Audit Summary
U.S. EPR FSAR Chapter 8, "Electric Power"
At AREVA's Rockville Office
November 18, 2010

Introduction

The U.S. Nuclear Regulatory Commission Electrical Engineering Branch (EEB) technical reviewer for Chapter 8, "Electric Power" of the U.S. EPR Final Safety Analysis Report (FSAR), along with the NRC project manager (PM) for the chapter, performed an audit to review design changes to the U.S. EPR FSAR, Revision 2 on November 18, 2010, at the AREVA NP Inc. Rockville Document Center in Rockville, MD. An audit plan, "U.S. EPR FSAR Electric Power Program Updates Audit" (attached) was developed and submitted to AREVA in advance of the audit. The EEB technical reviewer was Mr. Peter Kang, and the chapter PM was Mr. James Steckel. Applicant representatives included Mr. George Pannell, Mr. James Reddy, and Mr. Marty Bryant.

Purpose of Audit

The purpose was to review and determine the impact the revision 2 changes may have on the conclusions in the staffs' Chapter 8 Safety Evaluation (SE) of FSAR Chapter 8. The revision includes a reduction in the number of normal auxiliary transformers (NATs) from three to two in normal power supply system (NPSS). Staff requested the audit to gain a better understanding of these changes and determine the impacts these changes may have on the electric power system. Since most design changes are confined to non-safety related systems, no safety concerns had been raised by staff but the audit provided a chance to review the latest design changes, assess the staffs' understanding, and identify changes necessary in the staffs' Chapter 8 SE.

Audit Results

Staff requested clarification of the impact the reduced number of NATs will have to the electric power designs of the U.S. EPR. Applicant representatives attending the audit were able to answer all staff questions, and provided clarification in the following areas:

1. Re-configuration of circulating water and cooling fan loads due to elimination of trains 5 and 6 due to reduction of NATS from three to two in NPSS

   The applicant provided a comparison of the original and revised configurations in FSAR Figure 8.3-3, "Normal Power Supply System Single Line Drawing." The largest impact to the electric system involved changes to the circulation water pump power supply

ENCLOSURE

configuration. Due to the removal of trains 5 & 6 power loads are redistributed across remaining trains. With this design change the applicant stated that there are no overall electrical load increases and the new configuration has been re-analyzed. The applicant determined that functionality remained the same.

2. A dedicated bus configuration for reactor coolant pumps (RCPs)

   A new RCP configuration (i.e. a separate bus with two Class 1E circuit breakers in series) protects the RCP from a single failure of the circuit breaker. The staff noticed that the four 13.8 kV RCP switchgear were identified as Class 1E (FSAR Section 8.3.1.1.2), but that designation needed to be included in FSAR Table 8.3-1.

3. Creation of a new 6.9 kV direct feed to the emergency diesel generator (EDG) building for the EDG fans

   The new 6.9 kV feed for the EDG fans removes the need for a separate load center and reduces the total fan load.

4. Relocating the charging pumps (Divisions 1 & 4) to the NPSS (BBH bused trains 1 & 2).

   Charging pumps are classified as non-Class 1E equipment in the US-EPR design. This removes them from safety-related buses.

5. Addition of a safety chill water chiller pump with a cross-link to the EDG building

   Chill water pump distribution was shown on diagram DCR-#113-9081656-000, Attachment #1, indicating cross-division chill water link capability.

6. Addition of another main feed pump

   A fourth main feedwater pump is being added to improve planned pump availability. It is planned for three of the pumps to run at 33.3% capacity, with the fourth on standby. This description is provided in FSAR Chapter 10.

7. Updating the instrumentation and control grounding system for compliance with IEEE Standard (Std) 1050

   The grounding system for the instrument and control system is updated for compliance with IEEE Std 1050, Section 5.3.2.

8. Updating of EDG load lists to reflect the above changes, and the addition to the emergency uninterruptable power supply (EUPS) load list to include the plant communication system

   Inclusion of the communication system to the EDG load list tables were readied for the next FSAR revision. The applicant expects no significant increased load due to the plant communication system and the addition of the communication system load to the EUPS load list will be reflected in the next FSAR revision.

9. The use of variable speed drives on the non-safety load side and control of harmonic distortion effects on safety related equipment

   Only non-variable speed drive motors will be allowed for any safety systems. Variable speed drive motors are allowed for use on non-safety loads. An ITAAC is provided for testing for harmonics. Attenuation of harmonics from non-safety areas will be specified as a procurement condition.

10. Removal of Instantaneous Overcurrent Protection for load center protection (480 Vac)

    Page 8.3-9 of FSAR deletes instantaneous overcurrent (50) protection. The applicant stated that ITAACs 2.5.1 and 2.5.2 ensure overcurrent protection coordination.

11. Cathodic Protection

    This item was discussed for inclusion in a future US EPR Chapter 8 revision, to prevent incurring this as an issue in future COL applications.

<u>Summary</u>

Staff determined that there are no negative findings as a result of this audit, and no requests for additional information are needed. However the current FSAR Chapter 8 does not include cathodic protection, therefore staff suggested that the applicant consider including it in the next COLA revision. In addition, the applicant agreed with the staff suggestion to identify the 13.8 kV RCP switchgear as Class 1E in FSAR Table 8.3-1.