ArevaEPRDCPEm Resource

From: WELLS Russell D (AREVA NP INC) [Russell.Wells@areva.com]
Sent: Wednesday, January 28, 2009 3:15 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. 112, FSAR Ch 10, Supplement 1
Attachments: RAI 112 Supplement 1 Response US EPR DC.pdf

Getachew,

AREVA NP Inc. provided a schedule for a technically correct and complete response to RAI No. 112 on November 24, 2008. The attached file, "RAI 112 Supplement 1 Response US EPR DC.pdf" provides a technically correct and complete response to RAI No. 112, 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 112 Question 10.04.03-1.

The following table indicates the respective pages in the response document, "RAI 112 Supplement 1 Response US EPR DC.pdf," that contain AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 112 — 10.04.03-1	2	3

This concludes the formal AREVA NP response to RAI 112, and there are no questions from this RAI for which AREVA NP has not provided responses.

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: Monday, November 24, 2008 6:21 PM
To: 'Getachew Tesfaye'
Cc: 'John Rycyna'; BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC); KOWALSKI David J (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 112 (1251), FSARCh. 10

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 112 Response US EPR DC.pdf" states that a complete answer cannot be provided to the question at this time.

The following table indicates the respective page in the response document, "RAI 112 Response US EPR DC.pdf," that contains AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 112 — 10.04.03-1	2	2

The schedule for a technically correct and complete response to this question is provided below.

Question #	Response Date
RAI 112 — 10.04.03-1	January 30, 2009

Sincerely,

Ronda Pederson
ronda.pederson@areva.com
Licensing Manager, U.S. EPR(TM) 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: Wednesday, October 29, 2008 8:09 AM
To: ZZ-DL-A-USEPR-DL
Cc: Devender Reddy; John Segala; Peter Hearn; Joseph Colaccino; John Rycyna
Subject: U.S. EPR Design Certification Application RAI No. 112 (1251), FSARCh. 10

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on October 20, 2008, and on October 28, 2008, you informed us that the RAI is clear and no further clarification is needed. As a result, no change is made to the draft RAI. 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: 165

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Subject: Response to U.S. EPR Design Certification Application RAI No. 112, FSAR Ch 10, Supplement 1
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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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Reply Requested: No
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Response to

Request for Additional Information No. 112, Supplement 1

10/28/2008

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 10.04.03 - Turbine Gland Sealing System
Application Section: FSAR Ch. 10

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

Question 10.04.03-1:

a. According to FSAR Tier 2 Sections 10.4.3.2.1, “General Description,” and 10.4.3.2.2, “Component Description,” the gland steam condenser receives the steam and non-condensable gases from the turbine gland seal steam (TGSS) and condenses steam and routed to the shell side of the low pressure (LP) condenser through a steam trap. Whereas, the air and non-condensable gases from the gland steam condenser are removed via one of two gland steam exhausters which discharge to the nuclear auxiliary building ventilation (NAVB) system. Also, FSAR Tier 2 Section 10.4.3.2.3, “System Operation,” states that excess steam is routed to the main condenser through a seal steam leak-off valve. The FSAR further states that leak-off steam from the seals of the main stop and control valves is also discharged into the TGSS header.

   However, in its review of the TGSS flow diagram in Figure 10.4.3-1, the staff finds no depiction of these leak-offs from the main stop and control valves or other turbine valves. Also, the staff finds no gland steam exhaust fans and associated motors for discharging the air and non-condensable gases from the gland steam condenser to the nuclear auxiliary building ventilation system. According to SRP Section 10.4.3, Item III.1, the staff needs to review the piping and instrumentation diagrams to verify the source of sealing steam and the disposition of steam and non-condensables vented from the gland seal. The staff requests the applicant to include the above missing information in FSAR Figure 10.4.3-1. The staff needs this additional information to complete its review of Section 10.4.3.

b. In FSAR Tier 2 Section10.4.3.4, of the DCD, the applicant described the TGSS inspection and testing program. The TGSS components are inspected during construction and functionally tested as part of the initial plant startup testing. Test No. 064 will ensure proper valve operation, the ability of the system to perform its function during turbine startup and normal plant operation as load increases on HP turbine steam. This test program will verify performance of the sealing steam exhauster blowers and gland team condenser function. However, during its review, the staff finds an inconsistency; Test No. 064 Step 3.2 states that it will verify power operated valves fail upon loss of motive power as designed per Section 10.4.3. However, the FSAR Tier 2 Section 10.4.3 does not provide any details on the fail positions of any of the TGSS valves. Confirm there are no power operated valves in this system. The staff requests the applicant to provide clarification in the FSAR in this regard, and also requests the applicant to provide additional information in the FSAR regarding the pressure regulating valves in the system.

