52.79(a)(4) requires that a combined license (COL) application include a final safety analysis report (FSAR) that describes the design of the facility including the principal design criteria for the facility, for which the AP1000 used the 10 CFR Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants." For a COL application received after January 10, 1997, General Design Criterion (GDC) 19 requires that a control room be provided with adequate radiation protection to permit access and occupancy of the control room under accident conditions without the personnel receiving radiation exposures in excess of 5 rem total effective dose equivalent (TEDE) for the duration of the accident.

10 CFR 52.79(a)(17), requires that the COL FSAR include information with respect to compliance with technically relevant positions of the Three Mile Island requirements in 10 CFR 50.34(f). 10 CFR 50.34(f)(2)(xxviii) relates to the evaluation of potential pathways for radioactivity and radiation that may lead to control room habitability problems under accident conditions and necessary design provisions to preclude such problems.

NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," (SRP), Section 6.4, "Control Room Habitability System," provides staff guidance on the review of the applicant's analysis of the control room operator dose, which includes the assessment of radiation shielding and evaluation of direct dose in addition to the evaluation of dose from inhalation and immersion in airborne radioactive releases from the facility. SRP Section 15.0.3, "Design Basis Accident Radiological Consequence Analyses for Advanced Light Water Reactors," gives guidance on review of design basis accident (DBA) radiological consequence analyses. Given that the applicant is providing information on revised DBA analyses in the departure from the AP1000 Design Certification Document (DCD), the staff is using the guidance in SRP Section 15.0.3 for a COL which does not reference a DCD. SRP Section 15.0.3, paragraph III.4.J, states that for each postulated accident, the doses from all sources of radiation exposure to the control room personnel are combined to compare to GDC 19. In addition, Regulatory Guide (RG) 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors," Section 4.2, "Control Room Dose Consequences," states that all sources of radiation that will cause exposure to control room personnel should be considered in the dose analyses, and gives some typical examples.

With respect to the sources of radiation exposure evaluated to show compliance with GDC 19, clarify whether the control room dose results for DBAs other than a loss-of-coolant accident (LOCA), include the direct dose contribution from main control room emergency habitability system (VES) filter shine.

a. For DBAs that do not include VES filter shine in the control room dose results, provide a justification.
b. For DBAs that do include VES filter shine, are the LOCA VES filter shine doses used as bounding for the specific DBA, or are accident-specific filter loading and direct dose analyses performed?

06.04-8

With respect to the sources of radiation exposure evaluated to show compliance with GDC 19, clarify whether the control room dose results for DBAs other than LOCA include the direct dose contribution from nuclear island nonradioactive ventilation system (VBS) filter shine.

a. For DBAs that do not include VBS filter shine in the control room dose results, provide a justification.
b. For DBAs that do include VBS filter shine, are the LOCA VBS filter shine doses used as bounding for the specific DBA, or are accident-specific filter loading and direct dose analyses performed?

06.04-9

With respect to the sources of radiation exposure evaluated to show compliance with GDC 19, clarify whether the revised control room dose results for DBAs other than LOCA include the dose contribution from spent fuel pool boiling. For DBAs that do not include the dose from spent fuel pool boiling in the control room dose results as a change from the DCD analysis assumptions, provide a justification.

06.04-10

10 CFR 52.79(a)(4) requires that a COL application include an FSAR that describes the design of the facility including the principal design criteria for the facility, for which the AP1000 used the 10 CFR Part 50, Appendix A, GDC. For a COL application received after January 10, 1997, GDC 19 requires that a control room be provided with adequate radiation protection to permit access and occupancy of the control room under accident conditions without the personnel receiving radiation exposures in excess of 5 rem TEDE for the duration of the accident.

10 CFR 52.79(a)(17), requires that the COL FSAR include information with respect to compliance with technically relevant positions of the Three Mile Island requirements in 10 CFR 50.34(f). 10 CFR 50.34(f)(2)(xxviii) relates to the evaluation of potential pathways for radioactivity and radiation that may lead to control room habitability problems under accident conditions and necessary design provisions to preclude such problems.

SRP Section 6.4 provides staff guidance on the review of the applicant's analysis of the control room operator dose, which includes the assessment of radiation shielding and evaluation of direct dose in addition to the valuation of dose from inhalation and immersion in airborne radioactive releases from the facility. SRP Section 6.4, Subsection III.3, discusses the review of the control room ventilation systems with respect to the capability of the systems to control the intake and mitigation of radioactive releases into the control room envelope as it affects the radiation exposure to the control room personnel. SRP Section 15.0.3 gives guidance on review of DBA radiological consequence analyses. Given that the applicant is providing information on revised DBA analyses in the departure from the AP1000 DCD for review of the changes from the DCD, the staff is using the guidance in SRP Section 15.0.3 for a COL which does not reference a DCD. In addition, RG 1.183, Section 4.2, gives guidance on the modeling of engineered safety features, such as the control room ventilation and filtration systems, in the dose analyses.

