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Your ref: Docket No. 52-006
Our ref: DCP_NRC_002612

September 4, 2009

Subject: AP1000 Response to Request for Additional Information (SRP 9)

Westinghouse is submitting a response to the NRC request for additional information (RAI) on SRP Section 9. This RAI response is submitted in support of the AP1000 Design Certification Amendment Application (Docket No. 52-006). The information included in this response is generic and is expected to apply to all COL applications referencing the AP1000 Design Certification and the AP1000 Design Certification Amendment Application.

Enclosure 1 provides the response for the following RAI(s):

RAI-SRP9.1.4-SBPB-01 R2
RAI-SRP9.2.2-SBPA-02 R1
RAI-SRP9.2.2-SBPA-13

Questions or requests for additional information related to the content and preparation of this response should be directed to Westinghouse. Please send copies of such questions or requests to the prospective applicants for combined licenses referencing the AP1000 Design Certification. A representative for each applicant is included on the cc: list of this letter.

Very truly yours,

Robert Sisk, Manager
Licensing and Customer Interface
Regulatory Affairs and Standardization

/Enclosure

1. Response to Request for Additional Information on SRP Section 9

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NRO

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ENCLOSURE 1

Response to Request for Additional Information on SRP Section 9

AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

RAI Response Number: RAI-SRP9.1.4-SBPB-01
Revision: 21

Question:* *(Revision 0)

Sections of the DCD Revision 16 (Sections 9.1.1.2.1.D and 9.1.2.2.1.E) state that "The new fuel handling crane is a seismic Category II component. The crane is evaluated to show that it does not collapse into the spent fuel pool as a result of a seismic event." The new fuel handling crane handles new fuel and loads the new fuel into the spent fuel pool.

Regulatory Position C2 of Regulatory Guide 1.29, "Seismic Design Classification" and section 3.2.1.1.2. of the DCD Revision 16 describe the guidance for seismic Category II systems, structure and components (SSC). This guidance states, in part, that seismic Category II SSC are designed to preclude their structural failure during a safe shutdown earthquake or interaction with seismic Category I items which could degrade the functioning of a safety-related structure, system, or component to an unacceptable level.

Although the new fuel handling crane will not collapse into the spent fuel pool as stated above, DCD Sections 9.1.1.2.1.D and 9.1.2.2.1.E do not state that the new fuel handling crane will continue to hold its maximum load (not drop the load) during the seismic event. Considering the maximum load carried by the crane, please explain how this crane will meet seismic Category II criteria in that seismic Category II SSC are designed to preclude their structural failure during a safe shutdown earthquake or interaction with seismic Category I items which could degrade the functioning of a safety-related structure, system, or component to an unacceptable level.

Additional Question: (Revision 2)

Tier 1 states that both the RM and FHM are designed to maintain their load carrying and structural integrity functions during a safe shutdown earthquake.

However, Tier 2 only states that the FHM is designed to maintain its load carrying and structural integrity functions during a safe shutdown earthquake, not the RM.

Since all of information in Tier 1 is supposed to come from Tier 2, Tier 2 should be revised to include a statement that RM is designed to maintain its load carrying and structural integrity functions during a safe shutdown earthquake.

Westinghouse Response: (Revision 0)

A design change is being implemented related to the Fuel Handling Machine (FHM). The design change eliminates the need for the "New Fuel Handling Crane". The FHM is being changed from a sigma style machine to a bridge style machine with two overhead hoists. The hoist designated for handling new fuel is a 2 ton, single failure proof hoist. This hoist, along with the use of the new fuel handling tool, will transport new fuel from the new fuel shipping container located in the truck bay of the auxiliary building to the new fuel storage rack and the new fuel elevator.

For normal conditions plus SSE loading, the stresses in any load bearing component shall not exceed the allowable seismic stresses in the AISC Code. The FHM will not drop a fuel assembly under these conditions. The FHM will still remain a seismic Category II component meeting the requirements of section 3.2.1.1.2 of the DCD and Reg. Guide 1.29.