Response to Question 10.04.03-1:

a. Each main steam stop valve and main steam control valve is connected to either the gland sealing steam supply header or the steam return line directed to the gland steam condenser. These lines do not represent an important source of steam for the system; therefore, for the purposes of clarity, they are not shown on U.S. EPR FSAR Tier 2, Figure 10.4.3-1—Turbine Gland Sealing System.

   The reheat steam stop and control valves are mechanically sealed and do not require gland seal system support.

During plant startup, shutdown, and low load operation, the source of gland sealing steam is the auxiliary steam system. During normal operation, steam escaping from the high pressure (HP) and intermediate pressure (IP) gland seals, and steam from either auxiliary steam or a turbine extraction, supply sealing steam to the low pressure (LP) turbine seals.

The gland steam exhaust fans and motors are shown in U.S. EPR FSAR Tier 2, Figure 10.4.3-1 with tag numbers 30MAW20AN021 and 30MAW20AN031. Steam and noncondensable gases from the gland steam exhausters are routed to the turbine building air removal system as shown in U.S. EPR FSAR Tier 2, Figure 10.4.3-1, where they are monitored for radioactivity and released into the nuclear auxiliary building ventilation system. The turbine building air removal system is shown in U.S. EPR FSAR Tier 2, FSAR Figure 10.4.2-2—Vent System for Air Removal.

U.S. EPR FSAR Tier 2, Section 10.4.3 will be revised to reflect the above clarification.

b. As shown in U.S. EPR FSAR Tier 2, Figure 10.4.3-1—Turbine Gland Sealing System, there is a motor-operated isolation valve in the auxiliary steam supply line. This valve fails as is. There is also a pneumatically actuated pressure control valve in the auxiliary steam supply line. This valve fails to the position designated by the turbine supplier.

   The steam seal leak-off valve is a pneumatically actuated pressure control valve, which opens in response to excess sealing steam in the system. The steam seal leak-off valve fails to the position designated by the turbine supplier.

   The turbine-supplier supplies the TGSS and identifies the fail positions of power operated valves in the TGSS.

   Each control valve is an electro-pneumatic valve, which is equipped with an electronic positioner, a pneumatic actuator, an instrument air isolating valve, and an instrument air filter. The electronic positioner converts the electric signal from the turbine control system to a pneumatic signal for the actuator. The control valve position is measured by a position transmitter.

   U.S. EPR FSAR Tier 2, Section 10.4.3 will be revised to reflect the above clarification.

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 10.4.3 will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR Final Safety Analysis Report Markups

10.4.3 Turbine Gland Sealing System

10.04.03-1

The turbine gland sealing system (TGSS) prevents the escape of steam from the turbine shaft and casing penetrations and the glands of ~~large turbine~~main steam stop and control valves. This system also prevents air leakage into the low pressure turbine glands.

10.4.3.1 Design Bases

The TGSS performs no safety-related function and therefore has no nuclear safety-related design basis.

The TGSS is designed to meet the following functional criteria:

- Prevent atmospheric air leakage into the turbine casings and minimize steam leakage from the casings of the high-pressure (HP) and low-pressure (LP) turbines.
- Collect leak-off steam from the glands of large turbine valves in the leak-off steam piping.
- Return condensed steam to the condenser and exhaust noncondensable gases to the vent system of the main condenser evacuation system.
- Provide flow to and from all HP and LP turbine glands, assuming 1.5 to 2 times the normal gland clearances and the maximum allowable steam seal supply pressure.

10.4.3.2 System Description

Figure 10.4.3-1 shows a flow diagram of the TGSS.

10.4.3.2.1 General Description

During normal turbine operation, steam passing through the HP turbine shaft seals is throttled until it is only slightly above atmospheric pressure. It is then discharged from the inner steam space into a sealing steam header, which is common to the shaft seals of the turbine. The LP turbine shaft seals, which are under vacuum, are supplied with sealing steam from this header to prevent ingress of air.

