

Draft

Request for Additional Information No.84 (966,980), Revision 0

9/16/2008

U. S. EPR Standard Design Certification

AREVA NP Inc.

Docket No. 52-020

SRP Section: 09.01.02 - New and Spent Fuel Storage

SRP Section: 09.03.01 - Compressed Air System

Application Section: Ch 9

SBPA Branch

## QUESTIONS

### 09.01.02-1

The applicant has not identified the maximum capacity or provided details of the design of the new fuel storage facility. The new fuel storage facility (NFSF) needs to provide storage for new fuel assemblies in accordance with the design basis. The staff requests the applicant to provide and include in the FSAR the design basis for the new fuel storage facility and identify the maximum number of new fuel assemblies that can be stored.

### 09.01.02-2

The applicant stated that the spent fuel storage facility (SFSF) provides storage for a minimum of 1020 spent fuel assemblies stored in the spent fuel pool (SFP). In accordance with SRP Section 9.1.2, the applicant is requested to include in the FSAR the design basis of the spent fuel storage facility, including the number of fuel assemblies to be offload into the SFP from the core during a typical refueling outage and the number of refueling cycles the SFP is designed to accommodate.

### 09.01.02-3

SRP Section 9.1.2 recommends that low-density storage should be used, at a minimum, for the most recently discharged fuel to enhance the capability to cool it. If low-density storage is not used, the use high-density storage racks needs to be evaluated on a case by case basis. The staff determined that the applicant has not specified in the FSAR what are the density requirements for fuel racks. The applicant is requested to identify and include in the FSAR the density requirements for spent fuel storage and, if applicable, to provide justification.

### 09.01.02-4

Regulatory Guide (RG) 1.13, Regulatory Postion C.1 specifies that all structures and equipment necessary to maintain minimum water levels necessary for radiation shielding, should be designed to Seismic Category I requirements. RG 1.29 also includes the recommendation to design SSCs that need to remain functional following a design basis seismic event (SSE) to Seismic Category I criteria. The spent fuel pool is identified as being designed to Seismic Category 1 criteria. The spent fuel pool includes

a stainless steel liner that is provided with leak detection channels in the concrete along the weld seams. The applicant is requested to identify and include in the FSAR the seismic design basis for the spent fuel pool stainless steel liner. In accordance with SRP Section 9.1.2, the following issues need to be discussed by the applicant in the FSAR if the spent fuel pool liner plate is not designed and constructed to seismic Category I requirements:

Confirm that the failure of the liner plate as a result of an SSE will not cause any of the following:

- i. Significant releases of radioactivity due to mechanical damage to the fuel.
- ii. Significant loss of water from the pool which could uncover the fuel and lead to release of radioactivity due to heat-up.
- iii. Loss of ability to cool the fuel due to flow blockage caused by a complete section or portion of the liner plate falling on the fuel racks.
- iv. Damage to safety-related equipment as a result of pool leakage.
- v. Uncontrolled release of significant quantities or radioactive fluids to the environs.

#### 09.01.02-5

RG 1.13, Regulatory Position C.3 states that the Spent Fuel Storage Facility should be designed to protect the spent fuel from low-trajectory turbine missiles (i.e. turbine blades ejected from the turbine casing directly toward an essential system) and the storage pool should be designed to retain watertight integrity if struck by such missiles. The FSAR does not specifically address the New Fuel Storage Facility and the SFSF protection from internally generated missiles. It is not clear to the staff that the applicant has properly address the protection of essential systems from turbine blade missiles, as recommended in RG 1.115, "Protection Against Low-Trajectory Turbine Missiles." The staff requests the applicant to discuss in the FSAR how the design of the NFSF and the SFSF address the recommendations of RG 1.115 Regulatory Position C.3.

#### 09.01.02-6

The applicant stated that non-safety-related equipment or structures not designed to Seismic Category I criteria that are located in the vicinity of the NFSF and SFSF are evaluated to confirm that their failure could not cause an increase in the  $k_{eff}$  value beyond the maximum allowable. The staff determined that a statement establishing this condition as a design criterion is acceptable at the Design Certification review stage. However, this statement indicates that the evaluation is a site specific requirement of the final design and, as such, the staff considers that this should be included as a COL information item in the FSAR. The applicant is requested to justify that a new COL information item not listed in the FSAR, to confirm that the failure of non-safety related equipment or structures not designed to Seismic Category I criteria, could not cause an increase in the  $K_{eff}$  value beyond the maximum allowable.