Additional Westinghouse Response based on NRC comments at 3/18/09 meeting: (Revision 1)

The words "The fuel handling machine is designed to maintain its load carrying and structural integrity functions during a safe shutdown earthquake." are inserted into DCD Tier 2, Section 9.1.1.2.1.D, "New Fuel Rack Design".

The words "The fuel handling machine is designed to maintain its load carrying and structural integrity functions during a safe shutdown earthquake." are inserted into DCD Tier 2, Section 9.1.2.2.1.E, "Spent Fuel Rack Design."

These changes support the statement in DCD Tier 1, Section 2.1.1, "Fuel Handling and Refueling System," Item 6, "The RM and FHM are designed to maintain their load carrying and structural integrity functions during a safe shutdown earthquake."

See the DCD markup included below.

Additional Westinghouse Response: (Revision 2)

Modify DCD Tier 2, Section 9.1.4.1.1.F "Light Load Handling System (Related to Refueling), Safety Design Basis" to include the statement, "The refueling machine is designed to maintain its load carrying and structural integrity functions during a safe shutdown earthquake."

See the DCD markup included below.

Design Control Document (DCD) Revision (Revision 0, already included in DCD R17):

DCD Tier 2, Section 9.1.1.1, pg 9.1-2

~~The new fuel handling crane is used to load new fuel assemblies into the new fuel rack and transfer new fuel assemblies from the new fuel pit into the spent fuel pool. The capacity of the new fuel handling crane is limited to lifting a fuel assembly, control rod assembly, and handling tool. The new fuel pit is not accessed by the fuel handling machine or by the cask handling crane.~~ *The fuel handling machine is used to load new fuel assemblies into the new fuel rack and transfer new fuel assemblies from the new fuel storage vault into the spent fuel pool. The capacity of the fuel handling machine, while over the new fuel storage rack, is limited to lifting a fuel assembly, control rod assembly, and handling tool. The new fuel storage vault is not accessed by the cask handling crane.* This precludes the movement of loads greater than fuel components over stored new fuel assemblies.

DCD Tier 2, Section 9.1.1.2.1, pg 9.1-4

D. Failure of the Fuel Handling ~~Crane~~ *Machine*

The fuel handling ~~crane~~ *machine* is a seismic Category II component. The ~~crane and the attachment to the building structure~~ *fuel handling machine* is evaluated to show that the ~~crane~~ *machine* does not fall into the new fuel storage pit during a seismic event.

Design Control Document (DCD) Revision (Revision 1):

Modify DCD Tier 2, Section 9.1.1.2.1.D, "New Fuel Rack Design" as shown:

D. Failure of the Fuel Handling Machine

The fuel handling machine is a seismic Category II component. The fuel handling machine is evaluated to show that the machine does not fall into the new fuel pit during a seismic event. The fuel handling machine is also designed to maintain its load carrying and structural integrity functions during a safe shutdown earthquake.

Also, modify DCD Tier 2, Section 9.1.2.2.1.E, "Spent Fuel Rack Design" as shown:

E. Failure of the Fuel Handling Machine

The fuel handling machine is a seismic Category II component. The fuel handling machine is evaluated to show that it does not collapse into the spent fuel pool as a result of a seismic event. The fuel handling machine is also designed to maintain its load carrying and structural integrity functions during a safe shutdown earthquake.

Design Control Document (DCD) Revision (Revision 2):

Modify DCD Tier 2, Section 9.1.4.1.1.F "Light Load Handling System (Related to Refueling), Safety Design Basis" as shown:

F. In the event of a safe shutdown earthquake (SSE), handling equipment cannot fail in such a manner as to prevent required function of seismic Category 1 equipment. The refueling machine is designed to maintain its load carrying and structural integrity functions during a safe shutdown earthquake.

