ArevaEPRDCPEm Resource

From: WELLS Russell D (AREVA NP INC) [Russell.Wells@areva.com]
Sent: Tuesday, May 19, 2009 6:55 PM
To: Getachew Tesfaye
Cc: Pederson Ronda M (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 173, FSAR Ch 9, Supplement 2
Attachments: RAI 173 Supplement 2 Response US EPR DC.pdf

Getachew,

AREVA NP Inc. (AREVA NP) provided responses to 3 of the 19 questions of RAI No. 173 on February 20, 2009. AREVA NP submitted Supplement 1 to the response on April 20, 2009 to address 4 of the remaining 16 questions. The attached file, "RAI 173 Supplement 2 Response US EPR DC.pdf" provides technically correct and complete responses to 6 of the remaining 12 questions, as committed.

Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the response to RAI 173 Questions 9.01.05-4, 09.01.05-5, and 9.01.05-18.

The following table indicates the respective pages in the response document, "RAI 173 Supplement 2 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 173 — 9.01.05-4	2	3
RAI 173 — 9.01.05-5	4	4
RAI 173 — 9.01.05-7	5	5
RAI 173 — 9.01.05-15	6	6
RAI 173 — 9.01.05-17	7	7
RAI 173 — 9.01.05-18	8	9

The schedule for technically correct and complete responses to the remaining 6 questions is unchanged and provided below:

Question #	Response Date
RAI 173 — 9.01.05-8	July 27, 2009
RAI 173 — 9.01.05-9	July 27, 2009
RAI 173 — 9.01.05-10	July 27, 2009
RAI 173 — 9.01.05-13	July 27, 2009
RAI 173 — 9.01.05-14	July 27, 2009
RAI 173 — 9.01.05-16	July 27, 2009

Sincerely,

(Russ Wells on behalf of)

Ronda Pederson
ronda.pederson@areva.com
Licensing Manager, U.S. EPR Design Certification
New Plants Deployment
AREVA NP, Inc.
An AREVA and Siemens company

3315 Old Forest Road
Lynchburg, VA 24506-0935
Phone: 434-832-3694
Cell: 434-841-8788

From: WELLS Russell D (AREVA NP INC)
Sent: Monday, April 20, 2009 6:36 PM
To: 'Getachew Tesfaye'
Cc: Pederson Ronda M (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 173, FSAR Ch 9, Supplement 1

Getachew,

AREVA NP Inc. (AREVA NP) provided responses to 3 of the 19 questions of RAI No.173 on February 20, 2009. The attached file, "RAI 173 Supplement 1 Response US EPR DC.pdf" provides technically correct and complete responses to 4 of the remaining 16 questions, as committed.

Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the response to RAI 173 Questions 9.01.05-1, 09.01.05-6, and 9.01.05-11.

The following table indicates the respective pages in the response document, "RAI 173 Supplement 1 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 173 — 9.01.05-1	2	2
RAI 173 — 9.01.05-6	3	3
RAI 173 — 9.01.05-11	4	4
RAI 173 — 9.01.05-12	5	5

The schedule for technically correct and complete responses to the remaining 12 questions is unchanged and provided below:

Question #	Response Date
RAI 173 — 9.01.05-4	May 21, 2009
RAI 173 — 9.01.05-5	May 21, 2009
RAI 173 — 9.01.05-7	May 21, 2009
RAI 173 — 9.01.05-8	July 27, 2009
RAI 173 — 9.01.05-9	July 27, 2009
RAI 173 — 9.01.05-10	July 27, 2009
RAI 173 — 9.01.05-13	July 27, 2009
RAI 173 — 9.01.05-14	July 27, 2009
RAI 173 — 9.01.05-15	May 21, 2009
RAI 173 — 9.01.05-16	July 27, 2009
RAI 173 — 9.01.05-17	May 21, 2009
RAI 173 — 9.01.05-18	May 21, 2009

Sincerely,

(Russ Wells on behalf of)
Ronda Pederson
ronda.pederson@areva.com
Licensing Manager, U.S. EPR Design Certification

New Plants Deployment
AREVA NP, Inc.
An AREVA and Siemens company
3315 Old Forest Road
Lynchburg, VA 24506-0935
Phone: 434-832-3694
Cell: 434-841-8788

From: Pederson Ronda M (AREVA NP INC)
Sent: Friday, February 20, 2009 2:40 PM
To: 'Getachew Tesfaye'
Cc: BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC); WILLIFORD Dennis C (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 173 (1853), FSARCh. 9

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 173 Response US EPR DC.pdf" provides technically correct and complete responses to 3 of the 19 questions.

Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the response to RAI 173 Questions 9.01.05-2, 9.01.05-3 and 9.01.05-19.

The following table indicates the respective pages in the response document, "RAI 173 Response US EPR DC.pdf" that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 173 — 9.01.05-1	2	2
RAI 173 — 9.01.05-2	3	3
RAI 173 — 9.01.05-3	4	4
RAI 173 — 9.01.05-4	5	5
RAI 173 — 9.01.05-5	6	6
RAI 173 — 9.01.05-6	7	7
RAI 173 — 9.01.05-7	8	8
RAI 173 — 9.01.05-8	9	9
RAI 173 — 9.01.05-9	10	10
RAI 173 — 9.01.05-10	11	11
RAI 173 — 9.01.05-11	12	12
RAI 173 — 9.01.05-12	13	13
RAI 173 — 9.01.05-13	14	14
RAI 173 — 9.01.05-14	15	15
RAI 173 — 9.01.05-15	16	16
RAI 173 — 9.01.05-16	17	17
RAI 173 — 9.01.05-	18	18

17		
RAI 173 — 9.01.05-18	19	19
RAI 173 — 9.01.05-19	20	20

A complete answer is not provided for 16 of the 19 questions. The schedule for technically correct and complete responses to these questions is unchanged and provided below.

Question #	Response Date
RAI 173 — 9.01.05-1	April 20, 2009
RAI 173 — 9.01.05-4	May 21, 2009
RAI 173 — 9.01.05-5	May 21, 2009
RAI 173 — 9.01.05-6	May 21, 2009
RAI 173 — 9.01.05-7	May 21, 2009
RAI 173 — 9.01.05-8	July 27, 2009
RAI 173 — 9.01.05-9	July 27, 2009
RAI 173 — 9.01.05-10	July 27, 2009
RAI 173 — 9.01.05-11	April 20, 2009
RAI 173 — 9.01.05-12	April 20, 2009
RAI 173 — 9.01.05-13	July 27, 2009
RAI 173 — 9.01.05-14	July 27, 2009
RAI 173 — 9.01.05-15	May 21, 2009
RAI 173 — 9.01.05-16	July 27, 2009
RAI 173 — 9.01.05-17	May 21, 2009
RAI 173 — 9.01.05-18	May 21, 2009

Sincerely,

Ronda Pederson
ronda.pederson@areva.com
Licensing Manager, U.S. EPR Design Certification
AREVA NP Inc.
An AREVA and Siemens company
3315 Old Forest Road
Lynchburg, VA 24506-0935
Phone: 434-832-3694
Cell: 434-841-8788

From: Getachew Tesfaye [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Thursday, January 22, 2009 9:37 AM
To: ZZ-DL-A-USEPR-DL
Cc: Gerard Purciarello; Peter Wilson; John Segala; Peter Hearn; Joseph Colaccino; Michael Miernicki; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 173 (1853), FSARCh. 9

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on January 9, 2009, and on January 16, 2009, you informed us that the RAI is clear and no further clarification is needed. Draft RAI Questions 09.01.05-4 and 09.01.05-12 were modified to correct typographical errors. The schedule we have established for review of your application assumes technically correct and complete responses within 30 days of receipt of RAIs. For any RAIs that cannot be answered within 30 days, it is expected that a date for receipt of this information will be provided to the staff within the 30 day period so that the staff can assess how this information will impact the published schedule.

