ArevaEPRDCPEm Resource

From: BRYAN Martin (EXTERNAL AREVA) [Martin.Bryan.ext@areva.com]
Sent: Monday, July 19, 2010 2:01 PM
To: Tesfaye, Getachew
Cc: Hearn, Peter; KOWALSKI David (AREVA)
Subject: FW: DRAFT RESPONSES FOR FSAR Chapter 9 Weekly NRC Telecon
Attachments: Blank Bkgrd.gif; RESPONSE RAI 361 Q.09.02.02-97 FMEA TABLE.pdf; RESPONSE RAI 361 Q.09.02.02-97.pdf

Importance: High

Draft responses to discuss tomorrow on Ch 9 call.

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From: KOWALSKI David J (AREVA NP INC)
Sent: Monday, July 19, 2010 1:46 PM
To: BRYAN Martin (EXT)
Cc: BALLARD Robert W (AREVA NP INC); CONNELL Kevin J (AREVA NP INC); HUDDLESTON Stephen C (AREVA NP INC); EDWARDS Harold E (AREVA NP INC); GARDNER George Darrell (AREVA NP INC); SLOAN Sandra M (AREVA NP INC); MCINTYRE Brian (AREVA NP INC)
Subject: DRAFT RESPONSES FOR FSAR Chapter 9 Weekly NRC Telecon
Importance: High

Marty:

Please transmit to Getachew Tesfaye the attached partial set of DRAFT responses to RAI 361 questions. These responses will be discussed at tomorrow's (7/20/10) FSAR Chapter 9 Weekly Telecon/GoToMeeting with the NRC.

Attached are the following DRAFT responses:

- Response to RAI 361 - Question 09.02.02-97 - FMEA TABLE.

Note that these DRAFT responses have not been through the final Licensing review/approval process; nor do they reflect technical editing.

Please call me if you have any questions. Thanks.

David J. Kowalski, P.E.
Principal Engineer
New Plants Regulatory Affairs

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From: BRYAN Martin (EXTERNAL AREVA)

Created By: Martin.Bryan.ext@areva.com

Recipients:
"Hearn, Peter" <Peter.Hearn@nrc.gov>
Tracking Status: None
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Tracking Status: None
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Tracking Status: None

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RESPONSE RAI 361 Q.09.02.02-97 FMEA TABLE.pdf	242381	
RESPONSE RAI 361 Q.09.02.02-97.pdf	230722	

Options
Priority: High
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Table 9.2.2-3-- Safety Chilled W

Sheet

Component	Component Function	Failure Mode	Failure Mechanism	Failure Symptor
SCWS 30QKA	Supply Chilled Water to User Exchangers	Passive failure, leak > makeup can handle	Mechanical	System pressure falls below m
SCWS Expansion Tank 30QKA10/20/30/40 BB101	Maintains pressure in the system.	Tank diaphragm fails to maintain system pressure or loss of nitrogen pressure	Mechanical/I&C	System pressure falls below m
SCWS Pump 30QKA10/20/30/40 AP107/108	Provides flow of water to each user.	Pump fails during normal operation	Mechanical, Electrical, I&C	Loss of chilled water flow to t
SCWS Air Cooled Chiller 30QKA10/40 AH112 Note (6)	Transfers heat from the SCWS water to the refrigerant then transfers heat from the refrigerant to the air flow which is the heat sink for SCWS 1 and 4.	Chiller fails during normal operation.	Mechanical, Electrical, I&C	Loss of ability to provide chill temperature.
SCWS Ventilation Equipment for Air Cooled Chiller 30QKA10/40	Transfer heat from SCWS 1 and 4 to Outside Air	Ventilation fails during normal operation	Mechanical, Electrical, I&C	Loss of ability to provide chill temperature.

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Component	Component Function	Failure Mode	Failure Mechanism	Failure Symptom
SCWS Water Cooled Chiller 30QKA20/30 AH112 Note (6)	Transfers heat from the SCWS water to the refrigerant then transfers heat from the refrigerant to Component Cooling Water System (CCWS) which is the heat sink for SCWS 2 and 3.	Chiller fails during normal operation.	Mechanical, Electrical, I&C	Loss of ability to provide chill temperature.
Bypass Control Valve 30QKA10/20/30/40 AA101	Prevents freezing of the evaporator tubes.	Does not modulate to desired position	Mechanical, Electrical, I&C	Freezing the evaporator tubes
				Valve inadvertently opens, by flow. Either the operational di by division valve in each pair.