PRA Revision:
None

Technical Report (TR) Revision:
None

AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

RAI Response Number: RAI-SRP9.2.2-SBPA-02
Revision: 1

Question:

The description that is provided in the AP1000 DCD, Section 9.2.7, does not describe the defense-in-depth and investment protection functions of the CCWS very well. However, it is clear from the ITAAC specified in Tier 1 of the DCD, Section 2.7.2, "Central Chilled Water System," the initial test program described in Tier 2 of the DCD, Section 14.2.9.2.9, "Central Chilled Water System Testing," and Table 17.4-1, "Risk-Significant SSCs Within the Scope of D-RAP," that the CCWS is important for both defense-in-depth and investment protection considerations. It is not clear why this information is not better reflected in the description that is provided for the CCWS in Tier 2 of the DCD, Section 9.2.7, and why no investment protection short-term availability controls (IPSAC) were established for this system. Additional information is needed in the AP1000 DCD to better explain the defense-in-depth and investment protection functions of the CCWS, as well as to explain why IPSAC was not warranted for this system recognizing that CCWS is relied upon to support other defense-in-depth non-safety systems that are subject to IPSAC.

Westinghouse Response:

The high capacity chilled water subsystem of the AP1000 Central Chilled Water System (VWS) does not provide chilled water for systems required to function in support of safety-related, DID or Investment Protection functions, with the exception of the chilled water supply to the Containment Cooling System (VCS). The operation of the VCS to maintain containment average air temperature $\leq 120^{\circ}F$ is separately monitored and controlled under Technical Specification LCO 3.6.5, "Containment Temperature" and associated surveillance requirement SR 3.6.5.1.

The low capacity chilled water subsystem of the VWS provides chilled water to certain VAS and VBS coolers and air handling unit cooling coils that control the temperature of the Main Control Room (MCR), electrical equipment rooms, and RNS pump rooms, each of which are provided with explicit IPSAC requirements. The IPSAC requirements for these spaces and components are met in a variety of ways.

The RNS pumps are required to be operable during MODES 1, 2, and 3 for injection purposes, as well as in MODES 5 and 6 for RCS open conditions (with the RCS at low temperature). In either case, the operation of these pumps does not require the continued provision of chilled water from the VWS to the pump room coolers. Therefore, there are no applicable requirements to be placed on the low capacity chilled water system to ensure that these two sets of RNS IPSAC requirements can be met.

The IPSAC requirements for the MCR and I&C rooms B and C that are normally cooled by the low capacity chilled water system apply to the need to maintain a long-term (72 hours) shutdown condition. The IPSAC requirements applicable to maintaining the DID and Investment Protection functions for these spaces are provided by the passive heat sinks of the Main Control Room Emergency Habitability System (VES) and various pieces of equipment within the space (e.g., ancillary fans in the MCR and I&C rooms).

Additional Westinghouse Response based on NRC comments at 6/25/09 meeting:

The two functions of the Low Capacity Chilled Water System (LCVWS) are to maintain the MCR, 1E electrical rooms and the RNS pump rooms room temperatures and the associated concrete heat sink temperatures. By maintaining the concrete heat sink at design conditions, functionality of the above rooms is not compromised on a loss of LCVWS, VAS or VBS.

The VWS itself is not captured in the RTNSS program. After a PRA study was performed, it was found the LCVWS would not provide a benefit to the PRA uncertainty calculation if it was captured in RTNSS. Therefore, the VWS does not require IPSAC.

Design Control Document (DCD) Revision: (Revision 1)

~~None~~

Modify DCD R17 Tier 2 Section 9.2.7.2.2, page 9.2-30 as follows:

9.2.7.2.2 Component Description

The general descriptions and summaries of the design requirements for the central chilled water system components are provided below. The piping inside containment has a design pressure of 200 psig and a design temperature of 200°F to accommodate both cooling and heating service. The key equipment parameters for the central chilled water system components are contained in Table 9.2.7-1.

Pumps

Six central chilled water system pumps are provided. These pumps are single-stage, horizontal, centrifugal pumps. These pumps have an integral pump motor shaft driven by an ac-powered induction motor. The central chilled water system pumps are constructed of cast iron and have flanged suction and discharge nozzles. Each pump is sized to provide the maximum water flow required by its respective chiller unit for removal of its associated design heat load.

