

ArevaEPRDCPEm Resource

From: Wunder, George
Sent: Friday, January 17, 2014 10:32 AM
To: usepr@areva.com
Cc: Takacs, Michael; Kavanagh, Kerri; ArevaEPRDCPEm Resource
Subject: US EPR FINAL RAI 613 SECTION 14.2 RAI 7195
Attachments: Final RAI 613 RAI_7185.docx

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on October 23, 2013, and discussed with your staff on or about December 18, 2008. The schedule we have established for review of your application assumes technically correct and complete responses within 30 days of receipt of RAIs,

Sincerely,

George Wunder, Senior Project Manager
Office of New Reactors

Hearing Identifier: AREVA_EPR_DC_RAIs
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Request for Additional Information 613

Issue Date: 01/17/2014

Application Title: U. S. EPR Standard Design Certification - Docket Number 52-020

Operating Company: AREVA NP Inc.

Docket No. 52-020

Review Section: 14.02 - Initial Plant Test Program - Design Certification and New License Applicants

Application Section: 14.2.8.1 First-of-a-Kind Testing

QUESTIONS

14.02-164

10 CFR 50.2, "Definitions," Prototype Plant, means a nuclear reactor that is used to test design features, such as the testing required under § 50.43(e). The prototype plant is similar to a **first-of-a-kind** or standard plant design in all features and size, but may include additional safety features to protect the public and the plant staff from the possible consequences of accidents during the testing period.

10 CFR 50.43(e) states:

Applications for a design certification, combined license, manufacturing license, or operating license that propose nuclear reactor designs which differ significantly from light-water reactor designs that were licensed before 1997, or use simplified, inherent, passive, or other innovative means to accomplish their safety functions, will be approved only if:

- (1)(i) The performance of each safety feature of the design has been demonstrated through either analysis, appropriate test programs, experience, or a combination thereof;
 - (ii) Interdependent effects among the safety features of the design are acceptable, as demonstrated by analysis, appropriate test programs, experience, or a combination thereof; and
 - (iii) Sufficient data exist on the safety features of the design to assess the analytical tools used for safety analyses over a sufficient range of normal operating conditions, transient conditions, and specified accident sequences, including equilibrium core conditions; or
- (2) There has been acceptable testing of a prototype plant over a sufficient range of normal operating conditions, transient conditions, and specified accident sequences, including equilibrium core conditions. If a prototype plant is used to comply with the testing requirements, then the NRC may impose additional requirements on siting, safety features, or operational conditions for the prototype plant to protect the public and the plant staff from the possible consequences of accidents during the testing period.

RG 1.68, Revision 3, Section B, Discussion, Page 5, states: If first-of-a-kind (FOAK), that is, new, unique, or special, principal design features will be used in the facility, the in-plant functional testing requirements necessary to verify their performance should be identified at an early date to permit these test requirements to be appropriately accounted for in the final test design. For example, some new plant designs licensed under 10 CFR Part 52 have new passive plant design features and FOAK tests for systems that are safety-related or important to safety. Consequently, each new DC or COL applicant for an advanced plant should identify all new FOAK tests in the given plant. Section 6 of Appendix A to this regulatory guide presents examples of FOAK tests. For DC and COL applicants, the NRC will verify that all FOAK tests proposed by the applicant meet the ITAAC and ITP testing requirements. Future COL applicants may propose other FOAK tests not specifically identified in this regulatory guide.

The NRC staff attended the EPR Multinational Design Evaluation Program (MDEP) Commissioning Workshop and the MDEP 12th Biannual EPR Working Group (EPRWG) Meeting in China from June 3 – 7, 2013. At this meeting, AREVA gave a presentation on First of a Kind (FOAK) and First Plant Only Tests (FPOT).

The information contained in U.S. EPR Final Safety Analysis Report, Section 14.2.8.1 "First-of-a-Kind Testing," is inconsistent with the information that AREVA provided at the EPR MDEP.

At the EPR MDEP, AREVA defined FOAK tests as "test performed in order to validate a new concept or a new design feature [associated with Structure/System/Component (SSC) that are part of the EPR new

reactor design]” and “test which has never been done before [including never done during Factory Acceptance Test]”.

This definition deviates from the definition in the U.S. EPR Final Safety Analysis Report Revision (FSAR) and from RG 1.68 revision 3 to which the EPR FSAR is committed. During the EPR MDEP AREVA defined FPOT as “FOAK test performed only once on the 1st unit of the EPR fleet (FOAK EPR unit), for use in all other EPRs”. Reasons provided for performing the tests only once were: test results are valid for other EPRs, test is severe with significant plant equipment solicitation, or test is complex to implement on site (specific instrumentation), or test is heavy/special with numerous testing configurations. FPOT are not defined in RG 1.68, but the examples given for FPOT for the AP1000 approved DCD would meet a similar definition for FOAK tests. It is important to note that the NRC considers all FPOT tests to be FOAK tests. .

During the AREVA presentation, AREVA stated there were approximately 50 FOAK, which they did not list, and preliminarily (to be finalized summer 2013) AREVA determined there were 6 FPOT. The 6 FPOT were listed as:

- Special Vibration Measurements on the Reactor Pressure Vessel internals
- Pressurizer normal spray efficiency in different Reactor Coolant Pump configurations
- Low Head Safety Injection (LHSI) operation in Residual Heat Removal (RHR) mode at 180°C accident conditions
- Enhanced monitoring of LHSI in RHR-mode during vacuum
- Discharge capacity of MSRT and acoustical level
- Flow capacity of the MSIV bypass line.

In the EPR FSAR Revision 4, submitted by AREVA to the NRC, AREVA discusses FOAK testing in section 14.2.8.1. AREVA identified the following as new specific features for the US application that were not considered FOAK due to European use:

- Control Rod Drive Mechanisms (CRDM)
- Control Rod Position Indication
- Fixed and Moveable Incore Neutron Measurement Systems.

In FSAR section 14.2.8.1 AREVA then discussed the following specific features that were new to the US but were expected to be demonstrated in other EPR units prior to operation of a US EPR:

- Reactor Internals (Vibration Measurement)
- Natural Circulation of the Reactor Coolant System
- Reactor Coolant Pump Standstill Seal
- Pressurizer Surge Line (Thermal Stratification)

Only one test (RV internals vibration) is the same in both lists.

Using the guidance in NUREG-0800, SRP Section 14.2 and RG 1.68, Revision 3, AREVA should identify in FSAR Section 14.2 FOAK functional testing requirements and acceptance criteria for each of the following systems and components:

- Special Vibration Measurements on the RPV internals,
- PZR normal spray efficiency in different RCP configurations
- LHSI operation in RHR-mode at 180°C accident conditions
- Enhanced monitoring of LHSI in RHR-mode during vacuum
- Discharge capacity of MSRT and acoustical level
- Flow capacity of the MSIV bypass line
- Control Rod Drive Mechanisms (CRDM)

- Control Rod Position Indication
- Fixed and Moveable Incore Instrumentation Systems
- Natural Circulation of the Reactor Coolant System
- Reactor Coolant Pump Standstill Seal
- Pressurizer Surge Line Thermal Stratification

· AREVA should also identify any other FOAK tests in the EPR design described elsewhere in the FSAR that should also be included in Section 14.2 and provide acceptance criteria for each FOAK/FPOT.