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Flow Control Valve for 30SAC01/02/03/04 AC001 Valve # 30QKC10/20/30/40 AA101	Controls flow through the HVAC cooling coil 30SAC01/02/03/04 AC001.	Does not modulate to desired position	Mechanical, Electrical, I&C	Loss of control of chilled wate affected SAC exchanger in on
Flow Control Valve for 30SAB01/02/03/04 AC001 Valve # 30QKB10/20/30/40 AA101	Controls flow through the HVAC cooling coil 30SAB01/02/03/04 AC001.	Does not modulate to desired position	Mechanical, Electrical, I&C	Loss of control of chilled wate affected SAB exchanger in on
Flow Control Valve for LHSI Pump Seal Cooler Valve # 30QKA10/40 AA025	Controls flow through the LHSI pump seal cooler.	Does not open.	Mechanical, Electrical, I&C	Loss of chilled water flow for pump in one division.
Cross-tie Valves 30QKA10/20/30/40 AA102	Connect supply side of SCWS Div 1 to Div 2 and Div 3 to Div 4.	Fail open	Mechanical, Electrical, I&C	Prevents independent division requires cross-tie valves to be
		Fail closed	Mechanical, Electrical, I&C	Prevents cross-tie operation w tie valves to be open.

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Cross-tie Valves 30QKA10/20/30/40 AA103	Connect return side of SCWS Div 1 to Div 2 and Div 3 to Div 4	Fail open	Mechanical, Electrical, I&C	Prevents independent division requires cross-tie valves to be
		Fail closed	Mechanical, Electrical, I&C	Prevents cross-tie operation w tie valves to be open.
SAC HVAC Cooling Coils	Heat transfer via SCWS.	Clogged tubes/structural degradation/tube rupture	Mechanical	Loss of heat transfer capabiliti
SAB HVAC Cooling Coils	Heat transfer via SCWS.	Clogged tubes/structural degradation/tube rupture	Mechanical	Loss of heat transfer capabiliti
KLC HVAC Cooling Coils	Heat transfer via SCWS.	Clogged tubes/structural degradation/tube rupture	Mechanical	Loss of heat transfer capabiliti
KLL HVAC Cooling Coils	Heat transfer via SCWS.	Clogged tubes/structural degradation/tube rupture	Mechanical	Loss of heat transfer capabiliti
LHSI Pump Motor and Seal Coolers 30JNG10/40 AP001	Heat transfer via SCWS.	Clogged tubes/structural degradation/tube rupture	Mechanical	Loss of heat transfer capabiliti For LHSI pump seal cooler, tu result in contamination of SC

Notes:

1. This analysis considers safety chilled water system (SCWS) with loss of off-site power (LOOP) and one S
2. Mission success requires, for all modes of operation, that SCWS supply chilled water to two divisions of S and seal cooler.
3. One SCWS train is assumed to be out for maintenance with the following components out of service: SCW
4. SCWS Trains 1 and 4 are essentially identical. SCWS Trains 2 and 3 are essentially identical. The chilled this analysis will identify the identical components in the "Component" column and populate the table once
5. In cross-tie operation two pumps in the operating train of each divisional pair provides flow to 2 user divisio
6. The chiller unit for each SCWS train includes the condenser, evaporator, compressors, and other refrigera
7. If failure is limited to one compressor, there is redundancy in the compressor units provided by three 50% affected train can be administratively operated with the two remaining compressors.
8. In cross-tie operation the SCWS bypass valve in the operating train of each divisional pair provides the by

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Response to

Request for Additional Information No. 361, Supplement 1

3/04/2010

U.S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 09.02.02 - Reactor Auxiliary Cooling Water Systems
Application Section: 09.02.08

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

DRAFT

Question 09.02.02-97:

Follow-up to RAI 174, Question 09.02.02-53

Standard Review Plan (SRP) 9.2.2 Section III, requires review of the failure-modes and effects analyses to determine whether the system can sustain the loss of any active component and whether the system meets minimum requirements (i.e. cooling load and flow) for these failure conditions. Based on the staff's review of the applicant's response to RAI 174, Question 9.2.2-53, Supplement 5 and information provided in the associated markup of the Final Safety Analysis Report (FSAR), Section 9.2.8, "Safety Chilled Water System" the staff found a significant design change to the system. The safety chilled water system (SCWS) design now utilizes "cross-ties" between Trains 1 and 2 and between Trains 3 and 4, instead of the independent four-train system structure utilized in the original design. The staff requests the applicant provide failure-modes and effects analyses for the safety chilled water system (SCWS) including the cross-tie feature.

Response to Question 09.02.02-97:

There is a failure modes and effects analysis (FMEA) including the cross-tie feature.

Results of the FMEA are summarized in new table U.S. EPR FSAR Tier 2, Table 9.2.2-3—Safety Chilled Water System Failure Analysis.

FSAR Impact:

U.S. EPR FSAR Tier 2, Table 9.2.2-3 will be added as described in the response and indicated in the attached markup.

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