Thanks,
Getachew Tesfaye
Sr. Project Manager
NRO/DNRL/NARP
(301) 415-3361

Hearing Identifier: AREVA_EPR_DC_RAIs
Email Number: 491

Mail Envelope Properties (1F1CC1BBDC66B842A46CAC03D6B1CD41017DC6FA)

Subject: Response to U.S. EPR Design Certification Application RAI No. 173, FSAR Ch 9, Supplement 2
Sent Date: 5/19/2009 6:54:37 PM
Received Date: 5/19/2009 6:54:44 PM
From: WELLS Russell D (AREVA NP INC)

Created By: Russell.Wells@areva.com

Recipients:
"Pederson Ronda M (AREVA NP INC)" <Ronda.Pederson@areva.com>
Tracking Status: None
"BENNETT Kathy A (OFR) (AREVA NP INC)" <Kathy.Bennett@areva.com>
Tracking Status: None
"DELANO Karen V (AREVA NP INC)" <Karen.Delano@areva.com>
Tracking Status: None
"Getachew Tesfaye" <Getachew.Tesfaye@nrc.gov>
Tracking Status: None

Post Office: AUSLYNCMX02.adom.ad.corp

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MESSAGE	8121	5/19/2009 6:54:44 PM
RAI 173 Supplement 2 Response US EPR DC.pdf		148545

Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

Response to

Request for Additional Information No. 173, Supplement 2

01/22/2009

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 09.01.05 - Overhead Heavy Load Handling Systems
Application Section: 9.1.5

QUESTIONS for Balance of Plant Branch 1 (AP1000/EPR Projects) (SBPA)

Question 09.01.05-4:

In FSAR Section 9.1.5.2.2 the applicant identified that the reactor building (RB) polar crane is used for the following heavy loads:

- The multiple-stud tensioning machine.
- The reactor vessel closure head.
- The missile shields.
- The Reactor Building platform.
- The control rod drive shafts.
- The upper and lower head lifting rigs.
- The reactor vessel upper and lower internals.
- The pool liner slot and the set-down area partition gates.

In FSAR Section 9.1.5.2.3 the applicant identified that the fuel building (FB) auxiliary crane heavy loads include:

- Slot gates.
- New fuel containers.

The applicant needs to identify the approximate weight of each of the above listed loads and how it compares to the RB polar crane and FB auxiliary crane maximum critical load rating. Provide this information in the FSAR.

Response to Question 09.01.05-4:

The approximate weights of the equipment/components to be handled by the Reactor Building polar crane are as follows:

- Multiple-stud tensioning machine - 93 metric tons.
- Reactor vessel closure head - 185 metric tons.
- Reactor cavity cover slabs - 80 metric tons.
- Reactor Building platform - 10 metric tons.
- Control rod drive shafts - one metric ton.
- Upper and lower internals lifting rigs - 30 metric tons and 15 metric tons, respectively.
- Reactor vessel upper and lower internals - 80 metric tons and 195 metric tons, respectively.
- Heaviest gate the polar crane will lift - 25 metric tons.

The approximate weights of the equipment/components to be handled by the Fuel Building auxiliary crane are as follows:

- Slot gates - 11.2 metric tons (which includes lifting beam and lower load block).
- New fuel containers - 5 metric tons.

U.S. EPR FSAR Tier 2, Section 9.1.5.2.2 and Section 9.1.5.2.3 will be revised to indicate the approximate weights of the listed loads.

All of the above loads are less than the maximum critical load rating for their respective crane (i.e., either the reactor building polar crane or the fuel building auxiliary crane).

FSAR Impact:

U.S. EPR FSAR Tier 2, Sections 9.1.5.2.2 and 9.1.5.2.3 will be revised as described in the response and indicated on the enclosed markup.

