Draft

Request for Additional Information No. 81(960,1154,1046), Revision 0

9/15/2008

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 06.01.01 - Engineered Safety Features Materials
SRP Section: 06.01.02 - Protective Coating Systems (Paints) - Organic Materials
SRP Section: 06.06 - Inservice Inspection and Testing of Class 2 and 3 Components
Application Section: FSAR Ch. 6

QUESTIONS

06.01.01-1

Emergency Feedwater System (EFWS) components materials specifications and grades are not listed in FSAR Table 6.1-1. The staff requests that the applicant modify FSAR Table 6.1-1 to include the material specifications and grades for EFWS components (piping, valves, fittings, etc.) including weld filler materials. In addition, the staff requests that the applicant discuss the compatibility of the materials of construction with the expected service conditions.

06.01.01-2

The material types used for the ESF components are listed in FSAR, Tier 2, Table 6.1-1. The staff notes that the applicant has only listed material types such as austenitic stainless steel and ferritic steel for most components. In order for the staff to determine that the materials selected for ESF components meet GDC 1 and 10 CFR 50.55a, the staff requests that the applicant modify Table 6.1-1 to include material specifications and grades for each ESF component. In addition, the staff requests that the applicant include weld filler material specifications and classifications that will be used to weld each ESF component.

06.01.01-3

FSAR Section 6.1.1.1 states that pressure retaining ESF materials are selected from ASME Code, Section III, Division 1 as identified in Parts A, B and C of ASME Code, Section III. Section 6.1.1.1 further states that RG 1.84 may be used with the above ASME Specifications. The staff requests that the applicant modify Section 6.1.1.1 to indicate if any code cases identified in RG 1.84 will be used for ESF systems. In addition, if any code cases identified in RG 1.84 will be used, the staff requests that the applicant list the applicable code cases in FSAR Section 6.1.1 and Table 6.1-1.

06.01.01-4

FSAR Tier 2, Section 6.1.1.1 indicates that ferritic materials used in ESF components has a corrosion allowance of 1/16 in. The staff requests that the applicant explain its

basis for the corrosion allowance for ferritic materials used in ESF systems to ensure that it is sufficient for the design life of the plant.

06.01.01-5

FSAR Section 6.1.1.1 states that the use of nickel-base alloys in primary pressure-retaining ESF applications is limited to Alloy 690 and its associated weld metals (Alloys 52, 52M, and 152). The staff notes that no Alloy 690 components or piping are listed in Table 6.1-1. Ni-Cr-Fe weld filler material specifications (for Alloys 52, 52M, and 152) are listed under safety injection system/residual heat removal system materials in Table 6.1-1. The staff requests the following information regarding the use of Alloy 690 materials and matching weld filler materials in ESF systems.

a. Identify any ESF components fabricated from Alloy 690 other than RCPB components listed in Table 5.2-2 and include them in Table 6.1-1.

b. For components containing dissimilar metal welds that use Alloys 52, 52M or 152 in ESF systems, provide a detailed description of how these welds are performed. The applicants detailed description should include the following:

1. Provide base material combinations.

2. Describe the welding processes used.

3. Describe special fabrication process requirements employed to limit the effects of cold work and residual stress, caused by grinding/repair or other fabrication processes on surfaces that come into contact with ESF and RCS fluids in order to minimize the susceptibility of components to stress corrosion cracking for the design life of the plant. In addition, provide the above information for austenitic stainless steel welds and include this information in FSAR Section 6.1.1

4. Discuss welding process controls employed to reduce weld metal dilution in order to retain the maximum percentage of Chromium possible in order to decrease the susceptibility of components to stress corrosion cracking for the life of the plant.

5. Given the susceptibility of Alloys 52, 52M and 152 to ductility dip cracking and other types of welding flaws that have resulted in extensive repairs during repair and replacement activities for current operating PWRs, provide a description of special process controls used to minimize welding flaws.

06.01.01-6

FSAR Tier 2, Table 6.1-1 does not list reactor building liner or penetration materials. It does however provide a reference to FSAR Tier 2, Section 3.8.2. The staff reviewed Section 3.8.2 and could not locate specifications and grades for the reactor building liner or penetration sleeve materials. The staff did locate some limited information in Section

3.8.1.6.4. Section 3.8.1.6.4 states "The 0.25 inch thick liner plate is ASTM A516, Grade 55 material, which conforms to Subarticle CC-2500 of the ASME BPV Code, Section III, Division 2 (GDC 16)." The staff notes that Subarticle CC-2500 states that materials to be used for containment liners and attachments to liners are listed in Appendix I, Table I-2.2. Table I-2.2 does not list ASTM specifications for liner plate material. In addition, the staff was unable to locate the material specifications and grades for liner penetrations. In order for the staff to evaluate the acceptability of materials used in ESF systems, the staff requests that the applicant modify Table 6.1-1 to include all reactor building liner and penetration materials specifications and grades as well as verify that the materials selected are permissible in accordance with ASME Code for their intended use. The staff also requests that the applicant include weld filler metal specifications and classifications in Table 6.1-1.