Two pumps associated with the Low Capacity Subsystem are Risk-Significant and are included with the scope of D-RAP. See Table 17.4-1 for further information.

Water-Cooled Chillers

Two water cooled liquid chillers are provided. Each chiller unit consists of a compressor, condenser, evaporator, and associated piping and controls. Environmentally safe refrigerants will be used in these chillers.

Air-Cooled Chillers

Four air-cooled liquid chillers are provided. Each chiller unit consists of a compressor, condenser, evaporator, and associated piping and controls. Environmentally safe refrigerants will be used in these chillers.

Two air-cooled chillers associated with the Low Capacity Subsystem are Risk-Significant and are included with the scope of D-RAP. See Table 17.4-1 for further information.

Modify Tier 2, Table 9.2.7-1, page 9.2-50 as follows:

Table 9.2.7-1

COMPONENT DATA - CENTRAL CHILLED WATER SYSTEM

High Capacity Subsystem	
Water Cooled Chillers	
Capacity (nominal tons)	1700
Compressor type	Centrifugal
Maximum power input (kW)	1700
Entering water temperature (°F)	56
Leaving water temperature (°F)	40

Cooling water flowrate (gpm)	3500 (max)
Air-Cooled Chillers	
Capacity (nominal tons)	300
Compressor type	Reciprocating, Screw
Maximum power input (kW)	375
Entering water temperature (°F)	56
Leaving water temperature (°F)	40
Low Capacity Subsystem	
Air-Cooled Chillers	
Capacity (nominal tons)	300
Compressor type	Reciprocating, Screw
Maximum power input (kW)	375
Entering water temperature (°F)	56
Leaving water temperature (°F)	40
Coil	**Flow (gpm)**
VBS MY C01 A/B	138
VBS MY C02 A/C	108
VBS MY C02 B/D	84
VAS MY C07 A/B	24
VAS MY C12 A/B	15
VAS MY C06 A/B	15

Modify Figure 9.2.7-1: Add Sheet 4 of 4 as shown:

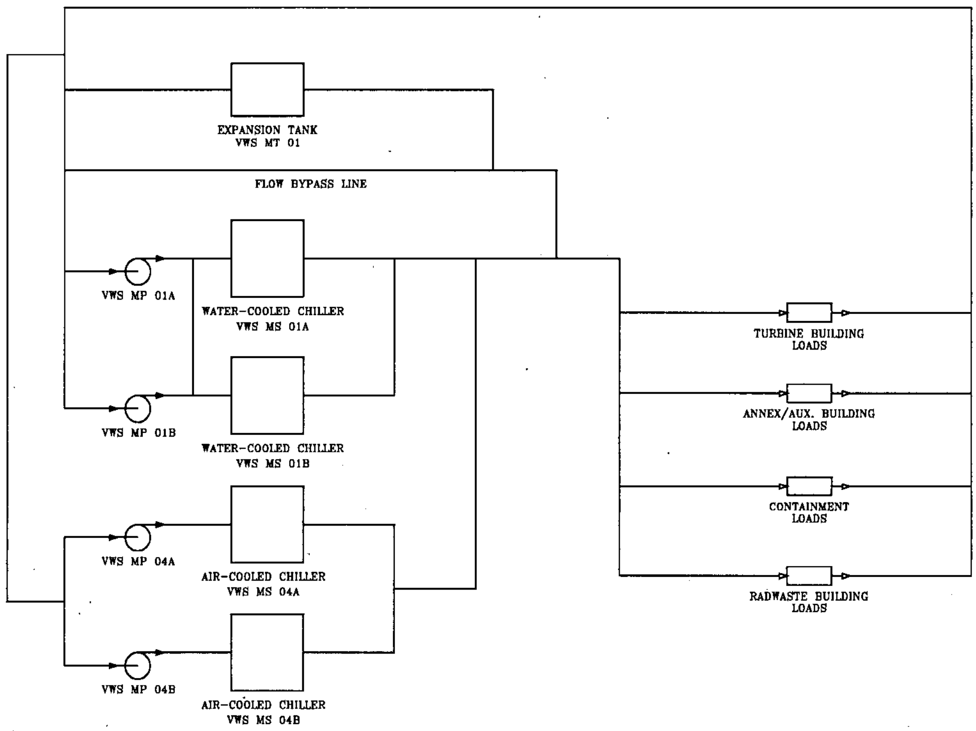

Figure 9.2.7-1 (Sheet 4 of 4)