#### 09.01.02-7

The applicant stated that new and spent fuel storage racks will be designed so that it is impossible to insert or jam a fuel assembly between two adjacent storage positions, or between the rack and the wall. The new and spent fuel storage rack design prevents inserting more than one fuel assembly into a single storage cell. The applicant is

requested to include these design features of the storage racks in COL Information Items 9.1.3 and 9.1.4.

09.01.02-8

The applicant stated that a drainage system is provided to prevent accumulation of water or other moderation media in the NFSF. Flood prevention in the NFSF is needed to prevent submerging fuel in an unintentional moderator which may lead to an unintentional criticality. The floor drainage systems described in FSAR Tier 2, Section 9.3.3 did not contain details of the NFSF system. The applicant is requested to include in the FSAR the design basis for the drainage system credited to prevent submerging the stored fuel, including the sizing requirements, periodic testing, and back-flow protection.

09.01.02-9

The applicant stated that additional testing requirements for new fuel racks are the responsibility of the COL applicant. The testing requirements for the new fuel racks are site specific and, as such, should be included as a COL information item. The staff requests the applicant to justify the exclusion of a new COL information item in the FSAR that confirms testing requirements for new fuel racks are established.

09.01.02-10

The applicant stated that access to the SFSF is provided for periodic inspection as shown in Figures 3.8.4-5 through 3.8.4-13. However, these figures are not in the FSAR. The applicant is requested to update the FSAR to include Figures 3.8.4-5 through 3.8.4-13.

09.01.02-11

The staff reviewed the applicant's submittal and determined that the applicant has not specified the elevation of the top of the stored spent fuel. The applicant is requested to provide the elevation of the top of the stored spent fuel and to confirm that the spent fuel storage rack maximum height limitation is included in the FSAR in COL Information Item 9.1.4.

09.01.02-12

The applicant has stated that the bottom of the loading pit gate is at elevation 10.9 meters (35'-9"). SRP Section 9.1.2 (iii).2.H.(i) states that the bottoms of any gates should be above the top of the fuel assemblies. The applicant has not provided the elevation of the stored spent fuel; therefore, the staff can not determine that the design of the gates are in accordance with SRP Section 9.1.2. Provide in the FSAR the elevation of the top of the spent fuel storage racks and confirm that the spent fuel storage rack maximum height limitation is included in COL Information Item 9.1.4.

09.01.02-13

The cask loading pit area is normally dry and is filled with approximately 109,776 liters (29,000 gallons) of water during the spent fuel removal and cask loading process. The cask loading pit area is connected to the SFP through the loading pit gates. The loading

pit gates are not Seismic Category I components; therefore, they are assumed to fail on a seismic event. The applicant has not addressed the impact on a gate failure on the SFP water inventory. The applicant is requested to determine the reduction in SFP water level if leakage into the adjacent fuel-handling areas were to occur and to confirm that the leakage into these areas would not reduce the SFP coolant inventory to less than 3 meters (10 feet) above the top of the stored fuel assemblies. This information needs to be reflected in the FSAR.

#### 09.01.02-14

In accordance with RG 1.13 Regulatory Position C (8), the capacity of the SFP makeup water should exceed the larger of:

- (1) the pool leakage rate, assuming SFP liner perforation resulting from a dropped fuel assembly, or
- (2) the evaporation rate necessary to remove 0.3 percent of the rated reactor thermal power.

However, the applicant has stated that the U.S. EPR safety-related, Seismic Category I SFP make-up capability is sized to compensate for normal evaporation losses from the SFP for up to 7 days with the FPCS in operation and maintaining SFP temperature at 60°C (140°F). Verify and confirm in the FSAR that the proposed makeup capability sized for normal evaporation losses is sufficient to meet or exceed the evaporation rate necessary to remove 0.3 percent of the rated reactor thermal power.

#### 09.01.02-15

The Seismic Category I design and anti-siphon design features prevent inadvertent draining of the SFP to assure that adequate water is available above the active fuel as recommended by SRP Section 9.1.2 (iii).2.H.(ii). However, the demineralized water distribution system (GHC) piping as shown on FSAR Tier 2, Figures 9.1.3.1 is not provided with an anti-siphon device or qualified to Seismic Category Category I criteria. Justify in the FSAR the exclusion of anti-siphon devices and/or qualified to Seismic Category 1 design for the the demineralized water distribution system (GHC) piping.