06.01.01-7

For stainless steel components in the ESF systems, FSAR Tier 2, Section 6.1.1.1 states that unstabilized austenitic stainless steels used in ESF components is provided in the solution annealed and rapidly cooled condition to optimize the resistance to intergranular corrosion in accordance with RG 1.44. It is unclear to the staff if the EPR design follows all of the guidance provided in RG 1.44 for ESF systems. The staff requests that the applicant provide the same level of detail, regarding prevention of sensitization and intergranular corrosion of austenitic stainless steel, as that provided in FSAR Section 5.2.3.4.1. The staff suggests that the applicant provide a reference to Section 5.2.3.4.1 if this information also applies to ESF materials. In addition, the staff requests that the applicant identify if stabilized grades of stainless steels are used in ESF systems. If stabilized grades are used, provide a discussion similar to that in Section 5.2.3.4.1 or reference Section 5.2.3.4.1 if it applies.

06.01.01-8

FSAR Section 6.1.1.3 discusses ESF component and systems cleaning but this section references the nuclear steam supply system (NSSS). If the applicant's definition for the NSSS encompasses all ESF systems, the staff requests that the applicant identify the location in the FSAR which states that the EPR NSSS includes all ESF systems. If this is not the case, the staff requests that the applicant replace its reference to the NSSS with ESF.

06.01.01-9

FSAR Section 6.1.1.4 states that portions of the ESF systems are insulated and portions within containment may be exposed to the insulation on the reactor coolant system (RCS) at their juncture with the RCPB, or other insulation if dislodged during an accident. The applicant further states that RCS insulation is primarily constructed of reflective stainless steel. The applicant did not provide a description of the insulation used on ESF systems other than to imply that non-metallic insulation is controlled in accordance with RG 1.36. The staff requests that the applicant modify FSAR Section 6.1.1.4 to include a description of the insulation used in ESF systems.

06.01.01-10

FSAR Section 6.1.1.1 states that the minimum preheat for welding of low alloy ferritic materials is in accordance with Appendix D (Article D-1000) of ASME Section III,

Division I and RG 1.50. The staff requests that the applicant provide the minimum preheat requirements for other ferritic materials used in ESF systems and modify FSAR Section 6.1.1.1 accordingly.

06.01.01-11

The staff was unable to locate ITAAC for the containment liner and containment liner penetrations relative to verifying compliance with ASME Codes (i.e. design, fabrication, welding and nondestructive examination). The staff requests that the applicant identify where the aforementioned information is addressed in FSAR Tier 1. If this is not addressed in Tier 1 information, modify the FSAR accordingly.

06.01.01-12

FSAR Section 6.1.1.2 states that the use of aluminum and zinc in components in containment that could be exposed to post-accident conditions is minimized to avoid hydrogen-gas generation. RG 1.7, Regulatory Position 4, Hydrogen Gas Production, states that materials within the containment that would yield hydrogen gas by corrosion from the emergency cooling or containment spray solutions should be identified, and their use should be limited as much as practicable. SRP 6.1.1, Acceptance Criteria 2, states that hydrogen generation from the corrosion of materials within containment, such as aluminum and zinc, depends upon the corrosion rate, which in turn depends upon such factors as the coolant chemistry, the coolant pH, the metal and coolant temperature, and the surface area exposed to attack by the coolant. The assumed corrosion rates of materials in containment should be consistent with standard corrosion rate data. In order for the staff to evaluate the applicant's compliance with GDC 41, the staff requests that the applicant discuss the approach used to conduct an inventory of and corrosion rates for zinc, aluminum, and other materials inside containment, in order to calculate the amount of hydrogen generated as a result of corrosion during a DBA. In addition, discuss the approach used to determine that the amount of hydrogen generated during a DBA is not significant.

06.01.02-1

Appendix B to 10 CFR 50 requires a quality assurance program that provides assurance that SSCs will perform satisfactorily in service. Conformance to the regulatory positions of RG 1.54 by a coatings system and program is considered an acceptable method to comply with the quality assurance requirements of Appendix B to 10 CFR 50. RG 1.54 references ASTM D5144-00 as a top-level coatings standard that incorporates by reference other key coatings standards. ASTM D5144-00 specifies that Service Level II coatings are not safety related and are restricted to the radiation controlled area (RCA) outside of the containment in nuclear facilities. How does the proposed definition of Service Level I and II coating classifications by the applicant in FSAR Tier 2, Section 6.1.2.1.2.1 meet the regulatory requirements? More specifically, provide additional detail regarding the specific areas of containment in which Service Level II coatings are proposed to be used. Provide justification as to why coatings in these areas do not have the potential to be affected by a design-basis accident or affect the operation of any emergency safety features.