Figure represents system functional arrangement. Details internal to the system may differ as a result of implementation factors such as vendor-specific component requirements

High Capacity Subsystem Simplified Sketch
(REF) VWS 004

PRA Revision:
None

Technical Report (TR) Revision:
None

AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

RAI Response Number: RAI-SRP9.2.2-SBPA-13
Revision: 0

Question:

Specific sections of SRP Section 9.2.2, "Reactor Auxiliary Cooling Systems," apply to the central chilled water system (CCWS), such as the requirements of GDC 2, or the capability of structures housing the CCS or its components to withstand the effects of natural phenomena and not impact the nonsafety-related portions of the CCS to perform their intended functions, in accordance with the guidance of Regulatory Position C.2 of RG 1.29.

Since the CCWS is a nonsafety-related, closed-loop cooling system that transfers heat from various nonsafety-related plant components via water or air cooled chillers, portions of SRP 9.2.2 that apply to safety-related systems do not apply to the AP1000 CCWS, except for the containment isolation portion. Although the CCWS is non-safety-related, the low-capacity subsystem is considered to be important to safety because it provides chilled water for cooling safety-related and defense-in-depth equipment rooms. The staff's evaluation focused primarily on confirming that the changes will not adversely affect safety-related SSCs or those that satisfy the criteria for regulatory treatment of non-safety systems (RTNSS), the capability of the CCWS to perform its RTNSS and defense-in-depth cooling functions, and the adequacy of ITAAC, test program specifications, and RTNSS availability controls that have been established for the CCWS.

In Revision 17 to DCD Tier 2 Section 9.2.7.2.2, "Component Description," the applicant proposed to revise the design temperature of the CCWS piping inside containment from 320°F to 200°F. The staff finds that lowering the design temperature of the CCWS piping inside containment is a reduction in conservatism. In order to determine the acceptability of this change, the staff requested, that Westinghouse provide the basis for the change in CCWS piping design temperature and justify, through evaluation, why this change is acceptable.

Westinghouse Response:

The Central Chilled Water System (VWS) consists of a High Capacity (HCVWS) and Low Capacity (LCVWS) sub-system. The changes proposed to DCD Revision 17 Tier 2 Section 9.2.7.2.2 are related to the HCVWS which is classified as a Non-Safety system.

The containment piping that has been revised from 320°F to 200°F in DCD Rev. 17 Section 9.2.7.2.2 is located in the non-safety HCVWS sub-system. The HCVWS containment piping can be aligned with the Hot Water System (VYS) for heating of containment during a cold weather outage. Originally, the VYS was a high energy piping system with a supply water temperature of 300°F. Westinghouse approved a design modification in August, 2008 that changed the operating temperature of the VYS from 300°F to a maximum temperature of 200°F.

This design change did not modify the VWS piping inside containment. This piping as specified has a limit of 320°F at 200 psig. Therefore, Westinghouse maintains that the design change did not reduce conservatism but actually increased it since the VYS is a lower energy system.

The DCD markup below revises the VWS statement of piping location and operating conditions, and restores the VWS piping design temperature value to 320°F.

Design Control Document (DCD) Revision:

Modify Section 9.2.7.2.2 as follows:

9.2.7.2.2 Component Description

The general descriptions and summaries of the design requirements for the central chilled water system components are provided below. The piping inside and outside containment has a design pressure of 200 psig and a design temperature of ~~200~~ 320°F ~~to accommodate both cooling and heating service~~. The key equipment parameters for the central chilled water system components are contained in Table 9.2.7-1.

PRA Revision:
None

Technical Report (TR) Revision:
None