#### 09.01.02-16

The applicant has stated that initial spent fuel pool liner testing and liner leakage monitoring is described in FSAR Tier 2, Section 9.3.3. A review of Section 9.3.3 did not find a reference to the SFP liner leak chase system. Provide in the FSAR a description of the initial testing and subsequent liner leakage monitoring requirements.

#### 09.01.02-17

The applicant has stated in FSAR Tier 2, Section 3.1.6.3, that in compliance with GDC 62, preventing criticality in the new and spent fuel storage areas is accomplished by physical separation of fuel assemblies, the use of borated water and borated neutron absorber panels in the fuel storage pool. However, the applicant has also stated in FSAR Tier 2, Section 9.1.2.2.2, that borated demineralized reactor makeup water is used to fill and to supplement water inventory in the SFP but boration is not essential for maintaining the subcriticality of the stored fuel assemblies. Clarify in the FSAR the U.S. EPR design requirements for borated water in the SFP.

09.01.02-18

The applicant stated that specific testing requirements for the spent fuel racks are the responsibility of the COL applicant. The testing requirements for the spent fuel racks are site specific and, as such, should be included as a COL information item. Justify the exclusion of a new COL information item in the FSAR to confirm that testing requirements for the spent fuel racks are established.

09.03.01-1

Generic Issue 43, "Reliability of Air Systems," ensures the reliability of safety-related equipment actuated or controlled by compressed air. An air system designed to air quality requirements of ANSI/ISA S7.3-R1981 help ensure that the CAS and connected components will perform their safety-function. Additionally, since the system has the capability to cross connect the instrument air and service air portion of the system, Generic Issue 43 stresses the importance of all system components meeting the same air quality requirements. Discuss in the FSAR the specifications of the major components of the compressed air system that ensure that the CAS and connected components will perform their safety function.

09.03.01-2

Resolution of Generic Issue 43, "Reliability of Air Systems" stresses the importance of procedures, training and testing related to loss of air system pressure. The applicant has not provided any method to implement the procedures and training addressed by Generic Issue 43. Create a new COL Information Item in the FSAR regarding procedures, training and testing, and provide a schedule as to when these procedures, training and testing will be implemented.

09.03.01-3

To address Generic Issue 43 regarding reliability of safety-related equipment actuated or controlled by compressed air, the applicant states in FSAR Tier 2, Section 9.3.1.3 that the U.S. EPR does not use air operators on safety-related valves, except for the non-safety function of opening normally-closed containment ventilation dampers. However, the staff identified that the component cooling water system piping and instrumentation diagram (P&ID) (FSAR Tier 2 Figures 9.2.2-1 through 9.2.2-3) shows multiple safety-related, Seismic Category I air operated valves. Update the FSAR to justify and reconcile the conflicting information regarding the use of air operators on safety-related valves throughout the plant.

09.03.01-4

The applicant provided the seismic design classification for the compressed air system in FSAR Tier 2, Table 3.2.2-1, which shows that the containment isolation valves are the only safety-related components in the compressed air system. The remaining components are classified as non-safety, quality group E and non-seismic. FSAR Tier 2, Section 9.3.1.2.2 states that the compressed air system supplies the opening function of the containment ventilation dampers for

the containment building ventilation system (CBVS), a non-safety related function. FSAR Tier 2, Figure 9.4.7-2 shows the CBVS ventilation dampers are safety-related and Seismic Category I. Connecting non-seismic piping to the Seismic Category I dampers may subject the dampers to damage in the event of a seismic event. Provide in the FSAR a justification that demonstrates that a failure of the non-seismic instrument air piping connected to Seismic Category I SSCs will not cause a failure of the Seismic Category I SSCs; therefore, complying with Regulatory Position C.2.

09.03.01-5

The staff's review of FSAR Tier 2 Table 3.2.2-1 shows that the non-seismic compressed air system piping is routed in areas with safety-related and Seismic Category I and II components. It's not clear to the staff that the applicant has evaluated the impact of the failure of non-seismic Category I SSCs on the Seismic Category I SSCs. Provide an evaluation of the impact of the failure of non-seismic Category I SSCs on the Seismic Category I SSCs.