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Sent: Friday, November 23, 2012 2:49 PM
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Subject: Draft - U.S. EPR Design Certification Application RAI No. 564 (6933), FSAR Ch. 19 - NEW PHASE 4 RAI - AIA Methodology
Attachments: DRAFT_RAI_564_BPFP_6933.doc

Attached please find draft RAI No. 564 regarding your application for standard design certification of the U.S. EPR. If you have any question or need clarifications regarding this draft RAI, please let me know as soon as possible, I will have our technical Staff available to discuss them with you.

Please, also review the draft RAI to ensure that we have not inadvertently included proprietary information. If there are any proprietary information, please let me know within the next ten days. If I do not hear from you within the next ten days, I will assume there are none and will make the draft RAI publicly available.

Amy

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Request for Additional Information 564

Issue Date: 11/23/2012
Application Title: U. S. EPR Standard Design Certification - Docket Number 52-020
Operating Company: AREVA NP Inc.
Docket No. 52-020
Review Section: 19 - Probabilistic Risk Assessment and Severe Accident Evaluation
Application Section: 19.2.7 Beyond Design Basis Large Commercial Aircraft Impact Assessment

QUESTIONS

19-357

US EPR FSAR Tier 2 Revision 3, Section19.2.7.3, "Methodology," states that the methodology used for assessing effects of aircraft impact is described in NEI 07-13, "Methodology for Performing Aircraft Impact Assessments for New Plant Designs," Revision 7. The methodology of NEI 07-13, Revision 7 was followed with no exceptions.

Since the original FSAR submittal, Regulatory Guide 1.217, August 2011, "Guidance for the Assessment of Beyond-Design-Basis Aircraft Impact," references Revision 8 of NEI 07-13. The applicant should consider changing their FSAR to the latest NEI 07-13 revision (Revision 8) and provide applicable changes to Section 19.2.7.3 of the FSAR.

19-358

US EPR FSAR Tier 2 Revision 3, Section 19.2.7.4, "Design Features Credited for Conformance with 10 CFR 50.150," states that the location and design of the concrete sliding door in the Radioactive Waste Processing Building at Elevation 0 feet described in FSAR Section1.2.3 and Reference 24 provides protection to portions of the Fuel Building.
Contrary to the requirements of paragraph (b)(1) of 10 CFR 50.150, Section 19.2.7.4 does not contain a description of design features nor functional capabilities relied upon for the concrete sliding door to ensure that the assessment requirements in paragraph (a)(1) of 10 CFR 50.150 are met.

The applicant should include in the FSAR how this protection is provided by describing, at a minimum, the following:
1. the normal position of this concrete sliding door during power operations and at shutdown conditions
2. controls in place that allow the door to be open/closed
3. the time it would take to close this concrete door
4. key design features that would potentially be affected or lost in the fuel building by a large commercial aircraft impact with the concrete door open, and the effects on the fuel pool, fuel pool cooling, or spent fuel pool liner.

19-359

The US EPR FSAR Tier 2 Revision 3, Section 19.2.7 submittal reviewed by the NRC should accurately reflect the results of the Aircraft Impact Assessment (AIA) performed by the applicant as required by 10 CFR 50.150. The submittal should include all key design features and functional capabilities credited in the AIA to meet the acceptance criteria. As such, the applicant is requested to verify that the submittal fully identified and described all key design features and functional capabilities credited in the AIA.
FSAR 19.2.7.5.2, "RCS Heat Removal Capability," states that the analyses performed demonstrated the ability of the U.S. EPR design, after the impact by a large commercial aircraft, to maintain functionality of one or more divisions of systems credited in U.S. EPR FSAR Tier 2, Chapter 15 with providing reactor core cooling under accident conditions. The U.S. EPR design has features such as hardened and isolated shield structures, a strategic site arrangement and plant structural design, fire barriers, and the physically separate and redundant trains. These features contribute to the success of one or more

divisions of systems credited in Chapter 15 to maintain functionality to provide reactor core cooling after the impact of a large commercial aircraft.

The submittal should include all key design features for RCS heat removal capability (Tier 2 FSAR Section 19.2.7.5.2) and functional capabilities credited in the AIA to meet the acceptance criteria and not just reference SSCs credited in Chapter 15 of the FSAR. Support systems such as the ultimate heat sink (UHS), component cooling water (CCWS) essential service water systems (ESWS) are not described in Chapter 15 of the FSAR.

As such, the applicant is requested to verify that the submittal fully identifies and describes all key design features and functional capabilities credited in the AIA for RCS heat removal capability.
The applicant should revise the submittal if it is found that there are key design features and functional capabilities credited in the AIA that are not clearly identified or described in the US EPR FSAR Section 19.2.7.

19-360

U S EPR FSAR Tier 2 Revision 3, Section 19.2.7.3, “Methodology,” states that the methodology used to demonstrate compliance with 10 CFR 50.150 is NEI 07-13, “Methodology for Performing Aircraft Impact Assessments for New Plant Designs,” Revision 7.
FSAR Section 19.2.7.4, “Design Features Credited for Conformance with 10 CFR 50.150,” states that because the systems necessary to scram the reactor are housed in the hardened and isolated Shield Building structures, there is no potential for impact damage that would prevent a scram. Following shutdown, one or more trains of the safety related and support systems in this section are available to maintain core cooling and SFP cooling.