Question 09.01.05-5:

FSAR Section 9.1.5.2.2 indicates that the reactor building (RB) polar crane can be used as a backup tool for handling fuel assemblies. FSAR Section 9.1.5.2.3 indicates that the fuel building (FB) auxiliary crane can be used as backup tool for handling fuel assemblies. American Society of Mechanical Engineers (ASME) NOG-1, “Rules for Construction of Overhead and Gantry Cranes,” and NUREG-0554, “Single-Failure-Proof Cranes for Nuclear Power Plants” and single failure criteria for Type 1 cranes, do not specify interlocks for moving fuel assemblies. Section 6.3 of American National Standards Institute/American Nuclear Society (ANSI/ANS)-57.1, “Design Requirements for Light Water Reactor Fuel Handling Systems,” specify interlocks for machines handling fuel assemblies in order to prevent damage to fuel and prevent excessive personnel exposure. The applicant needs to explain the interlocks that are provided for the RB polar crane and the FB auxiliary crane to move fuel safely as discussed in ANSI 57.1 Section 6.3. This information should be added to the FSAR.

Response to Question 09.01.05-5:

Interlocks will be provided to control the movement of fuel assemblies and associated components handled by the RB polar crane and the FB auxiliary crane during fuel handling modes. These interlocks will control the following crane operations:

- Underload – prevents continued lowering of load (other than full down position) upon receipt of a reduced load signal.
- Overload – prevents continued hoisting of load upon receipt of increased load signal (load hang-up).
- Up-position – prevents continued upward travel of hoist based on predetermined limit (two-blocking event).
- End of Travel – prevents continued translation of bridge or trolley using a physical hard-stop.
- Up Limit – prevents continued hoisting of load using a physical hard-stop.
- Non-simultaneous Motion – prevents horizontal and vertical movement from taking place simultaneously.
- Bridge Travel – prevents continued travel of the bridge motion beyond an established limit.
- Trolley Travel – prevent continued travel of the trolley motion beyond an established limit.

U.S. EPR FSAR Tier 2, Section 9.1.5.2.2 and Section 9.1.5.2.3, will be revised to add a description of the interlocks provided for the RB polar crane and the FB auxiliary crane to safely handle movement of fuel assemblies.

FSAR Impact:

U.S. EPR FSAR Tier 2, Sections 9.1.5.2.2 and 9.1.5.2.3 will be revised as described in the response and indicated on the enclosed markup.

Question 09.01.05-7:

FSAR section 9.1.5.2.4, “Other Overhead Load Handling Systems,” indicates that the ultimate heat sink and essential service water structures contain heavy load handling cranes and safety-related components, however, heavy load handling equipment in these structures is not included in FSAR Table 9.1.5-1, “Heavy Load Handling Equipment” and FSAR Table 3.2.2-1, “Classification Summary.” Justify not including the heavy load handling equipment in the ultimate heat sink and essential service water structures in FSAR Table 9.1.5-1 and Table 3.2.2-1. Change the FSAR accordingly.

Response to Question 09.01.05-7:

Information regarding these cranes was added to U.S. EPR FSAR Tier 2, Table 9.1.5-1 and Table 3.2.2-1, in the Response to RAI 173, Question 09.01.05-1.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Question 09.01.05-15:

FSAR Section 9.1.5.3, “Safety Evaluation,” states “Movement of heavy loads is restricted by design (including interlocks) and/or administrative controls to areas away from stored fuel and equipment necessary for the safe shutdown of the reactor.” The applicant did not describe any interlocks or administrative controls in the application for heavy load handling equipment (HLHE). The applicant needs to describe the interlocks and administrative procedures for which they are taking credit and place this information in the FSAR.

Response to Question 09.01.05-15:

A description of the interlocks on the cranes was added to the U.S. EPR FSAR in the Response to RAI 173, Question 09.01.05-5.

Administrative controls used herein refers to activities performed in accordance with the recommendations of NUREG-0612 (i.e., establishing safe load paths, limiting lift heights of heavy loads, moving loads over robust structural elements, etc.), which will be proceduralized and maintained as part of the plant operations program.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Question 09.01.05-17:

The applicant stated that preoperational inspection and testing of the heavy-load handling equipment is in accordance with ASME NOG-1, 2004 “Rules for Construction of Overhead and Gantry Cranes.” The application of ASME NOG-1 2004 criteria for Type 1 cranes satisfies NUREG-0554, “Single-Failure-Proof Cranes for Nuclear Power Plants. NUREG-0554, Section 8.3, “Two Block Test,” calls for a two block test. The applicant needs to address why a two-block test is not listed in the Initial Test Program in FSAR Tier 2, Section 14.2, test abstract #040 for the performance testing of the containment polar crane and #041 for performance testing of the fuel handling auxiliary crane.