A second steam space for gland steam is located between the inner steam space of the HP and LP turbine shaft seals and the atmosphere, which prevents the escape of seal steam to the atmosphere. The gland steam and any air entering this steam space through the shaft seals are normally drawn off by one of two exhaust fans via the condensate-cooled gland steam condenser.

The gland steam condenser is part of the condensate system that passes condensate through the tubing. Condensate produced by the gland steam condenser is routed to the condenser through a steam trap.

The steam side of the condenser can be bypassed in the event of gland steam condenser failure. Any condensate produced is passed to the Turbine Building drains system via a loop line upstream of the gland steam condenser isolation valve. This line also drains condensate that accumulates in the event of a tube leak in the gland steam condenser.

10.4.3.2.2 Component Description

U.S. EPR FSAR Tier 2, Table 3.2.2-1 provides the quality group and seismic design classification of components and equipment in the TGSS. Section 3.2 describes how the guidance of RG 1.26 is implemented for the U.S. EPR.

Condenser

The gland steam condenser receives steam and noncondensable gases from the TGSS and condenses the steam. The gland steam condenser is integrated into the condensate system with condensate passing through the tubing. The drains from the gland steam condenser discharge to the main condenser over a drip leg and through a steam trap.

Exhausters

The gland steam exhausters produce a slight vacuum in the gland steam condenser to remove air and noncondensable gases that carry over into the gland steam condenser with the leak-off steam from the shaft glands.

10.04.03-1

~~The air~~Steam and noncondensable gases from the gland steam exhausters are ~~discharged in~~routed to the ~~ventilation system of the main condenser evacuation~~turbine building air removal system (see U.S. EPR FSAR Tier 2, Section 10.4.2), where they are monitored for radioactivity and released into the nuclear auxiliary building ventilation system.

Piping

The TGSS piping provides steam for sealing the shafts of the HP and LP turbines. The system piping supplies the sealing steam from the HP turbine to the shaft seals of the HP and LP turbines and onto the gland steam condenser.

10.4.3.2.3 System Operation

Plant Startup and Shutdown

10.04.03-1

During startup and shutdown, and in the low-load power range, steam from the auxiliary steam system is supplied to the TGSS through the seal steam supply valves as

10.04.03-1

required to maintain the gland steam header pressure. The motor-operated isolation valve fails as is. The pneumatically actuated pressure control valve fails to the position designated by the turbine supplier.

Normal Operation

During normal operation, enough steam escapes through the HP turbine shaft seals that it can be used as a seal steam supply for the shaft seals of the LP turbines. The excess steam escaping at higher loads is dumped to the main condenser through the seal steam leak-off valve. Leak-off steam from the seals of the main stop and control valves is also discharged into the TGSS header. The steam seal leak-off valve is a pneumatically actuated pressure control valve, which fails to the position designated by the turbine supplier.

10.4.3.3 Safety Evaluation

The TGSS performs no safety-related functions and is not required to operate during or after an accident. The design of the TGSS satisfies general design criteria GDC 60 and GDC 64, related to the TGSS design for control and monitoring of release of radioactive materials.

The air and noncondensable gases discharged from the gland steam exhausters are not normally radioactive during plant operation. However, in the event of significant primary-to-secondary system leakage due to a steam generator tube rupture, it is possible for the seal steam to become contaminated resulting in the potential to discharge a radioactively contaminated mixture.

The gland steam condenser receives steam and noncondensable gases from the TGSS and condenses the steam. Air and non-condensable gases are evacuated from the gland steam condenser and discharged into the air vent system by exhaust fans. The exhaust flow is monitored for radioactivity as described in Section 11.5 and discharged to the Nuclear Auxiliary Building ventilation system.

10.4.3.4 Inspection and Testing Requirements

The TGSS components are inspected during construction and functionally tested during plant startup. Refer to Section 14.2 (test abstract #064) for initial plant startup test program. Components of the TGSS are designed to permit periodic inspection and testing during plant operation. Components of the system are monitored during operation to demonstrate satisfactory functioning of TGSS equipment.

10.4.3.5 Instrumentation Requirements

The following TGSS parameters are monitored during plant operation:

- Steam seal header temperature.

Next File