In order for the staff to better understand the modeling of the operation of the control room ventilation systems in your analyses, provide the time after the beginning of the accident that the control room ventilation system initiates as assumed in the dose analyses for each DBA, for both the operation of the VES and VBS supplemental filtration. Also discuss the timing of the radiation monitor reaching the setpoints for initiation of the VES or VBS.

06.04-11

10 CFR 52.79(a)(4) requires that a combined license (COL) application include a final safety analysis report (FSAR) that describes the design of the facility including the principal design criteria for the facility, for which the AP1000 used the 10 CFR 50, Appendix A, general design criteria (GDC). For a COL application received after January 10, 1997, GDC 19 requires that a control room be provided with adequate radiation protection to permit access and occupancy of the control room under accident conditions without the personnel receiving radiation exposures in excess of 5 rem TEDE for the duration of the accident.

10 CFR 52.79(a)(17), requires that the COL FSAR include information with respect to compliance with technically relevant positions of the Three Mile Island requirements in 10 CFR 50.34(f). 10 CFR 50.34(f)(2)(xxviii) relates to the evaluation of potential pathways for radioactivity and radiation that may lead to control room habitability problems under accident conditions and necessary design provisions to preclude such problems.

SRP Section 6.4 provides staff guidance on the review of the applicant's analysis of the control room operator dose, which includes the assessment of radiation shielding and evaluation of direct dose in addition to the evaluation of dose from inhalation and immersion in airborne radioactive releases from the facility. SRP Section 15.0.3 gives guidance on review of DBA radiological consequence analyses. Given that the applicant is providing information on revised DBA analyses in the departure from the AP1000 DCD, the staff is using the guidance in SRP Section 15.0.3 for COL which does not reference a DCD. SRP Section 15.0.3, Subsection III.4.J, states that for each postulated accident, the doses from all sources of radiation exposure to the control room personnel are combined to compare to GDC 19. In addition, RG 1.183, Section 4.2, states that all sources of radiation that will cause exposure to control room personnel should be considered in the dose analyses, and gives some typical examples.

For each DBA evaluated to show compliance with GDC 19, do the revised direct dose analyses from all applicable sources include consideration of all the changes made to the DBA dose analysis (e.g., control room ventilation flow rates, iodine re-evolution from the IRWST for LOCA, steam releases for the main steam line break (MSLB), increased source term for the rod ejection accident)?

06.04-12

FSAR Tables 12.2-28 and 12.2-29 provide information on the gamma source strength in the VES and VBS filters used in the control room direct dose analyses for the LOCA, which are one component of the control room dose evaluated to show compliance with GDC 19. Provide a listing of the VES and VBS isotopic filter loadings that are the basis for the information in Tables 12.2-28 and 12.2-29.

Request for Additional Information 129 (#8005)

Issue Date: 07/13/2015
Application Title: Levy County, Units 1 and 2 - Dockets 52-029 and 52-030
Operating Company: Duke Energy Florida
Review Section: 15.00.03 - Design Basis Accidents Radiological Consequence Analyses for Advanced Light Water Reactors
Application Section: Chapter 15

QUESTIONS

15.00.03-2

10 CFR 52.79(a)(1)(vi) requires that a combined license (COL) application include a final safety analysis report (FSAR) that provides a description and safety assessment of the site on which the facility is to be located. The safety assessment analyses are done, in part, to show compliance with the radiological consequence evaluation factors in 10 CFR 52.79(a)(1)(vi)(A) and 10 CFR 52.79(a)(1)(vi)(B). The radiological consequences of design basis accidents are evaluated against these siting criteria.

10 CFR 52.79(a)(4) requires that a COL application include an FSAR that describes the design of the facility including the principal design criteria for the facility, for which the AP1000 used the 10 CFR Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants." For a COL application received after January 10, 1997, General Design Criterion (GDC) 19 requires that a control room be provided with adequate radiation protection to permit access and occupancy of the control room under accident conditions without the personnel receiving radiation exposures in excess of 5 rem total effective dose equivalent (TEDE) for the duration of the accident.

NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," (SRP), Section 15.0.3, “Design Basis Accident Radiological Consequence Analyses for Advanced Light Water Reactors,” gives guidance on review of design basis accident (DBA) radiological consequence analyses. Given that the applicant is providing information on revised DBA analyses in the departure from the AP1000 Design Certification Document (DCD) for review of the changes from the DCD, the staff is using the guidance in SRP Section 15.0.3 for a COL which does not reference a DCD. In addition, Regulatory Guide (RG) 1.183, “Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors,” gives guidance on DBA dose analysis inputs, assumptions, and models.