Response to Question 09.01.05-17:

U.S. EPR FSAR Tier 2, Section 14.2, Test #040 and Test #041, are basic tests that do not include the final design details for a single-failure-proof crane. The final tests address redundant reeving, holding brakes, load hangup, wire rope mis-spooling, and overload features. The final single-failure-proof design addresses the requirements of ASME NOG-1, 2004 and NUREG-0554; including a two-block test or substitute test procedures.

NUREG-0554, Section 8.3 provides guidance for initial testing of the crane by suggesting that the complete hoisting machinery be allowed to two-block during the hoisting test with the load block limit and safety devices bypassed, and with an energy-controlling device between the load and head blocks. Tests for the procured crane will be conducted at slow speed without load to provide assurance of the integrity of design, equipment, controls, and overload protection devices. The tests will demonstrate that the maximum torque can be developed by the driving system, including the inertia of the rotating parts at the overtorque condition, and will be absorbed or controlled during two-blocking or load hangup. The complete hoisting machinery will be tested for its ability to sustain a load hangup condition by test in which the load-block-attaching points are secured to a fixed anchor or excessive load. Dependent upon the specific crane that is procured for the application, additional or substitute test procedures required by the crane manufacturer will be implemented to provide proper functioning of protective overload devices and compliance with NUREG-0554.

The tests that will be performed at the crane manufacturer’s facilities and the tests that are performed onsite will be determined using the following guidelines:

1. Tests that require post-test disassembly of the crane, inspection equipment that is not readily available onsite, or have potential for creating flaws that could go undetected on site due to crane location (i.e., height above operating floor) will be performed at the manufacturer’s facility.

2. Tests to demonstrate that the crane is properly assembled and has not been damaged during disassembly, transport, or reassembly will be performed onsite.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Question 09.01.05-18:

The EPR FSAR/ Tier 1 Section 2.10 does not list “single failure proof” as certified design information with ITAAC for either the reactor building (RB) polar crane, or the fuel building (FB) auxiliary crane. The staff believes that “single failure proof” design criteria for the above listed cranes should be listed in Tier 1 as described below.

One design criteria, among several design criteria for Tier 1 information, is that it should include features and functions which could have a significant effect on the safety of a nuclear plant or are important in preventing or mitigating severe accidents. A drop of the reactor vessel head or a heavy load into the spent fuel pool could affect plant safety. Therefore, design features that reduce the risk and/or analyses that provide assurance of safety after a dropped load are important to safety. The staff considers “single failure proof” design criteria for the RB polar crane and the FB auxiliary crane as Tier 1 safety significant design criteria. As a minimum, the following analyses would have to be performed in order to not consider “single failure proof” design criteria as safety significant criteria for the RB polar crane and the FB auxiliary crane:

1) 1) A heavy load analysis proving that a heavy load drop in safety related areas of the plant from these two cranes will not be the cause any of Items I through IV of section 5.1 of NUREG 0612, “Control of Heavy Loads at Nuclear Power Plants.”
2) 2) SRP 9.1.5, “Overhead Heavy Load Handling Systems,” Section III. 4, states that without “single failure proof” design criteria, analyses are required for a dropped load on the reactor vessel, among other analyses. The FSAR does not describe results of this analysis.

Without the analyses and design criteria stated above, the “single failure proof” design feature of the containment polar crane and the FB auxiliary crane becomes safety significant design criteria.

Both the RB polar crane and the FB auxiliary crane are classified seismic category II, such that an earthquake will not cause these cranes to damage safety related structure, systems, and components (SSC).

Please justify why the applicant did not include “seismic category II” and “single failure proof” design criteria and ITAAC in Tier 1 of the FSAR, which are safety significant design criteria, for the RB polar crane and the FB auxiliary crane.