Tables 3-4 “Approach to Key Issues in Scenario Development,” and 3-5 “Key Assumptions to be Used in Damage Footprint Assessment,” of NEI 07-13 provides the guidance for treating reactor scram in the assessment. Item 3 in Table 3-4 states in part “However, in reviewing damage footprints in areas with equipment essential to reactor scram an assessment will be made of the potential for damage to prevent a scram should it have not occurred.” In this regard, describe those design features that assure the reactor will be shutdown following an aircraft impact, including any features that protect equipment in the Reactor Trip System (Section 7.2.). Include in your discussion the necessary key design features needed for any core boration (reference FSAR Section 6.8, “Extra Borating System”) to maintain the core subcritical during cool down of the reactor coolant in FSAR Section 19.2.7.5.2, “RCS Heat Removal Capability.”

The applicant should provide the staff with a marked-up copy of FSAR Section 19.2.7 that shows the required descriptions and include the descriptions in the next Revision of the FSAR. If detailed descriptions of the subject design features are described in sections of the FSAR other than FSAR 19.2.7, then in FSAR Section 19.2.7, identify the features and the sections of the FSAR containing the descriptions. Include descriptions of any success criteria in the US EPR design PRA that are associated with the key design features.

19-361

US EPR FSAR Tier 2 Revision 3, Section 19.2.7.4, “Design Features Credited for Conformance with 10 CFR 50.150,” states that the use of hardened and isolated shield structures provides protection for the Containment, Fuel Building, and Safeguard Building 2/3 structures and the following credited SSCs that are housed in these structures. Component cooling water system (CCWS), trains 2/3 is one of these systems which protection is provided.

US EPR FSAR Section 19.2.7.5, “Evaluation of U.S. EPR Performance,” states that the physically separate and redundant train design of the U.S. EPR provides for survival of supporting functions such as emergency power and ultimate heat sink capability.

US EPR FSAR Section 9.2.2, “Component Cooling Water System,” state that the CCWS divisions are cross connected between various headers, for example; 1A, 1B, 2A, 2B and the thermal barrier. Cross connected trains also exists for the safety chilled water system (FSAR 9.2.8).
Describe in FSAR Section 19.2.7 the key design features that are credited and have cross connections between division/trains for aircraft impact in accordance with paragraph (b)(1) of 10 CFR 50.150.
Specifically describe in the FSAR that the key design features which may physically be located in multiple structures, which are able to be cross connected with motor operated, automatic, hydraulic, or manual valves will be able to perform their intended function for core cooling or spent fuel pool cooling after the impact of a large commercial airplane.
The applicant should provide the staff with a marked-up copy of FSAR Section19.2.7 that shows the required descriptions and include the descriptions in the next revision of the FSAR.

19-362

US EPR FSAR Tier 2 Revision 3, Section 9.1.4, “Fuel Handling System,” describes a spent fuel cask transfer system which is connected to the underside of the spent fuel loading pit. One of the structures of concern in NEI-07-13, “Methodology for Performing Aircraft Impact Assessments for New Plant Designs,” is the fuel handling building.
Describe in FSAR 19.2.7 the key design features for an aircraft impact assessment (AIA) postulating an impact of a large commercial airplane during spent fuel assemblies off loading from the spent fuel pool into a spent fuel cask. Describe if during an aircraft impact and during spent fuel assemblies off loading from the spent fuel pool if there is a leakage path below the minimum water level due to related vibrations/shock damage.
The applicant should provide the staff with a marked-up copy of FSAR Section19.2.7 that shows the required descriptions and include the descriptions in the next revision of the FSAR.

19-363

It is stated in US EPR FSAR Tier 2 Revision 3, Section 19.2.7, “Beyond Design Basis Large Commercial Aircraft Impact Assessment,” that the methodology used for assessing effects of aircraft impact is described in NEI 07-13, “Methodology for Performing Aircraft Impact Assessments for New Plant Designs,” Revision 7 (NEI 07-13).
Detailed description for support systems related to key design features appear to be missing from FSAR 19.2.7 aircraft impact assessment including:

- Essential Service Water Pump Building Ventilation (9.4.11)
- Nuclear Auxiliary Building Ventilation (9.4.3)
- Safeguard Building Controlled-Area Ventilation System (9.4.5)
- Containment Building Ventilation System (9.4.7)
- Emergency Power Generating Building Ventilation System (9.4.9)
- Containment Isolation System (6.2.4)
- Cask loading pit/transfer compartment (9.1.3.2.4)
- Main Steam relief lines (10.3) – located in the main steam valve room
- Alternating Current Power (8.3)

The US EPR FSAR Tier 2 Revision 3, Section 19.2.7 submittal reviewed by the NRC should accurately reflect the results of the Aircraft Impact Assessment (AIA) performed by the applicant as required by 10 CFR 50.150. The submittal should include all key design features and functional capabilities credited in the AIA to meet the acceptance criteria. As such, the applicant is requested to verify that the submittal fully identified and described all key design features and functional capabilities credited in the AIA.

The applicant should provide an assessment of the above noted systems and provide the staff with a marked-up copy of FSAR Section 19.2.7 that shows the required descriptions and include the descriptions in the next revision of the FSAR.