06.01.02-2

Appendix B to 10 CFR 50 requires a quality assurance program that provides assurance that structures, systems, and components (SSCs) will perform satisfactorily in service. Conformance to the regulatory positions of RG 1.54 by a coatings system and program is considered an acceptable method to comply with the quality assurance requirements of Appendix B to 10 CFR 50. RG 1.54 references ASTM D5144-00 as a top-level coatings standard that incorporates by reference other key coatings standards. The applicant proposes to use ANSI N101.2-1972 instead of ASTM D5144 as an acceptable standard for qualification of Service Level I coatings in FSAR Tier 2, Section 6.1.2.4. ASTM D5144-00 replaces ANSI Standard N101.2. What specific exceptions to the requirements of ASTM D5144 are planned by the applicant to qualify Service Level I coatings?

06.01.02-3

Appendix B to 10 CFR 50 requires a quality assurance program that provides assurance that SSCs will perform satisfactorily in service. Conformance to the regulatory positions of RG 1.54 by a coatings system and program is considered an acceptable method to comply with the quality assurance requirements of Appendix B to 10 CFR 50. RG 1.54 Revision 1, endorses ASTM 5962-96 as providing guidance that is acceptable for maintaining DBA unqualified coatings. FSAR Tier 2, Section 6.1.2.4, states that ASTM D5962-96 is not considered to be an acceptable standard for maintaining DBA-unqualified coatings in Service Level I areas. Which specific parts of ASTM D5962 will not be met by the proposed procedures for maintaining DBA-unqualified coatings?

06.01.02-4

Appendix B to 10 CFR 50 requires a quality assurance program that provides assurance that SSCs will perform satisfactorily in service. Conformance to the regulatory positions of RG 1.54 by a coatings system and program is considered an acceptable method to comply with the quality assurance requirements of Appendix B to 10 CFR 50. RG 1.54 provides requirements for protective coatings including zinc coated (galvanized) steel. FSAR Tier 2, Section 6.1.2.1.2.1 states hot dipped galvanization procedures are not considered to be a coating evolution requiring a Service Level designation. What is the basis for it not being a coating evolution, and what is the basis for the assumption that galvanized surfaces will not fail under a DBA?

06.01.02-5

Standard Review Plan (SRP) Section 6.1.2 refers to SRP Section 6.2.5 with respect to control of the production of combustible gasses from organic materials. With respect to the production of hydrogen from coatings, are organic coatings such as epoxy-based coatings assumed to produce any hydrogen under DBA conditions? If not, provide data demonstrating that hydrogen generation is not a concern for organic coatings. If hydrogen generation is to be determined by the qualification test program for Service Level I coatings, will the hydrogen generation safety analysis described in FSAR Tier 2 Section 6.2.5 be revised to account for the amount of hydrogen resulting from coatings?

06.01.02-6

FSAR Tier 2 Section 6.1.2.3.5 discusses a protective coating and organic materials monitoring and maintenance program. Discuss the need for a COL applicant to develop such a program and, if necessary, include a COL item in the FSAR.

06.06-1

The SRP acceptance criteria states that the design and arrangement of Class 2 and 3 systems should include allowances for adequate clearances to conduct the examinations specified in Articles IWC-2000 and IWD-2000 at the frequency specified. The design and arrangement of system components are acceptable if adequate clearance is provided in accordance with Subarticle IWA-1500. Special design considerations should also be given to those systems that are intended to be examined during normal reactor operation or other operational configurations that might cause Code examination methods to be ineffectual. For example, in the operational configuration where the plant is shut down, the staff questions the feasibility of radiographic examination of austenitic or dissimilar metal welds in water-filled lines. During an outage, an austenitic weld is designed for one-sided ultrasonic access versus two-sided access. Radiographic examination may be intended to supplement the ultrasonic examination to obtain 100% coverage, but if the lines cannot be drained due to the component's design or ALARA considerations, it could result in an unexamined weld volume. Based on the above, the staff requests additional information for the applicant to discuss how plant configurations are considered in the design to make the type of nondestructive examination practical.

06.06-2

The U.S. EPR FSAR, Section 5.2.4.4 states that it is not necessary for an inspection interval for the Class 1 portions of the ISI Program to conform to the same inspection programs as those for the Class 2 and Class 3 inspections. In addition, Section 6.6.4 of the U.S. EPR FSAR states that the inspection intervals do not need to be the same for Class 2 and 3 components. The staff recognizes that an interval may be extended by up to a year, but that extension applies to all components within the ISI program. Please provide additional information for the COL applicant to explain the basis and the regulations permitting different intervals for the Code Class 1, 2, and 3 components within one operating unit under one ISI Program.