The staff needs the following additional information to complete its review of the revised DBA dose analyses done to show compliance with the siting criteria and GDC 19. The June 5, 2015 (see Agencywide Documents Access and Management System (ADAMS) Accession No. ML15161A039), submittal indicates that the full-power moisture carryover from the steam generators was increased from 0.1% to 0.35%, and this value was used to model alkali metal releases to the environment in the revised DBA analyses that assume release through the secondary system. This is consistent with guidance in Appendix E of RG 1.183 that the retention of particulates in the steam generators is limited by the steam generator moisture carryover. However, this value for the full-power moisture carryover is larger than the maximum weight percent moisture carryover value of 0.25% listed in DCD, Revision 19, Table 5.4-4, “Steam Generator Design Requirements.”

a. Clarify this discrepancy. Is this only a bounding dose analysis assumption, or a change in the design requirements for the steam generators?

b. Are there any other effects of increasing the maximum weight percent moisture carryover for the steam generators?

15.00.03-3

10 CFR 52.79(a)(1)(vi) requires that a COL application include an FSAR that provides a description and safety assessment of the site on which the facility is to be located. The safety assessment analyses are done, in part, to show compliance with the radiological consequence evaluation factors in 52.79(a)(1)(vi)(A) and 52.79(a)(1)(vi)(B). The radiological consequences of design basis accidents are evaluated against these siting criteria.

10 CFR 52.79(a)(4) requires that a COL application include an FSAR that describes the design of the facility including the principal design criteria for the facility, for which the AP1000 used the 10 CFR Part 50, Appendix A, GDCs. For a COL application received after January 10, 1997, GDC 19 requires that a control room be provided with adequate radiation protection to permit access and occupancy of the control room under accident conditions without the personnel receiving radiation exposures in excess of 5 rem TEDE for the duration of the accident.

SRP Section 15.0.3 gives guidance on review of DBA radiological consequence analyses. Given that the applicant is providing information on revised DBA analyses in the departure from the AP1000 DCD for review of the changes from the DCD, the staff is using the guidance in SRP Section 15.0.3 for a COL which does not reference a DCD. In addition, RG 1.183 gives guidance on DBA dose analysis inputs, assumptions, and models.

The staff needs the following additional information to complete its review of the revised DBA dose analyses done to show compliance with the siting criteria and GDC 19. Provide the basis for the following changes from the DCD information on steam generator tube rupture dose analysis in FSAR Table 15.6.3-3:

a. increase in the duration of steam releases from 13.19 hrs to 15.94 hrs
b. reductions in reactor coolant mass and initial secondary coolant mass

15.00.03-4

10 CFR 52.79(a)(1)(vi) requires that a COL application include an FSAR that provides a description and safety assessment of the site on which the facility is to be located. The safety assessment analyses are done, in part, to show compliance with the radiological consequence evaluation factors in 52.79(a)(1)(vi)(A) and 52.79(a)(1)(vi)(B). The radiological consequences of design basis accidents are evaluated against these siting criteria.

10 CFR 52.79(a)(4) requires that a COL application include an FSAR that describes the design of the facility including the principal design criteria for the facility, for which the AP1000 used the 10 CFR Part 50, Appendix A, GDCs. For a COL application received after January 10, 1997, GDC 19 requires that a control room be provided with adequate radiation protection to permit access and occupancy of the control room under accident conditions without the personnel receiving radiation exposures in excess of 5 rem TEDE for the duration of the accident.

SRP Section 15.0.3 gives guidance on review of DBA radiological consequence analyses. Given that the applicant is providing information on revised DBA analyses in the departure from the AP1000 DCD for review of the changes from the DCD, the staff is using the guidance in SRP Section 15.0.3 for a COL which does not reference a DCD. In addition, RG 1.183 gives guidance on DBA dose analysis inputs, assumptions, and models.

The staff needs the following additional information to complete its review of the revised DBA dose analyses done to show compliance with the siting criteria and GDC 19. Page 7 of Enclosure 1 to the June 5, 2015, submittal states that in a departure from the DCD, changes are made to the modeling of iodine re-evolution in containment from the in-containment refueling water storage tank (IRWST) for the loss-of-coolant accident dose analysis. Provide a description and summary of the changes to the modeling of IRWST pH and iodine re-evolution, including time-dependent pH and partition coefficients for the water in the IRWST. Document this change from the DCD analyses in the FSAR.