Response to Question 09.01.05-18:

U.S. EPR FSAR Tier 2, Table 3.2.2-1 was revised in the Response to RAI 173, Question 09.01.05-1 to identify the RB polar crane and FB auxiliary crane as ASME NOG-1 “single-failure-proof” lifting systems meeting the guidance provided in NUREG-0554 "Single-Failure-Proof Cranes for Nuclear Power Plants."

U.S. EPR FSAR Tier 1, Section 2.10.1 will be revised to add ITAAC for the “single-failure-proof” RB polar crane and FB auxiliary crane. The following design commitments will be added to U.S. EPR FSAR Tier 1, Section 2.10.1:

“3.2. The containment polar crane main hoist is equipped with a dual load path reeving system and redundant holding brakes.

3.3. The auxiliary crane is equipped with a dual load path reeving system and redundant holding brakes."

U.S. EPR FSAR Tier 1, Table 2.10.1-2 will be revised to add the associated ITAAC Items 3.2 and 3.3.

As described in U.S. EPR FSAR Tier 2, Section 14.3, safety-significant design features are included in U.S. EPR FSAR Tier 1 based on Standard Review Plan (SRP) 14.3 guidance. SRP 14.3 does not identify Seismic Category II as a criteria for safety-significant design features. Since Seismic Category II is not a criteria for ITAAC, the Seismic Category II entries in U.S. EPR FSAR Tier 1, Table 2.10.1-1 will be changed to "N/A". Similar entries in U.S. EPR FSAR Tier 1, Table 2.2.8-1 (Fuel Handling System) were changed from Seismic Category II to "N/A" in the Response to RAI 201, Question 03.02.01-10. In addition, U.S. EPR FSAR Tier 1, Section 2.10.1, Item 3.1 and the corresponding design commitment in Table 2.10.1-2 will be revised as follows: Item 3.1 will be deleted because the seismic category of the containment polar crane and FB auxiliary crane is not a safety significant design feature for ITAAC.

FSAR Impact:

U.S. EPR FSAR Tier 1, Section 2.10.1, Table 2.10.1-1, and Table 2.10.1-2 will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR Final Safety Analysis Report Markups

2.10 Other Systems

2.10.1 Cranes

1.0 Description

The containment polar crane and the auxiliary crane provide for the lifting of heavy loads. The cranes can be operated during shutdown and refueling conditions. Some components of the cranes may be operated during plant operation.

2.0 Arrangement

2.1 The component locations of the cranes are as listed in Table 2.10.1-1—Crane Equipment Mechanical Design.

09.01.05-18

3.0 Mechanical Design Features

3.1 ~~The equipment identified in Table 2.10.1-1 can withstand seismic design basis loads without loss of safety function.~~Deleted

3.2 The containment polar crane main hoist is equipped with a dual load path reeving system and redundant holding brakes.

3.3 The auxiliary crane is equipped with a dual load path reeving system and redundant holding brakes.

4.0 Equipment and System Performance

4.1 The containment polar crane prevents the uncontrolled lowering of a heavy load.

4.2 The auxiliary crane prevents the uncontrolled lowering of a heavy load.

5.0 Inspections, Tests, Analyses and Acceptance Criteria

Table 2.10.1-2 lists the cranes ITAAC.

Table 2.10.1-1—Crane Equipment Mechanical Design

Equipment Description	Equipment Tag Number(1)	Equipment Location	Function	Seismic Category
Containment Polar Crane	SMJ-01	Containment Building	Avoid uncontrolled lowering of heavy load.	~~II~~N/A
Auxiliary Crane	SMF-01	Fuel Building	Avoid uncontrolled lowering of heavy load.	~~II~~N/A

1) Equipment tag numbers are provided for information only and are not part of the certified design.

09.01.05-18

Table 2.10.1-2—Cranes ITAAC

09.01.05-18

	Commitment Wording	Inspections, Tests, Analyses	Acceptance Criteria
2.1	The component location of the cranes are listed in Table 2.10.1-1.	Inspection of the as-built system will be performed.	The components of the cranes are located as listed in Table 2.10.1-1.
3.1	~~The equipment identified in Table 2.10.1-1 can withstand seismic design basis loads without loss of safety function.~~Deleted	~~a. Inspection will be performed to verify that the equipment identified in Table 2.10.1-1 is located on the Nuclear Island.~~Deleted	~~a. The equipment identified in Table 2.10.1-1 is located on the Nuclear Island.~~Deleted
		~~b. Type tests, analyses, or a combination of type tests and analyses of the equipment will be performed.~~	~~b. The equipment identified in Table 2.10.1-1 can withstand seismic design basis loads without loss of function.~~
		~~c. Inspection will be performed verifying that the as-installed equipment, including anchorage, is seismically bounded by the tested or analyzed conditions.~~	~~c. The as-installed equipment, including anchorage, is seismically bounded by the tested or analyzed conditions.~~
3.2	The containment polar crane main hoist is equipped with a dual load path reeving system and redundant holding brakes.	a. An inspection of the containment polar crane will be performed.	The containment polar crane main hoist is equipped with a dual load path reeving system with each reeving system containing an individual guide, containing an individual wire rope, and capable of holding the load independently.
		b. An inspection of the containment polar crane will be performed.	The containment polar crane main hoist is equipped with a set of paired brakes on each of the two reeving systems.
3.3	The auxiliary crane is equipped with a dual load path reeving system and redundant holding brakes.	a. An inspection of the auxiliary crane will be performed.	The auxiliary crane is equipped with a dual load path reeving system with each reeving system containing an individual guide, containing an individual wire rope, and capable of holding the load independently.

09.01.05-18

		b. An inspection of the auxiliary crane will be performed.	The auxiliary crane is equipped with a set of paired brakes on each of the two reeving systems.
4.1	The containment polar crane prevents the uncontrolled lowering of a heavy load.	Load testing of the main and auxiliary hoists that handle heavy loads will be performed. The test load will be 125% (±5%) of the rated load of the crane.	The crane lifts the test load and lowers, stops, and holds the test load with the hoist holding brakes.
4.2	The auxiliary crane prevents the uncontrolled lowering of a heavy load.	Load testing of the main and auxiliary hoists that handle heavy loads will be performed. The test load will be 125% (±5%) of the rated load of the crane.	The crane lifts the test load and lowers, stops, and holds the test load with the hoist holding brakes.

Other cranes capable of making heavy load lifts are also employed throughout the power plant. These cranes are designed to meet regulatory and power plant restrictions with regard to heavy load handling.

9.1.5.2.2 Reactor Building Polar Crane

The RB polar crane is designed in accordance with ASME NOG-1 as a single failure-proof crane (Type I) capable of handling the maximum critical load (i.e., not drop the load) during and following a safe shutdown earthquake (SSE). The maximum critical load is defined as the maximum load, not necessarily the rated load, the uncontrolled movement or release of which could adversely affect any safety-related system when such a system is required for unit safety or could result in potential offsite exposure in excess of established limits. This designation meets the requirements of RG 1.13. Single failure-proof cranes are designed in conformance with Reference 1, Reference 2, Reference 3 and Reference 4. See Section 3.8.3.4.4 for a description of the seismic analyses for the polar crane.

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The RB polar crane is primarily used during plant outages to assist in refueling and maintenance activities. The major heavy loads it normally handles include:

- The multiple-stud tensioning machine – 93 metric tons.
- The reactor vessel closure head – 185 metric tons.
- ~~The missile shields~~Reactor cavity cover slab – 80 metric tons.
- The RB platform – 10 metric tons.
- The drive rod shafts – one metric ton.
- The upper and lower ~~head~~internals lifting rigs – 30 metric tons, 15 metric tons.
- The upper and lower internals – 80 metric tons, 195 metric tons.
- The pool liner slot and the setdown area partition gates – 25 metric tons.

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In addition, the RB polar crane can be used as a backup tool for handling of fuel assemblies due to the unavailability of the refueling machine. When used in this capacity, interlocks are provided to prevent:

- Continued lowering of the load (other than full down position) upon receipt of a reduced load signal.
- Continued hoisting of the load upon receipt of an increased load signal (load hang-up).
- Continued upward travel of the hoist on a preset limit (two-blocking event).

- Simultaneous horizontal and vertical movement.
- Continued travel of the bridge and trolley beyond established limits.

Physical limits (hard-stops) are also provided on the bridge and trolly end of travel and on the hoist upper limit.

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The RB polar crane is supported by a circular runway, which rests on brackets attached to the containment structure. The structure is a rigid assembly. The bridge framework consists of two girders and two end trucks. The two main girders are welded box sections which are attached with end ties and are supported on the crane end trucks. The end trucks consist of structural frames containing wheel assemblies (bogies). The polar crane girders are provided with full-length walkways that allow access to the associated electrical and mechanical components.

The RB polar crane is equipped with trolleys that traverse the length of the bridge. The trolleys provide structural support for the associated hoisting equipment.

The RB polar crane is provided with three electric hoists. The main hoist is supported by a single trolley and has a rated capacity of 320 metric tons. The secondary trolley supports two hoist units, one rated at 35 metric tons and another rated at five metric tons.

Special lifting devices used with this crane will satisfy the design criteria specified in ANSI N14.6 ("Special Lifting Devices for Shipping Containers Weighing 10000 Pounds (4500 kg) or More"). If special lifting devices are not used, slings will be selected that satisfy the criteria of ASME B30.9 ("Slings"). In addition, slings for use with single-failure-proof handling systems will be constructed of metallic material (chain or wire rope). Special lifting devices and slings will have either dual independent load paths or a single load path with twice the design safety factor.

9.1.5.2.3 Fuel Building Auxiliary Crane

The FB auxiliary crane, located over the spent pool, is designed in accordance with ASME NOG-1 as a single failure-proof crane (Type I). As a Type I crane, the FB auxiliary crane is capable of handling the maximum critical load (i.e., not drop the load) during an SSE. The FB auxiliary crane is designed to Seismic Category II criteria and in conformance with Reference 1, Reference 2, Reference 3 and Reference 4.

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The heavy loads the FB auxiliary crane normally handles include:

- Slot gates – 11.2 metric tons (includes lifting beam and lower load block).
- New fuel containers – 5 metric tons.

In addition, the auxiliary crane can be used to handle spent fuel assemblies in the event that the spent fuel mast bridge is not available. When used in this capacity, interlocks are provided to prevent:

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- Continued lowering of the load (other than full down position) upon receipt of a reduced load signal.
- Continued hoisting of the load upon receipt of an increased load signal (load hang-up).
- Continued upward travel of the hoist on a preset limit (two-blocking event).
- Simultaneous horizontal and vertical movement.
- Continued travel of the bridge and trolley beyond established limits.

Physical limits (hard-stops) are also provided on the bridge and trolly end of travel and on the hoist upper limit.

Special lifting devices used with this crane will satisfy the design criteria specified in ANSI N14.6 ("Special Lifting Devices for Shipping Containers Weighing 10000 Pounds (4500 kg) or More"). If special lifting devices are not used, slings will be selected that satisfy the criteria of ASME B30.9 ("Slings"). In addition, slings for use with single-failure-proof handling systems will be constructed of metallic material (chain or wire rope). Special lifting devices and slings will have either dual independent load paths or a single load path with twice the design safety factor.

9.1.5.2.4 Other Overhead Load Handling Systems

Other than the RB polar crane, other major cranes in the RB include four single girder bridge cranes used for servicing heating, ventilation and air conditioning (HVAC) equipment, four jib cranes located within the steam generator cubicles and an assembly crane located near an accumulator tank. These cranes provide lifting capabilities during plant outages.

The FB contains bridge cranes in the equipment lock area. Load drop analyses are performed for this building to demonstrate that no unacceptable radiological release to the environment results from a heavy load drop.

The Safeguard Buildings, Emergency Power Generating Buildings, and ultimate heat sink/essential service water structures are also equipped with cranes that are rated for heavy loads. For these divisionally separated buildings, the local effect of a load drop is restricted to the affected division. Accordingly, the loss of a safety system inside the affected division is acceptable from a nuclear safety standpoint.